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COMMENTS

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FOREWORD

Each year, the *University of Colorado Law Review* proudly dedicates one issue to Natural Resources and Environmental Law. It is my pleasure to present you with the following:

In *The Problem of Environmental Monitoring*, Professor Eric Biber contends that the effectiveness of environmental regulatory and management policies depends on the regular collection of accurate information about the state of the natural world—what Professor Biber calls "ambient monitoring." He then attempts to answer a question largely ignored in the scholarly literature: whether and how effective ambient monitoring will take place. Professor Biber provides two reasons why one cannot assume accurate and timely monitoring will occur. First, monitoring is a difficult and costly enterprise. Second, those most likely to conduct monitoring—government agencies—face both external and internal obstacles to monitoring. Professor Biber then explores potential solutions to the problem of environmental monitoring, ultimately suggesting that the most promising solution is the creation of separate monitoring agencies.

A few years ago, over half the states enacted legislation that enabled local governments to use their property collection power to finance residential energy investments. These property assessed clean energy (PACE) programs allowed local governments to finance residential energy improvements, like a solar array in a backyard for example, with repayment in the form of special assessments on local government property taxes. In *Keeping Pace?: The Case Against Property Assessed Clean Energy Financing Programs*, Professor Prentiss Cox argues that these PACE programs are not an effective option for promoting investment in residential alternative energy and that current efforts to save these programs through legislation and litigation are not worth the candle. Professor Cox contends that the theory underlying PACE is fundamentally flawed because PACE programs do not account for the practical realities of the real estate market. He ultimately suggests that PACE programs either should be radically restructured or should be considered a failed experiment offering valuable lessons for future residential energy investment programs.

In the early 1970s, Congress passed the Wild Free-Roaming Horses and Burros Act, which had the effect of

diminishing state jurisdiction and rancher influence over public rangelands. When New Mexico challenged the law in *Kleppe v. New Mexico*, it lost . . . badly. The Supreme Court unanimously ruled against New Mexico and the case now stands for the proposition of expansive federal power under the Constitution's Property Clause. But that's not the whole story according to Professor Robert L. Fischman and Jeremiah I. Williamson, *The Story of* Kleppe v. New Mexico: *The Sagebrush Rebellion as Un-cooperative Federalism*. They argue that a strictly legal evaluation of *Kleppe* fails to measure its true significance as a galvanizing event for opposition to public land management reform. They suggest that the case can be understood as a "successful failure" because it prompted ranchers and states to employ effective non-judicial means of shaping and implementing rangeland reform. According to the authors, the legacy of *Kleppe* and the Sagebrush Rebellion, which the case helped spawn, is one of influencing policy through the common and useful response of "un-cooperative federalism."

No self-respecting issue devoted to Natural Resources and Environmental Law would be complete without a piece about climate change, and Professor Shi-Ling Hsu provides just such a piece in *A Prediction Market for Climate Outcomes*. Professor Hsu argues that climate change science currently produces a disparate, complicated, and unreliable hodgepodge of information about future climate conditions. His article proposes a solution to this problem: Impose a carbon tax, specify that the carbon tax will be indexed to some climate outcomes (like temperatures or mean sea level), and offer to the taxed entities the opportunity to purchase permits to emit in lieu of paying the tax. The permits would be tradable. The basic idea would be to use the trading activity of the future emissions permits to generate some credible forecasts about what the indexed carbon tax will be and, hence, what climate outcomes will be. Professor Hsu's proposal taps into the power of prediction markets to generate better information about future climate conditions.

Justin Plaskov's student comment, *Geothermal's Prior Appropriation Problem*, argues that geothermal energy production is an attractive way to address the United States' future energy needs. But geothermal production faces a serious problem in the West: state water laws, specifically the prior appropriation doctrine. After describing geothermal's prior

appropriation problem, Plaskov goes on to suggest a number of different solutions, including state regulatory reform, federal reserved water rights, federal preemption, and coproduction of geothermal resources and fossil fuels.

Chris Reagen's student note, *The Water Transfers Rule: How an EPA Rule Threatens to Undermine the Clean Water Act*, closes this issue. Suppose a person wants to dump a bucket of water full of pollutants into a lake that does not contain those pollutants. Under the Clean Water Act, that person would be required to obtain a permit to dump the bucket into the lake as part of the National Pollutant Discharge Elimination System. This system limits and monitors pollutant discharges into the country's lakes and rivers, thereby preserving their quality. But the EPA recently promulgated, and the Eleventh Circuit affirmed, a rule that Reagen argues significantly weakens this system by exempting certain water transfers that move polluted water into clean water. Reagen argues that the rule frustrates the Clean Water Act's purpose, undermines its statutory requirements, and threatens to undo its accomplishments in improved water quality. Reagen proposes that the EPA rule should be thrown out and replaced by a more general permitting system.

MARK D. GIBSON
Editor-in-Chief

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THE PROBLEM OF ENVIRONMENTAL MONITORING

ERIC BIBER*

Environmental law depends on the regular collection of accurate information about the state of the natural environment ("ambient monitoring") in order to assess the effectiveness of current regulatory and management policies and to develop new reforms. Despite the central role that ambient monitoring plays in environmental law and policy, the scholarly literature has almost ignored the question of whether and how effective ambient monitoring will take place—even though there is ample evidence that our current ambient monitoring data have extensive gaps and significant flaws. Moreover, the importance of ambient monitoring will only increase in the future with the shift to a new paradigm of adaptive management in which management and regulatory decision-making are kept purposefully flexible for future adjustment. This Article develops the ignored concept of ambient monitoring, explains why public agencies will predominantly have the task of ambient monitoring, and explores the fundamental characteristics of effective

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monitoring that make it so challenging. This Article then connects the scientific challenges of effective monitoring to the dynamics of public agencies to establish why those agencies might fail to conduct effective monitoring. Finally, it proposes possible solutions, with a focus on developing separate monitoring agencies.

INTRODUCTION

Last year, the *Washington Post* ran the headline: "[t]hat repulsive unflushed toilet? Better to swim in it than in the Chesapeake Bay."[1] Even though the cooperative federal and state program to clean up the Chesapeake Bay has spent millions on monitoring programs to evaluate its progress, critics contend (rightly) that the collected data are inadequate to evaluate whether and how management and regulatory programs are actually improving water quality.[2] The Chesapeake Bay is no anomaly. In California, for instance, the *Los Angeles Times* observed that "[h]ealth testing of California's beaches has slumped to its lowest level since ocean monitoring became law more than a decade ago, putting swimmers, surfers and divers at greater risk of exposure to contaminated water."[3]

1. Petula Dvorak, *Think the Bay's a Sewer? Don't Insult the Sewer*, WASH. POST, July 27, 2010, at B1.

2. *See infra* notes 120, 191 and accompanying text.

3. Tony Barboza, *Beach Water Testing at Ebb: Swimmers, Surfers and Divers Are at Greater Risk of Exposure to Harmful Bacteria, a* Times *Probe Shows*, L.A. TIMES, Aug. 30, 2010, at A1.

Water conditions that are sometimes sixfold dirtier than an unflushed toilet present possibly serious risks to human health.[4] But without proper and adequate monitoring of those conditions, how would we know a problem exists, let alone plan successful preventative and curative measures to address it?

These stories, and many others, highlight a central but neglected problem in environmental law: the surprising lack of reliable information about the conditions of the environment in which we live, i.e., ambient environmental conditions. There are tremendous gaps in our knowledge about a wide range of environmental resources, from water quality, to air quality, to endangered species, to wetlands.[5] Those gaps result not just from the absence of monitoring data but also from the ineffective nature of much of the monitoring data that is available.[6]

What might cause such gaps? To some extent, gaps are understandable: Monitoring is costly and difficult to do well.[7] Inadequate funding and infrequent collection of data were both important causes of the monitoring breakdowns in the Chesapeake Bay and in California.[8] But there are also significant political, legal, and institutional obstacles to the pursuit of effective monitoring by the public agencies that gather most of the data. One example is the failure to replace the aging U.S. satellites that monitor global environmental conditions, causing significant gaps for information crucial to understanding climate change.[9] Observers blame the problem

4. *See* Dvorak, *supra* note 1. One main risk is the potential for disease-causing bacteria and viruses from untreated human and animal waste; measurements for fecal coliform bacteria are used as a proxy for this risk. *See Fecal Bacteria*, ENVTL. PROTECTION AGENCY, http://water.epa.gov/type/rsl/monitoring/vms511.cfm (last visited June 30, 2011).

5. *See infra* notes 81–89 and accompanying text.

6. *See infra* notes 81–89 and accompanying text.

7. *See infra* Part I.C.

8. Barboza, *supra* note 3; Kate Yanchulis, *Is Your Swimming Spot Dirtier Than a Toilet?*, NEWS21 (July 26, 2010), http://chesapeake.news21.com/water/chesapeake-bay-swim-spots-bacteria (report from the organization that conducted Chesapeake Bay tests noting that some locations were not official public beaches and so were not monitored at all, despite being popular with the public for swimming; that other locations were monitored once a week; and that major storm events that caused pollution were sometimes missed by monitoring).

9. *See* Suzanne Bohan, *A Dimmer View of Earth*, CONTRA COSTA TIMES, Aug. 8, 2010, at A1 (discussing political dynamics that undermined the satellite monitoring program); U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-10-558, POLAR-ORBITING ENVIRONMENTAL SATELLITES: AGENCIES MUST ACT QUICKLY TO ADDRESS RISKS THAT JEOPARDIZE THE CONTINUITY OF WEATHER AND CLIMATE DATA (2010) [hereinafter POLAR-ORBITING ENVIRONMENTAL SATELLITES:

on inefficient inter agency coordination, indifferent management by the relevant agencies, and a change in White House priorities.[10]

Monitoring of environmental conditions matters for environmental law. It can provide essential information to regulators, legislators, industry, and the public about the cleanliness of our air and water and about the conditions of the ecosystems that human life depends upon. This is information that legislators use to hold regulators accountable, that regulators use to improve regulatory programs, and that the public uses to make decisions about the environmental risks of everyday activities like swimming at the beach.

Beyond its significance in current regulatory frameworks, monitoring is central to the future direction of environmental law. The new paradigm of adaptive management has been embraced by academics, regulators, and managers.[11] Indeed, adaptive management forms the basis of major ecological restoration projects in the Chesapeake Bay, Colorado River, and the Everglades, as well as a proposed planning process for the U.S. National Forest system.[12] These paradigms require that environmental policy be constantly updated to meet changing circumstances, especially a globally changing climate.[13] But a system that calls for constant adaptation requires the ongoing collection of information about changing circumstances. We can hardly adapt our policies if we do not know whether we need to adapt, why we need to adapt, or how we need to adapt.

Monitoring will also be crucial as environmental law relies more on the concept of ecosystem services, in which the benefits for humans from natural ecosystems are converted

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AGENCIES MUST ACT QUICKLY] (discussing risks to an environmental program from a gap in satellite monitoring); U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-564, POLAR-ORBITING ENVIRONMENTAL SATELLITES: WITH COSTS INCREASING AND DATA CONTINUITY AT RISK, IMPROVEMENTS NEEDED IN TRI-AGENCY DECISION MAKING (2009) [hereinafter POLAR-ORBITING ENVIRONMENTAL SATELLITES: WITH COSTS INCREASING] (discussing problems in a multi-agency group that managed the satellite program).

10. *See* POLAR-ORBITING ENVIRONMENTAL SATELLITES: WITH COSTS INCREASING, *supra* note 9.

11. *See infra* notes 54–61 and accompanying text.

12. National Forest System Land Management Planning, 76 Fed. Reg. 8480 (Feb. 14, 2011) (to be codified at 36 C.F.R. pt. 219); *see infra* Part I.B.

13. *See infra* Part I.B.

into quasi-monetary form.[14] Ecosystem services can help justify protection of those ecosystems politically, increase the legal consideration given to those ecosystems under existing legal doctrines (such as nuisance), or provide the basis for markets that trade in the services and create economic incentives for the protection of the ecosystems.[15] The most aggressive use of ecosystem services being considered today is "carbon offsets" in carbon regulatory systems.[16] These would allow emitters of carbon dioxide and other greenhouse gasses to "offset" their emissions by contributing to the protection and restoration of ecosystems that absorb greenhouse gases from the atmosphere (or at least prevent the release of those gases into the atmosphere).[17] The credibility and effectiveness of the offset concept depends in large part on ensuring that the quantity and quality of the relevant ecosystems are both well understood and monitored.[18]

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14. *See generally* J.B. Ruhl & James Salzman, *The Law and Policy Beginnings of Ecosystem Services*, 22 J. LAND USE & ENVTL. L. 157 (2007). These benefits might include the prevention of flooding that intact wetlands can provide by absorbing excess runoff or the sequestration of carbon by forests from the atmosphere.

15. *Id.*; *see also* J.B. Ruhl, *The "Background Principles" of Natural Capital and Ecosystems Services—Did* Lucas *Open Pandora's Box?*, 22 J. LAND USE & ENVTL. L. 525 (2007).

16. At the international level, climate change negotiations have developed the Reducing Emissions from Deforestation and Forest Degradation (REDD) program in which developing countries would receive funds to improve forest management and reduce or offset carbon emissions. *See UN Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (UN-REDD), FAO, UNDP, UNEP Framework Document*, UN-REDD PROGRAMME (June 20, 2008), http://www.un-redd.org/LinkClick.aspx?fileticket=gDmNyDdmEI0%3d&tabid=587&language=en-US [hereinafter UN-REDD PROGRAMME]. At the national level, the proposal for climate change regulation in the last U.S. Congress included a provision allowing for offsets. *See* H.R. REP. NO. 2454, at 678, 774 (2009). The state agency implementing California's carbon regulatory program (AB 32) has proposed including a similar offset program. *See* Mary D. Nichols, *Update Regarding the Proposed Offset Component of the California Cap-and-Trade Program*, CAL. AIR RESOURCES BOARD (July 29, 2010), http://www.arb.ca.gov/cc/capandtrade/meetings/062210/offset_program_-update.pdf.

17. *See* UN-REDD PROGRAMME*, supra* note 16.

18. For instance, the justification for granting particular offsets for the protection of tropical forests might depend on the argument that maintaining tropical forests in relatively undisturbed conditions will ensure that carbon is not emitted into the atmosphere. *See, e.g.*, William Boyd, *Ways of Seeing in Environmental Law: How Deforestation Became an Object of Climate Governance*, 37 ECOLOGY L.Q. 843, 867–69 (2010). Monitoring will be needed to (a) confirm that relatively undisturbed tropical forests continue to sequester carbon even in the face of future environmental change; (b) determine what "relatively

Nor is the importance of monitoring limited to environmental law. The concepts of flexibility and adaptability are increasingly relevant in administrative law. Under the rubrics of "new governance" or "democratic experimentalism," scholars have called for the regulatory system to move beyond rigid, inflexible legal mandates and instead to embrace legal structures in which agencies and stakeholders cooperate both to adjust legal standards to meet the particular needs of particular contexts and to use ongoing information collection to continually improve regulatory performance.[19] Again, these new paradigms require a broad understanding of the ambient conditions that the regulatory structure aims to improve. Even the recent financial crisis demonstrates the centrality of monitoring systemic conditions, given the importance of systemic risk for financial institutional health.[20] The just-passed financial reform statute creates a new agency to monitor systemic risks,[21] performing a role similar in nature to the monitoring of ambient environmental conditions in environmental law.

While ambient monitoring is important, there has been little investigation of whether and how it will occur. The literature to this point appears to assume that ambient monitoring is unproblematic, with little discussion of whether information gathering might constrain the adaptability and flexibility of regulatory standards.[22] To the extent that they have examined monitoring, environmental law scholars have focused on how government agencies can force private parties to produce more information about whether they are in compliance with relevant regulatory standards.[23] But when it comes to the monitoring of ambient environmental conditions,

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undisturbed conditions" in tropical forests means; and (c) confirm that the forests have, in fact, been left in "relatively undisturbed conditions."

19. *See, e.g.*, Michael C. Dorf & Charles F. Sabel, *A Constitution of Democratic Experimentalism*, 98 COLUM. L. REV. 267 (1998) (developing the concept of "democratic experimentalism"); Orly Lobel, *The Renew Deal: The Fall of Regulation and the Rise of Governance in Contemporary Legal Thought*, 89 MINN. L. REV. 342 (2004) (explicating the concept of "new governance"); *see also* Kenneth A. Bamberger & Deirdre K. Mulligan, *Catalyzing Privacy: New Governance, Information Practices, and the Business Organization*, LAW & POL'Y (forthcoming 2011) (noting the rise of "new forms of governance that promote regulatory ambiguity, diversity, and revisability; that involve policy dynamism informed by experience and experimentation").

20. *See infra* notes 335–37 and accompanying text.

21. *See infra* notes 337 and accompanying text.

22. *See infra* notes 66–71 and accompanying text.

23. *See infra* notes 69–71 and accompanying text.

public agencies provide the majority of the data[24] because most private parties have limited incentives to provide complete and unfiltered data. Even if private parties provide more of this information, oversight will still fall to public agencies.[25]

This Article fills a gap in this literature by exploring the previously unasked but critical question: Can public environmental agencies do a good job of performing the challenging task of collecting over time the data we need to understand the state of our environment? Thoughtful answers to that question are central to the present and future of environmental law and other regulatory fields.

In order to answer this question, this Article begins in Part I with a comprehensive introduction to the importance, difficulty, and essentially public nature of environmental monitoring. Here, this Article develops the distinction between monitoring to determine whether private parties are in compliance with the law and ambient monitoring of environmental conditions. Drawing on the relevant scientific literature, this Article next explores the ways in which ambient monitoring can be challenging to perform: (1) it often requires relatively long-term, continuous measurements, and (2) it can be extremely difficult to design an effective monitoring program given the dynamic and complex nature of many natural systems.

This Article then builds on recent political science and administrative law scholarship to explore how the essential characteristics of environmental monitoring interact with the legal and institutional structures of public agencies. These interactions produce a range of constraints that can interfere with the ability of agencies to conduct effective monitoring. These constraints are the subject of Part II.

For instance, the low-profile nature of monitoring means that monitoring is particularly susceptible to public choice failures; no rallies in Washington D.C. are held to demand that Congress provide more funding for monitoring environmental conditions. But even when monitoring is funded, that funding is vulnerable to the charge that it is useless, wasteful government spending—red meat for the producer of a television newsmagazine program looking for a story about "government waste."

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24. *See infra* notes 40–41 and accompanying text.
25. *See infra* note 33.

Constraints lie within agencies as well: Many agencies orient their activities around a particular "mission," yet collecting adequate monitoring data will often interfere with achieving that mission. An agency focused on timber production might be reluctant to collect adequate information about the status of wildlife populations because that information might produce political or legal pressures to cut back on logging.

If we can understand the vulnerabilities in public agency monitoring, then we can explore how to address the problem, which is the central aim of Part III. While there is a range of possible choices, the most promising separates agency monitoring from other administrative tasks. Separating tasks reduces the risk that a conflicting agency mission will interfere with an effective monitoring program and thus the risk that monitoring will be "traded-off" against other goals. In the end, effective practical solutions will depend on the particulars of individual regulatory and management programs, the resources at stake, and the political dynamics for any individual problem. While any solution will be challenging, environmental law in particular and administrative law more broadly will not be able to move forward unless we address the problem of environmental monitoring.

I. MONITORING IS NECESSARY, DIFFICULT, AND ESSENTIALLY PUBLIC

I begin by distinguishing ambient monitoring from the monitoring of compliance with existing rules, highlighting how ambient monitoring requires greater public involvement. I then explore ambient monitoring's importance for environmental law and the serious gaps in existing monitoring data. Next, I develop the challenges to conducting effective monitoring, specifically the need for continuity in monitoring and the difficulty of matching a monitoring program to the relevant management questions and to the complex ways in which environmental resources regularly vary across multiple scales.

A. Ambient Versus Compliance Monitoring

The monitoring of "ambient environmental conditions," i.e., the state of the environment at the local, regional, national, or global scale, contrasts with "compliance monitoring," which

focuses on compliance with a legal standard or regulation.[26] Ambient monitoring usually requires measurements over a larger temporal and geographic scale than compliance monitoring: compare the annual measurement of whether a particular end-of-the-smokestack pollution control device is functioning with the daily measurement of pollution levels across the entire Los Angeles Basin. Another useful example of ambient monitoring is the monitoring of river water quality, which might require measurements before the construction of any individual polluting factory, as well as measurements upstream of that factory's outfall and downstream measurements of where any impacts from that factory's outfall dissipate.

Ambient monitoring generally measures conditions that are affected by a combination of both human and natural causes, while compliance monitoring generally measures specific human causes. For example, contrast direct measurements of smokestack output with measurements of the impact of acid rain on the ecology of lakes in the Northeast United States.[27]

These two categories of monitoring are ends of a continuum, with various types of monitoring programs falling closer to one pole or another, or standing ambiguously in between. Ambient data might be used to measure compliance (depending on the regulatory standard). Some ambient monitoring programs might be small in absolute scale but still relatively large compared to the human activities that are the subject of regulation.[28] Thus, many types of monitoring—for instance, the "effects and effectiveness" monitoring conducted by the U.S. Fish and Wildlife Service (FWS) for permits issued under the Endangered Species Act (ESA)—might fall in both of these categories.[29]

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26. *See* C.S. Russell, *Monitoring, Enforcement, and the Choice of Environmental Policy Instruments*, 2 REG. & ENVTL. CHANGE 73, 74 (2001) (drawing this distinction); Clifford S. Russell, *Monitoring and Enforcement*, *in* PUBLIC POLICIES FOR ENVIRONMENTAL PROTECTION 243, 244–45 (P.R. Portney ed. 1990) (same).

27. Acid rain result from a complicated mix of human and natural causes such as sulfur dioxide releases from power plants, soil conditions around the lakes, wind patterns, etc. *See* D.W. Schindler, *Effects of Acid Rain on Freshwater Ecosystems*, SCI., Jan. 8, 1988, at 149.

28. See *infra* Part I.C.2 for a discussion of the mobile air toxics program.

29. Alejandro E. Camacho, *Can Regulation Evolve? Lessons from a Study in Maladaptive Management*, 55 UCLA L. REV. 293, 325 (2007). This monitoring requires understanding the status and trends of a species in general (ambient

The dichotomy between relatively small-scale, human-oriented compliance monitoring and large-scale, more ecosystem-oriented ambient monitoring helps us understand important differences between the public and private sector roles in monitoring. The scholarly literature has emphasized how law can encourage the disclosure of compliance information by regulated parties,[30] including voluntary compliance monitoring by regulated industry in response to social and economic pressures for greater environmental performance.[31] Because government compliance monitoring may be comparatively inefficient given industry's better access to employees, records, or facilities, encouraging private compliance monitoring may be more effective.[32] A key trade-off

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monitoring), *id.* at 320–21, as well as whether a particular project has adequately met its legal requirements under the ESA (compliance monitoring), *id.* at 317.

30. *See, e.g.*, John S. Applegate, *Bridging the Data Gap: Balancing the Supply and Demand for Chemical Information*, 86 TEX. L. REV. 1365, 1385–91 (2008); William W. Buzbee, *Adjudicatory Triggers of Enhanced Ambient Environment Information*, 83 IND. L.J. 583 (2008); Cary Coglianese et al., *Seeking Truth for Power: Informational Strategy and Regulatory Policymaking*, 89 MINN. L. REV. 277, 277–78 (2004); Daniel C. Esty, *Environmental Protection in the Information Age*, 79 N.Y.U. L. REV. 115, 124–28 (2004); Bradley C. Karkkainen, *Bottlenecks and Baselines: Tackling Information Deficits in Environmental Regulation*, 86 TEX. L. REV. 1409 (2008); Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?* 89 GEO. L.J. 257 (2001); Rena I. Steinzor, *Reinventing Environmental Regulation: The Dangerous Journey from Command to Self-Control*, 22 HARV. ENVTL. L. REV. 103, 150–83 (1998); Wendy E. Wagner, *Commons Ignorance: The Failure of Environmental Law to Produce Needed Information on Health and the Environment*, 53 DUKE L.J. 1619, 1717–36 (2004).

31. David W. Case, *Corporate Environmental Reporting As Informational Regulation: A Law and Economics Perspective,* 76 U. COLO. L. REV. 379, 386–401 (2005) (describing voluntary programs). Researchers have provided strong evidence that corporations will go beyond minimal statutory regulatory requirements in order to build public goodwill. *See, e.g.*, Neil Gunningham et al., *Social License and Environmental Protection: Why Businesses Go Beyond Compliance*, 29 LAW & SOC. INQUIRY 307 (2004).

32. *See* IAN AYRES & JOHN BRAITHWAITE, RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE 104–05 (1995); KEITH HAWKINS, ENVIRONMENT AND ENFORCEMENT: REGULATION AND THE SOCIAL DEFINITION OF POLLUTION (1984); Jennifer Arlen, *The Potentially Perverse Effects of Corporate Criminal Liability*, 23 J. LEGAL STUD. 833, 835 & n.10 (1994); Jennifer Arlen & Reinier Kraakman, *Controlling Corporate Misconduct: An Analysis of Corporate Liability Regimes*, 72 N.Y.U. L. REV. 687, 707, 713 n.62 (1997); Louis Kaplow & Steven Shavell, *Optimal Law Enforcement with Self-Reporting of Behavior*, 102 J. POL. ECON. 583, 584, 602 (1994). There are also arguments that less confrontational inspection processes will encourage greater cooperation from regulated parties, again improving compliance monitoring. *See, e.g.*, EUGENE BARDACH & ROBERT A. KAGAN, GOING BY THE BOOK: THE PROBLEM OF REGULATORY UNREASONABLENESS 109–11 (1982).

here is ensuring complete and reliable compliance data while providing incentives to private parties to produce important compliance information.[33]

But there are two reasons why private entities may not be as central to successful ambient monitoring. First, ambient conditions are often measured at scales larger than any one unit of private property and/or in areas that are publicly owned (such as air or water). Thus, regulatory or management agencies often do not need access to private property or to private information in order to conduct effective monitoring.[34]

Second, private industry has strong incentives not to conduct ambient monitoring compared to compliance monitoring, in large part because it is *harder* to connect the results of ambient monitoring with the performance of individual actors. A primary rationale for voluntary compliance monitoring is that such monitoring might establish a company's environmental bona fides and produce market,

33. See, for example, AYRES & BRAITHWAITE, *supra* note 32, at 19–21, 25, 105–06, for a discussion of why some sort of government oversight is required; Neil Gunningham & James Prest, *Environmental Audit as a Regulatory Strategy: Prospects and Reform*, 15 SYDNEY L. REV. 492, 494 (1993); Cameron Holley, *Facilitating Monitoring, Subverting Self-Interest and Limiting Discretion: Learning from "New" Forms of Accountability in Practice*, 35 COLUM. J. ENVTL. L. 127, 162, 170–72 (2010) (finding empirical evidence from Australia of sham compliance in self-regulation and importance of regulatory checks to ensure validity of data); Paul R. Kleindorfer & Eric W. Orts, *Informational Regulation of Environmental Risks*, 18 RISK ANALYSIS 155, 162 (1998) ("[O]versight by regulators must continue to ensure the credibility of the information released to the public."); Kimberly D. Krawiec, *Cosmetic Compliance and the Failure of Negotiated Governance*, 81 WASH. U. L.Q. 487 (2003); Jodi L. Short & Michael W. Toffel, *Making Self-Regulation More than Merely Symbolic: The Critical Role of the Legal Environment*, ADMIN. SCI. Q. (forthcoming 2010) (empirical analysis finding that compliance with self-regulation and self-monitoring is higher where there is the possibility of regulatory surveillance). *See generally* John T. Scholz, *Cooperation, Deterrence, and the Ecology of Regulatory Enforcement*, 18 LAW & SOC'Y REV. 179 (1984); Matthew D. Zinn, *Policing Environmental Regulatory Enforcement: Cooperation, Capture, and Citizen Suits*, 21 STAN. ENVTL. L.J. 81, 96–106 (2002).

34. There are exceptions, of course—for instance, monitoring of the conditions of certain kinds of endangered species with highly restricted ranges that are found predominantly on private property will exhibit more similarities with compliance monitoring. *Cf.* Stephen Polasky & Holly Doremus, *When the Truth Hurts: Endangered Species Policy on Private Land with Imperfect Information*, 35 J. ENVTL. ECON. & MGMT. 22 (1998); Wendy Wagner, *Stormy Regulation: The Problems that Result when Stormwater (and Other) Regulatory Programs Neglect to Account for Limitations in Scientific and Technical Information,* 9 CHAP. L. REV. 191, 195–96 (2006) (noting the advantage that landowners might have in monitoring stormwater runoff).

social, or political benefits.[35] But a company can only gain those benefits if the geographic and temporal scale of ambient environmental information matches closely with the geographic and temporal scale of the impacts of the company's operations. For instance, a company that has the only industrial facility on a lake will gain a substantial benefit in terms of public relations if it can show that the water around its facility is in good shape, because those positive conditions are more obviously the result of the company's activities. However, if there are ten other facilities on the lake, then positive ambient conditions will also show the good management activities of the other facilities, giving them the same benefits without the costs of ambient monitoring.[36] Conversely, the company may rightfully believe that its environmental performance is strong, but that the presence of other, poorly-performing facilities on the lake might obscure the strength of its own environmental performance. If there is a risk that the data will be positive or negative because of the activities of others, the company will have less incentive to invest in the collection of ambient environmental data (as opposed to measures of its own environmental performance, such as end-of-the-wastepipe pollution).[37]

Moreover, there is also the non-trivial risk that ambient outcomes will not directly relate to the performance of the facility because of complex interactions within natural systems that make causation difficult to establish. If there are significant feedback effects (positive or negative), raising or lowering emissions may not translate directly into improvements in ambient conditions. Again, ambient measures are not the best way for a facility to show that *its own* environmental performance is strong.

In fact, few corporate environmental reports contain any information about ambient environmental conditions.[38] There is also little evidence that private parties that receive permits

35. *See supra* note 31.

36. *Cf.* Richard R. Nelson, *The Simple Economics of Basic Scientific Research*, 67 J. POL. ECON. 297, 302–04 (1959) (noting the problems of underinvestment by private companies in basic scientific research because of positive externalities).

37. *Cf. id.* (noting that high uncertainty in investment in basic research will deter risk-averse companies from investment in the area).

38. Douglas J. Lober et al., *The 100 Plus Corporate Environmental Report Study: A Survey of an Evolving Environmental Management Tool*, 6 BUS. STRATEGY & ENV'T 57, 68 (1997) ("[A]lmost all companies have stopped with reporting releases, rather than their impact on the environment.").

under the ESA are conducting any monitoring on the status of the species at issue, even when required by the relevant permits.[39]

In practice, much of the ambient monitoring in this country is publicly funded or undertaken.[40] Moreover, publicly owned and managed natural resources, including hundreds of millions of acres of public lands, play a significant role in environmental management; given the scale of the resources and public ownership, monitoring of those resources will also usually be public.[41] Finally, major ecological restoration projects in the United States often include ambient monitoring, such as those in the Chesapeake Bay, the Everglades, and the Pacific Northwest; monitoring is public because of the large scale of the restoration projects.

B. The Importance of Ambient Monitoring for Environmental Law and the Lack of Monitoring Data

Ambient monitoring is important to environmental law because it can help set overall policy, it can be an integral part of an existing regulatory or management system, and it is a key component of the primary reforms that academics and policymakers have suggested for environmental law. Yet, despite its importance and the many existing public monitoring programs, there are major inadequacies in our existing ambient monitoring data.

In general, monitoring can help identify previously unknown environmental harms that require the development of a new regulatory system or the adjustment of an existing one, serving as a "meta" tool that helps us choose whether and how to regulate.[42] Within any regulatory program, monitoring

39. *See* Camacho, *supra* note 29, at 316, 325–27.

40. *See* Wagner, *supra* note 30, at 1676; *see also* Esty, *supra* note 30, at 198; Richard B. Stewart, *A New Generation of Environmental Regulation?,* 29 CAP. U. L. REV. 21, 103 n.313 (2001).

41. *See* Eric Biber et al., *Restoring Public Trust in Public Lands: An Agenda for the New Administration*, 36 ECOLOGY L. CURRENTS 159, 159–60 (2009) (outlining the importance of federally-managed public lands for environmental protection). Those lands will be even more important as both a resource for renewable energy to help reduce climate change and for adaptation in response to climate change. *See* John D. Leshy, *Federal Lands in the Twenty-First Century*, 50 NAT. RESOURCES J. 111 (2010).

42. *See* IAN F. SPELLERBERG, MONITORING ECOLOGICAL CHANGE 5 (2d ed. 2005) (long-term studies "can be a basis for early detection of potentially harmful effects on components of ecosystems"); John M. Hellawell, *Development of a*

can help determine whether regulatory standards should be strengthened or relaxed for known harms.[43] And finally, it can be used to determine whether individual activities are in compliance with existing standards, even if the regulatory standard does not depend on ambient measures of environmental quality, by, for example, revealing significant amounts of cheating.[44]

Therefore, monitoring may be used to either support additional regulation or relax regulatory standards, which will affect whether monitoring is politically viable or not.[45] And, it might be used either to support a change in the legal or regulatory status quo or to oppose such a change, raising legal questions.[46] The distinction between these two dichotomies is important: Not all changes in the legal or regulatory status quo will lead to greater regulation, for instance.[47]

Ambient monitoring may be embedded into existing regulatory programs. Many environmental statutes use "quality-based" approaches that depend on ambient measures.[48] The Clean Air Act sets the level of required state air pollution regulation based on whether air quality meets minimum federal standards.[49] Likewise, the Clean Water Act's Total Maximum Daily Load (TMDL) program requires states to identify which rivers and lakes have water quality below minimum standards and then requires regulations to improve

Rationale for Monitoring, *in* MONITORING FOR CONSERVATION AND ECOLOGY 1, 3, 5 (Barrie Goldsmith ed., 1991) (monitoring used for "detecting incipient change"); J.J. Messer, *Monitoring, Assessment, and Environmental Policy*, *in* ENVIRONMENTAL MONITORING 499, 502 (G. Bruce Wiersma ed., 2004) (noting importance of monitoring data for identifying the problem of acid rain for forests and lakes in the Eastern United States).

43. *See* Hellawell, *supra* note 42, at 4; *see also* Messer, *supra* note 42, at 504–05 (monitoring data accelerated the phase-out of ozone-depleting chemicals under the Montreal Protocol); *id.* at 508 (monitoring inspired stricter lead air emissions standards).

44. *See* BARBARA J. DOWNES ET AL., MONITORING ECOLOGICAL IMPACTS: CONCEPTS AND PRACTICE IN FLOWING WATERS 39 (2002); Hellawell, *supra* note 42, at 3–4.

45. *See infra* Part II.A.1 for further exploration of this topic.

46. The issue of whether monitoring is a prerequisite for proposed government action can play an important role in the attitude courts take towards enforcing legal monitoring requirements. *See infra* Part III.B.3.

47. *See* Eric Biber, *The Importance of Resource Allocation in Administrative Law*, 60 ADMIN. L. REV. 1, 57–58 (2008).

48. Carol Rose, *Environmental Law Grows Up (More or Less), and What Science Can Do to Help*, 9 LEWIS & CLARK L. REV. 273, 275–78 (2005).

49. 42 U.S.C. §§ 7409–7410 (2006).

water quality.[50] These regulatory programs force "regulators to figure out the state of the relevant environment . . . and then in an ongoing way to keep such information current, further adjusting regulatory requirements," necessitating "ongoing vigilance and regulatory zeal of sorts that are seldom observed in studies of regulatory behavior."[51] For instance, the TMDL program has been notoriously slow and unsuccessful, in large part because of a lack of information about ambient conditions.[52]

Monitoring is crucial to the future of environmental law as well. In the past ten years, the paradigm in environmental law has shifted to "ecosystem management" and "adaptive management."[53] Ecosystem management emphasizes a holistic approach, recognizing the connections between different resources even where those connections cross traditional jurisdictional lines.[54] Ecosystem management incorporates adaptive management, consciously structured to produce useful new information that can improve future decision making.[55] A

50. 33 U.S.C. § 1313(d) (2006).

51. *See* Buzbee, *supra* note 30, at 600.

52. *Id.* at 600–01. Similarly, "baselines" are often used to establish regulatory standards in environmental law, and those baselines are often based on historic environmental conditions and will require ongoing monitoring of those conditions for enforcement. *See generally* J.B. Ruhl & James Salzman, *Gaming the Past: The Theory and Practice of Historic Baselines in the Administrative State*, 64 VAND. L. REV. 1 (2011).

53. *See, e.g.*, Mary Jane Angelo, *Harnessing the Power of Science in Environmental Law: Why We Should, Why We Don't, and How We Can*, 86 TEX. L. REV. 1527, 1546–52 (2008); Alejandro E. Camacho, *Adapting Governance to Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L.J. 1 (2009); Holly Doremus, *Adaptive Management, the Endangered Species Act, and the Institutional Challenges of "New Age" Environmental Protection*, 41 WASHBURN L.J. 50, 54 (2001); C.S. Holling & Gary K. Meffe, *Command and Control and the Pathology of Natural Resource Management*, 10 CONSERVATION BIOLOGY 328, 332 (1996) ("Ecosystems are moving targets, with multiple potential futures that are uncertain and unpredictable. Therefore management has to be flexible [and] adaptive . . . ."); J.B. Ruhl, *Regulation by Adaptive Management—Is It Possible?* 7 MINN. J. L. SCI. & TECH. 21 (2005); J.B. Ruhl, *Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act*, 52 U. KAN. L. REV. 1249, 1249–50 (2004); J.B. Ruhl, *Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law*, 34 HOUS. L. REV. 933, 996–97 (1997); A. Dan Tarlock, *The Nonequilibrium Paradigm in Ecology and the Partial Unraveling of Environmental Law*, 27 LOY. L.A. L. REV. 1121, 1139–41 (1994); John M. Volkman, *How Do You Learn From a River? Managing Uncertainty in Species Conservation Policy*, 74 WASH. L. REV. 719, 738–62 (1999).

54. *See, e.g.*, R. Edward Grumbine, *What is Ecosystem Management?,* 8 CONSERVATION BIOLOGY 27, 29–31 (1994).

55. *See infra* note 66 and accompanying text.

main driver of these proposals has been the inevitable need for environmental law to be flexible in the face of climate change.[56]

One example of adaptive management-based proposals is a "rolling rule regime" that draws heavily on "new governance" principles. It asks central regulators to devolve management and regulatory powers to local entities. Those local entities in turn provide "reports on proposals and outcomes" from their efforts. Those reports in turn are then used to "periodically reformulate minimum performance standards, desirable targets, and paths for moving from the former to the latter" to achieve "continuous improvements in both regulatory rules and environmental performance."[57]

Environmental agencies have widely adopted these new paradigms.[58] Management of the Columbia River Basin in the Pacific Northwest, where multiple dams provide much of the electricity for the region but also have had devastating impacts on wild salmon runs, is based on ecosystem and adaptive management.[59] Managers attempt to balance multiple goals (such as electricity production and salmon production) through a wide range of resource decisions (such as water flow, fisheries restrictions, and land-use management) by operating facilities and designing regulations in ways that will produce new information.[60] The results of different management choices are, in theory, supposed to inform decision makers for future decision making; for instance, it might be determined that one management choice to protect salmon from the impacts of hydroelectric dams may be less effective than another.[61]

Yet many have been disappointed with the results so far.[62] For instance, habitat conservation plans (HCPs) under the ESA—plans intended to protect endangered species while also allowing development to proceed—are based on ecosystem and adaptive management, yet fail to meet many of the relevant

56. *See, e.g.*, Camacho, *supra* note 53.

57. Charles Sabel et al., *Beyond Backyard Environmentalism*, BOSTON REV., Oct.–Nov. 1999, at 4.

58. *See generally* NATHAN F. SAYRE ET AL., MONITORING AS A SOCIAL PROCESS: A CASE STUDY OF NATIONAL FOREST GRAZING ALLOTMENTS, 1927–2007 (2010) (surveying examples).

59. *See* John M. Volkman & Willis E. McConnaha, *Through a Glass, Darkly: Columbia River Salmon, the Endangered Species Act, and Adaptive Management*, 23 ENVTL. L. 1249, 1250, 1254–58 (1993).

60. *Id.* at 1254–58.

61. *See generally id.*

62. *See* Doremus, *supra* note 53, at 54 (noting that "skepticism about adaptive management comes from the lack of success stories to date").

regulatory standards and goals set to prevent the extinction of hundreds of rare species.[63] Legal scholars have identified a range of obstacles to ecosystem and adaptive management. For instance, artificial geographic or institutional divides might interfere with the ability to adaptively manage entire ecosystems.[64] In addition, the upfront costs to develop new agency regulations or management approaches deter agencies from experimenting.[65]

While there is much truth in these critiques, there is another key, understudied issue. Ecosystem and adaptive management need tremendous amounts of ambient data.[66] "[A]daptive governance" requires "regular monitoring" as well as regular "assessment[ ] and adjustment of all agency decision making."[67] Without monitoring, it will be impossible to determine whether management or regulation is achieving the relevant goals and therefore whether (and what type of) adaptation is required.

Despite the importance of ambient monitoring, the environmental law scholarship has not focused much on the

63. Camacho, *supra* note 29, at 297, 323–24, 330.

64. *See, e.g.*, Camacho, *supra* note 53, at 26–30; Jamison E. Colburn, *Habitat and Humanity: Public Lands Law in the Age of Ecology*, 39 ARIZ. ST. L. J. 145, 163–69, 195 (2007); Jeffrey W. Jacobs, *Broadening U.S. Water Resources Project Planning and Evaluation*, 42 NAT. RESOURCES J. 21, 28 (2002); Karkkainen, *Bottlenecks and Baselines, supra* note 30, at 1439–43.

65. *See, e.g.*, Camacho, *supra* note 53, at 37–38; Karkkainen, *Bottlenecks and Baselines*, *supra* note 30, at 1443–44; Ruhl, *Regulation by Adaptive Management*, *supra* note 53.

66. *See* KAI N. LEE, COMPASS AND GYROSCOPE: INTEGRATING SCIENCE AND POLITICS FOR THE ENVIRONMENT 58–59 (1993); Camacho, *supra* note 53, at 38; Norman L. Christensen et al., *The Report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management*, 6 ECOLOGICAL APPLICATIONS 665, 669–70 (1996); Holly Doremus, *Data Gaps in Natural Resource Management: Sniffing for Leaks Along the Information Pipeline*, 83 IND. L.J. 407, 409 (2008); Grumbine, *supra* note 54, at 31 (monitoring is usually part of the definition of ecosystem management used by scholars and management agencies); Bradley C. Karkkainen, *Toward a Smarter NEPA: Monitoring and Managing Government's Environmental Performance*, 102 COLUM. L. REV. 903, 939–40, 966 (2002); Jan G. Laitos & Thomas A. Carr, *The Transformation on Public Lands*, 26 ECOLOGY L.Q. 140, 219–20 (1999). Charles Sabel and his coauthors also recognize the importance of monitoring for accountability under their "rolling rule" proposal. Sabel et al., *supra* note 57 (noting that in the "absence of rigorous monitoring" their proposal would "lead to self-deluding celebrations of expert powers" and a lack of political accountability).

67. Camacho, *supra* note 53, at 49; *accord* Holling & Meffe, *supra* note 53, at 332; Ruhl, *Taking Adaptive Management Seriously*, *supra* note 53, at 1264; *see* NAT'L RESEARCH COUNCIL, ADAPTIVE MANAGEMENT FOR WATER RESOURCES PROJECT PLANNING 26 (2004).

issue.[68] It has explored in some detail how public agencies might create stronger incentives for private parties to produce more environmental information (for compliance purposes),[69] and there has been some discussion of how environmental law might be structured to reduce the need for monitoring data.[70] But there has been little exploration of whether and how public agencies will undertake effective monitoring programs.[71]

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68. C. S. Russell, *Monitoring, Enforcement, and the Choice of Environmental Policy Instruments*, 2 REG. & ENVTL. CHANGE 73 (2001) ("[A]ll too often the monitoring problem has been assumed away" in environmental law.). *But see* Dave Owen, *Probabilities, Planning Failures, and Environmental Law*, 84 TUL. L. REV. 265, 333 (2009) (noting possible problems with monitoring under adaptive management).

69. *See supra* note 30 and accompanying text.

70. *See, e.g.*, John S. Applegate & Robert L. Fischman, *Missing Information: The Scientific Data Gap in Conservation and Chemical Regulation*, 83 IND. L.J. 399, 400–01 (2008); Howard Latin, *Ideal Versus Real Regulatory Efficiency: Implementation of Uniform Standards and "Fine-Tuning" Regulatory Reforms*, 37 STAN. L. REV. 1267 (1985).

71. *See* Alejandro E. Camacho, *Beyond Conjecture: Learning About Ecosystem Management from the Glen Canyon Dam Experiment*, 8 NEV. L.J. 942, 953–54 (2008) (noting the "persistent failure of regulatory institutions to engage in systematic monitoring and assessment of regulatory programs" that is "all too often overlooked or neglected by both governmental regulators and scholars"); Holly Doremus, *Precaution, Science, and Learning While Doing in Natural Resource Management*, 82 WASH. L. REV. 547, 569 (2007) (noting that adaptive management as a term has "been used to emphasize the need to act while downplaying the role of learning," justifying management decisions "without any enforceable requirements for learning or incorporating new knowledge").

There are a few important exceptions in which scholars have examined the role that environmental law might play in structuring how agencies obtain information. Brad Karkkainen has shown how the NEPA does not create incentives to develop long-term information. Karkkainen, *supra* note 66, at 932; *see also* Buzbee, *supra* note 30, at 598–600 (exploring incentives for government agencies to collect ambient environmental information). Wendy Wagner has explored how administrative law and judicial review create an incentive for the production of too much information. Wendy E. Wagner, *Administrative Law, Filter Failure, and Information Capture*, 59 DUKE L.J. 1321, 1353–65, 1371 (2010). Holly Doremus notes the importance of changing institutional systems to make them more flexible to respond to changing information. *See generally* Doremus, *supra* note 53. *See also* Esty, *supra* note 30, at 142–49 (exploring how institutional structures might be relevant to the development of environmental information). Bruce Ackerman led a group of scholars who investigated the development of technical information to support water quality regulation along the Delaware River in the 1970s, although his research focused more on the modeling rather than on the data collection. BRUCE A. ACKERMAN ET AL., THE UNCERTAIN SEARCH FOR ENVIRONMENTAL QUALITY 9–16 (1974). There has been one study of "new environmental governance" in Australia that covered, among other issues, monitoring. Holley, *supra* note 33, at 178–84, 195–202 (finding serious problems with monitoring in a collaborative, neighborhood environmental program in Australia). While these are important beginning points for an analysis of how institutions might be relevant for environmental information policy, they do not closely examine how institutional structures and incentives, particularly

There are many existing federal and state environmental monitoring programs. Federal programs with national scope include the National Oceanic and Atmospheric Administration's (NOAA) programs focusing on ocean and coastal resources (such as its Center for Coastal Monitoring and Assessment),[72] the U.S. Forest Service's Forest Inventory and Analysis,[73] and FWS's National Wetlands Inventory.[74] There are also multiple federal monitoring programs that are regional or local, including the Glen Canyon Monitoring and Research Center (GCMRC), which monitors the effectiveness of the restoration of the Colorado River below Glen Canyon Dam,[75] and RECOVER, the monitoring and research program for the restoration effort in the Florida Everglades.[76] The U.S. Geological Survey (USGS) conducts perhaps the largest collection of environmental monitoring programs. It runs a range of national programs (such as a Status and Trends monitoring program for biological diversity)[77] and regional or local programs such as the GCMRC. At the state level, many states have their own substantial monitoring programs. Some are part of a larger state-federal "cooperative federalism" regulatory framework (such as state water-quality monitoring programs under the federal Clean Water Act);[78] others were developed by states on their own initiative, such as California's efforts to establish its own environmental indicators program[79] or the network of state "natural heritage" programs that

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those of public institutions, might help or hinder the collection of environmental information.

72. *About Us: An Overview of COAST*, CENTER FOR COASTAL MONITORING & ASSESSMENT, http://ccma.nos.noaa.gov/about/coast/overview.aspx (last visited June 22, 2011).

73. *Forest Inventory and Analysis National Program*, USDA FOREST SERVICE, http://fia.fs.fed.us (last visited June 22, 2011).

74. *National Wetlands Inventory*, U.S. FISH & WILDLIFE SERVICE, http://www.fws.gov/nwi (last visited June 22, 2011).

75. *Grand Canyon Monitoring and Research Center*, U.S. GEOLOGICAL SURV., http://www.gcmrc.gov (last visited June 22, 2011).

76. *RECOVER: Restoration Coordination & Verification*, COMPREHENSIVE EVERGLADES RESTORATION PLAN, http://www.evergladesplan.org/pm/recover/recover.aspx (last visited June 22, 2011).

77. *Status and Trends of Biological Resources Program*, U.S. GEOLOGICAL SURV., http://biology.usgs.gov/status_trends (last visited June 22, 2011).

78. *See, e.g.*, 33 U.S.C. § 1315 (2006).

79. *See Environmental Protection Indicators for California*, OFFICE ENVTL. HEALTH HAZARD ASSESSMENT, http://www.oehha.ca.gov/multimedia/epic/index.html (last visited June 22, 2011).

provide data about rare and endangered species around the country.[80]

These existing monitoring programs collect a tremendous amount of information. But nonetheless, the consensus is that the remaining gaps are large,[81] whether it is information about the level of exposures to chemical risks for the public at large,[82] water quality,[83] wildlife,[84] rangeland health,[85] or forest health.[86] Current efforts by a leading environmental foundation to develop indicators on the quality of the environment in the United States have been limited by data gaps that prevent any assessment of about forty percent of

80. *See About Us*, NATURESERVE, http://www.natureserve.org/about Us/index.jsp (last visited June 22, 2011). NatureServe is a public-private partnership of (primarily public) "natural heritage" organizations in all fifty states that was created over the past fifteen to twenty years and has been very successful in creating a national monitoring and data management program for information about endangered species. *Id.*

81. U.S. GEN. ACCOUNTING OFFICE, GAO/OCG-99-17, MAJOR MANAGEMENT CHALLENGES AND PROGRAM RISKS: ENVIRONMENTAL PROTECTION AGENCY 15–16 (1999) (identifying major gaps in the EPA's environmental data); *see, e.g.*, Lori Snyder Bennear & Cary Coglianese, *Measuring Progress: Program Evaluation of Environmental Policies*, ENV'T, Mar. 2005, at 22, 32; Christensen et al., *supra* note 66, at 681; Robert L. Fischman, *The Divides of Environmental Law and the Problem of Harm in the Endangered Species Act*, 83 IND. L.J. 661 (2008); Robin O'Malley et al., *Closing the Environmental Data Gap*, ISSUES SCI. & TECH., Spring 2009, at 69; Wagner, *supra* note 30, at 1625–31.

82. Applegate, *supra* note 30, at 1380–83 (noting the lack of any toxicity information for over half of the 100 highest production chemicals).

83. U.S. GEN. ACCOUNTING OFFICE, GAO/RCED-00-54, WATER QUALITY: KEY EPA AND STATE DECISIONS LIMITED BY INCONSISTENT AND INCOMPLETE DATA 25–35 (2000) (detailing that much state water quality data is unreliable); Sidney A. Shapiro & Rena Steinzor, *Capture, Accountability, and Regulatory Metrics*, 86 TEX. L. REV. 1741, 1771 (2008) (citing EPA figures, which show that only nineteen percent of river and stream miles and thirty-seven percent of lake, pond, and reservoir acres have water quality assessments).

84. U.S. GEOLOGICAL SURVEY, U.S. DEP'T OF INTERIOR, STATUS AND TRENDS OF THE NATION'S BIOLOGICAL RESOURCES 4 (Michael J. Mac et. al. eds., 1998), *available at* http://www.nwrc.usgs.gov/sandt/SNT.pdf [hereinafter STATUS AND TRENDS] ("[T]he information available to describe the status and trends of many organisms is extremely limited."); *see also* O'Malley et al., *supra* note 81, at 72 ("[I]nformation on short-term population trends was available for only about half of the vertebrate species at risk of extinction and only about a quarter of invertebrates.").

85. SUSTAINABLE RANGELANDS ROUNDTABLE, CRITERIA AND INDICATORS FOR SUSTAINABLE RANGELANDS 9–10 (2009) (describing how the national effort to develop indicators of rangeland health ran into obstacles because of a lack of data); *see also id.* at app. 2-1 (providing an overview of proposed indicators for which data are lacking).

86. *See* U.S. FOREST SERV., NATIONAL REPORT ON SUSTAINABLE FORESTS 2010, at 2-140 to 2-143 (2008) (providing a table with an overview of data quality for indicators of forest health showing substantial numbers without good data).

proposed indicators and limit the quality of the assessment for many more.[87] These failures exist at both the federal[88] and the state levels.[89]

C. The Challenges of Effective Ambient Environmental Monitoring

The gaps in our ambient monitoring programs are not surprising considering the difficulty of effective ambient monitoring. That difficulty stems from the tremendous variability in environmental resources and the uncertainty of our knowledge about that variability. Environmental processes function at radically different rates and at "spatial and temporal scales covering several orders of magnitude," and variations are not linear, making extrapolation over time and space difficult.[90] Indeed, this complexity and uncertainty has been a major rationale for ecosystem and adaptive management.[91]

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87. H. JOHN HEINZ III CTR. FOR SCI., ECON., & THE ENV'T, ENVIRONMENTAL INFORMATION: A ROAD MAP TO THE FUTURE 8 (2008) [hereinafter A ROAD MAP TO THE FUTURE]; *see also* H. JOHN HEINZ III CTR. FOR SCI, ECON., & THE ENV'T, FILLING THE GAPS: PRIORITY DATA NEEDS AND KEY MANAGEMENT CHALLENGES FOR NATIONAL REPORTING ON ECOSYSTEM CONDITION 13–14 & fig.1, 22, app. A (2006) [hereinafter FILLING THE GAPS]; H. JOHN HEINZ III CTR. FOR SCI., ECON., & THE ENV'T, HIGHLIGHTS, THE STATE OF THE NATION'S ECOSYSTEMS 2008, at 6–7 tbl.1 (2008).

88. *See supra* notes 85–86 (weaknesses in federal land management agency data).

89. *See supra* notes 1–3, 83 (failures in state water quality monitoring programs). The California Environmental Indicators program has released only one report since 2005, apparently a casualty of the state's budget crisis. *See Environmental Protection Indicators for California*, *supra* note 79 (listing reports provided by program, limited to a 2004 general report and 2005 update, and a 2009 report focused on climate change indicators); OFFICE OF ENVTL. HEALTH HAZARD ASSESSMENT, CAL. ENVTL. PROT. AGENCY, INDICATORS OF CLIMATE CHANGE IN CALIFORNIA (2009) (focusing on indicators that provide evidence of climate change and its impacts in California); CAL. RES. AGENCY, CAL. ENVTL. PROT. AGENCY, ENVIRONMENTAL PROTECTION INDICATORS FOR CALIFORNIA 2004 UPDATE add. 1, at 1 (2005), http://www.oehha.ca.gov/multimedia/epic/pdf/ADDENDUM-June2005complete.pdf (noting that fiscal constraints prevented the expansion of the program to cover needed indicators for which current data were insufficient).

90. Holling & Meffe, *supra* note 53, at 335.

91. Ruhl, *Taking Adaptive Management Seriously*, *supra* note 53, at 1260, 1263. *See generally* Ruhl, *Thinking of Environmental Law as a Complex Adaptive System*, *supra* note 53.

In this section, I talk about the monitoring of environmental resources, variables, or indicators. By resources, I mean the actual physical environmental qualities in which we are interested (e.g., how clean is the water, how plentiful is

Complexity and uncertainty mean that effective monitoring must be extended over considerable periods of time, that designing monitoring programs to effectively answer specific questions will be difficult and require significant expertise, and that monitoring will often be such a costly endeavor that managers and regulators might regularly rely on shortcuts. In this section, I develop all of these obstacles in detail; this provides a foundation for my analysis of the legal and institutional challenges that face agencies seeking to conduct effective monitoring.

1. Measurement over Time: Continuity and Longevity

A key part of monitoring, and a key challenge, is measuring variables over an extended period of time.[92] There are two aspects to this problem: continuity—how regularly measurements are made (i.e., whether there are gaps in the collection of measurements over time), and longevity—how long over time measurements are made (i.e., how many days, weeks, months, years, or decades the series of measurements covers).

Continuous monitoring is important because data gaps reduce the ability to assess the full scope of variability in environmental resources. Infrequent but significant events are often crucial to the status of environmental resources.[93] If, for

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an endangered species). By variables, I mean the physical characteristics that we measure in order to evaluate the environmental resource (e.g., we might measure the levels of a particular toxic pollutant in order to understand how clean the water is). By indicators, I mean the measurement or analysis of variables that are intended to serve as a proxy for other environmental variables, often because those other variables are too expensive or difficult to measure directly.

92. Leslie M. Reid, *The Epidemiology of Monitoring*, 37 J. AM. WATER RESOURCES ASS'N 815, 817 (2001) (noting that one-quarter of flawed monitoring programs studied "were not of sufficient duration to answer the questions posed"); LEE, *supra* note 66, at 175 ("The most foreseeable risk to ecosystem management is that the overall picture of the system will be damaged by interruption of data collection as some measurements are discontinued and by loss of existing data."). For definitions of monitoring that emphasize the temporal aspect, see, for example, T. Brydges, *Basic Concepts and Applications of Environmental Monitoring*, *in* ENVIRONMENTAL MONITORING 83, 84 (G. Bruce Wiersma ed., 2004); SPELLERBERG, *supra* note 42, at 2; CARYL L. ELZINGA ET AL., MONITORING PLANT AND ANIMAL POPULATIONS 2 (2001); Martin Kent, Book Note, *The Enigma of Ecosystem and Conservation Monitoring*, 30 J. BIOGEOGRAPHY 312, 313 (2003).

93. *See* Craig E. Williamson et al., *Lakes and Streams as Sentinels of Environmental Change in Terrestrial and Atmospheric Processes*, 6 FRONTIERS ECOLOGY & ENV'T 247, 248 (2008); *see also* Gary E. Davis, *Design Elements of Monitoring Programs: The Necessary Ingredients for Success*, 26 ENVTL.

example, one collects data over a twenty-year period, but with one year of that data missing, one might lose the ability to assess the frequency and intensity of events that could occur less frequently than every twenty years—and the missing data might be the one year when that rare event occurred. The higher, the more unpredictable, and the more unknown the variability of the system, the more important continuous data collection will be. Moreover, data may be missing for a reason, biasing the results of the monitoring program.[94] And because there is always something special or unique about any given individual time period, critics can use missing data to challenge the quality of the monitoring data and any management recommendations based on that data.

Continuity refers not just to the actual taking of measurements but also to making sure that data collection protocols are consistent over time (or at least compatible), so that data can be analyzed over the entire time period of the monitoring program.[95] Changes in monitoring methodologies can make it impossible to draw comparisons of data over time.

MONITORING & ASSESSMENT 99, 100–01 (1993); Jerry F. Franklin et al., *Contributions of the Long-Term Ecological Research Program*, 40 BIOSCIENCE 509, 509 (1990) (noting the importance of "infrequent (rare or episodic) events, including such disturbances as floods, hurricanes, wildfires, or volcanic eruptions" in ecology and that "[l]ong-term studies are essential to understand[ing] such phenomena"); Jerry F. Franklin, *Importance and Justification of Long-Term Studies in Ecology*, *in* LONG-TERM STUDIES IN ECOLOGY: APPROACHES AND ALTERNATIVES 3, 5–6 (Gene E. Likens ed., 1989); L. Roy Taylor, *Objective and Experiment in Long-Term Research*, *in* LONG-TERM STUDIES IN ECOLOGY: APPROACHES AND ALTERNATIVES, *supra*.

94. For instance, flood gauge data might be missing because a particularly large flood event destroyed the gauges, creating bias that systematically underestimates the importance and likelihood of large flood events. Lance H. Gunderson, *Foreword, Learning to Monitoring or Monitoring to Learn?*, *in* MONITORING ECOSYSTEMS: INTERDISCIPLINARY APPROACHES FOR EVALUATING ECOREGIONAL INITIATIVES xi, xiii (David E. Busch & Joel C. Trexler eds., 2003) ("[C]ases when monitoring was eliminated because of budget restrictions have proved to be ecologically critical years. It was during these critical periods when the system underwent a major transformation, yet those years became missing points on time-series plots."); NAT'L RESEARCH COUNCIL, A BIOLOGICAL SURVEY FOR THE NATION 8 (1993); *see also, e.g.*, Donald B. Rubin, *Inference and Missing Data*, 63 BIOMETRIKA 581, 581 (1976) (ignoring the processes that cause missing data is only appropriate if those processes are random).

95. SPELLERBERG, *supra* note 42, at 231; Michael B. Usher, *Scientific Requirements of a Monitoring Programme*, *in* MONITORING FOR CONSERVATION AND ECOLOGY 15, 27 (Barrie Goldsmith ed., 1991); Paul L. Ringold et al., *Design of an Ecological Monitoring Strategy for the Forest Plan in the Pacific Northwest*, *in* MONITORING ECOSYSTEMS, *supra* note 94, at 73, 82–83.

Longevity is important for several reasons. Many environmental resources change at a slow rate,[96] and if trends are subtle, then significant time may be needed to identify the trend.[97] It can be extremely time-consuming to identify declines in the populations of wildlife species, where even the sharpest declines are often measured by just a few percentage points annually.[98]

Long-term monitoring is also important for understanding whether changes in a set of variables or indicators are the product of an underlying change in the resource instead of temporary fluctuations, a particularly important issue given the high and uncertain variability of most environmental resources.[99] Without long-term data, it may be impossible to separate year-to-year variations from long-term trends that are of greater management interest.[100] For instance, measures of atmospheric levels of carbon dioxide had to continue for several years before seasonal patterns of changes could be detected and an overall increase in carbon dioxide levels over time could be differentiated from those seasonal patterns.[101] Satellite measurements of global environmental variables often require decades to identify long-term cycles and distinguish those cycles from potentially human-caused impacts due to increases

96. SPELLERBERG, *supra* note 42, at 22; Franklin, *supra* note 93, at 4; Gene E. Likens, *Preface*, *in* LONG-TERM STUDIES IN ECOLOGY: APPROACHES AND ALTERNATIVES ix, x–xi (Gene E. Likens ed., 1989).

97. *See* DAVID STRAYER ET AL., LONG-TERM ECOLOGICAL STUDIES: AN ILLUSTRATED ACCOUNT OF THEIR DESIGN, OPERATION, AND IMPORTANCE TO ECOLOGY 7–8 (1986); Franklin et al., *supra* note 93, at 509; A. Wolfe et al., *Long-Term Biological Data Sets: Their Role in Research, Monitoring, and Management of Estuarine and Coastal Marine Systems*, 10 ESTAURIES 181, 183 (1987) ("Long-term data sets are essential for field verification when subtle changes or long-term effects are involved.").

98. Teresa Woods & Steve Morey, *Uncertainty and the Endangered Species Act*, 83 IND. L.J. 529, 532 (2008).

99. NAT'L RESEARCH COUNCIL, A BIOLOGICAL SURVEY FOR THE NATION 4 (1993); SPELLERBERG, *supra* note 42, at 22; Brydges, *supra* note 92, at 84; Hellawell, *supra* note 42, at 13, 13 fig.1.6; Wolfe et al., *supra* note 97, at 185–86; Kent, *supra* note 92, at 313 (noting the challenge for monitoring of "isolating human impact/management effects from underlying 'natural' variability in species populations and environmental variables").

100. According to one study, about five years are required to develop a reasonable estimate of the variance of an ecological variable. *See* Timothy K. Kratz et al., *Temporal and Spatial Variability as Neglected Ecosystem Properties: Lessons Learned from 12 North American Ecosystems*, *in* EVALUATING AND MONITORING THE HEALTH OF LARGE-SCALE ECOSYSTEMS 359, 367 (David J. Rapport et al. eds., 1995).

101. Charles D. Keeling, *Rewards and Penalties of Monitoring the Earth*, 23 ANN. REV. ENERGY ENV'T 25, 39–42, 47 (1998).

in global temperatures.[102] Other examples abound, such as ice records on lakes that extend 130 years, providing evidence of general warming trends that are otherwise invisible.[103]

In addition, understanding causal linkages often requires data collection over long periods of time. For instance, long-term data can reveal the response of environmental resources to infrequent disturbances, allowing a determination of not just whether changes are occurring, but also why.[104]

Finally, monitoring may need to be long-term simply because it takes time for the relevant data to accumulate: Salmon runs occur at most a few times a year, and so obtaining significant data may require many years of observation;[105] collecting adequate data on the presence of an endangered bat species near a proposed wind farm in West Virginia required three years of surveys.[106] And just as with continuous monitoring, one might need long-term monitoring to respond to political arguments that the data do not extend long enough to cover the full range of variability for a resource. [107]

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102. NAT'L RESEARCH COUNCIL, EARTH SCIENCE AND APPLICATIONS FROM SPACE: NATIONAL IMPERATIVES FOR THE NEXT DECADE AND BEYOND 62–66 (2007); NAT'L RESEARCH COUNCIL, OPTIONS TO ENSURE THE CLIMATE RECORD FROM NPOESS AND GOES-R SPACECRAFT 2–3, 18–20 (2008).

103. John J. Magnuson, *Long-Term Ecological Research and the Invisible Present*, 40 BIOSCIENCE 495, 495 (1990).

104. SPELLERBERG, *supra* note 42, at 22; Brydges, *supra* note 92, at 88 (noting the importance of long term, multimedia "integrated monitoring" for identification of both "what changes are occurring and why they are happening"); Magnuson, *supra* note 103, at 497–98.

105. Kai Lee, *Appraising Adaptive Management*, 3 CONSERVATION ECOLOGY 3 (1999) ("Most natural indicators yield one data point a year; even a simple trend takes patience . . . ."); *see also* Ray Hilborn, *Can Fisheries Agencies Learn from Experience?*, 17 FISHERIES 6, 8–10 (1992).

106. *See* Animal Welfare Inst. v. Beech Ridge Energy LLC, 675 F. Supp. 2d 540 (D. Md. 2009).

107. "Long-term" can mean significant periods of time, extending to decades or longer. Brydges, *supra* note 92, at 88. A leading reference in the field recommends at least five years of data to detect trends in plant and animal populations. ELZINGA ET AL., *supra* note 92, at 191. "[D]ata for reporting on change in carbon . . . in forest soils, forest floors, and down woody debris" will take about ten years to result in "adequate data to report changes." FILLING THE GAPS, *supra* note 87, at 77; NAT'L RESEARCH COUNCIL, DOWNSTREAM: ADAPTIVE MANAGEMENT OF GLEN CANYON DAM AND THE COLORADO RIVER ECOSYSTEMS 45 (1999) (noting the need for "decades of data collection" to understand the "multidecadal life span and population dynamics" of long-lived fish species); Scott A. Hatch, *Statistical Power for Detecting Trends with Applications to Seabird Monitoring*, 111 BIOLOGICAL CONSERVATION 217 (2003) (reporting that to identify declines in wildlife populations, monitoring programs may have to operate from eleven to sixty-nine years); Gene E. Likens, *A Priority for Ecological Research*, 64 BULL. ECOLOGICAL SOC'Y AM. 234, 234–39 (1983).

2. Designing Monitoring Programs to Answer the Relevant Questions

Effective monitoring requires collecting enough of the right kind of data to answer effectively the questions the monitoring program was established to address.[108] There are at least three important issues here: measuring the right variables, measuring those variables at the right scale, and measuring those variables at sufficient levels.

First, a monitoring program may measure variables that are not actually connected to the underlying resources that are of management interest.[109] Choosing wrong or misleading variables or indicators can cause serious management problems if it leads the agency to ignore important environmental problems that are not adequately represented in its measurements.[110] For instance, wetlands managers and regulators have been criticized for overemphasizing a simplistic focus on total acreage of wetlands available instead of considering the quality of the wetlands being protected or restored.[111]

Second, if an environmental resource varies at a different scale from the monitoring program (larger or smaller geographically, or shorter or longer temporally), then monitoring will be ineffective.[112] A mismatch in scale can drown any signal with large variability in the monitoring data, greatly undermining the effectiveness of the monitoring program. It can also cause the reverse problem, where the monitoring program is unable to detect important variations that are happening at a finer resolution than the scale of the monitoring program.

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108. Reid, *supra* note 92, at 815 (finding that thirty percent of flawed monitoring programs studied could not provide the kind of information that "was needed to meet the project objectives").

109. Barry R. Noon, *Conceptual Issues in Monitoring Ecological Resources*, *in* MONITORING ECOSYSTEMS, *supra* note 94, at 27, 42–43.

110. *See generally* ACKERMAN ET AL., *supra* note 71 (noting how the existence of data on biological oxygen demand in the Delaware River caused policymakers and technocrats to focus on that variable to the exclusion of other, possibly more relevant variables such as turbidity).

111. *See* Lisa Dale & Andrea K. Gerlak, *It's All in the Numbers: Acreage Tallies and Environmental Program Evaluation*, 39 ENV'T MGMT. 246 (2007).

112. *See* Hellawell, *supra* note 42, at 9–13; Usher, *supra* note 95, at 18–19; Noon, *supra* note 109, at 50, 60–61; Robert J. Livingston, *Field Sampling in Estuaries: The Relationship of Scale to Variability*, 10 ESTUARIES 193 (1987); NAT'L RESEARCH COUNCIL, ECOLOGICAL INDICATORS FOR THE NATION 153–54 (2000); DOWNES ET AL., *supra* note 44, at 197–248.

For instance, if a resource only varies at a global scale and at a pace of months or years (such as concentrations of carbon dioxide in the atmosphere), more frequent measurements or many local measurement stations will be a waste of resources. On the other hand, if a resource varies at a level of meters and at a pace of days or even hours, then infrequent measurements or highly dispersed measurement stations will be highly misleading. Matching scale is particularly difficult because the appropriate scale will vary depending on the resource being monitored and the questions being asked.[113] A study of the same resource but asking different questions (e.g., how does water quality in a small urban stream change after large rain events, compared to understanding whether the average water quality has gotten consistently worse in that urban waterway) will require very different scales for monitoring.[114] The problem is further complicated by a common trade-off between frequent temporal coverage and widespread geographic coverage—in other words, it will usually be prohibitively expensive to conduct over the same area and time frame many more frequent measurements at many closely spaced monitoring stations.[115] For some variables with high spatial and temporal variability, "which include many of the critical environmental conditions," good information "is almost never available" to help understand status and trends of environmental conditions.[116]

One example of the problem of scale is demonstrated by temporary releases of hazardous air pollutants by industrial facilities (often from equipment malfunctions) that adjoin residential neighborhoods—releases that are a major health risk.[117] Initial identification of these harms can be done most effectively through the use of mobile monitoring stations, rather than long-term, fixed monitoring sites, which are often

113. STATUS AND TRENDS, *supra* note 84, at 5 (noting how the scale for monitoring can vary tremendously from one wildlife species to another); ENVTL. MONITORING TEAM, NAT'L SCI. & TECH. COUNCIL, INTEGRATING THE NATION'S ENVIRONMENTAL MONITORING AND RESEARCH NETWORKS AND PROGRAMS: A PROPOSED FRAMEWORK 35 (1997) ("Environmental issues that must be addressed by [monitoring] inevitably will have different properties of spatial and temporal variability and, thus, require different sampling designs.").

114. *See generally* Wagner, *supra* note 34.

115. ENVTL. MONITORING TEAM, *supra* note 113, at 5–6.

116. *Id.*

117. *See* Thomas O. McGarity, *Hazardous Air Pollutants, Migrating Hot Spots, and the Prospect of Data-Driven Regulation of Complex Industrial Complexes*, 86 TEX. L. REV. 1445, 1452 (2008).

ineffective because sample collection is infrequent in time and space.[118] Likewise, beach water-quality measurement programs are often only conducted weekly—even though water quality can vary tremendously over a few hours in response to rain storms.[119] The lack of frequent testing means that spikes in water pollution that might adversely affect swimmers can go undetected. And the Chesapeake Bay restoration program has been conducting water-quality monitoring for decades on the aggregate level of the principal pollutants entering the Bay from the major watersheds (such as the total level of pollutants entering from the Potomac River watershed).[120] The problem is that this monitoring program was unable to pinpoint where major pollution sources were located within a large watershed, nor was it able to identify the effectiveness of various management or regulatory efforts within a watershed (e.g., the effectiveness of efforts to control pollution from farms along a particular tributary to the Potomac River).[121] Yet it is the second set of data that is essential to the pursuit of adaptive management, since it will inform decision makers about the utility of various management or regulatory strategies.[122]

Because of the interaction of technical and budgetary limitations, the nature of the research or management question being asked, and the variability of the resource being

118. *See id.* at 1479 (noting that the stationary monitor for air pollution only collects data every sixth day); Dara O'Rourke & Gregg P. Macey, *Community Environmental Policing: Assessing New Strategies of Public Participation in Environmental Regulation*, 22 J. POL'Y ANALYSIS & MGMT., 383, 383–84, 395 (2003).

119. *See* sources cited *supra* note 8.

120. *See* HOWARD R. ERNST, CHESAPEAKE BAY BLUES: SCIENCE, POLITICS, AND THE STRUGGLE TO SAVE THE BAY 134–36 (2003). *See generally* CHESAPEAKE BAY PROGRAM SCIENTIFIC & TECHNICAL ADVISORY COMM. & CHESAPEAKE BAY PROGRAM WATERSHED PARTNERS SENIOR MANAGERS, DEVELOPMENT AND IMPLEMENTATION OF A PROCESS FOR ESTABLISHING CHESAPEAKE BAY PROGRAM'S MONITORING PROGRAM PRIORITIES AND OBJECTIVES (2009); TASK FORCE ON ANALYSIS OF NON-TIDAL WATER QUALITY MODELING RESULTS, SCIENTIFIC & TECHNICAL ADVISORY COMM. OF THE CHESAPEAKE BAY PROGRAM, ASSESSING PROGRESS AND EFFECTIVENESS THROUGH MONITORING RIVERS AND STREAMS (2005) [hereinafter ASSESSING PROGRESS AND EFFECTIVENESS]; TASK FORCE ON NON-TIDAL WATER QUALITY MONITORING NETWORK DESIGN, SCIENTIFIC & TECHNICAL ADVISORY COMM. OF THE CHESAPEAKE BAY PROGRAM, RECOMMENDATIONS FOR REFINEMENT OF A SPATIALLY REPRESENTATIVE NON-TIDAL WATER QUALITY MONITORING NETWORK FOR THE CHESAPEAKE BAY WATERSHED (2005).

121. *See* sources cited *supra* note 120.

122. *See* ASSESSING PROGRESS AND EFFECTIVENESS, *supra* note 120, at 17–19; sources cited *supra* note 120.

measured, the question of the appropriate scale for measurement of a resource is typically extremely difficult to answer. Moreover, because of the tremendous uncertainty about the variability of many environmental resources, answering these questions will involve high levels of uncertainty as well. As a result, it will be extremely difficult for outsiders not steeped in the details of any one monitoring program to assess its validity on this point.

The third problem is that many monitoring programs require the identification of a statistically significant difference or correlation in order to justify management changes.[123] However, if the monitoring program is not collecting enough data to be able to detect statistically significant differences at a level that is important for the management program (i.e., if the resolution of the monitoring program is too low), the monitoring program will be ineffective.[124] For instance, Congress required NOAA to determine whether a certain form of tuna fishing was harming dolphin populations.[125] The study that NOAA developed did not examine enough dolphins in order to obtain results that could answer the congressionally mandated questions.[126] This problem is also highly technical because for many resources we do not know the resource's full range of variability—a necessary precondition for a determination of how many measurements are needed to reduce uncertainty to an acceptable level. And again, because these questions require detailed understanding of the monitoring program, statistics, and the resource, it will be

123. ELZINGA ET AL., *supra* note 92, at 186 (noting general practice for trend detection is that if a regression does not find a slope that is statistically significant from zero, "then a population is assumed to be stable"); Doremus, *supra* note 53, at 74 (noting that the plan required monitoring to show a "statistically significant shortfall between performance expectations and actual results" to trigger mandatory management changes); James D. Nichols & Byron K. Williams, *Monitoring for Conservation*, 21 TRENDS ECOLOGY & EVOLUTION 668, 670 (2006) (noting that in general practice "population declines are identified by means of a statistical test of a null hypothesis of no decline versus a decline" triggering a decision to change management or conduct more intense monitoring).

124. ELZINGA ET AL., *supra* note 92, at 265–70; SPELLERBERG, *supra* note 42, at 234; Nichols & Williams, *supra* note 123, at 670–71; Noon, *supra* note 109, at 43–44; Usher, *supra* note 95, at 16–18.

125. *See* Earth Island Inst. v. Hogarth, 494 F.3d 757, 760 (9th Cir. 2007).

126. *Id.* at 764–65 ("The NOAA determined that a minimum sample size of 300 dolphins per species was necessary to make scientifically valid conclusions regarding fishery-related effects. . . . Instead, the NOAA studied a meager total of 56 dolphins . . . .").

difficult for outsiders to evaluate the quality of monitoring programs.

3. The Costliness of Monitoring, and Its Implications

Given all of the above, it is not surprising that effective monitoring is costly.[127] Monitoring the restoration of a riparian habitat in one small creek costs "as much as actual construction of the habitat improvements and [requires] three years of data for statistically reliable confirmation."[128] The most recent, best estimate of how much money we spend on monitoring is about $600 million a year at the federal level alone.[129] Often, expensive monitoring only produces a limited amount of data of limited utility.[130] The high cost of monitoring raises two obvious questions: Are there ways to reduce the costs? And how much do we really need to spend on monitoring?

a. Lowering the Cost of Monitoring

One option to address the high cost of monitoring might be technological advances, such as remote sensing of resources from satellites that can reduce the cost of monitoring; however, they are no panacea. For instance, satellite monitoring often requires significant measurements on the ground ("ground-truthing") to ensure accuracy, and a wide range of important resources and variables are not amenable to satellite monitoring.[131] But even a significant reduction in the cost of monitoring still will not eliminate the challenges of monitoring: One cannot monitor everything everywhere, so managers and regulators have to make choices about when to measure, how to measure, and what to measure. Even for low-cost monitoring

127. Doremus, *supra* note 66, at 447–49; Kai N. Lee & Jody Lawrence, *Adaptive Management: Learning from the Columbia River Basin Fish and Wildlife Program*, 16 ENVTL. L. 431, 455 (1986) ("[M]onitoring and evaluation can cost substantially more than all the rest of the implementation process."); Volkman & McConnaha, *supra* note 59, at 1261.

128. Lee & Lawrence, *supra* note 127, at 447.

129. A ROAD MAP TO THE FUTURE, *supra* note 87, at 18 n.3.

130. Kai N. Lee, *Deliberately Seeking Sustainability in the Columbia River Basin*, *in* BARRIERS AND BRIDGES TO THE RENEWAL OF ECOSYSTEMS AND INSTITUTIONS 214, 224–26 (Lance H. Gunderson et al. eds., 1995).

131. *See* NAT'L RESEARCH COUNCIL, ECOLOGICAL INDICATORS FOR THE NATION 60 (2000). See Esty, *supra* note 30, at 158–67, for a thorough overview of the possibilities that new technology might create for monitoring.

systems, continuity will be important, and the choices about when, how, and what to measure will be technical and often opaque to non-experts, contributing to the obstacles I develop in Part II.

There is also a range of analytic tools that can reduce the costs of monitoring. Variables used to measure one resource can be used as indicators to estimate the values of another resource that is more expensive or difficult to monitor ("proxies").[132] Models can reduce the need for monitoring data by allowing the extrapolation of results from one place or time to another.[133] Both proxies and models are widely used in environmental decision-making because of the "logistical and financial constraints associated with not being able to measur[e] everything everywhere."[134] But both proxies and scientific models are built upon assumptions, which are often based on value judgments and therefore tend to be contested.[135] The technical and complicated nature of many models makes it easy for an analyst to hide important assumptions from outside observers.[136]

b. The Inherently Political Question of How Much Monitoring Is Enough

The high cost of monitoring raises the question of how to prioritize among various monitoring programs and how to ensure that monitoring is cost-effective.[137] Answering these

132. Robert L. Glicksman, *Bridging Data Gaps Through Modeling and Evaluation of Surrogates: Use of the Best Available Science to Protect Biodiversity Under the National Forest Management Act*, 83 IND. L.J. 465, 467 (2008).

133. *See id.* at 474–79; *see also* DOWNES ET AL., *supra* note 44, at 164–94 (describing the range of models relevant for monitoring).

134. ENVTL. MONITORING TEAM, *supra* note 113, at 17.

135. James D. Fine & Dave Owen, *Technocracy and Democracy: Conflicts Between Models and Participation in Environmental Law and Planning*, 56 HASTINGS L.J. 901, 922–24, 926–29 (2005); Glicksman, *supra* note 132, at 467, 480–81; Thomas O. McGarity & Wendy E. Wagner, *Legal Aspects of the Regulatory Use of Environmental Modeling*, 33 ENVTL. L. REP. 10751 (2003); Wendy Wagner et al., *Misunderstanding Models in Environmental and Public Health Regulation*, 18 N.Y.U. ENVTL. L.J. 293, 295, 304 (2010).

136. Fine & Owen, *supra* note 135, at 926, 932; Glicksman, *supra* note 132, at 481–82 (discussing claims that natural resource management agencies, "intentionally or not, have masked their value judgments in the language of technical determinations," making it extremely difficult for outsiders to effectively judge how the agency is using the available data and the extent to which assumptions and the value judgments underlying those judgments affect the agency's decision); *see generally* Wagner et al., *supra* note 135.

137. *See* Doremus, *supra* note 66, at 447–51.

questions requires an understanding of how effectively our existing monitoring programs are functioning and how effectively any new investments will pay off.

But that understanding in turn requires significant time and expertise to obtain estimates that will still be highly uncertain. Because monitoring programs are extremely opaque for outsiders to assess, assessments of how much to monitor are very difficult. This raises an "infinite regress" problem—if monitoring is hard to assess, then monitoring of monitoring is therefore also hard to assess, and so on.

That does not mean we cannot draw any conclusions whatsoever about monitoring. It is relatively easy to determine when you have no monitoring data *at all*, and as noted earlier, that is all too frequent in environmental policy making today in the United States. The challenge is assessing, once a monitoring program is in place, whether it is providing effective answers to the relevant regulatory and management questions or whether it is (by design or by accident) providing the illusion of monitoring.[138]

The questions of how much and how well to monitor are therefore probably not questions that easily or readily lend themselves to fine-grained assessments. Instead, we will often have to rely on relatively crude assessments on the nature, quality, and worth of our monitoring programs. One shortcut is to ignore the "technical" questions of the statistical power, scale, and frequency of monitoring data collection and instead focus on the institutional and legal structures that implement a monitoring program. If we trust those structures to create positive incentives for effective monitoring, then we might have much more confidence that the outputs of our monitoring program are indeed effective.[139] Legal scholars have highlighted the importance of trust in making environmental programs operate effectively, in part because of the tremendous uncertainties that permeate decision-making in environmental law and policy.[140] The opacity of assessing whether monitoring

138. The effectiveness of monitoring can be seen as an extreme example of the hard-to-measure outputs of public agencies, a characteristic that has significant implications for how public agency management functions. *See infra* Part II.B.

139. *See* Rebecca M. Bratspies, *Regulatory Trust*, 51 ARIZ. L. REV. 575, 594, 603–05, 619 (2009).

140. *See id.* at 601 ("[U]ncertainty is a hallmark of situations requiring trust."); Richard J. Lazarus, *The Tragedy of Distrust in the Implementation of Federal Environmental Law*, 54 LAW & CONTEMP. PROBS. 311 (1991).

programs are effective or not also creates significant uncertainty, and thus a need to establish trust.

The importance of establishing trust for monitoring programs means that monitoring is inherently a political question.[141] Yet monitoring is often seen as one of the most technical and non-political parts of the implementation of environmental law—the monitoring literature almost exclusively focuses on technical questions, such as which variables best reflect changes in the resources of interest.[142] The assumption that monitoring is a technical, apolitical question probably also explains why so much of the existing environmental law and policy literature has elided the political, institutional, and legal obstacles to effective monitoring and instead assumed that monitoring will occur as a matter of course, at least for public agencies. But identifying those obstacles to trust is key to solving environmental law's monitoring problem.

II. OBSTACLES TO AGENCY MONITORING

Environmental monitoring requires continuity, consistency and significant expertise and effort to be successful. These characteristics create two main legal or institutional challenges for the achievement of effective environmental monitoring: the need for institutional continuity, and the relative opacity of assessing whether monitoring is effective. These challenges produce significant constraints on the public agencies seeking to conduct effective environmental monitoring.[143]

The need for continuity in monitoring leads to two major problems: myopic legislatures and agencies that cut monitoring

141. *See* SAMUEL P. HAYS, EXPLORATIONS IN ENVIRONMENTAL HISTORY 54–55 (1998) ("If the agency believes that it can work out a monitoring system by itself based upon a 'scientific' determination of the inherent qualities of the [resource] that will resolve disputes, then I think that it is sorely mistaken.").

142. *See, e.g.*, SAYRE ET AL., *supra* note 58.

143. Of course, there are many reasons why agencies might want to conduct monitoring. Monitoring may be seen as providing crucial information that is relevant for the agency's accomplishment of a necessary task. For instance, engineers constructing a dam may want a good sense of the variability of water flows in a river system so that they can properly design the dam and its storage capacity to handle flood events. Policymakers may be genuinely interested in determining whether environmental conditions are improving, declining, or stable to make decisions about whether and how to change environmental policy. Scientists may be genuinely interested in obtaining long-term information about a resource in order to investigate its characteristics and gain new information.

budgets in order to fund activities with more short-term payoffs; and the long-term nature of monitoring makes it unappealing professionally for the agency scientists who are often key figures in monitoring programs.

Likewise, opacity leads to two main problems: the difficulty of evaluating whether monitoring is effective leads agencies to underinvest in environmental monitoring in comparison to other activities that are more easily assessed; and the difficulty of evaluating monitoring data is one of the factors that leads courts to grant significant deference to agencies in judicial review, reducing the incentives for agencies to collect additional data.

And both continuity and opacity combine to cause two problems: together they make the political dynamics very difficult for monitoring because both factors produce significant advantages for regulated industry in overseeing the implementation of monitoring programs by environmental agencies; and both factors create uncertainty for agencies as to the results of monitoring, creating risks for the institutional autonomy that agencies value.

For purposes of this Part's analysis, these problems are split into two overarching categories: those that are the result of external constraints on the agency; and those that are the result of internal forces within the agency.

A. External Constraints on Agency Monitoring Programs

Actors external to the agency—Congress, the President, interest groups, the media, the public, or the courts—might constrain an agency's ability or willingness to develop and maintain an effective monitoring program in a variety of ways.

1. Political Constraints

The National Biological Survey (NBS) was intended to provide early warnings about declining species or ecosystems.[144] It was created through the transfer of scientists from other existing agencies within the Department of the Interior to a new, stand-alone research agency within the

144. Richard Stone, *Babbitt Shakes Up Science at Interior*, 261 SCI. 967, 967 (1993).

department.[145] The goal was to "distance the science from the political fray that is sometimes associated with contentious regulatory issues."[146]

But the proposal simply fanned political flames. Conservative fears over potential impacts of the NBS on property rights forced the new agency's disappearance as a separate entity.[147] NBS's personnel were merged into the USGS, forming the new Biological Resources Division.[148] With NBS "hidden" in USGS, the political controversy died down—and USGS has continued to develop monitoring programs for biological research.[149]

As the NBS example shows, information is political, and therefore politics influences the collection and dissemination of information.[150] The politics of environmental law are fundamentally influenced by the differential organizational capacities of those who benefit and those who pay for most environmental regulation. The costs of most environmental regulation tend to fall heaviest on a relatively small group of individuals or corporations, whereas the benefits of environmental regulation, usually a public good, tend to be spread widely among a large number of individuals, often the entire public.[151] Because the benefits are so dispersed, the challenges of organizing individuals to lobby for stronger environmental regulation are significantly harder compared to the opponents of stronger regulation.[152] Of course, lobbying for

145. *Id.*; Establishment of the National Biological Survey, 58 Fed. Reg. 63,387 (Dec. 1, 1993) (secretarial order creating NBS).

146. H. Ronald Pulliam, *The Political Education of a Biologist: Part II*, 26 WILDLIFE SOC'Y BULL. 499, 499 (1998).

147. Critics asserted that the information gathered by NBS would be used to justify a massive expansion of land-use regulation by the federal government under the ESA. Stone, *supra* note 144; Frederic H. Wagner, *Whatever Happened to the National Biological Survey?*, 49 BIOSCIENCE 219, 220 (1999). *See also* Pulliam, *supra* note 146, at 499–501 (describing campaign by property rights groups to eliminate NBS and quoting a property-rights activist who wrote that "[politicians] can use the information provided by [NBS] to control and regulate people.").

148. Colin Macilwain, *US Geological Survey Picks up the NBS Pieces*, 382 NATURE 658, 658 (1996); Wagner, *supra* note 147, at 220.

149. Pulliam, *supra* note 146, at 502.

150. Wagner, *supra* note 30, at 1641 ("Actors will invest as much in obstructing research as they expect to lose if the information is made publicly available.").

151. *See* Steven P. Croley, *Public Interested Regulation*, 28 FLA. ST. U. L. REV. 7, 35–38 (2000); Matthew D. Zinn, *Policing Environmental Regulatory Enforcement: Cooperation, Capture, and Citizen Suits*, 21 STAN. ENVTL. L.J. 81, 126–31 (2002).

152. Biber, *supra* note 47, at 43.

stronger environmental regulation will sometimes succeed, as shown by the passage of numerous environmental statutes.[153] But it does mean that those that seek to benefit from environmental regulation will often be at a political disadvantage compared to those that pay the costs.[154] That disadvantage may be easier to overcome in the push to enact high-profile and short-term legislation because the beneficiaries of regulation may be able to rally around significant events, such as environmental crises.[155] But the imbalance is more stubborn in the context of lower-profile, ongoing activities such as the implementation of environmental statutes by agencies.[156]

Monitoring can be seen as the ultimate example of low-profile implementation of environmental law.[157] While it may be relatively easy to determine whether monitoring is taking place at all (e.g., has an agency even issued a report?), it is often extremely difficult for non-experts (and even experts) to determine whether an existing monitoring program is effective. For the Chesapeake Bay restoration effort, it took years to determine that there were gaps between the models used to evaluate the program and the monitoring data, or that the monitoring data was not providing an adequate evaluation of the effectiveness of management techniques.[158]

Moreover, because good monitoring programs depend on continuity, outside parties need to conduct expert and *ongoing* supervision of agency monitoring programs—an even more demanding task. And because most environmental statutes place the burden of demonstrating the need for additional regulation on the agency, the lack of effective monitoring will usually benefit regulated industry.[159] In short, monitoring is

153. Christopher C. DeMuth & Douglas H. Ginsburg, *Rationalism in Regulation*, 108 MICH. L. REV. 877, 910 (2010); Biber, *supra* note 47, at 41–42 n.141.

154. *See* Biber, *supra* note 47, at 40–49.

155. *See* Anthony Downs, *Up and Down with Ecology—The "Issue-Attention" Cycle*, 28 PUB. INT. 38 (1972); Daniel A. Farber, *Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 59, 66–67 (1992).

156. *See* Biber, *supra* note 47, at 42–44.

157. *See id.* at 45–46.

158. *See* sources cited *supra* note 120.

159. Wendy E. Wagner, *Congress, Science, and Environmental Policy*, 1999 U. ILL. L. REV. 181, 229–31.

uniquely vulnerable to the "slippage" often present in the implementation of environmental law.[160]

For instance, the fight against the NBS was part of a campaign led by organizations, such as the American Farm Bureau and the National Cattlemen's Association, that represented industries that bore some of the regulatory costs under the ESA; these organizations might not have succeeded in changing the language of the ESA itself, but they were much more successful in eliminating data collection by the NBS that would have supported ESA implementation.[161] The Fish Passage Center (a small agency that monitored Pacific Northwest salmon populations) was targeted by a senator who considered a staff memo that supported court-ordered changes to dam management as "political advocacy"; the senator, who represented Idaho (where industry benefitted from the dams), tried to eliminate the agency through an appropriations rider, although in the end a federal appeals court concluded that the agency could continue operations.[162]

Politics will not always cut against the development and implementation of monitoring programs; in fact, it might inspire them. First, as noted earlier, monitoring might either be used to justify increased regulation or decreased regulation: There might be a range of situations where the parties subject to regulation might support monitoring because it might lead to lighter regulation.[163] Second, an agency might seek monitoring information in order to provide it with political support to accomplish a key agency goal. When the U.S. Forest Service sought to reduce grazing on its lands by politically powerful private leaseholders, it concluded that the development of quantitative data about the conditions of its rangelands over time through a monitoring program would be a powerful political tool in its favor.[164] As a result, the agency

160. *See, e.g.*, Doremus, *supra* note 71, at 573; McGarity, *supra* note 117, at 1485; Barton H. Thompson, Jr., *The Continuing Innovation of Citizen Enforcement*, 2000 U. ILL. L. REV. 185, 216; *see also* Daniel A. Farber, *Taking Slippage Seriously: Noncompliance and Creative Compliance in Environmental Law*, 23 HARV. ENVTL. L. REV. 297 (1999).

161. *See* H. Ronald Pulliam, *The Political Education of a Biologist: Part I*, 26 WILDLIFE SOC'Y BULL. 199, 200 (1998); Pulliam, *supra* note 146, at 501.

162. *Random Samples: People*, 310 SCI. 1613 (Yudhijit Bhattacharjee ed., 2005); Nw. Envtl. Def. Ctr. v. Bonneville Power Admin., 477 F.3d 668, 677 (9th Cir. 2007).

163. Davis, *supra* note 93, at 99–100; STATUS AND TRENDS, *supra* note 84, at 5–6.

164. *See generally* SAYRE ET AL., *supra* note 58.

developed a comprehensive monitoring program and maintained it through the late 1970s.[165]

Finally, those in favor of the current legal or regulatory status quo might see additional monitoring as a way to delay (or perhaps even defeat) changes to the legal or regulatory landscape. For instance, observers of the adaptive management program for Glen Canyon Dam have noted that powerful water and power interests have repeatedly called for more monitoring in order to avoid major changes to the operations of the dam to protect endangered species.[166] Of course, the pressure for additional monitoring as a way to delay action will not necessarily translate into *effective* monitoring. Indeed, it might be that ineffective monitoring, by never providing adequate answers to the relevant management questions, is the most effective way of achieving delay.

2. Budget Constraints

Monitoring programs are regularly constrained by budgets.[167] While budgeting is a political question, this

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165. *Id.*

166. Joseph M. Feller, *Collaborative Management of Glen Canyon Dam: The Elevation of Social Engineering over Law*, 8 NEV. L.J. 896, 927–28 (2008); Lawrence Susskind et al., *Collaborative Planning and Adaptive Management in Glen Canyon: A Cautionary Tale*, 35 COLUM. J. ENVTL. L. 1, 23, 46 (2010); *see also* Juliet Eilperin, *Interior Ignored Science When Limiting Water to Grand Canyon*, WASH. POST, Jan. 28, 2009, at A6 (describing history of political pressure from water and power interests to restrict changes to operation of dam).

167. SPELLERBERG, *supra* note 42, at 231 ("From my experience, I would estimate that approximately 80-90% of monitoring programmes fail or are abandoned because of lack of resources."); *see also* A ROAD MAP TO THE FUTURE, *supra* note 87, at 8 ("It is well known among environmental professionals that information collection and related activities are among the lowest priorities when it comes to budgets and other resources."); Holley, *supra* note 33, at 197–98. Funding constraints apparently doomed EPA's ambitious Environmental Monitoring and Assessment Program (EMAP) that was originally intended in the late 1980s to "monitor and report on status and trends in the condition of the Nation's ecological resources" both terretrial and aquatic. Laura E. Jackson & Steven G. Paulsen, *Preface to Special Issue: The Eighth Symposium of the Environmental Monitoring and Assessment Program (EMAP)—Research and Partnerships for Accountability*, 150 ENVTL. MONITORING & ASSESSMENT 1 (2009); *see also* FRESHWATER ECOLOGY BRANCH, U.S. ENVTL. PROT. AGENCY, METHODS FOR AQUATIC RESOURCE ASSESSMENT (MARA) FY 2008–2012, at 6–8 (2007) (detailing the decline in funding for EMAP over time); NAT'L HEALTH & ENVTL. EFFECTS RESEARCH LAB., U.S. ENVTL. PROT. AGENCY, RESEARCH STRATEGY: ENVIRONMENTAL MONITORING AND ASSESSMENT PROGRAM II-1 to -2 (2002) (describing limits of EMAP monitoring because of funding constraints); *id.* at I-1 to -2 (describing the scaling down of the EMAP program).

subsection discusses the possibility that budget cuts for monitoring programs might not be a result of the political inconvenience of monitoring, but instead a result of the perception that monitoring is not important at all.

Monitoring can easily be portrayed as wasteful information collection without any payoff in terms of improved decision-making.[168] For instance, during his presidential campaign, Senator John McCain regularly identified studies of grizzly bear population levels as wasteful government spending.[169] Myopia is a problem not just for the legislature that funds the agencies,[170] but also the agencies themselves that might respond to a cut in their overall budget by disproportionately cutting monitoring because the impacts of those cuts might not be felt for years.[171]

The U.S. environmental satellite program produces climate data that may take decades to provide policy-useful information.[172] When the overall U.S. earth observation satellite program ran into cost overruns and delays, Congress and the relevant agencies cut the climate data collection portion of the satellite programs first in order to protect the weather programs that provide information more relevant in the short-term.[173] These cuts were part of an overall decline in

168. *See, e.g.*, Doremus, *supra* note 66, at 429 ("Monitoring drains scarce agency resources without providing the political benefits of action."); Gunderson, *supra* note 94, at xiv.

169. *See* Coco Ballantyne, *McCain's Beef with Bears?—Pork*, SCI. AM. (Feb. 8, 2008), http://www.scientificamerican.com/article.cfm?id=mccains-beef-with-bears.

170. *See* Doremus, *supra* note 71, at 572–73 ("Legislatures . . . seem systematically inclined to target funding towards action to the exclusion of learning.").

171. Erica Fleishman et al., *Conservation in Practice: Overcoming Obstacles to Implementation*, 13 CONSERVATION BIOLOGY 450, 451 (1999) ("[T]he planning horizons for many organizations are considerably shorter than those needed for effective adaptive management or monitoring programs."); Robert C. Szaro et al., *The Ecosystem Approach: Science and Information Management Issues, Gaps, and Needs*, 40 LANDSCAPE & URB. PLAN. 89, 98 (1998) ("Federal, state, private, and academic institutions undervalue long-term monitoring . . . ."); Steven L. Yaffee, *Ecosystem Management in Practice: The Importance of Human Institutions*, 6 ECOLOGICAL APPLICATIONS 724, 725 (1996) ("While public agencies would seemingly have the greatest ability to look out for the long term, their traditions and permanent workforces make them very protective of the status quo, and their short-term perspective is reinforced by short-term budget and political cycles.").

172. *See supra* Part I.C.1.

173. *See* NAT'L RESEARCH COUNCIL, EARTH SCIENCE AND APPLICATIONS FROM SPACE: NATIONAL IMPERATIVES FOR THE NEXT DECADE AND BEYOND, *supra* note 102, at 1 (noting that cost overruns led Congress and the agencies to cut "secondary" measurements in climate data in order to protect "core" measurements in weather forecasting).

the number of missions and funding for space-based environmental data collection at NOAA and the National Aeronautics and Space Administration (NASA).[174]

Of course, one could make monitoring more appealing by increasing its relevance for short-term management and regulatory policy decision-making.[175] But if monitoring is seen as relevant for short-term management and regulatory decisions, it might become dangerous to politically powerful parties, and funding might be cut precisely because it is too relevant.[176] Agencies seeking to fund and maintain a monitoring program face a dilemma: making monitoring seem worthwhile enough for politicians to invest in, but not so important that it becomes politically risky.[177]

3. Judicial Review

A significant constraint on agencies is the possibility of judicial review. But judicial deference to agencies based on the relative technical expertise of agencies may actually discourage agency collection of monitoring data, both because it reduces the incentives for anyone but the agency to collect any data at all, and because it reduces the incentives of the agency itself to collect any more data than is minimally necessary for the agency to get its decision upheld by the court.

First, the "record review" rule requires that courts only consider the material the agency itself considered at the time it made its decision.[178] That rule has the practical impact of

174. *See* NAT'L RESEARCH COUNCIL, EARTH SCIENCE AND APPLICATIONS FROM SPACE: NATIONAL IMPERATIVES FOR THE NEXT DECADE AND BEYOND, *supra* note 102, at 32–35 (noting the decline in total number of Earth-observation space missions, the large decline in NASA funding for such missions, and the increase in NOAA funding that is offset by large cost overruns).

175. LEE, *supra* note 66, at 175 ("[M]onitoring is too expensive to be defended solely on the basis of its contribution to learning . . . ."); *see also* Noon, *supra* note 109, at 32–33 (noting that when monitoring is "discussed in abstract terms," has "vague objectives," and has "no institutionalized connections to the decision-making process" then it will be given low priority and will be politically unpopular).

176. An example is Senator Craig of Idaho's efforts to eliminate the Fish Passage Center. *See Random Samples: People*, *supra* note 162 and accompanying text.

177. LEE, *supra* note 66, at 83 ("Research that has consequences is research that actors will try to tamper with or keep from occurring. Adaptive management is research that must have consequences if it is to be worth the high costs of doing it.").

178. *See* 3 CHARLES H. KOCH, JR., ADMINISTRATIVE LAW AND PRACTICE § 8.27 (3d ed. 2010).

giving the agency the dominant role in developing the information that courts rely upon. While it is theoretically possible for outside groups to put monitoring or other information into the record to be considered by the agency or a reviewing court, in practice there are serious limits to the amount and quality of information that can be contributed this way. The public often is not able to participate until near the end of the decision-making process, when it may be too late to collect data or conduct significant analyses, let alone develop long-term monitoring data.[179] Thus, most monitoring data will be collected by the decision-making agency itself, or sometimes by another government agency with an interest in the issue. In addition, courts, wary of getting caught in a "battle of experts" over technical information, generally give much more weight to the information provided by either the decision-making agency or other government agencies compared to any information collected by outside groups.[180] Overall, judicial review generally discourages the production and collection of useful monitoring data by outside groups.[181]

Moreover, intimidated by the technical nature of many agency activities, when courts do evaluate the agency's decision, they generally show strong deference, with higher deference for more technical decisions.[182] This discourages information production by the agency itself, "endors[ing] deliberate (and convenient) ignorance on the part of" government agencies.[183] The highly deferential standard of

179. *See* William F. Pedersen, Jr., *Formal Records and Informal Rulemaking*, 85 YALE L.J. 38, 79–80 n.150 (1975) (noting the need for advance notice and significant amounts of preparation to provide useful comments on technical matters); Stephanie Tai, *Three Asymmetries of Informed Environmental Decisionmaking*, 78 TEMP. L. REV. 659, 686 (2005).

180. *See* Michael C. Blumm & Stephen R. Brown, *Pluralism and the Environment: The Role of Comment Agencies in NEPA Litigation*, 14 HARV. ENVTL. L. REV. 277, 302 (1990).

181. Wendy Wagner notes that record review provides few constraints on the relevance of the information that can be put into the administrative record, and therefore encourages parties (particularly regulated industry) to add large amounts of trivial or irrelevant information into the record in an effort to overwhelm the agency. Wagner, *supra* note 71, at 1329–34, 1353–65. While Wagner shows how administrative law encourages the inclusion of existing, but mostly irrelevant information, my analysis shows how administrative law discourages the production of new, potentially highly-relevant information.

182. *See, e.g.*, Balt. Gas & Elec. Co. v. Natural Res. Def. Council, Inc., 462 U.S. 87, 103 (1983) (noting that where an agency "is making predictions, within its area of special expertise, at the frontiers of science," then judicial review "must generally be at its most deferential").

183. Doremus, *supra* note 71, at 574–77.

review implies that an agency that produces the minimum amount of information to meet judicial scrutiny will have its decision upheld. But because courts want to impose some accountability on agencies, the standard is not toothless. If a court can deduce a major problem in the record, the agency's decision might be overturned.[184] In these circumstances, the agency is essentially being punished for developing additional information above the minimum needed for judicial deference.[185]

B. Internal Forces Shaping Agency Monitoring Programs

A range of forces within an agency might also affect the willingness and ability of that agency to conduct an effective monitoring program. Effective monitoring might conflict with other important goals that an agency seeks to pursue. An agency might be unwilling to conduct long-term monitoring because of the possibility that it might reduce the agency's autonomy, and monitoring might be in tension with the dominant professional culture in an agency.

1. Conflicts with Other Agency Goals, Particularly an Agency's "Mission"

Monitoring might conflict with other agency goals in several ways, all of which can deter the agency from conducting monitoring: First, an agency might be reluctant to implement monitoring because it might make it easier for outsiders to hold the agency accountable for performance on environmental goals that the agency has been legally tasked with but has historically disfavored. Second, environmental performance in general, and ambient monitoring in particular, are the kinds of goals that an agency may often underperform on, in part because they are so hard to evaluate in terms of performance. Third, a public agency frequently organizes itself around a central mission in order to motivate employees, so an agency

184. *See, e.g.*, Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983) (stating that a court will overturn an agency decision that "is so implausible that it could not be ascribed to a difference in view or the product of agency expertise").

185. *See* Matthew C. Stephenson, *Evidentiary Standards and Information Acquisition in Public Law*, 10 AM. L. & ECON. REV. 351, 363, 365 (2008).

will be reluctant to conduct monitoring to the extent that it might interfere with that mission.

Advocates for adaptive management call for an "adaptive governance" system in which there would be "systematic evaluation and adaptation of all agency decisions . . . in furtherance of stated program goals," including "the assessment of agency personnel and of the agencies themselves against statutory goals."[186] Systematic evaluation necessarily implies monitoring, but getting an agency to rigorously and critically examine itself on an ongoing basis may be a significant challenge. Agency leadership might discourage collection of monitoring data that might show flaws in the existing management of environmental resources by the agency.[187]

The Government Performance and Results Act requires federal agencies to develop quantitative performance metrics.[188] Because these metrics can be used to cut agency budgets, an agency does not have an incentive to make them meaningful—instead, an agency purposefully may make metrics unambitious (and therefore easy to achieve) and technically obscure (therefore reducing their political salience), rendering them more or less useless.[189]

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186. Camacho, *supra* note 53, at 49.

187. *See* LEE, *supra* note 66, at 77 ("There is accordingly a moral hazard for adaptive management: that managers will cook the books. . . . [S]kewed science can be beneficial to the trapped administrator, giving the appearance of rigorous evaluation and testing but providing a predetermined positive result."); JEFFREY L. PRESSMAN & AARON WILDAVSKY, IMPLEMENTATION: HOW GREAT EXPECTATIONS IN WASHINGTON ARE DASHED IN OAKLAND 183, 203–04 (3d ed. 1984) (noting the risks of fudging or self-serving data if agencies evaluate themselves); Doremus, *supra* note 53, at 55–56 ("[Decision makers] may even avoid collecting information that might shake [their] beliefs."); Doremus, *Precaution, Science, and Learning While Doing in Natural Resource Management*, *supra* note 71, at 571 (noting that "[i]nternal [agency] incentives are likely to run the other way" from the collection of information that allows for review of agency management decisions); Archon Fung & Dara O'Rourke, *Reinventing Environmental Regulation from the Grassroots Up: Explaining and Expanding the Success of the Toxic Release Inventory*, 25 ENVTL. MGMT. 115, 123 (2000); *cf.* Canice Prendergast, *A Theory of "Yes Men,"* 83 AM. ECON. REV. 757 (1993) (formal modeling showing that agents may manipulate information to mimic the preferences of the principal where the principal relies on incentive contracts to encourage information production).

188. Shapiro & Steinzor, *supra* note 83, at 1743.

189. *Id.* at 1759–69; s*ee also* THOMAS O. MCGARITY, REINVENTING RATIONALITY: THE ROLE OF REGULATORY ANALYSIS IN THE FEDERAL BUREAUCRACY 137–38 (1991) (noting the general problem).

Critics of the Chesapeake Bay restoration program argued that it consistently overemphasized information from models at the expense of monitoring, not just because the models were cheaper, but because the results from the models made the overall progress of the restoration program appear much better than the monitoring results did.[190] Public reports by the agency managing the Chesapeake Bay recovery program provided positive progress assessments that were based on models without making the source of the information clear.[191]

An agency's reluctance to monitor its performance effectively can be even greater when it is called upon to measure goals that it has previously disregarded or underemphasized, because monitoring would only highlight its lack of performance on those goals. And there are good reasons to expect that environmental goals are likely to be systematically underemphasized by many agencies. When an agency is tasked with multiple goals that might conflict, it must necessarily make a decision about how to trade off between those goals, and the more measurable goals will usually receive more attention from the agency.[192] Historically, environmental outcomes have been poorly measured because of the lack of monitoring;[193] thus, environmental performance has often been hard to evaluate. Consequently, environmental performance has been underemphasized compared to other goals. For instance, the Army Corps of Engineers might be less considerate of environmental values when making decisions about dam construction compared to other values (e.g., overall cost, flood control effectiveness).[194]

Moreover, an agency might systematically underperform in managing environmental monitoring programs, not just in the achievement of environmental goals themselves. Monitoring

190. *See* ERNST, *supra* note 120.

191. *See* David A. Fahrenthold, *Cleanup Estimate for Bay Lacking*, WASH. POST, Dec. 24, 2007, at B1; Peter Whoriskey, *Bay Pollution Progress Overstated*, WASH. POST, July 18, 2004, at A1.

192. Eric Biber, *Too Many Things to Do: How to Deal with the Dysfunctions of Multiple-Goal Agencies*, 33 HARV. ENVTL. L. REV. 1, 9–13 (2009).

193. *See supra* notes 81–89 and accompanying text.

194. As discussed above, environmental goals are often hard to measure as a technical matter, making them more vulnerable to this dynamic. *See supra* Part I.C.2. But environmental goals may often involve extremely vague, general exhortations to provide for a healthy environment. *See, e.g.*, 43 U.S.C. § 1732(b) (2006) (provision requiring the Bureau of Land Management to prevent "unnecessary or undue degradation" of federal public lands). Such vague provisions make measuring the success of goals even more difficult.

itself is hard to measure in terms of quality,[195] and improvement in environmental monitoring may be in conflict with other agency goals. Investment in improving monitoring necessarily means resources cannot be invested in other tasks, and improved environmental monitoring might produce political or legal pressure to perform better on underemphasized, underperforming environmental goals at the expense of other goals.

The environmental satellite monitoring program historically has been run by three agencies: NOAA, NASA, and the Department of Defense. For at least two of these agencies—NASA and the Department of Defense—environmental data collection is probably not a very high-priority goal. Unsurprisingly, the environmental satellite program has been plagued by incompetent and indifferent management[196]: The Defense Department official in charge of contract management and procurement for the program could not even be bothered to attend interagency program meetings.[197]

The problem might be ameliorated if an agency is able to break this loop, perhaps through leadership that invests in monitoring that in turn makes environmental goals easier to measure and therefore less disadvantaged relative to other goals. But for many government organizations, there is an additional barrier to overcome: the agency's sense of mission.

Many public agencies are assigned a range of hard-to-measure, vague goals.[198] Because of those vague goals, it is difficult or impossible to use strong performance-based incentives to motivate agency employees.[199] Public agency managers therefore might motivate employees by orienting the agency around a "mission" that employees are committed to

195. *See supra* Part I.C.2.

196. *See* POLAR-ORBITING ENVIRONMENTAL SATELLITES: WITH COSTS INCREASING, *supra* note 9, at 21–27.

197. *Id.*

198. HERBERT A. SIMON, ADMINISTRATIVE BEHAVIOR: A STUDY OF DECISION-MAKING PROCESSES IN ADMINISTRATIVE ORGANIZATIONS 176–77 (3d ed. 1976); DONALD P. WARWICK, A THEORY OF PUBLIC BUREAUCRACY: POLITICS, PERSONALITY, AND ORGANIZATION IN THE STATE DEPARTMENT 63 (1975); JAMES Q. WILSON, BUREAUCRACY: WHAT GOVERNMENT AGENCIES DO AND WHY THEY DO IT 26 (1989).

199. Oliver E. Williamson, *Public and Private Bureaucracies: A Transaction Cost Economics Perspective*, 15 J.L. ECON. & ORG. 306, 322, 324 (1999); *see also* Mathias Dewatripont et al., *The Economics of Career Concerns, Part II: Application to Missions and Accountability of Government Agencies*, 66 REV. ECON. STUD. 183, 198 (1999).

achieving without strong pecuniary incentives.[200] The mission will often align with one of the agency's goals, but there will be inconsistencies.[201]

If improved monitoring of environmental resources will result in information that might conflict with achievement of the agency's mission or is seen as a waste of resources that does not help accomplish the mission, then an agency will be even more likely to underinvest in monitoring. For instance, Alyson Flournoy argues that the Army Corps of Engineers' historic mission of developing water resources is in significant conflict with a conservation mission of implementing its wetlands protection program, limiting information production about wetlands protection.[202]

Public land management agencies provide multiple examples of this dynamic. The Bureau of Land Management (BLM) manages over 200 million acres of federal land in the western United States and has historically been focused on developing its land for mining, oil and gas, logging, and even grazing, but not on protecting non-consumptive uses such as scenic quality, wildlife, or water quality.[203] Unsurprisingly, the agency has systematically underinvested in monitoring of its wildlife resources. A GAO report in the early 2000s noted that the BLM had systematically shifted funds appropriated for wildlife monitoring toward permitting oil and gas drilling, leading to a dearth of adequate data on wildlife status or the impacts of oil and gas drilling on wildlife.[204]

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200. *See* SIMON, *supra* note 198, at 112–15, 198; WILSON, *supra* note 198, at 26, 95; Timothy Besley & Maitreesh Ghatak, *Competition and Incentives with Motivated Agents*, 95 AM. ECON. REV. 616 (2005); Biber, *supra* note 192, at 16. Among the non-pecuniary rewards that government agencies might use to attract and retain qualified personnel is the opportunity to "make a difference" in the accomplishment of a particular agency mission by ensuring that agency employees have significant discretion to achieve the mission. Sean Gailmard & John W. Patty, *Slackers and Zealots: Civil Service, Policy Discretion, and Bureaucratic Expertise*, 51 AM. J. POL. SCI. 873 (2007). Non-pecuniary goals, particularly a desire to achieve public service goals, are a major factor in motivating bureaucrats. *See, e.g.*, JOHN BREHM & SCOTT GATES, WORKING, SHIRKING, AND SABOTAGE: BUREAUCRATIC RESPONSE TO A DEMOCRATIC PUBLIC 194–95 (1997); MARISSA MARTINO GOLDEN, WHAT MOTIVATES BUREAUCRATS?: POLITICS AND ADMINISTRATION DURING THE REAGAN YEARS 23 (2000).

201. SIMON, *supra* note 198, at 210–11; Biber, *supra* note 192, at 16–17.

202. Alyson C. Flournoy, *Supply, Demand, and Consequences: The Impact of Information Flow on Individual Permitting Decisions Under Section 404 of the Clean Water Act*, 83 IND. L.J. 537, 579–80 (2008).

203. *See* Stewart, *supra* note 40, at 36.

204. *See* Blaine Harden, *Federal Wildlife Monitors Oversee a Boom in Drilling*, WASH. POST, Feb. 22, 2006; *see also* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-

Similarly, the U.S. Forest Service in the Coronado National Forest (CNF) in Arizona and New Mexico for decades had monitored the condition of its rangelands with inspections that occurred every year or two.[205] In the late 1970s, that regular monitoring program abruptly ceased and did not resume until the late 1990s; during the gap, only limited monitoring occurred.[206] The monitoring was not terminated because of any fundamental changes in the science or technology of rangeland management.[207] One likely explanation for why monitoring terminated is conflict with the agency's mission: The range conservation staff decided that to achieve its mission (ensuring that grazing was within the ecological limits of the rangeland), its time was better spent in developing relationships with ranchers rather than conducting detailed monitoring of rangeland conditions.[208]

2. Impingement on an Agency's Autonomy or Discretion

An agency might be reluctant to monitor not because it creates a specific, clear conflict with a current project, but because monitoring data might prove troublesome in the future. Monitoring programs are initiated to obtain information about an inadequately understood resource. Monitoring data are to some extent unpredictable or uncontrollable and might undermine an agency's decision in the future.

The lack of information, on the other hand, generally gives an agency a tremendous amount of political or legal leeway. An agency can use various tools to "stretch" incomplete or ineffective monitoring data instead of conducting additional

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05-418, OIL AND GAS DEVELOPMENT: INCREASED PERMITTING ACTIVITY HAS LESSENED BLM'S ABILITY TO MEET ITS ENVIRONMENTAL PROTECTION RESPONSIBILITIES 14–15, 17 n.28, 22–24, 31–32 (2005) (noting that BLM's problems with monitoring are long-standing, and that they have led to significant monitoring gaps due to shifting resources away from monitoring to development activities).

205. *See* SAYRE ET AL., *supra* note 58, at 9.

206. *See id.*

207. *See id.* at 10.

208. *See id.* at 10–11. Was the loss of monitoring a problem if the mission of environmental conservation of rangelands was advanced? The loss of decades of monitoring data about rangeland status harmed endangered species management in the CNF. *See id.* In other words, by focusing on their mission, the agency officials neglected the utility of their data for other important environmental goals, emphasizing how this dynamic can also result in harmful conflicts among environmental goals.

monitoring: indicators, proxies, extrapolation, and modeling.[209] All of these tools require underlying assumptions—assumptions that allow an agency (if it wants to) to bury important policy conclusions, making it extremely difficult for outsiders to detect and contest them.[210] Moreover, courts provide significant deference to all of these tools,[211] so their use by an agency provides both political and legal room to maneuver. While additional data might make models more accurate, they also create the possibility of constraining the conclusions that the agency can reach based on its models, restricting its legal and political discretion. That discretion may be a very valuable commodity for a public agency. [212]

Indeed, there are relatively few examples of an agency consciously imposing rigorous monitoring requirements upon itself.[213] A 1982 Forest Service regulation (the "MIS regulation") required the Service to monitor important indicator wildlife species populations in order to ensure that management activities were protecting overall species diversity and ecosystem health.[214] However, over time, the agency adapted and changed the regulatory requirements to maximize its own discretion. For instance, the Service interpreted those regulations as allowing it to measure suitable habitat for the relevant wildlife species and then extrapolate from habitat to the status of the species themselves (the "proxy-on-proxy"

209. *See supra* Part I.C.3.a.

210. Peter H. Schuck, *Legal Complexity: Some Causes, Consequences, and Cures*, 42 DUKE L.J. 1, 31 (1992) (Agencies seek to conceal what they do in technical jargon because it promotes "agency autonomy," making them "more opaque to the generalist institutions like Congress and the media" and "more difficult to control and help obscure their pursuit of controversial policies."); Wagner, *supra* note 159, at 253 n.255; Wagner et al., *supra* note 135; Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1650–72 (1995).

211. *See* Wagner et al., *supra* note 135, at 319–45.

212. Agency managers will often seek to "acquire sufficient freedom of action and external political support" in order to pursue the agency's mission. *See* WILSON, *supra* note 198, at 26. That autonomy may also be essential for the agency if it wants to provide significant policy discretion to its own employees as part of its efforts to attract and retain them. Gailmard & Patty, *supra* note 200. Agency managers may even be willing to trade off budgetary resources for greater autonomy. *See* WILSON, *supra* note 198, at 28, 179–81.

213. *See, e.g.*, Robert B. Keiter, *Ecological Concepts, Legal Standards, and Public Land Law: An Analysis and Assessment*, 44 NAT. RESOURCES J. 943, 975–77 (2004).

214. Glicksman, *supra* note 132, at 494–95; Greg D. Corbin, Comment, *The United States Forest Service's Response to Biodiversity Science*, 29 ENVTL. L. 377, 389–91 (1999).

approach). These steps gave it significantly more leeway to interpret population trends and reduce the potential constraints that the data might impose on management decisions.[215] Similarly, the agency avoided monitoring those species that might be most sensitive to management decisions.[216] Even so, after a series of court cases implied that the agency might be required to conduct significant monitoring as a result of the regulation (and in some cases rejected the "proxy-on-proxy" approach), the Service moved to eliminate the MIS regulations.[217]

A desire to avoid external constraints might be another explanation for the ending of monitoring in the Coronado National Forest. The monitoring terminated in the late 1970s, right as three major legal changes in the legal environment coalesced—the rise of more active judicial review of agency decision-making (particularly environmental decision-making), a greater willingness of courts to hear claims raised by environmental groups (through the expansion of standing to sue), and the passage of environmental statutes such as the National Environmental Policy Act (NEPA) that created causes of action for environmental groups to challenge agency decisions.[218] Those changes combined to create a powerful new legal force in grazing monitoring: environmental groups.[219] Information that the Forest Service collected about rangeland conditions was no longer just a weapon that it could use against grazing lessees—it was also a weapon that might potentially be used against the Service by outside environmental groups to challenge a range of agency decisions (from grazing permits to grazing improvements to road construction).[220]

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215. *See* ELZINGA ET AL., *supra* note 92, at 7 (proxy-on-proxy method necessarily "introduces the additional source of uncertainty in the assumed relationships between the indicator [habitat] and the species"); Corbin, *supra* note 214, at 399, 401; *supra* Part I.C.3.

216. *See* Gerald J. Niemi et al., *A Critical Analysis on the Use of Indicator Species in Management*, 61 J. WILDLIFE MGMT. 1240 (1997); Corbin, *supra* note 214, at 404.

217. *See* Keiter, *supra* note 213, at 950–52, 977 (noting the George W. Bush Administration's revisions to regulations to eliminate monitoring requirements and the transfer of any monitoring obligations to agency handbooks and manuals, which are less likely to be judicially enforceable); *see also* Glicksman, *supra* note 132, at 500–18 (noting similar regulation revisions made by the Clinton Administration).

218. *See* SAYRE ET AL., *supra* note 58, at 17–21.

219. *See generally id.*

220. *See id.*

Finally, the long-term commitment necessary for maintaining the effectiveness of many monitoring programs will necessarily require long-term planning and budgets. That commitment can tie the hands of the agency, constraining its flexibility with respect to internal budgeting, assignment of personnel and technical equipment, and so forth. An agency accustomed to planning for short-term horizons may feel great discomfort in trying to plan for the maintenance of a ten- or twenty-year monitoring program.[221]

3. Conflicts with Agency Culture, Particularly the Preferences of Scientists

A final internal constraint on agency monitoring might be that an agency's culture is simply not hospitable to monitoring. Here, the focus is the disdain or reluctance of scientists to conduct what is perceived to be "routine monitoring."

Scientists such as biologists, geologists, chemists, and epidemiologists are key components of the functioning of agencies such as EPA, FWS, the Forest Service, the Park Service, and USGS.[222] The problem is that there is a widespread attitude that scientists should not spend too much time monitoring because it is not good for professional advancement, as long-term monitoring projects do not easily turn into the kinds of research projects that lead to publication, grants, tenure, and improved professional reputation. The time frames are just not right because of the long-term nature of monitoring: Decades-long (or even multi-year) monitoring projects are longer than the relevant cycles for individual professional advancement in science. As a result, "[m]onitoring is science's Cinderella, unloved and poorly paid. . . . Monitoring does not win glittering prizes. Publication is difficult, infrequent, and unread. . . . [L]ong-term measurement is

221. *See, e.g.*, NAT'L RESEARCH COUNCIL, *supra* note 107, at 82–85 (criticizing monitoring program for Glen Canyon Dam management as too short-term, where the relevant strategic plan only applied for five years, while the resources in question likely required decades-long monitoring programs).

222. The federal government employs over 73,000 scientists, with significant numbers in environmental agencies. The Forest Service has over 7,000; NOAA has over 5,000; USGS and FWS each have over 4,000; and the EPA has about 5,000. Spreadsheet Compiled by Author, Summary of Employment Data from the United States Office of Personnel Management Website (July 2010), http://www.fedscope.opm.gov/ (on file with author).

simply not valued as 'discovery' science."[223] These negative attitudes matter, even for those scientists who might otherwise be interested in monitoring. Political scientists have identified peers as a major influence on agency employees' attitudes and motivation,[224] and if peer scientists do not respect monitoring, employees are less likely to pursue it in an effective way.

These attitudes can also have real impacts on the funding and institutional support for monitoring within agencies. For example, long-term measurements of carbon dioxide levels in the atmosphere were regularly threatened with funding cuts because funding agencies such as the National Science Foundation did not see long-term monitoring as a "scientific" endeavor.[225]

The scientific skepticism towards monitoring might be offset by more favorable attitudes toward monitoring from other major professional groups within environmental agencies. For instance, foresters are an important component of federal and state forestry agencies.[226] Professions that have been more focused on resource management might be more inclined toward monitoring of the resources as well. However, monitoring may not be seen as an end in itself, but as a way to achieve the dominant professional managerial goal. For instance, foresters might be far more enthusiastic about monitoring how quickly timber is growing, and less interested in monitoring the status of wildlife that might interfere with active forest management.[227] In these contexts, the problem of conflicts with other agency goals and missions might be exacerbated.

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223. Euan Nisbet, *Cinderella Science*, 450 NATURE 789, 789–90 (2007); *see also* Franklin, *Importance and Justification of Long-Term Studies in Ecology*, *supra* note 93, at 12 (noting that "the ecological community" has a "phobia of 'monitoring' "); Doremus, *supra* note 66, at 452–53; Likens, *supra* note 107, at 240; Reed F. Noss, *Indicators for Monitoring Biodiversity: A Hierarchical Approach*, 4 CONSERVATION BIOLOGY 355, 361 (1990) ("Monitoring has not been a glamorous activity in science . . . ."); Taylor, *supra* note 93, at 21.

224. *See* BREHM & GATES, *supra* note 200, at 196; GOLDEN, *supra* note 200, at 27.

225. *See* Keeling, *supra* note 101, at 51, 56–58.

226. Biber, *supra* note 192, at 24–27; Louise Fortmann, *The Role of Professional Norms and Beliefs in the Agency-Client Relations of Natural Resource Bureaucracies*, 30 NAT. RESOURCES J. 361 (1990).

227. Biber, *supra* note 192, at 14–17. Attitudes have shifted recently among foresters, however. *Id.* at 27–28.

III. EXPLORING SOLUTIONS

How might we try to solve the problems of ambient monitoring in environmental law? Solutions require addressing the problems that continuity and opacity pose for monitoring programs. Continuity requires establishing commitment and reliability on the part of the institutional actors that conduct or supervise monitoring.[228] Moreover, because of continuity, forcing reluctant institutional actors to monitor effectively is very difficult. Absent incentives for agencies to conduct adequate monitoring, supervision must be ongoing and continuous, which is a tall order.

Opacity also means that it is quite difficult for outsiders to force an actor to conduct effective monitoring. The supervision required to ensure that monitoring is effective demands significant technical expertise and resources. Moreover, the uncertainty that opacity creates means that at some point there needs to be underlying trust that the actor conducting or supervising the monitoring wants to achieve effective monitoring.

There are a range of possible solutions, each with their own strengths and weaknesses. We could try to encourage greater collaboration among agencies to conduct monitoring, an option that would encourage the efficient use of resources but that cannot not address situations where external constraints and internal forces mean that no agency has an incentive to conduct the relevant monitoring. We could try to rely more on resources outside agencies, particularly citizen groups; these organizations may have a great deal of passion and incentives to monitor, but they may lack both the expertise and the continuity to tackle many monitoring problems.

As Part III.C will develop in more detail, one of the more promising solutions to deal with both continuity and opacity is to rely on public agencies that are primarily focused on monitoring. Public agencies are more likely than other alternatives to have the institutional continuity either to undertake effective long-term monitoring or to supervise its performance. Public agencies that primarily focus on monitoring can also develop the expertise needed to deal with the technically difficult tasks of monitoring, and their focus on

228. *See* Todd R. La Porte, *High Reliability Organizations: Unlikely, Demanding, and at Risk*, 4 J. CONTINGENCIES AND CRISIS MGMT. 60 (1996).

monitoring can also create strong institutional incentives for them to do a good job in either conducting or supervising effective monitoring. These separate agencies need not conduct the monitoring themselves; they might instead provide regular, expert, and effective audits of monitoring data that can provide sufficient incentives for management or regulatory agencies to conduct their own effective monitoring programs.

Before solutions are discussed, a skeptical reader might ask whether Congress and the President, when they enact environmental laws that require significant monitoring, know that the monitoring is likely to be ineffective and will undermine implementation.[229] If that is the case, and one believes that Congress and the President are electorally accountable, is there a problem to solve? But ineffective monitoring undermines the transparency and accountability of the political process: There are often significant asymmetries in the understanding of the effectiveness of monitoring, asymmetries that tend to favor regulated parties.[230] In other words, the public probably does not understand the problems with monitoring and would not accept ineffective monitoring if they did understand them. Moreover, it is quite plausible that not even legislators or other elected officials fully understand the possibility of dysfunction in setting up monitoring programs—in which case, a fuller understanding of those concerns might lead to better institutional and legal design for environmental policymaking.

Part III.A begins by discussing how we might work with existing agencies, buttressed by better leadership, better funding, or better collaboration among these agencies. The best of these options (better collaboration) has potential to address problems of coordination and redundancy where agencies already have incentives to address monitoring problems. Part III.B then turns to exploring whether we could rely on groups that exist outside of agencies to encourage or conduct better monitoring; most of these options, however, have problems with continuity, although citizen groups provide a relatively overlooked option for improving monitoring. Finally, Part III.C discusses how we might restructure agencies themselves to encourage more and better monitoring, a solution with a great deal of promise, although it is not a panacea.

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229. *See, e.g.*, Daniel A. Farber, *Politics and Procedure in Environmental Law*, 8 J.L. ECON. & ORG. 59, 68–69 (1992) (noting this possibility).

230. *See supra* Part II.A.1.

A. Working with Existing Agencies: Better Leadership, Better Funding, Better Collaboration

Perhaps the most obvious solutions are better leadership, better funding, and better coordination and collaboration across agencies. While some of these options might be relatively inexpensive and politically feasible, all are limited by their failure to address the underlying incentives that make agencies reluctant to conduct effective monitoring.

There have been claims that "leadership" in key positions in agencies will lead to better monitoring.[231] But pinning all of our hopes on individual leaders is an inadequate response—great leaders are a highly contingent and uncertain solution. The contingent nature of this solution is particularly problematic given the importance of long-term continuity to successful monitoring. If great leaders come and go, then the monitoring programs they support may come and go too. In the end, even if strong leadership can be found, the structure and function of agencies is also crucial to the monitoring programs' success or failure.[232]

Another frequently suggested solution is providing more funding for monitoring,[233] such as dedicated funding streams that are more resistant to political whims.[234] While there is no question that more funding is required, the problem is how to overcome the political resistance to additional funding, including the creation of new funding streams. And even if dedicated, reliable funding is provided for agency monitoring, an agency might not use that funding to implement *effective* monitoring, given internal agency conflicts.

Improved collaboration among the various environmental agencies that currently do conduct monitoring would allow for better sharing and use of the information that does exist across the various agencies. Usually some sort of central information

231. *See* Bohan, *supra* note 9 (scientists decrying the "dearth of leadership" in the satellite monitoring program).

232. Alan L. Dean, *General Propositions of Organizational Design*, 131, 139, *in* FEDERAL REORGANIZATION: WHAT HAVE WE LEARNED? (Peter Szanton ed., 1981) ("Significant defects in organization cannot be overcome solely by the efforts of a leader . . . .").

233. Camacho, *supra* note 53, at 72; Doremus, *supra* note 66, at 457–59.

234. *See* Leshy, *supra* note 41, at 131, 134 (proposing the allocation of energy royalties from public lands for a monitoring and management fund).

clearinghouse or coordinating committee is proposed, with only advisory or facilitating powers.[235]

One key problem that collaboration might address is the compatibility of monitoring data and protocols across multiple agencies conducting similar monitoring programs.[236] Compatibility of data across monitoring programs could allow for the aggregation of data across those monitoring programs, which in turn could produce useful information at different (larger or smaller) temporal and spatial scales than the individual monitoring programs cover.[237] Aggregation of data might also allow different programs to complement each other and offset each others' weaknesses—for instance, programs that are large in geographic scale (e.g., remote sensing from satellites) can be paired with small-scale, intensive studies of particular locations (e.g., long-term ecological studies at biological research sites). The small-scale studies can be used to interpret and analyze the large-scale data and make it more effective and useful.[238] The advisory functions of a central body might also provide some additional impetus for agencies that are already interested in conducting good monitoring to extend or improve their efforts to address important gaps.

The problem is that collaborative efforts face an uphill battle if they are truly to address the hardest challenges in improving environmental monitoring—the reluctance (whether conscious or not) of agency officials to pursue effective monitoring programs that might threaten an agency's other goals, mission, or autonomy. If an agency was reluctant to pursue effective monitoring on its own, it is hard to see how a collaborative, voluntary process will matter. Participation in the collaborative venture might be pro forma.[239] And indeed,

235. A ROAD MAP TO THE FUTURE, *supra* note 87, at 10–12; NAT'L RESEARCH COUNCIL, A BIOLOGICAL SURVEY FOR THE NATION vii–viii (1993); ENVTL. MONITORING TEAM, *supra* note 113, at 3–4, 63–64; Camacho, *supra* note 53, at 68.

236. Data compatibility has been a serious issue in the United States. FILLING THE GAPS, *supra* note 87, at 39–40.

237. See KAREN E. SETTY ET AL., EVOLUTION OF MONITORING PROGRAM DESIGN FOR MARINE OUTFALLS IN THE SOUTHERN CALIFORNIA BIGHT (2010), ftp://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2010AnnualReport/ar10_001_013.pdf, for an example of a successful cooperative effort pooling monitoring from multiple industrial sources to estimate the impacts of discharges on the ambient environment of the coastal waters of Southern California.

238. ENVTL. MONITORING TEAM, *supra* note 113, at 9–12.

239. JEFFREY L. PRESSMAN & AARON WILDAVSKY, IMPLEMENTATION 133–34 (3d ed. 1984) (making same points); WILSON, *supra* note 198, at 190–91 (noting that agencies will generally attempt to preserve their autonomy in cooperative

the history of formal collaborative efforts across agencies makes fairly clear that, unless collaboration is in the interests of all of the participating agencies, success is unlikely.[240] The U.S. environmental satellite program's problems are in part the result of an ineffective inter-agency collaboration, with different agency protocols and procedures for contracting and procurement, different agency goals and standards for the program, and different institutional cultures.[241] In response, the Obama Administration terminated the interagency collaboration and divided the satellite program among the component agencies.[242]

All this is not to say that collaboration is not an important potential solution. It can be done with relatively low cost and with politically feasible inter-agency agreements. It is the solution that might work best when agencies do not have institutional reasons to oppose or resist monitoring and there is not likely to be significant political resistance to monitoring.

B. Outsourcing: Relying More on Actors Outside the Bureaucracy

If the problem is the incentives against monitoring that continuity and opacity create within agencies, we might look outside those agencies to try and resolve the problem, to institutions such as regulated parties, citizen groups, courts, or Congress. However, relying on industry leads us back to the same problem of agency incentives; citizen groups, courts, and Congress often lack either the continuity or the expertise to effectively conduct or supervise monitoring.

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agreements); *id.* at 268–69 (contending that most cooperative agreements are useless).

240. DONALD CHISHOLM, COORDINATION WITHOUT HIERARCHY: INFORMAL STRUCTURES IN MULTIORGANIZATIONAL SYSTEMS 146–49 (1989); WILSON, *supra* note 198, at 192 ("[I]t is extraordinarily difficult to coordinate the work of different agencies."); Allen Schick, *The Coordination Option* 85, 97–98, *in* FEDERAL REORGANIZATION: WHAT HAVE WE LEARNED? (Peter Szanton ed., 1981).

241. *See* POLAR-ORBITING ENVIRONMENTAL SATELLITES: WITH COSTS INCREASING, *supra* note 9, at 21–27.

242. *See* POLAR-ORBITING ENVIRONMENTAL SATELLITES: AGENCIES MUST ACT QUICKLY, *supra* note 9, at 15.

1. Industry Monitoring

While industry may have fewer incentives to conduct ambient environmental monitoring,[243] one could envision rigorous legal requirements that private industry conduct ambient monitoring.[244] Nonetheless, public oversight of the private monitoring programs would be required, leaving the question of when and how government agencies will be able to ensure that private parties conduct effective ambient environmental monitoring programs,[245] more or less the same question. For instance, a developer of a proposed wind farm in West Virginia conducted surveys inadequate to detect the presence of an endangered species in the area.[246] Despite the inadequate monitoring, the local government with permitting authority signed off on the survey and the project.[247]

2. Citizen Group Monitoring

Individual citizens in "bucket brigades" use inexpensive technology to measure air quality in their community, often with a particular focus on toxic air pollutants that nearby industrial facilities might release.[248] This monitoring can be a potent media and political tool that influences regulators or regulated industry. In the National Audubon Society's Christmas Bird Count (CBC), volunteer bird-watchers have reported counts of birds observed from thousands of locations across the country every Christmas for over 100 years.[249] These

243. *See supra* Part I.A.

244. Case, *supra* note 31, at 438–42; Coglianese et al., *supra* note 30; Donald T. Hornstein, *Complexity Theory, Adaptation, and Administrative Law*, 54 DUKE L.J. 913, 958 (2005).

245. EPA recognizes that its oversight of private data collection and reporting is a form of public monitoring. *See* JAMES H. FINGER, U.S. ENVTL. PROT. AGENCY, REGION IV, MEMO RE: ENVIRONMENTAL PROTECTION AGENCY QUALITY ASSURANCE POLICY STATEMENT (July 6, 1979). Scholars have called public supervision of private monitoring efforts "meta-monitoring." *See* Peter N. Grabosky, *Using Non-Governmental Resources to Foster Regulatory Compliance*, 8 GOVERNANCE 527, 543 (1995).

246. *See* Animal Welfare Inst. v. Beech Ridge Energy LLC, 675 F. Supp. 2d 540 (D. Md. 2009).

247. Ultimately, the farm was blocked by litigation in federal court. *See id.*

248. *See* Christine Overdevest & Brian Mayer, *Harnessing the Power of Information Through Community Monitoring: Insights from Social Science*, 86 TEX. L. REV. 1493, 1510–11 (2008).

249. Erica H. Dunn et al., *Enhancing the Scientific Value of the Christmas Bird Count*, 122 THE AUK 338, 338 (2005).

are only two examples of a wide range of citizen monitoring efforts for environmental quality across the United States.[250]

But many monitoring technologies may be financially out of the reach of most volunteer groups.[251] Even where the technology is feasible, the data protocols may be implemented in a flawed way.[252] And even if volunteer monitoring is methodologically correct, it may nonetheless be suspect in the eyes of the public or the regulator because of claims that the information was collected by groups with a hidden agenda.[253] Finally, there are serious questions about the ability of volunteer organizations to maintain long-term commitments to collect monitoring information continuously, rigorously, and effectively over an extended period of time.[254] Many community organizations are unlikely to have the kind of institutional lifespan necessary for effective monitoring.[255]

Volunteer monitoring seems most plausible when: (a) the monitoring techniques are relatively inexpensive and simple; (b) the effectiveness of the volunteer monitoring program is relatively simple for auditors or outsiders to assess (to reduce the perception of bias); and (c) the continuity of the monitoring program over time is less important. For instance, the CBC uses extremely simple methodologies, occurs only once a year, and involves an activity (bird-watching) that many people do for fun on their own.[256] Likewise, the "bucket brigade" measurements focus on transient and temporary outbursts of air pollution in local communities, although more technical expertise for performing and analyzing the data may be required.[257] Even with these caveats, there are areas in which volunteer monitoring can be quite useful, like monitoring of water quality in small- to medium-sized bodies of water, where the techniques are cheap and easy to use and where long-term measurements may not be as critical. In contrast, volunteer monitoring may not be feasible for the monitoring of trace

250. *See* Christine Overdevest, Cailin Huyck Orr & Kristine Stepenuck, *Volunteer Stream Monitoring and Local Participation in Natural Resource Issues*, 11 HUM. ECOLOGY REV. 177, 177–78 (2004); Thompson, *supra* note 160, at 187, 218–29.

251. *See* Overdevest & Mayer, *supra* note 248, at 1521–22.

252. *See id.* at 1519–20; O'Rourke & Macey, *supra* note 118, at 403, 407–08.

253. *See* sources cited *supra* note 252.

254. *See* O'Rourke & Macey, *supra* note 118, at 384, 407–09.

255. *See generally id.*

256. *See* Dunn et al., *supra* note 249 (describing the limits of CBC).

257. *See* O'Rourke & Macey, *supra* note 118; Overdevest & Mayer, *supra* note 248, at 1521.

pollutants in waterways or air (because of the challenge of avoiding contamination and the need for high-precision analysis). Finally, while the CBC program shows that some volunteer programs can be sustained over the long-term, we might be skeptical of relying upon citizen groups for the bulk of long-term monitoring.

3. Enlisting Courts? Imposing Mandatory Monitoring Duties on Agencies with Judicial Enforcement

While courts generally cannot conduct monitoring themselves, courts might compel agencies to conduct more effective monitoring through the enforcement of statutory provisions that require monitoring.[258]

But many prominent environmental statutes, such as NEPA, do not have explicit mandates for monitoring.[259] While these statutes do require agencies to provide analyses and reports of the information they already have, courts have rarely interpreted these statutes as imposing additional information collection duties on agencies.[260] Absent such a judicial interpretation, statutes like the NEPA generally do not support long-term monitoring because they are tied to individual projects.[261] Once information is gathered to justify a particular project, the agency moves on to the next one, with little ex post

258. For proposals to this effect, see, for example, Alyson C. Flournoy, et al., *Harnessing the Power of Information to Protect Our Public Natural Resource Legacy*, 86 TEX. L. REV. 1575, 1587–89 (2008) (proposing a National Environmental Legacy Act that would require agencies to monitor environmental conditions); *see also* Camacho, *supra* note 53, at 72–73; Doremus, *supra* note 53, at 83–84 ("Clear, enforceable information collection and disclosure mandates must be part of any adaptive management requirement or authority.").

259. 42 U.S.C. §§ 4321–4370(f) (2006).

260. *Compare* Colo. Envt'l Coal. v. Dombeck, 185 F.3d 1162, 1170–72 (10th Cir. 1999) (holding that the Forest Service did not violate NEPA when it did not collect quantitative population data about the distribution of rare species that might be affected by timber project), *with* Nat'l Parks & Conservation Ass'n v. Babbitt, 241 F.3d 722, 732–33 (9th Cir. 2001) (requiring collection of data about potential impacts of additional cruise ships on marine mammals in a national park), *abrogated on other grounds by* Monsanto Co. v. Geertson Seed Farms, 130 S. Ct 2743 (2010). *See also* 40 C.F.R. § 1502.22 (2010) (regulation interpreting NEPA that requires an agency to state whether there are significant uncertainties about any analysis of environmental impacts, but only requires additional information collection when such information is both essential "and the overall costs of obtaining it are not exorbitant.").

261. Buzbee, *supra* note 30, at 603; Karkkainen, *supra* note 66, at 939–40, 965–66.

data collection for the approved project and little or no baseline data collection for future projects.[262]

Some statutes and regulations do explicitly impose mandatory monitoring duties on agencies.[263] However, many of these programs have not been effectively implemented by agencies absent judicial intervention.[264] And that judicial intervention is quite rare, as even with explicit mandatory statutory or regulatory requirements, courts often simply refuse to order agencies to conduct monitoring. There are three main doctrinal rationales for the judicial reluctance to compel monitoring: (1) an agency monitoring program is neither a "final" nor specific agency "action" that a court can review or mandate under the APA;[265] (2) the level of compliance by an agency with a mandatory duty is not for the court to review, as long as at least some compliance exists;[266] or (3) the apparently

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262. Buzbee, *supra* note 30, at 603; Karkkainen, *supra* note 66, at 939–40.

263. For instance, BLM and Forest Service regulations currently require the monitoring of federal lands for adverse impacts from off-highway vehicle (OHV) use. *See* 43 C.F.R. § 8342.3 (2010) (BLM regulation); 36 C.F.R. § 212.57 (2010), *available at* http://www.gpoaccess.gov/cfr/retrieve.html (Forest Service regulation).

264. Regular GAO reports have found the level of OHV monitoring by the BLM and the Forest Service to be inadequate. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO/RCED-95-209, FEDERAL LANDS: INFORMATION ON THE USE AND IMPACT OF OFF-HIGHWAY VEHICLES 4 (1995); U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-509, ENHANCED PLANNING COULD ASSIST AGENCIES IN MANAGING INCREASED USE OF OFF-HIGHWAY VEHICLES (2009).

In theory, the ESA requires regular monitoring and reevaluation of major management decisions, such as status reviews for listed species and reports on the recovery progress for listed species. Ruhl, *Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act*, *supra* note 53, at 1266–68. However, in practice the agencies that implement the ESA "regularly fail to conduct status monitoring and adjustment" for listed species, *id.* at 1267, and the recovery reports have been cursory, *id.* at 1268. The ESA section 7 consultation requirement, which requires a federal agency proposing an action that might harm endangered species to consult with FWS, does impose some obligation to collect information about the current status of relevant listed species and the potential impact of the action on the species. Buzbee, *supra* note 30, at 596–97. However, that requirement generally produces only intermittent information gathering. *See* Ruhl, *Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act*, *supra* note 53, at 1264–71. The exception is repeated ESA consultation or permitting for an ongoing activity, such as in the context of the grazing program on the CNF. *See infra* notes 285–91 and accompanying text.

265. *See* Ecology Ctr., Inc. v. U.S. Forest Service, 192 F.3d 922, 925–26 (9th Cir. 1999) (concluding that monitoring obligation is not a final agency action which can be compelled by courts); Sierra Club v. Peterson, 228 F.3d 559, 565–68, 571 n.8 (5th Cir. 2000) (rejecting challenges to Forest Service monitoring because plaintiffs were not attacking a specific agency decision).

266. *See, e.g.*, Mont. Snowmobile Ass'n v. Wildes, 26 F. App'x 762, 764 (9th Cir. 2002); Friends of the Earth v. U.S. Dep't of the Interior, 478 F. Supp. 2d 11, 26

mandatory language in the statute, regulation, or plan is in fact only hortatory.[267] But underlying these rationales is likely a concern about judicial attempts to micromanage agencies by constantly supervising whether they are conducting what is, in essence, an ongoing, day-to-day operational program, rather than a particular task that can be completed within a set period of time.[268] Whatever the merits of those judicial concerns might be, they present a substantial obstacle to those who seek to reform environmental monitoring absent a fundamental reorientation of how courts view their relationship vis-à-vis administrative agencies.

There are a few areas where courts have tried to enforce statutory monitoring requirements. Usually, courts are more willing to step in when a monitoring duty can be framed as a precondition to the agency being able to pursue some other activity that it seeks to accomplish (such as a timber sale or road construction).[269] This allows courts to avoid the agency

(D.D.C. 2007) (citing Norton v. S. Utah Wilderness Alliance, 542 U.S. 55, 63 (2004)); Natural Res. Def. Council, Inc. v. U.S. Forest Serv., 634 F. Supp. 2d 1045, 1062 (E.D. Cal. 2007); Gardner v. U.S. Bureau of Land Mgmt., 633 F. Supp. 2d 1212, 1230 (D. Or. 2009); Friends of the Kalmiopsis v. U.S. Forest Serv., No. 98-35793, 1999 WL 893631 (9th Cir. Oct. 15, 1999); *Ecology Center*, 192 F.3d at 926.

267. *See* Norton v. S. Utah Wilderness Alliance, 542 U.S. 55, 71 (2004) (concluding that the agency's land management plan's requirement that monitoring of OHV requirements be conducted was only hortatory and not judicially enforceable); *see also* ONRC Action v. Bureau of Land Mgmt., 150 F.3d 1132, 1139–40 (9th Cir. 1998) (similar interpretation of similar provisions in management plan); Lands Council v. Vaught, 198 F. Supp. 2d 1211, 1229–33 (E.D. Wash. 2002) (same); Audubon Naturalist Soc'y of the Cent. Atl. States, Inc. v. U.S. Dep't of Transp., 524 F. Supp. 2d 642 (D. Md. 2007) (narrowly interpreting monitoring requirements under Clean Air Act); Mass. Audubon Soc'y, Inc. v. Daley, 31 F. Supp. 2d 189 (D. Mass. 1998) (same for Atlantic Tunas Convention Act).

268. *See* Lujan v. Nat'l Wildlife Fed'n, 497 U.S. 871 (1990) (requiring that an agency decision be a specific agency action for judicial review to apply, in part to avoid the risk that courts will be drawn into managing the "day-to-day" operations of an agency); Norton v. S. Utah Wilderness Alliance, 542 U.S. 55 (2004) (applying *Lujan v. Nat'l Wildlife Fed'n* to conclude that courts can only compel "specific" mandatory agency action and that plan language requiring monitoring was only hortatory for similar reasons); *Ecology Center*, 192 F.3d at 925–26 (citing Lujan v. Nat'l Wildlife Fed'n, 497 U.S. at 899) (applying the *Lujan* court's injunction against judicial intervention in "day-to-day" operations of agencies).

269. For instance, in the West Virginia wind farm case, the court was willing to conclude that the monitoring was inadequate in the context of a case where plaintiffs sought to enjoin the construction of a particular wind project. Animal Welfare Inst. v. Beech Ridge Energy LLC, 675 F. Supp. 2d 540 (D. Md. 2009). Caselaw in which plaintiffs have sought to enforce the Forest Service's MIS regulations usually involved a plaintiff seeking to stop a separate, specific Forest Service activity, such as a logging project, on the grounds of inadequate monitoring, rather than trying to seek direct review of the inadequate monitoring

action problem because they are merely enjoining a specific agency action (such as the timber sale or the road construction) until the agency has compiled an adequate monitoring record.[270] But even here, the result is often litigation trench warfare between plaintiffs seeking to force agency monitoring of a certain level or kind, and an agency that is determined to avoid what it sees as the unnecessary and unrealistic costs of proposed monitoring.

For instance, the Ninth Circuit has held that the Forest Service can use "proxy-on-proxy" estimates of habitat quantity and quality as a substitute for actual measures of MIS population numbers only if the Forest Service shows that the habitat estimates are an effective and adequate proxy.[271] However, the court's efforts to closely examine the Forest Service's proxy-on-proxy methodology have led the court into a long series of cases that require factually intense examination and produce difficult-to-reconcile outcomes.[272]

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itself. *See infra* notes 271–72; *see also Ecology Center*, 192 F.3d at 925 n.6 (drawing this distinction); Neighbors of Cuddy Mountain v. Alexander, 303 F.3d 1059, 1066–68, 171 (9th Cir. 2002) (allowing challenge to logging proposal based on claim of inadequate monitoring); J.B. Ruhl and Robert L. Fischman, *Adaptive Management in the Courts*, 95 MINN. L. REV. 424, 449–451 (2010) (describing how monitoring failures were successfully used to challenge proposed timber sales under the Northwest Forest Plan).

270. This approach is similar to the "destabilization right" concept that Brad Karkkainen has advocated as a way of forcing industry and regulatory agencies to produce more information about environmental harms. *See generally* Bradley C. Karkkainen, *Getting to "Let's Talk": Legal and Natural Destablizations and the Future of Regional Collaboration*, 8 NEV. L.J. 811 (2008); Bradley C. Karkkainen, *Information-Forcing Environmental Regulation*, 33 FLA. ST. U. L. REV. 861 (2006). It can also be seen as a tool by which Congress might make an agency's preferred action more difficult until and unless the agency meets minimum evidentiary standards or makes a showing of minimum effort in conducting monitoring activities, and in doing so, increases the incentives to conduct monitoring. *See generally* Matthew C. Stephenson, *Information Acquisition and Institutional Design*, 124 HARV. L. REV. 1422 (2011); Dezsö Szalay, *The Economics of Clear Advice and Extreme Options*, 72 REV. OF ECON. STUD. 1173 (2005) (formal modeling developing this analysis).

271. Lands Council v. McNair, 537 F.3d 981, 997–98 & n.10 (9th Cir. 2008), *overruled in part by* Winter v. Natural Res. Def. Council, Inc., 555 U.S. 7 (2008) (correcting the standard for a preliminary injunction), *as recognized in* Am. Trucking Ass'n v. Los Angeles, 559 F.3d 1046, 1052 (9th Cir. 2009).

272. *Compare Lands Council*, 537 F.3d at 997–98 (upholding use of proxy-on-proxy methodology), *and* Native Ecosystems Council v. U.S. Forest Serv., 428 F.3d 1233, 1251 (9th Cir. 2005) (same), *with* Native Ecosystems Council v. Tidwell, 599 F.3d 926, 933–34 (9th Cir. 2010) (rejecting use of proxy-on-proxy methodology), *and* Earth Island Inst. v. U.S. Forest Serv., 442 F.3d 1147, 1175–76 (9th Cir. 2006) (same), *abrogated by* Winter v. Natural Res. Def. Council, Inc., 555 U.S. 7 (2008). Other circuits have either prohibited the Forest Service from conducting proxy-on-proxy monitoring entirely, or have generally allowed it, without the close

The problem is that it is very difficult for courts to analyze whether an agency truly has done all it can in developing an effective monitoring program. Judicial enforcement appears to be a relatively costly and inefficient way of achieving better monitoring, with uncertain outcomes and the risk of exacerbating the "ossification" of agency action.[273] Even when judicial intervention occurs, it is a long and slow process for individual court cases to turn into effective monitoring programs, given the intermittent nature of judicial review. A more modest option might be to reduce the disincentives for information production, by allowing plaintiffs to introduce more extra-record evidence when challenging agency decisions, in order to force agencies to conduct better monitoring.[274] The risk is that outside parties will swamp courts with superfluous and irrelevant information, in the hope of either overturning the agency decision, or at least delaying adverse agency decisions.[275]

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analysis the Ninth Circuit has provided. *Compare* Sierra Club v. Martin, 168 F.3d 1, 6 (11th Cir. 1999) (rejecting Forest Service use of proxy-on-proxy methodology), *with* Ind. Forest Alliance, Inc. v. U.S. Forest Serv., 325 F.3d 851, 863 (7th Cir. 2003) (allowing use of proxy-on-proxy methodology). Nonetheless, even in these circumstances the difficult question of adequacy of monitoring arises, since a court that requires quantitative population measures to satisfy the MIS requirements must determine how much data is adequate. *See, e.g.*, Utah Envtl. Congress v. Bosworth, 372 F.3d 1219, 1227 (10th Cir. 2004) (rejecting proxy-on-proxy methodology, but upholding the Forest Service's reliance on "cursory" data on population levels of a species that had been collected from a single location); *see generally* Utah Envtl. Congress v. Troyer, 479 F.3d 1269 (10th Cir. 2007) (upholding Forest Service compliance with MIS regulations despite serious problems with underlying data).

273. *See, e.g.*, Thomas O. McGarity, *Some Thoughts on "Deossifying" the Rulemaking Process*, 41 DUKE L.J. 1385 (1992) (developing concept of rulemaking "ossification" in which significant procedural requirements and judicial review deter agencies from productive action). This is not to say that statutory monitoring requirements might not be useful to the extent they have political power to encourage agencies to conduct more monitoring by highlighting the importance of the task. And judicial enforcement of those monitoring requirements may be a "second-best" alternative if other solutions are not available. *See* Stephenson, *supra* note 185, at 360–71 (showing that where a court requires an agency to collect research in order to undertake an action the agency seeks to pursue, the incentives for the agency to collect information increase substantially).

274. *See* Jeffrey Rudd, *The Forest Service's Epistemic Judgments: Enhancing Transparency to Ensure "New Knowledge Informs" Agency Decision-Making Processes*, 23 TEMP. ENVTL. L. & TECH. J. 145, 216–21 (2004).

275. *Cf.* Wagner, *supra* note 71, at 1325 (discussing the excessive use of information and related information costs as a means of gaining control over regulatory decision making in informal rule makings).

Alternatively, one could require near absolute deference by courts to agency decisions, such that additional information will not increase the risk of a court overturning the agency decision.[276] The problem here is that the risk of judicial review is not the only factor that leads agencies to be reluctant to pursue effective monitoring—there may be other reasons agencies avoid monitoring.[277] Moreover, complete deference for agency decisions may have other costs that outweigh any benefits from improved monitoring programs.

4. Congress

Another possibility is that closer congressional supervision of agency monitoring might help improve an agency's incentives to monitor. GAO reports have provided important information about the weaknesses of individual agency monitoring programs.[278] However, Congress faces somewhat similar institutional capacity problems as the courts. There are limits on the type and amount of oversight Congress can do for monitoring programs and that oversight tends to focus on more glamorous activities than ambient monitoring:[279] GAO reports

276. *See* Stephenson, *supra* note 185, at 375–77.

277. *See supra* Part II.B.

278. *See* sources cited *supra* note 83.

279. After all, there are only 535 members of Congress, all with the entire federal bureaucracy to oversee, and a wide range of other activities to undertake besides oversight. *See* CHRISTOPHER H. FOREMAN, JR., SIGNALS FROM THE HILL 18–19 (1988) (noting the necessity of selectivity in Congressional oversight activities given the scale of bureaucracy and the size of Congress). It is for these reasons that scholars have contended that the dominant methodology by which Congress oversees the bureaucracy is reacting to complaints from constituents (responding to "fire alarms"), as it is far more cost-effective than regular "police patrols." *See, e.g.*, Mathew D. McCubbins & Thomas Schwartz, *Congressional Oversight Overlooked: Police Patrols Versus Fire Alarms*, 28 AM. J. POL. SCI. 165 (1984). Since monitoring is difficult for outsiders to evaluate in terms of effectiveness and is a low-profile activity, there may be little ability or willingness for outsiders to identify problems with monitoring programs and bring them to the attention of Congress; this would systematically skew oversight against finding problems with monitoring. *See generally* Hugo Hopenhayn & Susanne Lohmann, *Fire-Alarm Signals and the Political Oversight of Regulatory Agencies*, 12 J.L. ECON. & ORG. 196 (1996) (describing how asymmetric information may skew the political oversight of agencies). Thus, even with evidence that Congress does do substantial oversight, *see generally* JOEL ABERBACH, KEEPING A WATCHFUL EYE (1990), there is good reason to believe that this oversight would not focus on ambient monitoring and would not be effective in doing so, *see id.* at 109–12, 120–21, 199–201 (noting how Congressional oversight tends to focus on activities that provide political rewards for Congressmen, such as scandals or policy disputes with the agency).

on the topic, for instance, are intermittent.[280] While Congress may have access to more expertise than courts, it is nonetheless unlikely that Congress will ever be able to build up sufficient expertise in a wide range of technical areas related to monitoring to serve as an effective overseer. And finally, to the extent that Congress is a major source of the political and budgetary constraints for monitoring, it seems unlikely that Congress can be counted on to make the problem better, as opposed to worse.[281]

C. Restructuring Agencies to Create Incentives for Monitoring

Instead of trying to work with agencies as they are, or relying on other institutions instead of agencies, we might try to fundamentally restructure agencies in order to increase the incentives for monitoring. Agencies may have greater continuity than citizen groups, courts, or Congress, and greater expertise than all three as well. The most promising option here would be to consider the creation of separate agencies whose primary goal is monitoring.

1. The Advantages of Creating New Monitoring Agencies

If a main challenge is the potential conflict between monitoring and an agency's other goals, an agency focused primarily on monitoring might be an improvement.[282] A separate monitoring agency might have been less susceptible than the BLM to cutting wildlife monitoring in order to pursue oil and gas development, since that kind of development would have been outside the scope of the agency's mandate. While there are few examples of a pure monitoring stand-alone agency in the environmental context, there are a number of agencies where monitoring is a primary goal, and where monitoring has relatively little conflict with other goals. For

280. Since August 1, 1995, only thirteen of the last 150 GAO reports that discuss the BLM touch upon the question of ambient environmental monitoring. U.S. GOVERNMENT ACCOUNTABILITY OFFICE, http://www.gao.gov (follow "Reports & Testimonies" hyperlink; then search for reports that discuss BLM).

281. *See supra* Part II.A.1.

282. Others have made similar proposals. *See* ACKERMAN ET AL., *supra* note 71, at 156–61; Doremus, *supra* note 53, at 81; Doremus, *supra* note 66, at 458; Shapiro & Steinzor, *supra* note 83, at 1775–77.

instance, USGS contains a substantial amount of the environmental monitoring activity within the federal government, and its other tasks (primarily conducting scientific research for the federal government on a range of natural resource issues)[283] do not directly conflict with that monitoring role. Separation or institutional independence is not determined by the organizational chart: Agencies that are formally separate may in practice be closely intertwined and subunits within a larger agency may, in effect, be quite independent because of internal politics, budgeting, agency culture, or other factors. [284]

A separate agency need not conduct the monitoring itself in order to improve monitoring. For instance, the FWS's role in the ESA consultation process can substantially improve monitoring by other federal agencies. In the consultation process, other federal agencies have to develop an analysis of proposed federal actions to ensure that those actions will not seriously harm endangered species.[285] FWS reviews that analysis and then produces a biological opinion that agrees or disagrees with the acting agency's analysis.[286] That opinion is, for all practical purposes, determinative because of the potential for judicial review.[287] FWS's separate analysis plus judicial enforcement create strong incentives for the action agency to produce substantial data to ensure that consultation will reach a positive result.[288] For example, ESA litigation in the late 1990s over the impacts of Forest Service grazing activities in the Coronado National Forest (CNF) on endangered species forced consul-tation with FWS, which in turn demanded more monitoring data to ensure that listed species were not harmed.[289] As a result, the Forest Service restarted its monitoring program.[290] Unlike judicial review of agency monitoring, a supervising agency such as FWS has a significant expertise advantage in overcoming the opacity of monitoring, and, so long as the consultation or review is for a

283. *See* U.S. GEOLOGICAL SURVEY, U.S. DEP'T OF THE INTERIOR, FACING TOMORROW'S CHALLENGES—U.S. GEOLOGICAL SURVEY SCIENCE IN THE DECADE 2007–2017 (2007).

284. *Cf.* WILSON, *supra* note 198, at 92.

285. *See* 16 U.S.C. § 1536(a) (2006).

286. *Id.*

287. *See* Bennett v. Spear, 520 U.S. 154, 169–70 (1997).

288. *See* Buzbee, *supra* note 30, at 596–97.

289. *See generally* SAYRE ET AL., *supra* note 58.

290. *See id.*

repeated or ongoing activity (as with the grazing monitoring in the CNF), it can address the problems with continuity much better than courts can because review is built into the administrative process, rather than being dependent on a separate lawsuit.[291]

With a separate agency, we have the advantages of continuity (because we have a public institution, which is usually fairly long-lived);[292] we have the advantages of expertise (because the agency primarily focuses on monitoring); and we have an institution with an incentive to conduct effective monitoring (because of administrative separation from other potentially conflicting activities).[293]

There are also potential political benefits of a separate monitoring agency. A large organization that combines monitoring with other tasks might, if budget cuts come, cut monitoring budgets disproportionately in order protect other, higher-profile or preferred jobs.[294] And, of course, cuts may be worse to the extent that monitoring is disfavored within an agency (perhaps because of potential conflicts with the agency's mission).[295] For instance, the federal agencies responsible for Earth observation satellites have a wide range of activities they pursue besides monitoring, and therefore, did not have the

291. Unfortunately, many activities that go through ESA consultation are not repeated or ongoing, and, in these cases, consultation may not provide significant advantages for monitoring. *See* sources cited *supra* note 263.

292. There is some disagreement over exactly how long public agencies actually stay around. *Compare* HERBERT KAUFMAN, ARE GOVERNMENT ORGANIZATIONS IMMORTAL? 34 (1976) (finding that from the mid-1920s to the mid-1970s, 85% of government agencies continued to exist in some form and 62% had existed in virtually the same form), *with* David E. Lewis, *The Politics of Agency Termination: Confronting the Myth of Agency Immortality*, 64 J. POL. 89, 89 (2002) (finding that 62% of agencies created since 1946 have been terminated). Even with the lower numbers, however, public agencies likely have a much greater life expectancy than private organizations.

293. In envisioning using agencies to fill specific roles in a larger, integrated administrative structure, rather than as the primary locus of the decisionmaking process, the proposal is similar to the "modular regulation" concept developed by Jody Freeman and Dan Farber. *See generally* Jody Freeman & Daniel A. Farber, *Modular Environmental Regulation*, 54 DUKE L.J. 795 (2005). Freeman and Farber emphasize how modularity can improve information acquisition and use. *See id.* at 824–25, 846 (citing an example from joint federal-state management of the California Delta).

294. *See* Peter Szanton, *So You Want to Reorganize the Government?*, *in* FEDERAL REORGANIZATION 1, 13 (Peter Szanton ed., 1981); *supra* Part II.A.2.

295. JONATHAN B. BENDOR, PARALLEL SYSTEMS: REDUNDANCY IN GOVERNMENT 254–56 (1985); *supra* Part II.B.2.

same institutional incentives to avoid budget cuts to monitoring.[296]

But if the only activity the agency pursues is monitoring, then there is no such possibility for a trade-off. In order to ensure its institutional survival, the agency has to maintain its monitoring budget. And government agencies tend to fight hard for institutional survival.[297] A separate monitoring agency might fight for more consistent funding over time, and resist some of the short-term efforts to cut monitoring budgets.

Finally, there is one additional potential political benefit from the creation of a separate monitoring agency—it might be able to develop a reputation as an "unbiased" provider of information that is untainted by institutional connections to a regulatory or management agency. In other words, its data might be more credible, and its funding might be more secure, precisely because the staff who conduct monitoring do not have an institutional stake in regulatory or management decisions.[298]

2. The Disadvantages of a Separate Monitoring Agency

Perhaps the largest disadvantage of separating monitoring activities is the institutional distance it might create between the regulatory or management decision-makers and those conducting monitoring. Monitoring is often more effective and efficient if it is closely coordinated with the decisions that monitoring is supposed to inform.[299] For instance, a major

296. *See* Bohan, *supra* note 9 (noting that Earth observation satellites are managed by NASA, the Department of Defense, and NOAA).

297. *See* WILSON, *supra* note 198, at 58 (noting that members of an organization "will try to defend and advance the interests of their parent organization[s]" and that organizations will look to solve "organizational maintenance problem[s]" by finding roles for the organization to fulfill).

298. Regulated industry might be more suspicious of monitoring conducted by a regulatory agency that is perceived to be seeking data to justify more regulation; environmental groups might be more suspicious of monitoring conducted by a management agency that is perceived to be seeking data to justify new development projects.

299. *See, e.g.*, Davis, *supra* note 93, at 101 (noting that monitoring is "best managed by site managers and conducted by resource specialists"); David B. Lindenmayer & Gene E. Likens, *Adaptive Monitoring: A New Paradigm for Long-Term Research and Monitoring*, 24 TRENDS IN ECOLOGY & EVOLUTION 482, 482–83 (2009); Nichols & Williams, *supra* note 123, at 668, 672 (arguing that targeted (or focused) monitoring that is directly connected to management questions is much more effective and efficient than "omnibus surveillance monitoring" without

concern agency managers and scientists expressed about NBS's creation was the potential disconnect between scientists and resource managers, such that the questions of interest to managers would not be addressed by scientists, and managers would not be aware of the information that scientists were producing.[300] Close consultation can avoid waste that might arise if the monitoring is either too precise (with unnecessary measurements) or not precise enough (such that the monitoring program cannot help answer the relevant management question).[301]

There are two political problems with separation. First, it may be politically easier to fund monitoring programs if their relevance is clear. And that relevance may be more obvious to the extent that the agency that will use the information is conducting the monitoring.

Second, a larger agency just may be better able to get its way in terms of total funding, and this might help the funding of monitoring despite the risk that the agency might disproportionately cut monitoring.[302] Isolated, small agencies might have more of a challenge making their case heard for funding in the budgetary process, particularly if they do not

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a clear management connection); David G. Silsbee & David L. Peterson, *Planning for Implementation of Long-Term Resources Monitoring Programs*, 26 ENVTL. MONITORING & ASSESSMENT 177, 179 (1993).

300. Stone, *supra* note 144, at 976; Wagner, *supra* note 147, at 221. Similar criticisms have been made of the GCMRC. *See* Susskind et al., *supra* note 166, at 23, 45–46. Another example is the dysfunction created by the separation of the monitoring and research functions of the National Institute for Occupational Safety and Health from the regulatory functions of the Occupational Safety and Health Administration. *See* TED GREENWOOD, KNOWLEDGE AND DISCRETION IN GOVERNMENT REGULATION 116–18 (1984).

301. LEE, *supra* note 66, at 179; Kevin A. Roberts, *Field Monitoring: Confessions of an Addict*, *in* MONITORING FOR CONSERVATION AND ECOLOGY 179, 180 (F.B. Goldsmith ed., 1991).

302. A larger agency might have more stability in terms of overall funding but more volatility in terms of funding for monitoring specifically, and a smaller agency might have the reverse problem. For instance, a larger agency's overall budget might be $100 billion plus or minus $1 billion (a 1% variance) while the smaller agency's overall budget might be $5 billion plus or minus $500 million (a 10% variance). Reciprocally, the larger agency's monitoring budget might vary from .5% to 5% of its overall budget (from $500 million to $5 billion) while the smaller agency's monitoring budget might be consistently 20%. Whether monitoring will be better provided for in the larger or smaller agency will depend on which factor is more important for monitoring budgets: variance in the overall budge or variance in the monitoring budget (e.g., the larger agency's monitoring budget ranges from $500 million to $5 billion because of the variance in monitoring budgets, while the smaller agency's monitoring budget ranges from $900 million to $1.1 billion (20% of $4.5 to $5.5 billion)).

have strong outside clients who support the agency's mission.[303] The larger the number, or the more politically powerful the clients of an agency are, the more support there will be for the program as a whole, including monitoring. The Fish Passage Center might have been so politically vulnerable to retaliation by a single senator through the appropriations process precisely because the area of its work was so narrow, and the number and power of its clients so limited.[304]

3. Synthesis

a. Coordination vs. Independence

We must make a trade-off between the relative importance of coordination versus the reduction of conflicts between monitoring and management. Resolving that trade-off will depend on the particular context of the resources being monitored and the interaction between monitoring and other management or regulatory goals.

One tentative hypothesis is that regulatory agencies might have fewer conflicts between most kinds of monitoring and other goals than management agencies. Regulatory agencies are more likely to be organized around an agency mission of identifying environmental problems that require regulatory

303. Harold Seidman, *A Typology of Government*, *in* FEDERAL REORGANIZATION: WHAT HAVE WE LEARNED? 33, 41–43 (Peter Szanton ed., 1981) (noting that independent agencies can be isolated and weak); *see* Fortmann, *supra* note 226, at 362–64 (summarizing literature on how supporting and developing clients may increase agency's political power).

304. Another possible example of the weaknesses of small, stand-alone monitoring agencies is the Agency for Toxic Substances and Disease Registry (ATSDR), a part of the Department of Health and Human Services (HHS) that was created, in part, to monitor health impacts at hazardous waste sites around the country; its other primary roles are to conduct research and produce reports on the potential health impacts of toxic substances. *See* Rebecca Renner, *Health Agency Accused of Overlooking Environmental Threats to Public*, 2009 ENVTL. SCI. & TECH. 3989. Despite its relative independence, the ATSDR has been criticized as being too friendly to industry in its work and conducting sloppy monitoring and research programs. *Id.*; *see also* STAFF OF H. SUBCOMM. ON INVESTIGATIONS AND OVERSIGHT OF THE COMM. ON SCI. AND TECH., 111TH CONG., REP. ON THE AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY (ATSDR): PROBLEMS IN THE PAST, POTENTIAL FOR THE FUTURE? (Comm. Print Mar. 10, 2009). The problem in the case of the ATSDR is that its small size may have left it vulnerable to budget pressures and administrative indifference within HHS. *Id.* at 2–3 (describing how other agencies sought to subvert ATSDR's work).

solutions[305] and would more likely need monitoring data in order to justify new regulations against legal or political challenges. Management agencies are more likely to be focused around missions that involve development projects rather than environmental goals,[306] and, therefore, monitoring data are more likely to raise the risk of identifying new or emerging environmental problems that might interfere with proposed development activities.[307]

Another tentative hypothesis is that certain activities require less coordination between monitoring and management, and therefore might be more amenable to separation—for instance, the imposition of strict environmental standards. There is no need to tailor the monitoring program to the particulars of the individual management decisions since the standards must be met regardless.[308] On the other hand, if the object is to measure whether a particular management option has achieved environmental quality goals, then it may be crucial to calibrate the monitoring program to the specifics of the management option selected and the goals to be achieved.[309]

At least tentative evidence from some large ecological restoration projects in the United States indicates that more independence improves monitoring as long as minimal coordination exists. For instance, the restoration efforts for both the Colorado River in the Grand Canyon below Glen

305. An example is the federal Environmental Protection Agency, which has a reputation of pushing for environmental regulation. *See* Biber, *supra* note 192, at 46–50 (describing battles between the EPA and economists in the Office of Management and Budget over the cost-effectiveness of proposed EPA regulations).

306. For example, the Bureau of Land Management has a reputation of encouraging development. *See supra* notes 203–04 and accompanying text.

307. There may be regulatory agencies that might be wary of imposing additional regulation or that might see additional monitoring data as potentially threatening to their efforts to impose new regulation. Likewise, there may be management agencies that are committed to environmental conservation as a primary mission (such as, arguably, the National Park Service) and therefore might seek more monitoring data.

308. The ESA consultation process can be seen as an example of strict outside constraints (do not jeopardize the existence of listed species) that are imposed on management agencies (e.g., federal land management agencies).

309. For instance, in the Chesapeake Bay restoration program, coordination between management efforts to improve water quality through various "best management practices" and the monitoring program was essential. Without knowing where the management efforts might occur, and what the goals of those projects were, the design of effective monitoring programs would have been impossible. *See* sources cited *supra* note 120; *see also supra* text accompanying note 122.

Canyon Dam and for the Everglades have received praise for the quality of the monitoring work that they have conducted.[310] Both have relatively independent monitoring organizations.[311] By contrast, the monitoring for the Chesapeake Bay Program has been strongly criticized, and its monitoring group is integrated into the overall hierarchy of the program.[312]

b. Political Feasibility

But is it politically feasible to create stand-alone monitoring agencies in the first place? There is the benefit of the perception (if not reality) of an "unbiased" monitoring-only agency that can assure more funding and less political interference, but that benefit might often be outweighed by the twin risks of the agency being portrayed as either focusing on highly abstract, irrelevant studies that have no connection to reality, or providing politically dangerous information. The experience of the NBS—being eliminated by a hostile Congress that perceived it as a tool to increase regulation—highlights that second risk. It might be that the opponents of the NBS knew all too well how successful a stand-alone monitoring

310. *See* NAT'L RESEARCH COUNCIL, PROGRESS TOWARD RESTORING THE EVERGLADES: THE SECOND BIENNIAL REVIEW 194–212 (2008); NAT'L RESEARCH COUNCIL, ADAPTIVE MANAGEMENT FOR WATER RESOURCES PROJECT PLANNING 78–80 (2004).

311. *See* NAT'L RESEARCH COUNCIL, PROGRESS TOWARD RESTORING THE EVERGLADES: THE SECOND BIENNIAL REVIEW, *supra* note 310, at 72 (overview of structure of Everglades restoration program); Programmatic Regulations for the Comprehensive Everglades Restoration Plan, 67 Fed. Reg. 50,540, 50,543 (Aug. 2, 2002) (description of Everglades monitoring program); Restoration Coordination and Verification ("RECOVER"), 33 C.F.R. § 385.20 (2010) (federal regulations creating an Everglades monitoring program); *see* sources cited *supra* notes 75, 300 (describing the GCMRC); *see also* NAT'L RESEARCH COUNCIL, ADAPTIVE MANAGEMENT FOR WATER RESOURCES PROJECT PLANNING, *supra* note 310, at 66–68 (positive description of monitoring program for Upper Mississippi River restoration, also run by a relatively independent organization that is part of USGS). The monitoring programs for the Glen Canyon and the Upper Mississippi are relatively more independent, while the program for the Everglades is still overseen by the state and federal agencies conducting the restoration. However, the fact that the Everglades monitoring program has a separate mandate and authorization in federal regulations might give it more institutional autonomy than an agency that is an administrative component of a larger organization without any separate legal basis, as in the Chesapeake Bay restoration program.

312. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-06-96, CHESAPEAKE BAY PROGRAM: IMPROVED STRATEGIES ARE NEEDED TO BETTER ASSESS, REPORT, AND MANAGE RESTORATION PROGRESS 11–12, fig.3 (2005) (the monitoring program at the time was a subcommittee of the implementation committee of the overall CBP); *see also supra* notes 122, 191.

agency might be in developing better information about endangered species and therefore justifying expanded ESA protections for habitat and wildlife.

There are separate organizations that have survived the political gauntlet, such as the monitoring programs for the Grand Canyon and Everglades restoration efforts. The difference might be that these organizations were created as part of a larger ecological restoration project that was itself politically popular and did not have nearly the same high-profile posture as the NBS. For instance, the Glen Canyon Monitoring and Research Center is part of USGS.[313] Another possibility is that a monitoring agency created slowly over time is less politically vulnerable. For instance, Natureserve developed its network of biodiversity monitoring programs around the United States over a period of years, rather than through a major legislative effort in Congress (as with the NBS).[314]

To address the risk that small, isolated monitoring agencies might not have significant political clout, one could combine a range of monitoring activities into one single agency, rather than having a number of separate monitoring agencies conducting different monitoring activities.

Another solution might be to change the perception of how monitoring might benefit various interest groups. To the extent that the results of monitoring information are seen as not necessarily helping or hurting particular political actors ex ante, there might be less resistance. For instance, improved monitoring might lead to less regulation by reducing uncertainty about the status of an environmental resource or by providing evidence of improving conditions for the resource.[315]

Finally, broad participation of actors in deciding what resources to measure and how to measure them may help build trust in the monitoring program and reduce political opposition. These community-based or collaborative monitoring programs might increase support by reassuring the various

313. *See* Susskind et al. *supra* note 166, at 23.

314. *See supra* note 80.

315. *See, e.g.*, Leah R. Gerber et al. *Gray Whales and the Value of Monitoring Data in Implementing the U.S. Endangered Species Act*, 13 CONSERVATION BIOLOGY 1215 (1999) (showing the importance of monitoring data in demonstrating improved status of species and justifying a reduction of regulatory protection); *see also* Davis, *supra* note 93, at 99–100; Doremus, *supra* note 66, at 458–59.

stakeholders that the questions they believe are relevant for management decisions are being explored.[316]

c. Collaboration and Redundancy

One way to reduce coordination problems would be to provide some formal or informal connections between the monitoring agency and the relevant management or regulatory agencies. Of course, all the problems with collaboration outlined above would apply here. The management or regulatory agency might be more willing to cooperate if some sort of approval from the monitoring agency is required for the management or regulatory agency to initiate certain actions, similar to the ESA.[317]

Another option would be to allow the management or regulatory agency to conduct its own monitoring. If a management or regulatory agency concluded that the monitoring program implemented by the separate agency was not adequately answering the relevant questions, it could initiate its own monitoring program. The result would be redundant monitoring, and while redundancy may be a waste of resources,[318] it can also provide benefits. Redundancy can create resilience in an organizational system. For instance, we might be concerned that ineffective monitoring programs might miss important, emerging environmental problems. Multiple programs can reduce that risk, assuming that each program is relatively independent of the other.[319] If we set up multiple, redundant monitoring programs across different agencies, and

316. *See* Finn Danelsen et al., *Local Participation in Natural Resource Monitoring: A Characterization of Approaches*, 23 CONSERVATION BIOLOGY 31, 38 (2008); Ross Johnson, *What Does It All Mean?*, 26 ENVTL. MONITORING & ASSESSMENT 307, 311 (1993).

317. *See* 16 U.S.C. § 1536(a)(2) (2006) (requiring FWS approval for federal agency actions that might jeopardize species protected under the ESA).

318. BENDOR, *supra* note 295, at 29–32; Anne Joseph O'Connell, *The Architecture of Smart Intelligence: Structuring and Overseeing Agencies in the Post-9/11 World*, 94 CAL. L. REV. 1655, 1679–80 (2006). Analysis of collected information—along the lines of FWS participation in the ESA consultation process—might be the area most suited for redundancy, given relatively low costs for redundant analysis and the risk of missing important insights. *See* O'Connell, *supra*, at 1689–90.

319. BENDOR, *supra* note 295, at 44–54, 248 tbl.5. The creation of multiple monitoring programs in different agencies would increase their independence from one other.

if any one monitoring program detected a potential problem, then further action could be taken.[320]

Potentially offsetting these benefits is the risk that with multiple actors responsible for the same problem, each agency seeks to free ride on the efforts of the other agencies, resulting in less overall effort.[321] That risk can be reduced if a separate monitoring agency is given clear authority to monitor (making it at least partially accountable for any monitoring failure) and if other agencies that might have an interest in conducting monitoring (such as a management or regulatory agency) perceive themselves as competing to provide more accurate information than the monitoring agency.[322] For instance, if the regulatory agency is dissatisfied with the information being produced by the monitoring agency, then it will have an incentive to produce its own information to protect itself in the judicial or political process.

4. An Intriguing Example: USGS

As a way of tying these different points together, I turn to an emerging example in the federal government of an independent monitoring agency—USGS. Historically, USGS was an agency focused on mapping and geological research and had a strong reputation.[323] Over the decades, USGS has expanded into research on water quantity and quality, land-use changes, and, since the absorption of NBS in the 1990s,

320. O'Connell, *supra* note 318, at 1678–79. This is one of the key characteristics scholars have identified in successful "high reliability organizations." *See* La Porte, *supra* note 228, at 63–64. One problem with this solution is that it might increase the risk that non-existent problems are "identified" by various monitoring programs—the management and monitoring responses to such warnings must take into account the increased probability of such errors. O'Connell, *supra* note 318, at 1682.

321. O'Connell, *supra* note 318, at 1679–80; Michael M. Ting, *A Strategic Theory of Bureaucratic Redundancy*, 47 AM. J. POL. SCI. 274, 275 (2003); *see generally* William W. Buzbee, *Recognizing the Regulatory Commons: A Theory of Regulatory Gaps*, 89 IOWA L. REV. 1 (2003).

322. *See* Stephenson, *supra* note 270, at 1461–82 (noting that free-rider problems may be less severe in contexts where agencies are in competition with each other); *see generally* Mathias Dewatripont & Jean Tirole, *Advocates*, 107 J. POL. ECON. 1 (1999) (same); Sean Gailmard & John Patty, *Stove Pipes: A Theory of Internal Design* (2010) (unpublished paper on file with author) (developing a model that shows, under certain circumstances, that competition among multiple agencies can result in increased production of information).

323. Preston Cloud, *The Improbable Bureaucracy: The United States Geological Survey, 1879–1979*, *in* 124 PROCEEDINGS AMERICAN PHIL. SOC'Y 155 (1980).

biological resources.[324] In the past ten to fifteen years, USGS has conducted more monitoring activities and has pitched itself to Congress and the public as, in part, a leading provider of environmental monitoring services.[325] The prominence of monitoring in USGS's portfolio of activities might give it an institutional incentive to protect monitoring budgets to a greater degree than other agencies for whom monitoring is less important.[326]

Politically, USGS does not have any significant management or regulatory responsibilities and consequently markets itself as impartial.[327] As an agency that provides an array of services to private and public entities,[328] it has developed a large and growing clientele within and outside government that has benefited from its research, survey, and monitoring activities, such as the mining and oil and gas industries.[329] With a wide range of monitoring activities and

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324. *See* U.S. GEOLOGICAL SURVEY, FACING TOMORROW'S CHALLENGES—U.S. GEOLOGICAL SURVEY SCIENCE IN THE DECADE 2007–2017: U.S. GEOLOGICAL SURVEY CIRCULAR 1309 (2007).

325. *See* PAUL V. DRESLER ET AL., U.S. GEOLOGICAL SURVEY, STRATEGIC PLAN FOR THE U.S. GEOLOGICAL SURVEY STATUS AND TRENDS OF BIOLOGICAL RESOURCES PROGRAM: 2004–2009—U.S. GEOLOGICAL SURVEY, BIOLOGICAL RESOURCES DIVISION, CIRCULAR 1277 iv (2004) (goal is to create "an integrated and focused effort to address identified monitoring information needs"); *id.* at vii ("At the heart of [the USGS Status and Trends of Biological Resources Program] are its existing monitoring activities.").

326. For instance, USGS's overall budget (primarily for research and monitoring) appears to vary to a smaller degree than the comparable research and monitoring budget for EPA. *Compare U.S. Geological Survey and Environmental Protection Agency FY 2008 Budget Request: Hearings Before the Subcomm. on Interior, Environment, and Related Agencies of the S. Comm. on Appropriations*, 110th Cong. fig.1 (2007) (testimony of Craig M. Schiffries, Senior Scientist, National Council for Science and the Environment) (USGS budget from 1996 to 2008 ranging between $ 1.1 billion and $950 million) *with id.* fig.2 (EPA budget from 1996 to 2008 ranging between $550 million and $800 million). Of course, even these variations pose challenges to USGS. For instance, its National Water Quality Assessment Program (NAWQA) had to reduce the number of study units in 2001 and reorient its research approach in response to funding cuts. U.S. GEOLOGICAL SURVEY, THE NATIONAL WATER-QUALITY ASSESSMENT PROGRAM—ENTERING A NEW DECADE OF INVESTIGATIONS: USGS FACT SHEET 071-01 (2001).

327. STATUS AND TRENDS, *supra* note 84, at v (USGS's biological research and monitoring program provides "unbiased, independent, integrated information about plants and animals"); U.S. GEOLOGICAL SURVEY, *supra* note 324, at 1 ("The USGS does not have regulatory or land-management responsibility and has a worldwide reputation for objective, unbiased science.").

328. *See* U.S. GEOLOGICAL SURVEY, *supra* note 324.

329. *See, e.g.*, Paul A. David & Gavin Wright, *Increasing Returns and the Genesis of American Resource Abundance*, 6 INDUSTRIAL & CORPORATE CHANGE 203, 223–29 (1997). The incentives discussed *supra* Part II that might cut against an agency's desire to conduct monitoring appear to be outweighed in the context of

clients, USGS might reduce the risk of political isolation. Finally, USGS's gradual growth has reduced the political risks associated with the full-blown creation of a new monitoring agency (as with NBS).

A possible challenge is that USGS does conduct other activities besides monitoring, primarily scientific research. It is fair to say that one of USGS's primary self-conceptions is as a science agency.[330] Scientific research does not usually result in direct conflicts with monitoring activities. But, as noted above, there is a risk that scientists might see monitoring as "not scientific" and not leading to professional recognition or advancement. USGS scientists generally are more closely tied to their respective disciplinary organizations than their compatriots in other government agencies and seem to believe that USGS emphasizes scientific professional engagement, recognition, and advancement.[331]

The risk, then, is that USGS will underperform in conducting effective monitoring because the scientists within the agency do not value it professionally. To its credit, USGS has itself acknowledged that USGS scientists may be reluctant to undertake monitoring programs and has emphasized that "these perceptions" that monitoring is not suitable for scientists "should change."[332] Time will tell the success of those efforts.[333]

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the USGS by the political benefits of expanding its political support by building client relationships with a wide range of public and private entities with monitoring data. That does raise the risk that USGS might be tempted to skew its monitoring data to continue to keep those clients happy, but the wide and diverse range of clients that USGS serves might reduce that risk.

330. U.S. GEOLOGICAL SURVEY, *supra* note 324, at 1 (describing the agency as "world's leading natural science and information agency" with "nearly 9,000 scientists and support staff"). Output measures for many USGS programs include the number of peer-reviewed publications. *See, e.g.*, U.S. GEOLOGICAL SURVEY, WILDLIFE: TERRESTRIAL AND ENDANGERED RESOURCES PROGRAM, 5-YEAR PROGRAM PLAN FISCAL YEARS 2005–2009, at 13–20 (2004).

331. A survey of USGS and FWS biologists found that USGS biologists were more likely to be members of relevant scientific professional organizations, and this was in part a result of the greater support in USGS for professional orientation and a greater focus among USGS biologists on maintaining research skills. T. Bruce Lauber et al., *Factors Influencing Membership of Federal Wildlife Biologists in the Wildlife Society*, 73 J. WILDLIFE MGMT. 980, 986 (2009) ("The USGS is a research agency, whereas USFWS is a management and regulatory agency.").

332. *See* DRESLER ET AL., *supra* note 325, at 6.

333. Another risk is the possibility that USGS will become isolated from the management agencies that are the prime clients for its monitoring programs, reducing the effectiveness of those programs. USGS has emphasized collaborations with management agencies, perhaps in an effort to reduce this risk.

The discussion in this Part is only tentative, and there is a great deal of room for additional research here: Has USGS been and will it be successful in conducting effective monitoring? What kinds of cross-institutional comparisons could we make among the various large-scale ecosystem restoration programs in the Everglades, Chesapeake Bay, Grand Canyon, and elsewhere to learn more about whether and why effective monitoring can be successfully pursued? Are separate monitoring agencies really more effective or not? Moreover, there is also a great deal of work to be done to apply the general principles in this paper to the tremendously diverse range of environmental resource management problems, each with their own ecological, economic, and political context. The monitoring problems and solutions will be very different in the context of clean air versus range management. But, to this point, there has been almost no research on these kinds of questions, questions that are essential to a successful transition to a new world of adaptive ecosystem management.

CONCLUSION

The term "environment" can refer to the natural environment, and that is the usual meaning in environmental law. But it has a broader meaning—the context in which any activity takes place. Thus, the problem of environmental monitoring—of monitoring ambient, systemic conditions—is not just a problem for environmental law. It is a problem for any field of regulatory law.

The immediate trigger of the recent financial crisis was a series of dramatic changes in the global financial environment,[334] changes potentially caused by the problems of "systemic risk," (the possibility that the interconnections among different financial actors allow for the transmission and amplification of risk across institutional and international boundaries).[335] The analogy with ambient environmental

Id. at vi (stating that the strategic plan looks to "increas[e] communication, cooperation, and collaboration . . . in biological resource monitoring").

334. See ANDREW ROSS SORKIN, TOO BIG TO FAIL: THE INSIDE STORY OF HOW WALL STREET AND WASHINGTON FOUGHT TO SAVE THE FINANCIAL SYSTEM FROM CRISIS—AND THEMSELVES (2009), for an entertaining description of how those changes triggered the crisis.

335. See Olivier de Bandt & Philipp Hartmann, *Systemic Risk: A Survey*, (European Cent. Bank Working Paper Series, Working Paper No. 35, 2000), for an overview of the concept.

conditions is strong. In both cases, the focus is on systemic problems at a scale larger than that of an individual actor. Both problems require the gathering of tremendous amounts of data from large numbers of actors or locations (data about biotic and abiotic conditions in the natural environment in one case, data about a tremendous number of financial transactions in the other case).[336] And, in both cases, analysis and prediction will be complicated by the potential for interaction with exogenous changes or shocks (interaction of human pollution with biotic and abiotic systems in one case, the possibility of changes in underlying economic, political, or social conditions that affect the values of assets in the other case).

As with environmental law, ongoing, continuous monitoring of the financial environment will be important, if only because no one can know when a rapid rise in systemic risk might occur. The complexity and difficulty of assessing the effectiveness of systemic risk monitoring mimics the same challenges in environmental law; the uncertainty of any assessments as to the quality of the monitoring data parallel the same uncertainties in environmental law. Thus, the principles developed in this Article in the context of environmental law—the need to develop trust in the institutions that conduct the monitoring, the importance of creating institutions that are motivated to conduct effective monitoring, the difficulty of forcing effective monitoring to occur—can apply in the context of finance as well. Given the conclusions of this Article about the potentially important role that independent monitoring agencies can play, Congress's decision in the recent financial reform bill to give the task of collecting and analyzing the monitoring data on systemic risk to a new agency that has at least some institutional independence seems promising.[337]

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336. The problems of collecting monitoring data in finance might be more manageable than in the context of environmental law because the relevant financial data (e.g., transactions with other parties) are collected by individual actors in the course of doing business, while it is the rare business actor who is interested enough in the natural world to collect data (except actors reliant on the exploitation of natural resources).

337. The 2010 Dodd-Frank financial regulation statute in the United States creates a new Office of Financial Research to collect information on systemic risk; the newly created Financial Stability Oversight Council can require almost any company in the United States to provide data to the Office and will use the information and analysis of the Office to fulfill its role as the systemic risk regulator of the U.S. economy. *See* Dodd-Frank Wall Street Reform and Consumer

Whatever the regulatory field, monitoring of ambient conditions will be central to the present and future of successful regulation and management. After this Article's review of how challenging it can be to conduct effective monitoring, a reader might conclude that the law should focus more on developing legal and institutional design structures that do not depend so heavily on monitoring. For instance, in areas where monitoring is inordinately expensive (such as environmental resources where there is high variability at both small temporal and geographic scales), perhaps we should manage based on the assumption that we will not be able to act based on timely, accurate information.[338] But this might require abandoning the possibility of adaptive, flexible, or experimental regulation and returning to "rigid, inflexible, dictated" regulatory standards inconsistent with the paradigm of new governance.[339]

But we cannot know if experimentation and adaptation are successful if we cannot monitor whether management choices have improved outcomes or not. The new governance literature has argued that whatever we may lose in terms of accountability with more flexible legal standards, we can gain back with greater monitoring that can provide a foundation by which we can judge whether regulatory and management programs are succeeding.[340] Yet that literature has paid little attention to how this monitoring will occur, whether it will be successful, and whether it can fill the accountability gap that would otherwise be created by the legal flexibility that the new, dynamic, experimentalist forms of governance demand.[341] The analysis in this Article makes clear that the answers to these

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Protection Act, Pub. L. No. 111-203, §§ 112–15, 152–53, 124 Stat. 1376, 1394–1406, 1413–16 (2010).

338. *See, e.g.*, M. Estellie Smith, *Public Policy, Sciencing, and Managing the Future*, *in* NAKED SCIENCE: ANTHROPOLOGICAL INQUIRY INTO BOUNDARIES, POWER, AND KNOWLEDGE 201 (Laura Nader ed., 1996) (questioning the feasibility of monitoring fisheries); Wagner, *supra* note 34 (arguing for reshaping EPA's stormwater regulatory program to take into account the difficulty of conducting adequate monitoring of stormwater runoff).

339. *See* Holley, *supra* note 33, at 131–34 (noting "new environmental governance" in which new governance concepts are applied to environmental law); *see also* sources cited *supra* note 19.

340. *See* sources cited *supra* notes 19, 66.

341. *See*, *e.g.*, Holley, *supra* note 33, at 143–44 (noting the importance of monitoring for accountability in new governance); Rena I. Steinzor, *The Corruption of Civic Environmentalism*, 30 ENVTL. L. REP. 10909 (2000) (criticizing advocates of "rolling rule" regulation for failing to seriously consider need for accountability).

questions are not given, that monitoring may well not fill the breach caused by the retreat of law in new governance systems.

Every substantive regulatory area will have its own unique features that will make solving the problem of environmental monitoring different. But all have this in common: Addressing monitoring is a necessary feature of successful governance, whether of the old or new variety, and policymakers will need to thoughtfully consider how to answer what is an essentially political question as they make important legal and institutional design choices. To do otherwise is to court failure.

KEEPING PACE?: THE CASE AGAINST PROPERTY ASSESSED CLEAN ENERGY FINANCING PROGRAMS

PRENTISS COX*

Property Assessed Clean Energy (PACE) is a method of public financing for energy improvements through special assessments on local government property taxes. Interest in PACE exploded since its inception in 2008, with almost half the states rapidly enacting legislation enabling local governments to use their property collection power to finance residential energy investments. The growth in PACE has been suspended and existing programs have been put on hold in the face of opposition from the federal secondary mortgage market regulators. Governments and environmental advocates supporting PACE have initiated litigation against federal mortgage and banking regulators and are seeking passage of federal legislation to revive the programs. This Article argues that the theory underlying PACE is fundamentally flawed. PACE has been promoted as an alternative to traditional real estate financing that resolves the impediments to homeowners investing in alternative energy and energy efficiency. A careful analysis of these claims demonstrates that PACE actually operates similarly to most other types of real estate financing and that the efforts to reconstruct PACE programs through litigation or legislation are misplaced. Instead, PACE programs should be radically restructured or should be considered a creative yet failed experiment, offering valuable lessons for future residential energy investment programs.

INTRODUCTION

Property Assessed Clean Energy (PACE) is a creative new method of financing renewable energy systems and energy efficiency improvements for residential buildings. The essential element of a PACE program is public financing of energy improvements with repayment through special assessments on local government property taxes.[1] From 2008 through 2010,

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almost half the states enacted legislation enabling local governments to use their property collection power for this purpose.[2] Pioneering programs in California and Colorado are being studied by numerous cities and counties throughout the United States that are eager to participate in the critically needed transition to an environmentally sustainable economy.[3]

Harvard Business Review named PACE as one of ten "Breakthrough Ideas for 2010,"[4] *Scientific American* listed it as one of twenty "World Changing Ideas,"[5] and a White House report endorsed the concept.[6] Until recently, PACE programs were on the verge of being launched throughout the country.[7] The growth of PACE programs has been suspended, and existing programs have been put on hold, due to actions by federal mortgage market regulators requiring that property tax liens associated with PACE financing be subordinate to existing mortgage liens.[8] Aggressive push-back from the

Minneapolis on the desirability of a PACE program. *See infra* note 9. One of those students, Nathan Shepherd, also made this paper possible by providing extraordinary research assistance. The author also thanks Claire Hill, Ann Burkhart, and Dan Schwarcz for their consistently excellent advice, and George Jackson for his research assistance.

1. BETHANY SPER & RON KOENIG, PROPERTY-ASSESSED CLEAN ENERGY (PACE) FINANCING OF RENEWABLES AND EFFICIENCY, NAT'L RENEWABLE ENERGY LAB 1 (July 2010), http://www.nrel.gov/docs/fy10osti/47097.pdf.

2. Jonathon C. Dernbach et al., *Energy Efficiency and Conservation, New Tools and Legal Opportunities*, 25 NATL. RES. AND ENV'T. 7, 11 (2011) (stating that at least twenty-three states have adopted PACE enabling legislation); *PACE Program (Property Assessed Clean Energy) Financing*, http://solarfinancing.1bog.org/pace-program-solar-financing/ (last visited July 19, 2011) (noting that the Berkeley First Program was the first in the nation in 2008); PACENOW.ORG, http://pacenow.org/blog/ (last visited July 19, 2011) (noting that twenty-seven states allow or have adopted legislation for PACE programs) [hereinafter PACENOW.ORG BLOG].

3. Ed Brock, *'Green' Loan Programs Spread At Rapid Pace*, AM. CITY & CNTY. (Jan. 1, 2010), http://americancityandcounty.com/topics/green/green-loan-programs-201001.

4. Jack D. Hidari, *A Market Solution for Achieving "Green,"* 88 HARV. BUS. REV. 41, Jan.–Feb. 2010, at 50–51.

5. Christopher Mims, *The No-Money-Down Solar Plan*, SCI. AM., Dec. 2009, at 50 (including PACE financing on a list of twenty ideas that could change the world).

6. WHITE HOUSE, POLICY FRAMEWORK FOR PACE FINANCING PROGRAMS 2 (2009) [hereinafter WHITE HOUSE FRAMEWORK], *available at* http://www.whitehouse.gov/assets/documents/PACE_Principles.pdf.

7. *About PACE*, PACENOW.ORG, http://pacenow.org/blog/about-pace/ (last visited July 19, 2011).

8. *See infra* Part III.A; Todd Woody, *Loan Giants Opt to Block Energy Programs*, N.Y. TIMES, July 4, 2010, at A12, *available at* http://www.nytimes.com/2010/07/04/business/energy-environment/04solar.html; *see also* Audrey Dutton &

mortgage lending industry and mortgage regulators was predictable and likely will persist.[9]

The primary concern expressed by federal mortgage regulators was that the property tax liens integral to PACE financing "alter traditional lending priorities."[10] State and local governments, as well as environmental advocates, responded by filing lawsuits in defense of PACE. [11] These suits argue that liens associated with PACE financing are no different than other property tax assessments that have traditionally been given priority over existing mortgage liens.[12] PACE advocates also are lobbying for enactment of federal legislation that will establish a lien priority for PACE financing.[13] This Article explores the more fundamental questions of whether PACE programs are the best option for promoting investment in residential alternative energy and whether litigation or legislation to preserve PACE programs is worth the effort. PACE programs promised benefits to homeowners that the programs could not deliver.[14] The core problem with these promises is that the PACE program structure does not account

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Peter Schroeder, *PACE Programs On Hold*, THE BOND BUYER, July 8, 2010, http://www.bondbuyer.com/issues/119_378/federal_housing-1014475-1.html.

9. ANDREW BRAAKSMA ET AL., UNIV. OF MINN. ENVTL. SUSTAINABILITY CLINIC, REPORT ON A PROPERTY ASSESSED CLEAN ENERGY (PACE) PROGRAM FOR THE CITY OF MINNEAPOLIS 36–38 (2010), *available at* http://www.law.umn.edu/uploads/p0/Xo/p0Xo6vryak4O-5QNQl7XwA/PACE-REPORT-FINAL-pdf.pdf.

10. FHFA STATEMENT ON CERTAIN ENERGY RETROFIT LOAN PROGRAMS, FED. HOUS. FIN. AGENCY (July 6, 2010), http://www.fhfa.gov/webfiles/15884/PACE STMT7610.pdf.

11. Complaint, City of Palm Desert v. Fed. Hous. Fin. Agency, (N.D. Cal. Oct. 4, 2010) (No. CV 10 4482), 2010 WL 4236788; Complaint, County of Sonoma v. Fed. Hous. Fin. Agency, (N.D. Cal. July 26, 2010) (No. CV 10 3270 EMC), 2010 WL 3012310; Complaint, Natural Res. Def. Council v. Fed. Hous. Fin. Auth., (S.D.N.Y. Oct. 6, 2010) (No. CV 10 7467), 2010 WL 4000042; Complaint, Sierra Club v. Fed. Hous. Fin. Agency, (N.D. Cal. July 29, 2010) (No. CV 10 3317), 2010 WL 3141131; Complaint, California *ex rel.* Brown v. Fed. Hous. Fin. Agency, (N.D. Cal. July 14, 2010) (No. CV 10 3084), 2010 WL 3593758; Town of Babylon v. Fed. Hous. Fin. Agency, (E.D.N.Y. Oct. 28, 2010) (No. CV 10 4916), 2011 WL 2314989.

12. *See, e.g.*, Complaint at 8, *California ex rel. Brown*, 2010 WL 3593758 (No. CV 10 3084) ("PACE financing is not accomplished through loans, but through assessments.").

13. PACE Assessment Protection Act of 2010, S. 3642, 111th Cong. (2010); PACE Assessment Protection Act of 2010, H.R. 5766, 111th Cong. (2010); *see also* Letter from Representative Doris O. Matsui to Edward J. DeMarco, Acting Director, Fed. Hous. Fin. Agency (Aug. 31, 2010), *available at* http://www.matsui.house.gov/images/stories/pace_ltr_to_fhfa4.pdf; Letter from Fifty Members of Congress to Barack Obama, President of the United States (July 19, 2010), *available at* http://www.matsui.house.gov/images/stories/pace_letter_to_president.pdf.

14. *See infra* Part II.

for practical realities of the real estate market. PACE has been promoted as a national strategy for financing residential energy improvements without accurately representing the program to homeowners and without a careful analysis of the long-term sustainability of the program.

The primary argument in favor of PACE programs is that homeowners will not be responsible for the improvements when a property sells because the repayments are in the form of a tax.[15] This assertion fails to account for the existence of bargaining between home buyers and sellers and for the power of mortgage lenders to require repayment of the loan on transfer. In actual practice, PACE financing is likely to operate similarly to mortgage loans on transfer of the property.[16]

This analytic error is symptomatic of a theoretical flaw in the design of PACE programs. These programs have been conceptualized as an alternative to, rather than as a form of, real estate financing. Supporters present PACE as a public investment in energy improvements similar to a local government improving a street and assessing construction costs on property owners. There are important public policy concerns underlying investment in residential energy improvements, but PACE is more properly characterized as a voluntary choice made by a homeowner to accept public financing secured by her property. The failure of existing PACE programs to adequately anticipate the adverse secondary mortgage market reaction is a prominent example of this problem.

Part I of this Article explains the mechanics of PACE financing and the basics of residential energy improvement investments.[17] It also explains that the primary argument in favor of PACE programs is that tying repayment to property tax obligations removes homeowner concerns about responsibility for the financing when the homeowner sells the property.[18] Part II highlights the theoretical and practical flaws with this underlying theory, including why PACE financing does not overturn the market dynamics that make homeowners installing energy improvements responsible for the economic consequences of that decision.[19] When properly

15. *See infra* notes 48–51.
16. *See infra* Part II.
17. *See infra* Part I.
18. *See infra* notes 49–52.
19. *See infra* Part II.

characterized and understood as a home financing technique, PACE loses much of its appeal as a means of resolving long-standing homeowner concerns about investments in residential energy improvements.

Part III discusses the dispute between PACE programs and mortgage lenders and the broader problem of how PACE tax liens interact with mortgage liens.[20] Part IV looks at loan cost and financing availability with PACE, which are two other areas where PACE advocates overstate the advantage of this financing method.[21]

The last two parts of this Article draw lessons from the demise of PACE programs. Part V suggests that PACE programs have demonstrated the importance of governments organizing the market for residential energy improvements.[22] Part VI suggests a different and more modest model for how PACE can better incorporate some of the advantages offered by tax assessed recoupment of financing charges.[23]

I. HOW PACE WORKS

PACE was created to offer longer-term financing that would overcome impediments to homeowner investment in solar energy and other energy production or efficiency technologies. This Part begins with basic information on investments in residential energy improvements and then discusses the fundamentals of PACE financing.

A. Homeowner Economics for Residential Energy Improvements

Homeowners can invest in energy improvements by either constructing alternative energy systems that produce electricity or heat, or by installing efficiency measures that save on the consumption of energy. Alternative energy systems available for residences include solar, wind, and geothermal systems.[24] Energy efficiency programs range from tiny

20. *See infra* Part III.
21. *See infra* Part IV.
22. *See infra* Part V.
23. *See infra* Part VI.
24. *See generally* Edna Sussman, *Reshaping Municipal and County Laws to Foster Green Building, Energy Efficiency, and Renewable Energy*, 16 N.Y.U. ENVTL. L.J. 1 (2008) (discussing the use of solar, wind, and geothermal technologies in residential situations); *see also* I.R.C. § 25D(a) (2010) (allowing a

measures, like switching to fluorescent light bulbs, to investments that cost thousands of dollars, such as replacing heating and cooling equipment.[25] In many cases, energy efficiency results in rapid payback periods for the investment.[26]

The most popular alternative energy system for homeowners is solar photovoltaic (PV), which transforms solar energy into electricity.[27] The cost of a solar PV system depends on the system's size, but even a smaller three-kilowatt system has a gross installation cost of approximately $22,500.[28] State and local governments, utility companies, and non-profits provide a vast array of financing incentives and outreach programs to encourage homeowners to invest in energy efficiency measures, which improve the economic viability of installing these systems.[29] In states with favorable "net

tax credit for residential "solar electric," "solar water heating," "fuel cell," "small wind energy," and "geothermal heat pump" expenditures).

25. *See, e.g.*, Howard Geller, *Efficiency that Saves Money, Cuts Pollution*, DENVER POST, Dec. 29, 2010, *available at* http://www.denverpost.com/opinion/ci_16959937 (discussing Xcel Energy's energy-efficiency program to educate, assist, and help pay for efficiency measures).

26. *See, e.g.*, *Payback Period Example 1*, UNITED STATES DEP'T OF HOUS. & URBAN DEV., http://www.hud.gov/offices/cpd/affordablehousing/training/web/energy/cost/example1.cfm (last updated Mar. 26, 2010) (describing a payback period of less than seven years for the incremental cost of purchasing a new high-efficiency furnace).

27. JASON COUGHLIN, NAT'L RENEWABLE ENERGY LAB., PHOTOVOLTAICS (PV) AS AN ELIGIBLE MEASURE IN RESIDENTIAL PACE PROGRAMS: BENEFITS AND CHALLENGES 1 (June 2010) (noting that homeowners obtaining PACE loans overwhelmingly chose solar PV even when the PACE program funds other alternative energy production or efficiency investments). Solar thermal systems are used to heat water and do not create additional value for the homeowner that can be sold back to the system. *See* NAT'L RENEWABLE ENERGY LAB., 2008 SOLAR TECHNOLOGIES MARKET REPORT 6–10 (Jan. 2010) (discussing the increase in installation of solar PV systems in the United States).

28. NAT'L RENEWABLE ENERGY LAB., 2008 SOLAR TECHNOLOGIES MARKET REPORT 51 n.31 (Jan. 2010) (using $7.50 per watt as the installed cost); *see also* GALEN BARBOSE ET AL., LAWRENCE BERKELEY NAT'L LAB., TRACKING THE SUN III, THE INSTALLED COST OF PHOTOVOLTAICS IN THE U.S. FROM 1998–2009 1 (Dec. 2010) (showing the capacity-weighted average installed cost of systems completed in 2009—in terms of real 2009 dollars per installed watt and prior to receipt of any direct financial incentives or tax credits—was $7.5/Watt, virtually unchanged from 2008).

29. *See* I.R.C. § 25D (2009) (allowing a federal tax credit of 30% of the net system cost); *see also* RESIDENTIAL RENEWABLE ENERGY TAX CREDIT, DATABASE OF STATE INCENTIVES FOR RENEWABLES & EFFICIENCY, http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US37F&re=1&ee=1 (last updated Feb. 18, 2010). Many states also have a variety of incentive programs, including rebates, tax credits, and the sales tax exemption of solar installations. *See, e.g.*, Heather Hughes, *Enabling Investment in Environmental Sustainability*, 85 IND. L.J. 597, 625–26 (2010). Utilities in some areas contribute to homeowner

metering" and "feed-in tariff" laws, homeowners not only use the electricity produced, but they also can return any unused generated electricity to the electricity grid and obtain payment from the local utility at regulated prices.[30] The net cost of a solar PV system, therefore, will vary substantially with the incentives and regulatory structure at the location of the installation. Because the price of electricity can vary substantially across the country, homeowners' incentives to invest in alternative energy systems vary widely. [31]

The payback for solar systems varies by location for two other reasons. First, the fact that it is much sunnier in Phoenix than Seattle obviously matters, because the amount of electricity produced by the system will vary based on the solar resources of the location. Second, the price of electricity in different parts of the country can vary substantially. In areas like Southern California with substantial government incentives, high utility rates, and sunny skies, the monthly savings and revenue from a solar energy system can exceed the monthly financed cost of the system.[32] In contrast, solar energy

installation of solar systems by providing rebates or "renewable energy credits," which are payments to homeowners for renewable energy production that a utility can claim and apply to a state renewable portfolio standard mandating that the utility generate a certain percentage of its power from renewable sources. Megan Hiorth, Note, *Are Traditional Property Rights Receding With Renewable Energy on the Horizon?*, 62 RUTGERS L. REV. 527, 547–48 (2010) (explaining Solar Renewable Energy Certificates in New Jersey); s*ee, e.g.*, *Loan Helps Homeowners Upgrade Furnaces*, DETROIT NEWS, Nov. 19, 2010, at H10 (describing the Michigan Saves program, which makes low-interest loans for energy efficiency improvements); DSIRE.ORG, http://www.dsireusa.org/Index.cfm?RE=0&EE=1 (last visited July 21, 2011) (listing state incentives for energy efficiency); *Sustainable Home Initiative in the New Economy*, CITY OF ATLANTA, http://www.atlantaga.gov/mayor/shine_080410.aspx (last visited July 21, 2011) (describing a city program for energy efficiency); Geller, *supra* note 25.

30. *See* Sara Bronin, *Curbing Energy Sprawl With Smallgrids*, 43 CONN. L. REV. 547, 550–51 (2010) ("[A] homeowner with a solar panel installation that produces more electricity than she uses . . . can only 'sell' it back to local electric utility companies under state rules governing such transactions, known as net metering."); KARLYNN CORY ET AL., NAT'L RENEWABLE ENERGY LAB., FEED-IN TARIFF POLICY: DESIGN, IMPLEMENTATION, AND RPS POLICY INTERACTIONS 2 (Mar. 2009) (observing that feed-in tariff "policies may require utilities to purchase either electricity, or both electricity and the renewable energy (RE) attributes from eligible renewable energy generators").

31. *See, e.g.*, U.S. ENERGY INFO. ADMIN., AVERAGE RETAIL PRICE OF ELECTRICITY TO ULTIMATE CUSTOMERS BY END-USE SECTOR, BY STATE (2011), *available at* http://www.eia.gov/cneaf/electricity/epm/table5_6_a.html (last updated Mar. 11, 2011) (indicating electricity costs ranging from nineteen to nine cents per kilowatt hour in the contiguous United States).

32. *See* PAUL DENHOLM ET AL., NAT'L RENEWABLE ENERGY LAB., BREAK-EVEN COST FOR RESIDENTIAL PHOTOVOLTAICS IN THE UNITED STATES: KEY DRIVERS

has long payback periods in many other areas of the country.[33] Even though the economics of solar are not always favorable, it is clear that social, environmental, and ideological concerns still motivate many homeowners to invest in PV systems.[34]

B. The PACE Financing System

The substantial investment required for many energy improvements, especially alternative energy production systems, means that homeowners unable or unwilling to pay up-front for these improvements must obtain financing. Some homeowners are unable to obtain financing on any terms, and other homeowners cannot obtain financing at a cost that makes the investment affordable relative to the energy cost savings.[35] Even when financing is available, homeowners resist making investments out of concern that they will have to pay the remaining balance on the financing when the home is sold or refinanced.[36]

PACE was developed as a public financing solution to these concerns. This Subpart begins by describing the structure of PACE programs and then outlines the purported advantages of PACE programs for homeowners.

AND SENSITIVITIES 5–6 (Dec. 2009) (National Renewable Energy Laboratory (NREL) report that expresses this idea by noting how much solar PV would have to cost in order to allow a break-even point). In most areas of the country, solar PV would have to cost less than five dollars per watt, whereas in areas with high solar resources and high electricity costs, like California, or high electricity costs and robust incentives, like New York, the break-even cost per watt could be over eight dollars. *Id.*

33. BRAAKSMA ET AL., *supra* note 9, at 24 (calculating that, depending on the assumptions made in the process, the solar PV payback period in Minnesota would be somewhere between seventeen and thirty-seven years).

34. *Id.* at 27 (discussing a survey indicating that environmental benefits encouraged homeowners to invest in solar PV, and that they were willing to pay nearly 150% of their current electricity costs as a result).

35. NAT'L RES. DEF. COUNSEL ET AL., PROPERTY ASSESSED CLEAN ENERGY ("PACE") PROGRAMS WHITE PAPER 12 (May 3, 2010), http://pacenow.org/documents/PACE%20White%20Paper%20May%203%20update.pdf (stating that "the lack of non-traditional consumer financing for such projects was cited by the CEQ Report as a major barrier to substantive adoption of energy efficiency retrofits"); Jonathon B. Wilson et al., *The Great PACE Controversy*, 25 PROP. & PROB. 38, 38 (2011).

36. NAT'L RENEWABLE ENERGY LAB., U.S. DEP'T OF ENERGY, PROPERTY ASSESSED CLEAN ENERGY (PACE) FINANCING OF RENEWABLES AND EFFICIENCY 1 (2010), http://www.nrel.gov/docs/fy10osti/47097.pdf ("[PACE reduces] concern about investment recovery when the property is sold, because the financing is tied to the property itself, rather than to the owner.").

1. Essential Elements of PACE

PACE relies on property tax special assessments by local government units to fund energy improvements by residential homeowners.[37] Unlike most property tax assessments, the homeowner accepting PACE financing voluntarily assumes the obligation to make future property tax payments.[38] In order for a municipality to pass such ordinances, a state legislature usually must enact enabling legislation permitting local government units to create this unusual form of property tax assessment.[39]

PACE programs require access to a funding source to support homeowners. Local governments have taken two approaches to obtaining these funds. Many PACE programs rely on bond financing.[40] The local government unit issues a bond and promises repayment based on the proceeds of property tax assessments.[41] Alternatively, some local government units lend general reserve funds to homeowners for PACE projects.[42]

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37. Property tax special assessments typically are levied against property owners in a certain geographic area that have benefited from a particular public improvement, such as a new street or sidewalks. Gregory G. Brooker, *Distorted Federalism: the Resolution Trust Corporation and Local Special Assessments*, 15 HAMLINE L. REV. 327, 336–37 (1992).

38. ANNIE CARMICHAEL, VOTE SOLAR, PROPERTY ASSESSED CLEAN ENERGY (PACE) ENABLING LEGISLATION (Mar. 18, 2010); *see also* HANNAH MULLER & SARAH TRUITT, U.S. DEP'T OF ENERGY, SOLAR POWERING YOUR COMMUNITY: A GUIDE FOR LOCAL GOVERNMENTS 35 (July 2009) ("Property assessed clean energy programs are typically 100% opt-in, and property tax expenses remain unchanged for those who choose not to participate."); Joel B. Eisen, *Can Urban Solar Become a 'Disruptive' Technology?: The Case for Solar Utilities*, 24 NOTRE DAME J.L. ETHICS & PUB. POL'Y 53, 84 (2010) ("[P]roperty owners [have] the option of installing renewable energy projects and paying for them over a period of years by adding specified amounts to their property tax bills."); WHITE HOUSE FRAMEWORK, *supra* note 6.

39. CARMICHAEL, *supra* note 38. In some states, such as Hawaii and Florida, state law is thought to provide inherent authority for PACE programs. *See PACE Financing*, DSIRE.ORG, http://www.dsireusa.org/solar/solarpolicyguide/?id=26 (last visited July 21, 2011).

40. Erin Elizabeth Burg Hupp, *Refining Green Building Regulations and Funding Green Buildings in Order to Achieve Greenhouse Gas Reductions*, 42 URB. LAW. 639, 645–46 (2010) (describing the use of PACE bonds).

41. *Id.*; *see also* Eisen, *supra* note 38.

42. Robert Selna, *Sonoma County Resists Feds on Home Energy Loans*, S.F. CHRONICLE, July 29, 2010, at A1, *available at* http://articles.sfgate.com/2010-07-29/news/22003633_1_sonoma-county-property-taxes-federal-agency (noting that the Sonoma County "PACE program is funded by $100 million from its treasury").

PACE programs offer homeowners long-term financing, with loan terms up to twenty years.[43] These long loan terms make more favorable payback ratios possible for expensive investments in residential alternative energy systems. Purchase of a solar PV system may seem prohibitive to a homeowner if the monthly savings in electricity use (or payments for electricity production) are substantially less than the monthly payments on the loan for the system. By stretching the loan terms to fifteen or twenty years, PACE programs can lower the monthly payments and thereby improve the ratio of monthly savings to monthly costs.[44]

2. Claimed Advantages of PACE Financing

Proponents of the PACE financing system generally voice two types of advantages for homeowners: (1) cost-free transfers of the financing obligation,[45] and (2) better financing terms.[46] The claim that PACE programs allow for cost-free transfers of the financing obligation is based on the unique characteristics of paying property tax assessments. These assessments are made against the current owner of the property rather than the person who agreed to the assessment. The argument that PACE provides better financing terms, on the other hand, is a function of the priority given to property tax assessments relative to mortgage loans or other liens against the property. The lien priority afforded property tax assessments provides advantages to the investors in PACE bonds that PACE advocates believe will result in lower costs for homeowners obtaining PACE financing.

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43. BRAAKSMA ET AL., *supra* note 9, at 10 (noting PACE assessment terms ranging from five to twenty years). PACE terms for the Sonoma County program are five to ten years for loan amounts under $5,000 and ten or twenty years for amounts over $5,000. ENERGY INDEPENDENCE, SCEIP ANNUAL PAYMENT CALCULATOR, http://sonomacountyenergy.org/lower.php?url=calculator (last visited July 28, 2011). All loans in the Boulder County program have fifteen year terms. MULLER & TRUITT, *supra* note 38, at 37–38.

44. COUGHLIN, *supra* note 27 at 2–3 (discussing the savings to investment ratio); NAT'L RES. DEF. COUNCIL ET AL., *supra* note 35, at 4 ("PACE is designed to finance projects that are cash positive for participants over the useful life of the retrofit.").

45. *See infra* Part I.B.2.a.

46. *See infra* Part I.B.2.b.

a. Cost-Free Transfers by Tying Repayment to Tax Assessments

The most strongly promoted advantage of PACE programs is that PACE financing resolves homeowner concerns about paying off long-term financing for energy improvements. If the homeowner later sells the property, PACE allegedly transfers the burden of repaying energy improvements from the homeowner originating the PACE financing to the subsequent property owner. The primary argument for PACE programs, therefore, is that homeowners can confidently invest in long-term energy improvements knowing that the burden of repayment will fall on future owners of the home if the property is sold. In other words, the transfer of the financing obligation is "cost-free."[47]

PACE programs,[48] analysts and academics,[49] and environmental advocates[50] all emphasize the importance of this purported benefit. An influential White House report

47. Given that PACE financing is offered for lengthy loan terms, a cost-free transfer to future homeowners has even greater value because the homeowner is more likely to transfer the obligation during the life of the loan.

48. OFFICE OF ENERGY AND SUSTAINABLE DEV., BERKELEY FIRST SOLAR FINANCING, CITY OF BERKELEY, http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=26580 (last visited July 21, 2011) ("Since the solar system stays with the property, so does the tax obligation—if the property is transferred or sold, the new owners will pay the remaining tax obligation."); *see also* PACENOW.ORG BLOG, *supra* note 2 (stating that "PACE assessments stay with a property upon sale, until they are fully repaid by future owners").

49. COUGHLIN, *supra* note 27, at 3 (describing the cost-free transfer as "[o]ne of the pillars of PACE financing"); Eisen, *supra* note 38, at 85 (stating that "[b]ecause the debt is repaid through the property tax, if the homeowner moves before the system's payoff period, the debt simply continues to be repaid by the next owner," but noting concern about state servitude law on transfer of the property); *see also* John C. Dernbach et al., *Making the States Full Partners in a National Climate Change Effort: A Necessary Element for Sustainable Economic Development*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10597 (2010); RYAN NORTH ET AL., GREEN REAL ESTATE SUMMIT 2010: WHAT ATTORNEYS, DEVELOPERS, REGULATORS, TENANTS & LENDERS NEED TO KNOW: THE EVOLVING PICTURE OF ENERGY EFFICIENCY RETROFITTING FOR NEW YORK CITY COMMERCIAL BUILDINGS 247, 261 (2010) ("An attractive feature of this model is that debt payments are tied to the property, not the property owner, which makes deeper and more extensive retrofits more viable since the loan stays with the property even if the current owner moves."); Wilson, *supra* note 35, at 39.

50. Felicia Marcus & Justin Horner, *Response to the Quiet Revolution Revived: Sustainable Design, Land Use Regulation and the States by Sarah Bronin*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10743 (2010) (Marcus and Horner are staff with the Natural Resources Defense Council); PACENOW.ORG BLOG, *supra* note 2 ("Assessment transfers upon sale—new owner benefits from improvements that stay with the property.").

describes PACE financing as "attach[ing] the obligation to repay the cost of improvements to the property, not the individual borrower."[51] The Sonoma County, California PACE program claimed that "[a]ssessments are a lien on the property itself: when the property is sold, the assessment stays with the property."[52] One Block Off the Grid, an advocacy group, stated that "property tax financing solves the problem of 'what happens when I sell my home?' The simple answer is that the solar power system and whatever tax liability you have both go to the new owner of your home."[53]

Homeowners adopting PACE seemed convinced of this assertion. Surveys of participants in the Berkeley PACE program cite this purported benefit as an important motivator for obtaining PACE financing.[54] The *New York Times* quoted a PACE borrower from the Sonoma County project as stating that "part of the draw was that the loan goes with the property to the next owner."[55]

b. Better Financing Terms Through Lien Priority

The claim that PACE will offer better financing terms flows from the priority given to tax liens on real property. Real estate liens generally are ordered so that prior liens are paid in foreclosure before liens filed later in time.[56] For example, a mortgage loan used to buy the property takes priority over a later mortgage loan used to remodel the home.[57] The earliest

51. WHITE HOUSE FRAMEWORK, *supra* note 6.

52. *Energy Improvements*, SONOMA COUNTY ENERGY IMPROVEMENT PLAN, http://www.sonomacountyenergy.org/lower.php?url=about-us (last visited Dec. 30, 2010).

53. *PACE Program (Property Assessed Clean Energy) Financing*, ONE BLOCK OFF THE GRID, http://solarfinancing.1bog.org/pace-program-solar-financing/ (last visited Dec. 30, 2010).

54. OFFICE OF ENERGY AND SUSTAINABLE DEV., CITY OF BERKELEY, BERKELEY FIRST INITIAL EVALUATION 2 (2009) [hereinafter BERKELEY FIRST INITIAL EVALUATION], *available at* http://www.ci.berkeley.ca.us/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Berkeley%20FIRST%20Initial%20%20Evaluation%201-10.pdf.

55. Todd Woody, *Loan Giants Threaten Energy Efficiency Programs*, N.Y. TIMES, July 1, 2010, at B1, *available at* http://www.nytimes.com/2010/07/01/business/energy-environment/01solar.html?pagewanted=1&_r=1&emc=eta1.

56. GRANT S. NELSON & DALE A. WHITMAN, REAL ESTATE FINANCE LAW §§ 7.31–7.32 (West Group 5th ed. 2007).

57. Donna S. Harkness, *Predatory Lending Prevention Project: Prescribing a Cure for the Home Equity Loss Ailing the Elderly*, 10 B.U. PUB. INT. L.J. 1, 34 (2000).

and thus highest priority mortgage loan is known as a first lien, while the subsequent mortgage loan is deemed a second lien.[58] If the homeowner defaults on the second lien loan, the first lien mortgage holder retains the lien even if the second lien mortgage holder forecloses; however, the converse is not true.[59]

Tax assessments are an exception to this lien priority rule. Generally, unpaid property tax assessments have priority over other liens, regardless of the date the prior liens were recorded or when the tax assessments became delinquent.[60] This makes the lien priority for PACE financing senior to liens for mortgage loans closed prior to the homeowner's acceptance of the PACE financing. In the case of default by the homeowner on the PACE assessment, local governments and investors in PACE bonds can expect to collect the balance owed on a PACE assessment before any recovery by a mortgage lender.

PACE program advocates claim two advantages that arise from this lien priority. First, this advantaged lien position and consequent investor security of repayment can lead to lower costs for PACE financing compared to private real estate financing.[61] Second, lien priority for repayment in default means that investors do not need extensive underwriting and assurances regarding the homeowner's repayment ability that would normally be imposed by a mortgage lender. The lack of need to carefully underwrite the risks suggests the possibility of making PACE financing available to a much broader group of homeowners than those who would qualify for private financing.[62]

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58. 59 C.J.S. *Mortgages* § 292 (2011).

59. NELSON & WHITMAN, *supra* note 56, §§ 1.1, 7.31–7.32.

60. James J. Kelly, *Bringing Clarity to Title Clearing: Tax Foreclosure and Due Process in the Internet Age,* 77 U. CIN. L. REV. 63, 73 (2008).

61. Marcus & Horner, *supra* note 50, at 10745. MARK BOLINGER, BERKELEY LAB AND THE CLEAN ENERGY STATES ALLIANCE, PROPERTY TAX ASSESSMENTS AS A FINANCE VEHICLE FOR RESIDENTIAL PV INSTALLATIONS: OPPORTUNITIES AND POTENTIAL LIMITATIONS (February 2008), http://eetd.lbl.gov/ea/ems/cases/property-tax-finance.pdf.

62. *See, e.g.*, Interview by Alex Wise with Cisco DeVries, President, Renewable Funding (May 26, 2010) ("One of the remarkable things about PACE is that it really opens up the qualifications to a huge subset of folks. Essentially any property owner who owns their home in good standing, who is up to date on their taxes and their mortgage, and is not underwater on their property, meaning that their property is not worth less than their mortgage, generally qualifies. So, this means that we're not checking people's personal credit, we're not getting into the details of somebody's own personal income."); *see also infra* text accompanying note 150.

II. PACE AS REAL ESTATE FINANCING

The arguments for homeowner advantages with PACE are predicated on the idea that tying repayment to property tax assessments radically changes the characteristics of financing for homeowners. Unfortunately, the dynamics and constraints of the real estate finance market shape the realities of PACE financing. As a result, the claimed benefits for PACE programs disappear upon closer examination.[63] This Part critically analyzes the argument that use of property tax financing removes the property transfer risks for homeowners in financing energy improvements and ultimately concludes that homeowners are likely to pay any remaining PACE financing obligation when they transfer their property.

A. Transfer Risks Associated with PACE Financing

The notion that PACE financing, as compared to other real estate financing, creates a lien that runs with the property rather than the individual owner is true in a literal sense. A homeowner voluntarily agrees to a tax assessment that can only be collected against the property and is not a personal obligation of the homeowner.[64] PACE programs suggest that this result means that the homeowner is not required to pay off the remaining balance on the PACE financing because the lien will simply persist on the property and be repaid in the form of future property tax assessments.[65] But real estate sale and lending transactions do not operate in a vacuum, so the purported cost-free transfer of PACE financing obligations will not occur with any frequency. Buyers of real estate typically consider all liens on the property, and PACE assessments should be no exception.[66] A property tax special assessment

63. This Article is limited to an analysis of PACE as a means of residential energy finance. The PACE concept also could be used to fund commercial energy improvements, but a detailed analysis of PACE in the commercial context is beyond the scope of this Article. *See infra* note 141.

64. 5 RICHARD R. POWELL, POWELL ON REAL PROPERTY § 39.04 (2008). In a small minority of states, property taxes can be held a personal obligation of the homeowner. *Id.* at n.1.

65. *See supra* Part I.B.2.a. *See also* Eisen, *supra* note 38, at 85 ("Because the debt is repaid through the property tax, if the homeowner moves before the system's payoff period, the debt simply continues to be repaid by the next owner.").

66. *See, e.g.*, Ronald Benton Brown et al., *Real Estate Brokerage: Recent Changes in Relationships and a Proposed Cure*, 29 CREIGHTON L. REV. 25, 35

that is the subject of negotiation between the seller (the "PACE homeowner" who obtained the financing) and the home buyer has two foreseeable outcomes: (1) the PACE homeowner pays off the remaining balance of the PACE financing at the time of sale, or (2) the buyer assumes responsibility for future special assessments.

In the first scenario, if the PACE homeowner pays off the assessment upon the sale of the property, she will have the amount of outstanding PACE lien deducted from the closing proceeds. This is the same outcome for the seller as would have occurred if she had used mortgage financing to install the energy improvements because existing mortgage loans routinely are paid off when the buyer obtains financing for the property.[67] In the second scenario, rational buyers will assume responsibility for the PACE financing only if they receive a correspondingly lower sale price for the home, or some other consideration.

The result in either scenario is the same. The PACE homeowner walks away from the sale with less money because of the PACE financing obligation—either by paying off the assessment prior to or at closing, or by accepting a lower sales price in return. Thus, PACE does not resolve the problem of the seller being responsible for the long-term consequence of PACE financing she used to install energy-related improvements.

This result holds regardless of any increase in home value resulting from the energy improvements. For example, consider two identical homes sitting next to each other. Home A has a solar system made possible with a $10,000 remaining PACE assessment, and Home B has neither a solar system nor a PACE assessment. If a rational buyer values the solar system as worth $12,000 due to the energy savings or environmental concerns, then she will be willing to offer $12,000 more for Home A if the seller pays off the PACE assessment or $2,000 more for Home A if the assessment becomes the obligation of the buyer. In either case, the seller of Home A is $2,000 better off than the seller of Home B. Conversely, if the solar system does not increase the value of Home A in the view of the buyer,

(1995); REALESTATEEXPRESS.COM, http://www.realestatelicenseexpress.com/2010/07/real-estate-basics-real-estate-taxation/ (last visited July 8, 2011) ("Unless there is a written agreement in place stating otherwise, special assessment taxes must be paid in full prior to any transfer of property.").

67. Joseph R. Mason, *The Economic Impact Of Eliminating Preemption of State Consumer Protection Laws*, U. PA. J. BUS. L. 781, 786 (2010).

then the seller who installed the solar system with PACE financing will take a $10,000 loss on the investment because she will either have to pay off the $10,000, or she will receive $10,000 less for the house price with the buyer taking subject to the repayment obligation, or some combination thereof. The perceived value of the energy improvement to the buyer impacts the amount she will pay for the house and thus the amount the seller will receive in the transaction, but the seller's use of PACE financing does not change that calculation.

B. Arguments for the Cost-Free PACE Transfer Are Erroneous

PACE proponents have responded to the problem of real estate negotiation in four ways: (1) buyers do not consider property tax special assessments when negotiating home sale prices; (2) buyers will not negotiate the price because the energy improvements are worth more than the amount of the PACE assessment; (3) PACE provides the option of the buyer assuming the obligation, which is not available for other forms of financing; and, (4) PACE programs can require lien assumption. None of these arguments fundamentally addresses the inaccuracy of the claim that PACE financing is essentially cost-free upon the transfer of the property.

1. Irrational Buyers

Home buyers could irrationally fail to notice or care about a property tax special assessment because they will treat a property tax assessment differently than another type of obligation that runs with the property. A lack of economic rationality in consumer behavior is well documented,[68] so there may be some validity to this view. Nevertheless, the limited data available on resale or refinancing of homes with the initial PACE programs support the view that homeowners will pay off PACE liens rather than engage in a cost-free transfer of the obligation.[69]

68. *See, e.g.*, Oren Bar-Gill & Elizabeth Warren, *Making Credit Safer*, 157 U. PA. L. REV. 1, 21–22 (2008).

69. COUGHLIN, *supra* note 27, at 3. Coughlin reports that there has been one home sold with PACE financing through the Boulder program and that "the lien was paid off by the seller as a condition of the sale." Coughlin also reports that two homes with PACE loans in the Palm Desert program were refinanced and that "[i]n both cases, the PACE liens were paid off as part of the transaction." *Id.*

While more sale data would be helpful in evaluating the extent of economically irrational consumer behavior, the claims of PACE advocates will not be resolved simply through an empirical investigation. In assessing the conduct of home buyers facing PACE assessments, a starting point would be to determine how often PACE homeowners pay off the remaining financing upon the sale of the property. But even if buyers are purchasing properties subject to a PACE property tax assessment in large numbers, evaluating whether irrational buyer behavior exists and the extent of that behavior, would require determining if the buyer bargained on sales price or other consideration in the negotiation process. Because property and tax records do not show whether bargaining occurred, uncovering this information would require interviewing the buyers, and perhaps sellers, following any sale of a home with PACE financing. And even then, this type of evaluation does not account for likely changes in buyer behavior if PACE programs reach a large enough scale such that real estate agents are familiar with this type of tax lien.

While information on the rationality of home buyers vis-à-vis PACE obligations would be useful, it still will not resolve the issue of whether PACE programs should continue to promote PACE financing as a way to eliminate the homeowner's risk of having to pay off the obligation upon the transfer of the property. Promoters of PACE contend that PACE resolves homeowner concerns about being stuck with the cost of a solar system or other improvement if the homeowner sells the property before the loan is repaid.[70] Nothing about a PACE assessment, as opposed to a private mortgage lien, guarantees or even makes this result likely. Therefore, PACE programs, at best, can claim that they offer the possibility of a cost-free transfer if the person buying the home ignores the tax burden on the house. However, this is a much weaker claim than the current promotion of PACE as an essentially risk-free investment on sale of the property.

Finally, relying on home buyer ignorance or irrationality raises the issue of whether local governments should promote the benefits of a program based on the presumed irrationality of other citizens. Governments arguably have an obligation to ensure full disclosure of all information related to real estate transactions in which they have an interest.

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70. *See supra* Part I.B.2.a.

2. Cost Savings

PACE advocates also stress that PACE financing is different than traditional financing because monthly savings from the investment exceed the monthly cost of investment.[71] The logic is that a homeowner accepting PACE financing will have no further obligations upon the transfer of the property because new owners will want to obtain the benefits of that investment.[72] This argument is premised on analytic error. The buyer of a property with a PACE assessment is concerned with the value of the improvement to her and how the improvement changes the market value of the property. Assume, for example, the buyer values a solar PV system and insulated walls at $5,000. It does not matter if the PACE financing to achieve those improvements was for $1,000 or $20,000—the buyer will pay $5,000 more. Or if the value of these improvements outweighs the cost of the PACE assessment, the PACE homeowner will not decrease the market price for the property because the decision to make the improvement with PACE financing was a bargain. Accordingly, the value of energy improvements is irrelevant to whether the PACE homeowner will have a cost-free opportunity to transfer the obligation to repay the PACE assessment to the buyer.

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71. *See, e.g.*, WHITE HOUSE FRAMEWORK, *supra* note 6, at 4–5 (supporting PACE funding only for an investment that will "pay for itself," meaning an investment for which the "expected total utility bill savings are estimated to be greater than expected total costs (principal plus interest)").

72. *See, e.g.*, John Farrell, *Responding to Concerns with Municipal Financing of Energy Improvements*, NEW RULES PROJECT (April 2010), http://www.newrules.org/energy/publications/responding-concerns-municipal-financing-energy-improvements (explaining that because "PACE financing is attached to the property, not to the borrower, the energy savings and the costs stay with the property. While the PACE assessment—like any other—is negotiated during the sale of the property, it is the only financing model that allows the property owner to keep the financing costs tied to the energy savings or generation from PACE improvements."). Underlying this argument may be a broader misunderstanding that PACE somehow transforms the financing of energy improvements into a special-purpose loan whose obligations to repay are tied to the performance of the energy improvements. There are businesses, at least in the commercial sector, offering such an arrangement, but PACE financing is an obligation to repay regardless of the performance of the energy improvements. *See generally* JULIE OSBORN ET AL., ERNEST ORLANDO LAWRENCE BERKELEY NAT'L LAB., ASSESSING U.S. ESCO INDUSTRY: RESULTS FROM THE NAESCO DATABASE PROJECT (2002), *available at* http://eetd.lbl.gov/EA/EMP/reports/50304.pdf.

3. The Benefit of Lien Assumption

The third argument that PACE proponents make is that PACE at least offers the opportunity for the homeowner to transfer the lien to the buyer, as opposed to the typical home mortgage loan, which is not assumable. Although this is true, it comes at a cost.

PACE financing is assumable because the buyer of the property can take over the financing obligation on the same terms to which the seller was obligated. Assumability of financing is beneficial to the buyer if it costs less than the first lien mortgage loan used to purchase the house. For example, if interest rates rise substantially between the time the PACE bond rate is set and the time the homeowner sells the house, PACE assessments could be an advantage to a buyer. In that situation, the PACE assessment would offer a lower financing cost relative to the buyer's purchase money mortgage, so she would pay less in overall financing costs by assuming the PACE lien.

Conversely, if interest rates are stable, fall, or rise less than the spread between the PACE rate and the market first lien mortgage rate, buying a home subject to a PACE lien is then a burden to the buyer of the property. Under these circumstances, the buyer would be better off forcing the PACE homeowner to pay off the tax lien. Because PACE financing comes at a noticeably higher price in the current market than a first lien mortgage loan,[73] assuming existing PACE financing will generally be a burden to the buyer.

In short, PACE loans are assumable financing. They come with the advantages, and disadvantages, of any transferrable, fixed-rate financing mechanism.[74] Assumability, however, does not create a cost-free transfer of the PACE obligation.

4. Required Lien Assumption

The last argument in support of the notion that PACE offers a risk-free transfer is that PACE can be modified to

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73. *Infra* notes 109–10.

74. PACE loan assumability also means additional interest rate risk to the investor in a PACE bond. *See* Eurico J. Ferreira & G. Stacy Sirmans, *Interest-Rate Changes, Transaction Costs, and Assumable Loan Value*, 2 J. REAL EST. RES. 29, 32–34 (1987) (describing a model for valuing the right of loan assumption with rising interest rates).

require home buyers to assume the PACE lien. One state may already have taken this approach in its enabling legislation for PACE.[75] Unfortunately, this strategy will disadvantage all parties to the property transfer, including the PACE homeowner.

Requiring buyers to assume PACE financing restricts both the buyer and seller from exercising their options of either having the PACE homeowner pay off the lien or having the buyer add the value of the energy improvements to the price paid for the home. If the financing cost on the PACE lien exceeds the financing cost of the buyer's first lien mortgage, as is true with the cost of PACE financing in the current market,[76] compulsory lien assumption will increase the cost of the home purchase for the buyer.[77] A rational buyer in this circumstance will offer a lower price to the PACE homeowner in order to compensate for the burden of the PACE assessment.

III. THE RELATION OF PACE FINANCING TO EXISTING AND FUTURE MORTGAGE LOANS

Home buyers are not the only actors with control over whether a PACE lien survives a property transfer. Mortgage lenders for the buyers can require the pay-off of the PACE obligation as a condition of financing for new buyers. Homeowners who created or assumed a PACE lien can be required to satisfy the PACE obligation on refinancing, as with any existing lien on the property.[78] The actions of the secondary market in shutting down PACE reflect the reality of the mortgage lending industry's power to block the use of PACE as a long-term financing program for homeowners. This Part examines the current litigation brought by state and local governments and advocacy groups against federal regulators. The position of the governments and advocacy groups

75. *See* MINN. STAT. § 216C.436(2)(11) (2010).

76. *See infra* notes 104–08 and accompanying text.

77. In the event that interest rates rose enough in the period between PACE bonding and the home sale to close the gap between PACE rates and first lien mortgage rates, compulsory assumption does not add anything to the transaction. Buyers of a PACE home always have the option to assume the lien without such a requirement.

78. The Mortgage Professor's Website, *The Curse of Negative Equity: Is There An Escape?* (May 1, 2011), http://www.mtgprofessor.com/A%20-%20Amortization/the_curse_of_negative_equity_is_there_an_escape.htm.

defending PACE reflects the same analytic error that underlies the wrongfully claimed advantages of PACE for homeowners.

A. Mortgage Lenders Versus the States

When PACE programs began in 2008, PACE advocates stated that mortgage lenders were accepting the priority of the liens.[79] In July 2010, however, the government secondary mortgage market regulator, the Federal Housing Finance Agency (FHFA), issued a statement that mortgages that originated in a jurisdiction with a PACE program would be subject to significant restrictions.[80] FHFA is the federal regulator and conservator of the secondary mortgage market Government Sponsored Enterprises (GSEs), Fannie Mae and Freddie Mac.[81] On August 31, 2010, the GSEs issued guidance statements indicating that they would not purchase mortgage loans if the homeowner had a PACE obligation unless the PACE program was structured so that the PACE lien was subordinate to the first lien mortgage loan.[82] The Office of Comptroller of the Currency issued a similar guidance to the banks it regulated.[83]

Existing or planned PACE programs across the country were suspended while waiting for a resolution to this dispute.[84]

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79. *About PACE*, *supra* note 7 ("All municipal assessments are accepted by mortgage lenders and acknowledged in their standard mortgage underwriting documents.").

80. *FHFA Statement on Certain Energy Retrofit Loan Programs*, FED. HOUS. FIN. AGENCY (July 6, 2010) [hereinafter *FHFA Statement*], http://www.fhfa.gov/webfiles/15884/PACESTMT7610.pdf.

81. 12 U.S.C. § 4511 (2010).

82. *Bulletin to Freddie Mac Sellers and Servicers*, FREDDIE MAC, 1 (Aug. 31, 2010), http://www.freddiemac.com/sell/guide/bulletins/pdf/bll1020.pdf.

83. *Supervisory Guidance to Chief Executive Officers of All National Banks, Department and Division Heads, and All Examining Personnel*, OFFICE OF THE COMPTROLLER OF THE CURRENCY (July 6, 2010), http://www.occ.treas.gov/news-issuances/bulletins/2010/bulletin-2010-25.html. The Office of the Comptroller of the Currency is the primary regulator of national banks. Andru Wall, *The 2009 Stress Tests: A Model For Periodic Transparent Examinations of the Largest Bank Holding Companies*, 128 BANKING L.J. 291, 309 (2011).

84. Complaint at 4, Natural Res. Def. Council v. Fed. Hous. Fin. Auth., No. 10 Civ. 7647 (S.D.N.Y. Oct. 6, 2010) (alleging that the FHFA and related guidance statements "collectively mandated an effective end to all residential PACE programs"); David Clucas, *County Suspends ClimateSmart Loans*, BOULDER COUNTY BUS. REPORT (May 14, 2010), http://www.bcbr.com/article.asp?id=51635 ("Boulder County officials have temporarily suspended issuing new residential ClimateSmart loans due to new federal guidelines and challenges from the government-backed lending giants Fannie Mae and Freddie Mac."); Todd Woody, *Homeowners Must Pay Off Energy Improvement Loans*, N.Y. TIMES (Aug. 31,

Because the FHFA statement linked its underwriting restrictions to all mortgages in a jurisdiction with PACE rather than just properties with a PACE loan,[85] the existence of a PACE program would impact all residential home finance in a given community.

Therefore, the cost of PACE programs became unacceptable for most local governments.[86] State and local governments, along with environmental advocacy groups, struck back at the federal regulators with lawsuits claiming the agencies had violated the Administrative Procedure Act (APA).[87] These suits typically seek an injunction against

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2010, 5:30 PM), http://green.blogs.nytimes.com/2010/08/31/homeowners-must-pay-off-energy-improvement-loans/#more-68965 ("[T]he Federal Housing Finance Agency . . . guidance led to the halt of most PACE programs and left in limbo those homeowners who had already taken out energy improvement loans."). The Sonoma County PACE program continued to offer financing but required program participants to assume the financial risk by signing a disclosure acknowledging that "participation in assessment financing programs . . . may be in violation of your mortgage documents." Liz Yager, *Letter to Sonoma County Energy Improvement Program Participants*, SONOMA COUNTY ENERGY INDEPENDENCE PROGRAM (July 16, 2010), http://www.drivecms.com/uploads/sonomacountyenergy.org/SCEIP_Notice_to_Participants_071610.pdf. The Sonoma County program is attempting to continue. Loralee Stevens, *SCEIP, Loan Officials Finding Solutions*, NORTH BAY BUS. J. (Nov. 15, 2010, 4:55 AM), http://www.northbaybusinessjournal.com/26979/sceip-loan-officials-finding-solutions.

85. *FHFA Statement*, *supra* note 80, at 2 (explaining that FHFA directed Fannie Mae and Freddie Mac to "[a]djust[] loan-to-value ratios to reflect the maximum permissible PACE loan amount available to borrowers in PACE jurisdictions"); *see also* Todd Woody, *A Blow to Home Retrofits*, N.Y. TIMES (July 6, 2010, 4:21 PM), http://green.blogs.nytimes.com/2010/07/06/a-blow-to-home-energy-retrofits/ ("[FHFA] ordered lenders in areas where the programs are offered to lower the maximum all buyers can borrow to take into account the availability of PACE loans.").

86. PACENOW.ORG BLOG, *supra* note 2 (observing that the federal regulatory actions "brought PACE to a standstill today").

87. *See, e.g.*, Complaint at 11–12, County of Sonoma v. Fed. Hous. Fin. Agency, No. CV 10 3270 (N.D. Cal. July 26, 2010); Complaint at 14–16, Natural Res. Def. Council v. Fed. Hous. Fin. Auth., No. 10 Civ. 7647 (S.D.N.Y. Oct. 6, 2010); Complaint at 13–15, People *ex rel.* Brown v. Fed. Hous. Fin. Agency, No. C10-03084 BZ (N.D. Cal. July 14, 2010). The governmental and environmental advocacy plaintiffs in these suits allege numerous violations of the APA, including that there is no rational relationship between the action taken by the regulators and their statutory authority regarding safety and soundness of the lending institutions, that the regulators' actions were arbitrary and capricious, that the policy was not properly promulgated through rule-making procedures, and that the regulators failed to conduct an environmental impact statement. *See* Complaint at 11–12, County of Sonoma v. Fed. Hous. Fin. Agency, No. CV 10 3270 (N.D. Cal. July 26, 2010); Complaint at 14–16, Natural Res. Def. Council v. Fed. Hous. Fin. Auth., No. 10 Civ. 7647 (S.D.N.Y. Oct. 6, 2010); Complaint at 13–15,

implementation of the underwriting restrictions by the federal mortgage and banking authorities.[88] They also seek declaratory relief.[89] The State of California and Sonoma County, for instance, asked the court to declare that PACE financing "is accomplished through assessments and not 'loans.'"[90]

B. How Failure to Acknowledge PACE as Real Estate Financing Defines the Dispute with the Secondary Mortgage Market

This Subpart discusses how plaintiffs' description and legal framing of the PACE financing mechanism reflects the disconnect between the theories underlying PACE and the realities of real estate finance.[91] The governmental and environmental plaintiffs argue that PACE financing is not a loan.[92] They characterize PACE financing as identical to any other tax assessment by a local government, such as assessments for road paving.[93] Underlying this argument is the

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People *ex rel.* Brown v. Fed. Hous. Fin. Agency, No. C10-03084 BZ (N.D. Cal. July 14, 2010).

88. *See, e.g.*, Complaint at 15, County of Sonoma v. Fed. Hous. Fin. Agency, No. CV 10 3270 (N.D. Cal. July 26, 2010) ("[Sonoma County seeks] a temporary restraining order, preliminary injunction, and permanent injunction restraining and enjoining Fannie Mae and Freddie Mac from taking any adverse action against any mortgagee who is participating, or may participate, in SCEIP, or other action that has the effect of chilling participation in SCEIP.").

89. *Id.* (asking the Court to "issue a declaratory judgment that Defendant FHFA violated NEPA and the APA").

90. *Id.* (praying for the Court to "declare that under California Law, SCEIP financing is accomplished through assessments and not 'loans'"); Complaint at 14, People *ex rel.* Brown v. Fed. Hous. Fin. Agency, No. C10-03084 BZ (N.D. Cal. July 14, 2010) (using precisely the same language).

91. It is beyond the purpose of this Article to analyze the competing administrative law claims underlying the plaintiffs' assertions of a right to relief in these lawsuits.

92. Complaint at 9, County of Sonoma v. Fed. Hous. Fin. Agency, No. CV 10 3270 (N.D. Cal. July 26, 2010) ("[FHFA] mischaracteriz[ed] PACE assessments as 'loans.'"); Complaint at 8, People *ex rel.* Brown v. Fed. Hous. Fin. Agency, No. C10-03084 BZ (N.D. Cal. July 14, 2010) ("California state law is clear: PACE financing is not accomplished through loans, but through assessments.").

93. Complaint at 3, Sierra Club v. Fed. Hous. Fin. Agency, No. CV 10 3317 (N.D. Cal. July 29, 2010) ("PACE programs operate under well settled principles of California law by establishing assessments on homeowners' properties. California relies upon its assessment power to fund municipal projects such as road paving and other improvements."); Complaint at 5, People *ex rel.* Brown v. Fed. Hous. Fin. Agency, No. C10-03084 BZ (N.D. Cal. July 14, 2010) ("For well over 100 years, local governments in California have used their assessment

assertion that energy improvement financing involves the public purposes of greater energy efficiency or renewable energy production.[94]

A focus on the public benefit of the financing, however, does not change the essential character of the PACE financing arrangement from the point of view of homeowners and lenders. PACE financing has all the characteristics of a mortgage loan other than the mechanism of billing and payment through property tax. Unlike a public works tax assessment, PACE financing is voluntarily assumed by the homeowner and provides cash to the homeowner for improvements that ultimately will be owned by the homeowner. From the lender's perspective, PACE financing constitutes another lien on the property for purposes of evaluating the value of the home as security in case of default by the homeowner on the mortgage loan.

Attempting to avoid characterizing PACE financing as a real estate secured loan results in the same type of analytic disconnect with respect to lenders' concerns that was evident in the claim that homeowners accepting PACE financing could engage in a risk-free sale of the property. For example, the Sierra Club argues that mortgage lenders have little risk of losing money in the case of foreclosure on a PACE homeowner because "the amount due to local governments upon foreclosure is limited to the periodic property assessments that are outstanding."[95] The State of California describes as "minimal" the impact on lenders when homes with PACE liens fall into foreclosure.[96] California illustrates its point with an example of PACE financing of $15,000 on a home with a $250,000 mortgage resulting in only $1,500, at most, being given priority over the mortgage liens in foreclosure, with the remainder of the PACE obligation falling on future homeowners.[97] Again,

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powers to finance improvements that serve a public purpose, such as the paving of roads, sidewalk improvements, and the undergrounding of utilities.").

94. Complaint at *2, California *ex rel.* Brown v. Fed. Hous. Fin. Agency, 2010 WL 5300899 (2010) (No. C10-03-084).

95. Complaint at 4, Sierra Club v. Fed. Hous. Fin. Agency, (N.D. Cal. July 29, 2010) (No. CV 10 3317), 2010 WL 3141131; Complaint at *2, California *ex rel.* Brown v. Fed. Hous. Fin. Agency, 2010 WL 5300899 (2010) (No. C10-03-084).

96. Letter from Ken Alex, Cal. Senior Assistant Attorney Gen., to Edward DeMarco, Acting Dir., Fed. Hous. Fin. Agency 1 (June 22, 2010), *available at* http://www.mpowerplacer.org/forms/L%20AG%20DeMarco%20Letter%206_21_10.pdf.

97. *Id.* at 3 (concluding that there is minimal risk associated with PACE liens that are averaged over a mortgage portfolio).

the argument here fails to account for the reality of residential mortgage financing; in this case, the reality of foreclosing on a residential mortgage loan. The amount the foreclosing lender will recoup on the defaulted loan is measured by its net recovery from the eventual sale of the property.[98] Depending on the state and the market conditions, a foreclosed property will either be sold to the highest bidder at the foreclosure sale or the foreclosing lender will assume ownership and re-sell the property.[99]

In either case, the potential buyer of the property will be faced with bidding on a home burdened by the remaining PACE obligation. A rational and informed buyer will take this into account when negotiating or bidding on the price of the home. Accordingly, the value recouped by the lender in foreclosure will likely be reduced by this amount. As with the sale of the property by a PACE homeowner, the impact on lenders does not disappear simply because the PACE obligation exists in the form of a liability for future tax payments rather than a current lien on the property.

C. Pending Federal Legislation Has Also Been Introduced as a Means of Preserving PACE Programs

In addition to initiating litigation, PACE advocates are lobbying for the passage of federal legislation as a means of rebuilding PACE programs. A bill introduced in Congress known as "The PACE Assessment Protection Act" would resolve the conflict between PACE programs by requiring that the underwriting standards used by the GSEs acquiesce in all respects to PACE program assessments that comply with the guidelines issued by the Department of Energy (DOE).[100] The

98. NELSON & WHITMAN, *supra* note 56, §1.1.

99. Thomas W. Mitchell et al., *Forced Sale Risk: Class, Race, and the "Double Discount,"* 37 FLA. ST. U. L. REV. 589, 601–07 (2010).

100. The proposed legislation was introduced in 2010 but was not enacted by the 111th Congress. PACE Assessment Protection Act of 2010, H.R. 5766, 111th Cong. (2d Sess. 2010). The bill has been re-introduced in the 112th Congress. PACE Assessment Protection Act of 2011, H.R. 2599, 112th Cong. (2011). Prohibiting the GSEs from considering PACE in their underwriting standards does not prevent individual mortgage lenders from achieving the same result by requiring PACE homeowners to pay off the assessment when the homeowners refinance or by requiring buyers of such homes to pay off the PACE financing as a condition of purchase financing. It is possible, however, that the GSE standards would become the market standard. Future legislation could prevent individual lenders from imposing such requirements on financing.

DOE guidelines include some rudimentary underwriting requirements, limit the size of PACE assessments to ten percent of property value, permit funding only if the projected value of the energy investment exceeds the financed cost of the investment, and create various measures designed to protect against fraud and ensure program administration.[101] Specifically, the legislation would require that the GSEs not include the PACE obligation in determining whether a loan can be made and also not to make pay-off of PACE financing a condition of either a refinancing or purchase loan.[102]

The argument for this or similar legislation rests on the advantages of PACE as a means of promoting residential alternative energy investment and energy efficiency improvements. So the discussion returns to the alleged unique advantages of PACE as a financing mechanism.[103] Part II of this Article considered and rejected the notion that PACE financing offers risk-free transfers of the financing obligation. Part IV examines the two other purported benefits of PACE financing.

IV. PACE LIKELY WILL NOT SUBSTANTIALLY IMPROVE FINANCING COST OR AVAILABILITY

PACE programs have promised to lower loan costs and broaden availability. Both of these purported advantages rely on PACE assessments assuming priority over prior liens on the property. Section A of this Part analyzes the claim that PACE will lower financing costs. Existing PACE programs have higher costs than comparable loans, and this situation may not substantially change for bond-financed programs. Even if PACE does achieve lower costs, it likely will just mean a shifting of that burden to mortgage loan financing generally. Section B addresses the claim of PACE advocates that this

101. U.S. DEP'T OF ENERGY, GUIDELINES FOR PILOT PACE FINANCING PROGRAMS 3–4 (May 7, 2010), *available at* http://www1.eere.energy.gov/wip/pdfs/arra_guidelines_for_pilot_pace_programs.pdf.

102. PACE Assessment Protection Act of 2010, H.R. 5766, 111th Cong. § 2(a) (2d Sess. 2010). The legislation also requires that the Fannie and Freddie underwriting standards provide that "in the event that a tax or assessment under a PACE program is delinquent, only the unpaid delinquent amount along with applicable penalties, interest and costs will be subject to foreclosure and not the entire amount." *Id.* This provision seems to be aimed at preventing the GSEs from including future PACE assessments in their default risk analysis, although the actual language of the legislation may not achieve this objective.

103. *See supra* Part II.

form of financing will be easier to obtain for homeowners than traditional mortgage loans. PACE does have the potential to broaden loan availability, but achieving that objective will impose costs on the mortgage lending market.

A. The Cost of PACE Financing

The White House report on PACE issued in 2009 called it "less expensive" than private financing,[104] and a study of the Berkeley PACE program stated that it "offers the possibility of 100% financing at a fixed, favorable interest rate over a lengthy . . . term."[105] The initial PACE bond-financed programs, however, had higher costs than rates for mortgage loans. Berkeley charged homeowners 7.75% interest, Sonoma County 7%, and Boulder 6.68%.[106] Compared to second lien loans contemporaneously available, these costs were higher than, or at best comparable to, private financing.[107] Compared to a first lien refinancing loan with cash out to the homeowner for making the energy improvements, the PACE financing cost for homeowners was much higher.[108]

The rationale for cheaper cost financing through PACE is that investors will be willing to accept a lower return from PACE bond offerings because of the added security for investors from the property tax assessment repayment method.[109] Arguably, if PACE programs reached a sufficient scale and established a reliable record of repayment to

104. WHITE HOUSE FRAMEWORK, *supra* note 6, at 1.

105. BOLINGER, *supra* note 61, at 3.

106. BRAAKSMA ET AL., *supra* note 9, at 10–11; *Sonoma County Energy Independence Program (SCIEP): Frequently Asked Questions*, Question 14, http://www.drivecms.com/uploads/sonomacountyenergy.org/frequently_asked_questions.pdf (last visited July 14, 2011).

107. BRAAKSMA ET AL., *supra* note 9, at 32–33 (noting that PACE rates were the same or higher than second lien loans and that the closing costs and origination fees made PACE loans significantly more expensive); BERKELEY FIRST INITIAL EVALUATION, *supra* note 54, at 3 (noting that the interest rate for the Berkeley program was "nearly twice the rate for a home equity loan").

108. A simple rate comparison makes this point clear, as PACE program interest rates are generally around 7%, whereas first lien rates currently average below 5%. *See* Lynnley Browning, *A Less Costly Cash-Out*, N.Y. TIMES, Dec. 12, 2010, at RE.9 (noting an average interest rate of 4.91% for a thirty year fixed-rate conventional mortgage); *see also supra* note 107.

109. Letter from Chris Moriarty, Dir., Barclays Capital, and John Rhow, Senior Vice President, Barclays Capital, to Jeffrey Tannenbaum, Fir Tree Partners (Sept. 14, 2009), *available at* http://pacenow.org/documents/Pace%20letter%20sept%202009%20re%20liens%20_2_%20_2_%20-%20Barclays%20%209-14-09%20_3_.pdf.

investors, the promise of a superior lien priority might ultimately result in lower financing costs because investors have less risk of loss from default. Yet there are important limits on, and consequences of, this theoretical benefit.

It is not clear that issuance of PACE bonds could ever achieve the economies of scale available to the general residential mortgage loan market. For homeowners financing an energy improvement with a cash-out refinance loan, which will often be the case when mortgage rates are declining, the costs of the loan will be spread out over a much larger financing amount and thus will be relatively less of a burden than an additional payment obligation secured by the home. Long-term financing means investors in PACE bonds will face higher prepayment risk than lenders making first lien refinance loans.[110] That may be one reason why some PACE programs included significant prepayment penalties, which puts the costs of prepayment risk back on the homeowner.[111]

For homeowners seeking a second lien loan, the long-term possibility that PACE will provide a more efficient funding source is also questionable. The second lien home finance market is vast. Even with the sharp contraction in this market after the mortgage crisis, it accounted for about $5 billion dollars in loans in the second quarter of 2010.[112] The market systems for processing and securitizing such loans are well established.[113] A PACE bond program is a single-use financing system with much more limited capacity to spread its costs over the loan base.

Any future PACE cost advantage would likely raise overall mortgage financing costs. PACE priority tax lien status shifts the burden of default for the PACE financing to the existing

110. *See* Andrea J. Boyack, *Laudable Goals and Unintended Consequences: The Role and Control of Fannie Mae and Freddie Mac,* 60 AM. U. L. REV, 1489, 1498 (2011).

111. *SCIEP: Frequently Asked Questions*, *supra* note 106, at Question 17 (discussing program requirements that no partial prepayments be accepted, and that full prepayments of the long-term bond require a 3% prepayment penalty); Memorandum from George M. Burgess, Cnty. Manager, for Miami-Dade Cnty. Bd. of Comm'rs 5 (May 17, 2010), *available at* http://www.miamidade.gov/oos/library/energy_efficiency.pdf (discussing pre-payment penalties in relation to the salability of municipal bonds for a PACE program).

112. LESLIE L. PETTIJOHN, COMM'R OF THE TEX. OFFICE OF CONSUMER CREDIT, TEXAS SENATE BUSINESS AND COMMERCE HEARING 3 (2010), *available at* http://www.senate.state.tx.us/75r/senate/commit/c510/handouts10/1025-item1.LesliePettijohn.ppt.pdf.

113. NELSON & WHITMAN, *supra* note 56, § 11.3 (describing the federally-created secondary market agencies and private mortgage securitization).

mortgage lenders. The risk of loss from nonpayment falls on the lender whether the default occurs on the homeowner's taxes or on the homeowner's mortgage loan. If the PACE homeowner defaults on her taxes, the lender will be responsible for the taxes either by paying the amount of the tax deficit or purchasing the property at a tax lien foreclosure sale to protect its security interest.[114] If the PACE homeowner defaults on the mortgage, the lender will be forced to bear the full amount of the PACE obligation in foreclosure because the buyer of the property following foreclosure will pay less for the home due to future tax obligations for the reasons discussed above.[115] It may be that public policy should favor this shift of costs to homeowners in order to finance energy improvements, but this is a public policy trade-off that should be acknowledged and considered as a consequence of the PACE lien priority.[116]

B. Priority of Tax Liens as a Basis for Broader Loan Availability

The other purported advantage of PACE is the possibility of offering energy improvement loans to homeowners who cannot obtain financing in the private market.[117] This claim, while likely true, comes at the cost of deteriorated credit quality for private mortgage financing, and thus reduced lending or higher financing costs in that market. Subsection 1 explains the trade-off between broader financing availability under PACE and lending risk; Subsection 2 rebuts the

114. *See* Grant S. Nelson, *The Foreclosure Purchase by the Equity of Redemption Holder or Other Junior Interests: When Should Principles of Fairness and Morality Trump Normal Priority Rules?,* 72 MO. L. REV. 1259, 1279–82 (2010). The lender also will bear the burden of PACE obligations due in the future because the home will be resold subject to that obligation and thus buyers will discount the price of the home accordingly. *See supra* notes 109–10 and accompanying text.

115. *See supra* notes 82–86 and accompanying text.

116. Program administration is both a cost advantage and disadvantage with PACE. On the one hand, the use of an existing billing mechanism is a cost advantage. *See Efficiency Maine: Maine PACE Frequently Asked Questions*, http://www.efficiencymaine.com/pace/faqs (last visited July 21, 2011) ("For many municipalities in Maine, having [a] centralized [loan] service[r] available will be the most affordable and efficient way to administer the program."). On the other hand, promoting the PACE program and establishing separate application evaluation and billing systems in each locality is costly. *See* BRAAKSMA ET AL., *supra* note 9, at 31–33 (discussing the administrative costs associated with the Berkeley and Boulder PACE programs).

117. *See supra* Part I.B.2.b.

argument that energy savings from PACE-financed improvements resolve concerns regarding increased borrowing risk.

1. PACE Financing Offers a Tradeoff Between Loan Availability and Borrower Risk

Because PACE relies on the priority status of the tax lien, an investor needs far less security regarding the repayment capacity of the borrower than would a typical mortgage lender. A home worth $200,000 encumbered only by a mortgage of $160,000 has $40,000 in equity. A $25,000 second lien loan on this property could be a risky investment because the cost of default and foreclosure could exceed the $15,000 difference between the amount of the second lien loan and the amount of equity in the home, or property values could decline. But a $25,000 tax assessment takes priority over the first lien mortgage and thus is almost guaranteed to be recouped by the investor. In short, the investor in a PACE bond can be reasonably certain of repayment as long as there is enough value in the house in a tax forfeiture proceeding to cover the amount of PACE financing. Therefore, it is not necessary for a PACE program to have substantial underwriting of risk as would necessarily occur with a mortgage lender. A contractor working with a PACE program made this claim: "It requires $0 down and is not based on the owner's annual income or credit."[118]

Making credit available to borrowers without regard to their ability to repay raises obvious concerns. Lending without underwriting essentially allows for non-prime and equity-based lending,[119] which is highly disfavored after the recent mortgage crisis. Recognizing the problems inherent in real estate lending absent underwriting, many PACE programs and PACE-enabling laws address these concerns by including underwriting criteria to ensure that the homeowner has the

118. *SolarCraft Helps Sonoma County Go Green*, RENEWABLE ENERGY WORLD (Jan. 21, 2010), http://www.renewableenergyworld.com/rea/partner/solarcraft-3088/news/article/2010/01/solarcraft-helps-sonoma-county-go-green.

119. *FHFA Statement*, *supra* note 80, at 1 (summarizing FHFA's concern about PACE: "While the first lien position offered in most PACE programs minimizes credit risk for investors funding the programs, it alters traditional lending priorities. Underwriting for PACE programs results in collateral-based lending rather than lending based upon ability-to-pay.").

ability to repay the PACE financing.[120] The DOE guidelines suggest that PACE programs at least require that the property owner is current on taxes, has not had a recent bankruptcy, and has some equity in the property based on tax assessed value.[121] Other PACE programs or PACE-enabling legislation have included more stringent loan underwriting, such as the requirement of a certain amount of monthly income in excess of monthly debt obligations or an evaluation of the homeowner's credit rating.[122]

More underwriting of risk by PACE programs means fewer people qualify for that financing, reducing any advantage of broader loan availability. There is a direct trade-off between the claimed advantage of broadening loan availability and the stringency of PACE underwriting criteria.[123] To the extent that PACE programs offer loans that private lenders would not, this type of lending particularly exacerbates tensions with mortgage lenders. By making, in essence, a non-prime quality loan, PACE programs shift the burden of loan default to mortgage lenders with prior liens on properties that are more likely to default. This cost does not simply disappear from the real estate finance system.

If new legislation mandates that PACE financing continue without underwriting restrictions, mortgage lenders may still respond to this shifting of costs by further tightening underwriting criteria or raising the price of credit. Because borrowers with weak credit profiles pose the most risk of default, it would be logical to expect that borrowers who are at

120. *Cf.* ME. REV. STAT. ANN. Tit. 35-a, § 10155 (2010) (limiting the amount of a "PACE mortgage" to $15,000 and requiring "debt-to-income ratios of not more than 50%"); MINN. STAT. § 216C.436 (2)(7) (2010) (requiring that borrowers "demonstrate an ability to repay"); *see also* U.S. DEP'T OF ENERGY, *supra* note 101, at 5–7 (giving guidance on PACE assessment underwriting best practices).

121. U. S. DEP'T OF ENERGY, *supra* note 101, at 5–7. The DOE guidelines also include the rule that the savings from the energy investment exceed the cost of the investment as a primary indicator of the homeowner's ability to pay. *Id. at* 6. Savings from the energy may be helpful for the homeowner's finances, assuming that the homeowner does not use the cost savings to consume more energy, which is a well-recognized behavior known as a rebound effect. Horace Herring, *Energy Efficiency—A Critical View*, 31 ENERGY §2.1 (2006). But it does not add much to the ability-to-pay calculus because there is no way to tie the savings from the reduced energy cost to the repayment of the PACE obligation, especially as PACE financing can extend up to twenty years.

122. *See, e.g.*, ME. REV. STAT. ANN. Tit. 35-A, § 10155(1)(B) (2010) ("[The borrower must have a] debt-to-income ratio of not more than 50% for qualifying property that is residential property.").

123. BRAAKSMA ET AL., *supra* note 9, at 33–35 (discussing the inverse relationship between underwriting standards and financing availability).

the edge of current qualifications for mortgage loans in terms of credit score, amount of home equity, and other important loan quality indicators would be most affected by these restrictions. Although it is possible that PACE may be effective as a non-prime financing tool that increases accessibility for residential energy improvement loans, the price of this expanded lending likely would be some restriction on the availability of, or increase the price of, private mortgage financing.

2. Homeowner Savings Do Not Resolve Loan Quality Concerns

PACE advocates often respond to these concerns by stating that PACE financing provides a benefit to homeowners through energy savings that exceed the monthly cost of the loan, and thus homeowners are in a better position to make loan repayments. A "savings to investment ratio . . . greater than one" was listed as the first principle of homeowner protection in the White House Report on PACE.[124] PACE advocates argue that these savings, when combined with some evaluation of home value and secured debt to ensure that the homeowner has equity and that the investment is properly installed, are enough to rectify any problems related to making non-prime loans.[125] Even if these principles are carefully followed in each PACE financing, they do not remove the impact of non-prime PACE lending on the cost or availability of mortgage financing.

The fact that homeowners save money does not mean that they will not default on their PACE assessments or mortgage loans. Homeowners could use that money for a variety of purposes, especially when confronted with job loss or other substantial financial setbacks. Recent evidence suggests that homeowners no longer consistently favor mortgage payments when faced with choices among various debts.[126]

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124. WHITE HOUSE FRAMEWORK, *supra* note 6, at 4.

125. *See* Pete Atkin & Corey Glick, *How PACE Affects the Future Financing of Energy-Saving Projects*, GREENER BUILDINGS BLOG, at 2–3 (Oct. 14, 2010) [hereinafter Atkin & Glick], http://www.greenbiz.com/blog/2010/10/14/how-pace-affects-future-financing-energy-saving-projects?page=0%2C2.

126. *See TransUnion Study Finds More Consumers Making Payments on Their Credit Cards Before Their Mortgages*, TRANSUNION (Feb. 3, 2010), http://newsroom.transunion.com/easyir/customrel.do?easyirid=DC2167C025A9EA04&version=live&prid=583276&releasejsp=custom_144.

Furthermore, PACE financing is long-term, often extending for fifteen to twenty years.[127] The value of the investment in increasing borrower disposable income through monthly savings from energy improvements has to be measured accordingly. Alternative energy investments, in particular, occur in an environment of rapid technological change that means costs of a solar PV system may be in long-term decline.[128] A solar PV system that costs $12,000 today may, in ten years or less, cost $3,000, be a quarter of the size, and produce three times the electricity. Today's economically beneficial investment may look like a MS-DOS computer on the roof in 2019.

V. GOVERNMENT ORGANIZATION OF THE MARKET AS AN IMPORTANT LESSON

After careful analysis, the case for the promoted advantages of PACE programs is not compelling. Yet there is evidence that the pilot PACE programs resulted in homeowner investment in alternative energy systems.[129] Information from the Berkeley PACE program suggests that the program was responsible for this increased investment in solar energy.[130] This Part argues that PACE may have increased investment in alternative energy for reasons unrelated to the financing aspect of the PACE model.

One of the most striking findings of the initial report on the Berkeley project was the large number of homeowners who registered with the program but then dropped out to pursue their energy improvement investments with private financing, presumably because it was less expensive. Of forty homeowners who signed up in a first-come, first-served application process, twenty-seven homeowners withdrew from the program.[131] The high interest rate was the primary reason for homeowner withdrawals.[132] However, 85% of homeowners that withdrew from the PACE program, and some on the

127. *See* BRAAKSMA ET AL., *supra* note 9, at 10.

128. *See generally* Joel B. Eisen, *China's Renewable Energy Law: A Platform for Green Leadership*, 35 WM. & MARY ENVTL. L. & POL'Y REV. 1, 15–16 (Fall 2010) (discussing China's massive investment in solar energy and falling solar costs).

129. BERKELEY FIRST INITIAL EVALUATION, *supra* note 54, at 2.

130. *Id.*

131. *Id.* at 7.

132. *Id.* at 2.

waiting list, still installed solar PV or planned to do so.[133] The homeowners surveyed credited PACE with their decision to invest in solar power, although they ultimately sought financing elsewhere.[134]

This finding points to the critical function served by PACE in organizing the market for energy improvement investments. Homeowners showed an increased willingness to make energy improvements when the local government solicited them to participate in an arranged and publicly sanctioned program.[135] This market organization benefit may exist independent of the PACE financing model. Local governments may be able to achieve similar results by offering packages of terms and prices for private financing, contractor services, and the like.[136] It is worth exploring whether the benefit that PACE offered was from financing rather than the assurance or encouragement that came with a government-sanctioned offer for energy investments.

Even if government encouragement of energy investments is more important than making financing available, an advantage of PACE from the perspective of local governments is that the costs of organizing a PACE program can be recouped by increasing the rate homeowners pay for financing or adding fees in the financing process.[137] It takes funding to run such a program, especially one that actually offers homeowners a package of services. The cost of these charges can be significant and were an important reason the cost of PACE financing was not competitive with private financing.[138] A non-PACE alternative energy program may have fewer ongoing expenses because the local government would not need to be involved in, or pay a third party for, the costs of loan processing, evaluation, and funding.

Nonetheless, such programs would cost money. The same PACE financing premium could be gained through a direct fee

133. *Id.*

134. *Id.* ("Over 50% of the participants would have not installed solar without B1 financing, and none of the applicants would have installed solar without prior exposure to the B1 program.").

135. *Id.* at 1–2.

136. *See, e.g.*, GREEN INSTITUTE, SOLAR PIONEERS: A CASE STUDY OF THE SOUTHEAST COMO NEIGHBORHOOD SOLAR THERMAL PROJECT, 4, 15 (Dec. 2007), http://www.state.mn.us/mn/externalDocs/Commerce/Solar_Pioneers_Case_Study_032509032259_SolarPioneers.pdf.

137. BRAAKSMA ET AL., *supra* note 9, at 11–12.

138. *Id.* at 31–33.

imposed by local governments to participate in the program. Alternatively, the fee could be imposed through an additional charge paid with each private financing or with each installation through a contractor. PACE did not solve the funding problem for local government; it just shifted the cost to the financing.[139] Local governments have the potential to recoup such costs through other means.

One could argue that including the charges in PACE financing essentially hid these charges from homeowners more effectively than a direct fee. Transparency in costs and funding, along with accurate disclosure and promotion of the consequences of a PACE lien, should be a principle for developing sustainable residential energy investment programs.

VI. SMALL LOAN PROPERTY TAX ASSESSED FINANCING PROGRAM

In addition to filing lawsuits and seeking federal legislation to preserve PACE programs, governments and advocates have sought to adapt the PACE concept to meet the constraints imposed by federal regulators. A possibility for reviving a residential PACE program is to simply accede to lender demands on the lien priority and structure a PACE program in which PACE financing obligations are subordinated to prior liens.[140] Numerous governments have turned their attention away from residential energy improvements and launched PACE programs that finance energy investments by commercial entities.[141]

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139. *Id.*

140. Because the transferability of the property tax obligation is not much of a real advantage given negotiations with real estate purchases, this would limit the benefit of PACE as a financing program to the operating efficiency gained from using an existing billing mechanism—a real but very modest advantage when compared to the second lien private mortgage lending market. Lien priority creates the advantage for investors, so this type of PACE program probably would not work with bond-financing. *See* Boyack *supra* note 110. This option might have an appeal for a local government looking to invest reserve funds in an energy improvement loan program and needing a repayment mechanism. It is not different than simply using the local government's refuse bill or the like for repayment collection.

141. CLINTON CLIMATE INITIATIVE ET AL., POLICY BRIEF: PROPERTY ASSESSED CLEAN ENERGY (PACE) FINANCING: UPDATE ON COMMERCIAL PROGRAMS 2 (2011), http://pacenow.org/blog/wp-content/uploads/Commercial_PACE_Policy_Brief-032311.pdf (stating that commercial PACE programs are in operation in four communities, in the design phase in nine communities, and in the preliminary

This Part suggests another alternative—a small loan PACE program. A small loan program might end the costly and probably futile dispute with federal housing regulators. The reason to consider such a PACE program is that it maximizes operating efficiency from "on bill financing"[142] and efficient default enforcement with tax liens, which are two PACE advantages often ignored by PACE advocates.

PACE programs could establish a low limit on the amount of loans, perhaps $4,000 or less, in exchange for acceptance of the traditional property tax lien priority by the federal housing regulators. The federal housing agencies expressed concern about the size of PACE financing obligations, which often exceeds the value of the typical property tax special assessment.[143] The mortgage lending industry could effectively price the consequence from such priority lien financing and might be willing to accept the limited impact on loan risk because of the low dollar amount. Alternatively, federal legislators might be more willing to mandate a modest, and thus less risky, program.

A PACE program with loan terms of ten years or less also might be more acceptable to the lending industry or legislators and would be possible with small loans. Federal housing regulators have noted the "duration" of PACE financing as a concern.[144] The longer loan terms offered by PACE programs helped to finance large investments, like solar PV or geothermal systems, by lowering monthly payments to a level that would be offset by expected monthly benefits from the energy saved or produced. A small loan program investing in efficiency upgrades that are less costly and with more payback would not need to have extended loan terms to achieve a positive cash flow.

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planning phase in four communities); *see also* Mich. Comp. Laws Ann. § 460.933 (2010) (limiting PACE program to commercial property); World Business Council for Sustainable Development, US BCSD Explores Options for PACE Funding (Jan. 12, 2011), http://www.wbcsd.org/plugins/DocSearch/details.asp?DocTypeId=-1&ObjectId=MzkyMzc&URLBack=result.asp%3FDocTypeId%3D-1%26SortOrder%3D%26CurPage%3D1.

142. *See infra* note 146–48 and accompanying text.

143. *FHFA Statement*, *supra* note 80, at 1 ("First liens established by PACE loans are unlike routine tax assessments and pose unusual and difficult risk management challenges for lenders, servicers and mortgage securities investors. The size and duration of PACE loans exceed typical local tax programs and do not have the traditional community benefits associated with taxing initiatives.").

144. *Id.*

So why bother resurrecting PACE if it cannot deliver the promoted advantages? PACE programs sought to exploit two types of advantages from property tax assessment: the transferability of the obligation and lien priority.[145] PACE programs, however, also offer administrative benefits. An advantage of using property tax assessment not usually discussed by PACE advocates is the efficiency for program administration that results from using an existing mechanism for financing repayment. This practice is sometimes referred to as on bill financing.[146] Property tax bills are issued periodically and payments are collected periodically whether or not the local government assesses a charge for PACE.[147] A related advantage is that property tax assessments provide an established mechanism for default enforcement.[148] Similarly, the administrative apparatus to enforce property tax payments already exists, whether or not the local government assesses energy loan charges as part of the tax.

A small loan program is well positioned to take maximum advantage of these efficiencies. While saving on billing or lien enforcement costs is relatively less important when the average loan size is $25,000,[149] having efficient mechanisms for these

145. *See supra* Parts I.B.2.b, II.B.3.

146. Leanne Tobias, *Practicing Law Institute, Financing Innovations Supporting Green Building Retrofits: ESCOs, Chauffage, MESA and "On Bill" Financing*, *in* REAL ESTATE LAW AND PRACTICE COURSE HANDBOOK SERIES, 423, 428–29 (2010); *see also* Atkin & Glick, *supra* note 125, at 1 ("Municipal and City governments are where the rubber meets the road with regard to PACE as the mechanism at the heart of the financing scheme is a special assessment tax linked to the property tax system–a local government jurisdiction."); *Q & A from the November 18th PACE Financing Webinar*, U.S. DEP'T OF ENERGY, 4 (last visited July 21, 2010),http://www1.eere.energy.gov/wip/solutioncenter/pdfs/PACE_ webinar_QA_111809.pdf ("If the work is done through an 'improvement district' such as waste collection and there is an existing billing system, the charge can be levied on a monthly basis as a 'benefit assessment.' However, most programs thus far bill on the annual and bi-annual property tax bill.").

147. *See supra* Part II.B.2.

148. In addition to operating efficiency, it is conceivable that on billing financing offers the advantage to homeowners of salience in presenting the energy improvements. A homeowner may be better able to highlight the improvement to the home from the investment in alternative energy production or energy efficiency if she has a debt obligation tied directly to the energy investment.

149. For the entirely solar PV Berkeley PACE program, the average loan size was about $25,888. BERKELEY FIRST INITIAL EVALUATION, *supra* note 54, at 5–6; *see also* Jeffrey Tomich, *PACE Energy-Efficiency Loan Program Stirs Concerns*, STLTODAY.COM (July 18, 2010), http://www.stltoday.com/business/article_a36de206-7269-5a0b-b28c-ab690bd6e0bc.html ("80% of PACE loans in Missouri will be used to finance energy efficiency projects averaging about $5,000. The rest will also incorporate renewable energy systems such as solar panels with those

tasks is important with a small loan amount. Fixed administrative costs consume a higher percentage of the loan repayment amount with a very small loan and thus are relatively more important. A small loan program would be impractical with private second lien financing because the relative costs of servicing the loan probably would make it too costly.

The value of the lien priority in permitting broader loan availability through reduced underwriting might also make more sense in the context of small loans. Smaller loans reduce the repayment burden on the homeowner and thus may be less likely to trigger tax forfeiture. Smaller risk assumption by mortgage lenders with reduced sized PACE financing would limit the impact on overall mortgage lending criteria or costs charged to borrowers. Conversely, eliminating the need to extensively underwrite the loan would be consistent with reducing the fixed costs of the loan, which include the costs of reviewing underwriting data in the loan origination process. As with saving on the fixed cost of billing the loan, reducing fixed loan origination costs is much more important when the loan amount is small and costs can quickly exceed a reasonable percentage of the loan.[150]

A small loan PACE program might be especially effective if it could be quickly broadened to reach more people by combining it with a series of other highly targeted government mandates and services. A government unit, whether state or local, could identify a single improvement or a narrow list of less expensive but high-impact energy improvements that all homeowners would be expected to undertake. Homeowners needing financing for this single improvement could utilize the small loan PACE program. If further combined with a renewable energy credit or subsidy from a utility, government incentives, or a publicly organized purchase of contractor services, the result could be a program that is cost-effective at promoting investment in the selected energy improvement.

For example, perhaps a PACE program could focus solely on replacing low-efficiency home heating and cooling equipment with energy-saving equipment. The local government could offer the maximum PACE small loan financing, such as the proposed $4,000 limit. Many

projects averaging about $25,000. Statewide, the average PACE loan would be about $9,000.").

150. *See* BRAAKSMA ET AL., *supra* note 9, at 32–33.

homeowners could replace a single heating system if this financing were available.[151] The PACE program could be combined with a system charge to all utility customers to generate money for a partial rebate of the cost.[152] The local government could arrange purchases of the equipment at a discount based on the volume generated by the program.[153]

This type of PACE program might not have the transformative power originally envisioned for the program, but it could serve as a base to collect data and further evaluate the PACE model in practice. In any case, small steps may be all that is possible in the current environment.

CONCLUSION

PACE burst onto the scene in 2008 as a solution to fundamental problems in financing residential alternative energy investments, and it rapidly gathered momentum throughout the United States. It promised cost-free transfer of loan obligations, increased access to financing, and lowered costs. The objective of PACE programs to contribute to the transition to a clean energy economy is more than laudable; it is essential to our survival as a civilized society. The United States, as the world's largest per capita energy consumer,[154] bears special responsibility to commit to the transition to a

151. Energy Info. Admin., *Reducing Home Heating and Fueling Costs*, U.S. DEP'T OF ENERGY, at 13–14 (July 1994), ftp://ftp.eia.doe.gov/service/emeu9401.pdf (estimating average heating system cost as $2,500 for oil-burning system and $2,800 for natural gas burning system).

152. Steven Ferrey et al., *Fire and Ice: World Renewable Energy and Carbon Control Mechanisms Confront Constitutional Barriers*, 20 DUKE ENVTL. L. & POL'Y F. 125, 136 (2010) ("A system benefits charge (SBC) is a tax on utility consumption, or a surcharge mechanism, for collecting funds from electric consumers, the proceeds of which then support a range of energy activities[, including] demand-side management programs[] or renewable resources . . . from electricity consumers.").

153. If a local or state government had the popular support to enact a mandate that all homes with the least efficient heating/cooling systems replace their heating systems, a less likely proposition, the impact of PACE financing with a mandate could be especially substantial. For homeowners with larger units, combined heating and cooling systems, or other needs, the financing would have to be supplemented. This could be done by up-front payments from the homeowner, public subsidies, or even a secondary PACE loan that is subordinated to prior mortgage liens.

154. Andrea M. Guttridge, *Redefining Residential Real Estate Disclosure: Why Energy Consumption Should Be Disclosed Prior to the Sale of Residential Real Property*, 37 RUTGERS L. REC. 164, 173 (2010).

sustainable economy. Yet promising homeowners benefits that cannot be delivered will not achieve this purpose.

The suspension of PACE programs has led to litigation and proposed federal legislation to restore the PACE model. This Article argues that federal legislation mandating lender acquiescence in the current model of PACE financing is not justified. None of the advantages envisioned by PACE programs are likely to occur in the actual operation of the real estate market, or will happen only at corresponding costs to mortgage lending generally, if forced by statutory mandate.

Regardless of whether PACE advocates prevail in either litigation or in enacting legislation that would restore the growth in PACE programs, there are important lessons to be learned from this creative attempt at energy financing. A comprehensive government program to promote alternative energy systems may serve the critical function of helping to organize the market for energy investment and instill confidence in homeowners considering an investment. There also may be more targeted forms of PACE that could take advantage of the lien priority from property tax assessment without engendering the same degree of disruption in the residential mortgage finance market.

THE STORY OF *KLEPPE V. NEW MEXICO*: THE SAGEBRUSH REBELLION AS UN-COOPERATIVE FEDERALISM

ROBERT L. FISCHMAN* AND JEREMIAH I. WILLIAMSON**

The story of Kleppe v. New Mexico *dramatizes how assertion of federal power advancing national conservation objectives collided with traditional, local economic interests on public lands in the 1970s. This Article connects that history with current approaches to natural resources federalism. New Mexico challenged the Wild Free-Roaming Horses and Burros Act, which diminished both state jurisdiction and rancher influence over public rangelands. In response, the Supreme Court resoundingly approved federal authority to reprioritize uses of the public resources, including wildlife, and spurred a lasting backlash in the West. Further legislation passed in the wake of* Kleppe *transformed this unrest into a political movement, the Sagebrush Rebellion. Though* Kleppe *failed to undermine Congress's public land reform agenda, the Sagebrush Rebellion lived to fight another day. Adjudicated rights do not necessarily translate into social facts. This Article argues that a strictly legal evaluation of* Kleppe *fails to measure its true significance as a galvanizing event for opposition to public land management reform. The ill-fated litigation became a "successful failure," prompting ranchers and states to employ effective non-judicial means of shaping implementation of rangeland reform. Even as Congress invited states to influence public land management through "cooperative federalism," the* Kleppe *legacy of "un-cooperative federalism" remains a common, useful response.*

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INTRODUCTION

On March 26, 2010, the governor of Utah made national news by signing a new statute giving the state eminent domain authority over almost all federal lands in Utah.[1] At the same time, the governor signed a measure to allocate $3 million from the state's school trust fund to support litigation over the new authority,[2] which seems clearly unconstitutional under the U.S. Constitution's Property and Supremacy Clauses.[3] Some of the bill's proponents urged the state to exercise its new eminent domain power over the Grand Staircase-Escalante National Monument, which was established by President Clinton in defiance of Utah's elected representatives and is still

1. H.B. 143, 58th Leg., Gen. Sess., 2010 Utah 1258 (codified at UTAH CODE ANN. § 78B-6-503.5 (West 2010)).

2. H.B. 323, 2010 Legis. Gen. Counsel, Gen. Sess. (Utah 2010) ($1 million per year for three years), *available at* http://le.utah.gov/~2010/bills/hbillint/hb0323.pdf; Scott Streater, *Utah Eminent Domain Law More Than a 'Message Bill,'* LAND LETTER, Apr. 1, 2010, http://www.eenews.net/public/Landletter/2010/04/01/1.

3. U.S. CONST. art. IV, § 3, cl. 2; U.S. CONST. art. VI, cl. 2.

a sore point among many residents.[4] At a February 2010 hearing, a former U.S. Supreme Court law clerk and assistant U.S. attorney, Mike Lee, testified in favor of the discredited legal theory behind the bill.[5] Three months later, Lee shocked the Washington political establishment by defeating three-term incumbent Bob Bennett for the Republican nomination in Utah's Senate race.[6] Lee won the seat the following November.[7] By early 2011, six additional western state legislatures considered similar laws.[8] In March, the Montana legislature joined the "legal challenge of federal land rights" by passing an eminent domain bill authorizing the state to acquire nationally owned lands.[9]

Why would Utah throw millions of dollars down the drain of futile litigation?[10] Indeed, why even promote end-run tactics around federal authority instead of employing existing statutory avenues to influence public land management? The answer, of course, is politics. Utah is investing in fuel to stoke the fires of local frustration with federal control over public

4. *Utah Enacts States Rights Challenge to Federal Lands*, PUB. LAND NEWS, Apr. 2, 2010, at 5.

5. Phil Taylor, *U.S. Not 'Sovereign' Over Federal Lands, Utah GOP Senate Candidate Says*, LAND LETTER, July 1, 2010, http://www.eenews.net/public/Landletter/2010/07/01/1.

6. Jeff Zeleny, *Nikki Haley Is Winner in South Carolina Runoff*, N.Y. TIMES, June 23, 2010, http://www.nytimes.com/2010/06/23/us/politics/23elect.html?scp=1&sq=Nikki%20Haley%20Is%20Winner%20in%20South%20Carolina%20Runoff&st=cse.

7. *New Faces in Congress,* N.Y. TIMES, Nov. 4, 2010, at 5.

8. Kirk Johnson, *Rallying for States' Rights, G.O.P. Legislators Tell Washington to Go Away*, N.Y. TIMES, Feb. 27, 2011, http://topics.nytimes.com/top/reference/timestopics/people/j/kirk_johnson/index.html?offset=50&s=newest (follow "States' Rights a Priority for G.O.P.-Led Legislatures" hyperlink).

9. Stephen Dockery, *Montana House Backs Bill Giving Montana Authority Over Federal Land,* RAVALLI REPUBLIC, Mar. 31, 2011, http://ravallirepublic.com/news/state-and-regional/article_59555386-1da0-533e-aa56-d96dfd7217e2.html (quoting bill supporter Montana Rep. Jonathan McNiven). On April 8, 2011, the legislature transmitted the bill to the governor, who has not yet acted on the statute, but he has indicated that he would veto anti-federal bills. *Detailed Bill Information: SB 254*, MONT. LEGISLATURE, http://laws.leg.mt.gov/laws11/law0203w$.startup (find "Bill Type and Number" SB 254) (last visited Oct. 2, 2011); Johnson, *supra* note 8. ("The governor, who is from a family of ranchers, said he had just registered a cattle brand that spelled out the word 'veto.' ").

10. Utah is just now gearing up for litigation, having expended funds appropriated by the 2010 law to prepare a notice of intent to file suit. The suit claims rights-of-way in the Garfield County portion of the Grand Staircase-Escalante National Monument. E-mail from John Hurst, Senior Policy Advisor, Utah Pub. Lands Policy Coordination Office, to Jeremiah Williamson (June 9, 2011, 4:48 PM) (on file with author).

natural resources. The political movement feeding on this frustration, compounded by judicial setbacks, goes by many names today. But the original label is the "Sagebrush Rebellion."[11]

The Sagebrush Rebellion was born of similarly hopeless litigation which increased traditional commodity users' anger about their perceived loss of control over federal land management. The story of *Kleppe v. New Mexico*[12] illustrates how litigation itself, even when it yields no judicial relief, can serve as a powerful organizing tool for political movements.[13] Social science scholarship richly documents this phenomenon in the context of the civil rights and economic justice movements.[14] But it has yet to illuminate an enduring counterweight to federal control over public lands: the Sagebrush Rebellion. As with other political and social movements, the anti-federal sentiment in Utah and Montana (like New Mexico and Nevada before them) can be sustained by "successful failures."[15]

This Article aims to understand a landmark Supreme Court decision as a crucial early spark of the rebellion by exploring the case's context and political significance. Such an approach explains why a state would embark on an expensive and risky legal strategy. It also counters the conventional narrative that *Kleppe* stands for expansive federal power under the Constitution's Property Clause.[16] While that accurately characterizes the legal holding, it fails to account for the case's role in establishing a strong and ongoing movement to offset federal control over public natural resources. Even as Congress increasingly offers "cooperative federalism" for states to

11. *See generally* John D. Leshy, *Unraveling the Sagebrush Rebellion: Law, Politics and Federal Lands*, 14 U.C. DAVIS L. REV. 317 (1980).

12. 426 U.S. 529 (1976).

13. *See* MICHAEL W. MCCANN, RIGHTS AT WORK: PAY EQUITY REFORM AND THE POLITICS OF LEGAL MOBILIZATION 278–80 (1994) (discussing how movement-building outcomes can be more important than direct policy results or the creation of new rights); STUART A. SCHEINGOLD, THE POLITICS OF RIGHTS: LAWYERS, PUBLIC POLICY AND POLITICAL CHANGE 8 (Univ. of Mich. 2d ed. 2004) (1974) (same).

14. *See, e.g.*, CHARLES R. EPP, THE RIGHTS REVOLUTION: LAWYERS, ACTIVISTS, AND SUPREME COURTS IN COMPARATIVE PERSPECTIVE (1998); EVE S. WEINBAUM, TO MOVE A MOUNTAIN: FIGHTING THE GLOBAL ECONOMY IN APPALACHIA (2004). We relate this literature to the Sagebrush Rebellion. *See infra* Part IV.

15. WEINBAUM, *supra* note 14, at 267.

16. U.S. CONST. art. IV, § 3., cl. 2.

influence public land management,[17] the *Kleppe* litigation's legacy of "un-cooperative federalism" remains a common and effective response.[18]

In recent years, several popular essay collections have deepened our understanding of fields such as environmental, administrative, and constitutional law by telling the "stories" of court decisions.[19] Storytelling reveals the complex motivations and background facts of parties and disputes.[20] It counteracts the tendency of theory to gloss over particulars that reveal important aspects of legal developments.[21] There is no collection of natural resource or federal public land stories, and they are almost entirely absent from the Environmental Law Stories anthology.[22] If there were such a collection, surely

17. Cooperative federalism is an arrangement of power under which a national government induces coordination from subordinate jurisdictions. Robert L. Fischman, *Cooperative Federalism and Natural Resources Law*, 14 N.Y.U. ENVTL. L.J. 179, 200 (2005); *see also infra* notes 268–71, 318–24 and accompanying text (discussing cooperative federalism).

18. We employ the term "un-cooperative federalism" to contrast the legacy of *Kleppe* with the common statutory approaches to cooperative federalism. *See, e.g.*, Kirk Johnson, *States' Rights Is Rallying Cry for Lawmakers*, N.Y. TIMES, Mar. 16, 2010, www.nytimes.com/2010/003/17/us/17states.html (discussing the continued popularity of "un-cooperative federalism"); *see also* Jessica Bulman-Pozen & Heather Gerken, *Uncooperative Federalism,* 118 YALE L.J. 1256 (2009) (developing a framework for understanding different kinds of un-cooperative federalism); *infra* notes 322–26 and accompanying text. Along the continuum from polite conversation toward restrained disagreement, to "fighting words," our example of un-cooperative federalism is on the far end of, and possibly beyond, civil disobedience. Bulman-Pozen & Gerken, *supra*, at 1271; *see also infra* notes 324–28 and accompanying text.

19. *See generally* ADMINISTRATIVE LAW STORIES (Peter L. Strauss ed., 2006); CONSTITUTIONAL LAW STORIES (Michael C. Dorf ed., Found. Press 2009) (2004); ENVIRONMENTAL LAW STORIES (Richard J. Lazarus & Oliver A. Houck eds., 2005).

20. *See* JOHN T. NOONAN, JR., PERSONS AND MASKS OF THE LAW 1–6, 14–21 (Univ. of Cal. Press 2002) (1976) (stories unmask the participants in legal disputes and illuminate underlying humanity). *See generally* JAMES BOYD WHITE, THE LEGAL IMAGINATION (Univ. of Chi. Press 1985) (1973) (seminal work on the role of narrative in understanding the meaning of law).

21. Paul Gewirtz, *Narrative and Rhetoric in the Law, in* LAW'S STORIES: NARRATIVE AND RHETORIC IN THE LAW 2, 6 (Peter Brooks & Paul Gewirtz eds., 1996). Perhaps more relevant to the *Kleppe* story is its "healthy disruption and challenge to [legal doctrine, economic analysis, or philosophic theory]." Martha Minow, *Stories in Law, in* LAW'S STORIES: NARRATIVE AND RHETORIC IN THE LAW, *supra*, at 24, 36. *But see* JOHN COPELAND NAGLE, LAW'S ENVIRONMENT: HOW THE LAW SHAPES THE PLACES WE LIVE 251 (2010) ("[S]torytelling, like the Sun in the sky, obscures as much as it reveals.") (quoting Timothy Ferris).

22. *See generally* ENVIRONMENTAL LAW STORIES, *supra* note 19. However, Oliver Houck has told the stories of several natural resources cases, including foreign ones. *See* OLIVER A. HOUCK, TAKING BACK EDEN: EIGHT ENVIRONMENTAL CASES THAT CHANGED THE WORLD (2010); Oliver Houck, *The Water, the Trees, and the Land: Three Nearly Forgotten Cases that Changed the American*

Kleppe would warrant treatment as a critical buttress of modern natural resources law.[23] All of the major natural resources casebooks feature *Kleppe v. New Mexico* as a principal case.[24] But the story of *Kleppe* teaches more about public land lawmaking than the Court's expounding on the Constitution's Property Clause.

Kleppe dramatizes the changing relationship between livestock ranchers and the public rangelands. It describes how assertion of federal power advancing national conservation objectives collided with traditional, local economic interests on public lands. The legislation challenged in *Kleppe*—the Wild Free-Roaming Horses and Burros Act (WFRHBA)[25]—diminished the influence of states and ranchers over federal rangelands. The *Kleppe* decision resoundingly approved federal authority to reprioritize uses of the public resources, including wildlife, and spurred a lasting backlash in the western United States (the West). Further legislation passed in the wake of

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Landscape, 70 TUL. L. REV. 2279, 2291–99 (1996) (recounting the United States' land law story of *West Virginia Division of the Izzak Walton League v. Butz*, 522 F.2d 945 (4th Cir. 1975)); *id.* at 2300–08 (recounting the story of *Natural Resources Defense Council v. Morton*, 388 F. Supp. 829 (D.D.C. 1974), *aff'd*, 527 F.2d 1386 (D.C. Cir. 1976)); Oliver Houck, *Unfinished Stories*, 73 U. COLO. L. REV. 867, 909–21 (2002) (recounting the United States' land law story of *Sierra Club v. Morton*, 405 U.S. 727 (1972)).

23. The *Kleppe* decision immediately attracted scholarship in law journals and continues to be a foundational reference point for articles and student notes on natural resources and public land law. *See, e.g.*, Peter A. Appel, *The Power of Congress "Without Limitation": The Property Clause and Federal Regulation of Private Property*, 86 MINN. L. REV. 1 (2001); Eugene R. Gaetke, *Refuting the "Classic" Property Clause Theory*, 63 N.C. L. REV. 617, 617–20 (1985); Dale D. Goble, *The Myth of the Classic Property Clause Doctrine*, 63 DENV. U. L. REV. 495 (1986) (arguing against those who adhere to Property Clause theories inconsistent with the holding of *Kleppe*); Blake Shepard, *The Scope of Congress' Constitutional Power Under the Property Clause: Regulating Non-Federal Property to Further the Purposes of National Parks and Wilderness Areas*, 11 B.C. ENVTL. AFF. L. REV. 479, 489–90, 498–514 (1984); Margaret Elizabeth Plumb, Note, *Expansion of National Power Under the Property Clause: Federal Regulation of Wildlife*, 12 LAND & WATER L. REV. 181 (1977); Louis Touton, Note, *The Property Power, Federalism, and the Equal Footing Doctrine*, 80 COLUM. L. REV. 817, 823–25, 834–39 (1980); Linda Williams, Note, *Constitutionality of the Free Roaming Wild Horses and Burros Act: The Ecosystem and the Property Clause in* Kleppe v. New Mexico, 7 ENVTL. L. 137 (1976).

24. *See* GEORGE C. COGGINS ET AL., FEDERAL PUBLIC LAND AND RESOURCES LAW 163 (6th ed. 2007); CHRISTINE A. KLEIN ET AL., NATURAL RESOURCES LAW: A PLACE-BASED BOOK OF PROBLEMS AND CASES 90 (2d ed. 2009); JAN G. LAITOS ET AL., NATURAL RESOURCES LAW 1202 (2006); JAMES RASBAND ET AL., NATURAL RESOURCES LAW AND POLICY 148 (2d ed. 2009).

25. Wild Free-Roaming Horses and Burros Act, Pub. L. No. 92-195, 85 Stat. 649 (1971) (codified as amended at 16 U.S.C. §§ 1331–40 (2006)).

Kleppe intensified this political unrest into the full-blown Sagebrush Rebellion. Though the *Kleppe* litigation failed to undermine Congress's public land reform agenda, the Sagebrush Rebellion lived to fight another day.

In 1970, the Public Land Law Review Commission outlined a reform agenda for Congress.[26] The 1971 Wild Free-Roaming Horses and Burros Act[27] was not a part of that agenda, but it turned out to be the opening salvo in a decade-long battle over public land lawmaking. The 1971 law signaled the diminution of ranchers' power over public rangelands in the legislative realm, and the litigation that followed further threatened the influence of the graziers. However, adjudicated rights do not necessarily translate into social facts.[28] This Article argues that a strictly legal evaluation of the *Kleppe* litigation fails to measure its true significance as a galvanizing event for the Sagebrush Rebellion of the 1970s and the subsequent "wise use" wars over public lands.[29] The Article proceeds in four parts.

Part I of this Article sets the stage for the story of *Kleppe* by reviewing the history of ranching conflict on public lands, and the legislation addressing allocation of scarce rangeland resources. While rangeland reform of the 1930s aimed at soil conservation imposed new regulations on public land graziers, that purpose served the long-term interest of ranchers. In contrast, the 1971 Wild Free-Roaming Horses and Burros Act displaced ranching as the de facto priority use of public rangelands and helped trigger the Sagebrush Rebellion.

Part II focuses on the lawsuit challenging the 1971 statute and describes the stakeholders, arguments, and ultimate resolution by the U.S. Supreme Court. Delivered by a unanimous Court, *Kleppe v. New Mexico* now stands as the leading case interpreting the Constitution's Property Clause as

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26. PUB. LAND LAW REVIEW COMM'N, ONE THIRD OF THE NATION'S LAND (1970).

27. Pub. L. No. 92-195, 85 Stat. 649.

28. SCHEINGOLD, *supra* note 13, at 3–9.

29. *See* ROBERT B. KEITER, KEEPING FAITH WITH NATURE: ECOSYSTEMS, DEMOCRACY, AND AMERICA'S PUBLIC LANDS (2003) (discussing "wise use" wars that succeeded the Sagebrush Rebellion); WESTERN PUBLIC LANDS AND ENVIRONMENTAL POLITICS (Charles Davis ed., 2d ed. 2001); Florance Williams, *Sagebrush Rebellion II,* HIGH COUNTRY NEWS, Feb. 24, 1992, at 1. Even today, a Utah group opposing federal management of roads on public lands calls itself the Sagebrush Coalition. Jen Jackson, *The Revolution Will Be Motorized*, HIGH COUNTRY NEWS, June 14, 2011, http://www.hcn.org/hcn/wotr/the-revolution-will-be-motorized.

a very broad grant of power to Congress. Though New Mexico failed to persuade even a single Justice, its litigation promoted greater political momentum in the West to resist public natural resources law reform.

Part III shows how that resistance shaped the Sagebrush Rebellion. Shortly after the *Kleppe* decision, Congress enacted a comprehensive charter for rangeland management that further inflamed ranchers. They sought to undermine the new statute and other legislation reforming public land administration. While states participated in the cooperative federalism procedures provided by the legislation, they also engaged in "un-cooperative federalism" through a series of direct challenges to national resource management authority. Part III also examines the federal legislation and an ill-fated attempt by Nevada to control public rangelands.

Part IV explores the ways in which social science scholarship helps explain how New Mexico, and subsequently other western states, made lemonade out of courthouse losses. The political consequences of the "un-cooperative" challenges to federal power mostly aided ranchers and other interest groups associated with western state governments. Their embattled solidarity helped elect sympathetic officials (such as Senator Mike Lee) and profoundly influenced implementation of the public land statutes.

I. PUBLIC RANGELAND LAW

The federal government today manages nearly 330 million acres of public rangelands mostly scattered across sixteen western states.[30] The Bureau of Land Management (BLM) oversees roughly 160 million acres of these lands, divided into more than 21,000 allotments authorized for grazing under nearly 18,000 permits.[31] The Forest Service manages grazing on an additional ninety-six million acres of public land.[32] The size of this part of the public estate has changed little since the 1930s. Before then, disposal dominated federal public land

30. *About Rangelands*, U. S. FOREST SERVICE, http://www.fs.fed.us/rangelands/whoweare/index.shtml (last visited May 4, 2011).

31. *Fact Sheet on the BLM's Management of Livestock Grazing*, BUREAU OF LAND MGMT., http://www.blm.gov/wo/st/en/prog/grazing.html (last updated Sept. 27, 2011).

32. *About Rangelands*, *supra* note 30.

policy.[33] The United States divested itself of considerable acreage through statehood and homestead acts, railroad grants, and other devices.[34] Disposal flowed from the premise that "the public domain ought to be thrown open to private development, free of charge and unfettered by government regulation."[35] However, the federal government retained a substantial amount of dry, rocky land that was not suitable for agriculture and valuable only as pasturage.[36] These relatively infertile western lands constitute the majority of the public rangelands.[37]

A. Rangeland Conflict and the Taylor Grazing Act

Competition for scarce resources—forage and water—prompted disputes on the public rangelands.[38] In the early years of grazing on public rangelands, beginning in the 1880s, "adjudication of range rights . . . was mostly by sword and pistol."[39] Among the conflicts later known as the "range wars" were the Johnson County and Upper Green River wars in Wyoming, the Tonto Basin War in Arizona, and a number of other conflicts in places like the Blue Mountains of Oregon.[40] These fights over resources often pitted graziers against each other (large versus small operations, or cattle versus sheep ranchers) or against homesteaders.[41] In 1885, Congress reacted to the conflicts by passing the Unlawful Enclosures Act,[42] which limited one tool that ranchers had used to exclude others: fences. This was but the first of many federal restrictions to come.

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33. Disposal involves the transfer of property out of federal ownership. MARION CLAWSON & BURNELL HELD, THE FEDERAL LANDS: THEIR USE AND MANAGEMENT 5–7, 17, 22–27 (1957).

34. COGGINS ET AL., *supra* note 24, at 89–117.

35. Charles F. Wilkinson, *The Law of the American West: A Critical Bibliography of the Nonlegal Sources*, 85 MICH. L. REV. 955, 1003 (1987).

36. Phillip O. Foss, *The Determination of Grazing Fees on Federally-Owned Range Lands*, 41 J. FARM ECON. 535, 535 (1959).

37. DEBRA L. DONAHUE, THE WESTERN RANGE REVISITED 13 (1999).

38. *See generally* Foss, *supra* note 36.

39. M.W. Talbot & F.P. Cronemiller, *Some of the Beginnings of Range Management*, 14 J. RANGE MGMT. 95, 95–96 (1961).

40. *Id.*

41. DONAHUE, *supra* note 37, at 20–21.

42. 43 U.S.C. § 1061 (2006); *see also* Leo Sheep Co. v. United States, 440 U.S. 668, 684 (1979).

Once the range wars quieted, Congress mostly ignored the rangelands for the next fifty years. Founding Forest Service Chief, Gifford Pinchot, exercised his broad (but vague) legislative authority to impose permit requirements on graziers using national forest rangelands.[43] The backlash from ranchers was fierce.[44] But passive neglect characterized federal management over most public rangelands, especially outside of the national forests. Thus, the classic "tragedy of the commons" unfolded, resulting in overgrazing of public lands.[45]

The slow recognition of range degradation resulting from government mismanagement laid the groundwork for reform.[46] By the early 1900s, overgrazing already had noticeably reduced the capacity of the public range to support livestock.[47] Still, it took the great dust storms of the mid-1930s to prompt congressional enactment of the Taylor Grazing Act of 1934 and its 1936 amendments.[48] The Act guided management of federally owned rangelands, focusing primarily on preventing degradation and thus stabilizing the livestock industry. It authorized the Secretary of the Interior to establish grazing districts and to manage them through permits.[49] The Act expressed the then-dominant view that livestock grazing was "the highest use of the public lands pending its final disposal."[50] The disposal language meant that "the federal government considered public lands as temporary holdings to be claimed, privatized, and homesteaded as the nation

43. *See* United States v. Grimaud, 220 U.S. 506 (1911) (upholding grazing permits and fees notwithstanding that there is no mention of them in the legislation authorizing national forest management).

44. Houck, *The Water, the Trees, and the Land, supra* note 22, at 2302–03.

45. Garrett Hardin, *The Tragedy of the Commons,* 162 SCI. 1243, 1244 (1968) (using overgrazing as illustration of "tragedy of the commons" where no user of common resources can exclude others).

46. Talbot & Cronemiller, *supra* note 39, at 97.

47. *Id.*

48. Taylor Grazing Act, ch. 865, 48 stat. 1269 (1934) (codified as amended at 43 U.S.C. § 315 (2006)); *see also* E. LOUISE PEFFER, THE CLOSING OF THE PUBLIC DOMAIN: DISPOSAL AND RESERVATION POLICIES 1900–50, at 214–24 (1951) (describing history of the Act).

49. *See* 43 U.S.C. § 315 (2006).

50. *Id.* Congress twice amended the Act to open up more public lands to livestock grazing. In 1936, Congress increased the acreage that could be included in grazing districts from eighty million acres to 142 million acres. Act of June 26, 1936, Pub. L. No. 827, ch. 842, 49 Stat. 1976. Eighteen years later, Congress removed the acreage limitation altogether. Act of May 28, 1954, Pub. L. No. 375, ch. 243, 68 Stat. 151.

matured."[51] Paradoxically, however, the Taylor Grazing Act, by authorizing active management of unreserved federal lands, effectively closed the window on "unrestricted entry" of the public lands.[52]

In practice, the Taylor Grazing Act operated for the benefit of ranchers.[53] The Interior Department delegated most important decisions to local grazing districts and boards. Grazing advisory boards composed exclusively of ranchers worked with "stockmen" district administrators to manage rangelands and determine proper grazing intensities.[54] "To Western stockmen, these may have been public lands, but they were *their* public lands."[55] Despite the reforms of the 1970s, which implemented environmental regulations and comprehensive federal resource planning regimes, the Taylor Grazing Act remains the basic legal framework for allocating range resources.[56]

B. The Wild Free-Roaming Horses and Burros Act

Limited water and forage for livestock, which often brought ranchers into conflict with each other, also pitted the primary users of the public range against wild burros and horses. Horses and burros compete directly with livestock for water and forage.[57] Compounding this conflict, horses and burros lack limits on population growth because they have no natural predators on the rangelands.[58] The wild horses and burros that inhabit North America are not native species, but are the descendants of strays and abandoned animals.[59] The

51. Nancie G. Marzulla, *Property Rights Movement: How It Began and Where It Is Headed*, *in* A WOLF IN THE GARDEN 39 (Philip D. Brick & R. McGreggor Cawley eds., 1996) (discussing pre-1964 Interior Department policy).

52. PUB. LAND LAW REVIEW COMM'N, *supra* note 26, at 43.

53. *See* Richard H. Braun, *Emerging Limits on Federal Land Management Discretion: Livestock, Riparian Ecosystems and Clean Water Law,* 17 ENVTL. L. 43, 52–58 (1986); George Cameron Coggins & Margaret Lindberg-Johnson, *The Law of Public Rangeland Management II: The Commons and the Taylor Act,* 13 ENVTL. L. 1, 100 (1982).

54. Houck, *The Water, the Trees, and the Land, supra* note 22, at 2303.

55. *Id.* at 2301.

56. *See infra* text accompanying notes 315–23.

57. Kenneth P. Pitt, *The Wild Free-Roaming Horses and Burros Act: A Western Melodrama*, 15 ENVTL. L. 503, 511 (1985) (noting "definite temporal and spatial overlap between wild horses and other species").

58. *Id.* at 505.

59. *Id.* at 505–06.

oldest lineage traces its roots to the Spanish conquistadors[60] but today it accounts for only a small fraction of the horses and burros inhabiting the public lands.[61] The majority of the horses in fact owe their existence to the resolute ability of animals that strayed or were abandoned, often when economic circumstances changed, to survive in a harsh land.[62]

The American market demands little horsemeat, and wild horses interfered with the more profitable use of public rangelands, namely livestock grazing. Therefore, although many ranchers tolerated wild horses for both aesthetic and commercial reasons, others viewed the horses as feral pests.[63] As a result, federal agents frequently removed wild horses and burros from the public range.[64] Federal agents, however, were not the only people taking wild burros and horses from the public lands. In fact, virtually every western state legislature provided state agencies with the authority to remove abandoned, stray, or unbranded burros and horses.[65] Such laws provided a useful tool for many ranchers who valued the presence of the horses and burros, but at the same time recognized that a lack of natural predators necessitated population culling.[66]

When the demand for pet food made horse hunting a profitable venture, the broad language of state estray laws

60. *Id.*

61. *Id.*

62. *Id.*

63. RICHARD SYMANSKI, WILD HORSES AND SACRED COWS 131 (1985). Besides horsemeat, the other major commercial use of wild horses was slaughter for the production of glue. *See, e.g.*, Hatahley v. United States, 351 U.S. 173, 176 (1956).

64. *See, e.g.*, *Hatahley*, 351 U.S at 176 (involving federal officers removing free-roaming horses pursuant to Utah's abandoned horse statute). Though some "removed" animals would be shot on site, others would be sold for horsemeat or glue feedstock. *Id.*

65. *See, e.g.*, ARIZ. REV. STAT. § 3-1336 (1952); CAL. FOOD & AGRIC. CODE § 16521 (West 1933); COLO. REV. STAT. § 35-44-101 (1969); IDAHO CODE ANN. § 25-2309 (1976); N.M. STAT. ANN. § 47-14-1 (1966); NEV. REV. STAT. § 569.120 (1961); OR. REV. STAT. § 607.007 (1971); UTAH CODE ANN. § 4-25-1 (West 1953); WYO. STAT. ANN. § 11-24-101 (1913); *see also Protection of Wild Horses on Public Lands: Hearing on H.R. 795 and H.R. 5375 Before the H. Subcomm. on Pub. Lands of the H. Comm. on Interior and Insular Affairs*, 92d Cong. 147–50 (1971) [hereinafter *House Hearing*s] (statement of Dean Prosser, President, International Livestock Brand Conference).

66. SYMANSKI, *supra* note 63, at 65; *see also* Pitt, *supra* note 57, at 517 n.75 (noting that before the Act, ranchers often managed horse populations in cooperation with horse advocacy groups).

facilitated a new business.[67] Private profiteers pursued the horses, often utilizing appalling tactics. One author summarized the process as follows:

> Low-flying airplanes drove the wild horses towards mounted cowboys who fired shotguns at the horses to make them run faster. Captured horses were tied to large truck tires to exhaust them and make them easier to handle. Exhausted, they would be packed into trucks so tight that only their weight against each other held them up. Foals, weighing less, often were abandoned to die. Seeking maximum profits, often six and a half cents a pound, the hunters seldom fed or watered the horses and many died en route to the slaughterhouse.[68]

Such atrocities gained national media attention during the 1950s, resulting in the passage of the Wild Horse Annie Act,[69] which prohibited both the poisoning of watering holes and the use of motorized vehicles to hunt horses and burros.[70]

However, the Wild Horse Annie Act failed to protect the wild horses and burros because hunters simply resorted to non-motorized means of capture.[71] Moreover, state livestock boards continued to remove animals interfering with commercial grazing.[72] In response, Congress reformed public rangelands management with the WFRHBA.[73] This Act gave sweeping protections to all unclaimed and unbranded horses and burros on public lands, prohibiting their capture, branding, harassment, and killing.[74] It "essentially reversed BLM's

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67. BUREAU OF LAND MGMT., DEP'T OF INTERIOR, OUR PUBLIC LANDS 3 (1980) [hereinafter OUR PUBLIC LANDS].

68. Pitt, *supra* note 57, at 506.

69. Pub. L. No. 86-234, 73 Stat. 470 (1959) (codified as amended at 18 U.S.C. § 47 (2006)). The Act is named after Velma B. Johnston, also known as Wild Horse Annie, who led the Wild Horse Organized Assistance and dedicated her life to protecting free-roaming horses. See Velma B. Johnston, *The Fight to Save a Memory*, 50 TEX. L. REV. 1055 (1972), for Ms. Johnston's account of her experiences with common wild-horse-gathering practices and her efforts to protect the wild horse.

70. 18 U.S.C. § 47 (2006). The Act's actual prohibition is for "pollution" of watering holes for the purpose of trapping, killing, wounding, or maiming. *Id.*

71. Pitt, *supra* note 57, at 506–07; *see also* Johnston, *supra* note 69, at 1057–59 (suggesting that the Wild Horse Annie Act was only half-heartedly enforced in the West, in part due to the influence of livestock interests).

72. SYMANSKI, *supra* note 63, at 129.

73. Wild Free-Roaming Horses and Burros Act, Pub. L. No. 92-195, 85 Stat. 649 (1971) (codified as amended at 16 U.S.C. §§ 1331–1340 (2006)).

74. *Id.*

grassland management policy,"[75] declaring wild burros and horses to be "an integral part of the natural system of the public lands."[76] However, the horses and burros do considerable damage to the rangeland ecosystems:

> By passage of [the WFRHBA] the U.S. Congress declared that it felt it had the power to override the results of 500,000 years of separate evolution of New World and Old World equid lineages, and furthermore invalidated the extinction of North American equids near the end of the Pleistocene. Congress may have given legal status to these noxious herbivores, but Congress sees the natural world through a different visual filter than serious ecologists.[77]

The WFRHBA directed the BLM to shift its attention from managing grazing for the long-term benefit of ranching to "protection of specific rangeland resources," including horses and burros.[78]

This revolution in rangeland management hurt livestock ranchers who grazed cattle and sheep on public lands. Federal protection of wild horses and burros resulted in more competition with livestock for forage and water.[79] The Act indirectly required ranchers to subsidize horse and burro access to water with extra fuel to run well pumps and repair horse and burro-caused damage, thus increasing the operating costs of an already marginally profitable industry.[80] Ranchers correctly sensed that the 1971 law signaled a loss of control over public rangelands.

Even though statutory protections for horses and burros imposed costs on ranching, the legislative history displays indifference toward these economic harms.[81] Support for the

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75. Pitt, *supra* note 57, at 515.

76. 16 U.S.C. § 1331 (2006).

77. Bruce E. Coblentz, Letter to the Editor, 13 NAT. AREAS J. 3, 3 (1993).

78. Today, the WFRHBA joins a host of other statutes that direct BLM to embrace such rangeland resources as riparian areas, threatened and endangered species, sensitive plant species, and cultural or historical objects. *Fact Sheet on the BLM's Management of Livestock Grazing*, *supra* note 31. Focusing on these objectives may impair ranching interests.

79. *See* SYMANSKI, *supra* note 63, at 137–39.

80. *Id.* at 137–38. The operator of one ranch estimated that the damage from wild horses resulted in a $50,000 per year increase in operating costs. *Id.* at 137.

81. *See* Pitt, *supra* note 57, at 513. *See generally House Hearings*, *supra* note 65; *Protection of Wild Horses and Burros on Public Lands: Hearing on S. 862, S. 1116, S. 1090, and S. 1119 Before the S. Subcomm. on Pub. Lands of the S. Comm. on Interior and Insular Affairs*, 92d Cong. 23–24 (1971) (statements of Sen.

legislation and the plight of the wild horse dominated the congressional hearings, with representatives taking considerable time to pat themselves on the back for engaging in so worthy a cause.[82] Congressman after congressman made the case against the "savage destruction"[83] of the "living symbols of the historic significance and pioneer spirit of the West,"[84] each time generating responses of congratulation and thanks from other representatives.[85] When the first witness to testify introduced a letter from a nine-year-old Michigan girl stating that "[e]very time the men come to kill the horses for pet food, I think you kill many children's hearts,"[86] committee members commended and thanked him for his efforts.[87]

When ranchers did get their chance to testify, they were on the defensive. Much time was devoted to refuting accusations that ranchers were engaging in the wholesale slaughter of horses.[88] Karl Weikel, who testified on behalf of the American National Cattlemen's Association and the American National Wool Growers Association, began by explaining that "the issue has been clouded by controversy, accusations, counteraccusations and recriminations based mostly upon misunderstanding of, and impatience with, past mistakes, abuses, misuses and poor management decisions resulting from mistaken policy and too little factual information."[89] He then expressly refuted the claim that "western livestock interests sought to extinguish wild horses and burros"[90] and went on to state a more nuanced position, with a concern for management that balanced protection for equids with the legitimate interests of ranchers. But his explanations fell flat, a fact made evident at the conclusion of Mr. Weikel's remarks when

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Church acknowledging the "many heartfelt letters the committee has received from schoolchildren throughout the Nation urging the preservation of wild horses and burros").

82. *House Hearings*, *supra* note 65, at 10–16 (statements of Reps. Johnson, Foley, Roncalio, Williams, Steiger, and Baring).

83. *Id.* at 14 (statement of Rep. Williams).

84. *Id.* at 17 (statement of Rep. Gude).

85. *See, e.g.*, *id.* at 16 (statements of Reps. Dellenback, Baring, and Williams).

86. *Id.* at 19 (statement of Gregory Gude, son of Rep. Gude); see also *id.* at 137 (testimony of Hope Ryden), for another child's letter expressing support for the plight of the wild horse.

87. *Id.* at 19–20 (statements of Reps. Steiger, Saylor, and Dellenback).

88. *See, e.g.*, *id.* at 117–18 (statement of Karl Weikel, American National Cattlemen's Association).

89. *Id.* at 117.

90. *Id.*

Representative Johnson asked whether ranching interests actually "believe in protecting the wild horse."[91]

Making matters worse, grazing interests appeared disorganized and disjointed on approaches to the proposed legislation. The Wyoming Wool Growers Association argued in support of establishing horse refuges,[92] while the National Cattlemen's Association argued adamantly against refuges.[93] The testimony of one witness, who described the viciousness of the "wild jackass," suggested that ranching interests were at a loss for dealing with the media frenzy that surrounded the push for horse protection.[94]

The public had already made up its mind, and legislators had clearly taken note. In one observer's description, the legislators saw the rancher as "a profiteer, intent on using the public domain to satisfy his own greed, secretly shooting and maiming horses, fencing horses away from water, and generally being an all around bad guy."[95] As if to marginalize rancher concerns, the House Subcommittee on Public Lands scheduled the testimony of a fourth grader to follow the joint testimony of the National Cattlemen's Association and the National Wool Growers Association.[96] Unable to find relief in the legislative process, the primary users of the public rangelands turned to other avenues which are explored in the subsequent parts of this Article.

The ranchers had few friends in Congress who were willing to stand up to the sentiment of the WFRHBA supporters. This is particularly striking given the prominent role that otherwise rancher-friendly western members of Congress played in drafting the statute. The Senate version of the WFRHBA passed without dissent on June 29, 1971.[97] A House bill with only minor differences unanimously passed on October 4, 1971.[98] Congress reconciled and enacted the law later that

91. *Id.* at 128 (question of Rep. Johnson).

92. *Id.* at 131–33 (statement of Robert P. Bledsoe, Executive Secretary, Wyoming Wool Growers Association).

93. *Id.* at 123 (testimony of Karl Weikel).

94. *Id.* at 117, 123. Mr. Weikel's objections were not limited to the vicious nature of the wild burro, as he went on to explain that "[i]t will be most difficult in the Southwest to convince some of our Indian and Spanish people that they can't turn their horses out when they want to." *Id.* at 121.

95. Pitt, *supra* note 57, at 513.

96. *House Hearings*, *supra* note 65, at 142–43.

97. 117 CONG. REC. 22,671 (1971).

98. *Id.* at 34,782.

year, and President Nixon signed the WFRHBA on December 15, 1971.[99]

The new law could not change the fact that wild horses and burros "alter the ecosystems by consuming native plants, competing with native mammals such as the Desert Bighorn Sheep, fouling springs, and contributing to erosion by wearing trails on the steep desert hillsides."[100] Nevertheless, the WFRHBA declares that wild equids are "an integral part of the natural system of the public lands."[101] The WFRHBA charges the Secretary of the Interior with protecting wild horses and burros, but at the same time commands the Secretary to manage wild equids "in a manner that is designed to achieve and maintain a *thriving natural ecological balance* on the public lands."[102] The idea that protecting an invasive species, which causes harm to delicate desert ecosystems, could be done in such a way as to obtain "thriving natural ecological balance" is absurd.[103] This general tone of protectionism, rather than balanced management,[104] likely is the reason the WFRHBA received virtually no support from environmental groups.[105]

Due in part to these flaws, the BLM has struggled to implement the Act. In 1980, BLM estimated the yearly cost to administer the Act would reach $40 million.[106] Three decades later, the annual price tag continues to rise.[107] The WFRHBA

99. Wild Free-Roaming Horses and Burros Act, Pub. L. No. 92-195, 85 Stat. 649, 651 (1971); *see also* H.R. REP. NO. 92-681 (1971) (Conf. Rep.); ENVTL. POLICY DIV., CONG. RESEARCH SERV., 74-795, REPORT ON PUBLIC LAND POLICY: ACTIVITIES IN THE 92D CONGRESS 1–2 (1972).

100. Michael L. Wolfe, *The Wild Horse and Burro Issue, 1982*, 7 ENVTL. REV. 179, 183 (1983); *see also* Richard H. Gilluly, *The Mustang Controversy*, 99 SCI. NEWS 219, 220 (1971) (noting that horses compete with mule deer for food and that restoring desert big horn sheep populations would require "drastic reductions" in horse populations).

101. 16 U.S.C. § 1331 (2006).

102. *Id.* § 1333 (emphasis added).

103. *See* Wolfe, *supra* note 100, at 186 (stating that "there is no logic in assigning the maintenance of populations of these non-native and feral animals any higher ethical or socio-political priority than that accorded to indigenous wildlife species").

104. *See* Wolfe, *supra* note 100, at 183.

105. The Sierra Club did submit one page of written testimony in support of horse protections. *House Hearings*, *supra* note 65, at 198–99. Even in light of the Act's shortcomings, environmental groups were wise not to oppose the Act in the *Kleppe* litigation because the Court's broad endorsement of Congress's Property Clause power provided a strong foundation for protecting environmental interests in federal lands.

106. *House Hearings*, *supra* note 65, at 183–84.

107. *Fact Sheet on the BLM's Management of Livestock Grazing*, *supra* note 31. The fiscal year 2010 operating appropriations for the program were $64 million,

seeks to promote adoption of excess wild horses as an alternative to slaughter. On average, about half of the WFRHBA's implementation costs arise from the adoption program, which has been such a failure that almost as many horses now dwell in BLM holding pens as live in the wild.[108] Conditions in the pens can be unhealthy for the animals, breeding disease due to overcrowding.[109] The federal government estimates that the public rangelands support over 35,000 wild horses, which is about 10,000 horses in excess of carrying capacity.[110] Even with over 30,000 animals in BLM corrals and pastures, the number of wild horses and burros on the rangeland continues to grow.[111] The result is overgrazing, soil erosion, and the destruction of mule deer, elk, and antelope habitat.[112] Amendments to the WFRHBA in 1978, part of the Public Rangelands Improvement Act,[113] were intended to rein

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and the President's fiscal year 2011 budget asks for $76 million. *BLM Looking for Wild Horse Sanctuaries*, PUB. LAND NEWS, Apr. 8, 2011, at 14.

108. U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-77, BUREAU OF LAND MANAGEMENT: EFFECTIVE LONG-TERM OPTIONS NEEDED TO MANAGE UNADOPTABLE WILD HORSES 7–8 (2008). Representantive Sam Steiger (R-AZ) predicted this consequence in 1971. Discussing the adoption program, he stated: "If we talk about gathering and selling them at auction, we are kidding ourselves because these animals normally don't make very good pets unless you want one for your mother-in-law with whom you don't have a particularly good relationship." *House Hearings*, *supra* note 65, at 22; *see also* Phil Taylor, *BLM Announces 'New Direction' for Horse and Burro Program*, LAND LETTER, June 10, 2010 [hereinafter, Taylor, *New Direction*], http://plc.cylosoftdemo.com/CMDocs/PublicLandsCouncil/WILD_HORSES_E&E.pdf (stating that around seventy percent of the annual budget for wild horses and burros is spent on animals in BLM corrals and pastures).

109. Nick Neely, *Eligible Mustangs*, HIGH COUNTRY NEWS, Apr. 12, 2010, http://www.hcn.org/issues/42.6/eligible-mustangs (describing the BLM adoption program); *see also* Phil Taylor, *BLM Facilities Reach Capacity as Herds Boom*, LAND LETTER, May 14, 2009, http://www.eenews.net/Landletter/2009/05/14/7/ [hereinafter, Taylor, *Herds Boom*] (describing animal rights activists' displeasure with many aspects of the BLM corral program).

110. *BLM looking for Wild Horse Sanctuaries*, *supra* note 107, at 14.

111. *See* Lyndsey Layton & Juliet Eilperin, *Salazar Presents Ambitious Plan to Manage Wild Horses; Preserves in Midwest and East, Sterilizations Proposed as Population Grows Beyond Control in West*, WASH. POST, Oct. 8, 2009, at A3; Taylor, *Herds Boom*, *supra* note 109; Taylor, *New Direction*, *supra* note 108 (stating that the BLM estimates that herd numbers could grow to 325,000 by year 2021 without countermeasures). The BLM, on at least one occasion, indicated the need to euthanize animals due to overpopulation and the excessive costs of holding the animals. Taylor, *Herds Boom*, *supra* note 109.

112. *See, e.g.*, Taylor, *Herds Boom*, *supra* note 109.

113. 43 U.S.C. §§ 1901–1908 (2006). In its 1978 statement of national policy, Congress reaffirmed the policy of protection, but also addressed the need to "facilitat[e] the removal and disposal of excess wild free-roaming horses and

in administrative costs and to provide more authority for the BLM to combat overpopulation, but many of the original problems remain.[114] In addition to direct costs, indirect expenses of the Act have come in the form of extensive litigation. Over forty cases challenging BLM's implementation of the Act have made it to the federal courts.[115]

II. THE LITIGATION

Kelley Stephenson was a New Mexico livestock rancher.[116] Pursuant to the Taylor Grazing Act, Stephenson held grazing rights to some 8,000 acres of public rangeland.[117] Although little information exists regarding his personal history, it is clear that, like many livestock ranchers, the public rangelands played an important role in supporting his operation. Stephenson's grazing allotment included an invaluable desert water source known as the Taylor Well.[118] In the arid western climate, wells are one of the most important assets of a livestock operation. Wells are not naturally occurring bodies of water, but rather holes dug deep into the ground, from which ground water is pumped into a large trough that often resembles a plastic children's swimming pool. Gas or diesel generators usually run the pumps, which ranchers visit and

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burros which pose a threat to themselves and their habitat and to other rangeland values." *Id.* § 1901(b)(4).

114. Recent proposals by the Obama Administration to address ongoing problems with the administration of the WFRHBA include: providing additional funding, relocating herds from the West to midwestern or eastern lands, and increasing the use of infertility drugs and promoting partnerships with private and nongovernmental entities. *See, e.g.*, Layton & Eilperin, *supra* note 111; April Reese, *Eastward Ho! BLM Proposes New Sanctuaries in More Populated States*, LAND LETTER, Oct. 15, 2009; *DoI Proposes New Preserves as Part of Wild Horse Plan*, PUB. LAND NEWS, Oct. 16, 2009, at 1; *Obama Administration Fashions Multi-Part Wild Horse Solution*, PUB. LAND NEWS, Oct. 13, 2009.

115. Kristen H. Glover, *Managing Wild Horses on Public Lands: Congressional Action and Agency Response*, 79 N.C. L. REV. 1108, 1109 (2001); *see, e.g.*, Am. Horse Prot. Ass'n v. Watt, 694 F.2d 1310 (D.C. Cir. 1982); Dahl v. Clark, 600 F. Supp. 585 (D. Nev. 1984); Animal Prot. Inst. v. Hodel, 671 F. Supp. 695 (D. Nev. 1987); *see also* Richard Symanski, *Dances with Horses: Lessons from the Environmental Fringe*, 10 CONSERVATION BIOLOGY 708, 708, 712 (1996) (describing certain aspects of one Wild Free-Roaming Horses and Burros case litigated by the Rutgers Law School Animal Rights Law Clinic as "spurious" and "perversely counterproductive").

116. Kleppe v. New Mexico, 426 U.S. 529, 533 (1976).

117. *Id.*

118. *Id.* Coincidentally, it was the Taylor Grazing Act under which Stephenson acquired his permit to use the allotment. *Id.*

refuel on a regular basis. Because of the importance of wells to a livestock operation, as well as the time and labor required to develop and maintain them, ranchers guard wells zealously.

On the first day of February 1974, Stephenson discovered several unbranded and unclaimed burros wandering on his private land and on the rangelands his cattle were authorized to graze.[119] Stephenson requested that the BLM remove the burros because they were eating the feed he put out for his livestock and harassing his animals.[120] Stephenson may also have been concerned that the burros were competing with his livestock for access to water at the Taylor Well.[121] Regardless, BLM made it clear that no removal would occur.[122] So, Stephenson turned to state law for relief. He found it in the New Mexico Estray Law, which provided the New Mexico Livestock Board with the authority to round up and auction:

> [a]ny bovine animal, horse, mule or ass, found running at large upon public or private lands, either fenced or unfenced, in the state of New Mexico, whose owner is unknown in the section where found, or which shall be fifty [50] miles or more from the limits of its usual range or pasture, or that is branded with a brand which is not on record in the office of the cattle sanitary board of New Mexico . . . .[123]

The New Mexico Livestock Board is part of the oldest law enforcement agency in the state.[124] It originally consisted of two separate agencies—the Cattle Sanitary Board, founded in 1887, and the Sheep Sanitary Board, founded in 1889.[125] The two agencies merged in 1967 to form the New Mexico Livestock Board.[126] After passage of and pursuant to the WFRHBA, the board entered into a cooperative agreement with the Secretaries of the Interior and Agriculture to implement the

119. New Mexico v. Morton, 406 F. Supp. 1237, 1237 (D.N.M. 1975).

120. *Id.* at 1238.

121. Oral Argument at 8:20, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), *available at* http://www.oyez.org/cases/1970-1979/1975/1975_74_1488 (last visited July 27, 2011). The government stated at oral argument that Stephenson learned of the burros while visiting the local BLM office, which had photos of the burros standing around the well. *Id.* at 8:00–9:08.

122. Kleppe v. New Mexico, 426 U.S. 529, 533 (1976).

123. N.M. STAT. ANN. § 47-14-1 (1966).

124. NEW MEXICO LIVESTOCK BOARD, http://www.nmlbonline.com (last visited June 25, 2011).

125. *Id.*

126. *Id.*

Act. Apparently displeased with the results, the board terminated the agreement in November 1973.[127]

On February 18, 1974, seventeen days after Stephenson's complaint to the BLM, the board rounded up and removed nineteen unbranded and unclaimed burros pursuant to the New Mexico Estray Law.[128] Each burro was seized from federal land; none was taken from private land.[129] That same day, in accordance with usual practice, the Board sold the burros at public auction.[130] After the sale, the BLM asserted jurisdiction under the WFRHBA and "demanded that the [b]oard recover the animals and return them to the public lands."[131] The fight was on.

A. New Mexico v. Morton

In response to the BLM's demand for the return of the seized burros, the State of New Mexico, the New Mexico Livestock Board and its director, as well as the purchaser of three of the auctioned burros, filed suit in the U.S. District Court in Albuquerque.[132] The plaintiffs sought injunctive and declaratory relief from the BLM's demands, arguing that the WFRHBA went beyond Congress's constitutional authority.[133]

Representing the plaintiffs was George J. Hopkins, who had represented New Mexico with some success just seventeen days earlier in another case against the federal government.[134] However, that appears to have been his only prior appearance in a federal court. He was an associate in one of New Mexico's most prominent and largest law firms: Modrall, Sperling, Roehl, Harris & Sisk.[135] Dick Modrall, one of the firm's

127. *See Kleppe*, 426 U.S. at 532–33.
128. *Id.* at 533–34.
129. *Id.*
130. *Id.* at 534.
131. *Id.*
132. New Mexico v. Morton, 406 F. Supp. 1237 (D.N.M. 1975).
133. *Id.* at 1237–38.
134. New Mexico *ex rel.* Norvell v. Callaway, 389 F. Supp. 821 (D.N.M. 1975) (granting only part of the United States' desired motions to dismiss and for summary judgment). The case challenged refusal of the commanding general of White Sands Missile Range to allow state agents to enter the range to search for a hidden treasure that "long-lasting legend" said was located somewhere on a mountain within the Range. *Id.* at 822. As legend had it, the treasure consisted of "gold bars, jewels, and valuable artifacts." *Id.*
135. III MARTINDALE HUBBELL LAW DIRECTORY 2748B (1975). Modrall, Sperling, Roehl, Harris & Sisk was the second largest firm in Albuquerque, and the state, in 1975. *Id.* at 2725B–2812B.

founding partners, was a "cowboy/ranch foreman turned lawyer"[136] who no doubt understood the frustrations of public land grazing. On the other side, representing the federal government, was a Harvard educated, seasoned federal litigator named Victor R. Ortega.[137] A native of New Mexico, Ortega had served as the U.S. Attorney for the District of New Mexico since 1969, representing the federal government in over one hundred ca-ses.[138]

A three-judge panel convened in the U.S. District Court for the District of New Mexico to hear the case. This odd judicial arrangement was a relic of old federal civil procedure, which provided that a permanent injunction restraining the enforcement of an Act of Congress on grounds of unconstitutionality should not be granted unless heard and determined by a three-judge district court.[139] The panel consisted of Tenth Circuit Judge Oliver Seth, Chief District Judge Harry Vearle Payne, and District Judge Edwin L. Mechem.[140] The three judges had a combined thirty-five years of experience on the bench.[141] Seth, who served as Chief Judge of the Tenth Circuit from 1977 to 1984, and Mechem were both New Mexico natives, and both had worked for the federal government prior to joining the bench.[142] Judge Payne was born in a Mormon colony in Chihuahua, Mexico (just south of New Mexico) and did not go to law school, but rather read law.[143]

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136. *Our Story*, MODRALL SPERLING LAW FIRM, http://www.modrall.com/firm/our_story (last visited July 26, 2011).

137. *Morton*, 406 F. Supp. at 1237.

138. A November 16, 2009 search of Westlaw for cases in which Victor R. Ortega represented the United States yielded 120 cases. *See Victor R. Ortega*, LAWYERS.COM, http://www.lawyers.com/New-Mexico/Santa-Fe/Victor-R.-Ortega-1139049-a.html (last visited June 25, 2011).

139. 28 U.S.C. § 2282 (1970) (repealed 1976).

140. *Morton*, 406 F. Supp. at 1237.

141. *Biographical Directory of Federal Judges: Seth, Oliver*, FED. JUDICIAL CTR., http://www.fjc.gov/servlet/nGetInfo?jid=2147&cid=999&ctype=na&instate=na (last visited July 26, 2011); *Biographical Directory of Federal Judges: Payne, Harry Vearle*, FED. JUDICIAL CTR., http://www.fjc.gov/servlet/nGetInfo?jid=1854&cid=999&ctype=na&instate=na; *Biographical Directory of Federal Judges: Mechem, Edwin Leard*, FED. JUDICIAL CTR., http://www.fjc.gov/servlet/nGetInfo?jid=1608&cid=999&ctype=na&instate=na.

142. *Biographical Directory of Federal Judges: Seth, Oliver*, *supra* note 141 (Seth served as an Army Major in World War II); *Biographical Directory of Federal Judges: Mechem, Edwin Leard*, *supra*, note 141 (Mechem served as an FBI agent during World War II).

143. *Biographical Directory of Federal Judges: Payne, Harry Vearle*, *supra* note 141. "Reading law" was a means by which those who did not go to law school could

The three-judge panel turned out to be a godsend for the State, dealing it a resounding victory. It was clear that Congress could legislate "all needful Rules and Regulations" concerning public real estate under the Property Clause.[144] But the court took issue with the idea that wild horses and burros could "become 'property' of the United States simply by being physically present on the 'territory' or land of the United States."[145] The court's analysis began with the proposition that "the common law, dating back to the Roman law, has been that wild animals are owned by the state in its sovereign capacity, in trust for the benefit of the people."[146] Reasoning from three cases that upheld the power of the federal government to kill deer that were damaging federal lands, the court concluded that the Property Clause allowed the federal government to enact regulations only to protect the public lands from damage.[147] Because Congress had provided neither any "finding nor any evidence to indicate that wild horses and burros are damaging the public lands,"[148] the panel overturned the WFRHBA for exceeding the power granted to Congress in the Property Clause.[149]

However, the district court opinion left considerable room for argument on appeal. Congress did, after all, view the feral equids as a valued cultural and natural resource whose removal from public lands constituted a harm.[150] As born westerners (of Mexico and the United States), all three judges likely were familiar with ranching and life on the range. Thus, they may have had difficulty seeing the ecological findings as Congress intended.[151] They likely understood the WFRHBA to promote, rather than prohibit, damage to the rangelands. This

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be admitted to the bar. It involved mostly self-teaching but also guidance by an experienced attorney or judge. BLACK'S LAW DICTIONARY 1377 (9th ed. 2009).

144. U.S. CONST. art IV, § 3.

145. *Morton*, 406 F. Supp. at 1238.

146. *Id.*

147. *Morton*, 406 F. Supp. at 1239 (citing Hunt v. United States, 278 U.S. 96 (1928)); *see also* N.M. State Game Comm'n v. Udall, 410 F.2d 1197 (10th Cir. 1969); Chalk v. United States, 114 F.2d 207 (4th Cir. 1940), *cert. denied*, 312 US. 679 (1941)).

148. *Morton*, 406 F. Supp. at 1239 (citing *Hunt*, 278 U.S. 96). Of course, feral equids do damage to rangeland, but Congress made no such finding because the statute sought to protect them.

149. *Id.*

150. 16 U.S.C. § 1331 (2006).

151. *Id.* (finding wild horses are an "integral part of the natural system of the public lands").

cultural context may help explain why the panel made such an important ruling on the constitutionality of a federal statute in only a two-page memorandum opinion.

B. Kleppe v. New Mexico

The United States appealed the decision invalidating the WFRHBA directly to the U.S. Supreme Court, which noted probable jurisdiction in 1975.[152] Then, as now, federal law permitted appeal of a three-judge district court decision directly to the Supreme Court.[153] The stage was set for a dramatic showdown in Washington.

While the case was on appeal, President Ford nominated then-Secretary of the Interior Rogers Morton, the named defendant in the case and former chairman of the Republican National Committee, to serve as Commerce Secretary.[154] Thomas S. Kleppe, a Republican congressman from North Dakota, replaced Morton as Secretary of the Interior.[155] Kleppe was not known as a champion of wildlife protection—he entered office approving oil drilling off the Southern California coast and left office promoting the same on Alaska's North Slope.[156] Nevertheless, federal prerogatives were at stake in the case, and the transition at the Interior did not alter the course or substance of the United States' appeal.

The appeal gained the attention of Wyoming, Idaho, and Nevada,[157] which realized that much more was at stake than the seized burros.[158] Abandoned horse and estray laws, which existed in almost every western state,[159] would be preempted by conflicting provisions of the WFRHBA.[160] Moreover, a state

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152. Sec'y of the Interior v. New Mexico, 423 U.S. 818 (1975).

153. 28 U.S.C. § 1253 (2006).

154. Rogers Morton*, Official in Nixon, Ford Cabinets*, PITT. POST-GAZETTE, Apr. 20, 1979, at 12.

155. Matt Schudel, *Thomas Kleppe, 87; Interior Secretary During Mid-1970s*, WASH. POST, Mar. 4, 2007, http://www.washingtonpost.com/wp-dyn/content/article/2007/03/03/AR2007030301196.html.

156. *Id.* To Secretary Kleppe's credit, several of his decisions, such as banning the use of lead shot in waterfowl hunting, were environmentally noteworthy. *Id.*

157. *See infra* notes 182–202 and accompanying text.

158. *See, e.g.*, Brief of Amicus Curiae State of Idaho, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1974 WL 175952 at *3 [hereinafter Idaho Brief] ("In this case, much, much more is at issue than the validity of the Wild Free-Roaming Horse and Burro Act.").

159. *See* sources cited *supra* note 65.

160. Wyoming worried that "without the provisions of the State Estray laws relative to capture and control of such animals, the local rancher or farmer finds

victory would restore the dominant priority ranchers had enjoyed in their competition with feral equids for scarce rangeland resources. A loss, the states feared, would open the door "for eventual and complete erosion of any state jurisdiction . . . on federally-owned lands."[161] For Nevada in particular, which had the largest population of estrays and the second highest proportion of federal land ownership, the stakes were high.[162] Although New Mexico served as a plaintiff in the litigation, Nevada led the charge for the Sagebrush Rebellion,[163] advancing arguments for states' and ranchers' interests that would live on long after the resolution of *Kleppe*.

1. The Briefs

The parties' briefs alone foreshadow the outcome of the case. The United States asserted that the power of Congress under the Property Clause to protect feral equids is "beyond any reasonable doubt."[164] The only restrictions on Congress's powers under the Property Clause, the United States argued, are that the actions must be "needful" and "respecting" federal land.[165] Within those constraints, the Property Clause provides Congress with "what are essentially police powers to protect and preserve the natural resources of the public lands."[166]

New Mexico could not muster a persuasive response to the United States' arguments. New Mexico argued for a very limited scope of the Property Clause, framing the issue as

himself without an effective remedy to prevent disease and/or damage to his livestock." *See* Brief of Amici Curiae State of Wyoming Wyoming Livestock Board, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1976 WL 181209 at *5 (Feb. 17, 1976) [hereinafter Wyoming Brief]. Nevada lamented that if the WFRHBA survived, "Nevada's control of estrays would be emasculated." Brief of Amici Curiae Nevada State Board of Agriculture Central Committee of Nevada State Grazing Boards, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173619 at *4 (Aug. 18, 1975) [hereinafter Nevada Board Brief].

161. Idaho Brief, *supra* note 158, at *3; *see also* Nevada Board Brief, *supra* note 160, at *4–5; Wyoming Brief, *supra* note 160, at *5.

162. Nevada Board Brief, *supra* note 160, at *4–5.

163. MICHAEL W. BOWERS, THE SAGEBRUSH STATE: NEVADA'S HISTORY, GOVERNMENT, AND POLITICS 134 (2006). Former Utah Governor Scott Matheson described Nevada as assuming leadership of the rebellion. Scott M. Matheson, *Rebels Defied Federal Land Dominance*, DESERET NEWS, Sept. 22, 1986, at 1A, 4A.

164. Brief for the Secretary of the Interior, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173620 at *15 (Dec. 1, 1975) [hereinafter Interior Brief].

165. *Id.* at *17.

166. *Id.* at *11.

whether feral equids "are a part of the federal soil."[167] In addition to its narrow interpretation of "property," New Mexico asserted that only harm-avoiding regulations are "needful,"[168] and that Congress erroneously found that equids were at risk of harm.[169] Perhaps most detrimental to New Mexico's case,[170] it acknowledged that the burros at issue were seized on BLM lands,[171] though New Mexico nevertheless maintained that the burros spent "the majority of their time on private land."[172] In the debate over the extent of Congress's authority under the Property Clause, New Mexico appeared outmatched.

Eleven amicus briefs were filed: four supporting the United States, six opposing, and one taking a mixed position. In support of the federal government the American Horse Protection Association,[173] the International Association of Game, Fish, and Conservation Commissioners,[174] the Humane Society,[175] an author and wild horse conservationist named Hope Ryden,[176] and Wild Horse Organized Assistance, Inc.[177] filed amicus briefs. They argued, among other things, that the holding of the court below jeopardized "[p]ast and future

167. Answer Brief for the State of New Mexico, et al., Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1976 WL 181207 at *9 (Jan. 19, 1976) [hereinafter New Mexico Brief]; *see also id.* at *15 (arguing that "horses and burros do not constitute real property").

168. New Mexico Brief, *supra* note 167, at *8.

169. *Id.* at *10–11.

170. *See infra* notes 231–42 and accompanying text.

171. New Mexico Brief, *supra* note 167, at *4.

172. *Id.*

173. Brief of American Horse Protection Ass'n, Amicus Curiae, in Support of Appellant, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173616 (May 30, 1975) [hereinafter AHPA Brief].

174. Brief of Amicus Curiae, International Ass'n of Game, Fish and Conservation Commissioners, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173617 (Aug. 13, 1975). The Association argued that the WFRHBA was within Congress's Property Clause authority because feral animals are not wildlife, and therefore not within the management responsibility of the states. *Id.* at *5–7. In this respect the Association supported the United States. However, the Association also opposed the United States by arguing for a narrow interpretation of the Property Clause. *Id.* at *12. In this respect, the Association's position was mixed.

175. Brief of Amicus Curiae the Humane Society of the United States, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173622 (Nov. 19, 1975).

176. Brief of Amicus Curiae Hope Ryden, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173621 (Nov. 17, 1975). Ms. Ryden also testified at length in the hearings that led to the passage of the WFRHBA. *See, e.g.*, *House Hearings*, *supra* note 65, at 134–42.

177. Brief of Amicus Curiae Wild Horse Organized Assistance, Inc., Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173624 (Nov. 20, 1975).

legislation enacted pursuant to the Territory and Property Clause establishing national forests and public parks and providing protection for wildlife therein."[178]

The United States also worried that the trial court's narrow interpretation of the Property Clause might seriously undermine federal agencies' ability to manage the public lands. The Justice Department's brief noted that the very permit authorizing Stephenson to graze his cattle on public land could be unconstitutional if the Property Clause allowed Congress to act only on harm-avoidance grounds.[179] Other routine public land management activities, such as the manipulation of elk populations in the National Elk Refuge, would be difficult to justify under the terms of the lower court's ruling.[180] Moreover, the boundary between avoiding harm and producing benefits is notoriously muddled, and has vexed takings law for decades.[181] Applying the harm-avoidance principle to police congressional compliance with the Property Clause would invite endless litigious mischief.

Among the amici supporting the State of New Mexico were the Nevada State Board of Agriculture,[182] the Nevada Central Committee of Grazing Boards,[183] the Pacific Legal Foundation,[184] the State of Idaho,[185] and the Wyoming Livestock Board.[186] The states took a shotgun approach to the case, attacking the WFRHBA on every conceivable front, while at the same time defending against the argument that the holding below would threaten other environmental

178. *E.g.*, AHPA Brief, *supra* note 173, at *8.

179. Interior Brief, *supra* note 164, at *18.

180. See Robert L. Fischman & Angela King, *Savings Clauses and Trends in Natural Resources Federalism*, 32 WM. & MARY ENVTL. L. & POL'Y REV. 129, 131–41 (2007) (discussing elk management controversy in the refuge, and its conflict between Wyoming and the United States).

181. *See, e.g.*, Lucas v. S.C. Coastal Council, 505 U.S. 1003, 1024–27 (1992) ("[T]he distinction between 'harm-preventing' and 'benefit-conferring' regulation is often in the eye of the beholder.").

182. Brief of Amicus Curiae Nevada State Board of Agriculture, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173627 (Jan. 2, 1975).

183. Brief of Amicus Curiae Nevada State Board of Agriculture Central Committee of Nevada State Grazing Boards, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173619 (Aug. 18, 1975).

184. Brief of Pacific Legal Foundation as Amicus Curiae in Support of Appellees, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173626 (Aug. 14, 1975) [hereinafter PLF Brief].

185. Idaho Brief, *supra* note 158.

186. Wyoming Brief, *supra* note 160.

legislation.[187] Nevada, for example, claimed that the " 'parade of horribles' just cannot be supported in the law"[188] because the constitutional infirmity is unique to the WFRHBA. Specifically, Nevada argued that other environmental laws, such as the National Wildlife Refuge System Act[189] and the Wild and Scenic Rivers Act,[190] were "self-cleansing—they contain either specific language ruling against such confrontation with State fish and game laws, or they are easily distinguished."[191]

The Pacific Legal Foundation, founded just two years earlier, made essentially the same points as New Mexico.[192] Idaho, on the other hand, took a more extreme position and attacked the idea of protecting the horses and burros as "absurd."[193] Idaho's Attorney General, Warren Felton, offered the following alternative to the Act:

> Rather than preserve degenerate estrays, it is better to look backward to that which once was, and cease thinking of perpetuating that which does not exist. Texas has the idea. Build a statue to the horse that used to be, make it life size, include a stallion, some mares, and a few colts. Let this bronze symbol stand in a public place so that generations that are to come may see the type of horse that contributed the base stock to the Western range horse industry. And on this statue carve a caption taken from a letter to *Life* protesting the destruction of the wild horse herds in recent years: "Son, that is what was once known as the Western pony."[194]

Certainly this position was inconsistent with the broad public sentiment that led Congress to pass the Act,[195] and it

187. *See, e.g.*, Nevada Board Brief, *supra* note 160, at *11.
188. *Id.* at *9.
189. 16 U.S.C. § 668dd, ee (2006).
190. 16 U.S.C. § 1271 (2006).
191. Nevada Board Brief, *supra* note 160, at *11.
192. PLF Brief, *supra* note 184. The Foundation would later play an important role in the political movements spawned in reaction to the environmental legislation of the 1970s, especially in defending private property owners harmed by regulation. *See Environmental Regulation Cases*, PAC. LEGAL FOUND., http://www.pacificlegal.org/page.aspx?pid=270 (last visited July 26, 2011).
193. Idaho Brief, *supra* note 158, at *5.
194. *Id.* at *5 (quoting WALKER D. WYMAN, THE WILD HORSE OF THE WEST (1962)) (emphasis added).
195. One author captured this sentiment by describing the wild horse as follows: " '[t]he most beautiful, the most spirited and the most inspiring creature ever to print foot on the grasses of America.' " Richard H. Gilluly, *The Mustang Controversy*, 99 SCI. NEWS 219, 220 (1971) (quoting author J. Frank Dobie).

can perhaps be best explained as evidence of just how frustrated western states had become in trying to deal with the increasing dominance of federal control of the public rangelands. In this regard, these arguments foreshadowed a looming political rebellion. The Wyoming Livestock Board, on the other hand, offered no novel position and merely adopted the position of the State of New Mexico and the Nevada State Board of Agriculture.[196]

The case was of particular interest to Nevada, because it had been making the same argument as New Mexico—that the WFRHBA is unconstitutional and that wild and free-roaming equids belong to the states—in a separate controversy.[197] Furthermore, Nevada's ability to control horses on the public lands was of special import because the federal government owns such a large proportion of its land area, more than eighty percent.[198] Nevada thus saw the Act as interfering with its police powers, arguing that "Nevada should be able to control estrays, diseased animals, fish and game and promote range management within the boundaries of Nevada. Should these obvious rights under the State's police powers be stripped, state sovereignty is necessarily questioned."[199] Robert List, Nevada's Attorney General, hence asserted that if the Act were upheld, Wyoming, Nevada, and New Mexico "will have been admitted into the Union, not as an equal member, but as one shorn of a legislative power vested in all the other States of the Union, a power resulting from the fact of statehood and incident to its plenary existence."[200] Again, the states' arguments suggested something of greater political consequence than the mere management of wild horses. The equal footing argument, which would remain a complaint of Nevada's for many years,[201] as well as the states' other arguments concerning the Tenth Amendment and state police

196. Wyoming Brief, *supra* note 160. Wyoming instead chose to illustrate the factual circumstances of free roaming equids in Wyoming.

197. SYMANSKI, *supra* note 63, at 129 (Nevada's State Agricultural Director impounded eighty wild horses rounded up by BLM, claiming that the Act was unconstitutional and that the horses belonged to the state). This controversy eventually came before the courts in *American Horse Prot. Ass'n v. Frizzell*, 403 F. Supp. 1206 (D. Nev. 1975), but the State did not raise the issues of state ownership and the constitutionality of the Act.

198. *See infra* note 273 and accompanying text.

199. Brief for Nevada State Board of Agriculture, *supra* note 182, at *12.

200. *Id.* at *13 (citing Ward v. Race Horse, 163 U.S. 504 (1896)).

201. *See infra* text accompanying notes 303–10.

powers,[202] began to frame a public lands conflict that would long outlive the *Kleppe* dispute.

2. The Argument

Deputy solicitor general and adjunct professor of law at Georgetown, Arthur Raymond Randolph, Jr., represented the United States before the Supreme Court.[203] He graduated at the top of his class from the University of Pennsylvania Law School and is now a judge on the U.S. Court of Appeals for the District of Columbia Circuit.[204] Apparently New Mexico was impressed with Randolph's performance, for he later served the state as Special Assistant Attorney General from 1985 to 1990.

Given its success in the district court, New Mexico stuck with Modrall Sperling to advocate for its interests before the Supreme Court. For this task, the firm called on veteran litigator George T. Harris, Jr., a former president of the New Mexico Bar Association,[205] who had twice before unsuccessfully represented New Mexico as a special assistant attorney general in petitions for certiorari to the Court.[206]

Oral arguments took place on March 23, 1976, and Deputy Solicitor Randolph performed brilliantly. From the outset, members of the Court challenged Randolph to define the limits of Congress's Property Clause power, questioning whether Congress could protect wild equids on private land.[207] Randolph explained that protecting horses and burros on private land was not at issue in the case because New Mexico had seized the burros on public, not private, land.[208] Justice Stevens was not easily persuaded, referring to the trial court's opinion which stated that "[t]he controversy involved here began when a New Mexico rancher . . . discovered several unbranded and unclaimed burros wandering on his *private*

202. *See, e.g.*, Idaho Brief, *supra* note 158, at *2; New Mexico Brief, *supra* note 167, at *12–13; Wyoming Brief, *supra* note 160, at *5.

203. *Biographical Directory of Federal Judges*: *Randolph, Arthur Raymond,* FED. JUDICIAL CTR., http://www.fjc.gov/servlet/nGetInfo?jid=1964&cid=999&ctype=na&instate=na.

204. *Id.*

205. *Past Presidents*, N.M. BAR ASS'N, http://www.nmbar.org/AboutSBNM/Governance/pastpresidents.html (last visited Mar. 31, 2009).

206. *See* N.M. State Game Comm'n v. Hickel, 396 U.S. 961 (1969); N.M. State Game Comm'n v. U.S. Court of Appeals for Tenth Circuit, 396 U.S. 953 (1969).

207. Oral Argument at 3:09, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), *available at* www.oyez.org/cases/1970-1979/1975/1975_74_1488.

208. *Id.* at 5:18.

land . . . and also on public land."[209] Randolph held his ground, arguing that regardless of the language of the district court opinion, Congress's power to protect wild horses and burros on private land was not at issue.[210]

Randolph analogized the case to *Light v. United States*,[211] one of the seminal Supreme Court decisions establishing federal natural resource management authority over public lands.[212] He argued that if Congress could restrict access to the public lands then so too could Congress prohibit harm to animals living on the public lands.[213] He also likened the WFRHBA to the sixth century Justinian right of a landowner to prevent others from killing animals on his land.[214] Randolph noted that the WFRHBA passed both houses of Congress unanimously and the governor of Nevada, the state with the largest population of wild equids, wrote letters to both the Senate and the House expressing support for the Act.[215]

George Harris was outmatched. He conceded that the burros at issue were not seized on private land, which opened the door to an onslaught of challenges.[216] Time and again, the Justices questioned how New Mexico could have standing to bring arguments about Congress's power to protect wild equids

209. *Id.* at 29:40–32:05; *see also* New Mexico v. Morton, 406 F. Supp. 1237, 1237 (D.N.M. 1975).

210. Oral Argument, *supra* note 207, at 30:10. One vexing problem with the *Kleppe* story is explaining why New Mexico chose the Stephenson case instead of waiting for the federal government to use its WFRHBA authority to protect animals at the time they were roaming on private land. Such facts would have made a better challenge to the Property Clause authority of the United States than the Stephenson circumstances, where the New Mexico Livestock Board rounded up the animals on BLM land. However, the federal enforcement authorities were loath to preempt state estray laws on private land, so no opportunity would likely arise for the state to have chosen the more favorable fact pattern.

Similarly, Stephenson could have sought mandamus to force the BLM to act with dispatch to remove wild horses on his private lands. While that tactic was successful in the courts, *see, e.g.*, Mountain States Legal Found. v. Hodel, 799 F.2d 1423 (10th Cir. 1986), it does not raise the grand constitutional issues that rally movements.

211. 220 U.S. 523 (1911); see also the companion case to *Light*, *United States v. Grimaud*, 220 U.S. 506 (1911).

212. Oral Argument, *supra* note 207, at 20:45.

213. *Id.*

214. *Id.* at 19:40.

215. Near the end of the argument the bench signaled its view that the issues at stake were minimal. One Justice stated that Randolph probably drew straws for this case. Randolph answered, "[a]nd I lost," to which the Justices responded with laughter. *Id.* at 25:45.

216. *Id.* at 36:56.

on private land given Harris's concession that the burros at issue were not seized on private land.[217] Harris was without response, stating at one point: "I'm sorry, I'm not sure I'm following here."[218]

3. The Decision

On June 17, 1976, in one of two unanimous opinions written by Justice Marshall and issued that day,[219] the Supreme Court handed the western states a crushing defeat. Summarily dismissing New Mexico's arguments, the Court reached back to a long line of cases endorsing broad federal resource management to declare that " '[t]he power over the public land thus entrusted to Congress is without limitations.'"[220]

The Court unpacked the lawsuit into four main issues: (1) the scope of the challenge to the WFRHBA; (2) the breadth of federal power authorized by the Property Clause; (3) the distinction between the Property Clause and the Enclave Clause; and (4) the division of jurisdiction between the state and federal government on public land. These issues closely track the four sections of the Court's opinion.

Narrowly defining the constitutional issues raised by the WFRHBA, the Court proceeded on the basis that the dispute concerned only federal authority over wildlife on public lands. Though the protection of the Act extends to horses and burros on either public or private land,[221] the state's counsel had acknowledged at oral argument that the roaming burros were rounded up on public land.[222] The Court therefore reserved the more troublesome and inflammatory issue of federal authority over private land, stating: "[W]e do not think it appropriate . . . to determine the extent, if any, to which the Property Clause

217. *Id.* at 37:27, 39:36, 40:48, 42:10, 43:40, 44:50.
218. *Id.* at 46:18.
219. *See* Fed. Energy Admin. v. Algonquin SNG, Inc., 426 U.S. 548 (1976).
220. Kleppe v. New Mexico, 426 U.S. 529, 539 (1976) (citing United States v. San Francisco, 310 U.S. 16, 29 (1940)). As early as *United States v. Gratiot*, 39 U.S. 526 (1840), the Court interpreted the Property Clause power to vest "without limitation." *See also* Peter A. Appel, *The Power of Congress "Without Limitation": The Property Clause and Federal Regulation of Private Property*, 86 MINN. L. REV. 1 (2001).
221. *Kleppe*, 426 U.S. at 531–32.
222. *Id*. at 534 & n.3.

empowers Congress to protect animals on private lands or the extent to which such regulation is attempted by the Act."[223]

With the scope of the state's challenge so cabined, the Court held that the WFRHBA as applied to public land falls within congressional authority under the Property Clause. The state's construction of the Property Clause purported to limit federal authority to (1) "the power to dispose of and make incidental rules regarding use of federal property; and (2) the power to protect federal property," meaning the land itself.[224] New Mexico argued that the WFRHBA's wildlife protection extended beyond the boundaries of the Property Clause because it failed to protect the realty itself. This is the essence of the district court's opinion in *New Mexico v. Morton*.[225]

Rejecting New Mexico's "narrow reading" of the Property Clause as inconsistent with a long line of case law, the Court endorsed an "expansive reading" of the clause.[226] *Kleppe* reiterated that congressional power over the public lands is "without limitations."[227] While it does not possess a general police power, "Congress exercises the powers both of a proprietor and of a legislature over the public domain,"[228] which "necessarily includes the power to regulate and protect the wildlife living there."[229]

Arguing that the WFRHBA was not based on science and actually harms the public lands, New Mexico attempted to prompt the Court to question the empirical connection between the terms of the law and the aims of the Property Clause. In a footnote dismissal, the Court declined the invitation to "reweigh the evidence and substitute our judgment for that of Congress."[230] Courts inevitably will decide challenges to

223. *Id.* at 546. Many commentators in the years after *Kleppe* attempted to address this question regarding the scope of the Property Clause. *See, e.g.*, Jennifer Pruett Loehr, *Expansive Reading of Property Clause Upheld*, 23 NAT. RESOURCES J. 197 (1983) (discussing cases decided in years following *Kleppe*); Shepard, *supra* note 23 (arguing limitations on Property Clause should come from political process and not courts); Plumb, *supra* note 23, at 189 (predicting "erosion of states' control over hunting and fishing within their borders" and the "expansion of federal control in areas others than wildlife regulation").

224. *Kleppe*, 426 U.S at 536.

225. 406 F. Supp. 1237 (D.N.M. 1975).

226. *Kleppe,* 426 U.S. at 539.

227. *Id.*

228. *Id.* at 540.

229. *Id.* at 541.

230. *Id.* at 541 n.10. According to the Court, determinations of what are "needful" rules "respecting" the public lands under the Property Clause "are entrusted primarily to the judgment of Congress." *Id.* at 536.

statutes passed pursuant to the Property Clause, but the standard of review will be lenient, as exemplified in *Kleppe*. Thus, *Kleppe* signals that the Court will rely primarily on the political process to place limits on the exercise of the Property Clause.[231]

The *Kleppe* opinion also made clear that the Property Clause is a stand-alone basis for federal authority on public lands. New Mexico relied on the Enclave Clause to argue that the federal government could not supplant state police power under the New Mexico Estray Law without first obtaining the state's consent.[232] The Constitution's Enclave Clause is a separate source of federal authority for certain enumerated purposes,[233] which requires state consent for the transfer of jurisdiction. The state can cede exclusive or partial jurisdiction to the federal government, thereby extinguishing state police power over the land to the extent such power is transferred.[234] Under the Property Clause, in contrast, no state consent is necessary. The Court held that the federal government possesses pre-emptive jurisdiction over the public domain under the Property Clause even if it does not secure jurisdiction under the Enclave Clause.[235]

In response to the state's claims that the WFRHBA intruded upon sovereign police powers, the Court stated that "[t]he Act does not establish exclusive federal jurisdiction over the public lands in New Mexico; it merely overrides the New Mexico Estray Law insofar as the state agency attempts to

231. Deference to Congress's decisions about the scope of its constitutional power is much discussed in the literature. *See, e.g.*, Herbert Wechsler, *The Political Safeguards of Federalism: The Role of the States in the Composition and Selection of the National Government*, 54 COLUM. L. REV. 543 (1954). The Supreme Court took a dramatically less deferential approach to congressional findings in interpreting the Commerce Clause, beginning in the 1990s. *See* United States v. Lopez, 514 U.S. 549 (1995). It remains unclear the extent to which the disparity between *Kleppe* and *Lopez* is a function of the difference between the two constitutional clauses, or between the attitudes of the Court in two different eras.

232. *Kleppe*, 426 U.S. at 542.

233. U.S. CONST. art. I, § 8, cl. 17 (granting Congress the power "[t]o exercise exclusive Legislation in all Cases whatsoever, over such District (not exceeding ten Miles square) as may, by Cession of particular States, and the Acceptance of Congress, become the Seat of the Government of the United States, and to exercise like Authority over all Places purchased by the Consent of the Legislature of the State in which the Same shall be, for the Erection of Forts, Magazines, Arsenals, dock-Yards, and other needful Buildings").

234. *Kleppe*, 426 U.S. at 542.

235. *Id.* at 542–43.

regulate federally protected animals."[236] Congress and the states exercise concurrent, not mutually exclusive, jurisdiction over the public domain. To the extent that the laws of each conflict, federal law is supreme and preempts inconsistent state law. Despite New Mexico's lamentations, the states retain considerable authority over public lands in the absence of federal legislation or regulation. Indeed, the states retain "broad trustee and police powers over wild animals within their jurisdictions."[237] This may be little solace to the states—exercising power only to the extent the federal government has not acted—but it is not insignificant or unconstitutional.

Thus, *Kleppe* slammed the door shut on challenges to federal control of the public rangelands.[238] The decision undoubtedly "sharpened the ranching community's attention to the finer points of constitutional law,"[239] while leaving Nevada to wonder what to make of its equal-footing claim.

Although *Kleppe* was unanimous, the papers of Justice Marshall suggest that there was some debate among the Justices. The trove of Marshall materials contains a cryptic note from Chief Justice Burger regarding *Kleppe v. New Mexico*, dated a few days before the Court issued its judgment:

> [The] enthusiasm that the rancher-water Justices exhibited for my scholarly analysis of the grazing problems leads me to abandon the idea of separate writing. I assumed ranchers would want to be free to shoot trespassing burros but if Byron [White] and Bill Rehnquist want to put wild burros on a new form of "welfare" I will submit. In short, I join you.[240]

While the "ranchers" on the Court endorsed Justice Marshall's opinion, the *Kleppe* decision inflamed the public land ranchers in the West. The following part explores the Sagebrush Rebellion that resulted.

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236. *Id.* at 545.

237. *Id.*

238. George Cameron Coggins & Robert L. Glicksman, *Power, Procedure, and Policy in Public Lands and Resources Law*, NAT. RES. & ENV'T, no. 10, 1995, at 3, 4.

239. Sally Fairfax, *Old Recipes for New Federalism*, 12 ENVTL. L. 945, 971 (1982).

240. Robert V. Percival, *Environmental Law in the Supreme Court: Highlights from the Marshall Papers*, 23 ENVTL. L. REP. 10606, 10617 (1993).

III. THE SAGEBRUSH REBELLION

Federal ownership of western lands powerfully shapes the regional economy and society. Along with aridity, it is perhaps the defining characteristic of the West.[241] Though a national park can be a source of pride, most federal land ownership (especially BLM jurisdiction) "has always been a politically attractive whipping boy for western politicians."[242] Federal proprietary control and relatively unproductive rangelands prompted the *Kleppe* controversy; it should be no surprise that the Supreme Court decision did not quell the "disaffection with national government"[243] that permeated western states. Indeed, it helped propel a political response that grew in importance up to and through the election of self-identified "sagebrush rebel," Ronald Reagan.[244]

The Sagebrush Rebellion began as narrowly focused rancher frustration with the WFRHBA, and in less than half a decade grew to encompass a wide array of public land conflicts. After the crushing defeat of *Kleppe*, Nevada grabbed the baton and led the movement for greater state control of public lands, advancing a regional political agenda. As Nevada pressed forward, Congress enacted a more comprehensive public rangelands management reform statute. That legislation helped draw more stakeholders into the rebellion.

This Part focuses on two statutes that fomented subsequent conflicts over federal natural resources, further stoking the Sagebrush Rebellion. The first is the 1976 Federal Land Policy and Management Act,[245] which helped spread western disgruntlement beyond ranchers in the wake of *Kleppe*. The statute provided special avenues for states to influence federal public land management through cooperative federalism, and its implementation neglected to significantly change the extent of grazing on public lands. Nonetheless, it sparked more western grievances. The second statute is the 1979 Nevada law asserting proprietary control over federal public lands.[246] That law inspired other states to enact similar

241. Wilkinson, *supra* note 35, at 955.
242. COGGINS ET AL., *supra* note 24, at 76.
243. *Id.*; *see also* Leshy, *supra* note 11, at 343.
244. Leshy, *supra* note 11, at 354–55 & n.116.
245. Federal Land Policy and Management Act of 1976, Pub. L. No. 94-579, 90 Stat. 2744 (codified at 43 U.S.C. § 1701 (2006)).
246. NEV. REV. STAT. ANN. § 321.5973(1) (LexisNexis 2008).

declarations. Historian Patricia Limerick identifies the Nevada statute as the opening salvo of the Sagebrush Rebellion,[247] but the legislation's roots extend to the WFRHBA and discontent with *Kleppe*. This Part concludes with a description of Nevada's failed judicial challenge to the 1976 Act, punctuating another cycle in the development of the Sagebrush Rebellion, which continued to feed on discontent generated, in part, from judicial losses. The story of these legal developments following *Kleppe* highlights "un-cooperative federalism" as a key strategy of western states resisting federal limitations on longstanding public land users.

A. The Federal Land Policy and Management Act

Even as the litigation over the WFRHBA wound down, Congress considered a score of bills to reduce overgrazing and bring a more systematic approach to management of the unreserved public lands, which had not yet been removed from the disposal laws facilitating privatization.[248] On October 21, 1976, four months after the Court issued the opinion in *Kleppe*, Congress passed the Federal Land Policy and Management Act (FLPMA).[249] After decades of administrative drift, the FLPMA provided the BLM with organic legislation, a comprehensive legislative charter for the largest public land system in the United States.[250] Although the FLPMA retained much of the Taylor Grazing Act and so stopped short of a thorough overhaul of the law of livestock grazing,[251] it dramatically shifted the center of gravity in land management on public lands. The FLPMA brought comprehensive, pluralistic planning to the BLM.[252] It imposed on the public rangelands the multiple-use,

247. PATRICIA NELSON LIMERICK, THE LEGACY OF CONQUEST: THE UNBROKEN PAST OF THE AMERICAN WEST 46 (1987).

248. ENVIRONMENTAL LAW STORIES, *supra* note 19, at 2304.

249. Federal Land Policy and Management Act, 90 Stat. 2744.

250. *See* Robert L. Fischman, *The National Wildlife Refuge System and the Hallmarks of Modern Organic Legislation*, 29 ECOLOGY L.Q. 457, 501–10 (2002) (discussing various meanings of organic legislation).

251. COGGINS ET AL., *supra* note 24, at 799.

252. *See* 43 U.S.C. § 1712 (2006). Oliver Houck argues that *Nat. Res. Def. Council v. Morton*, 388 F. Supp. 829 (D.D.C. 1974), *aff'd*, 527 F.2d 1386 (D.C. Cir. 1976), paved the way for long-range planning on BLM lands by imposing NEPA environmental impact analysis on the grazing districts. Houck, *The Water, the Trees, and the Land, supra* note 22, at 2305–08.

sustained-yield rubric,[253] which had been the guiding legislative mandate of the national forests since 1960.[254] This shift in legislative policy meant that grazing no longer claimed dominant status on the rangelands.[255] Indeed, the FLPMA placed new environmental restrictions on BLM authority, including limits on grazing that caused unnecessary and undue degradation.[256] Now ranchers would have to compete not only with wild horses and burros, but also with anyone else who wanted to use the public lands, including recreationists and environmentalists. In addition to providing the BLM with expansive rangeland management authority, including the ability to designate and regulate areas of critical environmental concern,[257] the FLPMA explicitly affirmed that "the public lands [will] be retained in Federal ownership."[258] Frustrations boiled over again, and the combination of *Kleppe* and the FLPMA prompted the coalescence of a political movement to limit federal management that reduced the influence of ranchers and other traditional users of the public lands: the "Sagebrush Rebellion."[259]

Some commentators date the start of the Sagebrush Rebellion as late as 1979.[260] Most mark the passage of the

253. 43 U.S.C. §§ 1701(a)(7), 1702(c) (2006). In a certain sense, the WFRHBA had already brought multiple-use management to the public rangelands by raising the priority of horses, an aesthetic land use, to at least the same level as ranching, the former dominant use. *See House Hearings*, *supra* note 65, at 103 (testimony of Michael J. Pontrelli, Assistant Professor of Biology, University of Nevada, Reno) (arguing against livestock dominant use and in favor of multiple use management to protect horses).

254. Multiple-Use Sustained-Yield Act of 1960, 16 U.S.C. §§ 528–531 (2006).

255. Nat'l Wildlife Fed'n v. BLM, 140 I.B.L.A. 85, 99–101 (1997). In practice, ranchers remained successful in dominating grazing use decisions on BLM lands. Joseph M. Feller, *Back to the Present: The Supreme Court Refuses to Move Public Range Law Backward, but Will the BLM Move Public Range Management Forward?*, 31 ENVTL. L. REP. 10021, 10021, 10025 (2001); *see also* Joseph M. Feller, *What Is Wrong With the BLM's Management of Livestock Grazing on the Public Lands?,* 30 IDAHO L. REV. 555, 570 (1994).

256. 43 U.S.C. § 1732(b) (2006).

257. *Id.* § 1701(a)(11).

258. *Id.* § 1701(a)(1).

259. Dale D. Goble, *Public Lands and Agricultural Pollution*, 30 IDAHO L. REV. 433, 437 (1994).

260. *See, e.g.*, LIMERICK, *supra* note 247, at 46; Bruce Babbitt, *Federalism and the Environment: An Intergovernmental Perspective of the Sagebrush Rebellion*, 12 ENVTL. L. 847, 848 (1982); A. Costandina Titus, *The Nevada "Sagebrush Rebellion" Act: A Question of Constitutionality*, 23 ARIZ. L. REV. 263, 263–64 (1981) (dating the "Sagebrush Rebellion" to the formation of the Western Coalition in 1978); Ed Quillen, *Ronald Reagan: The Accidental Environmentalist*, HIGH

FLPMA in 1976 as the triggering event.[261] This story of *Kleppe* supports an earlier origin: the enactment of the 1971 WFRHBA.[262] The WFRHBA was the first congressional enactment reforming public land law in the modern environmental era. *Kleppe* was the first in a line of lawsuits lashing back at the modern framework of allocating scarce public natural resources.

Of course, dating the start of any political movement entails some arbitrary line drawing. Professor Goble describes antecedents to the Sagebrush Rebellion that date back to Tennessee's 1799 claim to the public domain within its borders.[263] In 1955, the western commentator, Bernard DeVoto, identified interest groups supporting a version of "home rule which means basically that we want federal help without federal regulation."[264] From this perspective, the Sagebrush Rebellion is a modern efflorescence of a perennial public-land state complaint. The Sagebrush Rebellion is a recent chapter written out of frustration with the legislation of the 1970s.[265]

Former Secretary of the Interior Bruce Babbitt, as prominent an opponent of the Sagebrush Rebellion as any the West has produced, cautioned that:

> It is easy to dismiss the motives of the small group of stockmen and their political allies who have revived the rallying cry of states' rights for their own benefit. But the considerable support that the Sagebrush Rebellion has gained in the West reflects a deep-seated frustration with . . . federal regulation of public lands. Many westerners share

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COUNTRY NEWS, Jan. 10, 2011, http://www.hcn.org/articles/ronald-reagan-the-accidental-environmentalist/.

261. Albert W. Brodie, *A Question of Enumerated Powers: Constitutional Issues Surrounding Federal Ownership of the Public Lands*, 12 PAC. L.J. 693, 694 (1981); Leshy, *supra* note 11, at 341.

262. *Cf.* Fairfax, *supra* note 239, at 970–71 (highlighting *Kleppe* among the three main events triggering the rebellion); Goble, *supra* note 259, at 437 (pairing enactment of the FLPMA with the *Kleppe* decision to date the rebellion to 1976).

263. Goble, *supra* note 259, at 438; *see also* DANIEL FELLER, PUBLIC LANDS IN JACKSONIAN POLITICS 163, 166 (1984) (documenting many state objections to federal retention of public lands in the early nineteenth century).

264. BERNARD DEVOTO, THE EASY CHAIR 254–55 (1995).

265. R. MCGREGGOR CAWLEY, FEDERAL LAND, WESTERN ANGER: THE SAGEBRUSH REBELLION AND WESTERN POLITICS 71–76 (1993); *see also* Richard D. Clayton, *The Sagebrush Rebellion: Who Should Control the Public Lands*, 1980 UTAH L. REV. 505, 509–11 (1980) (identifying western ineffectiveness in Congress and adverse federal regulation as two causes of the Sagebrush Rebellion).

> growing dissatisfaction with the way federal lands are managed. . . . As the fastest growing region in the country, the West cannot afford to be unable to plan its future development.[266]

Congress (especially through the committees that drafted the FLPMA, which were dominated by westerners) responded to the legitimate western state claims of a special interest in public rangelands. It peppered the FLPMA with several provisions inviting states to influence federal management through the tools of cooperative federalism.[267] The BLM resource management plans, in particular, must be attentive to state and local management goals.[268] The legislation promotes consistency in planning between levels of government.[269] But the Sagebrush Rebellion had little patience for jumping through the hoops to qualify for FLPMA consideration. What distinguished the Sagebrush Rebellion from other efforts to promote traditional and local economic interests was its rejection of cooperative federalism. Instead, the rebellion chose to push what we call "un-cooperative federalism."[270]

The following two subparts show how Nevada led the charge to advance the Sagebrush Rebellion by employing "un-cooperative federalism," first in state legislation challenging federal control of public lands and second in litigation seeking to overturn the FLPMA.

B. Nevada's Assembly Bill 413

Recall that New Mexico had not been alone in its fight with the federal government. In its brief to the Supreme Court, New Mexico had urged the Court to consider briefs filed by other western states, including Nevada, Idaho, and Wyoming.[271] Nevada had expressed particular interest in the issue, with its

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266. Babbitt, *supra* note 260, at 853.

267. Cooperative federalism is an arrangement of power under which a national government induces coordination from subordinate jurisdictions. Robert L. Fischman, *Cooperative Federalism and Natural Resources Law*, 14 N.Y.U. ENVTL. L.J. 179, 200 (2005); *see also* Fischman & King, *supra* note 180, at 147, 152–53, 162 (discussing how the FLPMA manifests cooperative federalism).

268. 43 U.S.C. § 1712 (2006).

269. *Id.*; *see also infra* notes 315–23 and accompanying text (discussing how cooperative federalism works in the FLPMA).

270. *See supra* note 18, for other uses of "un-cooperative federalism."

271. Answer Brief for the State of New Mexico, et al., Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1448), 1976 WL 181207, at *35.

Board of Agriculture filing three separate amicus briefs.[272] Like its fellow amici in the *Kleppe* litigation, Nevada contains substantial amounts of federally-owned land.[273]

From the perspective of these states, federal legislation like the FLPMA and the WFRBHA were burdens unfairly imposed by Washington outsiders who knew little about life on the range.[274] The general sentiment was that "the policy arena was distinctly biased in favor of environmental values."[275] Such sentiments arose for a variety of reasons, including the fact that the BLM's only effective tool for managing horse and burro populations in accordance with the law was to reduce livestock grazing allotments.[276] But what fundamentally stoked the rebellion was the ranchers' loss of control over federal lands. Until the WFRBHA, "overt competition for use of specific areas of public lands" was rare, and local ranchers held sway over rangelands.[277] And, as the comments of one Nevada jurist reflect, the ends of federal policies sometimes appeared dubious from a westerner's perspective: "Congress bought into politically correct, ecologically buffoonish arguments and tried to create a national symbol out of the inbred great grandson of somebody's plow horse."[278] Thus, many westerners concluded

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272. *See* Brief of Amici Curiae on the Merits Central Committee of Nevada State Grazing Boards and Duckwater Shoshone Tribe, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1448), 1975 WL 173625; Brief of Amici Curiae Nevada State Board of Agriculture Central Committee of Nevada State Grazing Boards, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1448), 1975 WL 173619; Brief of Amicus Curiae Nevada State Board of Agriculture, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1448), 1975 WL 173627.

273. The federal government owns 83% of the land in Nevada, 63% in Alaska, 65% in Utah, 53% in Oregon, 63% in Idaho, 45% in Arizona, 49% in Wyoming, and 34% in New Mexico. BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, PUBLIC LAND STATISTICS 2000, at tbl.1-3 (2000), *available at* http://www.blm.gov/public_land_statistics/pls00/index.html (follow "Table 1-3" hyperlink).

274. *See generally* SYMANSKI, *supra* note 63.

275. CAWLEY, *supra* note 265, at 69.

276. *Id.* at 51 ("Because grazing forage is a scarce resource, the allocation of AUMs is a zero-sum game in which providing for one group of animals means reducing forage for another group."); *see also* Pitt, *supra* note 57, at 513. Somewhat surprisingly, one federal official testified to Congress that protecting wild horses would *not* require reductions in livestock grazing permits. *House Hearings*, *supra* note 65, at 69 (testimony of Edward P. Cliff, Chief, Forest Service).

277. Leshy, *supra* note 11, at 345.

278. David R. Gamble, *Max Allred, Desperado*, NEV. LAWYER, Mar. 1998, at 25 (describing the WFRHBA). In their amici brief in *Kleppe*, Nevada's grazing and agricultural boards described themselves as the "knowledgeable, actual users of the western range . . . ." Brief of Amici Curiae Nevada State Board of Agriculture

that federal environmental legislation was nothing more than "a ploy of an upper-class elite that wanted to preserve its pristine playground at the expense of those who needed to use the nation's resources for survival."[279]

Frustrated by Congress and rebuffed by the courts, Nevada reasserted the traditional, pre-WFRHBA influence over the public rangelands through "un-cooperative federalism" involving direct challenges to federal authority. The Nevada legislature began studying public land policy reform in 1975,[280] while *Kleppe* was on appeal. Decrying the "uneven quality and sometimes arbitrary and capricious" nature of federal land management and its effects on livestock and mining, the Nevada legislature directed its commission to explore how to secure greater control over public lands through federal political and judicial processes.[281] Six months after the *Kleppe* decision, the commission reported to the legislature.[282] Referring to *Kleppe*, the legislative counsel advised the commission that due to "the machinations of the Supreme Court,"[283] Nevada had no legal claim to the public lands.[284] The counsel complained similarly of Congress.[285] Nonetheless, the commission saw political value in pursuing additional litigation "to reinforce other arguments . . . involving federal-state controversies."[286] In this regard, Nevada recognized that even unsuccessful litigation could play an important role in furthering the agenda of increasing state influence over federal resource management. Because the commission completed its findings before the passage of the FLPMA,[287] the legislative counsel's complaint against Congress may be traced to the WFRHBA.

Central Committee of Nevada State Grazing Boards, Kleppe v. New Mexico, 426 U.S. 529 (1976) (No. 74-1488), 1975 WL 173619, at *4.

279. WILLIAM E. PEMBERTON, EXIT WITH HONOR 119 (1998) (quoting one sagebrush rebel describing wild horse and burro protections as follows: "They want food for the soul. *We* need food for the body.").

280. S. Con. Res. 35, 1975 Leg., 59th Sess. (Nev. 1975).

281. *Id.*

282. NEV. LEGIS. COMM'N OF THE LEGIS. COUNSEL BUREAU, MEANS OF DERIVING ADDITIONAL STATE BENEFITS FROM PUBLIC LANDS, Bulletin No. 77-6, 58th Sess., at 3 (Dec. 1976).

283. *Id.* at 65.

284. *Id.* at 16.

285. *Id.* at 65.

286. *Id.* at 16.

287. *Id.* at 24–25.

In response to the commission's report, the legislature created the Select Committee on Public Lands in 1977 to rally support for state control of public lands.[288] The six Nevada lawmakers appointed to the Committee pushed forward Assembly Bill 413, now known as the Sagebrush Rebellion Bill.[289] The Bill passed the sixty-member Nevada legislature in 1979, calling for the state to take control of roughly 48 million acres of federally-owned, BLM-managed land located within its borders.[290] The law declared that "all public lands in Nevada and all minerals not previously appropriated are the property of the State of Nevada and subject to its jurisdiction and control."[291] It also granted to the state land office the authority "to convey, lease, license or permit the use of public lands to the same extent . . . [as] the Federal Government."[292] In other words, the Bill authorized the state land office to dispose of federal lands.[293] "According to the authors of Assembly Bill 413, the Sagebrush Rebellion was fueled by the perception that the federal government was both ignorant and unsympathetic to the impact of its policies on the West."[294] Addressing the *Kleppe* controversy specifically, one Nevada sagebrush rebel legislator said, "[s]ome of those people from Washington ought to see what a wild horse will do to a range and a watering hole."[295]

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288. *A Guide to the Records of Sagebrush Rebellion Collection No. 85-04*, U. OF NEV., RENO, MATHEWSON-IGT KNOWLEDGE CENTER, http://www.knowledgecenter.unr.edu/specoll/mss/85-04.html (last updated June 22, 2008). The Select Committee was, at the time, unique in the annals of the Nevada legislature. NEV. LEGIS. COMM'N OF THE LEGIS. COUNSEL BUREAU, SELECT COMM. ON PUB. LANDS, BULLETIN NO. 79-19: REPORT TO THE LEGISLATIVE COMMISSION, 4 (1978) [hereinafter SELECT COMM. ON PUB. LANDS].

289. NEV. REV. STAT. §§ 321.596–.599 (1979). *See generally* Titus, *supra* note 260.

290. NEV. REV. STAT. ANN. § 321.5973(1) (LexisNexis 2008).

291. *Id.*

292. *Id.* § 321.598(1).

293. *Id.*

294. LISA SCHOCH-ROBERTS, NAT'L PARK SERV., A CLASSIC WESTERN QUARREL: A HISTORY OF THE ROAD CONTROVERSY AT COLORADO NATIONAL MONUMENT (quoting CAWLEY, *supra* note 265, at 96), *available at* http://www.nps.gov/history/history/online_books/colm/adhi1-preface.htm; *see also* SELECT COMM. ON PUB. LANDS, *supra* note 288, at 6 (decrying the federal government's "lack of awareness of the impact of federal lands on state and local governments").

295. Joseph Seldner, *The Sagebrush Rebellion*, NAT'L L.J., Sept. 1980, at 1 (quoting State Sen. Keith Ashworth, "a leader in the early Sagebrush Rebellion") (internal quotation marks omitted).

Seeking to rally political support for its "un-cooperative federalism," Nevada hosted a conference of western states likely to be sympathetic to its cause.[296] The conference was an overwhelming success. Not only did Nevada receive the support of the Western Council of State Governments and the Western Interstate Region of the National Association of Counties, but the conference also led to the formation of the Western Coalition on Public Lands,[297] a primary proponent of the "wise use" movement.[298] The "wise use" slogan was an outgrowth of the Sagebrush Rebellion and would outlast the Rebellion as a rallying point for ranchers and other western commodity interests.

More importantly, several western states passed their own versions of Assembly Bill 413. Arizona, New Mexico, and Utah enacted bills similar to Assembly Bill 413 that called for state ownership of BLM lands.[299] The Arizona legislature even overrode Governor Bruce Babbitt's veto.[300] While Nevada pioneered legislative attempts to wrest control of public lands from the BLM, Wyoming took the approach one step further and laid claim not only to BLM lands but also to all Forest Service lands within its borders.[301] The legislatures of California, Colorado, and Idaho took the more tempered and less confrontational route of calling for feasibility studies of transferring federally owned lands to state ownership.[302]

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296. SELECT COMM. ON PUB. LANDS, *supra* note 288, at 8 (referring to a meeting held in Carson City in 1977); Titus, *supra* note 260, at 263–64 (marking the 1978 agreement from the Nevada meeting as the moment that the Sagebrush Rebellion transformed from "attitude to actuality").

297. SELECT COMM. ON PUB. LANDS, *supra* note 288, at 8, 14; *see also* A GUIDE TO THE SAGEBRUSH REBELLION COLLECTION, *supra* note 288.

298. *Wise Move?* (PBS Online Newshour broadcast Feb. 19, 1996), (transcript *available at* http://www.pbs.org/newshour/bb/environment/wise_use_2-19.html) (last visited Dec. 17, 2009).

299. ARIZ. REV. STAT. ANN. §§ 37-901 to -909 (Supp. 1981–1982); N.M. STAT. ANN. §§ 19-5-1 to -10 (Supp. 1982); UTAH CODE ANN. §§ 65-11-1 to -9 (Supp. 1981); *see also* CAWLEY, *supra* note 265, at 2.

300. CAWLEY, *supra* note 265, at 2.

301. WYO. STAT. ANN. § 36-12-109 (1980) (claiming ownership to all federal lands within Wyoming except for land controlled by the United States Department of Defense, national parks, national monuments, wildlife refuges, wilderness areas, and land held in trust for Indians).

302. 1980 Cal. Stat. 2607–09; 1980 Colo. Sess. Laws 857–58; 1980 Idaho Sess. Laws 1003–04. The Hawaii Senate passed a similar resolution. Titus, *supra* note 260, at 264.

C. Nevada's Judicial Challenge to the FLPMA

Legislative declarations like Assembly Bill 413 were largely symbolic, for they could not control federal management decisions. But they were rallying points for asserting political arguments about unfair imposition of federal will upon western public land users. Similarly, attacks on federal authority through litigation could not reasonably be expected to yield judicial relief. But they could build more political support for greater state control of federal resources. That support could influence legislation and agency administration of public lands.

Spoiling for such a fight, the Nevada State Board of Agriculture took the issue of western rangeland control back to court with a direct attack on the constitutionality of the FLPMA.[303] The ambitious new State Attorney General, Richard H. Bryan, used the cause as a stepping-stone to higher office.[304] Bryan made a second attempt at persuading the bench with the arguments the state had raised in the *Kleppe* litigation. Again arguing for state control of western rangelands, Nevada asserted that "she and all of the public land states had an expectancy upon admission into the Union that the unappropriated, unreserved and vacant lands within their borders would be disposed of by patents to private individuals or by grants to the States."[305] As in its *Kleppe* amicus brief, Nevada argued that federal control of lands within western states' borders prevented those states from standing on an equal footing with other states, as required by the Constitution.[306]

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303. Nev. *ex rel.* Nev. State Bd. of Agric. v. United States, 512 F. Supp. 166, 168 (D. Nev. 1981), *aff'd*, 699 F.2d 486 (9th Cir. 1983).

304. Bryan was elected Nevada governor following his term as attorney general and then enjoyed two full terms in the U.S. Senate. *See Bryan, Richard H*, BIOGRAPHICAL DIRECTORY OF THE UNITED STATES CONGRESS 1774–PRESENT, http://bioguide.congress.gov/scripts/biodisplay.pl?index=B000993 (last visited Oct. 4, 2011).

305. Nev. *ex rel.* Nev. State Bd. of Agric. v. United States, 512 F. Supp. at 170 (quoting Nevada's brief) (internal quotation marks omitted); *see also* Eugene R. Gaetke, *Refuting the "Classic" Property Clause Theory*, 63 N.C. L. REV. 617, 621 n.23 (1985) (describing as "a fundamental tenet of the Sagebrush Rebellion" the argument that, on admission of the state, the federal government must transfer federal lands to the state).

306. Nev. *ex rel.* Nev. State Bd. of Agric. v. United States, 512 F. Supp. at 170; *see also* Leshy, *supra* note 11, at 319–29 (providing thorough exploration of equal footing argument).

This argument found no more success with the U.S. district court in Nevada than it did in the Supreme Court. Citing *Kleppe*, Judge Reed reminded Nevada and every other western state that the Property Clause "entrusts Congress with power over the public land without limitations; it is not for the courts to say how that trust shall be administered, but for Congress to determine."[307] Judge Reed went on to explain that an otherwise valid federal regulation does not violate the equal footing doctrine "merely because its impact may differ between various states because of geographic or economic reasons."[308] The doctrine "does not cover economic matters," the court reasoned, because "there never has been equality among the states in that sense."[309] The Ninth Circuit had no trouble affirming the decision,[310] thus putting an end to western states' legal attempts to wrest control of the public rangelands from the federal government. The equal footing issue made a brief encore in Nevada's subsequent litigation to stop the federal government from developing a repository for nuclear wastes at Yucca Mountain.[311] But, by the time Nevada ranchers challenged federal ownership of rangelands under the equal footing doctrine in the 1990s, the State sided with the United States in defending continued federal control.[312]

IV. *KLEPPE'S* ROLE AS A POLITICAL TOOL

Despite losses in the courts, the Sagebrush Rebellion (continuing in its more recent guise as the "states' rights" or "wise use" movement) has proven resilient to changing politics and the dramatic demographic shifts in western states. What accounts for the staying power of a movement resting on such a weak legal foundation and based largely on an industry with shrinking economic importance?

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307. Nev. *ex rel.* Nev. State Bd. of Agric. v. United States, 512 F. Supp. at 172.

308. *Id.* at 171 (citing Island Airlines, Inc. v. Civil Aeronautics Bd., 363 F.2d 120 (9th Cir. 1966)).

309. *Id.* (citing United States v. Texas, 339 U.S. 707, 716 (1950)).

310. Nev. *ex rel.* Nev. State Bd. of Agric. v. United States, 699 F.2d 486 (9th Cir. 1983).

311. *See* Nevada v. Watkins, 914 F.2d 1545, 1553 (9th Cir. 1990) (rejecting Property Clause challenge to statute authorizing waste facility); Nuclear Energy Inst., Inc., v. U.S. Envtl. Prot. Agency, 373 F.3d 1251, 1304–305 (D.C. Cir. 2004) (rejecting both Property Clause and equal footing challenges).

312. United States v. Gardner, 107 F.3d 1314, 1317 n.1 (9th Cir. 1997); *see also* United States v. Nye Cnty., 920 F. Supp. 1108, 1120 (D. Nev. 1996).

Many have regarded the Sagebrush Rebellion as a bizarre and misguided movement.[313] As one author asked, "[w]hy would the commodity interests—ranchers, loggers, et al.—want to *own* federal lands that already offered such a bounty of subsidies?"[314] The reality is that ranchers did not really want to own the federal lands. Instead, ranchers and their representatives sought to stifle the effects of the 1970s federal legislation increasing environmental restrictions on and competition for the use of the public lands. Laws like the WFRHBA pitted ranchers against the federal government by giving horses what amounted to unrestricted access to scarce rangeland water and forage upon which the ranchers depended. The FLPMA exacerbated the tensions, even though it left the status quo of the Taylor Grazing Act mostly intact and provided special solicitude for state interests and plans.[315]

The FLPMA required the BLM, for the first time, not only to coordinate with and "assure that consideration is given to" relevant state-authorized plans, but also to "provide for meaningful public involvement of State and local government officials."[316] This is a version of cooperative federalism that is characterized by "state favoritism in federal process."[317] The FLPMA encourages federal agencies to account for state concerns, but often requires little more than that the BLM "pay attention."[318] Ultimately, the agency may adopt its own ideas about what is best for federal land management.[319] The BLM's regulations, though, go further than the FLPMA mandates in

313. *See* Babbitt, *supra* note 260, at 853.

314. Donald Snow, *The Pristine Silence of Leaving It All Alone*, *in* A WOLF IN THE GARDEN, *supra* note 51, at 28 (citing, for example, "absurdly cheap grazing fees").

315. *See* Fischman & King, *supra* note 180.

316. 43 U.S.C. § 1712(c)(9) (2006). John Leshy cites this provision in stating that "it can be argued that the FLPMA gives state and local governments a much greater say in federal land management than previously." Leshy, *supra* note 11, at 348.

317. Fischman, *Cooperative Federalism and Natural Resources Law*, *supra* note 267, at 200 (describing this type of cooperative federalism in natural resources law which provides special avenues for states, available to no other stakeholders (other than tribes), to influence federal decision-making).

318. N.M. *ex rel.* Richardson v. Bureau of Land Mgmt., 459 F. Supp. 2d 1102, 1120–21, (D.N.M. 2006), *aff'd in part, vacated in part, rev'd in part,* 565 F.3d 683 (10th Cir. 2009) (upholding BLM's oil and gas development plan for New Mexico's Otero Mesa notwithstanding the objections of the governor and inconsistencies with certain state plans); *see also* Fischman & King, *supra* note 180, at 162–63 (discussing Otero Mesa dispute in the context of cooperative federalism).

319. *N.M.* ex rel. *Richardson*, 459 F. Supp. 2d at 1120–21.

structuring cooperative federalism.[320] The regulations actually require every BLM plan to be consistent with state and local plans "so long as" the non-federal plans themselves are "consistent with the purposes, policies and programs of Federal laws and regulations."[321] This standard invites state and local planning to circumscribe BLM discretion in applying land use statutes and rules. The BLM regulations also establish a "consistency review" procedure for determining when the BLM will accept the recommendations of a governor on a plan.[322] The BLM approach to its statute is more accommodating of state interests than any other example of state favoritism in federal process.[323]

A. "Un-cooperative Federalism" as a Legacy of the Sagebrush Rebellion

The importance of cooperative federalism in the FLPMA starkly contrasts the Sagebrush Rebellion's distinctive "un-cooperative" methods, which also characterize some contemporary assertions of local control over federal lands, especially in Utah. In this respect, the Sagebrush Rebellion extends the spectrum of "un-cooperative federalism" as conceptualized by Jessica Bulman-Pozen and Heather Gerken.[324] The most extreme opposition to federal objectives in their model is "civil disobedience," as exemplified by state resolutions opposing federal policies or declaring that a state will not enforce or participate in a federal scheme.[325] The Sagebrush Rebellion demonstrates rebellious actions that lie beyond the uncooperative endpoint of their continuum, such as state challenges to federal legislation (e.g., the WFRHBA and the FLPMA) and direct interference with agency management

320. 43 C.F.R. §§ 1610.3-1 to -.3-2 (2010); *see* Fischman & King, *supra* note 180, at 159–60.

321. 43 C.F.R. § 1610.3-2(a).

322. The consistency procedure requires the BLM state director to submit each proposed BLM plan to the relevant governor for identification of any known inconsistencies. The governor then has sixty days to identify inconsistencies and provide recommendations for remedying the BLM plan. If the BLM state director does not accept the governor's recommendation(s), then the governor may appeal to the national BLM director. 43 C.F.R. § 1610.3-2(e) (2010).

323. Fischman, *Cooperative Federalism and Natural Resources Law*, *supra* note 267, at 200.

324. *See generally* Bulman-Pozen & Gerken, *supra* note 18.

325. *Id.* at 1271, 1278–80.

(as exemplified by the Kane County roads dispute, described below).[326]

While most states put substantial energy into shaping public land policy through the channels created by Congress, the rebellion (and its modern "wise use" adherents) rejected the role of states as junior partners in resource management. The choice to engage in "un-cooperative federalism" did not prevent the very same states from quietly pursuing their interests through existing statutory avenues to influence public land management. Thus, after Nevada enacted its Sagebrush Rebellion bill,[327] "state officials hurried to Washington to make sure that their claim of ownership would not result in interruption of federal payments to the state which were based on continuing federal land ownership."[328]

The Sagebrush Rebellion was an effort of a frustrated minority, accustomed to power, that had been beaten back not just by the power of the Property Clause but also by the environmental movement's legislative success. Protests under the Sagebrush Rebellion, and the related "wise use" banner, continue to directly challenge federal authority.[329] Rather than "a last gasp of a passing era,"[330] the Sagebrush Rebellion signaled the continued vitality of "un-cooperative federalism" as a tool for political leverage.

For instance, Kane County, Utah engages in an ongoing battle with the federal government over road claims on public lands in southern Utah. Kane County stands with a new "Sagebrush Coalition" in opposing federal efforts to close roads or limit motor vehicle access on federal lands.[331] Like the *Kleppe* challenge to the WFRHBA, the county was spurred into action by what it perceived as federal overreaching into the domain of traditional local control. On September 18, 1996, President Clinton designated 1.9 million acres in southern Utah, including part of Kane County, as the Grand Staircase-

326. *See infra* notes 332–43 and accompanying text.

327. *See supra* notes 289–95 and accompanying text (discussing Assembly Bill 413).

328. COGGINS ET AL., *supra* note 24, at 77.

329. *See* sources cited *supra* note 29.

330. Leshy, *supra* note 11, at 349; *see also* Clayton, *supra* note 265, at 533 (asserting that "[r]ather than fight for ownership of the public lands, a battle they will surely lose, the Rebels should concentrate their efforts on attempting to achieve increased control over the public land management decision process," and concluding that the Rebellion would result in "cooperative federalism seldom paralleled in the nation's history").

331. *See* Jackson, *supra* note 29.

Escalante National Monument.[332] Almost immediately thereafter, Kane County commissioners approved the grading of what the county called "roads" in federal wilderness study areas and in the national monument.[333] The BLM called them "primitive trails."[334] Crews employed by the county graded sixteen of these "roads" without getting approval from the BLM or even notifying the agency.[335] Kane County defiantly claimed ownership of the rights-of-way under an 1866 statute commonly called RS 2477.[336] But even if the county possessed the rights under RS 2477, it would need BLM's permission to conduct improvements on federal lands that go beyond mere maintenance of the paths' historical use.[337] Prompted by the Southern Utah Wilderness Alliance, the BLM sought an injunction against the county,[338] which commenced a protracted and multifaceted battle that remains mired in the courts.

In August 2005, Kane County upped the ante by enacting an ordinance opening some primitive trails on federal lands, including the national monument, to off-road vehicle (ORV) use, contravening BLM policy.[339] The BLM then attempted to

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332. Establishment of the Grand Staircase-Escalante National Monument, 61 Fed. Reg. 50,223 (Sept. 18, 1996). Utah reacted with animosity. *See, e.g.*, James Brooke, *New Reserve Stirs Animosities in Utah*, N.Y. TIMES Oct. 13, 1996, http://www.nytimes.com/1996/10/13/us/new-reserve-stirs-animosities-in-utah.html?scp=1&sq=grand+staircase-escalante&st=nyt.

333. S. Utah Wilderness Alliance v. Bureau of Land Mgmt., 425 F.3d 735, 742 (10th Cir. 2005) [hereinafter SUWA]; *see also* Larry Warren, *Utah Counties Bulldoze the BLM, Park Service*, HIGH COUNTRY NEWS Oct. 28, 1996, http://www.hcn.org/issues/92/2868/print_view.

334. *SUWA*, 425 F.3d at 742. The county claimed title to over sixty roads on federal lands, and "at least 30 roads within or on the boundary of Grand Staircase-Escalante National Monument." Eryn Gable, *Court Rules Enviros Can't Challenge Utah County's Road Claims*, LAND LETTER, Jan. 13, 2011.

335. *SUWA*, 425 F.3d at 742; Gable, *supra* note 334.

336. Act of July 26, 1866, ch. 262, § 8, 14 Stat. 251, 253 (codified at 43 U.S.C. § 932), *repealed by* Federal Land Policy Management Act of 1976, Pub. L. No. 94-579 § 706(a), 90 Stat. 2743 (codified as amended at 43 U.S.C. §1701 (2006)). While new RS 2477 rights could not be created after 1976, "valid" RS 2477 rights existing at the date of repeal continue in effect. *SUWA*, 425 F.3d at 741. The FLPMA provided no procedure to validate or record existing RS 2477 rights. *Id.*

337. *SUWA*, 425 F.3d at 745.

338. *Id.* at 743.

339. The Wilderness Soc'y v. Kane Cnty., 470 F. Supp. 2d 1300, 1303 (D. Utah 2006). The court granted plaintiffs' motion to amend their complaint in order to add the BLM and the Fish and Wildlife Service as defendants for a claim under the Endangered Species Act. *Id.* at 1308–09. The District Court again addressed the merits of the case in 2008. *See* The Wilderness Soc'y v. Kane Cnty., 560 F. Supp. 2d 1147 (D. Utah 2008) (holding that county ordinance allowing ORV use

close those same areas to such uses, but the county later took down the BLM signs and placed its own signs indicating the routes were "open."[340] Challenged in court by environmental groups, the county initially lost on the merits only to succeed in getting the case dismissed for lack of standing.[341] Representing Kane County in the dispute over roads in Grand Staircase-Escalante National Monument was none other than Mike Lee, the Utah eminent domain bill supporter who rode to the Senate on the latest iteration of the "un-cooperative federalism" movement: the Tea Party.[342] Despite its tenuous legal foundation, the county's strategy of "un-cooperative federalism" has reaped some practical dividends. In 2010, the Obama administration stipulated that five of the Kane County claims had perfected rights under RS 2477, including Skutumpah Road, which cuts through Grand Staircase-Escalante National Monument.[343] In 2011, Utah began dipping into its appropriations under the 2010 eminent domain law to assert ownership of rights-of-way in the neighboring Garfield County portion of Grand Staircase-Escalante National Monument.

B. Social Science Perspective on Kleppe's *Role in the Sagebrush Rebellion*

Social scientists who have studied political movements' use of confrontational litigation offer lessons applicable to the *Kleppe* story. One lesson is that the "Sagebrush Rebellion" may

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on federal land was preempted by federal law), *aff'd*, 581 F.3d 1198 (10th Cir. 2009), *rev'd on other grounds*, 632 F.3d 1162 (10th Cir. 2011) (holding environmental groups lacked standing to challenge county claims to RS 2477 rights on federal public land).

340. *The Wilderness Soc'y*, 560 F. Supp. 2d at 1154–56.

341. *The Wilderness Soc'y*, 632 F.3d at 1165.

342. Gable, *supra* note 334; *see also supra* note 5 and accompanying text (describing Mike Lee's role in promoting Utah's 2010 eminent domain law).

343. The victory is a limited one, however, as the federal government likely retains the power to make reasonable regulations respecting rights-of-way on public land. *See* Hale v. Norton, 461 F.3d 1092, 1096 (9th Cir. 2006) (reaffirming principle that rights-of-way through federal lands are subject to reasonable regulation by the United States); The Wilderness Soc'y v. Kane Cnty., 581 F.3d 1198, 1229 n.4 (10th Cir. 2009) (McConnell, J., dissenting) (conceding that even if the county established valid RS 2477 claims, the federal government retained "substantial regulatory authority" over the rights-of-way). At least one other right-of-way, Bald Knoll Road, was previously acknowledged by the BLM. Christine Hoekenga, *The Road More Traveled*, HIGH COUNTRY NEWS, Oct. 1, 2007; Rachel Jackson, *Counties Cross the Yellow Line*, HIGH COUNTRY NEWS, July 20, 2001.

be a better term than "states' rights" because it reflects the kind of coalition-building necessary to achieve success in the executive and legislative branches when judicially enforceable rights are *not* available.[344] While United States culture may conceive of political ideals in terms of fights for rights in courts, failure in the judicial forum does not foreclose success in other arenas.[345] In the end, "states' rights" in federal natural resources law may be more important as a political rallying cry than a judicial doctrine.[346]

Another lesson emerges from Eve S. Weinbaum's study of community-based activism in Tennessee to fight plant closings, de-industrialization, and economic inequality. She tells a similar "story of failure" in a very different context from *Kleppe*.[347] The central characters in her story had far less access to power in state government than the ranchers in the Sagebrush Rebellion. Nonetheless, Weinbaum's research illustrates how disparate but "organized, aggressive, [and] confrontational" social movements[348] can build institutions, "activist networks, and long-term coalitions" in losing battles, which "created the conditions for later success."[349] "Failures—rather than resulting in humiliation and depression—can create the context for social change and pivotal political movements. Successful failures do not always transform the economy, or the social or political landscape, but they can accomplish crucial outcomes."[350]

The story of *Kleppe* fits Weinbaum's category of a "successful failure."[351] The Sagebrush Rebellion would repeat, often intentionally, quixotic lawsuits. Indeed, the legislative history of Nevada's Assembly Bill 413 explicitly recognized the usefulness of doomed litigation to the larger cause of reducing

344. EPP, *supra* note 14, at 13 (emphasis added).

345. *Id.* at 15–16.

346. Another vehicle for states' rights constitutional claims is the Tenth Amendment, although this route is unlikely to see much more success than the states' previous arguments. *See, e.g.*, Shepard, *supra* note 23, at 528–32 (exploring Tenth Amendment claims cases after *Kleppe* which raised the Tenth Amendment as an issue, and the likelihood of this argument's success in the future).

347. WEINBAUM, *supra* note 14, at 7.

348. *Id.* at 10.

349. *Id.* at 8.

350. *Id.* at 267.

351. Of course, sometimes litigation losses lead to more failure. Benjamin I. Sachs has shown how this is true in labor organizing, where collective action depends on workers' self-reinforcing dynamic of success. Benjamin I. Sachs, *Employment Law as Labor Law*, 29 CARDOZO L. REV. 2685, 2690 (2008).

federal limitations on public land users.[352] Utah's 2010 law[353] illustrates the continuing popularity of this approach.

The converse to Weinbaum's term—one might call it a "failed success"—is also evident in the struggle over public rangeland management. An important limitation of activism through courts is that winning a case does not necessarily ensure compliance.[354] An example of this is the litigation that Oliver Houck highlights as the pivotal case paving the way for enactment of the FLPMA.[355] The environmentalist victory in *NRDC v. Morton* did require the BLM to conduct comprehensive environmental impact analyses to evaluate the relationship between range conditions and grazing.[356] But it did not ensure full compliance. Environmental impact analysis continues to lag far behind public rangeland decision-making, and has not made much of a dent in allotment stocking decisions.[357]

Unsurprisingly, the legal literature concentrates more on the outcomes of litigation than social science research,[358] which views success or failure through a wider lens. The late Stuart Scheingold pioneered the use of political science to better understand the practical, on-the-ground changes wrought by disputes over rights. Scheingold's analytical framework "decenter[s]" law to shift its focus from authoritative institutions, such as courts, to "the more fluid terrain" of

352. *See supra* notes 282–87 and accompanying text.

353. H.B. 143, 58th Leg., Gen. Sess., 2010 Utah Laws (codified at UTAH CODE ANN. § 78B-6-503.5 (West 2010)).

354. SCHEINGOLD, *supra* note 13, at 117–18.

355. Houck, *The Water, the Trees, and the Land*, *supra* note 22, at 2305–07.

356. NRDC v. Morton, 388 F. Supp. 829, 841 (D.D.C. 1974), *aff'd*, 527 F.2d 1386 (D.C. Cir. 1976); *see also* Houck,*The Water, the Trees, and the Land, supra* note 22, at 2300–08 (discussing *NRDC v. Morton*).

357. *See, e.g.*, Idaho Watersheds Project v. Hahn, 307 F.3d 815 (9th Cir. 2002); W. Watersheds Project v. Bennett, 392 F. Supp. 2d 1217 (D. Idaho 2005) (discussing BLM failure to conduct NEPA analysis on grazing permits and other problems with FLPMA administration). For the past decade Congress has responded to the BLM's failure to keep up with NEPA compliance on grazing permit renewals by providing relief in the form of riders on the annual Interior Appropriations budget. The riders direct that expiring grazing permits be renewed under the same terms until the Secretary can complete the NEPA analysis. *See, e.g.*, Act of Nov. 10, 2003, Pub. L. No. 108–108, § 325, 117 Stat. 1307, 1307–08 (2003). The Forest Service faces the same kind of problem with a backlog of environmental impact analyses for its grazing permits. Eryn Gable, *Thousands of Forest Service Allotments Await NEPA Analyses*, LAND LETTER, Aug. 2, 2007.

358. *See, e.g.*, sources cited *supra* note 23. (discussing legal scholarship on *Kleppe*).

intermediate institutions, such as agencies and civil society organizations.[359] The "decenter[ed]" view we present of *Kleppe* reveals substantial success in intermediate institutions, such as the BLM, which has largely insulated ranchers from their worst fears and environmentalists' best hopes of public land law reform. Scheingold's conclusions about the politics of rights nicely summarize the meaning of *Kleppe*, the rise of the Sagebrush Rebellion, and public rangeland reform. Judicial acceptance of rights or other legal arguments does not

> mean that the goal will be embraced more generally nor that the social changes implied will be effected. If there is opposition elsewhere in the system, the judicial decision is more likely to engender than to resolve political conflict. In that conflict, a right is best treated as a resource of uncertain worth, but essentially like other political resources: money, numbers, status, and so forth.[360]

Similarly, New Mexico's failure in *Kleppe* did not doom state resistance to federal public land reform or dampen ranchers' objections to incorporating environmental values in natural resource allocation. Instead, it helped spark the Sagebrush Rebellion and a host of spin-off movements that succeeded with money, status in agency deliberations, and political allies as often as they failed in courts.

Perhaps even more relevant for understanding the role of *Kleppe* in the Sagebrush Rebellion is the recent work of Michael Klarman on the civil rights movement.[361] His analysis of *Brown v. Board of Education*[362] cautions that even the highest profile Supreme Court decisions themselves do not (necessarily) directly prompt change. He argues that it was the southern backlash in response to *Brown*, rather than the

359. SCHEINGOLD, *supra* note 13, at xxii.

360. *Id.* at 7; *see also* ROBERT C. ELLICKSON, ORDER WITHOUT LAW: HOW NEIGHBORS SETTLE DISPUTES (1991) (documenting legally adjudicated rights playing only a marginal role in resolving on-the-ground conflicts in the context of social norms of liability among ranchers in northern California).

361. MICHAEL J. KLARMAN, FROM JIM CROW TO CIVIL RIGHTS: THE SUPREME COURT AND THE STRUGGLE FOR RACIAL EQUALITY (2004); Michael J. Klarman, *How* Brown *Changed Race Relations: The Backlash Thesis*, 81 J. AM. HIST. 81 (1994), *available at* JSTOR.

362. 347 U.S. 483 (1954).

holding itself, that catalyzed real reform in practice, especially in the form of the federal civil rights laws of the 1960s.[363]

Notwithstanding that *Kleppe* has no place in the pantheon of the most important decisions of the Court, Professor Klarman's work offers two lessons for our story. First, commentators should resist the urge to exaggerate the extent to which a judicial opinion directly alters the social-legal framework for allocating influence and power.[364] For example, *Brown* itself arguably failed directly to end legal segregation in the deep South.[365] Certainly, *Kleppe* failed to stanch western state "un-cooperation" with federal land management objectives. As lawyers ourselves, we perhaps exaggerate the direct role of *Kleppe* in our enthusiasm to connect legislation, litigation, administration, and politics.[366] Second, court decisions may be most important for their indirect impacts on political discourse through backlash.[367] Klarman argues that it was the violent, massive resistance to *Brown* that had the greatest impact on politics and stands as its lasting legacy.[368] He summarizes this argument in stating that "the post-*Brown* racial backlash created a political environment in which southern elected officials stood to benefit at the polls by boldly defying federal authority."[369] While the backlash in the West cannot be compared to the South's mass resistance to *Brown v. Board of Education*, "un-cooperative federalism" certainly pays dividends at the polls. Just ask Utah's Senator Mike Lee.

CONCLUSION

With its legal arguments shredded, one might imagine the Sagebrush Rebellion died a simple death. But it lived on, fueled

363. KLARMAN, FROM JIM CROW TO CIVIL RIGHTS, *supra* note 361; Klarman, *How* Brown *Changed Race Relations*, *supra* note 361, at 82.

364. Klarman, *How* Brown *Changed Race Relations*, *supra* note 361, at 81.

365. *Id.* at 84–85.

366. In this respect, we follow a long line of legal commentators chided by Klarman. *See id.* at 81 n.1. Professor Rosenberg develops a more finely detailed model to determine when litigation succeeds in changing the political balance of power in policy disputes. GERALD N. ROSENBERG, THE HOLLOW HOPE: CAN COURTS BRING ABOUT SOCIAL CHANGE? (1st ed. 1991).

367. Klarman, *How* Brown *Changed Race Relations*, *supra* note 361, at 82.

368. *Id.* Massive resistance was the "unification of southern racial intransigence, which . . . propelled politics in virtually every southern state . . . ." *Id.* Massive resistance included the brutal suppression of civil rights demonstrations. *Id.*

369. *Id.* at 110.

by the very litigation losses that seem to mark its failure. *Kleppe* was the first great court battle of the rebellion. In many ways, it served as the template for subsequent legal tactics that helped build political support for the ranching interests and other private property concerns reflected in western state ideology.

It would be hard to imagine how the basic narrative of the WFRHBA's enactment and the *Kleppe* decision could be worse for ranchers. They completely failed to shape the legislation in Congress and lost badly in the Supreme Court. More broadly, the Sagebrush Rebellion, which the WFRHBA and *Kleppe* helped spur, enjoyed no major judicial victories. Yet, as Utah prepares to spend millions more on futile litigation,[370] the Sagebrush Rebellion continues to enjoy success in setting the terms of political debate, and electing officials who will advance the rhetoric of state control. By framing the issues as ones of states' rights and local culture, the sagebrush rebels offered an alternative narrative to downplay ecological concerns of overgrazing. Congress inadvertently paved the way with the WFRHBA, which did not rest on ecological grounds and distracted reformers from the problems of livestock overgrazing. The sagebrush rebels may have peddled legal theories based on a "mendacious myth" about the Constitution and federal power.[371] But myths exert great power over the way people understand the world and its conflicts. So despite all the failures, the rebellion and its modern progeny successfully resisted major reforms of grazing management aimed at restoring the ecological condition of the public range.

The story of *Kleppe* and its aftermath shows how legislative frustration and court losses sustain popular movements. In this respect, the sagebrush rebels and their kin in the wise use, states' rights, Tea Party, and property rights movements share important characteristics with the traditionally liberal causes of civil rights and economic justice. At the dawn of the modern era of public land law, the perennial complaints of public land states moved into courtrooms, mimicking the tactics of the very environmentalists they abhorred. Both interests gained political leverage as a result.

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370. *See supra* notes 1–5 and accompanying text.

371. Scott W. Reed, *The County Supremacy Movement: Mendacious Myth Marketing*, 30 IDAHO L. REV. 525 (1993).

A PREDICTION MARKET FOR CLIMATE OUTCOMES

SHI-LING HSU*

This Article proposes a way of introducing some organization and tractability in climate science, generating more widely credible evaluations of climate science, and imposing some discipline on the processing and interpretation of climate information. I propose a two-part policy instrument consisting of (1) a carbon tax that is indexed to a "basket" of climate outcomes, and (2) a cap-and-trade system of emissions permits that can be redeemed in the future in lieu of paying the carbon tax. The amount of the carbon tax in this proposal (per ton of CO_2) would be set each year on the basis of some objective, non-manipulable climate indices, such as temperature and mean sea level, and also on the number of certain climate events, such as flood events or droughts, that occurred in the previous year (or some moving average of previous years). I refer to these indices and events as climate outcomes. In addition to a carbon tax rate being set each year, an auction would be held each year for tradable permits to emit a ton of carbon dioxide in separate, specific, future years. That is, in the year 2012, a number of permits to emit in 2013 would be auctioned, as well as a number of permits to emit in 2014, in 2015, and so forth. In the year 2013, some more permits to emit in 2014 would be auctioned, as well as more permits to emit in 2015, 2016, and so forth.

The permits to emit in the future are essentially unitary exemptions from a future carbon tax: An emitter can either pay the carbon tax or surrender an emissions permit to emit in the specific vintage year. Because of this link between the carbon tax and the permit market, the trading price of the

* University of British Columbia Faculty of Law. Thanks to Dianna Robertson for excellent research assistance, and thanks to Michael Abramowicz, John Abraham, Ross McKitrick, Andrew Dessler, Xuebin Zhang, Judith Curry, Yoram Margalioth, Kevin Gibson, Martin Smith, and commenters at the First Colloquium on Environmental Scholarship at Vermont Law School, and the attendees at the Environmental Law and Policy Workshop at the Buchman Faculty of Law at Tel Aviv University for their help and comments. This research was supported by funding from Carbon Management Canada.

permits should reflect market expectations of what the carbon tax will be in the future and, concomitantly, expectations of future climate outcomes. The idea is to link the price of tradable permits to future climate outcomes, so that a market is created in which accurate and credible information about future climate conditions are important inputs into the price of permits. The market for tradable permits to emit in the future is essentially a prediction market for climate outcomes. And yet, unlike prediction markets that have been operated or proposed thus far, this prediction market for climate outcomes operates against the backdrop of an actual and substantial tax liability. Whereas prediction markets have heretofore largely involved only recreational trading, this prediction market will operate against a regulatory backdrop and thus will provide much stronger incentives for traders to acquire and trade on information.

INTRODUCTION

Few challenges in the history of humankind have received as much attention or been the target of as much funding as global climate change. This unprecedented deployment of resources seems warranted, given the potential for vast, sweeping environmental changes that could not only destabilize vital ecosystems but also lead to civil unrest that could politically destabilize entire regions. Climate change is also alone among environmental problems in its extraordinary complexity and inherent uncertainty, therefore requiring a massive research effort. But a spastic outpouring of money has only produced a huge and intractable body of science trying very hard but falling short of predicting future climate conditions. Layered on top of this literature is another set of educated guesses, the variety of possible human response scenarios to climate conditions, which in turn could affect the future climate.[1] These disparate and complicated bodies of knowledge, products of research efforts at hundreds of universities and research institutes throughout the world, have been foisted upon a hapless global public in desperate need of a "Climate Change for Dummies" manual.[2]

1. Integrated assessment models link climate change effects and economic activity effects in a joint climate and economic model to project climate changes and economic costs and benefits together. For a review of the two dozen or so integrated assessment models, see NICHOLAS STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW 164–73 (2007), *available at* http://www.hm-treasury.gov.uk/stern_review_report.htm; *see also* Hans-Martin Füssel & Michael D. Mastrandrea, *Integrated Assessment Modeling*, *in* CLIMATE CHANGE SCIENCE AND POLICY 150, 150–61 (Stephen H. Schneider et al. eds., 2010).

2. One book, *Global Warming for Dummies* by Elizabeth May and Zoë Caron, is available, but by most indicators, it does not seem to be as popular as one would expect it to be. Elizabeth May is the leader of the Green Party, *A Message from Elizabeth May*, GREEN PARTY CAN., http://greenparty.ca/leader (last visited Aug. 10, 2011), and Zoë Caron serves on the board of directors for the Sierra Club,

Into this comprehension vacuum has rushed a variety of interest groups that have helped produce a public discourse that has been at times emotional and vitriolic, and at other times puzzlingly apathetic, but rarely constructive and rarely leading to rational policy discussion. Climate scientists, not generally accustomed to the glare of public policy debate, have found themselves the targets of accusations, investigations, and sometimes death threats.[3] In this science policy discussion of supreme importance, it is painfully obvious that more heat than light is emerging from the vast amount of climate information available and that the lay public has understandably thrown up its hands and tried to not think about climate change. Climate policy has suffered as a result.

This Article proposes a way of introducing some organization and tractability in climate science, generating more widely credible evaluations of climate science, and imposing some discipline on the processing and interpretation of climate information. I propose a two-part policy instrument—a tax-and-cap-and-trade program consisting of (1) a carbon tax that is indexed to a "basket" of climate *outcomes* (including, but not limited to, temperatures), and (2) a cap-and-trade system of emissions permits, nested inside this carbon tax, that can be redeemed in lieu of paying the carbon tax. The amount of the carbon tax in this proposal (per ton of carbon dioxide (CO_2)) would be set each year on the basis of some objective, non-manipulable climate indices, such as temperature and mean sea level, and also on the measured

Board of Directors, SIERRA CLUB CAN., http://www.sierraclub.ca/en/board-directors (last visited Aug. 10, 2011). As of June 26, 2011, the Amazon.com sales rank for the book was 1,095,219, AMAZON.COM, http://www.amazon.com/Global-Warming-Dummies-Elizabeth-May/dp/0470840986, as opposed to *The Rough Guide to Climate Change* by Intergovernmental Panel on Climate Change climate scientist Robert Henson, which ranked 143,368, AMAZON.COM, http://www.amazon.com/Rough-Guide-Climate-Change-2nd/dp/1858281059/ref=sr_1_1?s=books&ie=UTF8&qid=1311376968&sr=1-1, or *The Climate Crisis: An Introductory Guide to Climate Change* by David Archer and Stefan Rahmstorf, which ranked 24,542, AMAZON.COM, http://www.amazon.com/Climate-Crisis-Introductory-Guide-Change/dp/0521732557/ref=sr_1_1?s=books&ie=UTF8&qid=1311377058&sr=1-1.

3. *See, e.g.*, *Climate Scientists in U.S. Barraged with Death Threats*, CLIMATEWIRE (July 7, 2010), http://www.eenews.net/climatewire/2010/07/07/4 (paid subscription); *Climate Scientists Receive Death Threats*, ABCNEWS.COM (May 24, 2010), http://abcnews.go.com/WNT/video/climate-scientists-receive-death-threats-10729457; Stephen Leahy, *Violent Backlash Against Climate Scientists*, INTER PRESS SERVICE (Mar. 9, 2010), http://ipsnews.net/news.asp?idnews=50607.

severity of certain climate events, such as hurricanes or droughts, that occurred in the preceding year or some *moving average* of previous years. In addition to a carbon tax rate being set each year, an auction would be held each year for tradable permits to emit a ton of CO_2 in separate, specific, future years. That is, in the year 2012, a number of permits to emit in 2013 would be auctioned, as well as a number of permits to emit in 2014, in 2015, and so forth. In 2013, some more permits to emit in 2014 would be auctioned, as well as more permits to emit in 2015, and so forth.

The permits to emit in the future are the key to this proposal. Permits would be unitary exemptions from a future carbon tax: An emitter can either pay the carbon tax or surrender an emissions permit to emit in the specific vintage year. Because of this link between the carbon tax and the permit market, the trading price of the permits should reflect market expectations of what the carbon tax will be in the future and, concomitantly, expectations of future climate outcomes. The idea is to link the price of tradable permits to future climate outcomes so that a market is created in which accurate and credible data about future climate conditions are inputs into the price of permits. The market for tradable permits to emit in the future is essentially a *prediction market* for climate outcomes.

In prediction markets, as in futures markets, contracts are bought and sold in which payoffs are contingent upon specified future outcomes.[4] The trading prices of contracts thus rise and fall with the perceived probabilities of their occurrence. Prediction markets have a fairly long but inconspicuous history of successfully predicting a variety of outcomes, such as electoral outcomes.[5] The Iowa Electronic Markets project,[6] one of the pioneers of prediction markets, has long successfully operated a presidential election market in which "shares" of candidates are bought and sold, their trading price proving to be an accurate predictor of their vote share or the probability of

4. Prediction markets are really an extension of futures markets, with outcomes taking on a broader range of possibilities. While futures markets usually contemplate the delivery of some agricultural commodity or other resource (such as natural gas), shares in a prediction market can be predicated on any outcome.

5. *See* discussion *infra* Part II.

6. Tippie Coll. of Bus., The Univ. of Iowa, IOWA ELECTRONIC MARKETS, http://tippie.uiowa.edu/iem/index.cfm (last visited Feb. 11, 2011) [hereinafter IEM PROJECT].

their victory. But this proposal goes well beyond what most prediction markets have thus far tried to accomplish: This proposal creates a prediction market that is connected to an actual regulatory instrument with very substantial financial implications. The indexed carbon tax proposed here, even though quite modest, will give rise to a prediction market of unprecedented size and will create unprecedented incentives for information compilation and revelation.

At the same time, the advantages of prediction markets are uniquely useful in processing climate science. First, the ability of prediction markets to aggregate and organize vast, disparate pieces of information is nowhere employed as productively as in the case of climate change. With climate science coming from so many quarters and drawing on information that is local in many ways, prediction markets are a singularly effective way to process the otherwise intractably numerous bodies of climate science. Second, prediction markets tap into pecuniary self-interest to process information in a way that is presumptively free of bias or preference for certain outcomes. This advantage is of crucial importance in the climate debate, as climate science is in need of not only aggregation and filtering, but also an institution that can scrub out some of the taint of ideology or political manipulation. In the current environment, beliefs about climate change are too intertwined with a variety of economic and professional interests, such that virtually no one can make an assertion about climate change without being accused of having *some* interest—economic, professional, or psychic—in convincing others. In prediction markets, it is simply too costly to sustain a disingenuous position. It is harder to put your money where your mouth is when you do not *truly* believe what you are saying, particularly when market prices are providing constant feedback.

This marriage between the idea of prediction markets and the problem of climate science draws out, as marriages should, the best of each partner. There is no better mechanism for processing climate science than prediction markets, and there is no better way to showcase the power of prediction markets than to apply one to climate science. In climate science, prediction markets have found their heretofore highest and best calling, and in prediction markets, climate science has found its redeemer. While this proposal *could* reduce greenhouse gas emissions, the primary purpose of this proposal

is not to regulate or price emissions but to create a market that harnesses, processes, and even creates information about climate science in a way that is presumptively free of ideology and bias.

This tax-and-cap-and-trade mechanism also enjoys a political advantage. In this proposal, the carbon tax would be a low one and would increase only if climate change turns out, after all, to be a real problem. By indexing the carbon tax to climate outcomes, it creates a pay-as-you-go policy, requiring payments from carbon emitters as the consequences of their emissions become more tangible and costly. Because the climatic anomalies of climate change will impose costs and in some cases necessitate disaster assistance, the proceeds from the carbon tax and the auction proceeds from the cap-and-trade program can be used to provide this assistance. In this sense, this tax-and-cap-and-trade program is a pay-as-is-needed policy of assistance. Couched as a *funding* mechanism rather than a revenue-grab, it may be easier to sell to a tax-averse public.

Part I of this Article provides a background of the information problems that have plagued climate science and hampered the development of climate policy. Part II of this Article provides some background theory and practice of prediction markets. Part III sets forth the proposed policy, setting out the details of the policy proposal, along with some rationales for the many micro-decisions that need to be made for this proposal to work. Part IV addresses some of the implementation issues created by this proposal, as well as some of the political realities that this proposal is likely to encounter. Part V concludes with some summary remarks.

I. WHY IS CLIMATE SCIENCE SO HARD?

While public opinion on the seriousness of climate change has fluctuated,[7] the general public has consistently harbored fundamental misunderstandings about the causes and risks of climate change[8] and has maintained an inflated perception of

7. Lydia Saad, *Did Hollywood's Glare Heat Up Public Concern About Global Warming?*, GALLUP (Mar. 21, 2007), http://www.gallup.com/poll/26932/Did-Hollywoods-Glare-Heat-Public-Concern-About-Global-Warming.aspx.

8. For example, a recent study found that sixty-seven percent of Americans believe that "reducing toxic waste" would reduce global warming, while forty-three percent believe that "punching holes in the ozone layer with rockets" contributes to global warming. ANTHONY LEISEROWITZ ET AL., YALE PROJECT ON

the extent of disagreement among climate scientists.[9] Why is it that global climate change seems to pose such a problem in terms of knowledge dissemination? Hasn't humankind grappled with new and complicated sciences before—like nuclear energy and weaponry, space exploration, and information technology—and eventually wrestled them down to some satisfactory understanding? Why can't people get their heads wrapped around climate change?

Clearly, part of the problem is due to an active campaign waged by a legion of "climate skeptics"[10] of varying credibility who have challenged conventional climate wisdom and scrutinized a broad range of assertions by climate scientists. Some climate skeptics are more serious and thoughtful than others, and some raise more legitimate issues than others. The labels "climate skeptics" and "climate scientists" are not intended to suggest that climate skeptics do not include scientists in their ranks. They include M.I.T. climate science professor Richard Lindzen, an outspoken climate skeptic.[11] On occasion, Lindzen has been accused of overselling his climate skepticism,[12] but for the most part Lindzen's disagreements

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CLIMATE CHANGE COMMC'N, AMERICANS' KNOWLEDGE OF CLIMATE CHANGE 11–12 (2010), *available at* http://environment.yale.edu/climate/files/ClimateChangeKnowledge2010.pdf.

9. *See, e.g.*, Matthew C. Nisbet & Teresa Myers, *Twenty Years of Public Opinion About Global Warming,* 71 PUB. OPINION Q. 444, 450–54 (2007); Frank Newport, *Americans' Global Warming Concerns Continue to Drop*, GALLUP (Mar. 11, 2010), http://www.gallup.com/poll/126560/americans-global-warming-concerns-continue-drop.aspx.

10. "Climate skeptics" is a common term describing people who have doubts about the validity of the science supporting action on climate change. "Skeptic" and "skepticism" are terms that are commonly used by advocates for policy action on climate change. *See, e.g.*, Coby Beck, *How to Talk to a Climate Skeptic*, GRIST, http://www.grist.org/article/series/skeptics (last visited Apr. 22, 2011); John Cook, *How Climate Skeptics Mislead*, SKEPTICAL SCI. (June 13, 2010), http://www.skepticalscience.com/how-climate-skeptics-mislead.html. The terms are also used by the skeptics themselves. *See, e.g.*, THE CLIMATE SCEPTICS, http://climatesceptics.net (last visited Apr. 22, 2011) (subtitled "[t]he world's first political party representing scepticism and objectivity in climate policy"); CLIMATE SKEPTIC, http://www.climate-skeptic.com (last visited Apr. 22, 2011).

11. *See, e.g.*, Richard S. Lindzen, *The Climate Science Isn't Settled*, WALL ST. J., Nov. 30, 2009, http://online.wsj.com/article/SB10001424052748703939404574567423917025400.html.

12. Lindzen and several other physics professors once wrote an open letter to Congress titled, "To the Congress of the United States: You are being deceived about global warming," and claiming, among many other things, that "there is no such evidence; it doesn't exist." Letter from Robert H. Austin et al. to the 111th Cong. (July 1, 2009), *available at* http://www.climatedepot.com/a/1745/Scientists-Write-Open-Letter-to-Congress-You-Are-Being-Deceived-About-Global-Warming--Earth-has-been-cooling-for-ten-years. This letter was sharply criticized by his

with climate scientists have been on scientific grounds, mainly having to do with the effect of clouds on climate change.[13] Skeptics also include Roy Spencer, a respected climatologist at the University of Alabama at Huntsville, who developed a global temperature database based on satellite data.[14] Scientific progress depends on skepticism, and it would be unprincipled to dismiss the challenges posed by Lindzen and Spencer, at least when they are grounded in science.

Skepticism *not* grounded in science, however, has also been a part of the climate debate. This less credible skepticism has either been very selective in attacking climate science or taken the form of specious allegations of conspiracy or scientific misconduct. The recent "Climategate" affair, in which a number of emails to and from climate scientists were mysteriously stolen and leaked, has raised the suggestion that climate scientists have engaged in data manipulation.[15]

M.I.T. colleague, Kerry Emanuel, who subsequently blogged on a website for the National Association of Scholars that he "confronted the sole climate scientist among the authors with this statement, and he confessed that he did not hold that to be the case. Last I checked, lying to Congress was a federal crime." Kerry Emanuel, *"Climategate": A Different Perspective*, NAT'L ASS'N SCHOLARS (July 19, 2010), http://www.nas.org/polArticles.cfm?doc_id=1444.

13. Lindzen has hypothesized that rising temperatures increase the formation of cirrus clouds that would reflect solar radiation. Richard S. Lindzen et al., *Does the Earth Have an Adaptive Infrared Iris?*, 82 BULL. AM. METEOROLOGICAL SOC'Y 417 (2001). A subsequent study found that the effect of cirrus clouds actually leads to greater warming, not less. Bing Lin et al., *The Iris Hypothesis: A Negative or Positive Cloud Feedback?*, 15 J. CLIMATE 3 (2002). Lindzen has also hypothesized that increased sea surface temperatures correspond with higher rates of radiation leaving the Earth's atmosphere. Richard S. Lindzen & Yong-Sang Choi, *On the Determination of Climate Feedbacks from ERBE Data*, 36 GEOPHYSICAL RES. LETTERS L16705, 6 (2009). This has been criticized for assuming away energy flows in and out of the tropics. Kevin. E. Trenberth et al., *Relationships Between Tropical Sea Surface Temperature and Top-of-Atmosphere Radiation*, 37 GEOPHYSICAL RES. LETTERS L03702 (2010).

14. Roy W. Spencer & John R. Christy, *Precise Monitoring of Global Temperature Trends from Satellites*, 247 SCIENCE 1558, 1558 (1990).

15. Reasonably objective accounts of the controversy are the exception, but one credible account was published by the Guardian (U.K.), not ordinarily known for its restraint. Incorporating public comments, the series seems to have accurately picked out the most salient details. Fred Pearce, *Climate Wars*, GUARDIAN.CO.UK (Feb. 9, 2010), http://www.guardian.co.uk/environment/series/climate-wars-hacked-emails. Some fundamental facts seem to account for much of the controversy. The data that were sought by climate skeptics have been presented in a fashion that would appear to be opaque, but the raw data were provided to researchers at the Climatic Research Unit (CRU) at the University of East Anglia, one of the centers of the controversy, on the condition that they not be publicly disseminated. Editorial, *Closing the Climategate*, 468 NATURE 345, 345 (2010), *available at* http://www.nature.com/nature/journal/v468/n7322/full/468345a.html.

Although the scientists implicated in Climategate have been exonerated,[16] doubt seems to persist about the credibility of climate science.[17] Other forms of skeptical nonsense are more substantive. Some skeptics have asserted that global warming is due to increased sunspot activity, or that Arctic sea ice is actually increasing,[18] and have mis-cited sources as support for

> It remains the case that many of the data used by CRU scientists are covered by agreements that prevent their wider distribution. . . . There are often good reasons for such sequestering of data, and some studies might not be done without it. But where the full information needed to reproduce a study is not publicly available, scientists have a duty to report that, and say why.

Id.

16. *See, e.g.*, SIR MUIR RUSSELL ET AL., THE INDEPENDENT CLIMATE CHANGE E-MAILS REVIEW (2010), *available at* http://www.eenews.net/assets/2010/07/08/document_cw_01.pdf; Lauren Morello, *'Climategate' Investigators Find No 'Deliberate' Misconduct by Scientists*, CLIMATEWIRE (Apr. 15, 2010), http://www.eenews.net/climatewire/2010/04/15/6 (paid subscription).

17. *See, e.g.*, ANTHONY LEISEROWITZ ET AL., YALE PROJECT ON CLIMATE CHANGE COMMC'N, GLOBAL WARMING'S SIX AMERICAS 9 fig.1 (2010), *available at* http://environment.yale.edu/climate/files/SixAmericasJune2010.pdf (showing that from November 2008 to January 2010 (spanning the "Climategate" incident) those "alarmed" about global warming decreased from 18% to 10% and those "dismissive" (not at all concerned about global warming) rose from 7% to 16%. Those figures rebounded somewhat but remained below 2008 levels, with those alarmed rising back up to 13% in June 2010 and those dismissive dropping back down to 12%). *See also* David R. Baker, *'Climategate' Fallout May Impact Legislation*, S.F. CHRON., July 19, 2010, http://www.sfgate.com/cgi-bin/article.cgi?file=/c/a/2010/07/19/MNNS1EFLDU.DTL; Patrik Jonsson, *Climate Scientists Exonerated in 'Climategate' but Public Trust Damaged*, CHRISTIAN SCI. MONITOR, July 7, 2010, http://www.csmonitor.com/Environment/2010/0707/Climate-scientists-exonerated-in-climategate-but-public-trust-damaged.

18. While many people make these arguments, one prominent example is Lord Christopher Monckton, a former advisor to British Prime Minister Margaret Thatcher and policy advisor to a think tank called the Science and Public Policy Institute. *Personnel*, SCI. & PUB. POL'Y INST., http://scienceandpublicpolicy.org/personnel.html (last visited June 29, 2011). Monckton has asserted, among many other things, that sunspot activity was responsible for global warming and that we would begin to get global cooling, Minn. Free Mkt. Inst., *Lord Christopher Monckton Speaking in St. Paul*, YOUTUBE (Oct. 15, 2009), http://www.youtube.com/watch?v=stij8sUybx0 at 1:07:00, and also that arctic sea ice has actually been increasing over the last thirty years, *Protecting Lower-Income Families While Fighting Global Warming: Hearing Before the Subcomm. on Income Sec. & Family Support of the H. Comm. on Ways & Means*, 111th Cong. 41 (2009) (statement of Lord Christopher Monckton), *available at* http://www.gpo.gov/fdsys/pkg/CHRG-111hhrg49410/pdf/CHRG-111hhrg49410.pdf. Sunspot activity has been thoroughly debunked as an explanation of global temperature changes. *See, e.g.*, A.D. Erlykin et al., *Solar Activity and the Mean Global Temperature,* 4 ENVTL. RES. LETTERS 014006, at 4–5 (2009); Mike Lockwood, *Solar Change and Climate: An Update in the Light of the Current Exceptional Solar Minimum*, 466 PROC. ROYAL SOC'Y A 303, 323 (2010); T. Sloan & A.W. Wolfendale, *Testing the Proposed Causal Link Between Cosmic Rays and Cloud Cover*, 3 ENVTL. RES. LETTERS 024001, at 6 (2008). Monckton's statement

these assertions.[19] While spurious claims are relatively easy for scientists to debunk, they are difficult for most others to process. Even spurious claims, some climate skeptics seem to have astutely calculated, muddy otherwise robust conclusions for a lay public with a limited attention span and competing demands for time. An unwitting media industry, conditioned to provide balanced reporting, has given equal time to climate skeptics, credible or not, and has helped to create an exaggerated impression of controversy among reputable climate scientists and experts.[20]

But it is ultimately self-defeating to focus on the role of climate skeptics in trying to explain why people have trouble understanding climate change. Even without an opposition campaign, the task of communicating and addressing climate change is bound to run into trouble. If there was ever a scientific problem that was tailor-made to create public doubt and confusion, it would be global climate change. This Part outlines some of the reasons that climate change is such a difficult problem to study and communicate. They stem from the disparate sources of climate science, the complexity of the science, and the overwhelming temptation for people to resist engagement with the complicated and depressing realities of climate science.

A. Disparateness

One obstacle to broad comprehension lies in the disparate, far-flung sources of climate science, which make it more difficult for the lay public to collate the information. Climate science probably *should* have many origins because climate

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that sea ice was declining was based on an inaccurate comparison of two carefully selected years, 1980 and 2009. For two of several rebuttals to this absurdity, see John Abraham, *Abraham Shows Monckton Wrong on Arctic Sea Ice*, SKEPTICAL SCI. (June 2, 2010), http://www.skepticalscience.com/print.php?n=214, and Alden Griffith, *Is Arctic Sea Ice 'Just Fine'?*, SKEPTICAL SCI. (Aug. 18, 2010), http://www.skepticalscience.com/Is_Arctic_Sea_Ice_Just_Fine.html.

19. Lord Monckton, for example, stated that the International Astronomical Union "held a symposium" on solar activity and "concluded" that solar activity was largely responsible for increases in temperature, Minn. Free Mkt. Inst., *supra* note 18, at 1:07:55, a conclusion that was denied by the President of the International Astronomical Union's Division of Sun and Heliosphere, John Abraham, *Monckton Chronicles Part II—Here Comes the Sun?*, SKEPTICAL SCI. (June 4, 2010), http://www.skepticalscience.com/print.php?n=216.

20. Maxwell T. Boykoff & Jules M. Boykoff, *Balance as Bias: Global Warming and the US Prestige Press*, 14 GLOBAL ENVTL. CHANGE 125 (2004).

science draws on so many different sources of information, every ecosystem in every corner of the world having something to teach us about the effects of climate change and potential feedback effects. Studying climate change thus requires an extremely broad research effort; no single institution could undertake even a fraction of the research required to understand the broad impacts and sources of climate change. Moreover, some systems are so complex that multiple research efforts are required just to study one system or one aspect of climate change.

To take just one example, there are no fewer than five U.S. government-funded institutes that have made it part of their core mission to study or fund the study of climate changes in the polar regions.[21] And these five entities do not actually perform the bulk of the work; that is mostly left to the hundreds of groups and institutes based in academic institutions worldwide, many of which are funded by these five entities.[22] But even collectively, all of these groups are, for lack of a better phrase, just the tip of the iceberg.

There is probably considerable overlap in all of this research. But a time-consuming consolidation would clearly be unhelpful. Some of these entities already cooperate.[23] Each

21. *See, e.g.*, *Arctic Climate Research: Overview*, NAT'L SCI. FOUND., http://www.nsf.gov/news/special_reports/arctic/overview.jsp (last updated July 12, 2008); *Arctic Research of the Composition of the Troposphere from Aircraft and Satellites*, NAT'L AERONAUTICS & SPACE ADMIN., http://www.nasa.gov/mission_pages/arctas (last updated Aug. 7, 2008); NASA GODDARD INST. FOR SPACE STUD., http://www.giss.nasa.gov (last visited June 29, 2011); NAT'L ICE CENTER, http://www.natice.noaa.gov (last visited June 29, 2011); *NOAA Arctic Research Program*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., http://www.arctic.noaa.gov/arp (last visited June 29, 2011).

22. *See, e.g.*, BYRD POLAR RES. CENTER, OHIO ST. U., http://bprc.osu.edu (last updated June 2, 2011); INT'L ARCTIC RES. CENTER, U. ALASKA FAIRBANKS, http://www.iarc.uaf.edu (last visited July 6, 2011); NAT'L SNOW & ICE DATA CENTER, http://nsidc.org (last visited July 6, 2011); *Nordic Network on Sea-Ice Research*, U. HELSINKI, http://www.helsinki.fi/netice (last visited July 6, 2011); *Sea Ice Group*, U. OTAGO, http://www.physics.otago.ac.nz/research/ice/index.html (last modified Oct. 8, 2008).

23. For example, the National Science Foundation's Office of Polar Programs itself has several divisions, including one focusing on Arctic programs and one focusing on Antarctic programs. The website for the Division of Arctic Sciences states that "[t]he Foundation is one of 12 Federal agencies that sponsor or conduct arctic science, engineering, and related activities. As mandated by the Arctic Research and Policy Act of 1984, Federal interagency research planning is coordinated through the Interagency Arctic Research Policy Committee (IARPC), which is chaired by NSF." *About the Division of Arctic Sciences*, OFF. POLAR PROGRAMS, NAT'L SCI. FOUND., http://www.nsf.gov/od/opp/arc/about.jsp (last updated Feb. 4, 2010).

group, institute, or department has a unique perspective on the arctic environment, and each probably has something important to contribute as a stand-alone entity conducting arctic research. For example, the National Ice Center in Suitland, Maryland, has historically served as a navigational resource, collecting data on Arctic and Antarctic ice conditions, and is jointly operated by the U.S. Navy, the Coast Guard, and the National Oceanic and Atmospheric Administration (NOAA).[24] The day-by-day ice monitoring is a vital information resource that complements, for example, the analytical modeling and forecasting expertise in other agencies. And the diversity of institutions also serves to monitor ice throughout the world, tracking the recession of glaciers in far-flung corners such as the Himalayas, the Rocky Mountains, and southern Chile. A large, diverse crowd of researchers is a good thing.

But how does anyone make sense of the barrage of information from these hundreds of entities? One institution, the United Nations-created Intergovernmental Panel on Climate Change (IPCC),[25] has become a repository of climate research and a leading interpreter of climate science. Because of this leadership role, it has also served as a lightning rod. A relatively small number of errors in the IPCC's 2000-plus-page 2007 report on the science and policy of climate change[26] has

24. *Mission Statement*, NAT'L ICE CENTER, http://www.natice.noaa.gov/mission.html?bandwidth=low (last visited June 29, 2011).

25. The IPCC is a United Nations-appointed body of over 400 scientists engaged in the science of climate change. It was created and staffed as part of an attempt to develop some science that was as broadly representative as possible of the divergent viewpoints on climate science. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, http://www.ipcc.ch (last visited June 29, 2011). Often criticized, the IPCC was awarded the Nobel Peace Prize, along with former U.S. Vice President Al Gore, in 2007. *The Nobel Peace Prize 2007*, NOBELPRIZE.ORG, http://nobelprize.org/nobel_prizes/peace/laureates/2007 (last visited Apr. 22, 2011).

26. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS (Susan Solomon et al. eds., 2007) [hereinafter IPCC FOURTH ASSESSMENT], *available at* http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg1_report_the_physical_science_basis.htm. The IPCC came under fire for making a surprising claim that Himalayan glaciers could melt away by the year 2035, a claim that was based upon a media interview with a glacier scientist in 1999. For a description of the controversy, see Damian Carrington, *IPCC Officials Admit Mistake over Melting Himalayan Glaciers*, GUARDIAN.CO.UK (Jan. 20, 2010), http://www.guardian.co.uk/environment/2010/jan/20/ipcc-himalayan-glaciers-mistake. But the controversy over this mistake only seems to underscore the fact that the 2000-plus-page report contained few errors. For a discussion of the relatively few errors in the IPCC report, see *Pew's Gulledge Discusses Research*

spurred calls for the dissolution of the IPCC, and not just by climate skeptics.[27] But even if the IPCC was not (rightly or wrongly) under assault, it only serves as a rough compiler of climate science, only issuing assessment reports every six or seven years.[28]

In the meantime, it is a huge a challenge to keep track of the daily news about climate science developments, even for a dedicated layperson. Even if one is sophisticated and committed enough to subscribe to a news intermediary such as Greenwire,[29] the daily bombardment of climate research findings is overwhelming. Under these circumstances, it begins to appear rational to delegate some of the information processing to intermediaries, an interpretive vacuum that interest groups of all types have been happy to fill in a self-serving manner.

B. Complexity and Uncertainty

A second major cause of the climate comprehension problem is the complexity of climate science and the attendant uncertainties of modeling complex systems. Given the severity of these problems, we should probably feel fortunate to have a reasonably definitive projection of global mean temperature increase. The best estimate thus far, generated by the IPCC, is that a doubling of CO_2 concentration in the Earth's atmosphere will most likely lead to an increase in global mean temperature of 2° C to 4.5° C.[30] But this is a wide range, and within it, a variety of things can happen. At a 2.5° C increase, the Prairie Pothole Region of the central United States and Canada, home to the most productive waterfowl habitat in the world, will lose almost forty percent of its seasonal wetlands; at a 4° C

and Reporting of Climate Science, E&ETV (Mar. 2, 2010), http://www.eenews.net/tv/transcript/1122.

27. John M. Broder, *Scientists Taking Steps to Defend Work on Climate*, N.Y. TIMES, Mar. 3, 2010, at A11, *available at* http://www.nytimes.com/2010/03/03/science/earth/03climate.html.

28. Assessment reports have been issued in 1990, 1995, 2001, and 2007. *Reports*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml (last visited June 29, 2011). The next one is due in 2014. *Activities*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, http://www.ipcc.ch/activities/activities.shtml (last visited June 29, 2011).

29. GREENWIRE, http://www.greenwire.com (last visited June 29, 2011).

30. IPCC FOURTH ASSESSMENT, *supra* note 26, at 12.

increase, the loss would be closer to eighty-five percent.[31] Given the extraordinary predictions that climate researchers are being asked to make, this example of uncertainty is not unreasonable. But it does not make for easy communication to a mass audience.

Studying climate change is no less than studying how almost every system on Earth reacts to changing concentrations of greenhouse gases and incorporating them into one gigantic model. Climate models, developed for decades now, essentially try to do this. The most sophisticated climate models, "general circulation models" (GCMs), are so data-intensive that they can only be run on the world's most powerful supercomputers. GCMs depict the Earth's atmosphere as a three-dimensional grid consisting of cells that are, at present, roughly 100 kilometers squared by one kilometer high.[32] Each of the resulting billions of cells is governed by a menu of physical, chemical, and biological equations that describe what happens in each cell, as well as a number of equations that describe energy transfers between cells.[33] GCMs are validated and calibrated by seeing how well they reproduce *past* temperatures. Climate scientists have reconstructed historical records of temperatures using tree rings, mountain glaciers, coral reefs, and pollen from lake beds[34] and have reconstructed historical CO_2 concentrations from frozen air bubbles in ice core samples.[35] Models are then run as if they were operating in the distant past and trying to predict a future (a more recent past) that climate scientists have already reconstructed.[36] Despite the painstaking validation process, climate scientists have only slightly alleviated concerns about underlying model quality, especially as the historical reconstructions themselves have come under attack.[37]

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31. Lisa G. Sorenson et al., *Potential Effects of Global Warming on Waterfowl Populations Breeding in the Northern Great Plains*, 40 CLIMATIC CHANGE 343, 358 fig.4a (assuming a seven percent increase in precipitation).

32. Michael D. Mastrandrea & Stephen H. Schneider, *Climate Change Science Overview*, *in* CLIMATE CHANGE SCIENCE AND POLICY, *supra* note 1, at 11, 23–24.

33. *Id.* at 23.

34. *Id.* at 12.

35. *Id.* at 16–18.

36. *Id.* at 25.

37. Most notably, the "hockey stick" controversy, referring to the hockey stick-shaped graph of global temperatures as a function of time, has been a particularly bloody battleground, with some climate skeptics claiming that it is created by academic fraud, and climate scientists rallying around temperature modelers such as the embattled Michael Mann, one of the central figures in the "Climategate"

Climate modelers readily concede that even the most sophisticated GCMs can only do so much. While the resolution of GCMs is vastly improved from just a decade ago, much can happen within a space 100 kilometers squared by a kilometer high. Clouds, for example, are often smaller than a cell, so GCMs have only crudely modeled the behavior of clouds.[38] Climate modelers have also struggled to model the impact of aerosols, airborne particles (often pollution) that may reflect sunlight, reducing the amount of solar radiation trapped in the Earth's atmosphere.[39] Alternatively, they may also absorb sunlight and *increase* trapped heat.[40] Climate modelers have also had to improvise in modeling certain non-anthropogenic events that affect climate, like the 1991 eruption of Mount Pinatubo, which spewed enough volcanic ash into the air to slightly cool global mean temperatures for years.[41] Every time something happens that affects climate, climate modelers have to scramble to figure out if their models can accurately reproduce the temperature changes resulting from the event. Therefore, uncertainties remain large.

Perhaps more importantly, climate modelers concede that GCMs are generally not very good in modeling many *feedbacks* that, as a result of temperature increases, could either amplify or attenuate a temperature increase.[42] Cloud formation due to higher temperatures, for example, could potentially reflect sunlight and reduce temperatures[43] or could trap more heat within the atmosphere and further increase temperatures.[44] Models are currently inconclusive in predicting which direction clouds will push temperatures.[45] Models also struggle with projecting the formation of water vapor, which could increase with higher temperatures,[46] and the emissions of methane, a

affair. *See* Jonsson, *supra* note 17. The original hockey-stick analogy stemmed from a graph appearing in a 1998 article in *Nature* magazine, depicting the recent increase in global mean temperature as the "blade" part of a hockey stick. Michael E. Mann et al., *Global Scale Temperature Patterns and Climate Forcing over the Past Six Centuries*, 392 NATURE 779, 783 fig.5b (1998).

38. Mastrandrea & Schneider, *supra* note 32, at 24–25.

39. *Id.* at 19 ("[u]nfortunately, the uncertainty in aerosol radiative forcing complicates the assessment of 'climate sensitivity': the amount the Earth's surface warms for a given increase in forcing").

40. *Id.*

41. *Id.* at 25.

42. *Id.* at 21–23.

43. Lindzen et al., *supra* note 13, at 429.

44. IPCC FOURTH ASSESSMENT, *supra* note 26, at 635.

45. *Id.* at 636.

46. *Id.* at 593.

greenhouse gas twenty-five times more powerful than CO_2.[47] The emission of methane could increase catastrophically as higher temperatures melt the Arctic permafrost that has trapped huge quantities of methane.[48] That experts *still* have little idea of how much methane is being emitted[49] is indicative of the huge uncertainties that confront climate scientists.

Climate science has made enormous advances in the last several decades. But the world's climate scientists, as a group, are tasked with a continuing research assignment unlike anything ever attempted. Uncertainty and complexity are naturally going to be parts of this process, which makes for problematic communications to a lay public that may not relish the complexity or have the patience for uncertainty and might just be looking for a reason not to think about such a depressing subject.

C. The Benefits of Denial

A popular explanation of Galileo's conviction of heresy is that the Catholic Church found his advocacy of Copernican astronomy threatening to the Church's Ptolemaic, Earth-centered astronomy.[50] However, other more contextual versions

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47. Mastrandrea & Schneider, *supra* note 32, at 18.

48. ROBERT HENSON, THE ROUGH GUIDE TO CLIMATE CHANGE 86 (2d ed. 2008).

49. Edward A.G. Schuur et al., *The Effect of Permafrost Thaw on Old Carbon Release and Net Carbon Exchange from Tundra*, 459 NATURE 556, 556 (2009) ("[t]he rate of carbon release from permafrost soils is highly uncertain"); K.M. Walter et al., *Methane Bubbling from Siberian Thaw Lakes as a Positive Feedback to Climate Warming*, 443 NATURE 71, 71 (2006). As Walter notes:

> Large uncertainties in the budget of atmospheric methane, an important greenhouse gas, limit the accuracy of climate change projections. Thaw lakes in North Siberia are known to emit methane, but the magnitude of these emissions remains uncertain because most methane is released through ebullition (bubbling), which is spatially and temporally variable.

Id. (footnotes omitted).

50. *Galileo and the Inquisition*, GALILEO PROJECT, http://galileo.rice.edu/bio/narrative_7.html (last visited Nov. 10, 2010). This story finds some support in Biblical passages that, if taken literally, suggest that Earth is stationary and whatever objects that can be observed from the Earth are the moving objects. *See* Glenn Elert, *The Scriptural Basis for a Geocentric Cosmology*, E-WORLD (Apr. 25, 1999), http://hypertextbook.com/eworld/geocentric.shtml. The Earth could be understood to stand still from the following passages: "tremble before him, all earth; yea, *the world stands firm, never to be moved*," *id.* (emphasis added by Elert) (quoting 1 *Chronicles* 16:30) and "[y]ea, *the world is established; it shall never be moved*," *id.* (emphasis added by Elert) (quoting *Psalms* 93:1). The sun could be understood to be moving from the following:

emphasize the extent to which Ptolemaic astronomy was the conventional wisdom and how Copernican sun-centered astronomy posed a threat to a broad set of social and economic interests outside of the Church.[51] In this way, Galileo's trial could be seen as more of a failed campaign than an anti-science persecution.[52]

Like Galileo, climate scientists face numerous threats and challenges as they seek to upend the value judgments implicit in a world economy that has equated fossil fuel combustion with economic growth. U.S. Senator James Inhofe, a long-time and vociferous climate skeptic, recently used his office in the Senate Committee on Environment and Public Works to publish its own specious analysis of climate science, culminating with a list of seventeen climate scientists who, in Inhofe's view, have perpetrated a "fraud" on the public.[53] The

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> Then spoke Joshua to the Lord in the day when the Lord gave the Amorites over to the men of Israel; and he said in the sight of Israel, "*Sun, stand thou still* at Gibeon, and thou Moon in the valley of Aijalon." *And the sun stood still*, and the moon stayed, until the nation took vengeance on their enemies. Is this not written in the Book of Jashar? *The sun stayed in the midst of heaven*, and did not hasten to go down for about a whole day.

Id. (emphasis added by Elert) (quoting *Joshua* 10:12–13).

51. Doug Linder, *The Trial of Galileo*, U. MO.—KANSAS CITY (2002), http://www.law.umkc.edu/faculty/projects/ftrials/galileo/galileoaccount.html. As Linder points out:

> Copernicus' theory was a challenge to the accepted notion contained in the natural philosophy of Aristotle, the astronomy of Ptolemy and the teachings of the Church that the sun and all the stars revolved around a stationary Earth. In the half-century since its publication, however, Copernicus' theory met mostly with skepticism.

Id.

52. *See* RICHARD G. OLSON, SCIENCE AND RELIGION, 1450–1900: FROM COPERNICUS TO DARWIN 16 (Johns Hopkins Paperbacks 2006) (2004) (arguing that there is little evidence of Church suppression of astronomical inquiry). One economist has even made the argument that it was the league of astronomy professors that persuaded the Church to quash dissent from the Ptolemaic theory, at that time the dominant theory taught in universities. E. RAY CANTERBERY, THE MAKING OF ECONOMICS—VOLUME I: THE FOUNDATION 64 (4th ed. 2003).

53. MINORITY STAFF OF S. COMM. ON ENV'T & PUB. WORKS, 111TH CONG., 'CONSENSUS' EXPOSED: THE CRU CONTROVERSY 35–37 (2010) [hereinafter CRU CONTROVERSY], *available at* http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=7db3fbd8-f1b4-4fdf-bd15-12b7df1a0b63. The report states that, "[i]n our view, the CRU documents and emails reveal, among other things, unethical and potentially illegal behavior by some of the world's preeminent climate scientists," *id.* at 1, lists the federal laws that the scientists may have violated, *id.* at 30–31, lists seventeen climate scientists as "key players," *id.* at 35–37, and says it is "investigating" those scientists for misconduct, *id.* at 32. Inhofe has infamously and persistently called global warming a "hoax." *See, e.g.*, Amanda Little, *James Inhofe, Senate's Top Skeptic,*

charges have not stuck substantively, but have succeeded in clouding the reports and their authors.[54] Even the even-keeled *Economist* called for the resignation of the head of the IPCC, Rajendra Pachauri,[55] the man who American energy lobbyists and the George W. Bush administration fought hard to install as IPCC president.[56] Most ominously, some climate scientists have received death threats relating to their climate work,[57] including the late Stanford climatologist Stephen Schneider, one of the early pioneers of climate science.[58]

Perhaps even more troubling than the fanaticism behind death threats is the indifference with which much of the global public receives climate science. Even as the IPCC issues more definitive and more worrisome findings, the appetite for legislative action on climate change, particularly in the United States, does not seem to reflect the alarm of climate scientists.[59] With so much at stake, the public reaction even among those that do consider climate change a problem amounts to little more than a shrug.[60] A popular climate skeptic blog, *Climate Audit*, posted by retired Canadian mining executive Steve McIntyre, boasts an incredible audience, claiming over three million hits from September 12, 2010, through August 3, 2011.[61] The large following of McIntyre's blog appears to suggest that there are significant parts of the

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Explains His Climate-Hoax Theory, GRIST (Feb. 25, 2010), http://www.grist.org/article/2010-02-25-james-inhofe-senate-top-skeptic-explains-climate-hoax-theory.

54. Lauren Morello, *Panel Criticizes IPCC Leadership but Upholds Science*, CLIMATEWIRE (Sept. 7, 2010), http://www.eenews.net/climatewire/2010/09/07/3 (paid subscription).

55. *Climate Controversies: Flawed Scientists*, ECONOMIST, July 8, 2010, http://www.economist.com/node/15450615 ("Dr. Pachauri has been a staunch defender of the panel as it is rather than an advocate for reform that would improve it. He is not the man to carry out the changes it badly needs.").

56. Andrew C. Revkin, *Dispute Arises over a Push to Change Climate Panel*, N.Y. TIMES, Apr. 2, 2002, at A10.

57. *See* sources cited *supra* note 3.

58. Schneider's early works include *The Genesis Strategy: Climate and Global Survival* (1976) and *Global Warming: Are We Entering the Greenhouse Century?* (1989).

59. *See* LEISEROWITZ ET AL., *supra* note 17, at 9 fig.1.

60. For example, the Leiserowitz study reported that among those who were "concerned" about global warming, 15% of respondents reported that they paid "a lot" of attention to global warming, while 53% said they paid "some" and 31% said they paid "a little." *Id.* at 13 tbl.4. Of the same "concerned" group, 29% said they were "very interested," while 64% said they were "moderately interested." *Id.* at 15 tbl.6.

61. Steve McIntyre, CLIMATE AUDIT, http://climateaudit.org (last visited Aug. 3, 2011).

general public that seem to at least be ready to be talked out of the dangers of climate change. Rational or not, it is a current reality that many people distrust the sources of the scientific predictions about future climate conditions.

Climate scientists should not be any more surprised by the apathy than they are by the violence. If climate scientists are right, then the world faces a stark choice: either undertake fundamental changes in the way that almost every economy operates, imposing substantial costs on almost every country and society in the world, or roll the dice and see what happens with the Earth's climate. Avoiding this question by finding fault with the underlying science provides enormous psychic benefits.

D. Reform Proposals

The disparate, complex, and uncertain nature of climate information thus makes it *convenient* for people to find fault with climate science. Who wants to do the work required to keep pace with climate science, only to face a choice between two depressing realities?[62] The high costs of trying to avoid climate change, coupled with the scientific complexities and uncertainties, make a compelling case for rational denial.

Some believe that better communications of climate science can help change minds by better explaining the complexities and uncertainties of climate science in a more familiar context. For example, the notion of insurance has sometimes been invoked as a metaphor for reducing greenhouse gas emissions in the present, whereby humanity would spend some money now, akin to insurance premiums, to

62. It has been argued that in a selfish sense, it is rational to avoid the pain of reducing greenhouse gases now, on the grounds that centuries of economic history suggest that the future generations that will have to deal with climate change will be much wealthier than the current one. This argument has been made by Thomas Schelling, *Intergenerational Discounting*, 23 ENERGY POL'Y 395, 398 (1995) ("I conclude that most of us will want to discount or depreciate heavily the extra consumption provided for (or conserved for) descendants of the current population, because they are likely to be better off . . . ."). However, it has been counter-argued that this is a risky approach because there is a small (as far as we currently know) but significant chance that climate change could have such catastrophic consequences that future generations might not be wealthier after all. *See, e.g.*, STERN, *supra* note 1, at 162–63; *see also* Thomas Sterner & U. Martin Persson, *An Even Sterner Review: Introducing Relative Prices into the Discounting Debate*, 2 REV. ENVTL. ECON. & POL'Y 61, 62 (2008).

address the *risk* of climate change in the future.[63] A collection of prominent climate and social scientists have called for a nonpartisan climate communications initiative to take on some of the intermediary role of interpretation.[64] Too much discussion of Climategate and other putative scandals has taken on the air of self-defense, which has detracted from discussion of the underlying issues. The thinking would be that a separate communications body that is less personally involved with the science itself may have more success focusing the discussion on the science rather than the processes that have been impugned by Climategate and climate skeptics.

Other reforms and oversights have been proposed to bolster the credibility of climate science. In the wake of the few but embarrassing errors in the IPCC Fourth Assessment report, the United Nations created an independent panel to review IPCC procedures for transparency and credibility.[65] The panel concurred with the IPCC's scientific conclusions but was critical of its procedures.[66] Universities have also investigated claims against their faculty members accused of manipulating data.[67]

Unsurprisingly, none of these measures have mollified critics or climate skeptics.[68] It would be fanciful to think that this kind of fiat would change anybody's mind. It has been simple for climate skeptics to attack the review panels in much the same way that they have attacked climate science: that the

63. EUROPEAN COMM'N, EU ACTION AGAINST CLIMATE CHANGE: LEADING GLOBAL ACTION TO 2020 AND BEYOND 7 (2008) ("This is a small price to pay to insure ourselves against dangerous levels of climate change."); Martin L. Weitzman, *GHG Targets as Insurance Against Catastrophic Climate Damages* 2 (Nat'l Bureau of Econ. Research, Working Paper No. 16136, 2010); Stephanie Doster, *Leading UA Scholars Say Early Action Is Best "Insurance Policy" Against Climate Change*, U. ARIZ. INST. ENV'T (Jan. 12, 2006), http://www.environment.arizona.edu/news/early-action.

64. Thomas E. Bowman et al., *Time to Take Action on Climate Communication*, 330 SCIENCE 1044 (2010).

65. *Members of UN Climate Oversight Panel Announced*, UNITED NATIONS NON-GOVERNMENTAL LIAISON SERVICE (May 5, 2010), http://www.un-ngls.org/spip.php?article2419.

66. Morello, *supra* note 54.

67. *See, e.g.*, THE PA. STATE UNIV., RA-10 FINAL INVESTIGATION REPORT INVOLVING DR. MICHAEL E. MANN (2010), *available at* http://live.psu.edu/fullimg/userpics/10026/Final_Investigation_Report.pdf; RUSSELL ET AL., *supra* note 16.

68. For example, Senator Inhofe and others still plan to investigate the IPCC. CRU CONTROVERSY, *supra* note 53; *see also* Lauren Morello, '*Climategate' Inquiry Vindicates Scientists*, CLIMATEWIRE (July 8, 2010), http://www.eenews.net/climatewire/print/2010/07/08/2 (paid subscription).

outcomes were pre-ordained, and that the climate conspiracy includes those who are asked to provide oversight.[69] It is hard to escape the conclusion that climate skeptics will never be convinced by institutional adjustments aimed at making climate science more credible and that these skeptics will find fodder in efforts to increase transparency. This Article thus advocates an entirely different path for evaluating climate science and proposes to draw on an institution that is truly independent: the market.

II. PREDICTION MARKETS

Talk is cheap. Predictions are very cheap. In the public world of climate science, talk and predictions are not only cheap—they are frequently valueless, issued as they are by individuals and organizations with self-serving agendas and on the basis of questionable information. Quality climate science (and reasonable climate skepticism) is mixed with too much ideology, creating an ill broth containing very little informational nutrition.

There is an institution that, while currently suffering through a period of disapproval, is thought to be apolitical and may still be more confidence-inspiring than climate scientists: the market. The recent global financial downturn has called into question the accuracy of market prices as an indicator of value. The rational expectations hypothesis[70] and the efficient markets hypothesis,[71] ideological and intellectual beacons for

69. Climate skeptic Steve McIntyre has lambasted a review of the Climategate emails, chaired by Sir Muir Russell, in a number of entries in his Climate Audit blog. *See, e.g.*, Steve McIntyre, *"Without Oversight or Challenge,"* CLIMATE AUDIT (Oct. 26, 2010), http://climateaudit.org/2010/10/26/without-oversight-or-challenge; Steve McIntyre, *UEA "Welcomes" Untrue Muir Russell Findings*, CLIMATE AUDIT (Sept. 11, 2010), http://climateaudit.org/2010/09/11/uea-welcomes-untrue-muir-russell-finding; Steve McIntyre, *Blatant Misrepresentation by Muir Russell Panel*, CLIMATE AUDIT (July 22, 2010), http://climateaudit.org/2010/07/22/blatant-misrepresentation-by-muir-russell-panel; Steve McIntyre, *Muir Russell—What I'll Be Looking for*, CLIMATE AUDIT (July 6, 2010), http://climateaudit.org/2010/07/06/muir-russell-what-ill-be-looking-for ("I don't expect the Muir Russell report to be as much of an insult to the public as the Penn State report or the Oxburgh report—both of which set the bar pretty low.").

70. Robert E. Lucas, *Expectations and the Neutrality of Money*, 4 J. ECON. THEORY 103 (1972); John F. Muth, *Rational Expectations and the Theory of Price Movements*, 29 ECONOMETRICA 315 (1961).

71. Eugene F. Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383 (1970).

market enthusiasts, are obviously under attack.[72] Robert Schiller's 2000 book *Irrational Exuberance*,[73] prescient in its understanding of the delirious overvaluations of the dot-com bubble, was published in a second edition in 2005,[74] just in time to drop hints of the real estate asset bubble that sunk world markets in 2009. Combined with the Enron scandal earlier this century, in which accounting tricks were parlayed into artificially inflated share prices,[75] traumatic market plunges have cast doubt about whether markets are to be trusted at all. Behavioral economists have long studied systemic divergences from rationality, but it seems that the accumulation of market travails has made it fashionable to find not just exceptions to the rational expectations hypothesis and the efficient markets hypothesis, but to declare that they are "dead" and utterly useless as descriptive theories.[76]

This is hyperbole. No reasonable person doubts that markets still largely work. It would be callous to ignore the individual retirement portfolios that have been wrecked by stock market swings, but by and large, investors still entrust the stock market with large chunks of their individual wealth. Every time stock markets have plunged on the heels of a bursting bubble, investors have eventually returned. And bursting bubbles have only spurred calls for regulation; nobody believes that markets inherently do a poor job of allocating capital, at least as compared with the alternatives.

Most importantly for climate science, markets have always been very effective in knitting together disparate pieces of information and transmitting them in the pithy singularity of a price. If well-designed, markets are capable of collecting, filtering, and processing a huge amount of information of varying quality. An illustrative essay by libertarian icon Leonard Read,[77] *I, Pencil*,[78] concerns the genealogy of a pencil.

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72. John Quiggin, *Rational Manias*, OUT OF THE CROOKED TIMBER (July 19, 2004), http://crookedtimber.org/2004/07/19/rational-manias; David Wighton, *Efficient Market Hypothesis Is Dead—For Now*, THE TIMES (Jan. 29, 2009), http://business.timesonline.co.uk/tol/business/columnists/article5607960.ece.

73. ROBERT J. SCHILLER, IRRATIONAL EXUBERANCE (2000).

74. ROBERT J. SCHILLER, IRRATIONAL EXUBERANCE (2d ed. 2005).

75. *See, e.g.*, FRANK PARTNOY, INFECTIOUS GREED: HOW DECEIT AND RISK CORRUPTED THE FINANCIAL MARKETS 302–04 (2003).

76. *See* Wighton, *supra* note 72.

77. Read was also the founder of the Foundation for Economic Education. *A Tradition of Freedom*, FOUND. FOR ECON. EDUC., http://www.fee.org/office/a-tradition-of-freedom (last visited July 5, 2011).

The reason that Read devotes an essay to the lowly pencil is that there is such a huge number of economic factors that determine how many pencils are made. At one time, one and a half billion pencils were made every year in factories in San Leandro, California, and the markets that determined their production levels were (and remain) enormously complex.[79] Even a simple pencil has a huge number of inputs, including the wood from cedar trees and the graphite (then mined in Ceylon) and the clay (then brought into California from Mississippi) used to make the pencil "lead."[80] There are the labor inputs as well: the labor at the mills, the power plants powering the California pencil factories, and the coffee shops frequented by truckers hauling cedar logs from Oregon to California sawmills.[81] All of these labor and material inputs have competing uses. The point of Read's essay is that all of the countless allocative decisions made during the course of the manufacturing of a pencil are implicitly made by *prices*, which signify the scarcity of a commodity or worker and the importance of competing uses. Market prices, in communicating scarcity, collect, filter, and process the countless pieces of information that go into an implicit, decentralized allocation of resources.

The ability to buy and sell in different quantities also allows markets to *weight* information in accordance to its significance and credibility. If a large retailer that sells school supplies such as Staples or Office Depot were to negotiate a contract for pencils, its negotiated prices would likely reflect a great deal of information and research about the competitive price of pencils. Such a contract would thus likely be both an important (due to the market size of the retailer) and a credible (due to the likelihood that it negotiated a realistic price) source of information.

As Michael Abramowicz explains in his book *Predictocracy: Market Mechanisms for Public and Private Decision Making*,[82] markets can also be harnessed to provide non-financial

78. Leonard Read, *I, Pencil: My Family Tree as Told to Leonard Read*, LIBR. ECON. & LIBERTY (Dec. 1958), http://www.econlib.org/library/Essays/rdPncl1.html.

79. *Id.*

80. *Id.*

81. *Id.*

82. MICHAEL ABRAMOWICZ, PREDICTOCRACY: MARKET MECHANISMS FOR PUBLIC AND PRIVATE DECISION MAKING (2007). For another review of prediction markets, see Justin Wolfers & Eric Zitzewitz, *Prediction Markets*, 18 J. ECON. PERSPECTIVES 107 (2004).

information to improve public decision-making. A *prediction* market is a constructed market in which trades are made on contracts that specify payouts based on specific outcomes. Participating in a prediction market is *betting* on outcomes. Depending on the type of prediction market, "shares" of an outcome are bought and sold so that the trading prices reflect expectations about the likelihood of that specific outcome ultimately taking place. As briefly noted above, perhaps the best known of the examples of prediction markets are housed at the Iowa Electronic Markets project,[83] which for decades has accurately predicted, among other things, political election outcomes. In the Iowa Electronic Markets project, trading in presidential prediction markets can take place on a "winner-take-all" basis, which involves only binary outcomes (Republican or Democrat winning the Presidency) in which the traded contracts pay out the full amount if the outcome occurs and nothing if it doesn't. Thus, an "Obama share" after the 2008 presidential election was worth the full payout amount, and a "McCain share" was worth nothing. Alternatively, trading can take place on a "share" basis, in which the specified payout is indexed to a continuous number, such as the popular vote share, so that an Obama share was worth fifty-three cents on the dollar after the election, while a McCain share was worth forty-seven cents on the dollar.[84] Either way, trade prices leading up to elections reflect broad expectations about the outcome. As Abramowicz has argued, prediction markets are best justified by the fact that in a prediction market, "traders can profit from information suggesting that the market price is wrong."[85] In this way, prediction markets harness disparate pieces of information and aggregate them into the price.

The Iowa Electronic Markets project—which has operated to predict a wide variety of outcomes, including many political elections (not just presidential)—has generally been more accurate than polls, and considerably less volatile.[86] The reason

83. IEM PROJECT, *supra* note 6.

84. *Popular Vote in the 2008 Presidential Election*, HISTORYCENTRAL.COM, http://www.historycentral.com/elections/12008/popularvote2008.html (last visited Dec. 7, 2010).

85. ABRAMOWICZ, *supra* note 82, at 15.

86. *See, e.g.*, JAMES SUROWIECKI, THE WISDOM OF CROWDS 17–19 (2004); Joyce Berg et al., *Results from a Dozen Years of Election Futures Markets Research*, *in* HANDBOOK OF EXPERIMENTAL ECONOMICS RESULTS 742, 748 (Charles R. Plott & Vernon L. Smith eds., 2008); Joyce E. Berg, Forrest D. Nelson

for this is that a prediction market like the Iowa Electronic Markets project seems to do a better job of evaluating the value of new information.[87] For example, while a poll errantly captures the emotional "bump" after, say, a party's nominating convention, a prediction market is likely to have factored into its price the ultimate value of such an anticipated event.[88] Prediction markets generally do not get excited and overreact.

But Abramowicz argues that much more information could be mined for a variety of other purposes. Hewlett-Packard and Eli Lilly, huge companies with critical decisions to make about product lines, have set up internal (i.e., employee) prediction markets to predict future printer sales (in the case of HP) and future pharmaceutical sales (in the case of Eli Lilly).[89] They were remarkably effective in identifying which products were likely to succeed in the marketplace.[90] Most relevant for purposes of this Article, prediction markets can be used to help formulate public policy. Among the public policy applications for prediction markets that Abramowicz calls for are prediction markets for defense and anti-terrorism policy,[91] fiscal policy,[92] banking regulation,[93] and mine safety regulation.[94] In all of these cases, Abramowicz argues, prediction markets have advantages over more traditional policymaking processes because of the potential for the markets to harness information from disaggregated and informed market participants.[95]

Abramowicz's suggestion of using prediction markets to predict the number of injuries and deaths at particular mines seems especially prescient in light of the 2010 explosion of a Massey Energy-operated Upper Big Branch mine in West Virginia that killed twenty-nine miners, the worst mine explosion in the United States since 1970.[96] During the

& Thomas A. Rietz, *Prediction Market Accuracy in the Long Run*, 24 INT'L. J. FORECASTING 285 (2008).

87. Oleg Bondarenko & Peter Bossaerts, *Expectations and Learning in Iowa*, 24 J. BANKING & FIN. 1535, 1547–48 (2000).

88. Berg, Nelson & Rietz, *supra* note 86, at 293.

89. SUROWIECKI, *supra* note 86, at 221.

90. *Id.*

91. ABRAMOWICZ, *supra* note 82, at 46–49.

92. *Id.* at 62–63.

93. *Id.* at 148–49.

94. *Id.* at 151.

95. *Id.* at 282.

96. Greg Bluestein & Vicki Smith, *Mine Rescue Effort Turns to Recovery*, MSNBC.COM (Apr. 10, 2010), http://www.msnbc.msn.com/id/36183425/ns/us_news-life.

ensuing investigation, Massey Energy disputed accounts of the Mining Safety and Health Administration officials who cited past violations and illegally high levels of coal dust in the mine at the time of the explosion as causes of the explosion.[97] While prediction markets in these kinds of tragic events have been condemned as "people profiting from terrible things happening,"[98] it is worth wondering about the following proposition: Might a prediction market in safety violations (or even injuries) at specific mines—a market that could have drawn in mining experts with important local knowledge about the Upper Big Branch mine—have *saved* the lives of the 29 miners killed in the Massey explosion?

In appreciating the vast information network embodied in market prices, it becomes apparent how markets can play a role in aggregating and weighting the disparate pieces of climate science. This Article proposes to set up a prediction market for future climate outcomes by linking a carbon tax to climate outcomes and then establishing a market for tradable permits to emit CO_2; these permits would be unitary exemptions from the carbon tax. If greenhouse gas emitters *needed* information about future climate conditions—as they would under this proposal in order to evaluate their potential future carbon tax liabilities—they would become effective collectors of climate information. Together with other emitters that face a potential carbon tax liability, they would likely form a network of gatherers of climate information. While many amateur climate wonks would continue to pore through reams of daily climate reports, the evaluations of emitting firms would likely take on central importance.

In addition, prediction markets, like markets generally, *weight* the value of information by allowing market participants to vary the amount of money invested. This allows prediction market participants to place a premium on information that they believe to be especially important or credible and likely to change the expectation of an outcome. This kind of weighting is difficult with an opinion poll. Even

97. Kimberly Kindy, *Probe into Fatal W.V. Mine Explosion Finds Large Amounts of Volatile Coal Dust*, WASH. POST, Sept. 17, 2010, http://www.washingtonpost.com/wp-dyn/content/article/2010/09/17/AR2010091704242.html.

98. SUROWIECKI, *supra* note 86, at 80; *see also* ABRAMOWICZ, *supra* note 82, at 47 (both discussing political criticism of prediction markets that would have allowed trading in events in the Middle East including—but not limited to—terrorist attacks).

surveys that provide a rating scale are vulnerable to variations in how different people express their opinions.

Perhaps most importantly, a prediction market in future climate conditions would force market participants—in the first instance, emitters of greenhouse gases that face a future carbon tax liability—to be extremely discerning consumers of climate science, critically evaluating climate science and the critiques offered by climate skeptics. While some emitters may have an ideological axe to grind in terms of climate policy, it would turn out to be very expensive to allow an ideological filter to affect their valuations of different pieces of climate science. For example, one study showed that while the majority of participants in a prediction market for the 1988 presidential election were Republican, the predicted outcome was not ideologically skewed toward a Republican result but accurately predicted the margin of victory by President George H.W. Bush over Michael Dukakis in 1988.[99] Talk is cheap, but prediction markets force participants to back their stated beliefs with money, forcing a person to, as Abramowicz puts it, "put[] his money where his mouth is."[100] In the world of climate change, climate scientists and climate skeptics alike can, instead of lobbing rhetorical grenades at the other, profit by trading on what they believe is superior information. It would not be Pollyannaish to imagine that some of the vitriol characterizing climate debate could be displaced by a discussion of whether the market price for future emissions permits is too high or too low. Complaints that the market price reflects too much optimism or too much pessimism about future climate outcomes could be met with the advice to go buy or sell some emissions permits.

III. THE TAX-AND-CAP-AND-TRADE PROPOSAL

The proposal in this Article builds upon two other works. First, Professor Abramowicz's *Predictocracy* features prominently and obviously in this proposal and its policy justifications. Second, economist Ross McKitrick has proposed

99. Robert Forsythe et al., *Anatomy of an Experimental Political Stock Market*, 82 AM. ECON. REV. 1142, 1155–56 (1992).

100. ABRAMOWICZ, *supra* note 82, at 8.

an important precursor to this proposal: a temperature-indexed carbon tax.[101]

McKitrick proposed the idea of a temperature-indexed carbon tax in part as a way of introducing a different "referee" for climate science.[102] If temperatures increase, the level of the carbon tax goes up.[103] As McKitrick, a climate skeptic, told *New York Times* columnist John Tierney:

> The only people who lose will be those whose positions were disingenuous, such as opponents of greenhouse policy who claim to be skeptical while privately believing greenhouse warming is a crisis, or proponents of greenhouse gas emission cuts who neither understand nor believe the I.P.C.C. projections, but invoke them as a convenient argument on behalf of policies they want on other grounds even if global warming turns out to be untrue.[104]

McKitrick's clever (and admirably constructive) proposal should be received with several caveats. First, a temperature-indexed carbon tax should not be viewed as a way of neatly internalizing the cost of CO_2 emissions. I have argued in my other work[105] that a carbon tax is an imperfect, though a first and necessary, step toward creating an effective carbon price. Given the current vast and profound disagreements over the appropriate price of carbon,[106] however, it seems unrealistic to believe that any one-to-one correspondence between damages and contemporaneous temperature measurements could be agreed upon. This caveat is not specific, of course, to McKitrick's proposal.

Second, McKitrick's model limits the degree to which temperature could be a nonlinear function of emissions.[107] This

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101. *See* Ross McKitrick, *A Simple State-Contingent Pricing Rule for Complex Intertemporal Externalities*, 33 ENERGY ECON. 111 (2011). The implementation of a temperature-indexed carbon tax would be based upon the impartial, non-manipulable reporting of an increase in tropical temperatures.

102. John Tierney, *Trusting Nature as the Climate Referee*, N.Y. TIMES, Dec. 15, 2009, at D1.

103. McKitrick, *supra* note 101, at 111.

104. Tierney, *supra* note 102.

105. SHI-LING HSU, THE CASE FOR A CARBON TAX: GETTING PAST OUR HANG-UPS TO EFFECTIVE CLIMATE POLICY (2011).

106. *See infra* Part IV.A.2.

107. McKitrick, *supra* note 101, at 113. McKitrick's model also imposes an assumption of symmetry, which requires that a lagged marginal effect of emissions on temperature be the same no matter what the year. In other words, while temperature may be more influenced by some years than others, the

is problematic, since it is widely believed among climate scientists that nonlinearities may exist in a relationship between emissions and temperature because of a number of potential tipping points, or "thresholds," that may exist beyond which some runaway positive feedbacks could suddenly change the state of the Earth's climate.[108] It seems problematic to assume that even in short periods of time, the relationship between temperature and emissions could not change quickly.

The final caveat to McKitrick's proposal pertains to his temperature index, which he proposes should be a mean annual temperature for the tropical troposphere (the upper atmospheric layers above the band of Earth between twenty degrees north and south of the Equator).[109] McKitrick offers a reasonable argument that instead of the more intuitive global mean temperature, tropical tropospheric temperature offers better data and a more stable signal.[110] But while this might serve as a reasonable climate "referee," it would not necessarily be a good barometer of the state of the Earth's climate, statically or over a long period of time. A single tropical temperature reading would obscure, among other things, an increase in extremes that could cancel each out when averaged.

Expanding on this last caveat, this Article proposes a more general policy of indexing a carbon tax to not just one temperature but a broader set of non-manipulable climate outcomes. A broader "basket" of climate outcomes, not unlike a consumer price index, might be devised to be a better indicator of the state of the Earth's climate. The effects of climate change on humankind are not necessarily limited to a change in the global mean temperature, though that change in itself is likely a very good proxy for many indirectly harmful effects on humankind, such as those affecting sensitive species and ecosystems. But in thinking about what is directly and immediately worrisome about climate change, a number of

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influence of emissions on temperature ten years (for example) hence will always be the same, no matter the year. *Id.*

108. *See, e.g.*, Martin L. Weitzman, *On Modeling and Interpreting the Economics of Catastrophic Climate Change*, 91 REV. ECON. & STAT. 1, 13 (2009) (citing and analyzing Margaret S. Torn & John Harte, *Missing Feedbacks, Asymmetric Uncertainties, and the Underestimation of Future Warming*, 33 GEOPHYSICAL RES. LETTERS L10703 (2006)); *see also* H. Damon Matthews & David W. Keith, *Carbon-Cycle Feedbacks Increase the Likelihood of a Warmer Future*, 34 GEOPHYSICAL RES. LETTERS L09702, 1 (2007).

109. McKitrick, *supra* note 101, at 117–18.

110. *See id.*

other climatic effects leap to mind: (1) temperature *extremes*, so that there will be more extremely hot days that could prove fatal to vulnerable populations and result in forest dieback[111] and forest fires; (2) the possibility of more intense hurricanes and tropical storms; (3) the intensification of hydrological cycles, with the dual results that precipitation would become more intense (and less manageable, leading to more flooding and less water storage capability) and droughts would last longer and be more severe; (4) sea level rises; and (5) ocean acidification. All of these effects are thought to be (though not uncontroversially) among the potential and anticipated effects of climate change, and absent a successful geo-engineering effort[112] they are outcomes that are non-manipulable. All of these effects are directly relatable to significant damages, though adaptation efforts[113] may alleviate some of the damages. For example, developed countries such as the United States could clearly do a better job of protecting their most vulnerable populations from heat waves. All of these climatic events are monitored internationally, routinely, and reliably so that even in remote parts of the planet weather anomalies are susceptible to measurement and counting.[114] Some details on

111. Forest "dieback" is the term for unnatural tree mortality due to environmental stress. *See* Oliver L. Phillips et al., *Drought Sensitivity of the Amazon Rainforest*, 323 SCIENCE 1344, 1344 (2009).

112. "Geo-engineering" is a general term used to describe a wide variety of measures aimed at reducing the atmospheric concentration of greenhouse gases, post-combustion or post-release, sometimes by directly removing greenhouse gases from the atmosphere or reducing the amount of solar radiation that reaches the Earth. For example, one frequently debated idea involves the promotion of ocean algal growth, or "ocean fertilization," which would promote the absorption of CO_2 but would also have numerous side-effects for ocean biology and chemistry. Global Envtl. Alert Serv., *Geoengineering to Combat Global Warming*, UNITED NATIONS ENV'T PROGRAMME (May 2011), http://na.unep.net/geas/newsletter/May_11.html. A much more innocuous form of geo-engineering involves painting roofs white to reflect sunlight. *Id.* For a general discussion of geo-engineering, see HENSON, *supra* note 48, at 330. This article discusses geo-engineering *infra* Part IV.E.

113. "Adaptation" is a general term used to describe all forms of adjustment to a climate-changed world that societies may undertake, now and in the future. *See* HENSON, *supra* note 48, at 299. For example, building sea walls is a way of adapting to higher sea levels and has been frequently discussed as a way of protecting New York City from sea level rises. *Launch a Citywide Strategic Planning Process for Climate Change Adaptation*, PLANYC 2030, http://prtl-prd-web.nyc.gov/html/planyc2030/html/plan/climate_citywide.shtml (last visited July 6, 2011).

114. *See, e.g.*, *GISS Surface Temperature Analysis*, GODDARD INST. FOR SPACE STUD., NAT'L AERONAUTICS & SPACE ADMIN., http://data.giss.nasa.gov/gistemp/graphs (last modified July 15, 2011) (monitoring global temperatures);

exactly how this index would be constructed are discussed in Part IV, *infra*.

But there is even more that can be done with the idea of an indexed carbon tax. There is no reason to limit the amount of information created by market transactions to *contemporaneous* climate conditions. Because current emissions will contribute to higher future temperatures for centuries,[115] it is important to obtain and evaluate—*right now*—climate science about future conditions. Professor McKitrick's indexed carbon tax would do this, but the signal would not be very clear. A temperature-indexed carbon tax, provided that a government is sufficiently committed to maintaining it for a long period of time, would induce emitters to plan for the future and undertake capital investments that reflect their expectations about what the future temperature will be. When the American Electric Power Company (AEP), the largest CO_2 emitter in the world,[116] invests in renewable energy sources such as wind farms, there could well be a reasonable inference that it anticipates a higher temperature in the future. But the signal would be muddled. AEP has, in fact, been investing heavily in renewable energy sources and

Global Historical Climatology Network Gridded Products, NAT'L CLIMATIC DATA CENTER, NAT'L OCEANIC & ATMOSPHERIC ADMIN., http://lwf.ncdc.noaa.gov/temp-and-precip/ghcn-gridded-prcp.html (last updated May 16, 2011) (mapping temperature and precipitation anomalies); *Hurricane/Tropical Data*, UNISYS, http://weather.unisys.com/hurricane (last visited Sept. 26, 2010) (providing data on hurricanes and tropical storms); *Integrated SST Data Products*, GROUP FOR HIGH-RESOL. SEA SURFACE TEMPERATURE, http://www.ghrsst.org (last visited Sept. 26, 2010) (providing products to monitor sea surface temperature); INT'L SATELLITE CLOUD CLIMATOLOGY PROJECT, http://isccp.giss.nasa.gov/index.html (last visited Sept. 26, 2010) (featuring data on clouds); *Overview of WCRP Climate Extremes Research*, CLIMATE VARIABILITY & PREDICTABILITY, http://www.clivar.org/organization/extremes/extremes.php (last updated Nov. 11, 2010) (providing data on ocean surface and upper ocean thermal temperatures and global wind data); *State of the Climate: Global Hazards—August 2010*, NAT'L CLIMATIC DATA CENTER, NAT'L OCEANIC & ATMOSPHERIC ADMIN. (Sept. 2010), http://www.ncdc.noaa.gov/sotc/hazards/2010/8 (featuring rainfall and flooding data, drought, and extreme weather events).

115. Carbon dioxide has had a residence in the Earth's atmosphere for hundreds of years, meaning that emissions of CO_2 now will form part of the Earth's stock of greenhouse gases for millennia, unless that CO_2 is removed somehow. *See* IPCC FOURTH ASSESSMENT, *supra* note 26, at 125–26.

116. This conclusion is derived from running a query on an Excel spreadsheet that is downloadable from the website of the U.S. Environmental Protection Agency's "eGRID" project. *Clean Energy*, U.S. ENVTL. PROTECTION AGENCY, http://www.epa.gov/cleanenergy/egrid (click on "eGRID2007 year 2005 plant and aggregation files (ZIP)" to download spreadsheet) (last visited Dec. 13, 2010).

carbon capture and storage technology.[117] But the primary reason for AEP's move towards renewable energies is almost certainly to begin to prepare a behemoth company for a future regulatory environment that will price CO_2 emissions. Teasing out the impact of an indexed carbon tax from AEP's other strategic decisions would be difficult. Thus, something over and above the observation of capital investments made putatively in anticipation of a future tax liability is needed.

There is thus a second part to this proposal: a cap-and-trade program for permits to emit a ton of CO_2 in future years, the exercise of which would displace the carbon tax liability for emitting one ton of CO_2. Under this second part of the proposal, a batch of permits for each of many future years[118] will be auctioned off every year. Once auctioned, the permits would be tradable until, of course, they are exercised in the year of their designated vintage. Permits can be redeemed by whoever is subject to the carbon tax, but trading can take place among any interested parties. Emissions permit-trading is now a familiar part of environmental law, having formed the basis of the 1990 Clean Air Act Amendments and its pioneering cap-and-trade program for permits to emit sulfur dioxide.[119] Until recently, when the failure of the U.S. Congress to pass climate legislation torpedoed any potential for carbon credit trading, carbon credits were traded on the Chicago Climate Exchange.[120] The motivation for this part of the proposal is to tie market activity in tradable permits to future climate outcomes and thereby create a market for information about future climate outcomes. If emitters with future carbon tax liability are rational and risk-neutral, they should be willing to pay for tradable permits a price just slightly less than their anticipated liability under the indexed carbon tax.

This second part of the proposal induces emitters to forecast their own future carbon tax liabilities and *reveal* their

117. *AEP Doubles Renewable Energy Goal to 2,000 MW*, RENEWABLE ENERGY WORLD (Apr. 29, 2009), http://www.renewableenergyworld.com/rea/news/article/2009/04/aep-doubles-renewable-energy-goal-to-2000-mw.

118. The issue of how many years in advance permits will be available is discussed *infra* Part IV.B.2.

119. Clean Air Act, 42 U.S.C. §§ 7401–7671 (1994).

120. *Markets*, CHI. CLIMATE EXCHANGE, https://www.theice.com/ccx.jhtml (last visited July 6, 2011). Carbon trading has been suspended in light of the failure of the United States to pass cap-and-trade legislation, or any climate policy at all for that matter. *Dwindling Interest to Shutter Chicago Climate Exchange*, GREENWIRE (Nov. 17, 2010), http://www.eenews.net/Greenwire/print/2010/11/17/8 (paid subscription).

forecasts through the exchange of tradable permits. Such private forecasts are not oracles, of course. But the level of private concern over future climate conditions, as expressed through market prices for permits, is at least an unbiased opinion derived from self-interest. The price bid by emitters for, say, permits to emit in 2020 would speak volumes about private expectations of the consequences of climate change. Moreover, this information would be free of suspicions of conspiracies by climate scientists to shore up their research grant fiefdoms[121] or desires by radical environmentalists who really wish to use climate change as an excuse for imposing environmental restrictions.[122] The market price is a far stronger and clearer signal of future expectations than what would probably be mostly anecdotal information concerning which firms are worried about and planning for rising temperature taxes.

There is one final benefit of this tax-and-cap-and-trade proposal that is worth emphasizing, as it achieves something unprecedented in both enhancing climate science and accomplishing something far more effectively than any previous prediction market has accomplished. This proposal would create *a private market* for information and information processing about climate outcomes. Clearly, emitters with future carbon tax liabilities do not have, and would be unlikely to develop, the internal capacity to do their own climate outcome projections. At the same time, a carbon tax liability that is tied to future climate outcomes would compel most emitters to invest some money to investigate the likely extent of their liabilities. This could constitute a major source of funding for a new climate information market.

Those with direct and first-hand information about climate science—mostly climate scientists, but other highly interested climate change wonks as well—would likely buy and sell permits, aggregating information in an important manner along the way. But by and large, the most important traders in a market for permits issued under this proposal will be those CO_2 emitters, such as AEP, that may have to rely on the

121. *See* Roy W. Spencer, *On the House Vote to Defund the IPCC*, ROY SPENCER, PH. D. (Feb. 19, 2011), http://www.drroyspencer.com/2011/02/on-the-house-vote-to-defund-the-ipcc ("The perpetual supply of climate change research money also biases them. Everyone in my business knows that as long as manmade climate change remains a serious threat, the money will continue to flow, and climate programs will continue to grow.").

122. *See supra* text accompanying note 104.

permits for their future compliance with a carbon tax scheme. In 2005, AEP emitted approximately 161 million tons of CO_2;[123] if one assumed a very modest carbon tax that was set to five dollars per ton at current climate outcomes,[124] AEP's annual carbon tax liability would be about $805 million. If climate outcomes increased by, say, twenty-five percent, its annual carbon tax liability would top one billion dollars. All 101 electricity generators in the EPA's eGRID database would have a combined current carbon tax liability (assuming a rate of five dollars per ton of CO_2[125]) of $8.75 billion.[126]

Because of the amounts of money involved, it is the participation of large emitters in a cap-and-trade program for emissions futures that is likely to make or break the credibility of climate science. In essence, this proposal uses markets to turn the evaluation of climate science over to those emitters that will potentially rely on those permits for their emitting operations. Environmental advocates may chafe at the notion that the greatest greenhouse gas emitters will have such a large say in evaluating the quality of climate science, but $8.75 billion is a lot of impetus for honestly evaluating climate science. As for the prickly personalities that debate climate science, Professor McKitrick and other climate skeptics would no doubt be pleased that those guilty of deceit or of shoddy climate science would be punished by being ignored.

IV. IMPLEMENTATION ISSUES AND THE REALPOLITIK OF CARBON TAXES

As is the case with all legal policy, the devil is in the details. Whether this proposal succeeds in lending clarity and cohesiveness to climate science, and whether it succeeds in generating new climate information, depends vitally on how it is carried out. This Article does not set out to produce a finished, policy-ready proposal, so some details are left to future work. But some principles and considerations are set out here to guide future development and implementation of this proposal. Sections A and B in this Part set out the key

123. *Clean Energy*, *supra* note 116.

124. *See infra* Part IV.A.2 for discussion of setting the tax.

125. eGRID also measures methane emissions, which could provide a means for expanding the carbon tax to include methane emissions. *Clean Energy*, *supra* note 116.

126. *Id.*

parameters in setting up the indexed carbon tax and the cap-and-trade program, respectively. This includes a critical discussion of the climate outcomes that would be made a part of the index, leaving some of the details for the Appendix. Sections C through E address critical questions that pertain to the effectiveness of this program. In closing out this Part, Section F addresses some of the political obstacles faced by this proposal.

A. Establishing the Carbon Tax

Implementing a carbon tax is, as I have argued in my other work, generally easier than setting up a cap-and-trade program.[127] Two fundamental questions, however, must be answered: Who will be subject to the tax, and how should the tax level be set? This proposal, as well, must answer a third critical question: What climate outcomes should be included in the index that determines the level of the carbon tax? This Section addresses these questions.

1. Who Is Subject to the Tax?

A carbon tax is a liability based upon the quantity of CO_2 emitted, generally as a tax per ton of CO_2 emitted. The carbon tax would be levied at some point along the chain of distribution of fossil fuels, the main fossil fuels being coal, natural gas, and petroleum, which account for nearly eighty percent of all greenhouse gas emissions in the U.S.[128] Where should the carbon tax be levied? There are a number of options. The cleanest option is to require permits far *upstream*, where (1) coal is mined, (2) natural gas is processed, (3) petroleum is refined, and (4) each of these fossil fuels is imported.[129] By imposing the tax upstream, comprehensive regulation can be achieved by taxing (or requiring permits of) a relatively small

127. HSU, *supra* note 105, at 87–88.

128. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2009, at ES-4 to ES-6 tbl.ES-2 (2011) [hereinafter GREENHOUSE GAS EMISSIONS], *available at* http://www.epa.gov/climatechange/emissions/downloads11/US-GHG-Inventory-2011-Complete_Report.pdf (illustrating that of 6633.2 million metric tons of emissions, 5209.0 come from fossil fuel combustion).

129. This proposal was most recently made by Gilbert E. Metcalf & David Weisbach, *The Design of a Carbon Tax*, 33 HARV. ENVTL. L. REV. 499, 501 (2009).

number of entities in the United States[130]: 148 petroleum refineries,[131] 1,407 coal mines,[132] 530 natural gas processors,[133] and points of importation. Fortunately, as an economic matter, absent transaction and enforcement costs, the economic effects of an upstream carbon tax (or cap-and-trade program) can be demonstrated to be the same as a similarly comprehensive downstream carbon tax (or cap-and-trade program), where the price is levied on the end user.[134] For heavily regulated and efficiently traded energy commodities, tax burdens are passed up and down the chain of distribution with little friction. Moreover, the administrative costs are considerably less for upstream programs.[135] Pulling Canadian entities into this program would be a sensible extension for a country with a closely integrated energy infrastructure that is accustomed to being a climate change policy-taker anyway.[136]

A carbon tax could also, likely without much trouble and administrative expense, be expanded to include a number of other CO_2-emitting activities and other heat-trapping greenhouse gases.[137] It turns out, for example, that "fugitive emissions" of CO_2 from the cement-making process, those related to the chemical process used to grind up raw materials into cement, can be estimated with reasonable accuracy from

130. Originally estimated by Metcalf & Weisbach, *id.* at 501, a change in the number of refineries, coal mines, and natural gas processors does not materially change this estimate.

131. U.S. ENERGY INFO. ADMIN., REFINERY CAPACITY REPORT 1 tbl.1 (2011), *available at* http://www.eia.gov/petroleum/refinerycapacity/refcap11.pdf.

132. U.S. ENERGY INFO. ADMIN., ANNUAL COAL REPORT: 2009 at 13 tbl.1 (2010), *available at* http://www.eia.gov/cneaf/coal/page/acr/acr.pdf.

133. U.S. ENERGY INFO. ADMIN., NATURAL GAS PROCESSING: THE CRUCIAL LINK BETWEEN NATURAL GAS PRODUCTION AND ITS TRANSPORTATION TO MARKET 6 tbl.1 (2006), *available at* http://www.eia.gov/pub/oil_gas/natural_gas/feature_articles/2006/ngprocess/ngprocess.pdf.

134. *See, e.g.*, Metcalf & Weisbach, *supra* note 129, at 523 ("[T]he incidence of a tax and its efficiency effects are unrelated to the statutory obligation to remit the tax. This means that, in deciding where to impose the tax (choosing the remitting entity), one can focus on minimizing collection and monitoring costs while ensuring maximum coverage.").

135. Erin T. Mansur, *Upstream Versus Downstream Implementation of Climate Policy* 3 (Nat'l Bureau of Econ. Research, Working Paper No. 16116, 2010), *available at* http://ssrn.com/abstract=1626605.

136. Recently, Environment Canada announced that it would follow the United States in promulgating a set of greenhouse gas emissions regulations that the United States was implementing pursuant to its Clean Air Act. *Canada Might Follow U.S. EPA's Lead on Permitting—Environment Minister*, GREENWIRE (Nov. 29, 2010), http://www.eenews.net/Greenwire/print/2010/11/29/8 (paid subscription).

137. Metcalf & Weisbach, *supra* note 129, at 537.

the amount of lime used in the industrial process.[138] Similarly, regulating emissions from landfills by requiring the monitoring and measurement of emissions of methane, a greenhouse gas twenty-five times more powerful than CO_2, is thought to be a manageable administrative task.[139] Imposing a carbon tax on cement manufacturers for fugitive emissions and to landfill operators for methane emissions would thus appear to be reasonable extensions. This proposal can thus be expanded to cover a number of other greenhouse gas-emitting activities.

2. The Carbon Tax Level

A carbon tax, as noted above, is a tax levied on a per-ton basis. But how much of a tax should be levied on a ton of CO_2 emissions? A Pigouvian[140] carbon tax would set the level at the amount of marginal social damages for each ton of CO_2 emitted.[141] However, the actual, present-value damages of climate change over the next hundred years or so are sharply disputed among economists studying the economic effect of climate change. Estimates are extremely sensitive to a number of assumptions, most prominently the appropriate discount rate to be used in weighting future costs and benefits.[142] The

138. The statistical accuracy of CO_2 estimation methods is plus-or-minus thirteen percent, with a ninety-five percent level of confidence. GREENHOUSE GAS EMISSIONS, *supra* note 128, at 4-4 to 4-6; *see also* Metcalf & Weisbach, *supra* note 129, at 530.

139. Metcalf & Weisbach, *supra* note 129, at 531–32 ("Requiring monitoring of all landfills and including their emissions in the tax base should be relatively straightforward.").

140. A Pigouvian tax is a unitary tax levied to make an emitter pay for the damages caused by its emissions, which are often invisible, or "external," to the emitter. The purpose of a Pigouvian tax is to make emitters face these external, invisible costs, or "externalities," and make them pay—no more, no less. ALFRED C. PIGOU, THE ECONOMICS OF WELFARE 131–35 (1928). Taxes that reflected the extent of negative externalities thus became known as "Pigouvian" taxes. WILLIAM J. BAUMOL & WALLACE E. OATES, THE THEORY OF ENVIRONMENTAL POLICY 21–23 (Cambridge Univ. Press 1988) (1975).

141. In theory, if the Pigouvian tax were to exactly price the marginal level of social damages, the tax rate would vary according to how much marginal damage was being imposed, right at that level of emissions. In practice, of course, such a floating rate would be administratively infeasible.

142. A plethora of modeling assumptions makes a huge difference in marginal damages estimates. One of the most influential studies, by William Nordhaus and Joseph Boyer, estimated in 2000 that the marginal social damages of the emission of one ton of CO_2 were $2.48, WILLIAM D. NORDHAUS & JOSEPH BOYER, WARMING THE WORLD: ECONOMIC MODELS OF GLOBAL WARMING 91 tbl.4-10 (2000), an estimate that Nordhaus recently upped to about $7.50, WILLIAM NORDHAUS, A QUESTION OF BALANCE 90 tbl.5-4 (2008). This contrasts quite dramatically with

range of estimates of marginal social damages of a ton of CO_2 is huge: A 2005 survey found a range of estimates from zero to over a thousand dollars per ton.[143] The best pair of bookends for the disagreement includes one estimate by economist William Nordhaus ($7.50 per ton of CO_2)[144] and another by Nicholas Stern, the author of the UK-commissioned Stern Review ($85 per ton of CO_2).[145] Numerous methodological differences highlight a sharp intellectual divide between the two eminent economists,[146] but more than anything, the divide illustrates how challenging it is to try to set a carbon tax at a level that economists could agree constitutes a *comprehensive* policy response to climate change.

In part because of this, my other work has advocated setting a low carbon tax that would be less controversial and would serve as just a first step in addressing climate change.[147] Of course, even a small carbon tax is likely to generate political heat, but, at least among climate change economists, there is likely to be wide agreement that a small carbon tax is better than nothing.[148] By the same reasoning, I also recommend that

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the estimate obtained by the UK government-commissioned *Stern Review*, by Nicholas Stern, a former chief economist with the World Bank, which estimated current marginal damages at about $85/t$CO_2$ (in year 2000 dollars, to provide a comparison with Nordhaus and Boyer). STERN, *supra* note 1, at 287. A very large part of this disparity can be accounted for by the two studies' difference in discount rates. Stern assumes a pure rate of time preference of roughly zero, *id.* at 35–37, while Nordhaus uses a more conventional rate of three percent, NORDHAUS, *supra*, at 95.

143. Richard S.J. Tol, *The Marginal Damage Costs of Carbon Dioxide Emissions: An Assessment of the Uncertainties*, 33 ENERGY POL'Y 2064, 2068–69 tbl.2 (2005).

144. NORDHAUS, *supra* note 142, at 90 tbl.5-4.

145. STERN, *supra* note 1, at 287. A primary reason for the difference between the two estimates is the difference in assumed discount rates, with Stern using a very low discount rate, *id.* at 35–37, and Nordhaus a more conventional one, NORDHAUS, *supra* note 142, at 95.

146. Both Nordhaus and Stern include estimates of the costs of catastrophic risks, but Stern assumes higher likelihoods and greater costs. The *Stern Review* includes estimates of non-market impacts, which it describes as "impacts on the environment and human health," STERN, *supra* note 1, at 161, which would include impacts on wildlife and unpriced effects on human health such as increased spread of disease due to climatic changes, *id.* at 293. Nordhaus finds these costs a bit speculative. NORDHAUS, *supra* note 142, at 95.

147. HSU, *supra* note 105, at 29.

148. A proposal by three think tanks of varying political orientations, the American Enterprise Institute, the Breakthrough Institute, and the Brookings Institution, introduced a "post-partisan" proposal after the collapse of climate proposals in the U.S. Congress in 2010. The proposal emphasized small subsidies and a small carbon tax. STEVEN F. HAYWARD ET AL., POST-PARTISAN POWER: HOW A LIMITED AND DIRECT APPROACH TO ENERGY INNOVATION CAN DELIVER CLEAN,

this proposal steer as clear as possible of political turmoil by initially setting the carbon tax at a low level. This proposal is not intended to be a climate policy to end all other policies but rather is meant to generate a market for climate information. The carbon tax or cap-and-trade liabilities under this proposal would therefore be in addition to those imposed by any other climate policies. Of course, if anomalous climate outcomes that are part of the index became frequent enough, the carbon tax would be pushed higher and become very expensive and perhaps serve as a regulatory tool after all. If that turns out to be the case, the costs of compliance would be the least of our worries.

A carbon tax in the neighborhood of Nordhaus's $7.50 estimate of the marginal social damages seems to be a good starting point. A wide range of economists would agree that the marginal social damages are *at least* that and would endorse such a tax level.[149] The indexed carbon tax level should be adjusted for inflation to ensure that prices for tradable permits keep pace with market prices for other goods, thereby keeping constant the budgetary effects of the indexed carbon tax on emitters. Finally, to smooth out some of the potential volatility in this carbon tax, it could be indexed not just to the basket of outcomes from the previous year but to a *moving average* of the climate outcomes over a period of time. While the moving average period may not, and need not, capture very long-term climatic cycles, even an average of the previous five or ten years can smooth out some of the year-to-year variations in weather by diluting the effects of one or more exceptional years.

3. Which Climate Outcomes?

In addition to these two basic carbon tax questions, this proposal requires resolution of a third, more complicated matter: construction of the index to which the carbon tax level is linked. Toward this end, the basket of climate outcomes that make up the index should be composed of outcomes that (1) are

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CHEAP ENERGY, ECONOMIC PRODUCTIVITY AND NATIONAL PROSPERITY 7 (2010), *available at* http://thebreakthrough.org/blog/Post-Partisan%20Power.pdf.

149. Nicole Heller & Douglas Fischer, *What's the Economic Impact of Climate Change? Pick a Number*, CLIMATE CENT. (Jan. 27, 2011), http://www.climatecentral.org/blogs/whats-the-economic-impact-of-climate-change-pick-a-number (showing that the vast majority of studies indicate a marginal cost much larger than $7.50 per ton).

non-manipulable and (2) are or can be reliably, regularly, and uncontroversially counted or measured. Prediction markets can only function if the outcomes are clearly defined and the rules for adjudication are stable.[150] But beyond these basic reliability criteria, the question of which climate outcomes should be part of the index also forces us to confront the question of what exactly we wish the index to achieve. First, to keep the index focused on climate science, the climate outcomes included in the index should truly be climatological effects and not indirect, second-order ecological events caused by climate changes. Second, the index should capture a broad array of climate conditions while balancing the impacts that different outcomes will have on the index. That is, the index should provide a measure of all of the ways that climate change will affect humankind but without over-emphasizing any particular way that climate change will affect humankind.

As an example of how climate outcomes should be first-order climatological effects and not indirect, second-order ecological effects, one might consider the inclusion of forest fires as a climate outcome. Counting forest fires that become more frequent or more damaging due to warmer and drier weather,[151] or counting the forestry industry losses from heat-stressed dieback,[152] may seem more relevant and more directly connected to human loss. Not only that, but a solid body of research seems to support the notion that a climate-changed future will lead to these ecological outcomes.[153] But focusing on outcomes that are more closely linked to the increase in greenhouse gases would ensure that the index is a gauge of the real, unavoidable threats posed by climate change. If the index could be changed by, for example, a widespread change in fire suppression practices, then it would not be an index of climate change but an index of climate change and how humans respond to it. Similarly, while forest fires and the pine-beetle outbreaks can be reasonably tied to climate change, so can monoculture-dominated forestry practices.[154] Including second-

150. Wolfers & Zitzewitz, *supra* note 82, at 120.

151. Anthony L. Westerling, *Wildfires*, *in* CLIMATE CHANGE SCIENCE AND POLICY 92, 93–94 (Stephen H. Schneider et al. eds., 2010).

152. Phillips et al., *supra* note 111, at 1346.

153. *See supra* notes 151–52.

154. C.S. Holling & Gary K. Meffe, *Command and Control and the Pathology of Natural Resource Management*, 10 CONSERVATION BIOLOGY 328 (1996); John Nowak et al., *The Southern Pine Beetle Prevention Initiative: Working for Healthier Forests*, 106 J. FORESTRY 261, 262–63 (2008).

order outcomes would make for a noisier prediction market in which human interventions could interfere with the market signals on the quality and importance of climate science.

Second, some attention should be paid to the relationship among the different climate outcomes that make up the index. Where climate outcomes are *not orthogonal* to each other—i.e., where they are statistically or climatically related—some accounting should be employed so that different aspects of the same climate phenomenon are not double-counted or over-weighted. For example, extreme droughts *and* extreme rainfall events are both part of the same climate phenomenon (the intensification of the hydrologic cycle)[155] and are thus not orthogonal. Including both extreme rainfalls and extreme droughts in the index is useful because the two types of events may not occur in lockstep and will likely occur in different parts of the world, but some under-weighting is appropriate. And to some extent, some non-orthogonality will be unavoidable—given the limits of climate science, we may not even know if outcomes are orthogonal or not. But some attention to the relatedness of different climate outcomes is warranted.

Based on these criteria and taking these factors into consideration, the carbon tax should be indexed to the following six types of climate outcomes. A precise weighting of the six climate outcomes is left to future development. Some supplementary discussion of these outcomes is set out in the Appendix.

1. Global mean temperature. The core part of Professor McKitrick's proposal[156] is surely on the mark: If one were to pick just one proxy for the severity of climate change, temperature would almost certainly be the best one. In the simplest physical terms, trapping heat within the Earth's atmosphere means that more energy is staying within the Earth's system, which means that the temperature will rise. Trapped heat will have other effects, so that temperature alone would not form a complete index, but it is surely a fundamental indicator of climate change.

The most general and reliable temperature statistic is the global mean temperature, which is the temperature averaged over an entire year and over the entire planet. This is not

155. *See* Thomas G. Huntington, *Evidence for Intensification of the Global Water Cycle: Review and Synthesis*, 319 J. HYDROLOGY 83, 83 (2006).

156. McKitrick, *supra* note 101, at 118.

necessarily a straightforward measurement; weather monitoring in some places in the world is spotty, and because weather stations are irregularly spaced throughout the world, some statistical manipulation is necessary to reconstruct the temperature that evenly represents the whole planet. This has been the source of considerable controversy but, as discussed in the Appendix, should not interfere with the construction of this element of the index.

It should be noted that because temperature is such a good proxy for climate change, it is clearly not orthogonal to other climate outcomes. But this is not a reason to exclude temperature. Some climate outcomes, such as harm to ecosystems and loss of biological diversity, would be difficult to quantify and include in an index. It would thus be appropriate to weight temperature readings to try to reflect these unquantifiable harms that are orthogonal to other climate outcomes.

2. Days of unusually high or low temperatures. While global mean temperature is a vital statistic, using just one temperature is incomplete in several ways. First, it fails to capture the full range of climate effects that are regionally unique. Temperature changes in a climate-changed world will be heterogeneous. Polar regions will probably experience the most dramatic climatic changes,[157] so that a single temperature reading will not quite reflect the degree of change in the polar regions.

Second, climate change is not limited to warming and may impose as much harm from unusually low temperatures as it does from high temperatures.[158] Relying only on one temperature allows these two types of opposite extremes to cancel each other out, concealing the extreme events that are the most serious source of climate harm. High temperature extremes are associated with many costly climate effects, such as forest fires,[159] heat waves that lead to deaths in vulnerable

157. *See, e.g.*, IPCC FOURTH ASSESSMENT, *supra* note 26, at 766–67 figs.10.8 & 10.9.

158. For example, current climate conditions sustain an Atlantic Ocean circulatory pattern that keeps Europe warm by bringing warm air northward from the tropics. One potential effect of climate change would be the shutdown of this circulatory pattern—the Atlantic Thermohaline Circulation—which would make Europe so cold as to be uninhabitable. *See, e.g.*, HENSON, *supra* note 48, at 119–22.

159. *See* Westerling, *supra* note 151, at 93–94.

human populations,[160] and a variety of ecological effects that impose indirect but potentially large costs upon society.[161] Unusually low temperature extremes, widely considered to be a part of climate change,[162] also impose costs on cities, agricultural industries, and other staples of society that are ill-prepared to deal with cold-weather events such as record frosts and snowfalls.[163] Some statistical transformation needs to be made of the raw temperature data.

The index should include a broad basket of temperature readings from weather stations throughout the world to capture all of the different regional changes. And to make this data meaningful, the raw temperature readings should be transformed into *counts of days with extreme temperatures*. For each reporting weather station made a part of the index, an annual (or periodic moving average) count should be made of days in which *unusually high* and *unusually low* temperatures are reached. This definition of this climate outcome operationalizes regional variations in climate change, cold as well as hot anomalies, and the truly harmful events—extreme temperature (hot and cold) situations. Further details on quantifying this climate outcome are provided in the Appendix.

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160. It was estimated that the summer heat wave that struck Moscow in 2010 nearly doubled the number of daily deaths. *Death Rate Doubles in Moscow as Heat Wave Continues*, BBC NEWS (Aug. 9, 2010), http://www.bbc.co.uk/news/world-europe-10912658. The heat wave has been estimated to have caused 7,000 deaths in Moscow alone and 15,000 in Russia overall and to have decreased Russia's GDP by fifteen billion dollars. Lucian Kim & Maria Levitov, *Russia Heat Wave May Kill 15,000, Shave $15 Billion of GDP*, BLOOMBERG (Aug. 10, 2010), http://www.bloomberg.com/news/2010-08-10/russia-may-lose-15-000-lives-15-billion-of-economic-output-in-heat-wave.html.

161. For example, damages to wetlands could undermine some of the ecosystem services that are provided, such as water filtration, flood control, and feeding grounds for migratory waterfowl. Climate change could affect water systems that are major water sources for population centers. And finally, loss of biological diversity worldwide could deprive humankind in a wide variety of ways, such as depriving it of medicinal resources, disrupting predator-prey relationships so that pests become more prevalent, or allowing some pests to become disease vectors. *See, e.g.*, Rik Leemans, *Ecosystems*, *in* CLIMATE CHANGE SCIENCE AND POLICY, *supra* note 1, at 56, 57–61.

162. HENSON, *supra* note 48, at 55–56; Wayne Higgins et al., *The Facts About Snowstorms & Climate Change*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., http://www.noaa.gov/features/02_monitoring/snowstorms.html (last visited Feb. 25, 2011).

163. An unusual number of snowstorms affecting New York City imposed substantial costs, including loss of revenue from parking meters buried under snow. Manny Fernandez, *Crime Down, Bills Up: How Snow Affects the City*, N.Y. TIMES, Feb. 11, 2011, at A23.

3. Extreme rainfall and drought events. One of the ironies of climate change is that it will make water both more abundant and more scarce. In neither case, however, will this be helpful. Climate change will intensify the hydrological cycle, leading to *both* increased instances of flooding and drought, and probably, in different places, making water supply management much more difficult (if not impossible).[164] Again, if one were to simply take a total rainfall number as a climate outcome, the aggregated number would conceal the extremes that are most harmful. Part of the index should thus capture the occurrence of precipitation extremes, just as it captures temperature extremes.

Costs from extreme rainfall events and drought in the United States could be as much as 0.5% of GDP,[165] or about seventy billion dollars.[166] Of the two, extreme drought seems less manageable, as life without water is impossible. Adapting to extreme rainfall, however, would only be more manageable if vital infrastructures to capture and store water were dramatically upgraded or fundamentally altered, measures that are probably out of the reach of most developing countries. The different nature of the harms of extreme rainfall and drought seems to warrant separate measurement in the index. Again, details on how to define and count extreme rainfall events and droughts are set forth in the Appendix.

4. Rises in sea level. If there is one climate outcome that has alarmed people, it is the prospect of rising sea levels that jeopardize trillions of dollars of real estate worldwide.[167] In reality, the most expensive real estate is in developed countries, which have the resources and the engineering skills to construct sea walls to protect certain cities.[168] While climate change may tax the capacity of dikes in the Netherlands, some of which have been designed to withstand 10,000 years' worth

164. *See, e.g.*, HENSON, *supra* note 48, at 58; Peter H. Gleick, *Water*, *in* CLIMATE CHANGE SCIENCE AND POLICY, *supra* note 1, at 74, 75–76.

165. Gleick, *supra* note 164, at 78.

166. The estimated 2009 GDP of the United States is slightly over fourteen trillion dollars. *The World Factbook: United States*, CIA, https://www.cia.gov/library/publications/the-world-factbook/geos/us.html (last visited July 8, 2011).

167. *See* TIM LENTON ET AL., MAJOR TIPPING POINTS IN THE EARTH'S CLIMATE SYSTEM AND CONSEQUENCES FOR THE INSURANCE SECTOR 37 (2009), *available at* https://www.allianz.com/static-resources/en/press/media/documents/tipping_points.pdf (estimating a loss of one trillion dollars for New York City alone).

168. *Id.* at 34.

of storms,[169] some engineering solutions do seem imaginable, if unattractive and possibly uneconomical.[170] Perhaps most ominously, rising sea levels could lead to civil unrest, as some of the most vulnerable populations in low-lying areas such as the Ganges Delta in Eastern India and Bangladesh[171] would find permanent migration necessary. Low-lying island countries, such as the Maldives and Tuvalu, could find it necessary to find entirely new homes for their permanently displaced populace, imposing an entirely new set of economic and diplomatic challenges.[172]

Moreover, for larger sea level rises, even some advanced countries will face enormous costs. With a rise of six meters in mean sea level, much of what is presently Florida would be uninhabitable.[173] As there is still a fair amount of disagreement among climate scientists about the range of possible sea level rises attributable to climate change, larger values cannot be ruled out. Climate scientist James Hansen even believes that, with a 3° C increase in mean global temperatures, enough glacial melting at the poles could occur to bring on a catastrophic twenty-five-meter increase in mean sea levels,[174] orders of magnitude greater than the IPCC's estimate of 0.22 to 0.44 meters.[175] Few climate scientists share Hansen's level of alarm,[176] but neither is it dismissed. Apart from the potential for harm from sea level rises, it is this kind of scientific uncertainty that might be best run through a prediction market.

5. Ocean acidity. As CO_2 concentrations increase in the atmosphere, oceans absorb much of the CO_2, taking up an estimated 500 gigatons of CO_2, about thirty percent of fossil fuel emissions since 1800.[177] This absorption has come at a cost of increasing the acidity of the ocean, thereby decreasing the

169. *See* Krystian W. Pilarczyk, *Design Philosophy and Methodology*, *in* DIKES AND REVETMENTS: DESIGN, MAINTENANCE AND SAFETY ASSESSMENT 11, 15 (Krystian W. Pilarczyk ed., 1998).

170. *Id.*

171. HENSON, *supra* note 48, at 115.

172. *Id.* at 112–13.

173. *Id.* at 114.

174. *See* J.E. Hansen, *Scientific Reticence and Sea Level Rise*, 2 ENVTL. RES. LETTERS 024002, at 3 (2007).

175. IPCC FOURTH ASSESSMENT, *supra* note 26, at 409 fig.1.

176. HENSON, *supra* note 48, at 118.

177. Carol Turley, *Marine Ecosystems*, *in* CLIMATE CHANGE SCIENCE AND POLICY 66, 68 (Stephen H. Schneider et al. eds., 2010).

mean pH of the world's oceans by 0.1.[178] This is a subtle but potentially much more costly and harmful effect than a rise in sea level, as the disruption of marine ecosystems could lead to a crash in marine food chains[179] that sustain an enormous fraction of the world's population and currently contribute almost $250 billion per year to the world economy.[180] Coral reefs, in particular, are believed to be vulnerable to even small changes in acidity and are believed to play an important role in maintaining biological diversity in oceans.[181] If a severe decline in ocean life and a serious disruption to the marine food chain occurs, the damages would well exceed $250 billion, since the value of something like food is far greater than what the market price would suggest, especially when it becomes scarce. While it is difficult to ascertain how harmful changes in acidity will be to humankind, this is clearly an important climate effect to include in an index.

6. Hurricanes above a certain intensity level. Hurricanes are hypothesized to increase in severity with increases in sea surface temperature, and increases in sea surface temperature are believed to be a consequence of the trapping of heat by greenhouse gases.[182] But there is no current scientific consensus on a link between hurricanes and climate change.[183] There is, however, a great deal of attention and research, especially following the publication in 2005 of two articles, one by M.I.T. atmospheric scientist Kerry Emanuel,[184] and one by a

178. HENSON, *supra* note 48, at 124.

179. *See, e.g.*, THE ROYAL SOC'Y, OCEAN ACIDIFICATION DUE TO INCREASING ATMOSPHERIC CARBON DIOXIDE 15 (2005), *available at* http://royalsociety.org/WorkArea/DownloadAsset.aspx?id=5709; Christopher L. Sabine et al., *The Oceanic Sink for Anthropogenic CO_2*, 305 SCIENCE 367 (2004).

180. Andrew J. Dyck & U. Rashid Sumaila, *Economic Impact of Ocean Fish Populations in the Global Fishery*, 12 J. BIOECONOMICS 227, 227 (2010).

181. *See* HENSON, *supra* note 48, at 125–26.

182. *See, e.g.*, J.A. Curry et al., *Mixing Politics and Science in Testing the Hypothesis That Greenhouse Warming Is Causing a Global Increase in Hurricane Intensity*, 87 BULL. AM. METEOROLOGICAL SOC'Y 1025, 1032 (2006); Kerry Emanuel, *Increasing Destructiveness of Tropical Cyclones over the Past 30 Years*, 436 NATURE 686, 686–88 (2005); Thomas R. Knutson, *Has Global Warming Affected Atlantic Hurricane Activity?*, GEOPHYSICAL FLUID DYNAMICS LABORATORY (Sept. 3, 2008), http://www.gfdl.noaa.gov/global-warming-and-hurricanes.

183. *See* Curry et al., *supra* note 182, at 1032. A significant problem is that the worldwide record of storms is not very long, dating back only to 1851 for North American storms, *id.*, and 1949 for global storms, *Hurricane/Tropical Data*, *supra* note 114.

184. Emanuel, *supra* note 182.

team at Georgia Tech,[185] which coincided with Hurricane Katrina (which has *not* been attributed to climate change). Current thinking among most climate scientists studying the effects of climate change on hurricanes is that climate change may produce more intense hurricanes, but not necessarily more of them.[186] An index of climate outcomes may thus include a count of *more severe* hurricanes, not a raw count of all hurricanes.

As discussed above, "deadliness" and "costliness" are not the correct ways to think about *inherent* climate harm. The existence of potential avoidance and mitigation actions, *ex ante* and *ex post*, means that these measures could be internally inconsistent, varying from one hurricane to the next depending on the (climatically) irrelevant factor of where the hurricanes made landfall.[187] Nevertheless, if there is a link between hurricanes and climate change, it is one of the few climate outcomes that would be orthogonal to global mean temperature and would capture a climate harm not captured by other outcomes.

Constructing an index for a carbon tax thus turns out to be a fairly tricky exercise. It raises not only some mundane but also some unexpectedly philosophical questions about climate change that challenge what we fear, know, and wish to know about climate change. A number of other possible climate outcomes could be defensibly included in an index.[188] Over time, it may become apparent that other climate outcomes should have been included at the outset. Answering these questions and constructing the index with precision, however,

185. P.J. Webster et al., *Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment*, 309 SCIENCE 1844 (2005).

186. *See, e.g.*, Curry et al., *supra* note 182; Emanuel, *supra* note 182.

187. *See* Jerry D. Jarrell et al., *The Deadliest, Costliest, and Most Intense United States Hurricanes from 1900 to 2000*, ATLANTIC OCEANOGRAPHIC & METEOROLOGICAL LABORATORY, http://www.aoml.noaa.gov/hrd/Landsea/deadly (last updated Oct. 2001).

188. For example, another potential climate outcome could be Arctic Ocean sea ice extent. Melting Arctic sea ice has long been thought to be one of the most alarming consequences of climate change, as it portends a palpably dramatic change in the Arctic environment. *See* HENSON, *supra* note 48, at 75. The National Snow and Ice Data Center in Boulder, Colorado, is of the opinion that "[l]ong-term changes in Arctic sea ice are an index of climate change." *Sea Ice Index*, NAT'L SNOW & ICE DATA CENTER, http://nsidc.org/data/seaice_index (last visited June 13, 2011). However, it is not clear that sea ice extent would be a better indicator than a count of the number of days of unusually high temperatures for an Arctic weather station, which would be part of climate outcome number two.

is not as important as the overall goal of the proposal—to run climate science through a market filter and neutralize the political partisanship and disingenuous posturing that has tainted the debate. However, because the problem of climate change is so important, and the stakes so large, it is worth spending some time to get the details of the indexed carbon tax right.

B. The Cap-and-Trade Program

The establishment of a cap-and-trade program to act as essentially a prediction market for future climate outcomes gives rise to the other set of tricky implementation questions. As a cap-and-trade program, it raises the usual implementation questions, plus those that are unique to this program's situation in a carbon tax environment. One of the usual implementation questions is that of which entities should be covered (required to hold permits for their emissions). Under most cap-and-trade programs, being covered is a burden; in this program, the cap-and-trade system is for permits that represent an exemption to the indexed carbon tax, and are thus an opportunity to lower the regulatory costs, rather than just minimize them through trading. As the indexed carbon tax is proposed to apply upstream to all coal mines, natural gas processors, oil refineries, and fossil fuel importers,[189] these are the entities that must be allowed to hold permits in lieu of paying the carbon tax. Of course, other entities and other people are allowed to buy and sell permits; this proposal depends vitally on widespread market participation as a means of aggregating the widely disparate pieces of information about climate science. The program-scoping question thus resolved by virtue of its link to the carbon tax, this Article now turns to the remaining issues involved in setting up the cap-and-trade program: the initial allocation of permits and the timing and quantity of permits to be issued.

1. Initial Allocation of Permits

The first and most obvious implementation question for setting up a cap-and-trade program is how to make the initial allocation of permits. Should they be auctioned or given away

189. *See supra* notes 129–35 and accompanying text.

for free? If given away for free, should they be "grandfathered" in on the basis of historical emissions, or on the basis of some other politically-devised method of allocation? As an economic matter and a distributional matter, auctioning permits is almost always superior to giving them away for free. Not only does the latter effect a transfer from taxpayers to wealthy individuals (shareholders of emitting firms), but it also produces some economically distortionary effects.[190] As a political matter, however, giving away permits to purchase political support, under the guise of "transition relief," is usually viewed as being necessary in order to obtain even a remote chance of legislative passage in the United States.[191] It is apparently lost on no one that when a cap-and-trade program gives away permits, the legislature is essentially printing money, albeit an undetermined amount.[192]

The cap-and-trade part of this proposal differs from an ordinary cap-and-trade program in two respects that might render the free allocation of permits a little less irresistible and auctioning a little more politically palatable. First, the carbon tax is to be initially set at a low level so that the permit prices will be low and their value as transition relief concomitantly low. Second, permit prices in this program will not be driven by scarcity, as they are in pure cap-and-trade programs, but rather by expectations of future climate outcomes. The trading market for permits to emit in the distant future could be very thin. Those emitters given free permits may conclude that the simplest option in the near term is to wait and see what happens in the near- and medium-run. If that turns out to be a common strategy, then the value of those free permits may be quite low. With low prices, it would also make the economic pain of buying permits less acute. A thin trading market would also mean that the market would be missing an important opportunity to collect a valuable piece of information: the auction price. For these reasons, the permits to emit in future years in this proposal should be auctioned rather than given away for free.

190. *See, e.g.*, HSU, *supra* note 105, at 61–62; Dallas Burtraw et al., *The Incidence of U.S. Climate Policy: Alternative Uses of Revenues from a Cap-and-Trade Auction* 2 (Res. for the Future, Discussion Paper No. 09-17-REV, 2009), *available at* http://ssrn.com/abstract=1392251.

191. *See* HSU, *supra* note 105, at 120–21; Jonathan S. Masur & Jonathan Remy Nash, *The Institutional Dynamics of Transition Relief*, 85 N.Y.U. L. REV. 391, 393 (2010).

192. HSU, *supra* note 105, at 62.

2. How Far in Advance Should Permits Be Available?

As the point of a cap-and-trade program is to process information about future climate conditions, it is important to decide how far in advance permits should be available. Of course, if permits were not tradable, then asking firms to bid on permits many years in advance might ask too much in terms of information. But it is the trading activity subsequent to initial acquisition through auction that will yield the most important information. Obviously, as the vintage year of a permit approaches, one should expect the price of the permit to be a better estimate of the actual prices and a better anticipation of climate outcomes. Just as obviously, in evaluating the market signals produced by this program, some consideration must be made of the time value of money. If a firm is buying a permit to avoid a carbon tax thirty or forty years in the future, then it can be expected to discount that future carbon tax liability substantially, paying much less for permits to emit far in the future than it would for permits to emit in the next year or two.

As a starting point, the failed American Clean Energy and Security Act of 2009[193] (a.k.a. Waxman-Markey, after the co-sponsors) and the Clean Energy Jobs and American Power Act[194] (a.k.a. Kerry-Lieberman, after the co-sponsors) contemplated a cap-and-trade system out to 2050. Also, California's AB 32, its landmark climate change legislation, includes a cap-and-trade program that contemplates a reduction of greenhouse emissions by eighty percent by the year 2050.[195] An auction of permits forty years in advance would thus prima facie seem reasonable.

There is the objection that such a long time horizon seems Pollyannaish since emitters may not believe that this proposal, if enacted, would stay intact for forty years. If that were the case, then there would be very little interest in bidding for permits more than a few years down the road. Waxman-Markey and Kerry-Lieberman, one might snort, could afford to

193. H.R. 2454, 111th Cong. § 321 (2009), *available at* http://www.govtrack.us/data/us/bills.text/111/h/h2454pcs.pdf.

194. S. 1733, 111th Cong. § 111 (2010), *available at* http://www.govtrack.us/data/us/bills.text/111/s/s1733rs.pdf.

195. *Cap-and-Trade*, AIR RESOURCES BOARD, CAL. ENVTL. PROTECTION AGENCY, http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm (last visited July 8, 2011).

be unrealistically optimistic because, even if one believed that targets in 2050 would remain intact, many near- and medium-term greenhouse gas emission reductions would take place, and those reductions were the most important objective of climate legislation anyway.

The response to this objection is that participation in a program like this would create its own policy stability: those who spend money on buying auctioned permits would oppose an abandonment of a program such as this, as that would leave them with valueless permits. This would especially be true if some emitters felt that they had been clever enough to have obtained future permits at a low price and thus stand to lose out if the program is stopped. Unlike most cap-and-trade programs, this proposal explicitly contemplates making emitters think far in advance and plan for the fairly distant future. Once investments are made in reliance on this program, dismantling it would become politically and perhaps economically costly. So a cap-and-trade program could be designed with a little bit of optimism about the prospects for its survival and credibility. And since the purpose of a cap-and-trade program is to generate and evaluate information about climate conditions with long time horizons, this program would not be useful unless it sold permits for vintage years far in the future. Looking ahead forty years, as did the Waxman-Markey and Kerry-Lieberman bills, does not seem overly optimistic.

3. How Many Permits Should Be Available for a Vintage Year?

It is worth being careful about how many permits to make available for each vintage year. A target amount of permits would have to be large enough to create a real market, one that is large enough to mobilize interest in evaluating climate science. The number of available permits should be large enough to ensure a robust market that reveals significant information about opinions of climate science. But the number of available permits should also not be too large. A surfeit of permits could drive the market price below the indexed carbon tax, which would create the risk that this hybrid program would simply morph into a pure cap-and-trade program. This program would lose the benefit of having the cap-and-trade program actually reveal information about opinions of climate science.

This over-allocation danger should also be borne in mind when considering the possibility of another, more ambitious climate policy with an explicit goal of reducing greenhouse gases (unlike this proposal, which is primarily aimed at generating information about climate science). If at any time, for any reason, emissions fall below the number of extant permits available, the price of permits will be driven to near zero. For example, if a more ambitious policy drives emissions lower than the number of extant permits under this tax-and-cap-and-trade program, then there will be more permits available than are needed to permit emissions. There would be no scarcity of permits at all, and no prices to generate information about climate science, stripping this proposal of any informational benefits. So determining the extant number of permits to make available involves a moving target, taking into account the possibility of future policy advances that might curtail future emissions.

A little back-of-the-envelope math would help the reader gain a rough idea of how many permits should be available for each year. Consider that world emissions of CO_2 were approximately 30.55 gigatons in 2007, 5.97 of which were emitted by the United States.[196] Even if, assuming optimistically, some legislation such as Waxman-Markey comes back to pass in a future Congress and that an eighty percent reduction is achieved, that would still mean that roughly 1.2 gigatons of CO_2 would be emitted in the United States in 2050. If the cap-and-trade program issued, say, *one-third* of that emissions total, 400 million permits of vintage year 2050 should be made available. In the interests of maintaining some consistency in terms of the amount of climate information generated for each future year, the number of permits available each vintage year should be uniform, necessitating some scheduling of permit auctions. A proposed schedule is set forth in the Appendix.

Is this enough of a market to meet the program's goals of generating interest among emitters in participating? Assuming, just for the purpose of a rough calculation, a trading price of $5 per permit—that the best forecasts for the indexed carbon tax would be about $5 per ton—the cap-and-trade program would create a $2 billion market, $50 million of which

196. WORLD RES. INST., CLIMATE ANALYSIS INDICATORS TOOL: TOTAL GHG EMISSIONS IN 2007 (2011) (total world emissions are obtained by dividing U.S. emissions by its fraction of world emissions).

is added each year. As noted earlier, AEP's 2005 emissions would have produced a carbon tax liability of about $805 million,[197] assuming that it does not reduce emissions. The liability of the top 101 emitters would be about $8.75 billion.[198] It could be much higher if dangerous climate outcomes become unexpectedly frequent. That would appear to be enough to mobilize interest in forecasting climate outcomes and the resulting indexed carbon tax.

Cap-and-trade programs invariably require resolution of a number of design issues. This Article proposes the simplest resolutions of two fundamental cap-and-trade design issues: how permits are allocated (by auction) and who is covered (everyone, upstream). In addition, this Article suggests some parameters for some of the design issues that are specific to this proposal, ones that will determine how useful this program is to aggregating and processing climate science.

C. Competitiveness and Trade Concerns

This proposal could be the subject of national, state, or provincial legislation, or of a regional program among states and provinces, or indeed a program among almost any combination of jurisdictions. But whatever its constituents, an important consideration in adopting this proposal is what, if anything, to do about the competitiveness of firms, vis-à-vis those outside of the jurisdiction that do not face the costs of a carbon pricing program such as this one. This Section addresses this problem, working from an assumption that the program is a national one.

The climate change problem is unique in the overwhelming incentive it produces to free-ride. The harder one country tries to reduce its CO_2 emissions by reducing fossil fuel use, the greater downward pressure on fossil fuel prices (due to the resulting decrease in demand), the greater the temptation for other countries, especially developing ones, to snap up the suddenly abundant and cheap fossil fuel.[199] And finally, this proposal would appear to even further exacerbate that cruel dynamic: A carbon tax indexed to climate outcomes could very

197. *Clean Energy*, *supra* note 116.

198. *See supra* text accompanying note 126.

199. *See, e.g.*, Shi-Ling Hsu, *A Game-Theoretic Model of International Climate Change Negotiations*, 29 N.Y.U. ENVTL. L.J. (forthcoming 2011), *available at* http://ssrn.com/abstract=1573054.

well increase in part *because* of the emissions of other, non-cooperating countries, since CO_2 emissions anywhere contribute to climate changes everywhere. American industries subjected to this tax-and-cap-and-trade program could wind up paying more carbon taxes *because* China is uncooperative and emitting greater amounts of CO_2.

There are two responses built into the structure of this proposal: (1) the revenues from both the carbon tax and the auction proceeds from the cap-and-trade part can be used for transition relief, and (2) this tax-and-cap-and-trade program, if implemented, may provide a legitimate basis for levying a border tax adjustment on imports from countries that do not price carbon.[200]

First and foremost, this tax-and-cap-and-trade proposal, like other proposals, creates a source of revenue. As suggested earlier, some of these revenues can be targeted at communities that suffer damages from climate events or used to fund adaptation measures. But another potential use for the revenues is to provide some relief for industries that face competitive pressures from firms in countries that do not price carbon. What little evidence that is able to rise above the hand-wringing suggests that the amount of "offshoring" of both manufacturing and emissions is relatively small and possibly exaggerated to serve protectionist purposes.[201] Nevertheless, to the extent that this policy could provide some palliative for industries feeling a bit vulnerable, it is an advantage that many other climate policies do not have. Granted, while transition relief provided from the proceeds of this proposal could not make emitters whole, it could provide some incentives and support for carbon-intensive and trade-exposed

200. This latter consideration does not apply if the proposal is carried out as a state, provincial, or regional program.

201. TREVOR HOUSER ET AL., PETERSON INST. FOR INT'L ECON., LEVELING THE CARBON PLAYING FIELD: INTERNATIONAL COMPETITION AND US CLIMATE POLICY DESIGN 10 (2008), *available at* http://pdf.wri.org/leveling_the_carbon_playing_field.pdf (showing that a carbon tax of ten dollars per ton would only reduce output by 0.5%). Only eighteen percent of the steel, aluminum, cement, paper, and basic chemicals produced in the world are internationally traded. *Id.* at 77. Although carbon pricing *could* increase this amount, it is not widely believed among economists to be likely to have much of an effect. Joost Pauwelyn, *U.S. Federal Climate Policy and Competitiveness Concerns: The Limits and Options of International Trade Law* 6 (Nicholas Inst. for Envtl. Policy Solutions, Working Paper No. 07-02, 2007), *available at* http://nicholasinstitute.duke.edu/climate/policydesign/u.s.-federal-climate-policy-and-competitiveness-concerns-the-limits-and-options-of-international-trade-law/at_download/paper.

industries to re-examine old assumptions about the need to emit greenhouse gases. And the revenues available to accomplish this are not trivial; even at a low carbon tax rate of $5 per ton, if it covered all fossil fuel emissions in the United States, the combined proceeds from the tax and the cap-and-trade program would total about $30 billion annually at present emission rates.[202] Even a small portion of that could go a long way toward transition relief.

Second, a carbon tax provides perhaps the best legal chance under international trade rules to levy a border tax adjustment on imports from countries that do not price carbon. World Trade Organization (WTO) panels and predecessor panels of the General Agreement on Tariffs and Trade (GATT) have had a mixed record when it comes to allowing countries to protect domestic industries disadvantaged by stronger environmental regulations at home.[203] While WTO and predecessor GATT panels have been stingy in permitting trade relief on environmental grounds, based on provisions under the "General Exceptions" article (Article XX),[204] they have been somewhat less skeptical when reviewing border tax adjustments under Article II.[205] Article II.2(a) of the GATT provides that GATT's prohibitions on tariffs do not prevent a country "from imposing at any time on the importation of any product . . . a charge equivalent to an *internal tax* . . . in respect of the like domestic product or in respect of an article from which the imported product has been manufactured or produced in whole or in part."[206] "Internal taxes" are commonly interpreted as including sales taxes, excise taxes, or value-added taxes.

The question is thus whether a carbon tax could be likened to other "internal" taxes that would justify a border tax adjustment under Article II. The international trade jurisprudence, such as it were, is sketchy and incomplete. From

202. U.S. emissions were about six gigatons of CO_2 in 2007. WORLD RES. INST., *supra* note 196.

203. *See, e.g.*, Daniel C. Esty, *Bridging the Trade-Environment Divide*, 15 J. ECON. PERSP. 113, 114 (2001); George Hoberg, *Trade, Harmonization, and Domestic Autonomy in Environmental Policy*, 3 J. COMP. POL'Y ANALYSIS: RES. & PRAC. 191, 195–207 (2001).

204. General Agreement on Tariffs and Trade art. XX, Oct. 30, 1947, 61 Stat. A3, 55 U.N.T.S. 187.

205. Pauwelyn, *supra* note 201, at 17.

206. General Agreement on Tariffs and Trade, *supra* note 204, 61 Stat. at A15, 55 U.N.T.S. at 202 (emphasis added).

the literature that has emerged on this possibility, the consensus is a resounding "maybe."[207] What does seem clear, however, is that a carbon tax is less vulnerable to a WTO challenge than many other climate policies in that it seeks to equalize a tax burden across trade borders. For cap-and-trade programs in which allowances are distributed for free, either on the basis of historical emissions or on some other politically-derived formula, it would be difficult to make the case that a border tax adjustment sought to equalize a burden, since domestic emitters would already be benefitting from free allowances. In this regard, this tax-and-cap-and-trade program, insofar as it imposes unambiguous, unitary charges, would be a better platform from which to justify a border tax adjustment than other policies.

At least on an international level, then, this tax-and-cap-and-trade proposal would thus appear to have some economic resources and legal footing on which to address competitiveness and trade concerns. Even if such concerns are exaggerated, it cannot be an inefficient move to equalize carbon pricing burdens across borders, and it could well prove to be helpful in recruiting international cooperation on greenhouse gas emissions reduction.

D. How Well Will the Market Work?

As noted earlier, recent market travails have cast a shadow over markets as allocative mechanisms.[208] More so than in the past, people distrust market prices as fundamental indicators of inherent value.[209] In the long run, however, markets still provide the best chance of ascertaining value. There is still no institution that more *rationally* evaluates value.

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207. *See, e.g.*, HOUSER ET AL., *supra* note 201, at 30; GARY CLYDE HUFBAUER ET AL., GLOBAL WARMING AND THE WORLD TRADING SYSTEM 39–46 (2009); Gavin Goh, *The World Trade Organization, Kyoto and Energy Tax Adjustments at the Border*, 38 J. WORLD TRADE 395, 422–23 (2004); Roland Ismer & Karsten Neuhoff, *Border Tax Adjustment: A Feasible Way to Support Stringent Emission Trading*, 24 EUR. J. LAW & ECON. 137, 143–52 (2007); Pauwelyn, *supra* note 201, at 17–23. *But see* DANIEL C. ESTY, GREENING THE GATT—TRADE, ENVIRONMENT AND THE FUTURE 168 (1994).

208. *See supra* Part II.

209. *See supra* Part II.

One objection is that irrationalities do creep into market evaluations, and the outcome can be spectacularly bad.[210] When analysts' valuations are *systemically* errant—when they are systemically based on other analysts' errant evaluations—assumptions of widespread rationality break down, and a long chain of inaccurate valuations cascades throughout a market, skewing prices. When a critical piece of corrective information finally emerges, prices can be crushed almost instantaneously in an electronic era. But systemic error can persist for a long time before a correction. As Keynes famously remarked, "[m]arkets can stay irrational longer than you can stay solvent."[211]

According to James Surowiecki, the author of the book *The Wisdom of Crowds*, the danger of systemic and cascading breakdowns in market accuracy emerges when evaluations lose independence from each other.[212] The strength of markets and the advantage of the many are only present when a diverse body of people, thinking *independently*, make their own evaluations. Independence is so important because it ensures that groupthink does not form and that ideas are genuinely tested before individuals begin to adopt them.[213]

In this way, a prediction market in future climate outcomes—the cap-and-trade program—would make a virtue out of the exasperatingly deep divide between climate scientists and climate skeptics. Climate skeptics would, in all likelihood, make the market for climate information *better,* even if in the end they are proven wrong in their skepticism. It is the intellectual challenge posed to ideas that strengthens them. This was the way that the concept of the "marketplace of ideas"[214] was supposed to work. Something seems to have gone

210. *See* SUROWIECKI, *supra* note 86, at 41–43.

211. Maureen O'Hara, *Bubbles: Some Perspective (and Loose Talk) from History*, 21 REV. FIN. STUD. 11, 14 (2008).

212. *See* SUROWIECKI, *supra* note 86, at 41–43.

213. *See id.*

214. This widely used market metaphor to support legal arguments for the First Amendment right to freedom of expression is attributed to a dissenting opinion by Justice Oliver Wendell Holmes in *Abrams v. United States*, 250 U.S. 616 (1919), but was never actually used by Justice Holmes. In *Keyishian v. Board of Regents,* another U.S. Supreme Court case, this one involving the constitutionality of a university's requirement that its faculty members certify that they were not Communists, Justice Brennan wrote that "[t]he classroom is peculiarly the 'marketplace of ideas.' The Nation's future depends upon leaders trained through wide exposure to that robust exchange of ideas which discovers truth 'out of a multitude of tongues, [rather] than through any kind of

wrong in the marketplace for climate ideas, and a prediction market is likely to at least improve the situation. Because climate science and climate skepticism are both brutally cross-examined, a market in climate science would seem to be a poor host for *systemic* errors.

In addition to suffering systemic error, markets can be subject to conscious manipulation. Abramowicz discusses the possibility of market manipulation and reviews the literature on market manipulations, particularly in prediction markets.[215] His tentative conclusion is that in markets possessing a great deal of public information, the empirical evidence does not support a fear of long-term effects from manipulation.[216] If that is the case, then climate science, derived mostly from published data and analysis, should be a market that is uniquely insulated from manipulation. Would-be manipulators would be faced with trying to move prices in the face of an enormous amount of information, far more information than is ever made public with regard to the millions of publicly-traded firms whose shares are traded throughout the world.

A brief thought experiment in imagining a market for climate outcomes would provide some reassurance that a prediction market in climate science would be even less susceptible to manipulation. The findings and assertions of climate science are almost completely public (even if climate skeptics charge that climate scientists have been secretive about their data). Under the Abramowicz analysis of prediction markets, this predominance of public information would pose a significant obstacle for market manipulators hoping to bias a perception. The task of biasing opinion for a long enough period of time to profit would be enormously difficult, as it would be facing a barrage of countervailing assertions every day from both climate scientists and climate skeptics. While some industry groups and ideological groups have succeeded in biasing public opinion against concern about climate change,[217] convincing those with a material interest in accuracy—such as AEP, with its potentially billions of dollars of annual carbon

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authoritative selection.' " 385 U.S. 589, 603 (1967) (second alteration in original) (quoting United States v. Associated Press, 52 F. Supp. 362, 372 (S.D.N.Y. 1943)).

215. ABRAMOWICZ, *supra* note 82, at 28–32.

216. *Id.*

217. *See, e.g.*, Boykoff & Boykoff, *supra* note 20, at 133.

tax liability—would be an entirely different matter with a continuing trove of research being produced daily.

Also, the sheer size of just a domestic U.S. market would make sustained market manipulation exorbitantly costly. By the rough back-of-the-envelope calculations above,[218] with a market of about two billion dollars for each vintage year, and with a huge number of market participants likely to trade in emissions permits, it is inconceivable that anybody would find it worthwhile to try to sway the market in any meaningful fashion. For a cap-and-trade program whose value is indexed to a large *basket* of climate outcomes, one would have to not only skew one piece of information but also manipulate information about three or four or five climate outcomes.

Perhaps most relevantly, the few emissions permit markets that have been implemented thus far have shown no signs of either manipulation or cascading breakdowns due to systemic bias and error. The sulfur dioxide trading program has never drawn suspicions of market manipulation, even while attracting a considerable number of speculators that were not involved in the electricity generating industry at all.[219] Nor have other subsequent programs, such as the European Union Emissions Trading System or the much smaller (and therefore potentially vulnerable) Regional Greenhouse Gas Initiative, involving only power plants in ten northeastern U.S. states.[220] Prices have in some cases been volatile,[221] and a source of consternation for some investors, but in no instance has a price movement been sustained for a long time or been cause for suspicion.

Finally, a question related to systemic error and manipulation is the question of whether there is enough information on which to trade. Is there or would there be enough climate science on which to trade? On what basis would firms buy permits to emit forty years in the future?

In thinking about this problem it is worth bearing in mind that not only do markets knit together disparate information and create incentives to reveal information, but they also

218. *See supra* text accompanying note 197.

219. *See, e.g.*, A. DENNY ELLERMAN ET AL., MARKETS FOR CLEAN AIR 7 (2000); Jacob Kreutzer, *Cap and Trade: A Behavioral Analysis of the Sulfur Dioxide Emissions Market*, 62 N.Y.U. ANN. SURV. AM. L. 125, 138 (2006).

220. REGIONAL GREENHOUSE GAS INITIATIVE, http://www.rggi.org/home (last visited July 8, 2011).

221. HSU, *supra* note 105, at 71.

create incentives to generate *new* information.[222] Beyond public monies, private firms have already begun to get involved in the climate monitoring business.[223] The prospect of more climate information may seem daunting to those already inundated by climate science, but few climate researchers, even as they advocate for strong policies to reduce greenhouse gases, would deny that huge data gaps remain.[224]

Again, because of the unprecedented size of this prediction market, the demand for new, better, and more predictive climate science will become apparent. Future multi-billion-dollar carbon tax liabilities, even when discounted, will draw in even more climate researchers, potentially working in areas in which climate science is currently somewhat less developed, or areas that funding agencies may have completely overlooked.

It is also worth bearing in mind that publicly traded stocks are traded robustly and are based upon long-term projections of profitability that may seem unrealistic. Google currently has a market capitalization of about $175 billion,[225] with revenues of only $27 billion and net income available to common shareholders of about $8 billion.[226] In such a fast-moving industry, what exactly makes people think Google's profitability is so sustainable for five, ten, twenty, or forty years as to warrant this size of investment, especially in a rapidly changing industry such as information technology? How do people even hazard a guess as to what the industry will look like two or three decades from now, and whether Google will even exist, let alone be as dominant then as it is now? Analysts will cite statistics and compare Google's figures with

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222. *See supra* notes 77–81 and accompanying text.

223. Lauren Morello, *Measuring Greenhouse Gases, a New Business Venture*, CLIMATEWIRE (Jan. 12, 2011), http://www.eenews.net/climatewire/print/2011/01/12/2 (paid subscription).

224. *See* Quirin Schiermeier, *The Real Holes in Climate Science*, 463 NATURE 284, 284 (2010).

> Researchers say it is difficult to talk openly about holes in understanding. "Of course there are gaps in our knowledge about Earth's climate system and its components, and yes, nothing has been made clear enough to the public," says Gavin Schmidt, a climate modeller at NASA's Goddard Institute for Space Studies in New York.

Id.

225. *Google Inc. (GOOG)*, YAHOO! FIN., http://finance.yahoo.com/q/ks?s=GOOG (accessed Aug. 10, 2011).

226. *Id.*

those of other companies, but in the end, investors believe that somehow, this company is sustainable for many years.

In markets, we cope with uncertainty by somehow taking our best guesses. This is what is needed in climate science. The lack of a credible institution that forces us to take our best guess about future climate conditions, in the face of uncertainty, is precisely the problem with climate policy. Are the data flaws so great that costly action is premature, as the climate skeptics argue, or are the risks so great that much more immediate action is warranted, as climate scientists generally argue? Doing nothing is the default policy. Doing nothing is also the stock market's equivalent of stashing one's money in his mattress, a myopic strategy that almost every investor recognizes as a sure-fire money-loser.

E. What Kinds of Information Will Be Reflected in Trading Activity?

Although the primary purpose of this proposal is to process, evaluate, and generate climate science, the trading activity of future permits will also reflect the emergence of other important pieces of information. Many kinds of events, not just scientific discoveries about climate science, have the potential to affect forecasts of the number and frequency of dangerous climate outcomes. This Section discusses some of the types of events that may affect trading prices. These events create unwelcome side effects, mixing the impacts of climate science with those of other events, thereby diluting the signal for climate science. Ideally, this proposal would filter out both developments unrelated to discoveries and evaluations unrelated to climate science, but for some of these events it may be difficult to separate out the effects of these events.[227] To some extent, dilution of the signal for climate science is unavoidable.

This inevitability underscores again the need to keep the index simple and to use it to focus on fundamental indicators of

227. There is the possibility that the effects of some events that could affect climate outcomes could be captured by a separate contingent prediction market. Separate continent markets could allow for trading in shares of outcomes only if a specified condition occurred. So, for example, if the election of Sarah Palin as U.S. President were likely to lead to a dismantling of this program, then a separate contingent prediction market could be established for those outcomes contingent upon her election. For a review of contingent prediction markets, see Wolfers & Zitzewitz, *supra* note 82, at 122–24.

climate change. But beyond that, maybe it is not such a bad thing that this prediction market captures events other than just climate science. Again, in the seemingly constant chatter of information about all kinds of developments in climate science, technology, and policy, what is the layperson to make of it all? A prediction market can help. After all, a wide variety of things are said about addressing climate change (or not), and there is, again, precious little rational evaluation of the seriousness of these things, and there is still a lay public wondering what to think.[228]

Viewed in this vein, a prediction market for climate outcomes could aid in the more rational discussion of technological developments and their potential to reduce greenhouse gases. A prediction market could actually act as an arbiter of the quality of climate technologies, a role that markets have historically played with great effectiveness. Because the index is keyed to climate outcomes, this prediction market would judge climate technologies ultimately by their ability to change the climate. This information is, like credible evaluations of climate science, currently scarce.

Climate technologies currently fall into two very broad categories: (1) *mitigation* technologies, which reduce emissions, or (2) post-emission *geo-engineering* strategies to directly reduce the risk of climate change, either by physically or chemically removing greenhouse gases from the Earth's atmosphere or reducing the heat-generating effects of solar radiation.[229] Carbon capture and storage (CCS) technology is an example of an emissions reduction technology. CCS aims to *extract* the CO_2 from fossil fuels (mostly coal) and store it in underground caverns or some other geologically appropriate space, where it will remain for an effective eternity and avoid affecting the Earth's climate.[230] What should we make of this technology? Perhaps more pertinent, how much should governments spend to subsidize the development of this technology? The answers offered to this question have not been sensible, except in a nakedly political sense.

Some in Congress seem to have fallen in love with CCS technology, and some have even likened its development to

228. *See supra* notes 1–2 and accompanying text.

229. *See supra* note 112.

230. *Carbon Dioxide Capture and Storage (CCS)*, WORLD RESOURCES INST., http://www.wri.org/project/carbon-capture-sequestration (last visited Feb. 25, 2011).

that of the atomic bomb, necessitating a super-research effort. In a 2009 floor speech, U.S. Senator Lamar Alexander said, "we should launch another mini-Manhattan Project and reserve a Nobel Prize for the scientist who can get rid of the carbon from existing coal plants, because coal provides half our energy."[231] This seems overenthusiastic. The most prominent pilot American CCS project, FutureGen,[232] has lost its two biggest industry backers, AEP and the Southern Company.[233] This is a shocking development involving the two largest coal users in the United States.[234] And yet, FutureGen has suffered a never-ending series of twists and turns, the news alternately holding out the promise of rescuing the coal industry and at times sounding the death knell of the whole idea.[235] How seriously do we take information about advances and setbacks with respect to CCS? Markets may provide a badly needed reality check.

A prediction market for climate outcomes would also evaluate geo-engineering technologies and perhaps be an even better arbiter, since the only thing that geo-engineering projects are supposed to do is reduce the concentration of greenhouse gases. One technology currently under consideration is "air capture" technology, which literally sucks CO_2 right out of the air for sequestration.[236] This is accomplished by exposing some alkaline chemical compounds capable of reacting with ambient CO_2 to form new compounds, from which the absorbed CO_2 can be captured and stored.[237]

231. 155 CONG. REC. S4529 (daily ed. Apr. 22, 2009) (statement of Sen. Lamar Alexander), *available at* http://frwebgate.access.gpo.gov/cgi-bin/getpage.cgi?position=all&page=s4529&dbname=2009_record.

232. FutureGen is a proposed pilot carbon capture and storage project that aims to capture the CO_2 emissions from a midwestern coal-fired power plant, most recently slated for construction in Morgan County, Illinois. *See, e.g.*, *FutureGen 2.0 Project*, FUTUREGEN ALLIANCE, http://www.futuregenalliance.org/futuregen-2-0-project (last visited June 3, 2011); Christa Marshall, *FutureGen Gets a Storage Site*, CLIMATEWIRE (Mar. 1, 2011), http://www.eenews.net/climatewire/print/2011/03/01/4 (paid subscription).

233. Mark Chediak & Katarzyna Klimasinska, *AEP to Exit Clean-Coal Project*, TULSA WORLD, June 25, 2009, at E2. The U.S. Department of Energy has nevertheless pledged one billion dollars in support of the project. Christa Marshall, *DOE Commits $1 Billion to FutureGen Project*, CLIMATEWIRE (Sept. 29, 2010), http://www.eenews.net/climatewire/print/2010/09/29/5 (paid subscription).

234. Chediak & Klimasinska, *supra* note 233.

235. *Compare id. with* Marshall, *supra* note 233.

236. David W. Keith, *Why Capture CO_2 from the Atmosphere?*, 325 SCIENCE 1654, 1654 (2009).

237. *Id.* at 1655.

The concentration of CO_2 in the air is very low,[238] so capturing the CO_2 directly from the air is an inherently clumsy engineering task.[239] However, air capture technology can be deployed anywhere, so it can be strategically placed near geologic formations susceptible of CO_2 storage and can utilize renewable energy technologies away from the grid.[240] Air capture technology is more clearly benign and free from side-effects than other geo-engineering technologies that have been proposed.[241] Finally, air capture technology can be employed unilaterally and is thus a way around the seemingly intractable international diplomacy problems that plague climate change.[242] But it is expensive—even more so than CCS.[243] How excited should we be about *this* technology?

This proposal introduces a financial incentive for people to critically evaluate these and other truly climate-altering technologies. As some people have become discouraged by the one-step-forward-two-steps-backward pace of international climate negotiations, the ability of geo-engineering technologies to allow unilateral action is, going forward, going to remain a policy option. Market evaluations of the feasibility of these technologies cannot be a bad thing. A market signal may provide policymakers information about what markets think about the potential of certain technologies to affect climate outcomes. It could be that the most significant thing a market in future permits can do is yawn while Washington pundits and overnight physicists in the U.S. Congress scream, "this is a game-changing technology!"[244]

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238. Carbon dioxide concentrations are currently at about 390 parts per million. *Trends in Atmospheric Carbon Dioxide*, EARTH SYS. RES. LABORATORY, http://www.esrl.noaa.gov/gmd/ccgg/trends (last visited Feb. 26, 2011).

239. Keith, *supra* note 236, at 1654–55.

240. *Id.* at 1655.

241. For example, one geo-engineering idea that has been discussed is "iron fertilization," the seeding of oceans with iron, to facilitate the growth of CO_2-absorbing phytoplankton. While this could result in the absorption of CO_2, it would also likely dramatically alter the balance of ocean life by changing, among other things, the acidity of the ocean. *See* HENSON, *supra* note 48, at 331.

242. Scott Barrett, *Climate Treaties and Backstop Technologies* 4 (CESifo, Working Paper No. 3003, 2010), *available at* http://www.ifo.de/portal/pls/portal/docs/1/1185648.PDF.

243. *Id.*

244. Supposed "game-changing" technologies have included: electric vehicle batteries, Jason Plautz, *States See Rebirth in Battery Manufacturing*, GREENWIRE (July 12, 2010), http://www.eenews.net/public/Greenwire/2010/07/12/11 (paid subscription) (quoting a Michigan Economic Development Corporation as stating, "This is a game-changer for Michigan. It's the birth of an industry"); electricity storage technology generally, Lea Radick, *Some Energy Storage Solutions May Be*

In addition to providing information about technologies, a prediction market might also provide information about policy developments. This is not altogether welcome, as it dilutes the signal for climate science, but again, it is unavoidable. The political rise of climate skeptics may dampen prices because of the prospect of their dismantling this program if one of them becomes President. One response to this has already been made: that this program will generate vested interests that could make its termination politically costly.[245] Another response is that if a climate skeptic is elected President and this program is terminated, then we are no worse off than we would be never having had this program and perhaps better off for the information collected while the program was in place.

To again put this inevitability in a more positive light, a prediction market might be helpful in interpreting policy events. Markets may signal their beliefs in the significance of certain actions or statements. For example, the widely criticized behavior of Chinese representatives at the Copenhagen meeting, seeming to signal a disinterest in agreeing to climate action,[246] might be a signal that China is

'Game-Changers,' Industry Leaders Say, CLIMATEWIRE (Mar. 13, 2009), http://www.wbcsd.org/Plugins/DocSearch/details.asp?ObjectId=MzM2ODU; shale gas, Mike Soraghan, *Shale Plays Create 'New World' for Energy Industry*, GREENWIRE (Mar. 11, 2010), http://www.eenews.net/Greenwire/print/2010/03/11/1 (paid subscription) ("Nearly every presenter at the conference has found a way to describe shale as a 'game changer.' "); small nuclear reactors, Katherine Ling, *House Panel to Focus on Small Reactors, Future R&D at DOE*, ENV'T & ENERGY DAILY (May 17, 2010), http://www.eenews.net/EEDaily/print/2010/05/17/10 (paid subscription); nuclear reactors that burn spent fuel, Peter Behr, *A Reactor That Burns Depleted Fuel Emerges as a Potential 'Game Changer,'* CLIMATEWIRE (Feb. 23, 2010), http://www.eenews.net/climatewire/print/2010/02/23/1 (paid subscription); ocean thermal power, Saqib Rahim, *Is 'Ocean Thermal' Power Ready for Its Day in the Sun?*, CLIMATEWIRE (Feb. 11, 2009), http://www.earthportal.org/news/?p=2165; a transmission line linkage, Peter Behr, *Proposal to Link the Nation's Grid Sparks a Debate*, CLIMATEWIRE (Feb. 3, 2010), http://www.eenews.net/climatewire/print/2010/02/03/1 (paid subscription), Peter Behr, *An Electric 'Game Changer' Gets FERC Scrutiny*, N.Y. TIMES, Dec. 23, 2009, http://www.nytimes.com/cwire/2009/12/23/23climatewire-an-electric-game-changer-gets-ferc-scrutiny-48247.html; and General Motors' plug-in hybrid vehicle, Josh Voorhees, *Plug-in Hybrids Likely to Stay Expensive for Decades—Report*, GREENWIRE (Dec. 14, 2009), http://www.eenews.net/Greenwire/print/2009/12/14/15 (paid subscription).

245. *See supra* Part IV.B.2.

246. During negotiations at the Copenhagen Conference of Parties, Chinese Premier Wen Jiabao twice snubbed world leaders by sending an aide instead of attending in person, prompting President Obama to ask, "Mr. Premier, are you ready to see me?" Peter Maer, *Impromptu Moments Shaped Copenhagen Accord*, CBSNEWS.COM (Dec. 24, 2009, 12:02 PM), http://www.cbsnews.com/stories/2009/12/20/politics/main6000506.shtml.

prepared to live in a future world with climate change. On the other hand, China has raced past all other countries (including the United States) in investment in renewable energy technologies, possibly signaling its preparation for a low-carbon future.[247] Which way is China heading? It is not a crazy thought to entertain that a prediction market might make more objective guesses and better projections than climate pundits and China-watchers.

F. The Politics of Carbon Taxes and Cap-and-Trade

Carbon taxes will continue to be controversial. My other work on carbon taxes acknowledges these political realities.[248] At the same time, there is a set of countervailing realities that American politicians will have to confront eventually. First, rising deficits and the now ever-present concern over sovereign debt problems may push carbon taxes out of the taboo category and into the "necessary evil" category, as jurisdictions look for ways to bridge their yawning budget gaps.[249] Second, if other nations begin to cobble together some sort of climate policy (as Europeans will continue to do) and foster a low-carbon economy (as China's investments in renewable energy seem to be aimed at doing), then Americans, Canadians, and other laggards may find themselves at political and economic disadvantages. Finally, a carbon tax can be made to start out (with present climate outcomes) at a low level. A low-enough-indexed carbon tax could conceivably fly under the threshold of indignation that could doom most climate policies. A $5-per-ton tax, for example, translates to a five-cent increase in the price of a gallon of gasoline.[250] For a household that consumes the 2001

247. Lisa Friedman, *China Leads Major Countries with $34.6 Billion Invested in Clean Technology*, CLIMATEWIRE (Mar. 25, 2010), http://www.eenews.net/climatewire/print/2010/03/25/1 (paid subscription) (citing PEW CHARITABLE TRUSTS, WHO'S WINNING THE CLEAN ENERGY RACE? (2010), *available at* http://www.eenews.net/public/25/14924/features/documents/2010/03/25/document_cw_03.pdf).

248. HSU, *supra* note 105, at 181–91.

249. *See, e.g.*, Christa Marshall, *British Columbia Survives 3 Years and $848 Million Worth of Carbon Taxes*, CLIMATEWIRE (Mar. 22, 2011), http://www.eenews.net/climatewire/2011/03/22/1 (paid subscription) (" 'A huge question we are facing is how to deal with budget problems,' [University of Michigan professor Barry] Rabe said. 'Where are states going to get money? They don't have many choices, and carbon is one place to look.' ").

250. One U.S. gallon of gasoline contains about 2.42 kg of carbon. N.C. COOP. EXTENSION, CONVERSION FACTORS FOR BIOENERGY (2008), *available at* http://www.ces.ncsu.edu/forestry/biomass/pubs/WB008.pdf. One kilogram of

U.S. average of 1143 gallons per year,[251] there is an average increase of about $56 per year in fuel costs. At some point, shrill cries of a carbon tax increasing gasoline prices will meet the reality that its actual cost would be relatively modest.

Perhaps most importantly, this proposal would enjoy one critical political and optical advantage over other carbon tax proposals. Indexed as it is to destructive climate outcomes, all or a portion of proceeds of this carbon tax could be earmarked for disaster assistance for victims of climate outcomes. It could be considerably easier to sell a carbon tax that is viewed as being a funding mechanism for climate-related disaster (or even disaster unrelated to climate) such as hurricanes or droughts. Such a tax seems much more linked to ameliorating a problem than it is to a simple consumption tax burden and a government money-grab.

More generally, carbon taxes must, for lack of any alternatives, soon emerge as an acceptable option. It is tempting to dismiss any carbon tax as politically unpalatable at this juncture. But even a moment's reflection would suggest considerable potential for introducing a carbon tax. In the Canadian province of British Columbia, North America's first carbon tax is being phased in from a level of about $10 (Cdn) per ton up to about $30 (Cdn) per ton, over five years, ending in 2012.[252] The governing political party that introduced the carbon tax, the Liberal Party, has survived the political storm, even picking up some support along the way,[253] suggesting that the resistance to a carbon tax in this range may not be immovable. One key to the success of the Liberal Party of British Columbia is that it was the more conservative of the two parties vying for power in the province. By outflanking its

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carbon is 5.34 pounds, which equals 0.00266 short tons. The molecular weight of carbon is 12, while the molecular weight of CO_2 is 44. *See Calculate Molecular Weight—Molar Mass Calculator*, WEBQC.ORG, http://www.webqc.org/mmcalc.php (last visited May 3, 2011). Burning one gallon of gasoline thus emits 0.00266 short tons of carbon and 0.00978 short tons of CO_2. A carbon tax of five dollars per ton of CO_2 would thus result in a carbon tax of 4.89 cents per gallon.

251. ENERGY INFO. ADMIN., HOUSEHOLD VEHICLES ENERGY USE: LATEST DATA AND TRENDS 57 tbl.A2 (2005), *available at* http://www.eia.gov/emeu/rtecs/nhts_survey/2001/tablefiles/0464%282005%29.pdf. This only reports average consumption among U.S. households *that own a car*. The average per *all* households would be lower.

252. Carbon Tax Act, S.B.C. 2008, c. 40 (Can.), *available at* http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/00_08040_01.

253. HSU, *supra* note 105, at 187.

more liberal and environmentally active rival party, the Liberal Party split the voters of its rival along environmental lines and undermined the rival's traditionally solid and large base of environmental voters.[254] Despite the label of "Liberal" for the governing party, American conservatives might take note of this political success.

CONCLUSION

It is no exaggeration to say that markets inexplicably work. How exactly does information travel from one market participant to another, what form does that information take, and how does it get translated into prices? Nobody knows. As economist Maureen O'Hara has quipped, "while markets appear to work in practice, we are not sure they work in theory."[255] This proposal aims to tap into the mysterious efficiency of markets. This Article has left a number of details to future thought and design but has sketched out the basic parameters of a simple idea: Impose a carbon tax, specify that the carbon tax will be indexed to some climate outcomes, and offer to the taxed entities the opportunity to purchase permits to emit in lieu of paying the tax. These permits would be tradable after their initial auction. The idea of this proposal is to use the trading activity of the future emissions permits to generate some credible forecasts about what the indexed carbon tax will be and, hence, what climate outcomes will be.

We are probably better off not giving in to cynicism when considering the arguments of those with whom we disagree about climate science, however tempting it is to think that the "other side" is just nuts or corrupt. However, the vast uncertainties, the enormous political stakes involved, and the very personal core values implicated by the problem of climate change, not to mention the large investments that both climate advocates and climate skeptics have in their particular substantive positions, give rise to a situation in which anybody can accuse anybody of taking a subjective interpretation of climate science. It is truly challenging under these circumstances to take a benign view of those with whom we disagree. This proposal, more than even addressing the

254. *Id.*

255. Maureen O'Hara, *Making Market Microstructure Matter*, FIN. MGMT., Summer 1999, at 83, 83.

problem of reducing greenhouse gases, addresses the question of whom we truly believe and how sure we are of our beliefs.

Markets are inherently imperfect, so the information generated by this proposal will be imperfect. It is not as if this cap-and-trade market will reveal the true climate science. Rather, what this proposal does is provide objective information about what others think. This information network aspect, similar to the information network embedded in market prices, is *feedback* more than it is information, and it serves as a challenge to our beliefs. While McKitrick's proposal of a temperature-indexed carbon tax is meant to tap into nature as an "arbiter," this proposal goes further and taps into *both* nature and markets as arbiters. Nature gets to determine the level of the carbon tax, but markets get to make important forecasts about what nature will do in the future.

APPENDIX

A. Construction of the Carbon Tax Index

1. Global Mean Temperature

As noted in Part IV.A.3.i, constructing a global mean temperature statistic raises thorny issues because temperature-taking is not uniform across the planet, and in some countries where it is taken the data are spotty and unreliable. Moreover, countries are sometimes reluctant to release their raw climate data except with confidentiality agreements that protect their proprietary interests.[256] How does one "clean" or adjust data that are obviously faulty without being accused of tampering? This has been the plight of the Climatic Research Unit (CRU) at the University of East Anglia and its beleaguered director, Dr. Phil Jones, foci of the "Climategate" controversy.[257] The CRU data are compilations of raw temperature readings compiled into 5° x 5° grid boxes for most of the land surface of the Earth.[258] While CRU makes its compilation publicly available, it irked climate skeptics by

256. Telephone interview with Xuebin Zhang, Research Scientist, Env't Can. (Feb. 17, 2011).

257. *See supra* notes 15–17 and accompanying text.

258. Phil Jones & Mike Salmon, *Temperature*, CLIMATIC RES. UNIT, U. E. ANGLIA, http://www.cru.uea.ac.uk/cru/data/temperature (last updated Jan. 2011).

refusing to divulge its raw data.[259] The problem was that CRU's raw data from weather stations throughout the world were provided by the national meteorological services of each country under the condition that the data not be publicly disseminated.[260] Even demands by climate skeptics that CRU share its code would allow people to reverse engineer the publicly available data and re-create the raw data, violating the confidentiality agreements.

Other datasets exist,[261] but they are not free of controversy either. McKitrick proposes using an average temperature calculated from a dataset maintained by Roy Spencer and John Christy, researchers at the University of Alabama at Huntsville (UAH), which uses publicly available data from NOAA satellites and infers temperatures at different altitudes.[262] The controversy surrounding this dataset stems from its deployment in past studies that seem to have shown no increase in global temperatures.[263] Frank Wentz and Matthias Schabel argued that part of the cooling trend can be attributed to the orbital decay of the satellites from which the readings were taken.[264] Spencer and Christy made adjustments to their analysis but have also made other adjustments that suggest that there is no warming trend, at least in the troposphere above ground level.[265] A subsequent special report from the National Academy of Sciences concluded that it was possible that both sets of data were correct—that the surface temperatures may have warmed more quickly than tropospheric temperatures.[266] Subsequent

259. *See supra* note 15.

260. Lauren Morello, *'Climategate' Scientist Admits 'Awful Emails,' But Peers Say IPCC Conclusions Remain Sound*, CLIMATEWIRE (Mar. 2, 2010), http://www.eenews.net/climatewire/2010/03/02/2 (paid subscription); *see also supra* note 15.

261. For a brief description of the main datasets, see HENSON, *supra* note 48, at 178–80.

262. McKitrick, *supra* note 101, at 117–18. McKitrick's specific proposal would average the temperature of the tropical troposphere, the lowest layer of the atmosphere—the one touching the Earth's surface—over the tropical belt (between the Tropic of Capricorn and the Tropic of Cancer) around the Earth. *Id.*

263. Spencer & Christy, *supra* note 14, at 1558.

264. Frank J. Wentz & Matthias Schabel, *Effects of Orbital Decay on Satellite-Derived Lower-Tropospheric Temperature Trends*, 394 NATURE 661, 661 (1998).

265. John R. Christy et al., *Tropospheric Temperature Change Since 1979 from Tropical Radiosonde and Satellite Measurements*, 112 J. GEOPHYSICAL RES. D06102, 1 (2007).

266. PANEL ON RECONCILING TEMPERATURE OBSERVATIONS, BD. ON ATMOSPHERIC SCIS. & CLIMATE, RECONCILING OBSERVATIONS OF GLOBAL

analyses of the data now appear to have reconciled them with other datasets.[267]

These are live controversies that need to be addressed, but for purposes of indexing a carbon tax, they seem susceptible to resolution. There is no disagreement in principle, even between climate scientists and climate skeptics (who of course include scientists), that the use of some global temperature measure is a fundamental indicator of climate change. At a minimum, the UAH data, which have now been tested and reconciled with other datasets, and which Professor McKitrick proposes be used for an index, would seem to be a reasonable beginning point.

2. Days of Unusually High or Low Temperatures

"Unusual" implies some comparison with historical standards and would obviously be location specific, as the average for a polar location would be much lower than the average for a tropical one. Fortunately, the Expert Team on Climate Change Detection and Indices (ETCCDI), a working group of climate scientists attempting to collect and process temperature data throughout the world,[268] provides a head start on thinking about temperature extremes. Seeking to process raw temperature and precipitation data in a way that does not violate confidentiality agreements that inevitably come with the data, the ETCCDI has developed an index of twenty-seven outcomes (the ETCCDI calls them "indices") through which to run the data and create a separate database.[269] In other words, the "indices" are a transformation of the raw data—a way of presenting the same information without the actual raw data.

Included in the ETCCDI basket of "indices" are a number of statistics aimed at measuring the duration and severity of temperature and precipitation anomalies (both extreme

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TEMPERATURE CHANGE 2 (2000), *available at* http://www.nap.edu/catalog/9755.html.

267. Henson describes the UAH data and documents the controversy among climate scientists on the reliability of the UAH dataset. HENSON, *supra* note 48, at 183–85.

268. *Overview*, EXPERT TEAM ON CLIMATE CHANGE DETECTION & INDICES, http://cccma.seos.uvic.ca/ETCCDI/index.shtml (last updated Sept. 15, 2009).

269. *Climate Change Indices*, EXPERT TEAM ON CLIMATE CHANGE DETECTION & INDICES, http://cccma.seos.uvic.ca/ETCCDI/list_27_indices.shtml (last updated Sept. 15, 2009).

precipitation and drought).[270] Prominent among the indices are two that suit the purpose of this proposal well:

1. The percentage of days in which the daily maximum temperature was *higher than* ninety percent of the following: the daily maximum temperature readings for that same calendar day in the base years 1961 to 1990, plus the two days before and the two days after that calendar day, also in the years 1961 to 1990;[271] and

2. The percentage of days in which the daily minimum temperature was *lower than* ninety percent of the same set of temperature readings.[272]

For example, if the ninetieth percentile of all daily maximums from June 13 to June 17, 1961 to 1990, was 88°, then any June 15 with a daily maximum temperature of 89° or more would be counted for purposes of this index as an "unusually high" day. By the same token, if the tenth percentile for all daily minimums from March 2 to March 6, 1961 to 1990, was 13°, any March 4 on which the daily minimum was 12° or lower would be counted as an "unusual low."

These two indices measure the extremes of heat and cold—the hottest it gets on hot days, and the coldest it gets on cold days. It is also possible to include some measure of the persistence of such heat and cold by including the *minimum* temperature on *hot* days[273] and the *maximum* temperature on *cold* days.[274] Using the same method of comparing daily measurements against a historical five-day window centered upon the calendar day in which the measurement is taken, the ETCCDI aims to provide some measurement of how persistently hot and cold days can be without relief.

The ETCCDI's work is a work in progress. In constructing an index, it is also important to consider how to choose locations from which data will be processed and become part of the index. As the ETCCDI continues to work with and process datasets, this question is also one that requires deft resolution.

270. *Id.* (indices 17–27).
271. *Id.* (index 13).
272. *Id.* (index 10).
273. *Id.* (index 12).
274. *Id.* (index 11).

3. Extreme Rainfall and Drought Events

Even "flooding" and "drought" are somewhat subjective terms and require some formal definition. A number of indices taking into account drought are possible, but it is useful to refer again to the work of the ETCCDI. As with #2 (days of unusually high or low temperatures), some transformation of raw data is necessary. It seems desirable to compare data with historical records of precipitation in the comparable time of year so that the precipitation in wet areas such as coastal British Columbia are evaluated in the context of how wet it has been in the past. With dry areas, however, extreme and prolonged dryness render this way of counting dry days statistically difficult. If it has historically been bone-dry in Phoenix every single summer for the entire period of 1961 to 1990,[275] there will be no ninetieth percentile, or any other percentile. There is no such thing as "unusually dry" when looking at summers in Phoenix.

Consistent with the objectives of this climate index, two statistics under consideration by the ETCCDI seem helpful in measuring extreme rainfalls and droughts:

1. The total number of days in which the precipitation is greater than ninety-nine percent of all wet days (defined as getting more than one millimeter of rain, just a very small amount) in the entire period from 1961 to 1990. In other words, extreme rain is evaluated against the wettest days in the entire thirty-year period from 1961 to 1990.[276]

2. The *length* of droughts, i.e., the number of consecutive days in which there was less than one millimeter of rain.[277]

The Bureau of Meteorology in Australia is able to get around the statistical dryness problem by aggregating data over a region and averaging them over an entire year. The Bureau defines a drought as rainfall over three consecutive months that is in the lowest ten percent of what has been recorded for that region in the past.[278] Of course, droughts could be extremely long periods of time with very limited

275. From 1971 to 2000, average rainfall in Phoenix was as follows: April, 0.25 inches; May, 0.16 inches; June, 0.09 inches; July, 0.99 inches; and August, 0.94 inches. Judy Hedding, *Does It Rain in Phoenix, AZ?*, ABOUT.COM, http://phoenix.about.com/od/weather/qt/rain.htm (last visited May 4, 2011).

276. *Climate Change Indices*, *supra* note 269 (index 26).

277. *Id.* (index 23).

278. *Climate Glossary: Drought*, BUREAU METEOROLOGY, AUSTRALIAN GOV'T, http://www.bom.gov.au/climate/glossary/drought.shtml (last visited Jan. 3, 2011).

rainfall. The economically vital Murray-Darling basin in Australia experienced almost a decade of low rainfall[279] (though not all of it within the definition of "drought").[280]

4. Sea Level Rise

As oceans warm along with the rest of the planet, they expand in volume, accounting for a significant part of sea level rises to date.[281] This much is not in doubt, but the contribution of melting, land-based glaciers is cause for concern and may cause oceans to rise by several meters rather than several inches.[282]

As with other climate indicators meant to measure something on a planetary scale, measuring sea levels is surprisingly difficult. Because of tectonic changes in land and ocean beds, using land as a reference point is flawed, so using tidal gauges—putting a measuring stick in the ocean and taking periodic measurements—is inadequate.[283] More advanced systems now use satellite data to measure mean sea levels with error of less than one millimeter.[284] For purposes of measuring ocean level rises, satellite data collected by several governments do not, unlike other climate data, seem to be controversial.

5. Ocean Acidity

Measuring the average pH of the world's oceans is not, at this time, a particularly controversial exercise, in part because so little attention has been focused on this subject.[285] With oceans occupying seventy-one percent of the Earth's surface,[286] and given the importance of ocean life to humankind, ocean chemistry would appear to be a vital statistic to include in an index of climate outcomes.

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279. *Annual Australian Climate Statement 2010*, BUREAU METEOROLOGY, AUSTRALIAN GOV'T (Jan. 5, 2011), http://www.bom.gov.au/announcements/media_releases/climate/change/20110105.shtml.

280. *Drought Statement*, BUREAU METEOROLOGY, AUSTRALIAN GOV'T (Dec. 3, 2008), http://www.bom.gov.au/climate/drought/archive/20081203.shtml.

281. IPCC FOURTH ASSESSMENT, *supra* note 26, at 408.

282. HENSON, *supra* note 48, at 111–18.

283. *Id.* at 107–08.

284. *Id.* at 108.

285. *Id.* at 124.

286. *Ocean*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., http://www.noaa.gov/ocean.html (last visited May 4, 2011).

6. Hurricanes Above a Certain Intensity Level

Hurricane intensity is commonly measured using the Saffir-Simpson Hurricane Wind Scale, which rates hurricane strength on the basis of the maximum *sustained* wind speed during a hurricane.[287] A category 3 hurricane is one in which the peak wind speeds are 111 to 130 miles per hour, category 4 is one in which peak speeds are 131 to 155, and category 5 is one in which the peak speeds are greater than 155 miles per hour.[288] A "major" hurricane is a category 3, 4, or 5 storm.[289] Between 1900 and 2000, twenty-five of thirty-one of the deadliest hurricanes were category 3 or higher, and ten of the twelve deadliest were category 4 or higher.[290]

In most cases, the bulk of the damage from hurricanes comes from the storm surges that inundate coastal areas and account for the vast majority of deaths directly attributable to hurricanes.[291] The old Saffir-Simpson scale used to incorporate central pressures and storm surges as part of the index.[292] To avoid confusion, however, and because storm surges vary greatly by topography, the index was simplified to only include hurricane peak wind speeds.[293] Using a simpler index, focusing on wind speed, would be consistent with the objectives of this index of climate outcomes.

Counting hurricanes and monitoring their wind speeds have been done uncontroversially, if inconsistently, for over a century. A number of hurricane-tracking sites exist, but the best global compilation of hurricane data is maintained by a private security management firm, Unisys.[294] Unisys compiles information about hurricanes in each of the six major oceanic regions, collecting data from a number of national and international sources.[295] While the relatively short history (for

287. Timothy Schott et al., Saffir-Simpson Team, *The Saffir-Simpson Hurricane Wind Scale*, NAT'L HURRICANE CENTER, http://www.nhc.noaa.gov/pdf/sshws.pdf (last visited July 21, 2011).

288. *Id.* The National Hurricane Center's Saffir-Simpson Hurricane Wind Scale states that in hurricanes of category 4 or category 5 strength, "[c]atastrophic damage will occur," and that in hurricanes of category 3 strength, "[d]evastating damage will occur." *Id.*

289. Jarrell et al., *supra* note 187.

290. *Id.*

291. *See id.*

292. Schott et al., *supra* note 287.

293. *Id.*

294. *Hurricane/Tropical Data*, *supra* note 114.

295. *Id.*

climate data) handicaps efforts to attribute hurricanes to climate change, it is clearly long enough to support construction of an index including hurricane data.

B. Cap-and-Trade Permit Auction Schedule

If 400 million permits for each vintage year were to be issued each of the forty years preceding the vintage date, ten million would have to be issued each year. So starting in the year 2012, ten million 2052 permits would be auctioned per year, ending in the year 2051. But what about all of the years prior to 2052? For some years, more than ten million permits for a vintage year would have to be issued. For 2014 permits, should the bulk of them be auctioned in 2012 or 2013? To maximize the amount of information garnered by this prediction market, and to make sure the permit markets are as healthy as possible, the bulk of them should be issued in 2012—390 million, with the remaining ten million to be auctioned in 2013. Also in 2012, 380 million permits to emit in 2014 would be auctioned, with ten million in each of the following years. In other words, 2012 should be the year in which all excess permits are issued, with ten million permits for every vintage year being issued in each successive year. The schedule is set forth below in Table 1.

Table 1: Schedule of Permit Auctions

Year of auction	Vintage Years							
	2013	2014	2015	•••	2050	2051	2052	2053
2012	400m	390m	380m	•••	30m	20m	10m	
2013		10m	10m	•••	10m	10m	10m	10m
2014			10m	•••	10m	10m	10m	10m
• • •					• • •	• • •	• • •	• • •
2049					10m	10m	10m	10m
2050						10m	10m	10m
2051							10m	10m
2052								10m

GEOTHERMAL'S PRIOR APPROPRIATION PROBLEM

JUSTIN PLASKOV*

Geothermal energy production is an attractive way to help meet our nation's future energy needs due to its low emissions, minimal environmental impact, and ability to serve as a baseload power. In the 1960s, Congress recognized our nation's abundant geothermal resources and authorized their development on public lands through the Geothermal Steam Act of 1970. However, geothermal development did not take off as Congress anticipated. One reason for this is that state water laws in the West inhibit its growth.

This Comment begins with a primer on geothermal energy production. Next, it looks at how state water laws hinder geothermal development and gives a state-by-state depiction of how these laws apply to geothermal resources. Ultimately, this Comment argues for regulatory reform and focuses on ways around state water laws through the doctrine of federal reserved water rights, preemption, and coproduction.

* Juris Doctor Candidate 2012, University of Colorado Law School. The author would like to thank the members of the Colorado Law Review for their hard work and dedication to this Comment; Adam Reed, Kevin Rein, Thomas Gallagher & University of Colorado Law School Professors Sarah Krakoff, Mark Squillace, and Charles Wilkinson for their guidance on legal issues discussed; Sherri Thompson for encouraging exploration of some of the legal problems addressed; and Justine Pierce and Jen Curtis for their enthusiasm and support. All errors and omissions are my own.

> "Geothermal power . . . stands out as a potentially invaluable untapped natural resource. It becomes particularly attractive in the age of growing consciousness of environmental hazards and increasing awareness of the necessity to develop new resources to help meet our Nation's future energy requirements. The Nation's geothermal resources promise to be a relatively pollution-free source of energy, and their development should be encouraged."[1]
>
> - John P. Saylor, United States Congressman, 1970

INTRODUCTION

The words spoken by former Representative Saylor in 1970 are only truer today than when he advocated for the passage of the Geothermal Steam Act of 1970 (Geothermal Steam Act).[2] Growing concerns over energy independence, global warming, a lack of water, and pollution are all reasons to advocate for the development of geothermal resources. However, geothermal resources have become the forgotten cousin of wind and solar and are all too often left out of the discussion of renewable resources, even though they are a viable domestic resource that can help meet our nation's energy needs.[3] This Comment argues that it is essential for the United States to develop more geothermal resources in the transition to an energy portfolio that incorporates more renewable resources (renewables) because of the advantages that geothermal resources provide over other means of producing electricity, including other renewables.[4]

This Comment focuses on one particular impediment to the production of geothermal resources in the western United

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1. 116 CONG. REC. H34858 (daily ed. Oct. 5, 1970) (comments by former Rep. Saylor on the soon-to-be-passed Geothermal Steam Act of 1970).

2. Geothermal Steam Act of 1970, Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified at 30 U.S.C. §§ 1001–1027 (2006)).

3. While the federal government does support geothermal resources through providing grants and a structure for the development of geothermal resources on public lands, geothermal energy is rarely mentioned in discussions about renewables. *See, e.g.*, Barack Obama, Remarks at a Town Hall in Cedar Rapids, Iowa (July 31, 2008) ("I'll invest in renewable energies like wind power, solar power, and the next generation of homegrown biofuels. That's how America is going to free itself from our dependence on foreign oil—not through short-term gimmicks, but through a real, long-term commitment to transform our energy sector.").

4. *See infra* Part I.C.

States: state water laws.[5] While many factors have contributed to the slow development of geothermal resources, state water laws have long been recognized as a significant hindrance.[6] Some states have already adapted their laws to encourage geothermal resource development.[7] However, over forty years after the passage of the Geothermal Steam Act,[8] it is still unclear if state water laws bind geothermal developers, and the presumption that state water laws are binding should be challenged. If state laws are not preempted under the current state of the law, regulatory reform should be accomplished in order to foster further development of this invaluable resource. This Comment addresses solutions to the "prior appropriation problem."[9] It takes a broad approach and suggests solutions for states, the Bureau of Land Management (BLM), and geothermal developers.

Part I gives a basic overview of how geothermal energy production works, why it should be promoted, and its current status in the United States, including recent federal statutory and administrative developments. This Part is designed to encourage interest in and enthusiasm for geothermal energy production and to serve as a primer on the history and science thereof. This background gives the lay reader an understanding of the technical aspects of geothermal energy production so as to better understand the legal arguments addressed later in this Comment.

Part II discusses how state water laws sometimes impede the development of geothermal resources. First, it gives a background on the prior appropriation doctrine. Then it demonstrates how the doctrine frustrates the development of geothermal resources. Next, it proposes that state-imposed "renewable portfolio standards" obligate western states to help

5. This Comment focuses on geothermal development in the western United States because more valuable geothermal resources are found closer to the surface in western states as a result of more active tectonic plates. JAN G. LAITOS & JOSEPH P. TOMAIN, ENERGY AND NATURAL RESOURCES LAW IN A NUTSHELL 487 (1992).

6. *See infra* Part II.

7. *See infra* Part III.B.3.

8. The Geothermal Steam Act authorized and developed a leasing scheme for the development of geothermal resources on public lands. 30 U.S.C. §§ 1001–27 (2006). The Act is discussed in more detail below in Part IV.

9. This paper coins the phrase "geothermal's prior appropriation problem," which refers to state water laws that inhibit the growth of geothermal energy development.

foster the development of more geothermal electricity within their respective borders.

Part III argues for state regulatory reform as one solution to the prior appropriation problem. It builds on Part II by depicting how individual states apply the prior appropriation doctrine to the development of geothermal energy production. Specifically, this Part identifies and analyzes the geothermal regulatory structures of Wyoming, Utah, Colorado, New Mexico, Oregon, Idaho, Nevada, and California. Thereafter, this Part suggests regulatory reform in all of these states except California.

Part IV gives a background on the doctrine of federal reserved water rights and explains how the doctrine could be used as a way around the prior appropriation doctrine. This Part looks to the Geothermal Steam Act, the Homestead Act of 1916, and past executive and administrative withdrawals to identify public lands that may have federal reserved water rights for geothermal development, which would avoid the need for appropriating water under state water laws. This Part also suggests that geothermal developers may be immune from state water laws on public lands after land is leased to them, notwithstanding the BLM's interpretation of the applicability of state water laws.

Part V focuses on a basic Supremacy Clause challenge to state water laws. This Part admits that a challenge to state water laws is not currently feasible due to regulations promulgated by the BLM. However, this Comment suggests that the BLM should change its regulations to recognize that federal law preempts certain state water laws. Such an interpretation of the Geothermal Steam Act is more reasonable than the BLM's current policy stance, albeit politically difficult to assert. This Comment contends that under the proposed policy, the BLM's stance would more appropriately align with congressional intent relating to state water laws, and it would also encourage more development of geothermal resources on public lands, which was Congress's general objective in passing the Geothermal Steam Act. To help make this case, this Comment analyzes the intent of Congress in passing the Geothermal Steam Act, as well as the language contained in the Act regarding state water laws, and compares the preemption issues surrounding the Geothermal Steam Act to past federal public land law cases where courts held that federal laws preempted state laws.

Lastly, Part VI introduces and analyzes coproduction—and the use of holes already bored for oil and gas extraction—as a way for geothermal developers to use already appropriated water for the production of geothermal energy and to significantly reduce the economic costs associated with geothermal resource development. This Part evaluates potential legal implications and advantages of developing coproduction systems.[10] In doing so, this Part seeks to increase scholarly interest in coproduction and encourage a more thorough analysis of the legal implications of coproduction in the future.

I. GEOTHERMAL BASICS

A. Defining Geothermal Resources

Geothermal resources come in many forms, but the easiest way to think about them is as thermal heat typically found under the earth's surface.[11] Geothermal resources are naturally occurring and abundant.[12] They can be found as hot liquids, dry rocks, or steam, and their temperatures vary significantly.[13] Some geothermal resources flow naturally to the earth's surface in the form of geysers or hot springs, while others are trapped beneath the earth's surface.[14]

Geothermal resources are found around the globe.[15] However, only in a few places is the thermal heat hot enough and close enough to the earth's surface to allow for power production.[16] Luckily for developers in the western United States, 1.3 million acres of land in the United States have the

10. There is little scholarly work on coproduction (also spelled co-production). The following are notable exceptions and appear to comprise a somewhat comprehensive list of non-governmental articles on the topic: ALYSSA KAGEL, GEOTHERMAL ENERGY ASS'N, THE STATE OF GEOTHERMAL TECHNOLOGY, PART II: SURFACE TECHNOLOGY 46 (2008); Kurt E. Seel, *Legal Barriers to Geothermal Development*, ROCKY MTN. MIN. L. FOUND., Sept. 10–11, 2009, at 8-7 to 8-8; Karl Schulz, *Evaluating the Energy Independence and Security Act of 2007: Inclusions, Exclusions, and Problems with Implementation*, 38 ENVTL. L. REP. NEWS & ANALYSIS 10763, 10765 (2008).

11. Carl F. Austin, *Technical Overview of Geothermal Resources*, *in* GEOTHERMAL RESOURCES DEVELOPMENT INSTITUTE 2-1 (1977).

12. DOUGLAS M. SACARTO, STATE POLICIES FOR GEOTHERMAL DEVELOPMENT: UNCOVERING A MAJOR RESOURCE 7 (1976).

13. Austin, *supra* note 11, at 2-1 to 2-2.

14. *See* SACARTO, *supra* note 12, at 7.

15. *Id.* at 2 fig.1 (Geothermal Regions of the World).

16. LAITOS & TOMAIN, *supra* note 5, at 487.

potential to produce electricity from geothermal resources,[17] a significant portion of which exists in the West[18] and on federal public lands.[19]

Geothermal resources can be used in a variety of ways. On the small scale, some people use them for heating single-family homes.[20] Other times they are used commercially to heat greenhouses[21] or for aquaculture.[22] However, the scope of this Comment is limited to geothermal resources used to generate electricity.

B. Producing Electricity from Geothermal Resources

Three different systems are currently used to generate electricity from geothermal resources: hot water, vapor-dominated, and binary systems.[23] Typically a geothermal developer must bore a hole, and the resource found will determine which system will be used.[24] Hot water systems are used when a developer finds geothermal fluids hot enough to produce electricity without the use of a secondary fluid.[25] These liquids are piped to the surface where some of the water "flashes" into steam and powers turbines,[26] thereby generating electricity.[27] Vapor-dominated systems work the same way but

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17. *Id.*

18. SACARTO, *supra* note 12, at 2 fig.1. It is significant that these resources exist in western states because most federal public lands are in the West due to the federal government conditioning statehood upon retention of a significant portion of those lands. *See* GEORGE CAMERON COGGINS, CHARLES F. WILKINSON, JOHN D. LESHY, & ROBERT L. FISCHMAN, FEDERAL PUBLIC LAND AND RESOURCES LAW 69 (6th ed. 2007).

19. *See* BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, GEOTHERMAL RESOURCES LEASING PROGRAMMATIC EIS, http://www.blm.gov/wo/st/en/prog/energy/geothermal/geothermal_nationwide.html (last visited January 15, 2011) [hereinafter PEIS].

20. WENDELL A. DUFFIELD & JOHN H. SASS, U.S. GEOLOGICAL SURVEY, U.S. DEP'T OF THE INTERIOR, GEOTHERMAL ENERGY–CLEAN POWER FROM THE EARTH'S HEAT, Circular 1249, at 7 (2003).

21. *See* Rosette Inc. v. United States, 277 F.3d 1222, 1225 (10th Cir. 2002).

22. Geothermal Resources Council, *Gators in the Sage*, GRC BULLETIN 246, 247 (Nov./Dec. 2001), *available at* www.geothermal.org/articles/alligators.pdf. In fact, Idaho's first geothermal fish farmer, Leo Ray, opened shop in 1973. Although Ray began with and continues to grow catfish and tilapia, Ray now also grows alligators for their skin and meat. *Id.* at 246–59.

23. DUFFIELD & SASS, *supra* note 20, at 11.

24. *Id.*

25. *Id.*

26. *See* FRED BOSSELMAN ET AL., ENERGY, ECONOMICS AND THE ENVIRONMENT 847 (3d ed. 2010).

27. DUFFIELD & SASS, *supra* note 20, at 11.

are more efficient because steam found within the earth's surface is routed directly to the turbines to generate electricity.[28] Lastly, binary systems are used when geothermal temperatures are not hot enough to produce enough steam to generate electricity.[29] Geothermal fluids are brought to the earth's surface where the heat is transferred to a secondary fluid with a lower boiling point capable of producing steam at a lower temperature.[30] After the heat is transferred, the secondary fluid produces steam that turns turbines.[31] In all three systems, some or all of the fluids extracted from the ground are eventually pumped back into the ground through reinjection wells.[32] Hot water and vapor-dominated systems lose some water through evaporation, but binary systems reinject all groundwater.[33] Figure 1 below demonstrates these three systems:

28. *Id.*
29. *Id.*
30. *Id.* Isobutane is an example of a secondary fluid used in binary systems. *Id.*
31. *Id.*
32. *Id.*
33. ALYSSA KAGEL ET AL., GEOTHERMAL ENERGY ASS'N, A GUIDE TO GEOTHERMAL ENERGY AND THE ENV'T 43–44 (2007), *available at* http://www.geo-energy.org/pdf/reports/AGuidetoGeothermalEnergyandtheEnvironment10.6.10.pdf.

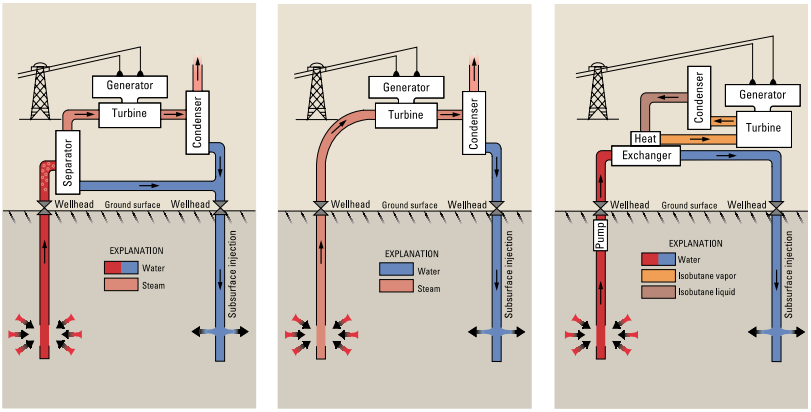

Diagram showing how electricity is generated from a hot-water hydrothermal system. The part of the hydrothermal water that flashes to steam is separated and used to drive a turbine generator. Wastewater from separator and condenser is injected back into the subsurface to help extend the useful life of the hydrothermal system.

Diagram showing how electricity is generated from a vapor-dominated hydrothermal system. Steam is used directly from wells to drive a turbine generator. Wastewater from the condenser is injected back into the subsurface to help extend the useful life of the hydrothermal system.

Diagram showing how electricity is generated from a moderate-temperature hydrothermal system using a "binary" system. The geothermal water is used to boil a second fluid (isobutane in this example) whose vapor then drives a turbine generator. The wastewater is injected back into the subsurface to help extend the useful life of the hydrothermal system

FIGURE 1: United States Geological Survey [34]

C. The Attraction of Geothermal Energy

Concerns over climate change and energy security, as well as the recognition of geothermal energy's value as a clean, renewable, baseload energy source,[35] drive the development of geothermal resources in the United States.[36] Geothermal energy is a very clean source of energy.[37] Generally, the environmental impact of a geothermal electricity plant is much less significant than that of other types of electricity generation.[38] For example, in terms of emissions, a hot water

34. DUFFIELD & SASS, *supra* note 20, at 11 (The diagrams and accompanying text are both from the U.S. Geological Survey.).

35. Baseload power refers to power plants that typically can run without interruption. BOSSELMAN ET AL., *supra* note 26, at 1010.

36. *See* DAN JENNEJOHN, GEOTHERMAL ENERGY ASS'N, U.S. GEOTHERMAL POWER PRODUCTION AND DEVELOPMENT UPDATE 17 (2010), http://www.geo-energy.org/pdf/reports/April_2010_US_Geothermal_Industry_Update_Final.pdf; *see also* Seel, *supra* note 10, at 8-1 (declaring that the environmental benefits of geothermal energy development "greatly outweigh the environmental impacts").

37. BOSSELMAN ET AL., *supra* note 26, at 847.

38. George Vranesh & John D. Musick, Jr., *Geothermal Resources: Water and Other Conflicts Encountered by the Developer*, GEOTHERMAL RES. DEV. INST., 1977, at 6-1, 6-10; *see also* Steven Ferrey, *Environmental Regulation of*

or steam geothermal plant emits about 1% of the sulfur dioxide, less than 1% of the nitrous oxides, and 5% of the carbon dioxide of a coal-fired power plant of similar generating capacity.[39] When binary systems are used, virtually no emissions are released into the atmosphere because geothermal gases and fluids are all reinjected into the ground.[40]

There is also much less physical damage to the environment, even in comparison with other renewables. We now recognize the harsh, and sometimes irreversible, impacts of damming rivers to produce hydropower.[41] Wind turbines are often criticized for harming birds[42] and significantly changing the aesthetics of a landscape or ocean view.[43] Wind farms also use much more land than the typical geothermal power plant.[44]

Geothermal power plants also use significantly less water than some other forms of energy production.[45] Geothermal power plants, on average, consume about 20 liters of water per megawatt hour (MWh[46]).[47] In comparison, solar power plants require significantly more water.[48] Some types of solar power

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Independent Power, 1 L. INDEP. POWER § 6:17 (2010) (discussing geothermal energy's low impacts due to low emissions and comparatively low noise pollution).

39. DUFFIELD & SASS, *supra* note 20, at 26.

40. *Id.*; JOHN W. LUND, GEO-HEAT CTR., OR. INST. OF TECH., CHARACTERISTICS, DEVELOPMENT AND UTILIZATION OF RESOURCES 8 (2007), *available at* geoheat.oit.edu/pdf/tp126.pdf.

41. *See* BOSSELMAN ET AL., *supra* note 26, at 848.

42. Robert Johns, *Wind Power Could Kill Millions of Birds Per Year by 2030*, AM. BIRD CONSERVANCY, http://www.abcbirds.org/newsandreports/releases/110202.html (last visited July 10, 2011) ("[T]he build-out of wind energy proposed by the federal government to meet a Department of Energy target of generating 20% of the nation's electricity through wind power is expected to kill at least one million birds per year by 2030, and probably significantly more.").

43. Katherine Q. Seeyle, *Big Wind Farm off Cape Gets Approval*, N.Y. TIMES, Apr. 29, 2010, at A1 (noting that the Cape Cod wind project was long resisted by the late Senator Ted Kennedy and others because many thought it "would create an industrial eyesore in a pristine area").

44. A typical geothermal power plant uses 404 square meters of land per gigawatt hour (GWh) in comparison with the average wind farm that uses 1335 square meters per GWh, and the average coal plant uses 3632 square meters per GWh. LUND, *supra* note 40, at 8.

45. LUND, *supra* note 40, at 8.

46. One MWh is calculated as one MW generated for one hour.

47. LUND, *supra* note 40, at 8. Admittedly, some types of geothermal energy production require much more water. Kathleen Callison, *Water and Geothermal Energy Development in the Western U.S.: Real World Challenges, Regulatory Conflicts and Other Barriers, and Potential Solutions*, 22 PAC. MCGEORGE GLOBAL BUS. & DEV. L.J. 301, 305 (2010) (discussing comparative amounts of water used in different types of geothermal energy production).

48. *See* NAT'L RENEWABLE ENERGY LAB., U.S. DEP'T OF ENERGY, PARABOLIC TROUGH FAQS tbl.1 (June 9, 2011), http://www.nrel.gov/csp/troughnet/faqs.html.

require about 3000 liters per MWh for cooling and mirror washing.[49] Coal-fired power plants use about 1370 liters per MWh.[50] Combined-cycle natural gas power plants require about 750 liters per MWh.[51] Additionally, although precise numbers are not known for how much water is lost in the production of hydropower generated with dams, it is well established that a significant amount of water is lost due to evaporation from the increased surface area of water in reservoirs.[52]

Another attractive aspect of geothermal power production is that it can be utilized more efficiently than solar or wind power.[53] A geothermal power plant can run almost all of the time because the supply of energy is constant. This is known as "baseload power."[54] Comparatively, solar panels only produce energy while the sun shines, and wind only produces electricity while the wind blows at the right speed. This makes these sources of energy less efficient and less economical.[55] To make matters worse, intermittent sources of electricity like solar and wind are problematic due to the complex way our energy grid works.[56] For these reasons, the economics and practicality of

49. U.S. DEP'T OF ENERGY, CONCENTRATING SOLAR POWER COMMERCIAL APPLICATION STUDY: REDUCING WATER CONSUMPTION OF CONCENTRATING SOLAR POWER ELECTRICITY GENERATION 4 [hereinafter U.S. DEP'T OF ENERGY, SOLAR POWER STUDY], *available at* http://www1.eere.energy.gov/solar/pdfs/csp_water_study.pdf (showing these estimates in gallons per MWh).

50. LUND, *supra* note 40, at 8.

51. U.S. DEP'T OF ENERGY, SOLAR POWER STUDY, *supra* note 49.

52. *See* United Nations Environmental Programme, *More Water Evaporates from Reservoirs than is Consumed by Humans*, http://maps.grida.no/go/graphic/more-water-evaporates-from-reservoirs-than-is-consumed-by-humans (last visited Mar. 12, 2011).

53. *See* Ned Farquhar, *Energy, Security, Climate: Converging Solutions*, 29 J. LAND RESOURCES & ENVTL. L. 1, 10 (2009).

54. *See* Farquhar, *supra* note 53, at 10; *see also supra* note 35 and accompanying text (providing an overview of baseload power).

55. This, of course, is unless the energy from solar and wind is stored, which is currently not economically feasible. *See* ARJEN MAKHIJANI, CARBON-FREE AND NUCLEAR-FREE: A ROADMAP FOR U.S. ENERGY POLICY 37–45 (2007), *reprinted in* BOSSELMAN ET AL., *supra* note 26, at 840.

56. Power is managed in real time in our electricity grid and the energy supply must equal the energy demand. Scheduling intermittent sources of energy like solar and wind can be difficult because they are unpredictable and therefore sometimes the energy produced is wasted. Also, because these resources are unreliable, it is necessary to have the ability to produce enough electricity to meet "peak demand" without these resources. Peak demand is the greatest amount of electricity that might be used at any given time. If there is not enough electricity to meet that demand, blackouts and brownouts occur. *Id.* (discussing how solar energy's intermittent output causes problems but is nonetheless more predictable than wind power).

geothermal make more sense than those of other renewables in many circumstances. This is especially true compared to solar, which continues to be economically impracticable in most circumstances.[57] While this Comment is not attempting to discourage the development of wind, solar, and other renewables, it is attempting to show that geothermal can be more beneficial in some circumstances and that, despite these benefits, it is often left by the wayside.[58]

D. A Brief History and Current Developments

1. Technology

Geothermal resources were first used to produce electricity in Italy as early as 1904.[59] In 1922 the first geothermal power plant in the United States was put into production at a hotel resort in Lake County, California.[60] It had the generating capacity of 0.25 MW, which was enough electricity to light the buildings and the streets at the resort.[61] However, this geothermal power plant fell into disuse as other, more competitive sources of electricity came into use.[62]

Since then, technological advancements have made geothermal energy production much more viable and will continue to make it more affordable as technology advances. By 1960, the first large-scale geothermal power plant in the United States went into operation, with a generating capacity of 11 MW.[63] This is enough electricity for about 11,000 homes.[64] There have also been significant advancements in

57. *See id.* at 838.

58. Admittedly, geothermal development has its own deleterious environmental effects resulting from drilling, clearing land for power plants, and other minimal environmental effects as discussed above. 4 GEORGE C. COGGINS & ROBERT L. GLICKSMAN, PUBLIC NATURAL RESOURCES LAW § 40:21 (2d ed. 2011).

59. United States v. Union Oil, 549 F.2d 1271, 1273 (9th Cir. 1977) (citing John W. Brooks, Jr., *Legal Problems of the Geothermal Industry*, 6 NAT. RESOURCES J. 511, 514–15 (1966)).

60. U.S. DEP'T OF ENERGY, A HISTORY OF GEOTHERMAL ENERGY IN THE UNITED STATES (2011), *available at* http://www1.eere.energy.gov/geothermal/history.html.

61. *Id.*

62. *Id.*

63. *Id.*

64. *See* Craig D. Galli, Steven W. Snarr & Michael N. Thatcher, *Getting Into Hot Water: Current Hot Topics in Geothermal Development*, 55 ROCKY MTN. MIN. L. INST. 6-1, 6-4 (2009) (indicating that 725 MW can produce enough electricity for 725,000 homes).

lowering the temperatures needed for geothermal power production. Until recently, only temperatures over 93ºC (200ºF) were deemed commercially viable for successful power generation from geothermal resources.[65] However, in 2006, the Chena Hot Springs Resort in Alaska successfully generated power using 74ºC (165ºF) water and a binary system.[66] This technology proved very useful for the resort owner as it allowed him to produce electricity for less than a quarter of the cost.[67]

Binary plant designs have also allowed power developers to substantially reduce plant construction lead times. One noteworthy example is the Hatch Power Plant in Utah, completed in November 2008. The plant is capable of producing at least 10 MW of net electricity.[68] The entire project was built and brought online[69] in less than one year, with construction completed in just six months instead of the typical three years it takes for a hot water or vapor-dominated geothermal power plant.[70]

The Hatch Power Plant project is remarkable not only because of its rapid construction, but also because of the flexibility of its modular approach, which allows it to be adapted to various locations.[71] This plant design can be scaled to the local geothermal resource, energy demand, and available financing.[72] Its inventors claim that the geothermal resource at Hatch has the potential of generating more than 200 MW.[73] To help reach this production capacity, the company plans to add ten more geothermal power plants in the area.[74]

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65. JONATHON CROSS & JEREMIAH FREEMAN, U.S. DEP'T OF ENERGY, 2008 GEOTHERMAL TECHNOLOGIES MARKET REPORT 16 (2009), *available at* http://www1.eere.energy.gov/geothermal/pdfs/2008_market_report.pdf.

66. *Blowing Hot and Cold: Geologists Are Getting More Juice out of the Ground*, ECONOMIST, Sept. 14, 2006, *available at* http://www.economist.com/node/7905301?story_id=7905301.

67. JOHN W. LUND, GEO-HEAT CTR., CHENA HOT SPRINGS 2, 3 (2006), *available at* http://geoheat.oit.edu/bulletin/bull27-3/art2.pdf. Beforehand, the resort used diesel generators. *Id.*

68. *See* JENNEJOHN, *supra* note 36, at 17.

69. To be brought "online," as used in this Comment, means that the power plant is sending electricity to the grid.

70. CROSS & FREEMAN, *supra* note 65, at 17.

71. *Id.*

72. *Id.*

73. *Id.*

74. *Id.*

2. Federal Statutory and Administrative Regulations

In addition to the technological developments mentioned above, federal programs have also caused a renewed interest in geothermal energy production.[75] More specifically, the Energy and Policy Act of 2005[76] (EPAct of 2005) and the BLM's overhaul of its regulatory leasing policy[77] have increased interest in[78] and production of geothermal energy.[79]

a. Energy and Policy Act of 2005

In the omnibus EPAct of 2005,[80] the federal government laid much of the groundwork for the current upswing in interest and investment in geothermal energy production through its new leasing system.[81] Under the EPAct of 2005, if a developer wants to lease land, she must nominate the land to be leased.[82] Thereafter a competitive bidding process is required.[83] Once the land is leased, the developer has exclusive rights to develop that resource for ten years with the ability to extend the lease.[84]

Aside from the regulatory restructuring, the federal government has recently increased its support of geothermal power production through grants,[85] investment credits,[86] and a directive to the BLM to (1) identify lands as open or closed to geothermal energy production and (2) address the growing interest in geothermal resources on public lands.[87]

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75. *Id.* (noting the federal role in increasing interest in geothermals).

76. Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594 (2005).

77. *See* BUREAU OF LAND MGMT., U.S. DEP'T OF THE INTERIOR, RECORD OF DECISION AND RESOURCE MANAGEMENT PLAN AMENDMENTS FOR GEOTHERMAL LEASING IN THE WESTERN UNITED STATES, at Abstract (2008) [hereinafter U.S. DEP'T OF THE INTERIOR, ROD], *available at* http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/energy/geothermal_eis/final_programmatic.Par.90935.File.dat/ROD_Geothermal_12-17-08.pdf.

78. Galli et al., *supra* note 64, at 6-4 to -5.

79. *See* JENNEJOHN, *supra* note 36, at 4.

80. Energy Policy Act of 2005, 42 U.S.C. §§ 221–237 (2005).

81. *See* Galli et al., *supra* note 64, at 6-8.

82. *See* 30 U.S.C. § 1003 (2006).

83. *See id.* § 1003(b).

84. *See id.* § 1005.

85. *See, e.g.*, 42 U.S.C.A. § 17195(c) (West 2010).

86. Energy Policy Act of 1992, Pub. L. No. 102-486, § 1916, 106 Stat. 2776, 3024 (1992).

87. *See* PEIS, *supra* note 19.

b. The BLM's Record of Decision (ROD)

At the direction of the EPAct of 2005,[88] the BLM created a Programmatic Environmental Impact Statement (PEIS).[89] Based on the PEIS, in December 2008 the BLM released a ROD,[90] which announced that, as a result of its analysis, federal public lands in twelve western states could be leased for geothermal energy production.[91] It did this in order to facilitate geothermal leasing in an environmentally responsible way while also addressing the growing interest in geothermal energy production on federal lands.[92] The BLM estimated that public lands open for geothermal development have a reasonable potential of producing 12,210 MW of electricity from 244 plants by 2025.[93] Currently, the BLM administers 480 geothermal leases on public lands, and 54 of those are producing electricity from geothermal resources.[94]

A lessee of a geothermal lease is endowed the non-exclusive right to explore the area and the exclusive right to use and produce geothermal energy in the area.[95] However, the lease issuance does not authorize "ground disturbing activities." [96] Rather, site-specific approval is still needed for

88. *See* Energy Policy Act of 2005, 42 U.S.C. §§ 211, 221–37 (2005) (encouraging development of geothermal energy and requiring administrative agencies "to ensure timely completion of administrative actions . . . necessary to process applications for geothermal leasing"). *Id.* § 222(d)(I).

89. *See* PEIS, *supra* note 19. A programmatic EIS differs from an ordinary EIS because it assesses a broader, overarching plan whereas an EIS is site-specific. *See* Amending Land Use Plans with Programmatic EISs, BLM 2009 National Land Use Planning Conference "Keeping Pace with Change" 3–5, *available at* http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/presentations.Par.49126.File.pdf/Amending_LUPs_with_Programmatic_EISs_2.pdf.

90. "[A] ROD is the final step for agencies in the EIS process. The ROD is a document that states what the decision is; identifies the alternatives considered, including the environmentally preferred alternative; and discusses mitigation plans, including any enforcement and monitoring commitments." EXEC. OFFICE OF THE PRESIDENT, COUNCIL ON ENVTL. QUALITY, A CITIZENS GUIDE TO THE NEPA: HAVING YOUR VOICE HEARD 19 (2007), *available at* http://ceq.hss.doe.gov/nepa/Citizens_Guide_Dec07.pdf.

91. U.S. DEP'T OF THE INTERIOR, ROD, *supra* note 77, app. A, at A-1 to -7 tbl. A-1, (showing public lands in each of the twelve states that are open for leasing).

92. *See id.* at 1-4 to -5.

93. *Id.* at 1-9.

94. *Id.* at 1-1.

95. *Id.* at 1-7.

96. *Id.*

these activities.[97] In addition, some states require geothermal developers to appropriate water under that state's water laws in order to develop geothermal resources, even on federal public lands.[98]

c. Other Federal Encouragement

The 2009 American Recovery and Reinvestment Act (ARRA)[99] provided further support for geothermal development by appropriating up to $338 million in new funding for implementation by the Geothermal Technologies Program for research, development, demonstration, and deployment activities.[100]

On March 11, 2009, Interior Secretary Ken Salazar issued Order 3285,[101] which created an Energy and Climate Change Task Force. Its purpose is to identify, quantify, and prioritize geothermal and other renewable energy projects and transmission projects and to streamline compliance with the National Environmental Policy Act, Endangered Species Act, and other applicable laws that might burden geothermal developers.[102] On May 5, 2009, Secretary Salazar announced that he would open four renewable energy-permitting offices and smaller renewable energy teams in other western states in order to encourage and expedite development of renewable energy projects, including geothermal.[103]

E. Summary

Due in large part to the factors discussed above, the United States now leads the world in online geothermal energy capacity and continues to increase production.[104] Currently, the United States has a total installed capacity of 3086.6 MW, and since 2006 the number of projects in development has

97. *Id.* Site-specific approval is often needed by states because of states' police powers over environmental concerns. *See* BOSSELMAN ET AL., *supra* note 26, at 13 (discussing the role that state agencies have in regulating power production).

98. *See infra* Part III.

99. American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009).

100. JENNEJOHN, *supra* note 36, at 22.

101. *See* SEC'Y OF THE INTERIOR, U.S. DEP'T OF THE INTERIOR, ORDER NUMBER 3285 (2009), *available at* http://solareis.anl.gov/documents/docs/SOenergy.pdf.

102. Galli et al., *supra* note 64, at 6-5.

103. *Id.* at 6-5 to -6.

104. *See id.* at 6-4.

continued to increase at a steady rate.[105] The Geothermal Energy Association found that from March 2009 through April 2010, the number of identified and confirmed projects in development rose from 121 to 152, an increase of 26%.[106]

In 2008, geothermal electrical production reached 15 million MWh, representing approximately 0.36% of the United States' total electrical production and 12.13% of electricity generated from renewables, not including hydropower.[107] However, a study issued by the United States Geological Survey estimates that there are enough geothermal resources to generate up to 10% of the United States' total energy needs.[108] While the current trend is encouraging, the current rate of development must increase in order to make a significant impact on our domestic electricity use.

II. DEFINING GEOTHERMAL'S PRIOR APPROPRIATION PROBLEM

This Part begins by explaining the prior appropriation doctrine in order to provide the necessary legal background for understanding the allocation of water rights in western states and how this allocation affects geothermal development. Next, this Part analyzes how the prior appropriation doctrine impedes geothermal resource development and why the prior appropriation doctrine is a poor fit for the production of geothermal electricity. Lastly, this Part recognizes western states' commitments to increasing the development of renewable resources—particularly in the area of renewable portfolio standards (RPS) and cap-and-trade legislation—as another reason why reform is necessary.

A. The Prior Appropriation Doctrine

Prior appropriation is the primary water allocation system in the western United States.[109] The system is premised on the

105. *See* JENNEJOHN, *supra* note 36, at 3–4.
106. *Id.* at 19.
107. CROSS & FREEMAN, *supra* note 65, at 12.
108. Galli et al., *supra* note 64, at 6-4.
109. JAMES RASBAND ET AL., NATURAL RESOURCES LAW AND POLICY 777 (2d ed. 2009). This system developed in strong contrast to riparianism. *See* CHARLES F. WILKINSON, CROSSING THE NEXT MERIDIAN 232 (1992). Under riparianism, water rights derive from an ownership of land. *See* JOSEPH L. SAX ET AL., LEGAL CONTROL OF WATER RESOURCES 28–29 (4th ed. 2006).

idea of "first in time, first in right."[110] That is, whoever is first to divert and make beneficial use of water obtains vested rights to use that same amount of water in the future.[111] Once a water right is established, it is superior to claims by all subsequent appropriators; the person who diverted before another is the "senior" and the person who diverted water afterwards is the "junior" for purposes of priority.[112] This system allows for the senior to divert water whenever it is available, whereas the junior cannot divert water if the diversion would leave a senior's water rights unmet.

This system developed partly because of the arid nature of lands west of the 100th Meridian and partly as a result of history.[113] As Americans moved west after the 1848 discovery of gold in California, those who made use of water for mining, farming, ranching, and development needed assurance that their efforts would not be futile.[114] Investments of time and money would have been much less attractive without the guarantee of future access to water. Prior appropriation provided the legal backdrop necessary for western settlement and development and remains the law today in most western states.[115]

In all of the states discussed in this section, groundwater is typically subject to the prior appropriation doctrine.[116] Generally, water laws in these states require a permit to appropriate groundwater.[117]

B. Impediments to the Developer

The problem of subjecting the use of geothermal fluids to the prior appropriation doctrine is multifaceted. First, the administrative burdens on geothermal developers on federal lands are excessive, as geothermal resources are usually not potable and cannot be used for agriculture, ranching, or

110. *See* WILKINSON, *supra* note 109, at 233.
111. SAX ET AL., *supra* note 109, at 125.
112. SAX ET AL., *supra* note 109, at 126; WILKINSON, *supra* note 109, at 234.
113. *See* RASBAND ET AL., *supra* note 109.
114. *See id.*
115. Scott L. Campbell & Davis Wright Tremaine, *Examination of Title to Western Water Rights*, 31B ROCKY MTN. MIN. L. INST. 9 (1992).
116. *Id.*
117. *Id.*; *see also* COLO. REV. STAT. § 37-90-107(1) (2010).

drinking due to their temperature and mineral content,[118] and geothermal energy production by use of binary systems is nonconsumptive.[119] Furthermore, "[geothermal] resources are usually sufficiently physically separate from aquifers used for normal consumptive purposes to merit separate treatment."[120] Even though these resources may not be in great demand by other appropriators,[121] a lack of water in the West makes it difficult to appropriate these resources for fear that use of the resources will impact other water users.[122]

Second, complying with some state processes can be discouraging for geothermal developers. Meeting the requirements can be extremely burdensome because prior appropriation was not developed with the use of geothermal resources in mind.[123] Indeed, scholars have identified prior appropriation as an ill-fitting system for geothermal development precisely for this reason.[124]

Lastly, in states like Colorado—where there is little case law, a lack of guiding secondary sources, and little to no development of geothermal resources—geothermal developers may be unsure of what geothermal laws require. Therefore, even though a geothermal developer may be exempt from prior appropriation laws for certain types of geothermal development, such laws may be unclear to a developer. Without administrative guidance or clear statutes, a geothermal developer will likely be discouraged.

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118. DANIEL JENNEJOHN ET AL., GEOTHERMAL ENERGY ASS'N, GEA ISSUE BRIEF: GEOTHERMAL ENERGY AND WATER CONSUMPTION 1 (2009), *available at* http://www.geo-energy.org/reports/Geothermal_Energy_and_Water_Consumption_Issue_Brief.pdf; *see also*, ALYSSA KAGEL ET AL., GEOTHERMAL ENERGY ASS'N, A GUIDE TO GEOTHERMAL ENERGY AND THE ENVIRONMENT 43–44 (2007), *available at* http://www.geo-energy.org/pdf/reports/AGuidetoGeothermalEnergyandtheEnvironment10.6.10.pdf.

119. *See supra* Part I.B.

120. A. DAN TARLOCK, LAW OF WATER RIGHTS AND RESOURCES § 6:6 (2010); Ralph B. Kostant, *Geothermal Law—The Last and Next 23 Years*, 37 ROCKY MTN. MIN. L. INST. 2-1, 2-3 to -4 (1991).

121. Owen Olpin, *The Law of Geothermal Resources*, 14 ROCKY MTN. MIN. L. INST. 123, 134 (1968).

122. *See generally* Kathleen Callison, *Water and Geothermal Energy Development in the Western U.S.: Real World Challenges, Regulatory Conflicts and Other Barriers, and Potential Solutions*, 22 PAC. MCGEORGE GLOBAL BUS. & DEV. L.J. 301, 307 (2010) (addressing the noteworthy lack of water and desire for water in the West and discussing the prediction of a "potential water supply crises by 2025").

123. *See* Joseph W. Aidlin, *Representing the Geothermal Client*, 19 ROCKY MTN. MIN. L. INST. 3, 38–39 (1974).

124. *See id.*; SACARTO, *supra* note 12, at 2.

For example, imagine being a geothermal developer who wants to build a geothermal power plant on public lands. First, obtaining water rights in the arid West will be difficult because often there is little to no water to appropriate.[125] Further, as Joseph Aidlin once recognized, it will be difficult "to know in advance how many gallons of geothermal water or how many pounds of geothermal steam will be required to produce one kilowatt hour of electricity [and] to know in advance what the rate of heat decline will be over the years," and therefore it will be difficult to fill out the necessary permit applications.[126] Conversely, it would be much more enticing to develop geothermal resources in a state that does not require developers to go through an arduous and often unnecessary prior appropriation permitting process. It is precisely for these reasons that some legislatures and courts classify geothermal resources as minerals and explicitly exempt developers from prior appropriation laws.[127]

C. State Obligations Regarding Renewables

Understanding RPSs and cap-and-trade legislation is important for the policy argument below, which asserts that states are legally obligated by their own legislation to support the development of more renewables within their borders.[128] RPSs are state targets that require a certain percentage of the electricity generated or bought and sold in a state to come from renewable energy sources.[129] For example, Colorado, with some exceptions, requires 30% of all retail electricity sales to be generated from renewable resources by 2020.[130] As of August 2011, twenty-nine states, the District of Columbia, and Puerto

125. *See* Callison, *supra* note 122, at 307 (discussing water shortages in the West).

126. *See* Aidlin, *supra* note 123, at 38.

127. *See* TARLOCK, *supra* note 120, § 6:6.

128. *See infra* Part III.C.

129. *See* INTERSTATE RENEWABLE ENERGY COUNCIL, U.S. DEP'T OF ENERGY, RPS POLICIES (2011), http://dsireusa.org/summarymaps/index.cfm?ee=1&RE=1 (showing states with RPS standards, their percentage targets, and the dates to reach those targets).

130. *See* COLO. REV. STAT. § 40-2-124(1)(c)(I)(E) (2010). Cooperative electric associations and municipally owned utilities have the lower standard of generating 10% of their electricity from renewables by 2020. *Id.* § 40-2-124(1)(c)(V)(D).

Rico have adopted RPS mandates, and another eight states have "renewable portfolio goals."[131]

Cap-and-trade legislation might also drive the development of renewables. Cap-and-trade proposals function in various ways. However, they all share a common element: The amount of emission of carbon or other greenhouse gases is capped at a certain amount of pollutants, and if a state or entity wants to emit more carbon, they must then buy it from an entity that emits less carbon than the given amount. Some eastern states are in the process of implementing cap-and-trade legislation,[132] and western states are currently considering similar measures.[133] As demonstrated below, geothermal energy development has a significant role to play in helping states meet these goals.

III. SOLUTION ONE: STATE-BY-STATE REGULATORY REFORM

This Part classifies western states into three categories based on how those states apply the prior appropriation doctrine to geothermal resource development. Indeed, not all states subject geothermal development to the prior appropriation doctrine. Rather, states vary significantly in their respective approaches to regulating geothermal resource development.[134]

For this analysis, I propose a new taxonomy based on how states' water law systems treat geothermal resources.[135] The

131. *See* INTERSTATE RENEWABLE ENERGY COUNCIL, U.S. DEP'T OF ENERGY, RPS POLICIES (2011), http://dsireusa.org/summarymaps/index.cfm?ee=1&RE=1. The U.S. Congress has also proposed legislation to create a federal standard. *See* Renewable Electricity Promotion Act of 2010, S. 3813, 111th Cong. § 2 (2010). The current federal proposals would not supplant state goals, but generally would require that all load serving entities (a "load serving entity" is an electric company that buys power on the wholesale market and provides electricity services to customers such as residences) in the country to get 15% of their energy from renewables by 2039. *Id.* § 610(b)(1)(B) (2010).

132. *See* REG'L GREENHOUSE GAS INITIATIVE, EXECUTIVE SUMMARY, http://www.rggi.org/docs/RGGI_Executive_Summary.pdf (last visited July 25, 2011).

133. *See* W. CLIMATE INITIATIVE: DESIGN FOR THE WCI REGIONAL PROGRAM 1 (2010), *available at* http://westernclimateinitiative.org/component/remository/func-startdown/282/.

134. Galli et al., *supra* note 64, at 6-9.

135. Past scholars have simply classified states based on whether states treat geothermal resources as minerals, water, or *sui generis*, which is Latin for "[o]f its own kind or class." BLACK'S LAW DICTIONARY 1602 (4th ed. 1968). From there, these scholars analyze the impacts of these classifications. *See, e.g.*, Galli et al., *supra* note 64, at 6-12 to -14. Here, I do not use this typical classification because I

first category represents the most hostile approach, where developers are subject to the prior appropriation doctrine without exception. Utah, Wyoming, and Montana[136] follow this model. This Comment also places Colorado in this section. Even though Colorado statutes declare that geothermal developers may be exempted from acquiring a permit to appropriate water, the implementing regulations do not mention this exemption, and it appears that the State Engineer has never granted any of these waivers.[137] The second category is for states that conditionally exempt geothermal developers from the prior appropriation doctrine based on the temperature of the geothermal resource. New Mexico, Oregon, and Idaho fit into this category.[138] The third category consists of states that classify geothermal resources as minerals, either implicitly or explicitly, to foster the growth and development of the industry.[139]

A. Classifications

1. Prior Appropriation

The following states do not make prior appropriation exceptions for the development of geothermal resources. As the

find the classification that I have laid out more helpful and accurate for the purposes of identifying how states apply the prior appropriation doctrine. This is mainly because "*sui generis*" is not really its own classification. For example, Montana calls geothermal resources *sui generis* but then treats geothermal resources as water for purposes of water rights acquisition, like Utah and Wyoming. *See infra* Part III.A.1. On the other hand, in Idaho, where geothermal resources are also classified as *sui generis*, geothermal resources are exempt from Idaho's water laws so long as the water is above 212°F, and therefore the classification more closely resembles the systems used in New Mexico and Oregon. *See infra* Part III.A.2. Admittedly, any classification of states based on geothermal laws is an oversimplification as geothermal laws are complex and extremely diverse.

136. Montana's geothermal resource laws are not discussed in-depth below. While Montana classifies geothermal resources as *sui generis*, MONT. CODE ANN. § 77-4-104 (2010), Montana still subjects all geothermal development to the prior appropriation doctrine. *Id.* § 77-4-108 (2010); *Id.* §§ 85-2-102(1), (8), (19).

137. The Colorado State Engineer was unable to state if these waivers have ever been granted because "[t]o date, geothermal development in Colorado that is diversionary is not usually reinjected and is not applied to energy development." E-mail from Kevin G. Rein, Assistant State Engineer, Colorado Division of Water Resources, to Justin Plaskov, Author (Jul. 25, 2011, 07:52 MDT) [hereinafter Rein E-mail] (on file with the University of Colorado Law Review).

138. *See infra* Part III.A.2.

139. Owen Olpin, A. Dan Tarlock & Carl F. Austin, *Geothermal Development and Western Water Law*, 1979 UTAH L. REV. 773, 804.

numbers show, states that subject geothermal development to the prior appropriation doctrine without making exceptions lag behind other states in terms of current generation of geothermal energy production.[140]

Utah defines geothermal resources as "heat energy."[141] Ownership of heat associated with geothermal resources "derives from an interest in land and not from an appropriative right to geothermal fluids."[142] However, it expressly excludes any ownership rights to subsurface waters associated with heat.[143] Rather, geothermal resources are deemed a special kind of groundwater resource.[144] As such, development of those resources requires the developer to publicly advertise the application and to have a hearing for any protests of such appropriation.[145] Utah currently has an installed capacity of 42 MW and another 628–883 MW in development.[146]

In Wyoming, the use of water for the purpose of extracting heat is considered a "beneficial use" subject to the prior appropriation doctrine.[147] Geothermal resources are defined as groundwater.[148] A groundwater developer must apply for and obtain a permit in Wyoming before constructing a well.[149] A developer may bore a hole for "mineral exploration, oil and gas exploration, stratigraphic information or any other purpose not related to groundwater development."[150] While one may argue that geothermal energy development is not "groundwater development," and therefore should be exempt from the prior appropriation permit requirement, this argument is unlikely to persuade a court.[151] Therefore, developers must get a permit

140. This Comment does not contend that prior appropriation is the sole reason why these states lag behind other states in terms of geothermal development. Naturally, the amount of resources found within a state, the location of those resources, administrative guidance, and other factors also play a role in geothermal development.

141. *See* UTAH CODE ANN. § 73-22-3(5) (West 2010).

142. *Id.* § 73-22-4 (West 2010).

143. *Id.* § 73-22-8 (West 2010).

144. *Id.*

145. *Id.*

146. JENNEJOHN, *supra* note 36, at 16.

147. WYO. STAT. ANN. § 41-3-101 (2010).

148. *Id.* § 41-3-901 (2010).

149. *Id.* § 41-30-930(a) (2010).

150. *Id.*

151. *See* Lawrence J. Wolfe & Jennifer G. Hager, *Wyoming's Groundwater Laws: Quantity and Quality Regulation*, 24 LAND & WATER L. REV. 39, 47 (1989) (explaining that anyone in Wyoming who wants to withdraw groundwater for a beneficial use must obtain a permit before drilling).

before drilling. The application for a permit must contain the "estimated depth of the proposed well, the quantity of water proposed to be withdrawn and beneficially utilized in gallons per minute and acre-feet per calendar year."[152] These requirements inevitably present many obstacles to a geothermal developer because such specifics are difficult to accurately predetermine.[153] However, the State Engineer has discretion to issue any permits "subject to such conditions as he may find to be in the public interest."[154] Thus, one could argue that it is in the public interest to develop more geothermal resources and that such strict standards should not apply to geothermal developers. Wyoming has a current installed capacity of 0.25 MW and another 0.28 MW in development.[155]

Colorado is an anomaly in that its statutes provide for exemption from the prior appropriation permitting system, but the corresponding implementing regulations make no mention of the exemption. Consequently, there is uncertainty surrounding the geothermal laws in the state and little geothermal development in the state. This is especially true since it appears unlikely that the State Engineer will grant these waivers in the future.[156]

In Colorado, appropriation of any water used for geothermal development is recognized as a beneficial use of water.[157] As such, a geothermal developer must apply for and obtain a permit from the State Engineer to appropriate geothermal fluids.[158] However, the legislature declared that the prior appropriation doctrine "should be modified to permit the full economic development of the resource."[159] Therefore, the required appropriation permit "may be waived by the State Engineer for a diversionary utilization method which is nonconsumptive and which will not impair valid, prior water

152. WYO. STAT. ANN. § 41-30-930(a) (2010).
153. *See* Aidlin, *supra* note 123.
154. WYO. STAT. ANN. § 41-3-933 (2010).
155. JENNEJOHN, *supra* note 36, at 18.
156. The Assistant State Engineer, Kevin Rein, stated that "with the concern about impacts from ground water diversions in the state, I believe that it is unlikely that the Division of Water Resources would waive the permit requirement for a significant diversion of a geothermal resource for energy production, even if it was to be 100 percent reinjected." Rein E-mail, *supra* note 137.
157. COLO. REV. STAT. § 37-90.5-107(1) (2010).
158. *Id.* § 37-90.5-107(1), (2)(a).
159. *Id.* § 37-90.5-102(1)(c).

rights."[160] This language appears to indicate that geothermal developers can use binary systems without needing to appropriate water under Colorado's geothermal statutes, because binary systems are nonconsumptive.

However, the lack of administrative regulations addressing this exemption suggests that these waivers are not being granted because they are within the discretion of the State Engineer. The rules themselves recognize that they "are required to enable the State Engineer to carry out the provisions of the Colorado Geothermal Resources Act."[161] They state that a "permit issued by the State Engineer shall be obtained prior to construction or use of any geothermal well."[162] A variance may be requested "[w]hen the strict application of any provision of these Rules presents practical difficulties or unusual hardship."[163] Nevertheless, these regulations do not make it clear that a variance may be given for nonconsumptive uses. Nor do they make it clear how nonconsumptive geothermal projects will be treated.[164]

Colorado currently does not have any installed capacity of geothermal energy and has only 10 MW in development.[165] Most troubling about the meager amount of geothermal resources in production in Colorado is the great potential within the state. A recent Massachusetts Institute of Technology study found that Colorado has the greatest potential of any state to produce geothermal electricity between the depths of 10,000 and 13,000 feet, a depth currently reachable with oil drilling rigs.[166]

2. Exemption Based on Temperature

Some states, recognizing that geothermal resources over a certain temperature are unlikely to be used by other appropriators, exempt very hot geothermal fluids from the prior appropriation doctrine. In those states, development of geothermal resources is moderate.

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160. *Id.* § 37-90.5-102(2)(a).
161. COLO. CODE REGS. § 402-10, 3.1 (2011).
162. *Id.* § 402-10, 6.1.2 (2011).
163. *Id.* § 402-10, 14.1 (2011).
164. *See id.* §§ 402-10, 1 to 18 (2011).
165. JENNEJOHN, *supra* note 36, at 8.
166. Press Release, U.S. Dep't of the Interior, Bureau of Land Management, Colorado Collaborate to Advance Efficient Geothermal Development (Mar. 15, 2011) (on file with the University of Colorado Law Review).

New Mexico classifies geothermal resources as a hybrid between a mineral and water resource and thus sometimes subjects geothermal development to the prior appropriation doctrine. If the fluid has a temperature over 250°F, then the resource is considered a mineral.[167] However, geothermal resources at or below 250°F are considered water resources and therefore subject to the prior appropriation doctrine.[168] New Mexico has a currently installed capacity of 0.24 MW and another 35 MW in development.[169]

Oregon also exempts water above 250°F from the prior appropriation doctrine.[170] Uniquely, Oregon's laws state that if interference between a geothermal well and an existing water appropriation occurs, the Water Resources Director is required to resolve the conflict considering the most beneficial use of the water and heat resources.[171] This allows existing users to continue to use those resources to the greatest extent possible while also protecting the public's interest in the efficient use of water and heat resources. By contrast, most states do not have this sort of balancing process. Oregon has a currently installed capacity of 0.28 MW and another 342–473 MW in development.[172]

Idaho, a state with considerable geothermal resources,[173] defines geothermal resources as heat resources above 212°F found inside the earth.[174] Idaho classifies geothermal resources as *sui generis*—neither a mineral resource nor a water resource—while recognizing that the resource is "closely related to and possibly affecting and affected by water and mineral resources in many instances."[175] This avoids the need for a developer to demonstrate that a geothermal well will not impair other existing water rights, as required under the water appropriation statutes.[176] Developers also are not required to

167. N.M. STAT. ANN. § 71-5-2.1 (West 2010).
168. *Id.*
169. JENNEJOHN, *supra* note 36, at 14.
170. *See* OR. REV. STAT. § 522.025 (2010).
171. *Id.* § 522.255.
172. JENNEJOHN, *supra* note 36, at 15.
173. Laura MacGregor Bettis, Comment, *In Hot Water: Can Idaho's Ground Water Laws Adequately Govern Low Temperature Geothermal Resources?*, 39 IDAHO L. REV. 113, 113–16 (2002).
174. IDAHO CODE ANN. § 42-4002(c) (2010).
175. *Id.*
176. *See id.*

specify how much water will be used.[177] The statute requires a developer to give "the character and composition of the material expected to be derived from the well," rather than an account of how much water is expected to be used.[178] Under the Idaho system, a developer does not need a permit to appropriate water. A developer need only conform to Idaho's groundwater permitting process if the proposed permit will decrease the groundwater.[179] Idaho has a currently installed capacity of 15.8 MW and another 413–676 MW in development.[180]

3. More Favorable Approaches

Nevada and California have well-established geothermal laws that provide exemptions from the states' prior appropriation laws. Due in part to these exemptions, these states produce a significant amount of electricity from geothermal resources.

In Nevada, "[t]he owner of real property owns the rights to the underlying geothermal resources unless they have been reserved by or conveyed to another person."[181] Nevada exempts geothermal wells from the prior appropriation process as long as all of the water is reinjected into the same source.[182] Unlike Colorado's statute, which gives discretion to the State Engineer to exempt geothermal developers from the state permitting process,[183] Nevada's language is mandatory.[184] However, "if

177. *See generally id.* § 42-4003 (describing requirements for geothermal resource well permits).

178. *Compare id.* § 42-4003(a)(4), *with* WYO. STAT. ANN. § 41-3-930(a) (2010) (requiring prospective permittees to specify "the quantity of water proposed to be withdrawn and beneficially used in gallons per minute and acre-feet per calendar year").

179. *See* IDAHO CODE ANN. § 42-4005(e) (2010).

180. JENNEJOHN, *supra* note 36, at 9.

181. NEV. REV. STAT. § 534A.050 (2010).

182. Telephone Interview with Thomas K. Gallagher, P.E., Manager II, Section Chief, Drilling Regulation and Special Projects, Nev. Div. of Water Res., (Mar. 5, 2011 17:02 MST) [hereinafter Gallagher Interview] (email confirming the content of the interview is on file with the author and the Colorado Law Review) (if the water is reinjected but is diversionary, then this exemption does not apply); *see* NEV. REV. STAT. § 534A.040(1)–(2). Nevada also allows for a reasonable amount of water to be lost during well testing and for temporary system failures. *Id.*

183. *See* COLO. REV. STAT. § 37-90.5-107(b) (2010).

184. The Nevada statute states that:

> A consumptive use of water brought to the surface outside of a geothermal well is subject to the appropriation procedures of chapters 533 and 534 of NRS, except for:

water is brought to the surface as a by-product of geothermal development for a consumptive use, the groundwater appropriation statute applies."[185] This means that binary systems are exempt from groundwater appropriation statutes.[186] Nevada formerly subjected all geothermal resources to the prior appropriation doctrine[187] but amended its statutes to help foster the development of geothermal energy in the state.[188] Nevada has a currently installed capacity of 433.4 MW and another 2120.4–3686.4 MW in development.[189]

California case law has determined that geothermal energy is properly defined as a mineral and therefore is a part of the mineral estate.[190] The holdings in *Pariani* and *Geothermal Kinetics* rejected the arguments that geothermal resources are merely water and therefore are not part of a reserved mineral estate.[191] In *Pariani*, the court noted that "[t]he fluid component of the resource, including the steam, is *distinctly separate and different from, and is in fact not the 'water' which is the subject of the California water law*."[192] Similarly, in *Geothermal Kinetics*, the court noted that "there [is] a sound geologic basis for distinguishing between the usual ground water system and geothermal waters."[193] Therefore, it is not necessary to appropriate groundwater for geothermal resource development in California.[194]

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1. Water that is removed from an aquifer or geothermal reservoir to develop and obtain geothermal resources if the water is returned to or reinjected into the same aquifer or reservoir.

NEV. REV. STAT. § 534A.040 (2010).

185. Galli et al., *supra* note 64, at 6-11.

186. Gallagher Interview, *supra* note 182.

187. *See* LARRY J. GARSIDE, NEV. BUREAU OF MINES AND GEOLOGY REP. NO. 21, GEOTHERMAL EXPLORATION AND DEVELOPMENT IN NEVADA THROUGH 1973, at 8 (1974) (indicating that the Attorney General of Nevada considered geothermal resources as water resources and that geothermal development was under the jurisdiction of the Division of Water Resources).

188. *See* NEV. REV. STAT. § 534A.040(1)–(2) (2010).

189. JENNEJOHN, *supra* note 36, at 11.

190. Pariani v. State, 164 Cal. Rptr. 683, 687, 691 (Cal. Ct. App. 1980); Geothermal Kinetics, Inc. v. Union Oil Co. of Cal., 141 Cal. Rptr. 879, 880 (Cal. Ct. App. 1977); Seel, *supra* note 10, at 8-3 (citing United States v. Union Oil Co. of Cal., 549 F.2d 1271 (9th Cir. 1977)).

191. *Pariani*, 164 Cal. Rptr. at 691; *Geothermal Kinetics*, 141 Cal. Rptr. at 880.

192. *Pariani*, 164 Cal. Rptr. at 690 (emphasis added) (internal quotation marks omitted).

193. *Geothermal Kinetics*, 141 Cal. Rptr. at 883.

194. *See generally* CAL. CODE REGS. tit. 23 (2010); ROCKY MTN. MIN. L. INST., STATE GEOTHERMAL REGULATORY APPROACHES § 6.09 app. I, *available at*

It is likely that California's judicial recognition of geothermal resources as minerals rather than water has helped make California the leading producer of geothermal energy. Of course, California's large supply of geothermal resources also plays a significant role.[195] "In 2007, 4.5% of California's electric energy generation came from geothermal power plants," amounting to a net total of 2565.5 MW and another 1609.7–1997.7 MW in development.[196]

B. A Case for Reform

States must significantly increase development of renewable energy resources to meet their RPS targets.[197] For example, Colorado must install an additional 7.7 million MWh of renewable-energy generating capacity before 2025 in order to meet its RPS goals.[198]

States wishing to meet their RPS mandates would be wise to encourage geothermal development within their borders. To accomplish this, states should consider statutory and regulatory reform to encourage geothermal development. Although it is apparent that geothermal developers face many obstacles, such as dealing with environmental laws and the potential of induced seismicity,[199] conflicts with water laws may be the most significant impediment to geothermal development.[200] Statutory and regulatory changes will help to bring more geothermal power online more rapidly.[201]

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www.rmmlf.
org/AI55-Ch6-Appendix.pdf.

195. SACARTO, *supra* note 12, at 10-11 fig.6 (showing a map of known and prospective geothermal resources in western states).

196. JENNEJOHN, *supra* note 36, at 7.

197. *See* Richard Lauckhart, Black & Veatch, Need for Renewables and Gas Fired Generation in WECC 8 (Jan. 25, 2010), http://wyia.org/wp-content/uploads/2010/01/rich-lauckhart-black-veatch.pdf.

198. This estimate includes estimated growth of energy demand. DAVID HURLBUT, NAT'L RENEWABLE ENERGY LAB., U.S. DEP'T OF ENERGY, RENEWABLE RESOURCES AND TRANSMISSION: NEEDS AND GAPS 12 (2010), *available at* http://www.cleanlineenergy.com/wp-content/uploads/2010/06/NREL-ppt-from-SW-renewable-energy-transmission-conf-5-21-10.pdf.

199. Seel, *supra* note 10, at 8-5.

200. *See* SACARTO, *supra* note 12, at 2; Aidlin, *supra* note 123, at 36–37; Olpin et al., *supra* note 139, at 810–11.

201. *See* Seel, *supra* note 10, at 8-1. Seel further suggests that regulatory changes promoting geothermal development would be desirable because, on balance, geothermal power is environmentally beneficial. *Id.*

This Comment suggests a hybrid approach of Nevada's and Idaho's geothermal laws in order to facilitate development. More specifically, states should consider doing two things. First, states should exempt geothermal appropriators from the prior appropriation doctrine where the use is nonconsumptive and nondiversionary.[202] This will allow developers to use geothermal resources without the difficulty of complying with states' prior appropriation laws but will also protect other water users from the potential that geothermal appropriators would deplete their water source. Second, states should exempt geothermal developers from the prior appropriation system if the geothermal resources are above 212°F. This takes into account the scientific reality that geothermal resources above a certain temperature are unlikely to be used for other purposes[203] and that nonconsumptive uses of geothermal resources will not likely affect established water rights.[204]

In the event that states do not want to wholly exempt geothermal developers from the prior appropriation doctrine, states should create a rebuttable presumption that geothermal developers are not interfering with others' water rights.[205] However, under this scenario, if senior water rights are damaged, a developer may face litigation. This should be expected in any state. But because geothermal resources typically are physically separate from aquifers used for other purposes, and because they cannot typically be used as potable water or for agriculture or ranching, litigation is unlikely.[206] Some progressive states have already demonstrated the practicability of conditionally exempting geothermal resources from the prior appropriation doctrine.[207]

IV. SOLUTION TWO: FEDERAL RESERVED WATER RIGHTS

This Part gives an overview of the doctrine of federal reserved water rights and demonstrates why geothermal

202. It is also suggested that states follow Nevada and allow for a reasonable amount of water to be lost lost during well testing and for temporary system failures. *See* NEV. REV. STAT. § 534A.040(1)–(2) (2010).

203. *See supra* Part I.D.1.

204. *See supra* Part II.B. It is also necessary to recognize and protect established geothermal rights under this system.

205. *See* Olpin et al., *supra* note 139, at 811.

206. *See supra* notes 118–20 and accompanying text.

207. *See supra* Part III.A.3 (addressing the applicability of the prior appropriation doctrine in Nevada and California).

developers may not need to comply with state water laws on federal public lands and split estates. First, this part gives a background on the doctrine of reserved water rights. Next, it looks at the Geothermal Steam Act of 1970[208] for legislative intent regarding withdrawals and delegation of withdrawal power. Then, it looks to past federal reservations[209] and withdrawals[210] that might have reserved water rights for geothermal energy production.[211] Lastly, it argues that the doctrine of reserved water rights should be used to identify and develop geothermal resources on federal public lands.

A. Federal Reserved Water Rights Doctrine

When the federal government sets aside land for a specific purpose, e.g., a national park, national forest, or a national monument, the reserved lands generally carry with them a reservation of the amount of then-unappropriated water on or under that land necessary to fulfill the purpose of the reservation.[212] The reservation is based on federal law and often conflicts with state water law.[213]

The power of the United States to appropriate non-navigable[214] waters on federal lands generally, and on

208. Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. §§ 1001–27 (2006)).

209. "A 'reservation' means a dedication of withdrawn land to a specified purpose, more or less permanently." COGGINS ET AL., *supra* note 18, at 416.

210. The federal government defines "withdrawal" as: "[W]ithholding an area of Federal land from settlement, sale, location, or entry . . . for the purpose of limiting activities . . . in order to maintain other public values in the area or reserving the area for a particular public purpose or program." 43 U.S.C. § 1702(j) (2006).

211. Reservations and withdrawals, as used in this sentence, are terms that are often confused because "[b]right lines do not always separate classifications, withdrawals, and reservations." COGGINS ET AL., *supra* note 18, at 417. To distinguish between the type of reservation used here, and the "reservation" of minerals that creates a split estate, only the term "reserved minerals" is used to describe the reservation of minerals rather than a designation of land.

212. *See* Cappaert v. United States, 426 U.S. 128, 138 (1976); *see also* SAX ET AL., *supra* note 109, at 904.

213. *See* SAX ET AL., *supra* note 109; *see also* Alan E. Boles, Jr. & Charles M. Elliott, United States v. New Mexico *and the Course of Federal Reserved Water Rights,* 51 U. COLO. L. REV. 209, 211–12 (1980).

214. The term "non-navigable" is a term of art. It appears the *Cappaert* Court is using "non-navigable" as a reference to "non-navigable in fact." *Cappaert*, 426 U.S. at 138. Navigable in fact means that the waterway was used for commerce at the time a state was admitted into the nation. *See* DAVID H. GETCHES, WATER LAW IN A NUTSHELL 221 (3d. ed. 1997). Title to waters that are navigable in fact is held by states in a public trust, and therefore the federal government does not

reserved lands specifically, is derived from the Interstate Commerce Clause[215] and the Property Clause[216] of the United States Constitution.[217] Once the federal government appropriates water, the Supremacy Clause protects the federally reserved water rights from extinguishment under state law.[218] Courts do not apply a balancing test to determine if federal reserved water rights can exist under state laws or if states have the power to terminate those water rights.[219] Rather, federally reserved water rights trump all state water rights vested after the creation of the federal reservation.[220] This means that if surface water or groundwater is reserved or withdrawn by the federal government, the federal government does not need to comply with state adjudicative or administrative processes of allocating water rights in order to appropriate the water.[221]

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own those waters and cannot appropriate those waters. *See* SAX ET AL., *supra* note 109, at 522–23.

215. The Interstate Commerce Clause gives Congress broad power to regulate commerce among the states. *See* U.S. CONST. art. I, § 8, cl. 3.

216. The Property Clause gives Congress the "power to dispose of and make all needful Rules and Regulations respecting the Territory or other Property belonging to the United States." U.S. CONST. art. IV, § 3, cl. 2.

217. *Cappaert*, 426 U.S. at 138.

218. *See* Sierra Club v. Yeutter, 911 F.2d 1405, 1419 (10th Cir. 1990). The Supremacy Clause declares that the laws of the United States "shall be the supreme law of the land." U.S. CONST. art. VI.

219. *See Cappaert*, 426 U.S. at 138.

220. *See* Jan G. Laitos, *Whose Law Governs? State and Local Regulation on Federal Lands, and Federal Regulation on State Lands*, 49 ROCKY MTN. MIN. L. INST. 17-1, 17-20 to -21 (2003).

221. *See Cappaert*, 426 U.S. at 143 (holding "that the United States can protect its water from subsequent diversion, whether the diversion is of surface or groundwater"). While the Supreme Court in *Cappaert* dodged the question of whether the federal government could reserve groundwater, the Ninth Circuit below in *Cappeart* held "the United States may reserve not only surface water, but also underground water." United States v. Cappaert, 508 F.2d 313, 317 (9th Cir. 1974), *aff'd*, 426 U.S. 128 (1976). Further, subsequent and earlier courts have applied the doctrine to groundwater. United States v. Wash. Dep't of Ecology, 375 F. Supp. 2d 1050, 1058 (W.D. Wash. 2005); Tweedy v. Tex. Co., 286 F. Supp. 383, 386 (D. Mont. 1968); *In re* Gen. Adjudication of All Rights to Use Water in Gila River Sys. & Source, 989 P.2d 739, 747 (Ariz. 1999); Confederated Salish & Kootenai Tribes of the Flathead Reservation v. Stults, 59 P.3d 1093, 1099 (Mont. 2002). Commentators also note that it appears that the doctrine applies to groundwater, GETCHES, *supra* note 214, at 325–26, or at least acknowledge that this is the majority view, *see* A. DAN TARLOCK ET AL., WATER RESOURCE MANAGEMENT 922 (6th ed. 2009); *see also* Debbie Leonard, *Doctrinal Uncertainty in the Law of Federal Reserved Water Rights: The Potential Impact on Renewable Energy Development*, 50 NAT. RESOURCES J. 611, 612, 622 (2010) (recognizing the uncertainty surrounding the doctrine of federally reserved water rights). It should be noted that the federal government can still be joined in a suit to determine the

Many federally reserved water rights have yet to be formally claimed or adjudicated.[222] For claims under the federal reserved water right doctrine, it is necessary to "determine the precise federal purposes to be served by such legislation; determine whether water is essential for the primary purposes of the reservation; and finally determine the precise quantity of water—the minimal need as set forth in *Cappaert* and *New Mexico* required for such purposes."[223]

B. Did the Geothermal Steam Act Reserve Water Rights?

To determine what federal water rights might be reserved for geothermal energy production, it is logical to start by looking to the Geothermal Steam Act.[224] Until 1970, there was no comprehensive statute in the United States giving rights to developers to exploit geothermal resources on public lands.[225] By 1960, the United States Congress recognized the great potential of geothermal resources and trudged through a decade of trying to create a comprehensive licensing scheme for geothermal resource development on public lands.[226] Eventually, the federal government passed the Geothermal Steam Act in 1970.[227] "The [Geothermal] Steam Act is the

validity of the reserved water rights under the McCarran Amendment. *See* 43 U.S.C. § 666 (2006).

222. COGGINS ET AL., *supra* note 18, at 516.

223. United States v. City and County of Denver, 656 P.2d 1, 20 (Colo. 1982). In *Cappaert*, the Supreme Court looked at a federal reservation at Devil's Hole Monument. *Cappaert*, 426 U.S. at 141. The Court noted that "Devil's Hole was reserved 'for the preservation of the unusual features of scenic, scientific, and educational interest.'" *Id.* Therefore, the court determined that the amount of water to be reserved was determined by the amount "necessary to preserve its scientific interest." *Id.* In *New Mexico*, the Supreme Court looked at federal reserved water rights for national forests and determined that "Congress intended that water would be reserved only where necessary to preserve the timber or to secure favorable water flows for private and public uses under state law" because that was Congress's intent in passing the Organic Administration Act of 1897. United States v. New Mexico, 438 U.S. 696, 718 (1978).

224. Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. §§ 1001–27 (2006)).

225. *See* 116 CONG. REC. 34,857 (1970) (statement of Rep. Saylor).

226. *See generally id.* at 34,856 (statement of Rep. Edmondson commenting on the past vetoes of the Geothermal Steam Act by President Lyndon Johnson); *see also* Owen Olpin & A. Dan Tarlock, *Water That is Not Water*, 13 LAND & WATER L. REV. 391, 405 (1978) (describing how, prior to 1970, geothermal developers attempted to use the Mining Law of 1872 and the Minerals Leasing Act of 1920 to secure rights to develop geothermal resources, to no avail).

227. Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. §§ 1001–27 (2006)).

exclusive means of acquiring rights to develop geothermal resources on lands owned by the United States."[228]

In passing the Act, Congress hoped to create a licensing scheme that would lead to significant development of geothermal resources. Congress recognized that "[a]t the present time there is no statute that specifically provides for the development of geothermal steam on Federal lands . . . . We therefore need legislation such as this bill to handle a resource that is assuming increasing importance to the Nation as a whole."[229] In recommending the passage of the Act, the Committee on Interior and Insular Affairs recognized the great advantages of geothermal energy and its immense potential for future development on federal lands.[230]

However, the Geothermal Steam Act did not explicitly reserve water rights.[231] There are many plausible explanations for this. It is likely due, in part, to the fact that Congress was more interested in restricting administrative agencies' withdrawal power at that time.[232] In addition, Congress may not have foreseen states' abilities to impede geothermal

228. Galli et al., *supra* note 64, at 6-6.

229. 116 CONG. REC. 34,857 (statement of Rep. Saylor).

230. Ethel R. Alston, *Construction and Application of Geothermal Steam Act of 1970*, 40 A.L.R. FED. 814, at § 2[a] (1978); *see also* H.R. REP. NO. 91-1544 (1970), *reprinted in* 1970 U.S.C.C.A.N. 5113, 5119–20.

231. *See generally* Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. §§ 1001–27 (2006)).

232. While working on a draft of the Geothermal Steam Act, on February 7, 1967, the Department of the Interior "caused to be published in the Federal Register a notice of the filing of a withdrawal of those public lands valuable for geothermal steam resource development, and also those public lands prospectively valuable for such geothermal steam development." 113 CONG. REC. 6520 (1967) (statement of Sen. Kuchel); *see also* Notice of Proposed Withdrawal and Reservation of Lands, 32 Fed. Reg. 2588 (Feb. 3, 1967). The Department of Interior attempted to withdraw the land pursuant to its implied reservation powers under the Supreme Court case *United States v. Midwest Oil*. United States v. Midwest Oil, 236 U.S. 459, 459 (1915); *see also* 113 CONG. REC. 15,328–29 (statement of Sen. Bible) (explaining where the implied power came from). The notice alarmed Congress, and therefore Congress made sure that the Department of the Interior amedended the withdrawal. *See* 113 CONG. REC. 7988 (statement of Sen. Church); Amendment of Notice of Proposed Withdrawal and Reservation of Lands, 32 Fed. Reg. 4030 (Mar. 14, 1967). On March 21, 1967, the Department of the Interior withdrew specified lands. Revised Notice of Proposed Withdrawal and Reservation of Lands, 32 Fed. Reg. 4506–08 (Mar. 21, 1967). Under the federally reserved water rights doctrine, these lands are not subject to any water rights perfected after March 21, 1967. *See* Winters v. United States, 207 U.S. 564, 568–69 (1908) (where the Supreme Court first articulated that when the federal government reserves land for a specific purpose, the date of the reservation rather than the date of the appropriation is the seniority date for water); *see also* GETCHES, *supra* note 214, at 308–19; Olpin & Tarlock, *supra* note 226, at 415.

development through the prior appropriation doctrine.[233] Another possible reason could be that Congress assumed that water would be reserved when land was leased under the Act.[234] Lastly, Congress may not have granted this express authority because it would have been politically unfavorable. Nevertheless, pursuant to its implied authority under *Midwest Oil*,[235] the Department of the Interior successfully withdrew about one million acres[236] before Congress set forth any limitations on the power of administrative agencies to withdraw land.[237] Congress eventually rewrote the process and rules for withdrawal power in the Federal Land Policy and Management Act of 1976.[238]

Despite the fact that the federal government neither explicitly reserved water rights in the Geothermal Steam Act nor explicitly delegated withdrawal power to an administrative agency, the Act arguably reserved water rights in two distinct ways.[239] First, as the Colorado Supreme Court noted, a withdrawal might occur when the land is leased under the Geothermal Steam Act.[240] If this is true, then the appropriation would be subject to the federally reserved water rights doctrine and federal lessees would not need to follow state water law procedures.[241] Second, the Geothermal Steam Act could theoretically be applied retroactively to withdrawals and reservations that took place before 1970. This would be closely

233. The Geothermal Steam Act takes the official position of neutrality with regard to state water laws. "Nothing in this chapter shall constitute an express or implied claim or denial on the part of the Federal Government as to its exemption from state water laws." Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. § 1021 (2006)). This clause and its implications are addressed in Part IV.D.

234. Olpin & Tarlock, *supra* note 226, at 413.

235. 236 U.S. at 459.

236. 116 CONG. REC. 34,859 (statement of Rep. Johnson).

237. 43 U.S.C. § 1714 (1976).

238. *Id.*; *see also* JOHN D. LESHY, THE MINING LAW: A STUDY IN PERPETUAL MOTION 35–36 (Samuel Allen ed., 1987).

239. In rejecting the argument that the Geothermal Act withdrew lands for geothermal development, the Colorado Supreme Court recognized that "[i]t is reasonable to conclude that state appropriation law should govern until the United States has actually leased the geothermal resource." United States v. City & County of Denver, 656 P.2d 1, 34 (Colo. 1982). However, it appears no federal court has addressed this issue.

240. *See id.*

241. Olpin & Tarlock, *supra* note 226, at 418.

analogous to the holdings by the Ninth Circuit in *Union Oil*[242] and the Tenth Circuit in *Rosette*,[243] as discussed below.[244]

C. Reserved Minerals Under the Homestead Act of 1916

Below is a discussion of the application of the Geothermal Steam Act to the Stock-Raising Homestead Act of 1916[245] (Homestead Act), which authorized homesteaders to enter onto 640 acres to use for homesteading.[246] As a result of the Homestead Act, in just a few years, settlers entered into over 50 million acres and the federal government patented claims to about 30 million acres.[247] However, these grants did not give fee simple title.[248] Rather, the United States retained ownership to the minerals below the patented land.[249] This created what is known as a "split estate": the settlers owned the rights to use the surface of the land, and the United States retained the right to the minerals below the surface of the

242. United States v. Union Oil Co. of Cal., 549 F.2d 1271, 1273 (9th Cir. 1977).

243. Rosette Inc. v. United States, 277 F.3d 1222, 1224 (10th Cir. 2002).

244. Even though land withdrawals and reservations are different from the reservation of a mineral estate, they are closely analogous, and both allow for federal reservations of water whether it is implied or explicit. *Compare* DAVID H. GETCHES, WATER LAW IN A NUTSHELL 311–12 (3d. ed. 1997) (explaining that the reserved water rights doctrine applies to "public lands reserved for a particular governmental purpose"), *with* United States v. Union Oil Co. of Cal., 549 F.2d 1271, 1273–74 (9th Cir. 1977) (holding that a reservation of a mineral estate can include a reservation of water used in the development of geothermal resources). Further, whereas land withdrawals and reservations preserve certain areas of federally owned land for specific purposes, COGGINS ET AL., *supra* note 18, at 416, a reservation of a mineral estate keeps the mineral rights for future use. Under either of these designations, the federal government owns the land or minerals. There is further support for this argument in the fact that a reservation of minerals only gives the government a retained interest in the subsurface, *see* 70 A.L.R.3d 383, § 2[a] (1976), whereas the government owns withdrawals and reservations in fee simple. *See generally* BLACK'S LAW DICTIONARY 1422 (9th ed. 2009) (defining a "reservation"). Both of these cases held that reservations of minerals can include geothermal resources even if they were not thought to be valuable at the time of the reservations. *See infra* Part IV.C.2.

245. 43 U.S.C. § 315 (repealed 1976).

246. *See* COGGINS ET AL., *supra* note 18, at 106.

247. *Id.* Once the federal government recognized a valid land claim under the Homestead Act, the government issued "patents" or transferred ownership to the property. *Id.* at 105.

248. *Id.* at 106. Fee simple is a property term for the ownership of property without limitation or condition, or to own a piece of property outright. BLACK'S LAW DICTIONARY 691 (9th ed. 2009).

249. *See* COGGINS ET AL., *supra* note 18, at 106.

land.[250] Both the Ninth and Tenth Circuit held that reserved minerals under the Homestead Act included geothermal resources.[251]

1. Legistlative History Regarding Split Estates

The issue of split estates was directly addressed by the 91st Congressional Committee on Interior and Insular Affairs (Committee) in a report on the then-proposed Geothermal Steam Act.[252] The Committee recognized that the ownership of geothermal resources on 35 million acres of land was at stake.[253] The Committee decided to take no position except that it required the Attorney General to initiate proceedings to quiet title "when development of such resources occurs or is imminent,"[254] and therefore left the question for courts to decide.[255] The Ninth Circuit eventually addressed this situation seven years later in *Union Oil*.[256]

2. *Union Oil* and *Rosette*

In *Union Oil*, the Ninth Circuit addressed the issue of who owned the rights to geothermal resources found under a split estate created pursuant to the Homestead Act.[257] The surface owners sought to use subsurface geothermal resources under their estates to generate electricity.[258] The court found that the grants were "subject to and contain a reservation to the United States of all the coal and other minerals in the lands so entered and patented, together with the right to prospect for, mine, and remove the same."[259] The court noted that geothermal energy production was not known at the time the federal government reserved the minerals, and therefore there was no explicit mention of geothermal resources in the Homestead Act.[260]

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250. *See id.*
251. *See infra* Part IV.C.2.
252. H.R. REP. NO. 91-1544 (1970), *reprinted in* 1970 U.S.C.C.A.N. 5113, 5119–20.
253. *Id.* at 5119.
254. *Id.*
255. *See id.*
256. United States v. Union Oil Co. of Cal., 549 F.2d 1271, 1272 (9th Cir. 1977).
257. *See id.*
258. *Id.* at 1273.
259. *Id.* (quoting Section 9 of the Homestead Act, 43 U.S.C. § 299).
260. *Id.*

Nevertheless, the court held that this was irrelevant because the government reserved "all the coal and other minerals" and this was broad enough to include geothermal resources.[261] The court stated that geothermal resources, including water, "may be classified as 'minerals'" within the meaning of the Homestead Act.[262]

By including geothermal resources in reserved minerals under the Homestead Act, the Ninth Circuit in effect retroactively applied the Geothermal Steam Act.[263] The court noted that Congress, in passing the Geothermal Steam Act, "found it unnecessary to alter the language of existing statutory 'mineral' reservations."[264] The Geothermal Steam Act simply provided that such reserved minerals "shall hereafter be deemed to embrace geothermal steam and associated geothermal resources."[265] The court examined the legislative history of the Geothermal Steam Act and found that the 89th Congress took a neutral position in determining if the term "minerals" as used in past legislation could include geothermal resources. This decision to remain neutral bound the court.[266] The court also found that including geothermal resources in the term "minerals" as found in the Homestead Act would further the intent of that Act.[267] In 2002, the Tenth Circuit used the same reasoning as *Union Oil* and held that geothermal resources are "minerals" within the meaning of the Homestead Act.[268]

This line of logic and its ultimate conclusion lends significant precedent to the idea that geothermal resources can be included in many federal withdrawals that are termed broadly, such as lands withdrawn for mining of minerals or lands withdrawn to preserve fuel sources for future

261. *Id.*

262. *Id.* at 1273–74.

263. Although one may argue that this is not retroactive application, the court allowed for geothermal resources to be reserved even though geothermal resources likely were not considered at the time of the creation of the split estate. *See id.*

264. *Id.* at 1274 (referring to the Geothermal Steam Act of 1970, 30 U.S.C. § 1024 (2006)). As used in this sentence, the court is referring to what this Comment refers to as "reserved minerals." *See supra* note 211.

265. *Id.* (citing the Geothermal Steam Act of 1970, 30 U.S.C. § 1024).

266. *Id.* at 1274 n.6 (citing *Disposition of Geothermal Steam: Hearing on H.R. 7334, H.R. 10204, S. 1674 and Related Bills Before the Subcomm. On Mines & Mining of the H. Comm. on Interior & Insular Affairs*, 89th Cong. 295–96 (1966)).

267. *Id.*

268. Rosette Inc. v. United States, 277 F.3d 1222, 1224 (10th Cir. 2002).

generations. In addition, based on this precedent, geothermal developers may be exempt from state water laws while on lands disposed of under the Homestead Act because the Ninth Circuit stated that even water itself might have been reserved under the Act.[269] The areas with reserved minerals constitute large landmasses. For example, in Colorado, over 8.4 million acres were patented under the Homestead Act.[270] In Wyoming, over 18 million acres include federal mineral reserves.[271]

D. Other Withdrawn Lands

In 1930, President Herbert Hoover issued an executive order that withdrew land for hot baths and hot springs. [272] This demonstrates one example of land that may include federally reserved water rights for geothermal energy development. In 1961, the Department of the Interior interpreted this withdrawal broadly and indicated that it could encompass geothermal resources for energy production.[273]

This specific withdrawal constitutes just one example of federal land that may include reserved water rights available for appropriation by geothermal developers. However, if a geothermal developer intends to exploit geothermal resources on withdrawn lands, it is worth investigating why the government withdrew those lands and if that purpose may encompass geothermal energy production.

E. Guiding the Developer

When a geothermal developer is looking for public lands to develop, the first inquiry should be to see if those lands are designated by the BLM as opened or closed to geothermal development.[274] If the lands are open to development, the next step is to comply with the federal leasing statutes and to analyze the state water laws. Assuming that the state water laws would significantly frustrate the development of the resources, a developer should identify the land in question, find out when it was reserved, and see if an argument can be made

269. *See Union Oil*, 549 F.2d at 1273–74.
270. SACARTO, *supra* note 12, at 19 fig.21 (this figure contains state-by-state images of land patented under the Homestead Act through 1948).
271. *Id.*
272. *See* Exec. Order No. 5389 (July 7, 1930).
273. Solicitor's Opinion M-36625 (Aug. 28, 1961).
274. *See* U.S. DEP'T OF THE INTERIOR, ROD, *supra* note 77, at 1-1.

that there are federally reserved water rights. To do so, it is necessary to investigate the intent of the federal government in withdrawing the land. If the federal government withdrew the land for energy purposes or for the development of minerals, then one could argue that the government reserved water rights for geothermal development on the land. If this is the case, a developer could seek a declaratory judgment stating that there are reserved water rights for this purpose.[275]

Another starting point for a developer is to find lands disposed of under the Homestead Act of 1916. *Rosette* and *Union Oil* lend support for the argument that compliance with state water laws is not necessary on these lands because the geothermal resources, including water, were reserved for the development of minerals.[276]

V. SOLUTION THREE: THE SUPREMACY CLAUSE

This Part argues that state law could be preempted under a traditional Supremacy Clause[277] analysis of public lands, but that it is currently impracticable to do so under BLM regulations.[278] This argument is unique in that it appears no scholars have yet addressed the impact of the BLM's new policy regarding the applicability of state water laws to geothermal development on public lands.[279] First, this Part provides a background on how courts view preemption issues on public lands when Congress left a clear ambiguity in the law. Next, it analyzes the development of geothermal resources on public land as it relates to state water laws. Lastly, it proposes that the BLM promulgate new regulations that more appropriately reflect the congressional intent behind the Geothermal Steam Act[280] by encouraging more development of geothermal

275. While such a lawsuit would likely be more expensive and time consuming than just complying with state water laws in any given instance, such a test case, if won, could have profound implications for the future development of geothermal resources.

276. *See supra* Part IV.C.2.

277. U.S. CONST. art. VI, cl. 2.

278. This stands in stark contrast to the viability of the arguments that scholars made in the 1970s. At that time, the BLM had not yet taken a stance on this question, and therefore the analysis was different. *See, e.g.*, Olpin & Tarlock, *supra* note 226, at 419–21.

279. A search under multiple criteria on Westlaw yields no results for such an analysis.

280. Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. §§ 1001–27 (2006)).

resources in states that require geothermal developers to comply with the prior appropriation doctrine.

A. The Applicable Supremacy Clause Analysis

Under the Supremacy Clause[281] of the U.S. Constitution, Congress can preempt state and local authority on public lands.[282] Federal law trumps state law under three circumstances. First, if Congress expressly preempts state law, the inquiry ends, and state law is preempted.[283] If Congress has not explicitly preempted a state law, the next question to ask is if a federal regulatory scheme is "so pervasive as to make reasonable the inference that Congress left no room for the States to supplement it."[284] This is traditionally the case with such areas as immigration and Indian law, where uniformity is preferred.[285] Lastly, courts ask if a state law "stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress."[286] This last test is very commonly used in preemption cases for public lands issues.[287]

B. Federal Regulation on Public Lands

The Property Clause gives the federal government the power to control the disposition of lands it owns.[288] This clause has been interpreted very broadly by the Supreme Court, which has held that Congress's power to dispose of its public lands is "without limitation."[289] State and local regulations that

281. U.S. CONST. art. VI, cl. 2.

282. *See* Kleppe v. New Mexico, 426 U.S. 529, 546 (1976) (upholding the Wild Free-Roaming Horses and Burros Act, 16 U.S.C. §§ 1331–1340 (2006)); Ventura Cnty. v. Gulf Oil Corp., 601 F.2d 1080, 1086 (9th Cir. 1979), *aff'd*, 445 U.S. 947 (1980) (mem.) (holding that local zoning laws were preempted because they frustrated the purpose of the Mineral Lands Leasing Act of 1920).

283. COGGINS ET AL., *supra* note 18, at 180.

284. *Id.* at 181 (quoting Rice v. Santa Fe Elevator Corp., 331 U.S. 218 (1947) (internal quotation marks omitted)).

285. *Id.*

286. *Id.* (quoting Hines v. Davidowitz, 312 U.S. 52 (1941) (internal quotation marks omitted)).

287. *See, e.g.*, Cal. Coastal Comm'n v. Granite Rock Co., 480 U.S. 572, 592–93 (1987).

288. *See* 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.").

289. Kleppe v. New Mexico, 426 U.S. 529, 539 (1976); *see* United States v. Gratiot, 39 U.S. 526, 534 (1840).

are inconsistent with federal law on public lands are generally preempted.[290]

However, states traditionally control the allocation of water within their borders, even if the water is located on public lands.[291] In fact, under the McCarran Amendment, the federal government allows itself to be joined in state water rights adjudications to determine the validity of federally-owned water rights within that state's borders.[292] However, states do not own the water on or under their soil.[293] Additionally, the Supreme Court has suggested that Congress, through the Commerce Clause,[294] can directly regulate water in states, even off of federal public lands.[295]

C. The Supremacy Argument Needs Help from the BLM

Like most preemption questions regarding federal lands, one must ask whether state water laws conflict with or obstruct Congress's purpose in enacting the Geothermal Steam Act. This is because Congress has left the question open.[296] In the Act, Congress addressed state water laws and declared: "Nothing in this chapter shall constitute an express or implied claim or denial on the part of the Federal Government as to its exemption from State water laws."[297] This patent ambiguity leaves the question of preemption for the courts to decide.[298] When a "court reviews an agency's construction of the statute which it administers," and the statute is ambiguous on its face, then the court must ask, "whether the agency's answer is based on a permissible construction of the statute."[299] If the interpretation is reasonable, then the court should grant significant deference to the agency's interpretation.[300] Under

290. *See* Laitos, *supra* note 220, at 17-7.
291. *See* S. REP. NO. 755, at 3, 6 (1951).
292. 43 U.S.C. § 666 (2006).
293. *See* Sporhase v. Nebraska *ex rel.* Douglas, 458 U.S. 941, 950–51 (1982).
294. U.S. CONST. art. I, § 8, cl. 3.
295. *Sporhase*, 458 U.S. at 954.
296. *See generally* Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. § 1021 (2006)). Congress often leaves open these hard questions for political reasons. *See* COGGINS ET AL., *supra* note 18, at 186.
297. Pub. L. No. 91-581, 84 Stat. 1566 (1970) (codified as amended at 30 U.S.C. § 1021 (2006)).
298. COGGINS ET AL., *supra* note 18, at 181.
299. Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 842–43 (1984).
300. *See id.* at 844.

this deferential standard, the BLM's interpretation of the Geothermal Steam Act should be upheld, and therefore the BLM is well-positioned to facilitate further geothermal development.

Until recently, it was possible to pursue a lawsuit challenging the applicability of some state water laws to geothermal developers.[301] However, in 2005, the BLM foreclosed this possibility when it addressed the applicability of state water laws to geothermal development on federal lands.[302] In its ROD of 2005, addressing geothermal development on public lands, the BLM declared that "[i]n coordination with State regulatory agencies the operator will comply with all State and Federal surface and ground water rules and regulations for all phases of geothermal exploration, development, and reclamation."[303]

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301. *See* U.S. DEP'T OF THE INTERIOR, ROD, *supra* note 77, at app. B-5 (taking the position that developers are bound by state water laws). For example, in *Vesterso*, the Eighth Circuit interpreted a similar ambiguity, but from a different statute. United States. v. Vesterso, 828 F.2d 1234, 1240 (8th Cir. 1987). There, the court asked whether a North Dakota water law frustrated the congressional intent of the Wildlife Refuge Act, 16 U.S.C. § 668dd(a)(1). *Id.* at 1238. The court found that Congress left it to the courts to decide if a state water law would be preempted because the statute was neutral on its face. *See id.* at 1240 n.5; *see also* Wyoming v. United States, 279 F.3d 1214, 1233 (10th Cir. 2002). Ultimately, the court held that the state water law was preempted because its application would frustrate congressional intent. *Vesterso*, 828 F.2d at 1245. The court also declared that preemption should be dealt with on a case-by-case basis. *Id.* at 1240 n.5. Other courts have also held that similar statutes—ones that are facially neutral as to whether the state law is preempted—can preempt state law where the laws conflict with congressional intent. *See, e.g.*, Ventura Cnty. v. Gulf Oil Corp., 601 F.2d 1080, 1086 (9th Cir. 1979) (holding that the Mineral Lands Leasing Act preempted state laws), *aff'd*, 445 U.S. 947 (1980) (mem.).

302. Some scholars suggest that a strict scrutiny standard might be more appropriate for preemption claims arising from agency decisions. *See* COGGINS ET AL., *supra* note 18, at 185. However, there appear to be no courts on record applying this standard.

303. U.S. DEP'T OF THE INTERIOR, ROD, *supra* note 77, app. at B-5. However, one could nonetheless litigate a case under the following analysis. "The purpose of Congress is the ultimate touchstone" in deciding if a state law is preempted. Gade v. Nat'l Solid Wastes Mgmt. Ass'n, 505 U.S. 88, 96 (1992) (internal quotation marks omitted) (citing Allis-Chalmers Corp. v. Lueck, 471 U.S. 202, 208 (1985)). While it is most important to determine if Congress intended to override state law, where a statute is ambiguous as to that specific point, the general intent of the statute becomes significant. *See* Wyoming v. United States, 279 F.3d 1214, 1230–31 (10th Cir. 2002). While congressional intent is clearly ambiguous as to trumping state law, the congressional purpose behind the Geothermal Act is generally clear: Congress wanted to increase national geothermal energy production. *See supra* notes 229–30 and accompanying text.

The ultimate purpose of Geothermal Steam Act was to "encourage in every way possible, the development of the geothermal resources of the publicly

Additionally, the BLM extended this policy specifically to Colorado in a nonbinding Memorandum of Understanding (MOU) released in March 2011.[304] In the MOU, the BLM declared that "[p]rior to and during all lease operations including exploration, development, and utilization of a geothermal resource, a federal-geothermal-resources lessee must comply with Colorado appropriations law."[305] While this agreement is not binding on the BLM,[306] the BLM should not continue to enter into such agreements because these agreements stand as further obstacles to future development of geothermal resources.

This Comment shows that the BLM's declaration that geothermal developers must comply with all state laws is bad policy.[307] For the same reasons that this Comment argues for states to change their policies to promote geothermal resources, the BLM should also change its regulations. It would be more reasonable for the BLM to create a comprehensive regulation that is state-specific, identifies state water laws that are unduly restrictive for geothermal developers, and takes the position that geothermal developers are exempt from those restrictive laws on federal public lands. To accomplish this change in regulations, the BLM would need to go through a notice and comment procedure.[308] If the BLM promulgates such regulations, it is likely that courts will grant large deference to such regulations and will only ask if the rulemaking was arbitrary and capricious[309] and "whether the agency's answer

owned lands." *See* S. REP. NO. 683, at 1 (1965), *reprinted in* 111 CONG. REC. 22,917 (1965) (explaining the purposes of the bill). Congress believed that "geothermal steam is a resource of the United States which should be used." 116 CONG. REC. 34,857 (1970) (statement of Rep. Saylor). As discussed above, state water laws significantly impede geothermal development in states that do not exempt geothermal resources from the prior appropriation doctrine. *See supra* Part II.B. If geothermal fluids are not tapped and used, then the heat resources will not be utilized. Olpin & Tarlock, *supra* note 226, at 418. This frustrates the intent of Congress in passing the Geothermal Steam Act. *Id.*

304. Memorandum of Understanding Between Bureau of Land Management, Colorado State Office, and the Colorado Department of Natural Resources, Concerning Geothermal Leasing, Permitting, and Admin. in Colo. 3 (Mar. 14, 2011) (on file with the Colorado Law Review).

305. *Id.*

306. *Id.* (declaring that the Memorandum of Understanding is nonbinding).

307. *See supra* Part II.B.

308. Notice and comment procedures allow for public input when federal agencies attempt to adopt new regulations or amend existing regulations. *See* 5 U.S.C. § 553(b)–(c) (2006).

309. COGGINS ET AL., *supra* note 18, at 229.

is based on a permissible construction of the statute."[310] Assuming that the BLM's interpretation was neither arbitrary nor capricious, there should be no reason for courts to reject the regulations. The end result would be that the BLM's regulations could preempt some restrictive state laws because, as seen in the past, "agency regulations implementing federal statutes [can] pre-empt state law under the Supremacy Clause."[311]

D. Obvious Problems with Arguing for Preemption

For federal law to preempt state water laws, courts would need to take a rare jurisprudential step. Courts and Congress are generally protective of states' rights to control the water within their borders.[312] This is partly based on the entrenched history of water law and our federalist system, but it is also a result of the reliance on current water appropriation systems.[313] It would be somewhat drastic to depart from this system by declaring that a federal statute preempts state water laws when Congress took a neutral position as to preemption of water laws. For example, in *Vesterso*, the Eighth Circuit ruled that Congress must explicitly manifest its intent to change the status quo before the court will interpret a facially-neutral law as changing the status quo.[314] Here, there is no clear manifestation of congressional intent to override state water laws.[315] Additionally, the *Vesterso* court ruled that preemption cases should be dealt with on a case-by-case basis, which provides precedent that discourages courts from ruling that a state law is *per se* preempted rather than preempted in just a specific instance.[316] *Granite Rock* also presents an obstacle. The

310. Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 844 (1984).

311. Chrysler Corp. v. Brown, 441 U.S. 281, 295–96 (1979).

312. *See generally* California v. United States, 438 U.S. 645 (1978); *see also* 43 U.S.C. § 666 (2006) (allowing for the U.S to be joined in state adjudication of water rights); COGGINS ET AL., *supra* note 18, at 486–88.

313. *See* COGGINS ET AL., *supra* note 18, at 487–88 (discussing the origins of state water laws).

314. *See* United States v. Vesterso, 828 F.2d 1234, 1240 n.5 (8th Cir. 1987).

315. *See supra* note 231 and accompanying text.

316. This has obvious implications for any potential test case because a future court could distinguish a future case based on the facts of that case. A test case is a "lawsuit brought to establish an important legal principle or right." BLACK'S LAW DICTIONARY 244 (9th ed. 2009).

Court's holding there showed that facial challenges[317] under the preemption doctrine present an uphill battle for the challenger of state or local laws.[318]

VI. COPRODUCTION OF GEOTHERMAL RESOURCES AND FOSSIL FUELS

This last Part argues that the coproduction of geothermal resources at existing gas and oil wells is another way to avoid the prior appropriation doctrine. This Part is by no means a complete analysis of all the issues surrounding coproduction, but serves as an introduction to this undeveloped area of the law, with the goal of encouraging academics, litigators, and entrepreneurs to analyze this area more thoroughly. This Part begins with a background on coproduction. Next, it analyzes how this new technology can increase the development of geothermal resources by using already-appropriated water and decreasing the cost of generating electricity from geothermal resources. Lastly, it argues that states should encourage coproduction through regulatory reform.

A. What is Coproduction?

The coproduction of geothermal resources at fossil fuel wells is a new technology that could significantly increase the development of geothermal resources[319] and provide a way around state water laws. Coproduction is possible at gas and oil wells where the oil produced from the well is extracted with hot fluids, which is commonplace at many wells throughout the country.[320] Currently, this water is treated as waste and its disposal is quite costly. [321] Utilization of this thermal energy can have significant environmental benefits.[322] The first step in coproduction is bringing oil and water mixtures to the surface

317. A facial challenge is a challenge claiming "that a statute is unconstitutional on its face." BLACK'S LAW DICTIONARY 261 (9th ed. 2009).

318. *See* Cal. Coastal Comm'n v. Granite Rock Co., 480 U.S. 572, 594 (1987) (holding that a facial challenge to a state law did not sufficiently show an actual conflict with federal laws even though the state law may have been preempted under certain scenarios).

319. *See* KAGEL *supra* note 10, at 46.

320. *Id.*

321. *Id.*

322. *See supra* Part I.C. (discussing the environmental benefits of geothermal energy).

and separating the oil from the water.[323] This process is necessary in order to utilize the oil, whether a developer chooses to use the hot water or dispose of it as wastewater.[324] If the wastewater is sufficiently hot, a power plant could use the wastewater by sending it through turbines to generate electricity, which can provide power for the on-site operation of the wells.[325] Also, as noted earlier, binary systems can be utilized when the temperatures are not hot enough to utilize a hot water system.[326]

The Rocky Mountain Oil Testing Center is a successful model of a coproduction system. There, developers installed a 0.25 MW geothermal hydrocarbon coproduction unit at its facilities near Casper, Wyoming.[327] This coproduction system is estimated to pay for itself in seven years; over the period of twenty-five years, it could turn a $2.5 million profit.[328]

B. Why Coproduction?

There are two main reasons why this technology has a bright future. First, boring holes for geothermal exploration and production is one of the most expensive and risky aspects of geothermal resource development.[329] Drilling can constitute up to 50% of a total project budget.[330]

Therefore, in addition to coproducing geothermal electricity at existing wells, geothermal developers should strongly consider investigating abandoned wells to test the temperature and composition of the local groundwater source and consider utilizing the well for geothermal energy

323. *See* KAGEL, *supra* note 10, at 46.

324. *See* Wyoma Groenenberg, *Using Geothermal Energy in Oilfield Picking up Steam*, WYO. BUS. REP., Aug. 20, 2010, http://www.wyomingbusinessreport.com/article.asp?id=53165.

325. *Id.* Using this electricity on-site is also very efficient. This is because the resource and need for electricity are in the same place. Therefore, it avoids the need to connect the grid to the site or to run the oil wells using electricity from expensive diesel-powered generators. Likewise, this model avoids the need to run transmission lines from the geothermal power plant to an urban area.

326. *See supra* notes 29–31 and accompanying text.

327. JONATHAN CROSS & JEREMIAH FREEMAN, U.S. DEP'T OF ENERGY, 2008 GEOTHERMAL TECHNOLOGIES MARKET REPORT 16 (2009).

328. *See* Groenenberg, *supra* note 324.

329. JENNEJOHN, *supra* note 36, at 26.

330. *Id.*

production.[331] Gas and oil developers should also consider retrofitting abandoned or marginal wells to produce hydrocarbons and geothermal to make these wells more profitable.[332] However, although geothermal development at these locations may be economically advantageous, the legal background surrounding this development option is unsettled.[333]

Next, because the developers at these sites have already applied for and received permits to drill and extract fluids from the ground, a developer can argue that the water associated with the pumping is thereby appropriated.[334] Even if the water is not appropriated, current practice often wastes this water, where instead it can be utilized for geothermal energy production and then pumped back into the ground through a reinjection well.[335] This is a win-win situation. Currently, disposal of water brought to the surface in oil and gas wells "is at best a nuisance. It is difficult to handle, costs money to pump, and has to be re-injected at an additional cost. Capturing this waste heat and running it through a binary cycle offers the possibility of a revenue stream."[336]

C. Government Encouragement of Coproduction

Numerous proposals are currently circulating to design systems to utilize inactive oil and gas wells for geothermal energy production exclusively or through coproduction.[337] Although the federal government has increased investments

331. Karl Schulz, *Evaluating the Energy Independence and Security Act of 2007: Inclusions, Exclusions, and Problems with Implementation*, 38 ENVTL. L. REP. NEWS & ANALYSIS 10763, 10765 (2008).

332. *Id.*

333. *See* Seel, *supra* note 10, at 8-7 to 8-8 (referring to current proposals to develop these resources, the uncertainty and complexity of determining who owns these resources, and how they can be developed); *see also* Kurt M. Peterson, *Wellbores*: *Shedding Light on a Transactional Black Hole*, 48 ROCKY MTN. MIN. L. INST. 13-1, 13-7 (2002) (discussing the process of "[w]ell [t]ake [o]ver and [f]orfeiture").

334. *See* Seel, *supra* note 10, at 8-7 (discussing the uncertainty of who owns which resources when geothermal and oil or gas are found in the same reservoir).

335. *Id.* Seel also discusses the potential that geothermal developers could "force pool their way into an existing oil and gas well located in the same area" by using state laws that prohibit waste. *Id.* at 8-7 to 8-8.

336. KAGEL, *supra* note 10, at 46. Kagel also states that in "certain water-flood fields in the Gulf Coast region of the United States, 95 percent of the production out of an oil and gas well is water." *Id.*

337. *See id.*; *see also* Peterson, *supra* note 333, at 13-7.

for coproduced systems through the American Recovery and Reinvestment Act of 2009,[338] coproduction remains an area ripe for innovation by enterprising entrepreneurs wanting to make use of this promising new technology. Both the federal and state governments should encourage the use of coproduction systems through regulations and incentives designed to attract innovative thinkers to this method of geothermal energy production.

CONCLUSION

When Congress passed the Geothermal Steam Act, many thought that geothermal resources were the answer to many of our nation's problems, such as energy independence and pollution.[339] Even though there has been some development of geothermal resources, geothermal has become the forgotten cousin of wind and solar.

In the 1970s, many scholars concluded that states' prior appropriation laws would hinder the development of geothermal resources.[340] Since then, few have written about this hindrance, likely in part because many western states clarified whether or not the state water laws applied to geothermal resources when the states developed and revised their licensing schemes for geothermal development.[341] Nevertheless, geothermal's prior appropriation problem has not gone away. States have not yet done enough to foster the development of geothermal resources, and promising new technological advances make regulatory reform necessary to realize geothermal's full potential.[342]

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338. One part of the Act proposes to invest up to $20.7 million in eleven coproduction, geopressured, and low-temperature projects. *See* JENNEJOHN, *supra* note 36, at 22. For a list of projects and awards, see TIM REINHARDT, U.S. DEP'T OF ENERGY, LOW TEMPERATURE/COPRODUCED/GEOPRESSURED SUBPROGRAM OVERVIEW 6–7 (2010).

339. *See* 116 CONG. REC. 34,858 (1970) (statement by Rep. Saylor on the soon-to-be-passed Geothermal Steam Act of 1970).

340. Aidlin, *supra* note 123, at 38–39; Olpin & Tarlock, *supra* note 226, at 421.

341. *See* Olpin et. al. *supra* note 139, at 803–04 (identifying California and New Mexico as the first states to regulate geothermal development and noting that many states regulated geothermal resources after 1970); *see also* Olpin, *supra* note 121, at 150 (identifying California and New Mexico as the only states authorizing leasing of state lands for geothermal development).

342. The development of binary power plants makes regulatory reform essential because it allows for nonconsumptive use of geothermal resources to produce electricity. *See supra* notes 29–34 and accompanying text.

Geothermal energy development stands as a promising way for our country to meet its future energy needs while addressing legitimate concerns about the environment, the economy, and national security. Geothermal energy not only stands as a way to help revolutionize the energy sector in our county, but it also is a favorable alternative to other renewables because of its cost efficiency, ability to generate energy without consuming water, low environmental impact, abundance, and ability to serve as a baseload power source.[343]

Although the federal government continues to promote geothermal development, its efforts are not enough. The BLM can and should do more to encourage the development of geothermal resources. In addition, even though individual states recognize the benefits of geothermal resources,[344] they must do more to foster geothermal development through regulatory reform. Lastly, because there has been little litigation on many of the issues discussed in this Comment, it is likely that developers are being cautious about the steps they take. Now is the time to address some of the unresolved issues regarding the development of geothermal resources.

343. *See supra* Part I.C.

344. For example, Colorado declares that "development of geothermal resources is in the public interest because it enhances local economies and provides an alternative to conventional fuel sources." COLO. REV. STAT. § 37-90.5-102(1)(a) (2010).

THE WATER TRANSFERS RULE: HOW AN EPA RULE THREATENS TO UNDERMINE THE CLEAN WATER ACT

CHRIS REAGEN*

Water transfer is a term that describes the movement of water from an area where water is available to another area where water is scarce. This process has enabled otherwise uninhabitable lands in the western United States to support large cities and agricultural districts. In Friends of the Everglades v. South Florida Water Management District*, the Eleventh Circuit upheld a rule that removed federal water quality restrictions on water transfers. This rule codified the Environmental Protection Agency (EPA) position that the National Pollution Discharge Elimination System (NPDES) requirement of the Clean Water Act (CWA) does not apply to water transfers that do not subject the water to an intervening use. The rule clarifies that a water transfer does not constitute an "addition" of a pollutant under the CWA that triggers the NPDES requirement. This is true even when the water source contains pollutants that the receiving body of water does not. In essence, the EPA's Water Transfers Rule adopted the highly controversial unitary waters theory.*

This Note explores the potential effects of the EPA's Water Transfers Rule and concludes that the current rule is untenable. It discusses the importance of water transfers in the western United States and how NPDES permits can limit the movement of water to areas where water is scarce. It then discusses complex water diversions that transfer water across state lines and proffers that federal oversight is necessary to control pollution that results from water diversions. Finally, this Note argues that the Water Transfers Rule should be replaced by a general NPDES permit system that balances the EPA's rule and an individual NPDES requirement for each water transfer.

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INTRODUCTION

The Environmental Protection Agency (EPA) recently promulgated a rule that is harming America's lakes and rivers by exposing them to contamination by means of water transfer. The Water Transfers Rule[1] exempts certain classes of water transfers from the National Pollutant Discharge Elimination System (NPDES), which limits and monitors pollutant discharges into bodies of water in the United States.[2] The NPDES program has been hailed as the centerpiece of the Clean Water Act (CWA).[3] But the EPA's rule significantly weakens the NPDES program because it exempts from the

1. National Pollutant Discharge Elimination System (NPDES) Water Transfers Rule, 73 Fed. Reg. 33,697 (June 13, 2008) (codified at 40 C.F.R. § 122.3(i) (2008)) [hereinafter Water Transfers Rule], *available at* http://edocket.access.gpo.gov/2008/pdf/E8-13360.pdf.

2. 33 U.S.C. § 1342 (2006).

3. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1225 (11th Cir. 2009).

permit requirement water transfers that move polluted water into clean water.[4] The Water Transfers Rule frustrates the CWA's purpose, undermines its statutory requirements, and threatens to undo its accomplishments in improved water quality.[5] Therefore, the EPA should replace this rule with a permit system that ensures that the Nation's waters are adequately protected.

The EPA promulgated its Water Transfers Rule in 2008 to clarify what type of water transfer triggers the NPDES requirement.[6] This rule exempts from the NPDES program water transfers that do not subject the water to intervening industrial, municipal, or commercial use.[7] This Note refers to these types of transfers as "pure water transfers." Under the EPA's rule, moving water from Point A to Point B does not require an NPDES permit unless the transferor actually introduces pollutants to the water during the transfer.[8] The rule mirrors the unitary waters theory.[9] Circuit courts have consistently rejected this theory every time it has been raised in litigation.[10] However, in *Friends of the Everglades v. South Florida Water Management District*, which was the first case to interpret the NPDES program after the EPA finalized its Water Transfers Rule, the Eleventh Circuit held that the rule was a reasonable interpretation of ambiguous statutory language in the CWA.[11] Accepting the EPA's rule, the Eleventh Circuit departed from previous circuit court holdings on the unitary waters theory. As a result, it is uncertain whether other jurisdictions will follow the Eleventh Circuit's lead in accepting the Water Transfers Rule.

The uncertain applicability of the NPDES program to pure water transfers has significant economic consequences, especially for the western United States.[12] In the West, states must divert massive amounts of water through a complex

4. Water Transfers Rule, *supra* note 1, at 33,699.
5. *Compare id. with* Clean Water Act, 33 U.S.C. §§ 1251–1387 (2006).
6. Water Transfers Rule, *supra* note 1, at 33,699.
7. 40 C.F.R. § 122.3(i) (2008).
8. *See id.*
9. *See* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1217 (11th Cir. 2009). For further discussion, see *infra* Part II.C.
10. *Friends*, 570 F.3d at 1217.
11. *Id.* at 1228.
12. *See* Brief for Town of Grand Lake, Colorado et al. as Amici Curiae Supporting Petitioners at 2, Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 131 S. Ct. 643 (2010) (mem.) (No. 10-196), 2010 WL 3611704, at *2 [hereinafter Brief for Grand Lake].

system of canals, tunnels, and ditches to meet the demands of growing cities[13] and agricultural regions.[14] Expensive diversion projects become even more costly if every point source discharging pollutants into the navigable waters must obtain an NPDES permit.[15] While it is important to limit the spread of pollution caused by water transfers, an over-inclusive NPDES program that requires a permit for every pollutant discharge is overly expensive.[16] Therefore, the EPA must find a way to strike a balance that protects water quality while limiting costs and administrative burden.

This Note examines the Water Transfers Rule, explains why it should be rejected, and concludes that a general NPDES permit system should replace the rule. Part I of this Note provides an overview of the CWA and the EPA's Water Transfers Rule. The purpose of the NPDES program and the disagreement over what constitutes an "addition" that triggers a permit is explained in Part I.A. Next, Part I.B recounts the situation that gave rise to the Water Transfers Rule and why the Eleventh Circuit accepted it. Part II introduces three reasons that the Water Transfers Rule should be rejected. Part II.A advocates that the CWA unambiguously requires NPDES permits for water transfers, and Part II.B introduces the Supreme Court's *Miccosukee* decision and argues that the Water Transfers Rule undermines the holding of that case. Next, the discussion turns to the unitary waters theory with

13. Heidi Hande, Comment, *Is the EPA's Unitary Waters Theory All Wet?*, 6 WYO. L. REV. 401, 402 (2006).

14. *See id.* For example, a series of complex water transfer projects have transformed California's once-dry Imperial Valley into a fertile agricultural region. *Id.* Water transfers can range from relatively simple conveyances directing a small amount of water over a short distance to very complex systems routing water hundreds of miles and across state lines. *Compare* one municipality transferring water between nearby reservoirs *with* interbasin water diversions such as the *Colorado-Big Thompson Project*, N. COLO. WATER CONSERVANCY DISTRICT, http://www.ncwcd.org/project_features/cbt_main.asp (last visited July 12, 2011) (purportedly "the largest transmountain water diversion project in Colorado"), *and California State Water Project and the Central Valley Project*, CAL. DEPARTMENT WATER RESOURCES, http://www.water.ca.gov/swp/cvp.cfm (last modified Apr. 29, 2008) ("one of the world's largest water storage and transport systems").

15. *See* Steven G. Davison, *Defining "Addition" of a Pollutant into Navigable Waters from a Point Source Under the Clean Water Act: The Questions Answered—and Those Not Answered—by* South Florida Water Management District v. Miccosukee Tribe of Indians, 16 FORDHAM ENVTL. L. REV. 1, 109 (2004).

16. *Id.* at 76–77.

Part II.C demonstrating how the theory is inconsistent with the CWA.

Part III shifts the focus toward the importance of water transfers in the West. In Part III.A, this Note reveals the negative effects that an over-inclusive NPDES program would have in the West, while Part III.B encourages some level of federal oversight to replace the Water Transfers Rule. This Note concludes that a general NPDES program is a possible solution that balances cost, administrative feasibility, and effectiveness.

I. THE EMERGENCE OF THE WATER TRANSFERS RULE

The CWA is the principal federal law regulating water pollution in the United States.[17] Congress enacted the CWA in 1972 partly in response to Ohio's Cuyahoga River catching on fire and partly to rectify harm to the quality of America's lakes, rivers, and streams caused by decades of industrialization.[18] The law's purpose is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[19] The statute proclaimed the lofty goal of eliminating the discharge of pollutants into the navigable waters of the United States by 1985.[20] Although this ambitious objective was not met, the statute has slowed the pollution of the Nation's waters by regulating certain types of pollutant discharges and prohibiting discharges in toxic quantities.[21] Perhaps the most significant mechanism contributing to the CWA's achievements is its National Pollution Discharge Elimination System.

A. The NPDES Program and Defining "Addition"

For over thirty years, America's water pollution policy has relied upon NPDES permits to limit pollutant discharges from

17. *See* 33 U.S.C. § 1251 (2006).

18. *See id.*; *see also* Kenneth M. Murchison, *Learning from More Than Five-and-a-Half Decades of Federal Water Pollution Control Legislation: Twenty Lessons for the Future*, 32 B.C. ENVTL. AFF. L. REV. 527, 585–86 (2005) (discussing the factors that prompted Congress to take a new approach to controlling water pollution).

19. 33 U.S.C. § 1251(a).

20. *Id.* § 1251(a)(1).

21. *Id.* § 1251(a)(7).

industrial and municipal sources.[22] Courts have repeatedly emphasized the importance of NPDES permits in federal water pollution control, referring to it as the "linchpin,"[23] "the centerpiece,"[24] and "the most important component of the [CWA]."[25] The NPDES program is the basic structure that regulates the discharge of pollutants from point sources[26] into the navigable waters of the United States.[27] NPDES limitations specify the quantity or concentration of certain pollutants that may be discharged from a point source.[28] A discharger is liable under the CWA if he does not comply with the NPDES permit,[29] which requires that the discharger meet pollutant limitations and monitoring requirements before the discharge is allowed.[30] The federal NPDES program is not the only layer of protection limiting pollutant discharges. The CWA also grants the states the power to issue water quality permits.[31] But federal NPDES permits can be used to control pollutants that are not covered by state permits. Together, state and federal permit systems are a simple and effective way to enforce pollution requirements and to identify illegal discharges.[32]

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22. Jeffrey M. Gaba, *Generally Illegal: NPDES General Permits Under the Clean Water Act*, 31 HARV. ENVTL. L. REV. 409, 410 (2007).

23. United States v. Puerto Rico, 721 F.2d 832, 834 (1st Cir. 1983).

24. Am. Iron & Steel Inst. v. Envtl. Prot. Agency, 115 F.3d 979, 990 (D.C. Cir. 1997).

25. Dubois v. U.S. Dep't of Agric., 102 F.3d 1273, 1294 (1st Cir. 1996).

26. A point source is "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants may be discharged. This term does not include agricultural stormwater discharges and return flows from irrigated agriculture." 33 U.S.C. § 1362(14).

27. "The term 'navigable waters' means the waters of the United States, including the territorial seas." *Id.* § 1362(7).

28. 33 U.S.C. § 1342(a)(1) (establishing the National Pollutant Discharge Elimination System). For the actual restrictions specifying the quantity or concentration of pollutants that may be discharged from a point source, see *id.* §§ 1311, 1312, 1316, 1317, 1318. For the definition of point source, see *id.* § 1362(14).

29. Gaba, *supra* note 22, at 460–61. Civil sanctions are available for inadequate permit plans. 33 U.S.C. § 1319(a)–(b). Criminal liability may be imposed for violations that include negligence and inadequately prepared plans. *See id.* § 1319(c)(1)(A).

30. 33 U.S.C. § 1342(a); *see also* 40 C.F.R. § 122.44 (2006) (setting criteria for "[e]stablishing limitations, standards and other permit conditions").

31. *Id.* § 1342(b).

32. Gaba, *supra* note 22, at 412.

Before Congress passed the modern CWA, the states had established their own water quality standards.[33] Because the states did not have a mechanism to monitor and limit point source discharges, the government faced the Herculean task of tracing in-stream pollution back to its discharger.[34] Therefore, it was extremely difficult to determine the source of polluted water.[35] The NPDES program ameliorated this difficulty by controlling pollutant discharges from point sources.[36] NPDES monitoring and reporting requirements enable the government to easily and efficiently maintain water quality standards.[37] However, the Water Transfers Rule jeopardizes this efficiency by exempting a significant class of water transfers from the NPDES program.

It is important to understand the clarifying purpose behind the EPA's promulgation of its Water Transfers Rule. The CWA prohibits "the discharge of any pollutant" subject to a few exceptions, one of which is when an NPDES permit is obtained.[38] The statute defines "discharge of a pollutant" as "any addition of any pollutant to navigable waters from any point source."[39] Most of these terms are also defined in the statute. "Navigable waters" is defined as "the waters of the United States."[40] This definition includes lakes, rivers, and streams that are navigable in fact.[41] The CWA defines "point source" as "any discernible, confined and discrete conveyance,

33. *Id.* at 413–14.

34. *Id.* at 414.

35. *Id.* (citing Jeffrey M. Gaba, *Federal Supervision of State Water Quality Standards Under the Clean Water Act*, 36 VAND. L. REV. 1167, 1178–79 (1983)).

36. *Id.* at 410.

37. *See id.*

38. 33 U.S.C. §§ 1311(a), 1342(a)(1) (2006).

39. *Id.* § 1362(12).

40. *Id.* § 1362(7).

41. 33 U.S.C. § 1362(7) defines navigable waters of the United States. This definition includes tributaries, interstate waters, and intrastate lakes, rivers, and streams (1) used for recreational or other purposes by interstate travelers, and (2) from which shellfish or fish are collected and sold in interstate commerce. 40 C.F.R. § 112.2 (2010); *see, e.g.*, Rapanos v. United States, 547 U.S. 715, 730–31 (2006) (plurality opinion) (stating that the term "navigable waters" includes only relatively permanent, standing, or flowing bodies of water); Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 171–74 (2001) (holding that the Corps' expansion of the definition of "navigable waters" to include intrastate waters used by migratory birds exceeded the authority granted to the Corps under the Clean Water Act); *Guidance to Identify Waters Protected by the Clean Water Act*, ENVTL. PROTECTION AGENCY, http://water.epa.gov/lawsregs/guidance/wetlands/CWAwaters_guidesum.cfm (last updated Apr. 27, 2011).

including but not limited to any pipe, ditch, channel, tunnel, conduit, [or] well . . . from which pollutants are or may be discharged."[42] The CWA, however, does not define "addition."[43]

Two competing interpretations of "addition" have emerged in CWA litigation: the unitary waters theory and the traditional approach. The unitary waters theory holds that an addition occurs only when a pollutant first enters the navigable waters from a point source.[44] An addition does not occur when polluted water is transferred between bodies of water, no matter the distance.[45] The Supreme Court used a metaphor to help explain the unitary waters theory: "[I]f one takes a ladle of soup from a pot, lifts it above the pot, and pours it back into the pot, one has not 'added' soup or anything else to the pot."[46] Because the "navigable waters" of the United States are considered one pot under this theory—rather than a number of separate pots—"[l]adling pollution from one navigable water to another does not add anything to the pot."[47] Therefore, an NPDES permit is required only when a pollutant first enters the water from a point source and not when polluted water is transferred between bodies of water.[48]

The alternative interpretation is the traditional approach, which holds that an "addition" occurs whenever polluted water is moved from one meaningfully distinct[49] body of water to another.[50] Under this approach, an NPDES permit is necessary to discharge pollutants into Lake A and also to transfer water from Lake A to a meaningfully distinct Lake B. However, if the bodies of water are not meaningfully distinct—for example, if

42. 33 U.S.C. § 1362(14).

43. 33 U.S.C. § 1362.

44. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1217 (11th Cir. 2009).

45. *Id.*

46. S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 110 (2004) (quoting Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York, 273 F.3d 481, 492 (2d Cir. 2001)).

47. *Friends*, 570 F.3d at 1217.

48. *Id.*

49. For example, canal water is meaningfully distinct from Lake Okeechobee if the evidence shows that the pollutants would not have entered the lake without the pumping. *See* Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *48–51 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

50. *See Miccosukee*, 541 U.S. at 102–03. For further discussion of *Miccosukee*, see *infra* Part II.B.

one lake occasionally floods into the other—then an NPDES permit is required only for the discharge into Lake A.[51]

Until the *Friends of the Everglades* decision, circuit courts had always chosen the traditional approach over the unitary waters theory.[52] The interpretation a court adopts can have severe environmental consequences because the traditional approach protects an individual body of water from pollutants more than the unitary waters theory. The CWA already excludes nonpoint source pollution from the NPDES requirement, which the EPA has recognized as the most significant source of water pollution in the country.[53] Yet the Water Transfers Rule expands this exclusion by holding that water transfers "convey[ing] or connect[ing] waters of the United States without subjecting the transferred water to intervening industrial, municipal, or commercial use" do not require NPDES permits because they do not constitute the "addition" of a pollutant.[54] Because the Water Transfers Rule embraces the unitary waters theory, the EPA has opened a regulatory hole in the CWA that jeopardizes the quality of the Nation's waters.

B. Accepting the EPA's Interpretation

The Eleventh Circuit was the first to interpret the EPA's Water Transfers Rule after it had been finalized. Finding the statutory language of the CWA ambiguous, the court held that the EPA's rule was a permissible construction of the ambiguous language.[55] While the court's holding applies only to the

51. *See* Priscillia de Muizon, Comment, *"Meaningfully Distinct" Waters, the Unitary Waters Theory, and the Clean Water Act:* Miccosukee v. South Florida Water Management District, 32 ECOLOGY L.Q. 417, 446–48 (2005).

52. For further discussion of the unitary waters theory, see *infra* Part II.C.

53. *Introduction to the Clean Water Act, Section 319: Nonpoint Source Program*, ENVTL. PROTECTION AGENCY, http://www.epa.gov/watertrain/cwa/cwa52.htm (last updated Sept. 12, 2008). "[M]ore than 40 percent of all impaired waters were affected solely by nonpoint sources, while only 10 percent of impairments were caused by point source discharges alone." *Id.* Examples of nonpoint sources include agricultural and silvacultural runoff, mining activities, construction activities, and pollutant disposal in wells. *See id.*; *see also* 33 U.S.C. § 1314(f)(A)–(D) (2006).

54. Water Transfers Rule, *supra* note 1, at 33,699.

55. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1228 (11th Cir. 2009); *see also* Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 842–45 (1984). For a regulation to be a reasonable construction of an ambiguous statute, *Chevron* deference requires that there be two or more reasonable ways to interpret the statute and that the regulation adopts one of

Eleventh Circuit, other jurisdictions may decide to follow suit. If so, the Water Transfers Rule will severely restrict what the Eleventh Circuit had previously recognized as the "centerpiece of the Clean Water Act."[56]

In *Friends of the Everglades*, the plaintiffs sought to enjoin the South Florida Water Management District (SFWMD) from pumping polluted canal water into Lake Okeechobee without first obtaining an NPDES permit.[57] South Florida's Lake Okeechobee is the second largest freshwater lake contained entirely within the continental United States.[58] With an average depth of only nine feet, Lake Okeechobee spans an area of approximately 730 square miles and is the liquid heart of the Everglades ecosystem.[59] Aside from its hydrological and ecological importance, it also functions as a reservoir, collecting and supplying water to the urban and agricultural regions of south Florida.[60] Historically, the lake's southern shoreline flooded during the rainy season, sending a shallow sheet of water across the surrounding wetlands and toward the Florida Bay.[61] Several flood control and water management projects were developed to provide flood protection and ensure a stable water supply for the millions of people inhabiting the flood plain.[62] The water management system includes a complex arrangement of canals and pump stations. At issue in *Friends of the Everglades* were the S-2, S-3, and S-4 pump stations at the south end of the lake that pumped canal water sixty feet uphill into Lake Okeechobee.[63]

The pump stations are diversion facilities that change the movement, flow, and circulation of the canal water that they

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them. If the regulation is a reasonable construction of an ambiguous statute, then it is entitled to *Chevron* deference. *See id.* In *Friends of the Everglades*, the EPA promulgated its water transfers rule after it lost its case in federal district court. *See Friends*, 570 F.3d at 1218. However, it did not matter whether the regulation was proposed and issued after the beginning of a lawsuit or that it was a dramatic shift in agency policy. *Id.* at 1219.

56. *Friends*, 570 F.3d at 1225.

57. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *1 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

58. *Id.* at *7.

59. *Id.*

60. *Id.* at *8.

61. *Friends*, 570 F.3d at 1214.

62. *Id.*

63. *Id.*

control.[64] While operating, they do not introduce pollutants into the water.[65] The primary purpose of pumping is to protect the surrounding communities and agricultural areas from flooding, but pumping occasionally occurs for water supply purposes as well.[66] By pumping the water into the lake, SFWMD has artificially added over 400 square miles to the lake's watershed, all of which would have drained elsewhere under natural conditions.[67] At full capacity, the flow rate from just one pump station is comparable to the flow of a medium-sized river.[68] While operating at full capacity, the three pump stations can introduce large quantities of canal water and significantly alter the chemical composition of Lake Okeechobee.[69]

It is indisputable that introducing canal water adversely affected Lake Okeechobee.[70] These canals collect runoff from surrounding agricultural, industrial, and residential areas, and canal water is polluted with noxious contaminants, including nitrogen, phosphorous, un-ionized ammonia, and other chemicals.[71] As expected, the lake's water quality is generally better than the water quality in the surrounding canals.[72] But when the canal water is pumped into Lake Okeechobee, it introduces heavy metals and pesticides that would not have otherwise entered the lake.[73] Before pumping began, the State of Florida designated the lake as a potable water supply.[74] Presently, the pumping has impaired the water to such a degree that the lake can no longer meet its designated uses.[75]

64. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *13 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

65. *Id.*

66. *Id.* at *15.

67. *Id.* at *13.

68. *Id.* at *14.

69. *See id.* at *14–21.

70. *Id.* at *15.

71. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1214 (11th Cir. 2009).

72. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *20 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

73. *Id.* at *17.

74. *Id.* at *19.

75. *Id.* at *22.

Hoping to prevent further deterioration of the lake, Friends of the Everglades (FOE), an organization of over 6,000 members seeking to preserve and protect the Everglades, filed suit against SFWMD on April 8, 2002.[76] The citizen suit sought to require SFWMD to obtain an NPDES permit before it could discharge polluted canal water into Lake Okeechobee via S-2, S-3, and S-4 pump stations.[77] After the United States Supreme Court granted certiorari in a related case, *South Florida Water Management District v. Miccosukee Tribe of Indians of Florida*, all proceedings in *Friends of the Everglades* were stayed.[78] Following the Supreme Court's decision in *Miccosukee*,[79] the Court granted SFWMD's motion to reopen the case in 2005, and a Florida district court heard the case in early 2006.[80]

One of the issues for the Florida district court to determine was whether an NPDES permit was required for the S-2, S-3, and S-4 pump stations to pump polluted water into Lake Okeechobee.[81] Intervening on behalf of SFWMD, the United States argued that NPDES permits were not necessary because the pump stations transferred water without subjecting the water to intervening industrial, municipal, or commercial use.[82] The United States pointed to the EPA's proposed Water

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76. *Id.* at *1.

77. *Id.* The "citizen suits" provision of the CWA established jurisdiction. 33 U.S.C. § 1365(a) (2006). Section 1365(a) provides, in part, that any citizen may commence a civil action against any person (including the United States or any governmental agency) who is alleged to be violating an effluent limitation or standard under the CWA, or against the EPA for an alleged failure to perform any act or duty under the CWA.

78. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *2 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

79. *See infra* Part II.B.

80. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *2 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

81. Miccosukee Tribe of Indians of Fla. v. S. Fla. Water Mgmt. Dist., 559 F.3d 1191, 1194 (11th Cir. 2009).

82. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *34 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009). The United States intervened on behalf of the U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency on May 2, 2005, arguing that it

> had a compelling interest in the litigation because for decades the Corps had been building a comprehensive network of levees, water storage areas, pumps and canal improvements in South Florida . . . .

Transfers Rule (it was not finalized until 2008), which would exclude pure water transfers from the NPDES program.[83] Because the rule was merely a proposal, the court was not required to defer to the EPA's interpretation.[84] Concluding that the EPA's proposed rule offered no substantive explanation to support its strained definition of "addition," the court found "that 'addition . . . to the waters of the United States' contemplates an addition from anywhere outside of the receiving water, including from another body of water."[85] Next, the court needed to determine whether the canals were meaningfully distinct from Lake Okeechobee.[86] Basing its analysis on ten factors, the court found that the canals were meaningfully distinct from the lake and held that continued pumping of canal water into Lake Okeechobee would require an NPDES permit.[87]

> As for the EPA, that agency administers the NPDES permitting program in conjunction with the states, including Florida, that have assumed responsibility for issuing permits within their borders under 33 U.S.C. § 1342.

Id. at *2.

83. *Id.* at *34.

84. *Id.* at *47–48.

85. *Id.* at *42 (alteration in original). " 'Addition' is defined as the 'joining of one thing to another.' " *Id.* (quoting WEBSTER'S THIRD INTERNATIONAL DICTIONARY UNABRIDGED 24 (1993)); *see also* Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York, 451 F.3d 77, 84 (2d. Cir. 2006) (finding that defendants' arguments "simply overlook [the CWA's] plain language"); Miccosukee Tribe of Indians of Fla. v. S. Fla. Water Mgmt. Dist., 280 F.3d 1364, 1368 (11th Cir. 2002), *vacated sub nom.* S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95 (2004) ("[I]n determining whether pollutants are added to navigable waters for purposes of the CWA, the receiving body of water is the relevant body of navigable water.").

86. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *32, *48 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

87. *Id.* at *48–51. The factors included:

> (1) [T]he waters are separated by a physical barrier (the Dike); (2) historically, water generally flowed south from the Lake (in the system's natural state); (3) today, water also generally continues to flow south; (4) there are chemical differences between the Lake and the canals; (5) there are biological differences between the Lake and the canals; (6) the canals are man-made and were cut into bedrock, while the Lake is a natural bowl-shaped water body; (7) when water enters the Lake *via* backpumping, a visible plume may be observed; (8) backpumping canal water into the Lake has a negative impact upon the Lake; (9) the waters are classified differently under the CWA (the Lake is a Class I water body and the canals are Class III water bodies); and (10) the waters that are backpumped into the

When the Eleventh Circuit heard the case on appeal in 2008, the EPA had codified its proposed Water Transfers Rule that the Florida district court had rejected. Because the EPA had not finalized its Water Transfers Rule when the district court made its findings, the Eleventh Circuit reviewed the case *de novo*.[88] One of the issues on appeal was the district court's requirement that SFWMD obtain an NPDES permit to continue pumping canal water into Lake Okeechobee.[89] While FOE contended that the water transfer triggered the NPDES requirement, SFWMD argued that the EPA's Water Transfers Rule exempted its pumping from the NPDES requirement.[90] The Eleventh Circuit was the first circuit court to address the statutory language "addition . . . to navigable waters" in light of the EPA's recently promulgated rule.[91] Therefore, it needed to determine whether the statutory language was ambiguous.[92]

When a case involves an agency's interpretation of a statute that the agency administers, *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.* is applied. *Chevron* established a two-step approach for a court to determine whether it must defer to an agency's interpretation.[93] If Congress expressly addressed the question at issue, then the statute is not ambiguous and the court must give effect to the intent of Congress.[94] If the court finds the statute to be silent or ambiguous on the question at issue, it must defer to the agency's interpretation unless the interpretation is procedurally defective, substantively capricious, or manifestly contrary to the statute.[95]

The Eleventh Circuit held that "addition . . . to navigable waters" was ambiguous because both FOE and the EPA offered reasonable interpretations.[96] Surveying the usage of "navigable

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> Lake would not otherwise reach the Lake (in any significant amount, much less in the same quantities) but for the backpumping activities.

Id. at *50.

88. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1217 (11th Cir. 2009).

89. *Id.* at 1216.

90. *See id.* at 1218–20.

91. *Id.* at 1218.

92. *Id.*

93. Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc., 467 U.S. 837, 842–43 (1984).

94. *Id.*

95. *Id.* at 844.

96. *Friends*, 570 F.3d at 1223.

waters" throughout the CWA and other water protection statutes, the court found that "[a]lthough Congress did use the term 'any navigable waters' in the Clean Water Act to protect individual water bodies, it also used the unmodified 'navigable waters' to mean the same thing."[97]

Despite reservations about the rule's environmental effects, the Eleventh Circuit upheld the Water Transfers Rule.[98] The court prefaced its decision by stating that the EPA's construction might not be the reading the court would have reached had the question initially arisen in a judicial proceeding.[99] Although the court agreed that FOE's interpretation supported the statutory purpose of the CWA, it rejected that position because the court was not authorized to "rewrite, revise, modify, or amend statutory language" while interpreting a statute.[100] Once the court found that the EPA's rule was a reasonable interpretation of an ambiguous statute, it was forced to accept the Water Transfers Rule.[101]

To simplify the EPA's rule, the Eleventh Circuit developed a hypothetical rule that removed the controversial environmental consequences. Its hypothetical, however, inadvertently illustrated the incompatibility between the Water Transfers Rule and the commonsense understanding of the term "addition."[102] The court's rule prohibited "any addition of any marbles to buckets by any person."[103] Accordingly, the court asked: If there were two buckets, one empty and the other containing four marbles, and a person moved the marbles so that there were two marbles per bucket, have any marbles been added to the buckets?[104] Although FOE would argue that placing two marbles into the empty bucket is an addition, the Water Transfers Rule states that it is not because the marbles were already in one bucket.[105] Just as the second bucket was empty until the marbles were added, polluted water transferred into a clean body of water should constitute an

97. *Id.* at 1225.
98. *Id.* at 1227–28.
99. *Id.*
100. *Id.* at 1224 (quoting Nguyen v. United States, 556 F.3d 1244, 1256 (11th Cir. 2009)).
101. *Id.* at 1228.
102. *See id.*
103. *Id.*
104. *Id.*
105. *Id.*

addition. Such a scenario should trigger the NPDES requirement.

The court's hypothetical rule also reveals the inconsistency between the Water Transfers Rule and the CWA's purpose. By permitting the transfer of polluted water without attaching federal water quality limitations, the Water Transfers Rule will undermine the progress made under the CWA. While the rule might make sense if the bodies of water are connected, it seems foolish when water is transferred from Colorado to California. Therefore, the Water Transfers Rule should be rejected and replaced with a more practical rule that maintains federal oversight of water transfers.

II. WHY THE WATER TRANSFERS RULE SHOULD BE REJECTED

The Water Transfers Rule will facilitate the spread of polluted water across the United States by exempting pure water transfers from federal oversight. This rule undermines enforcement under the CWA and should be rejected for the following reasons: First, the CWA is unambiguous in its requirement that water transferors must obtain NPDES permits before transferring water. Thus, the Eleventh Circuit erred in finding that the statutory language was ambiguous. Second, the rule disregards the Supreme Court's requirement that water transferors must acquire NPDES permits if the water is transferred between meaningfully distinct bodies of water.[106] Finally, the Water Transfers Rule parallels the unitary waters theory, which perverts the common understanding of "addition" and is antipodal to the CWA.

A. The CWA's NPDES Requirement Is Not Ambiguous

The Eleventh Circuit should have rejected the EPA's Water Transfers Rule because Congress intended that a water transferor obtain an NPDES permit before discharging pollutants. The statutory language reflects this intent in its unambiguous NPDES requirement for the discharge of any pollutant to navigable waters from a point source.[107] By

106. *See* S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 112 (2004).

107. *See* Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *36 (S.D. Fla. Dec. 11, 2006), *rev'd in part,*

focusing on "navigable waters" instead of "any addition," however, the Eleventh Circuit found ambiguity where it does not exist. As a result, the *Friends of the Everglades* court accepted a rule that substantively changes the CWA under the pretense of clarification.

In its *Chevron* analysis, the *Friends of the Everglades* court mistakenly focused on the term "navigable waters" instead of the plain meaning of "any addition." The two parties disagreed whether a water transfer constituted an "addition" of a pollutant, not whether the canals or the lake were "navigable waters of the United States."[108] "Navigable waters" is simply a jurisdictional term identifying those bodies of water subject to federal regulation.[109] Other courts have found that the term "any addition" "unambiguously means that permits are required whenever there is something added to a body of 'navigable waters' " from another meaningfully distinct body of water.[110] The Eleventh Circuit should have followed its sister circuit courts and focused its attention on whether "any addition" was ambiguous; instead, it misdirected its analysis by focusing on whether "navigable waters" meant "any navigable waters" or "navigable waters" as a whole.[111] By ignoring the plain meaning of the term "any addition" and focusing on "navigable waters," the Eleventh Circuit found ambiguity where it did not exist.

The Eleventh Circuit's misguided analysis compelled it to accept a rule that substantively changed the CWA under the guise of clarification. Not only does the Water Transfers Rule facilitate the transfer of polluted water throughout the Nation, but it also eliminates a means to fight water quality degradation.[112] Without the NPDES program for pure water transfers, concerned citizens can no longer sue to require

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appeal dismissed in part sub nom. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

108. *Friends*, 570 F.3d at 1216–18.

109. *See* Petition for Writ of Certiorari at 18, Miccosukee Tribe of Indians of Fla. v. S. Fla. Water Mgmt. Dist., 131 S. Ct. 645 (2010) (mem.) (No. 10-252), 2010 WL 3318307, at *18; *see also* Rapanos v. United States, 547 U.S. 715, 730–31 (2006) (plurality opinion) (discussing the jurisdictional significance and scope of "navigable waters").

110. Petition for Writ of Certiorari, *supra* note 109, at 17; *see also* Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York, 273 F.3d 481, 492 (2d Cir. 2001).

111. *Friends*, 570 F.3d at 1223–27.

112. *See* Brief for Grand Lake, *supra* note 12, at 15.

NPDES permits.[113] While most states have established their own permit requirements for water transfers, some have relied on NPDES permits either entirely or in part.[114] Pennsylvania, for example, has routinely required NPDES permits for interbasin water transfers since 1986.[115] Other states have required NPDES permits for transfers associated with anything from the expansion of a ski resort to the supply of drinking water.[116] After the EPA finalized its Water Transfers Rule, states may no longer rely upon the NPDES program in lieu of state permits to regulate pure water transfers. As a result, the EPA's rule has severely limited an important tool available to concerned citizens and states.

B. The Water Transfers Rule Undermines Supreme Court Precedent

The Water Transfers Rule also subverts the Supreme Court's holding that NPDES permits are required when water is transferred between meaningfully distinct bodies of water.[117] In *Miccosukee*, the Supreme Court held that the CWA requires an NPDES permit for the "discharge of a pollutant" from a point source into a meaningfully distinct body of water *even if* that source does not itself generate the pollutant.[118] But under the Water Transfers Rule, NPDES permits are required only if the point source subjects the water to "intervening industrial, municipal, or commercial use."[119] The Water Transfers Rule does not account for whether the bodies of water are meaningfully distinct. Therefore, the EPA's rule is inconsistent with the *Miccosukee* Court's holding.

The *Miccosukee* Court considered a question nearly identical to the one addressed by the *Friends of the Everglades* court: whether NPDES permits were necessary for SFWMD to

113. *See id.* at 17.

114. *See* ENVIRONMENTAL PROTECTION AGENCY, STATE NPDES PROGRAM AUTHORITY, *available at* http://www.epa.gov/npdes/images/State_NPDES_Prog_Auth.pdf.

115. *See* Petition for Writ of Certiorari at 14–18, S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95 (2004) (No. 02-626), 2003 WL 22793537, at *14–18.

116. *See, e.g.*, Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York, 273 F.3d 481, 492–93 (2d Cir. 2001); Dubois v. U.S. Dep't of Agric., 102 F.3d 1273, 1299 (1st Cir. 1996).

117. *See Miccosukee*, 541 U.S. at 105–12.

118. *Id.* at 105.

119. Water Transfers Rule, *supra* note 1, at 33,697.

pump water into Lake Okeechobee.[120] While the *Friends of the Everglades* court was concerned with the S-2, S-3, and S-4 pump stations, the *Miccosukee* Court dealt with the S-9 pump station.[121] It held that water transfers require NPDES permits only if they transferred polluted water between *meaningfully distinct* bodies of water.[122] Supporting its position, the Court looked to the CWA's definition of point source, "mak[ing] plain that a point source need not be the original source of the pollutant; it need only convey the pollutant to 'navigable waters,' which are, in turn, defined as 'the waters of the United States.' "[123] Unfortunately, the record was not developed enough to determine whether the canal water pumped by the S-9 station was meaningfully distinct from the lake.[124] Therefore, the Court did not address whether an NPDES permit is required when the bodies of water are not meaningfully distinct.[125] But the Water Transfers Rule has codified the same argument that the Supreme Court rejected.

Although the Court also addressed the unitary waters theory, it declined to rule on its validity because neither party raised the theory before the Eleventh Circuit or in briefing for certiorari.[126] Despite not ruling on the theory, the Court noted that "several NPDES provisions might be read to suggest a view contrary to the unitary waters approach."[127] Thus, it found that the argument that the NPDES program applies to

120. *See Miccosukee*, 541 U.S. at 103.

121. Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *33, *37 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

122. *Miccosukee*, 541 U.S. at 112.

123. *Id.* at 105 (citing 33 U.S.C. § 1362 (2000)).

124. *Id.* at 111.

125. *Id.*

126. *Id.* at 109.

127. *Id.* at 107. The Court continued:

> For example, under the Act, a State may set individualized ambient water quality standards by taking into consideration "the designated uses of the navigable waters involved." Those water quality standards, in turn, directly affect local NPDES permits; if standard permit conditions fail to achieve the water quality goals for a given water body, the State must determine the total pollutant load that the water body can sustain and then allocate that load among the permit holders who discharge to the water body. This approach suggests that the Act protects individual water bodies as well as the "waters of the United States" as a whole.

Id. (citations omitted).

point sources only when a pollutant originates from that point source and not when pollutants that originated elsewhere merely pass through the point source was "untenable."[128] While the *Miccosukee* Court remanded the case to the district court to determine if the waters were distinct, it hinted that an NPDES permit would be required if two bodies of water are "meaningfully distinct" and the pollutant would not enter the receiving body of water but for the point source.[129] Based on the *Miccosukee* Court's unfavorable reception of the theory, it seems unlikely that the Supreme Court would favorably view a rule that parallels the unitary waters theory.

C. The Unitary Waters Theory: An Impediment to Clean Water

The unitary waters theory is antithetical to the very purpose of the CWA. The circuit courts have recognized this incongruity, as the theory has repeatedly struck out when raised before them.[130] "Even the Supreme Court has called a strike or two on the theory, stating in *Miccosukee* that 'several NPDES provisions might be read to suggest a view contrary to the unitary waters approach.' "[131] Despite the theory's poor track record, the EPA based its Water Transfers Rule on it anyway. But even if the EPA decides to recant its rule, the theory continues to be an insidious threat to the Nation's waters. Therefore, the Supreme Court should deliver the theory's third and final strike.

Until the EPA embraced the theory in its Water Transfers Rule, the unitary waters theory was rejected by every circuit court that had addressed it.[132] The Second Circuit held that "the transfer of water containing pollutants from one body of water to another, distinct body of water is plainly an addition

128. *Id.* at 104–05.

129. *See id.* at 112. "After reviewing the full record, it is possible that the District Court will conclude that C-11 and WCA-3 are *not* meaningfully distinct water bodies. If it does so, then the S-9 pump station will not need an NPDES permit." *Id.* (emphasis added).

130. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1217–18 (11th Cir. 2009).

131. *Id.* at 1218 (quoting S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 107 (2004)).

132. *See id.* at 1217.

and thus a 'discharge' that demands an NPDES permit."[133] In *Dubois v. U.S. Department of Agriculture*, the First Circuit declared that "[t]here is no basis in law or fact for the district court's 'singular entity' [unitary waters] theory."[134] The Ninth Circuit rejected a similar argument when it recognized that transporting water between water bodies *could* violate the CWA.[135] Even the Supreme Court in *Miccosukee* effectively dismissed it by suggesting that the CWA protects both individual water bodies and the waters of the United States as a whole.[136]

Yet the EPA adopted the unitary waters theory in its rule. As a result, the Water Transfers Rule has created a gaping regulatory hole that frustrates the CWA's purpose and jeopardizes the federal government's ability to ensure that water quality standards are achieved and maintained.[137] Congress declared that the CWA's purpose is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[138] However, both the unitary waters theory and the Water Transfers Rule are antithetical to this goal because they facilitate the spread of pollutants by severely restricting the NPDES program.

NPDES permits can play an important role in limiting the spread of nonpoint source pollution. For example, in Montana a coal bed methane extraction operation was pumping saline groundwater containing chemical constituents that EPA regulations had identified as pollutants, and discharging it into a river.[139] The saline groundwater degraded the river water so much that it was unfit for irrigation.[140] If Montana transferred

133. Catskill Mountains Chapter of Trout Unlimited, Inc. v. City of New York, 273 F.3d 481, 491 (2d Cir. 2001).

134. Dubois v. U.S. Dep't of Agric., 102 F.3d 1273, 1296 (1st Cir. 1996). In *Dubois*, the First Circuit needed to determine whether withdrawing water from two meaningfully distinct bodies of water for snowmaking activities and then depositing all of the water, which contained pollutants, back into one body of water required an NPDES permit. *Id.*

135. N. Plains Res. Council v. Fid. Exploration & Dev. Co., 325 F.3d 1155, 1163 (9th Cir. 2003).

136. S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 107 (2004).

137. *See* 33 U.S.C. § 1251(a) (2006).

138. *Id.*

139. *N. Plains Res. Council*, 325 F.3d at 1157.

140. *Id.* at 1163. The groundwater had a high Sodium Absorption Ratio (SAR), which measures the water's ratio of sodium to calcium and magnesium. The SAR of the water discharged into the Tongue River was between forty to sixty times greater than the Tongue River's SAR. *Id.* at 1158. As the court noted:

that water to other rivers and lakes for mining purposes, it would pollute other bodies of water within the state. Requiring NPDES permits for pure water transfers can limit the spread of pollutants already introduced by nonpoint sources.[141] Exempting pure water transfers from the NPDES requirement eliminates a federal check on nonpoint source pollution.

Invalidating the unitary waters theory will enable the CWA to function as Congress intended. NPDES permits are especially powerful when pollutants are not discharged into the water but are naturally occurring instead. Under the unitary waters theory, however, federal permits are not required to transfer these pollutants.[142] By adopting the unitary waters theory in its Water Transfers Rule, the EPA has punctured the CWA and facilitated the spread of nonpoint source pollution through water transfers. Therefore, if presented with the opportunity, the Supreme Court should find that the unitary waters theory is an improper interpretation of the CWA.

Alternatively, mandating NPDES permits for all water transfers will produce just as absurd a result as the current Water Transfers Rule. While requiring NPDES permits for every discharge would certainly improve the quality of the Nation's "navigable waters," the cost of compliance and the administrative burden might make this impractical. Such an

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> Farmers who use water from the Tongue River for irrigation are concerned with the "saltiness" and high SAR of [coal bed methane (CBM)] water because of the potential hazards these characteristics pose to soil structure. High SAR water, such as CBM water, causes soil particles to unbind and disperse, destroying soil structure and reducing or eliminating the ability of the soil to drain water. The Montana Department of Environmental Quality (MDEQ), in a Final Environmental Impact Statement analyzing coal bed methane extraction, warns that "clayey" soil, like that in the Tongue River Valley, is vulnerable to damage from high SAR water. Fidelity's soil expert concluded that "the SAR of CBM water creates a permeability hazard and precludes its use for irrigation without mixing, treatment or addition of soil amendments." The MDEQ cautioned that unregulated discharge of CBM water would cause "[s]urface water quality in some watersheds [to] be slightly to severely degraded, resulting in restricted downstream use of some waters."

Id. (second and third alterations in original) (citation omitted).

141. *See* Brief for Grand Lake, *supra* note 12, at 17–18; *see also* Sara Colangelo, Comment, *Transforming Water Transfers: The Evolution of Water Transfer Case Law and the NPDES Water Transfers Proposed Rule*, 35 ECOLOGY L.Q. 107, 140 (2008).

142. *See* discussion *supra* Part I.A.

over-inclusive NPDES requirement would devastate economies dependent on water transfers, especially in the West. While the NPDES program should limit and monitor the spread of pollutants, its requirement should also be cost-effective and administratively feasible. Therefore, if the Water Transfers Rule is changed, a balance must be struck between protecting the Nation's waters and promoting feasibility and efficiency.

III. WATER TRANSFERS IN THE WEST

The economic well-being of the West is deeply interwoven with the ability to transfer water over great distances.[143] Generally arid, much of the West receives fewer than ten inches of precipitation per year.[144] This is significantly less than the thirty inches of annual precipitation necessary to sustain non-irrigated agriculture.[145] Yet the West also hosts both large agricultural centers and urban areas.[146] These farms and cities often rely on a conveyance that transfers water vast distances and through many point sources and bodies of water before the water is finally used.[147] Therefore, any change to the Water Transfers Rule must consider the West's heavy dependence on water transfers.[148]

Most of the precipitation that does fall in the West falls as snow. The water must be captured when and where the snow melts, often in mountainous areas far from the major urban and agricultural districts that depend upon the water.[149] "[T]he majority of the precipitation in the seven-state Colorado River basin, an area encompassing 250,000 square miles, falls as snow on land at elevations above 9,000 feet—just five percent

143. *See* Colangelo, *supra* note 141, at 11; *see also* Jedidiah Brewer et al., *Transferring Water in the American West: 1987–2005*, 40 U. MICH. J.L. REFORM 1021, 1021–25 (2007).

144. Janet C. Neuman, *Drought Proofing Water Law*, 7 U. DENV. WATER L. REV. 92, 93 (2003).

145. Brief for Colorado et al. as Amici Curiae Supporting Respondents at 2–3, *Friends*, 570 F.3d 1210 (2009), Nos. 10-196, 10-252, 2010 WL 4232627, at *2–3 (11th Cir. Oct. 22, 2010) [hereinafter Brief for Colorado].

146. *See id.* at 3.

147. *See infra* note 153 and accompanying text for discussion of the Colorado-Big Thompson project.

148. *See* Brief for City & County of Denver et al. as Amici Curiae Supporting Respondents at 1, Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 131 S. Ct. 645 (2010) (mem.) (No. 10-196), 2010 WL 4255028, at *1 [hereinafter Brief for Denver].

149. Brief for Colorado, *supra* note 145, at 1.

of the basin's land area."[150] As spring arrives in the mountains, snowmelt revives the ephemeral streams that permeate the West. Thus, spring runoff in the West is the major water supply. Because this runoff can occur in remote areas far from the thirsty agricultural and urban areas, many western states have developed complex diversion projects that bring water over vast distances.[151] These elaborate water transfers enable many important agricultural regions to grow crops and supply water to many of the West's great cities including Albuquerque, Cheyenne, Colorado Springs, Denver, Los Angeles, Las Vegas, Phoenix, Reno, Salt Lake City, San Diego, San Francisco, Santa Fe, Seattle, and Tucson.[152]

But these water transfers, which are so essential to the West's economic well-being, can also harm its lakes and rivers by introducing pollutants from distant regions. While NPDES permits can limit the spread of these pollutants, each permit comes with substantial financial and administrative costs. An NPDES permit for each point source discharging pollutants would limit and monitor much of the contamination resulting from a water transfer. But complying with such a requirement might prove too costly, burdensome, or even futile for larger water diversions. Some complex diversions in the West integrate many point sources into multiple lakes and rivers.[153] Ensuring NPDES limitations are met at each point source discharging pollutants would result in the same transferor complying with a number of limitations that might vary significantly by point source. Furthermore, the high cost of compliance might overwhelm an individual transferor such as an agribusiness, a city, or a small town. Nevertheless, exempting pure water transfers from the NPDES program

150. Brief for Denver, *supra* note 148, at 1–2.

151. *See id.*

152. Brief for Colorado, *supra* note 145, at 3.

153. *See* Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *30 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009). The Central Utah Project's Bonneville Unit includes ten reservoirs and a complex system of canals, pipelines, and tunnels to transport water from the Colorado River. The Colorado-Big Thompson Project often relies on pumps as the primary means of diverting water from the western slope of the Continental Divide to the eastern slope. This project's primary purpose is to provide irrigation water, to supply municipal water, and to generate hydroelectric power. The Fryingpan-Arkansas Project transports water through a series of conveyances and utilizes pumps in doing so. *Id.*

cannot be tolerated at a time when the West is importing more water from distant areas. Therefore, the EPA should find a balance between an over-inclusive NPDES permit requirement and the current Water Transfers Rule.

A. The Effects of NPDES Permits on Water Transfers in the West

Western states have increasingly turned to complex water diversions that transfer water vast distances through many point sources to solve the problem of declining water supply and increased urban demand.[154] Although an over-inclusive NPDES requirement might lead to cleaner water, compliance costs would be so severe that it would limit these transfers and impede the West's growth. Mandating a permit for each point source discharging pollutants might be prohibitively expensive and dissuade states from undertaking future diversion projects.

The scarcity of water in the West has forced many western states to rely on complex water diversions to import water from rural areas to regions with high urban demand.[155] For example, approximately 229 billion gallons of water are moved from the Upper Colorado River Basin to other basins in Colorado and other states through at least thirty-six major water diversions.[156] One example of such a diversion is the Bureau of Reclamation's Colorado-Big Thompson (C-BT) Project, which transports water across the Continental Divide to the more populated eastern slope.[157] Together, gravity and three pump stations push the water through two tunnels and nine canals and then into and out of at least seventeen different water bodies.[158] Treating polluted water every time it is discharged from a point source could raise the cost of treating C-BT water so much that it would exceed $315 million,

154. *See id.* at *30–31; *see also* Laura A. Schroeder & Kendall A. Woodcock, *Turbid Waters: The Interaction Between Interbasin Transfers and the Clean Water Act*, NEV. LAW., Jan. 2011, at 12, *available at* http://documents.scribd.com.s3.amazonaws.com/docs/96dbnq8r7k102qrs.pdf?t=1307941552.

155. Water is "imported" through conveyances, or water transfers, which "may be as simple as the diversion of water from a river into an adjacent (but hydrologically separate) stream for irrigation of a nearby field, or as complex as the interstate San Juan-Chama Project, which transfers water across the Continental Divide and across the Colorado-New Mexico state line." Brief for Colorado, *supra* note 145, at 2–3.

156. *Id.* at 2.

157. Brief for Denver, *supra* note 148, at 13.

158. *Id.*

double the cost of the project itself.[159] Requiring individual NPDES permits for each point source in complex water diversions such as the C-BT Project would dissuade planners from constructing future projects if compliance costs are prohibitively expensive.[160]

An over-inclusive NPDES program would also burden the West immensely by forcing states to monitor and treat naturally occurring pollutants. Spring runoff erodes Colorado's mineralized mountains, carrying particles of soil and sediment downstream into canals and ditches.[161] Treating these natural pollutants at every point source would be expensive and impractical. In order to treat the water, municipalities or states would have to construct million dollar treatment facilities.[162] But these "expensive treatment plants would operate for just a few weeks or months because water is usually available for transfer only during snowmelt (fifty percent of mountain stream flow occurs in just three months: May, June, and July)."[163] Therefore, treating spring runoff might be an inefficient use of limited state resources.

Western states must plan complex water diversion projects years in advance to meet future demand.[164] For example, the city of Thornton, Colorado, has estimated that full development of its Northern Project will cost roughly $427 million in order to meet the city's water demand through the year 2031.[165] The uncertain future of the NPDES program might dissuade cities like Thornton from undertaking costly new water diversion projects. While the EPA's current rule exempts water transfers from NPDES requirements, future court challenges may limit or reverse this rule. Although the EPA rule reaffirms the rights of states to conduct these transfers, the fact that its underlying theory has been rejected by a number of circuit courts has left many states uncertain as to the rule's long-term viability.[166] Adding to this uncertainty, the EPA has been reconsidering its

159. *Id.*
160. *See* S. Fla. Water Mgmt. Dist. v. Miccosukee Tribe of Indians, 541 U.S. 95, 108 (2004).
161. Brief for Denver, *supra* note 148, at 11–12.
162. *See id.* at 12–13.
163. *Id.* at 13.
164. *See, e.g.*, City of Thornton v. Bijou Irrigation Co., 926 P.2d 1, 20–21 (Colo. 1996).
165. *Id.* at 21.
166. Brief for Colorado, *supra* note 145, at 5–6.

Water Transfers Rule.[167] If the EPA decides to keep the current rule, Congress or the courts may override the EPA's rule and require NPDES permits for water transfers. Therefore, either Congress should provide clarity by amending the CWA's NPDES requirement, or the Supreme Court should decide the validity of the unitary waters theory or the Water Transfers Rule.

B. A World Without NPDES Permits

While the costs of an over-inclusive NPDES program are high, an under-inclusive or non-existent program will produce more harm than good. NPDES permits are an important tool that citizens can use to limit pollutant discharges.[168] Section 301(a) of the CWA enables citizens to sue a discharger to force it to obtain an NPDES permit before it continues discharging pollutants.[169] Regrettably, the current Water Transfers Rule has eliminated the ability to bring a citizen suit for pollutant discharges from water transfers.[170] Under the current Water Transfers Rule, FOE would be unable to bring another suit to require NPDES permits if it discovered that other pumps were transferring pollutants into the lake, even if the Eleventh Circuit agreed that SFWMD pumps were introducing pollutants into Lake Okeechobee.[171] Although this rule might eliminate some vexatious lawsuits, its sweeping effect will foreclose many bona fide lawsuits as well.

Citizen suits are especially useful in the West. With a high demand and limited water supply, the West is increasingly relying on large water diversion projects that transfer water across state boundaries and through multiple point sources and water bodies.[172] Because these diversions are complex, state regulators may overlook the pollutant discharges into some

167. *Id.* at 6 n.3.

168. *See* Gaba, *supra* note 22, at 418–19.

169. 33 U.S.C. § 1365(a)(1) (2006).

170. *See* Brief for Grand Lake, *supra* note 12, at 17; *see also* Gaba, *supra* note 22, at 419. Ironically, the EPA enacted its rule as a result of a citizen suit. *See* Friends of the Everglades, Inc. v. S. Fla. Water Mgmt. Dist., No. 02-80309 Civ., 2006 WL 3635465, at *1 (S.D. Fla. Dec. 11, 2006), *rev'd in part, appeal dismissed in part sub nom.* Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210 (11th Cir. 2009).

171. Friends of the Everglades v. S. Fla. Water Mgmt. Dist., 570 F.3d 1210, 1214 (11th Cir. 2009).

172. *See* David Petersen, Book Note, 23 ECOLOGY L.Q. 788, 791–92 (1996).

lakes and rivers that are components of the diversion.[173] Thus, states may allow the degradation of lakes and rivers if they are components of a large water transfer. For example, water transfers from a nearby water body, Shadow Mountain Reservoir, are deteriorating the water quality in Grand Lake, Colorado.[174] Both Grand Lake and Shadow Mountain Reservoir function as part of the larger C-BT project.[175] Because the EPA's rule eliminates the need to obtain NPDES permits for these transfers, Grand Lake's citizens are deprived of an important possible remedy.

Water from Shadow Mountain Reservoir replenishes Grand Lake when lake water is transferred to the eastern slope of the Rocky Mountains.[176] With a maximum depth of only twenty-four feet, Shadow Mountain Reservoir is considerably warmer than Grand Lake, which is 265 feet deep.[177] Shadow Mountain Reservoir's warm water experiences seasonal algal blooms, excessive growth of aquatic vegetation, increased concentrations of nitrogen and phosphorous, and low concentrations of dissolved oxygen.[178] When this water, full of algae, chlorophyll, and dissolved solids, is pumped into Grand Lake, it seriously affects the lake's natural biological conditions.[179] For example, in 2007 Colorado's government advised visitors not to swim, bathe, or drink from Grand Lake and Shadow Mountain Reservoir because levels of microcyst toxin, which is produced by algal blooms, exceeded safe levels.[180] These blooms would not have occurred naturally in Grand Lake without the water transfers from Shadow Mountain Reservoir.[181] Grand Lake's water clarity has suffered as well. In late 1941, Grand Lake's water clarity was measured at 9.2 meters.[182] Since the introduction of Shadow Mountain

173. *See* Brief for Grand Lake, *supra* note 12, at 18. Grand Lake is one component of the C-BT project. It appears that Colorado's regulators have allowed the pollution of Grand Lake because the C-BT project provides a net benefit to the state.

174. *See id.* at 4.

175. *Id.*

176. *Id.* at 5–6.

177. *Id.* at 9.

178. *Id.* at 9–10.

179. *Id.* at 10.

180. *Id.* at 12.

181. *See id.*

182. *Id.* at 11. Water clarity "is typically measured through the use of a 'Secchi disk,' a circular disk bearing a high-contrast pattern that is attached to a line or

water, water clarity has diminished significantly, reaching a low of 1.37 meters in 2007.[183] The plight of Grand Lake manifests the importance for the ability of citizen suits to require a point source to comply with NPDES permit limitations. Absent this federal remedy, concerned citizens must turn to other solutions to stop the untreated transfers that have deteriorated Grand Lake's water quality, damaged its ecosystem, and affected its tourism.[184]

Without NPDES permits to cover interbasin transfers, transferors must look to state law to provide certainty for environmental concerns. Although states have provisions to address issues raised by complex transfers, some states have regulatory loopholes.[185] Nevada, for example, does not have a provision addressing potential water quality impacts on the receiving basin.[186] Nevada can fill this regulation gap to reduce uncertainty, as well as the cost and impact of interbasin transfers.[187] However, Nevada's regulation establishing water quality limitations on the receiving basin might differ drastically from, for example, Arizona's regulation. Therefore, a complex water diversion involving both Nevada and Arizona would have to comply with two different requirements instead of one. For this reason, uniform limitations in federal permits would lower costs and benefit both the states and the environment.

IV. GENERAL NPDES PERMITS: A POSSIBLE SOLUTION

At least some aspect of the NPDES program should be required for water transfers, especially when complex diversions transfer water between states and through multiple point sources. Without federal oversight, discordant state laws or inadequate laws protecting the receiving water basin will be insufficient to control the spread of pollutants through water transfers. However, due to the varying magnitudes of water transfers, NPDES permits must be administered in both a practical and flexible manner. Requiring individual NPDES

pole and then lowered into the water body. The depth at which the disc can no longer be seen is termed the 'Secchi depth.' " *Id.* at 11 n.9.

183. *Id.* at 13.

184. *See id.* at 4–13.

185. *See* Schroeder & Woodcock, *supra* note 154, at 14.

186. *Id.*

187. *Id.*

permits for each point source discharging pollutants is too costly and administratively burdensome. But exempting pure water transfers from the NPDES requirement is foolish because it weakens environmental protection in exchange for relieving the EPA of a supervisory duty. Therefore, Congress or the EPA should develop a solution to the NPDES conundrum consisting of general NPDES permits that balance environmental considerations with cost and the ability of the EPA to administer and monitor these permits.

General permits covering pure water transfers offer a better alternative than the Water Transfers Rule. A general permit is a mechanism that allows the EPA to issue a single permit containing a common set of pollutant limitations and other conditions that can be applied to a large number of sources.[188] To be covered under the permit, eligible point sources must submit only a "Notice of Intent."[189] Once a source is covered under a general permit, it is authorized to discharge pollutants under the terms established by the general permit without additional government review or public participation.[190] Although the CWA does not expressly authorize the EPA to issue general NPDES permits, Congress has acknowledged their use for storm water discharges.[191] In the past, the EPA has issued hundreds of general permits for multiple uses covering thousands of point sources.[192] General permits are attractive for a government agency because it can issue them relatively quickly with limited paperwork and administrative burden.[193] For instance, the EPA can issue a general NPDES permit for all pollutant discharges into a single body of water, or it can also cover all the point sources included in a complex water diversion.[194] Practicality alone should convince the EPA to replace its Water Transfers Rule with a general NPDES permit system to cover water transfers. This would enable the EPA to balance its administrative resources with its duty to protect the environment.

188. Gaba, *supra* note 22, at 419.
189. *Id.*
190. *Id.* at 411.
191. *Id.*; *see also* Intermodal Surface Transportation Efficiency Act of 1991, Pub. L. No. 102-240, § 1068, 105 Stat. 1914, 2007–08 (1991). These provisions are not codified as part of the Clean Water Act.
192. Gaba, *supra* note 22, at 411.
193. Petition for Writ of Certiorari, *supra* note 109, at 16.
194. *See* Gaba, *supra* note 22, at 411.

Even though a general permit system is a better alternative to the current Water Transfers Rule, it offers fewer environmental protections than individual NPDES permits. Because general permits are developed with a broad scope, they inevitably overlook discharges that would be prohibited by an individual permit.[195] A general NPDES permit covering discharges into Grand Lake, for example, might not stop the natural pollutants that are devastating the lake because a general permit covering the entire C-BT project will not necessarily cover some of those pollutants. However, a general NPDES permit covering some pollutants is a better alternative than no permit. Plus, if the Water Transfers Rule were removed, citizens could once again sue to require an NPDES permit for an individual point source when a general permit is insufficient. Even though the EPA might have to supplement a general permit with individual permits, this is much less burdensome than issuing individual permits for each point source. General permits will not provide the same level of environmental protection that an individual permit for each point source would provide, but at some point we must balance concerns about water quality with practicality.

While a general permit system is a feasible option, it might violate the CWA's requirement that permits for discharges "require controls to reduce the discharge of pollutants to the maximum extent practicable."[196] The very nature of a general permit system could result in the EPA neglecting its responsibility to make individualized findings at each point source.[197] Another possible CWA violation that could result from the use of general permits is that they do not "contain express requirements for public participation in the NPDES permitting process."[198] In *Environmental Defense Center, Inc. v. U.S. Environmental Protection Agency*, the Ninth Circuit held that a general permitting system for storm water discharges violated both the individualized findings requirement and the public participation requirement of the CWA.[199] Under current law, it appears that a court will not uphold the use of general permits even when Congress has specifically acknowledged

195. *Id.* at 433.
196. 33 U.S.C. § 1342(p)(3)(B)(iii) (2006).
197. *See* Envtl. Def. Ctr. v. U.S. Envtl. Prot. Agency, 344 F.3d 832, 859 (9th Cir. 2003).
198. *Id.* at 852.
199. *Id.*

their application. Therefore, if the EPA wishes to use general permits instead of burdensome individual permits, Congress should amend the CWA to expressly allow them.

CONCLUSION

The Water Transfers Rule is untenable because it significantly weakens the CWA by increasing the likelihood that water transfers will introduce pollutants into clean lakes and rivers. Furthermore, it has revitalized the unitary waters theory, which, if adopted in other jurisdictions, will impede the ability to ensure that clean water quality standards are maintained. Therefore, the Water Transfers Rule must be replaced with an approach that rejects the unitary waters theory and restores federal oversight to pure water transfers. But any solution should not require individual permits for each point source discharging pollutants because this unnecessarily burdens the EPA and imposes excessive compliance costs on the transferor. Therefore, the EPA should implement a general NPDES program as a practical solution that balances administrative, environmental, and transferor interests.

To ensure that the NPDES program adequately protects the Nation's waters, Congress must amend the CWA. First, the CWA should explicitly require an NPDES permit for each pollutant discharge from a point source involved in a pure water transfer. This would decrease the likelihood that water transfers would pollute the receiving body of water by retaining an important level of federal oversight that would supplement state water quality standards. Second, Congress should authorize general permits for the NPDES program. This would enable the EPA to replace burdensome individual permits with a practical general permit system based on regions, water basins, or point sources. No matter how Congress or the EPA replaces the Water Transfers Rule, it must balance cost and practicality while preserving the CWA's integrity.