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LEGAL ADAPTIVE CAPACITY: HOW PROGRAM GOALS AND PROCESSES SHAPE FEDERAL LAND ADAPTATION TO CLIMATE CHANGE


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ABSTRACT

The degree to which statutory goals are pliable is likely to affect significantly the ability of an agency with regulatory or management responsibilities to achieve those objectives in the face of novel challenges or changing circumstances. This Article explores this dynamic by comparing the degree of “give” provided by the goals of the regimes governing management of the five types of federal public lands in responding to the challenges posed by climate change. It asserts that the extent of climate change adaptation in which an agency engages is influenced by a program’s legal adaptive capacity—the mutability of the goals pursued under its authorizing legal framework.

Though a few scholars have explored the concept of adaptive capacity as it applies to law, most focus on the impact of procedural discretion on the ability to manage change. A comparative analysis of federal land adaptation to climate change demonstrates that a management regime’s legal adaptive capacity is influenced not only by procedural flexibility, but also by the flexibility the agency has in defining and pursuing a program’s substantive goals. Counterintuitively, for this reason, the land regimes most closely tied to resource preservation goals have generally lagged behind those with mixed conservation-commodity development mandates in preparing for climate change. Accordingly, the Article suggests ways to enhance the substantive legal adaptive capacity of land management agencies to promote ecological health in the face of climate change, and evaluates tradeoffs implicated when policymakers choose more appropriate levels of such adaptive capacity.
INTRODUCTION

The degree to which statutory goals are pliable is likely to affect significantly the ability of an agency with regulatory or management responsibilities to achieve those objectives in the face of novel challenges or changing circumstances. This Article explores this dynamic by comparing the degree of “give” provided by the management goals governing the five types of federal public lands in response to the challenges posed by climate change. It asserts that the comparative rapidity and extent of climate change adaptation in which a natural resources management agency engages is influenced by the adaptability of the goals identified in its authorizing legal framework. This Article identifies this intrinsic mutability as a program’s legal adaptive capacity.

Though some scholars have explored the concept of adaptive capacity as it applies to law, almost all focus on the extent of agency procedural discretion and its influence on an agency’s ability to manage change.1 As demonstrated by a comparative analysis of federal land agency

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adaptation to climate change, a regulatory or management regime’s legal adaptive capacity is influenced not only by the extent of procedural flexibility the implementing agency enjoys under its organic statute and other sources of law, but also by the degree to which the underlying program’s substantive goals are capable of accommodating shifts in management approaches in response to change. Accordingly, the Article recommends changes in the substantive legal adaptive capacity of federal land management agencies that are likely to enhance their ability to better address the considerable effects of climate change.

Various agencies manage the approximately twenty-eight percent, or 635-640 million acres, of the land in the United States that is federally owned. The four largest landholders are natural resource management agencies. These include the United States Forest Service (USFS) in the U.S. Department of Agriculture (USDA), which manages nearly 193 million acres, and three agencies in the Department of Interior (DOI): the National Park Service (NPS), which manages approximately 80 million acres; the Bureau of Land Management (BLM), which manages nearly 248 million acres of land; and the Fish and Wildlife Service (FWS), which manages approximately 89 million acres of land as well as 217 million acres of marine refuges and monuments. Additionally, more than 109 million acres of federal conservation lands have been designated by Congress as federal wilderness, subject to an additional regulatory overlay under the Wilderness Act of 1964.

Anthropogenic climate change will result in significant physical and biological effects on all of these federal land systems. These changes, in turn, will raise challenges to the capacity of the agencies under existing federal land management laws to manage uncertainty and promote effective


3 Id. at 1, 13.
4 Id. at 1, 13.
conservation. Scholars and policymakers thus increasingly urge changes to existing natural resources laws and institutions to better manage these new fundamental challenges, largely highlighting the need for mechanisms that promote procedural adaptive capacity by increasing access to information and flexible implementation. Few, however, have considered how a legal regime’s substantive goals may affect the adaptive capacity of that regime to respond to climate change.

To varying degrees, the federal government has slowly turned its attention to climate change adaptation planning and implementation, spurred by directives issued by President Obama between 2009 and 2014. One might anticipate the pace and degree of climate change adaptation activity to largely track the historical orientation of each land management agency to ecological conservation, given the risk that climate change will disrupt the ecological functioning of the natural resources these agencies manage. In particular, some might expect that, in light of their focus on resource preservation, the FWS and the NPS would be more attentive to the potential effects of climate change and more apt to embrace the task of preparing to adapt to these changes than the USFS and the BLM, which for at least part of their histories emphasized extractive and consumptive uses.

We posit, however, that because the management goals of the statutory mandates under which the BLM and the USFS operate are pliant enough to accommodate changed conditions, these agencies actually have a greater legal adaptive capacity to engage in productive ecosystem protection in preparation for climate change than the FWS and the NPS. The two agencies’ multiple-use, sustained-yield mandates provide them with broad authority to pursue management actions that maintain ecological function, notwithstanding physical changes that pose novel management

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7 See infra Part II.
8 See infra Part III.A; U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE CHANGE ADAPTATION IN UNITED STATES FEDERAL NATURAL RESOURCE SCIENCE AND MANAGEMENT AGENCIES: A SYNTHESIS vi (Jessica E. Halofsky et al. eds, April 2015), http://www.globalchange.gov/sites/globalchange/files/ASIWG_Synthesis_4.28.15_final.pdf [hereinafter USGCRP, SYNTHESIS] (“Although adequate scientific databases, analytical tools, and decision support aids are generally available to assist with adaptation, on-the-ground projects and plans relevant to resource management have been implemented unevenly across agencies.”).
challenges. The malleability of the goals set forth in the two agencies’ organic statutes positions them well to swiftly engage in meaningful climate change adaptation activities. In contrast, the FWS and the NPS are charged primarily with what we label “historical preservation”—maintaining current ecological conditions or restoring managed lands to former ecological conditions. Thus, although the two agencies possess significant procedural flexibility to advance their statutory objectives, the substantive goals they are directed to pursue may directly conflict with promoting ecological health and are increasingly difficult if not impossible to attain for some federal land units as climate changes. In addition, Congress established federally designated wilderness areas primarily to minimize active human management or disturbance—“wildness preservation”—and secondarily to promote historical preservation. As a result, all four land management agencies have limited capacity to actively manage wilderness areas in the face of the threats posed by climate change.

A review of existing climate change adaptation activities by the four federal land management agencies reflects the legal adaptive capacity that their respective organic statutes suggest. Agencies that manage federal lands subject to statutory goals that place more emphasis on promoting historical fidelity (such as national parks) or on minimizing active management (wilderness areas) have developed more modest adaptation measures. Federal lands governed by statutory goals that place less emphasis on historical or wildness preservation, principally those under the charge of the USFS, have engaged in more robust adaptation planning and measures, even if those measures did not take full advantage of the USFS’s legal adaptive capacity. However, the BLM’s analogous and relatively

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10 See infra Part III.B-C.


12 See Alejandro E. Camacho, Transforming the Means and Ends of Natural Resource Management, 89 N.C. L. Rev. 1405, 1407 (2011) (arguing that “key preservationist goals of natural resources law premised on historical preservation (the protection of resources or landscapes in their historical condition) or passive management (minimizing human involvement with nonhuman systems) will be increasingly costly, difficult, and even impossible to meet” as a result of climate change); J.B. Ruhl & James Salzman, Gaming the Past: The Theory and Practice of Historic Baselines in the Administrative State, 64 Vand. L. Rev. 1, 53 (2011) (“Building adaptation strategies around historic baselines to resist climate change thus is a losing proposition”); id. at 56 (characterizing historic baselines as “maladapted” to climate change adaptation). Cf. Robin Kundis Craig, “Stationarity Is Dead”—Long Live Transformation: Five Principles for Climate Change Adaptation Law, 34 Harv. Envtl. L. Rev. 9, 17 (2010) (arguing that existing preservationist natural resources laws “no longer reflect[] ecological realities”); id. at 34-35 (claiming that “preservation paradigm” “threatens to dislocate the goals of natural resources law from the ecological realities of a climate change era”).

13 See Camacho, supra note 12, at 1407.
substantial legal adaptive capacity has not yet translated into significant adaptation planning or concrete adaptation activities.\textsuperscript{14}

Though the absence of clear and enforceable directives requiring the BLM to exercise legal adaptive capacity could have been a factor, it is evident that legal adaptive capacity alone does not determine the extent of adaptation actually pursued or achieved.\textsuperscript{15} Factors like budgetary resources,\textsuperscript{16} agency leadership, entrenched culture and tradition, and resources can strongly influence a regime’s record on adaptivity, and we do not discount the role that such factors may have played in the degree to which the federal land management agencies have responded to the challenges posed by climate change.\textsuperscript{17} Nonetheless, attending to a regime’s substantive goals can help increase the likelihood that the program effectively manages unanticipated challenges or changing circumstances and remove obstacles to doing so.\textsuperscript{18} Indeed, if a statutory goal or management standard forbids the administering agency from altering its management approach in the face of change, then even an agency with leaders who prioritize responsiveness to climatic changes and a culture in which employees throughout the agency commit to pursuing leadership goals is not likely to engage in effective climate change adaptation.

The Article proceeds in five parts. Part I discusses the concept of legal adaptive capacity in regulatory or management institutions. It distinguishes between the substantive and procedural dimensions of legal

\textsuperscript{14} See Kelli M. Archie et al., \textit{Climate Change and Western Public Lands: A Survey of U.S. Federal Land Managers on the Status of Adaptation Efforts}, 17(4) ECOLOGY & SOC’Y 20 (2012), http://www.ecologyandsociety.org/vol17/iss4/art20/ (concluding based on surveys completed in 2011 by federal land managers in Colorado, Utah, and Wyoming that the BLM “has taken a less targeted approach to adaptation planning” than the other three land management agencies). Cf. Victor B. Flatt, \textit{Adapting Laws for a Changing World: A Systemic Approach to Climate Change Adaptation}, 64 Fla. L. Rev. 269, 291 (2012) (“In theory, [the multiple use] legal mandate should be the ‘best’ option for climate change adaptation because it provides a ‘resilient’ law that can alter resource usage without statutory change. In practice, however, it has proven to be just the opposite, as agencies routinely cling to a static balance of uses.”).

\textsuperscript{15} Agency management structure, which is an aspect of procedural legal adaptive capacity, may play a role in the BLM’s slow response to the challenges posed by climate change. \textit{See infra} notes 468-472 and accompanying text.

\textsuperscript{16} A survey of employees of the four land management agencies in three western states during 2011 identified budget constraints as one of the most significant barriers to both adaptation planning and implementation. \textit{See Archie et al., supra} note 14. Another important factor was lack of information at relevant scales. \textit{Id.} Additional factors included personnel constraints, lack of perceived importance to the public, and lack of public demand for action. \textit{Id.}

\textsuperscript{17} \textit{See infra} Part IV; USGCRP, \textit{SYNTHESIS}, \textit{supra} note 8, at vii (“Accomplishments in preparing for climate change differ across the many agencies responsible for managing land and water resources and for providing the science needed for resource management. This is to be expected, given the diversity of agency missions, organizational culture, programmatic structure, and scientific capability.”).

\textsuperscript{18} \textit{See infra} Conclusion.
adaptive capacity, and assesses potential tradeoffs of integrating more legal adaptive capacity into a regulatory or management regime. Part II briefly relates the concept of legal adaptive capacity to anthropogenic climate change, explaining how this phenomenon is exerting enormous pressure not only on the federal lands but also the processes and goals of the regimes that manage them.

Part III assesses and compares the existing legal adaptive capacity and climate-related adaptation activities of five federal land systems. After briefly summarizing White House and department-wide directives by the Secretaries of the Interior and Agriculture, it considers lands administered by the USFS and the BLM that are governed by flexible multiple-use, sustained-yield mandates. It then discusses the legal adaptive capacity and adaptation activities provided for national wildlife refuges, national parks, and designated wilderness, which are subject to mandates that, to varying degrees, focus on historical or wilderness preservation. Part III illustrates that though the various federal agencies have similar procedural legal adaptive capacities, the relatively narrower substantive legal adaptive capacity afforded agencies in managing the national parks, national wildlife refuges, and wilderness areas is likely hindering the ability to effectively adapt those lands to climate change in ways consistent with applicable statutory goals and with promoting ecological health.

Based on the emerging federal experience with climate adaptation planning and implementation measures, Part IV offers observations about the role of legal adaptive capacity in promoting timely and effective adaptation. We focus primarily on the significance of substantive legal adaptive capacity because the literature on the tradeoffs implicated by procedural adaptive capacity in environmental law is much more extensive. Part V urges changes in the substantive standards that govern federal land management to enhance legal adaptive capacity by placing greater emphasis on promoting ecological function on lands governed by the multiple-use mandate, and by detaching management goals from strict adherence to historical or wilderness preservation where climate change is likely to render those goals ineffective at promoting ecological health.

I. A Theory of Legal Adaptive Capacity

The concept of legal adaptive capacity draws from the growing scholarly literature seeking to characterize and understand the dynamics of ecological systems. The ecological literature introduced the concepts of both resilience and adaptive capacity as phenomena in the natural world. A natural system’s resilience measures its ability “to absorb impacts and

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continue to function, while adaptive capacity refers to a system’s ability to change to adjust to new conditions.”

Because of the convulsive changes associated with it, climate change will test the resilience and adaptive capacity of natural systems.

Scholars have also applied the concept of adaptive capacity to human social systems, including in the context of climate change adaptation. The Intergovernmental Panel on Climate Change, for example, defines adaptive capacity as “the ability or potential of a system to respond successfully to climate variability and change, and includes adjustments in both behaviour and in resources and technologies.” Researchers have identified adaptive capacity as a “necessary condition for the design and implementation of effective adaptation strategies so as to reduce the likelihood and the magnitude of harmful outcomes resulting from climate change.” In this context, scholars have studied the role of factors such as education, income, health, knowledge, technology, and institutions on the capability of communities to adapt to risks related to climate change. Limited attention, however, has been given to the influence of the adaptive capacity of legal regimes in shaping climate change adaptation.

Like natural systems, legal systems may be more or less adaptive to change. When Congress creates an administrative agency, it typically identifies goals in the organic statute from which the agency derives its authority and prescribes standards to which the agency must conform in its pursuit of those goals. As scholars of regulation in different contexts have recognized, “[a]ll regulators must adapt to change in order to remain effective.” The same holds true for agencies acting as resource managers. As Karl Llewellyn recognized in describing the common law system of adjudication, “an adequately resilient legal system can . . . absorb the

20 Craig, supra note 12, at 23.
23 Id.
24 Id. at 727-28.
25 In the absence of standards that supply an “intelligible principle” to guide agency discretion, the statute may violate separation of powers principles. See Whitman v. Am. Trucking Ass’ns, 531 U.S. 457 (2011).
26 Brett McDonnell & Daniel Schwarz, Regulatory Contrarians, 89 N.C. L. REV. 1629, 1635 (2011). Among other things, “regulators’ failure to evolve can [stem from] the continuation of rules or policies that have become ineffective or counterproductive in light of market change, or that were simply mistakes in the first place.” Id. at 1636.
particular trouble and resolve it each time into a new, usefully guiding, forward-looking felt standard-for-action or even rule-of-law.”

Law can facilitate (or hamper) adaptation through both substantive and procedural means. We refer to this adaptability as legal adaptive capacity. In our conception, legal adaptive capacity denotes the formal regulatory or management regime’s capacity to adapt to changes in the phenomena it regulates. For our purposes, this regime includes rules promulgated by public legal institutions, including legislatures, courts, or administrative agencies (including agency regulations, manuals, plans, and guidance). As we use the term, legal adaptive capacity does not refer to other factors, such as resource constraints or agency culture, which may nonetheless influence the adaptive capacity of a regulatory regime.

The scope of a regime’s legal adaptive capacity turns on two axes. First, a legal regime, including one administered by an administrative agency, may have goals that are more or less capable of accommodating changed conditions. The degree to which statutory goals are capable of accommodating change measures the regime’s substantive legal adaptive capacity. Second, an agency may have more or less flexibility in determining the processes or organizational structure it will use in pursuing organic statute goals. We refer to that kind of flexibility as procedural legal adaptive capacity. Thus, J.B. Ruhl has noted that it is “important to distinguish between the resilience of the legal system’s underlying structure and processes and the stability of the substantive content of the law.” Nonetheless, the significance of legal adaptive capacity—and in particular

29 See, e.g., J.B. Ruhl, General Design Principles for Resilience and Adaptive Capacity in Legal Systems – With Applications to Climate Change Adaptation, 89 N.C. L. REV. 1373, 1379 (2011) (“The legal system, like any system, can be defined by its structure (e.g., constitutional division of powers) and processes (e.g., administrative decision procedures).”).
30 Id. at 1383. Because this article focuses primarily on substantive legal adaptive capacity, we do not dwell on the relationship between structural and procedural adaptive capacity. Differences in agency organizational structure nevertheless may affect a program’s adaptive capacity. See infra notes 468-75 and accompanying text (discussing how the BLM’s organizational structure may impair its capacity to respond to climate change).
substantive legal adaptive capacity—has been under-explored by the legal and broader scholarly literature. In particular, it is important to consider the tradeoffs of more or less procedural and substantive adaptive capacity in designing a legal regime.

Drawing on the ecological concept of adaptability or resilience, this Part elaborates on these different components of legal adaptive capacity and provides examples of how the scope of an agency’s legal adaptive capacity can affect its ability to successfully pursue statutory missions. In particular, we focus on how the scope of each kind of legal adaptive capacity can influence agency efforts to respond to novel challenges or changing circumstances such as changing ecological dynamics. We also consider potential generic tradeoffs of integrating more or less adaptive capacity into a regulatory regime.

A. Substantive Legal Adaptive Capacity

Substantive legal adaptive capacity refers to the extent to which a legal regime’s goals are capable of responding to changed conditions. An agency with a high degree of substantive legal adaptive capacity has the authority under its organic legislation to adjust its interpretation of regulatory goals or the means of pursuing them to meet new challenges or accommodate changed circumstances. At the other end of the spectrum, a program with limited adaptive capacity has relatively rigid goals that do not allow agencies to alter regulatory or management approaches notwithstanding changed conditions. Of course, substantive legal adaptive capacity is only meant to identify the extent of elasticity in regulatory goals; as such, two regulatory regimes may have similar levels of substantive legal adaptive capacity but regulatory goals that are significantly different.

An example of extensive substantive legal capacity is provided by the Clean Air Act (CAA), which sets as its fundamental goal protection and enhancement of air quality to promote the public health and welfare. In Massachusetts v. EPA, the Supreme Court addressed a challenge to a denial by the Environmental Protection Agency (EPA) of a petition to regulate greenhouse gas (GHG) emissions from new motor vehicles. The agency argued that GHGs did not qualify as “air pollutants” over which it had regulatory jurisdiction. It claimed, among other things, that climate change was such an important problem that unless the CAA “spoke with

34 The CAA requires EPA to limit emissions of “any air pollutant” from motor vehicles which may contribute to health or welfare endangerment. 42 U.S.C. § 7521(a)(1) (2006).
exact specificity,” Congress could not have intended that EPA regulate GHGs that contribute to it. The Court rejected EPA’s limited conception of its regulatory power. It characterized the statutory definition of an “air pollutant” as “sweeping” and “capacious.” It made no difference that Congress may not have been cognizant when it adopted the statute in 1970 of the risks posed by GHG emissions:

While the Congresses that drafted § 202(a)(1) might not have appreciated the possibility that burning fossil fuels could lead to global warming, they did understand that without regulatory flexibility, changing circumstances and scientific developments would soon render the Clean Air Act obsolete. The broad language of § 202(a)(1) reflects an intentional effort to confer the flexibility necessary to forestall such obsolescence.

Other courts have similarly construed the CAA as affording EPA broad flexibility to protect public health and welfare from air pollution in the face of uncertainty concerning evidence that is “on the frontiers of scientific knowledge.”

The two different domestic regulatory regimes that govern the allocation of water provide a nice contrast between regulatory standards that provide more and less substantive legal adaptive capacity. As Tony Arnold has recognized, a critical question is "whether American water law regimes

35 EPA also contended that Congress designed the CAA to address local air pollutants, not substances with consistent atmospheric concentrations, and that Congress declined to require EPA to regulate GHG emissions. *Massachusetts*, 549 U.S. at 512.
36 The Act defines an “air pollutant” to include any “substance or matter which is emitted or otherwise enters the ambient air.” 42 U.S.C. § 7602(g) (2006).
37 *Massachusetts*, 549 U.S. at 528, 532.
38 *Id.* at 532. More generally, the environment’s responses to human activities “have a tremendous capacity . . . to take us by surprise despite our intensive efforts to study and predict them.” Ruhl, *supra* note 31, at 954.
39 Ethyl Corp. v. EPA, 541 F.2d 1, 28 (D.C. Cir. 1976). Although the pliability of the CAA’s goals and the breadth of its definition of an air pollutant allowed EPA to regulate GHGs, an air pollutant that was not the focus of congressional concern in 1970, nevertheless not all of the statute’s substantive regulatory programs are well-suited to tackling climate change. The national ambient air quality standards, for example, would not easily accommodate regulation of GHGs because they assume different localized pollutant concentrations, whereas GHG concentrations are uniform worldwide. See Holly Doremus & W. Michael Hanemann, *Of Babies and Bathwater: Why the Clean Air Act’s Cooperative Federalism Framework Is Useful for Addressing Global Warming*, 50 ARIZ. L. REV. 799, 821 (2008) (“The one conspicuous misfit between the present Clean Air Act and the global warming problem is the Act’s reliance on national air quality standards.”); cf. Jacob Kavkewitz, Comment, *Jamming the Square Peg through the Round Hole: EPA’s Options for Implementing Efficient Climate Change Regulation Under the Clean Air Act*, 4 ARIZ. J. ENVTL. L. & POL’Y 1001, 1002 (2013) (“Even though the CAA is not an ideal structure for addressing climate change, it is the most feasible option currently available domestically for making serious progress in reducing GHG emissions.”).
can become increasingly adaptive to changing conditions and sudden disturbances.”

Arnold’s answer is two-fold. He characterizes U.S. water law as “full of inflexible rules that inhibit adaptive responses to disturbances and changes,” pointing specifically to the prior appropriation system of water rights that governs water allocation in most western states. In its traditional form, that system is composed of “a hard-edged, or ‘crystalline,’ set of rules” that, by creating vested property rights in permit holders, “locks in and protects historical uses, many of which were established over a hundred years ago in the western United States, without regard to whether those uses embody current views on the ‘highest and best use’ of limited water.”

Among the advantages of the prior appropriation system are “predictability and certainty to support economic investment in consumptive uses of water.” Such advantages come at a substantial cost, however:

The rigidity of the priority system discourages or prevents adaptive sharing of water during shortages. The combination of measuring rights in specific quantities of appropriated water and the use-it-or-lose-it rule deter improved efficiencies and adaptive water conservation efforts. The persistence of defining beneficial uses by historic rules and uses prevents regulators or courts from determining that some water uses are no longer well-adapted to the conditions in which they occur.

Arnold contrasts this rigidity with “the looser ‘muddy’ riparian doctrine followed in more water-rich areas.” Under that system for allocating access to water, “[a] riparian owner’s rights are limited by the requirement that his or her water use must be reasonable. What is reasonable depends in part upon each riparian owner’s water use vis-à-vis other riparian owners,

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41 Id. at 1057.
42 Id. Under a prior appropriation system, appropriators who secured their allocative rights before others did so are entitled to their full allocations before junior appropriators are entitled to any of theirs. See, e.g., Aransas Project v. Shaw, 930 F. Supp. 2d 716, 738 n.28 (S.D. Tex. 2013), rev’d on other grounds, 774 F.3d 324 (5th Cir. 2014). Prior appropriation doctrine may have lost some of its hard edges over time, however. See Charles F. Wilkinson, In Memoriam: Prior Appropriation, 1848-1991, 21 ENVTL. L. xvi (1991). The incorporation of market mechanisms into prior appropriation systems, for example, may allow reallocation of water rights to those who now value them most highly. See A. Dan Tarlock, The Future of Prior Appropriation in the New West, 41 NAT. RESOURCES J. 769, 772 (2001); see generally James L. Huffman, Water Marketing in Western Prior Appropriation States: A Model for the East, 21 GA. ST. U. L. REV. 429, 448 (2004).
43 Arnold, supra note 40, at 1058.
44 Id. at 1058.
the public’s rights, and the circumstances of each case. The test is a flexible one capable of changing over time . . . .”

To the extent that substantive adaptive capacity includes not only the flexibility of a regime’s fundamental goal but also the controls and strategies employed to achieve that goal, the familiar distinction between rules and standards is also relevant to an assessment of the scope of a legal regime’s substantive adaptive capacity. Rules tend to be “clearly defined [and] highly administrable,” thus providing more certainty and regulatory efficiency, while standards “produce ad hoc decisions with relatively little precedential value,” and thus are more concerned with the effectiveness of decision-making than efficiency. Professor Arnold draws on this distinction in describing an adaptive legal system as one that adapts to changing conditions by using “context-regarding standards and flexible discretionary decision making, in contrast to legal abstractions, rigid rules, and excessive limits on action and authority.” Others regard “the levels of clarity and flexibility” provided as “crucial to the distinction between rules and standards.” As Kathleen Sullivan has recognized, “[r]ules tend toward obsolescence. Standards, by contrast, are flexible and permit decision-makers to adapt them to changing circumstances over time.” The distinction between rules and standards blurs at the edges, however, as “the categorical distinctions being attempted are not binary but more akin to a pluralism, continuum or synthesis.”

46 Sherry A. Enzler et al., Finding a Path to Sustainable Water Management: Where We’ve Been, Where We Need to Go, 39 WM. MITCHELL L. REV. 842, 858 (2013).
48 Duncan Kennedy, Form and Substance in Private Law Adjudication, 89 HARV. L. REV. 1685, 1685 (1976). As Professor Schauer has put it, rule adopters make most of the substantive choices at the time of the drafting, while standards allow choices “to be made at the moment of application.” Schauer, supra note 47, at 803.
49 See Russell B. Korobkin, Behavioral Analysis and Legal Form: Rules vs. Standards Revisited, 79 OR. L. REV. 23, 36 (2000) (“[B]ecause rules are specified ex ante, even complex rules will sometimes fail to take account of all factual variations that might arise ex post which might be relevant to optimal tailoring of legal boundaries.”).
51 Michael Faure et. al., The Regulator’s Dilemma: Caught Between the Need for Flexibility & the Demands of Foreseeability, Reassessing the Lex Certa Principle, 24 ALB. L.J. SCI. & TECH. 283, 292 (2014).
52 Kathleen M. Sullivan, The Justices of Rules and Standards, 106 HARV. L. REV. 22, 66 (1992); see also Pierre J. Schlag, Rules and Standards, 33 UCLA L. REV. 379, 400 (1985) (claiming that “standards are seen as more appropriate when flexibility, individualization, open-endedness, and dynamism are important”).
B. Procedural Legal Adaptive Capacity

Procedural legal adaptive capacity measures the degree to which a legal regime’s process is able to adjust to new policy directions or information or changed factual circumstances. According to Professor Arnold, “[a]n adaptive law system recognizes and embraces iterative processes among multiple participants, instead of linear decision-making and implementation processes by a single authority.” At one end of the spectrum of procedural adaptability is the U.S. Constitution, which, among other things, creates a rigorous process for amendment. The Constitution “displays little tolerance for structural or process change. It was designed to be hard to alter in design.”

Other forms of lawmaking tend to be more procedurally adaptable, but not uniformly so. The Anglo-American common law system, for example, is in some ways more procedurally adaptive than the legislative process. A common law court has the capacity to distinguish previous cases when it addresses fact situations that differ from those previously presented. If Congress wants to amend a statute to address a new situation not covered by existing law, or because changed circumstances have undercut the effectiveness of existing law, it must follow the constitutionally prescribed method for changing the law – adoption of the same bill by both houses of Congress and either presidential signature or legislative override of a presidential veto by a two-thirds vote.

Within the realm of administrative law, statutes make it easier for agencies to shift course in some contexts than in others. The Administrative Procedure Act (APA), for example, imposes more rigorous procedural requirements for the adoption of formal than informal rules. Thus, an agency subject to formal rulemaking procedure is likely to have to devote

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54 Arnold, supra note 50, at 253.
55 Ruhl, supra note 29, at 1380. Cf. Lazarus, supra note 1, at 1180 (describing “strong structural bias within our existing lawmaking institutions in favor of government acting slowly and incrementally.”); id. at 1198 (arguing that the Constitution makes lawmaking difficult “to guard against potential overreaction to more immediate impulses of the moment”).
56 See, e.g., Ruhl, supra note 29, at 1381 (describing the American common law system as “an example of ecological resilience” with “a high capacity for swings in behavior in response to changing conditions without altering the system’s basic structure and process design”). Justice Holmes’ “claim that legal doctrines evolve in response to changes in the social environment has become virtually a canon of professional faith for American lawyers.” E. Donald Elliott, The Evolutionary Tradition in Jurisprudence, 85 COLUM. L. REV. 38, 51 (1985). Cf. Hornstein, supra note 1, at 921 (describing view that when common law doctrines were inefficient and judges made mistakes, people adversely affected by those rules “would have a greater incentive to litigate and relitigate them”).
57 U.S. CONST. art. I, §7, cl. 2.
more time and resources to rule promulgation than if it need only comply with notice-and-comment procedures. If an agency chooses to adopt a nonbinding non-legislative rule, most APA rulemaking requirements do not apply at all.

Another aspect of regulation that leads to differential procedural legal adaptive capacity is the extent to which it relies on what one of us has referred to as “front-end decision-making” processes or “back-end adjustments.” Front-end requirements are designed to rationalize regulation on the basis of rational choice theory, microeconomic efficiency models, and cost-benefit analysis. “Back-end” mechanisms allow policymakers to make incremental adjustments in regulatory approaches or applications based on factors such as the actual impacts of regulation, changed circumstances, or information that was unavailable at the time of initial regulatory adoption. Reliance on back-end adjustments, such as variances, exceptions, or deadline extensions, mitigates the problems resulting from the bounded rationality facing agencies when they seek to design a one-shot solution at the inception of the regulatory process. The authority to make back-end adjustments creates regulatory flexibility that can mitigate unfair or unintended results, thereby increasing the legitimacy of regulatory efforts. That enhanced flexibility may come at a price, however, as reliance on back-end adjustments can water down regulatory standards and allow regulators to cater to the desires of regulated entities or beneficiaries in ways that may not be transparent.

Professor Ruhl characterizes much of environmental law as fixated on reliance on front-end approaches such as environmental assessment and cost-benefit analysis, producing a system that “shows no signs of being

61 Glicksman & Shapiro, supra note 1, at 1179.
62 Id. at 1183.
63 Id. at 1179.
64 See Sidney A Shapiro & Robert L. Glicksman, Risk Regulation at Risk: Restoring a Pragmatic Approach 23 (Stanford 2003) (describing bounded rationality as the result of “time, resource, and cognitive constraints that make it virtually impossible to verify that the solution [reflected in a regulation at the time of its adoption] chosen is optimal”).
65 Glicksman & Shapiro, supra note 1, at 1185-87 (describing the potential benefits of back-end adjustments).
66 Glicksman & Shapiro, supra note 1, at 122-23.
flexible. He asserts that this lack of flexibility tends to thwart efforts to adjust laws and “move toward ecological resilience strategies when variability is on the rise and prediction is unreliable.” Numerous other scholars have similarly criticized the procedural rigidity of environmental laws and administrative regulation more generally. One of us has previously characterized current natural resource management laws as directing “virtually all agency attention and resources . . . at the initial decision, regardless of how little information there is to make the decision. Once an initial decision is made, whether regarding an individual project or an entire program, the agency rarely revisits it in any systematic way to adjust the decision or learn from its successes or limitations for future actions.” As a result, “natural resource decision making reflects a static, front-end approach to resource regulation and management.”

Many scholars urge greater reliance on a back-end technique that has received much attention in the environmental law literature, adaptive management. Adaptive management allows incremental policy and decision adjustments at the “back end,” under a framework in which altering course if conditions warrant is an essential ingredient. An adaptive management framework is “evolutionary . . . , relying on iterative cycles of goal determination, model building, performance standard setting, outcome monitoring, and standard recalibration.” It therefore provides greater adaptive capacity than a regulatory approach that creates procedural constraints on pursuing changes in initial regulatory strategies. However, adaptive management may not be appropriate in all circumstances, and less rigorous alternatives to formal adaptive management, such as

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67 Ruhl, supra note 29, at 1392.
68 Id. at 1393.
69 See, e.g., Camacho II, supra note 1, at 36-40.
71 Camacho, supra note 12, at 1414.
72 Id.
75 Ruhl, supra note 29, at 1391.
76 See, e.g., HOLLY DOREMUS ET AL., CENTER FOR PROGRESSIVE REFORM, MAKING GOOD USE OF ADAPTIVE MANAGEMENT 5-9 (2011), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1808106 (stating that adaptive management should only be used if there are information gaps, good prospects for learning, and opportunities for adjustment in the regulatory process).
contingency planning, also seek to incentivize iterative planning and periodic adjustments (and thus increase procedural adaptive capacity).

Other forms of flexible decision-making processes that have received attention in the environmental policy arena include new governance and dynamic federalism. “New governance” theory favors “collaborative, multi-party, multi-level, adaptive, problem-solving” governance, whose central organizing principles are “stakeholder participation, collaboration among interests, diversity of and competition between instruments, decentralization of governance structure, integration of policy domains, flexibility, and an emphasis on noncoerciveness and adaptation.” Dynamic federalism, in which regulatory jurisdiction is presumptively within the authority of both the federal and state governments, “builds scalability, modularity, and response diversity into the system.” Back-end adjustment regimes such as adaptive management or new governance are examples of regulatory approaches with a relatively high degree of procedural legal adaptive capacity.

The manner in which an agency’s structure is prescribed by statute, regulation, or other sources of law of course is connected to its procedural legal adaptive capacity. Scholars have discussed the relationship between structure and process in other contexts. The nature of an agency’s vertical hierarchy, for example, may determine the number of participating decision makers and the need for internal appeal or review procedures. Similarly, scholarship has noted that how well an agency integrates scientific information into decision making or the extent of intra-agency

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78 Camacho, *supra* note 12, at 1449.


81 As noted above, Professor Ruhl distinguishes between a legal system’s structure and processes. See Ruhl, *supra* note 29, at 1379.

82 See, e.g., Jonathan Rothchild, *Law, Religion, and Culture: The Function of System in Niklas Luhmann and Kathryn Tanner*, 24 J.L. & RELIGION 475, 494 (2009) (referring to “the relationship between structure and operation (process), or norm and action, or rule and decision”). For further discussion of the manner in which agency structure can affect legal adaptive capacity, see infra notes 468-472 and accompanying text (discussing the impact of the BLM’s decentralized structure on its approach to climate change adaptation).
centralization or coordination can influence the capacity of an agency to adapt. Indeed, proponents of adaptive management have emphasized the development of formal organizational structures that can promote adaptive decision making.

C. Legal Adaptive Capacity and Values Tradeoffs

The absence of either substantive or procedural legal adaptive capacity may hinder an agency’s ability to accommodate changed circumstances in pursuing statutory goals. The lack of adaptability is troublesome if existing legal rules produce outcomes that were once desired but are no longer acceptable. As Richard Lazarus has argued, “[f]lexibility is necessary to allow for the modification of legal requirements over time in light of new information.” Yet, legal adaptive capacity is not uniformly desirable. Donald Hornstein has noted that “there is such a thing as too much adaptivity” and substantive resilience and adaptability in a legal system is not “an unalloyed good.” As the debate over the desirability of rules and standards reveals, adaptive and non-adaptive legal systems each have advantages and disadvantages. In choosing the desirable form and extent of adaptability, those designing a legal system need to assess and strike a balance between the benefits and costs of adaptability.

A regime with limited substantive legal adaptive capacity has certain advantages over a more loosely defined and adaptable system. Because decision-makers, such as agencies, have less flexibility, they may apply legal rules more consistently than if their ability to craft contextual legal solutions is more expansive. Consistency in decision-making may promote stability and fairness and protect against arbitrariness. A non-adaptive system is also likely to generate more predictable results, creating

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84 See, e.g., Camacho II, supra note 1; Dorf & Sabel, supra note 70.
85 See Ruhl, supra note 29, at 1382.
86 Lazarus, supra note 1, at 1157.
87 Id. at 1205-07 (proposing limits on capacity for certain future alterations to legislation addressing climate change).
88 Hornstein, supra note 79, at 1552. Hornstein refers to a resilient legal system that returns to path-dependent roots or is based on “suspect or even despised intellectual foundations.” Id.
89 See Sullivan, supra note 52, at 62. Rules may generate unfair results, however. See Ruhl, supra note 29, at 1402 (noting tradeoffs between a legal system’s resilience and the stability of its substantive content).
a degree of certainty that an adaptive system likely cannot match.\textsuperscript{90} Certainty, in turn, may create incentives for affected interests to commit to actions and investments they may avoid if legal outcomes are unpredictable.\textsuperscript{91} In addition, a non-adaptive system may be more efficient to administer because decision-makers such as agencies choose from a limited number of prescribed solutions rather than inventing new approaches on a case-by-case basis.\textsuperscript{92}

In contrast, a legal system characterized by significant substantive legal adaptive capacity is likely better at allowing decision-makers such as agencies to reach results that promote relevant policy goals in unanticipated or changed circumstances. A regime that lacks such capacity is likely to sacrifice the potential to tailor decisions to changing conditions in ways that promote regulatory or management goals.\textsuperscript{93} A substantively adaptive system thus can reduce the risk that the quest for consistency leads to the application of fixed and bright-line rules to factual contexts for which they were not designed or are otherwise ill-matched.\textsuperscript{94}

Substantive legal adaptive capacity also may increase the risk that agencies will abuse their discretionary authority. For example, flexible goals provide an increased capacity to promote the interests of favored constituencies instead of the broader public interest.\textsuperscript{95} Statutory constraints on substantive flexibility can minimize such “slippage.”\textsuperscript{96} One important question for policymakers, therefore, is whether they regard it as more important to create a substantively nimble legal system or to reduce the risk that agencies vested with broad flexibility to accommodate solutions to novel challenges will stray from or subvert statutory goals.\textsuperscript{97}

\textsuperscript{90} Cf. Eric Biber, \textit{Adaptive Management and the Future of Environmental Law}, 46 AKRON L. REV. 933, 948 (2013) (arguing that flexibility creates uncertainty, which “creates significant costs—economic, social, psychological” for communities in which adaptive management is occurring).


\textsuperscript{92} Sullivan, \textit{supra} note 52, at 63 (explaining how rules promote economies for legal decision makers).

\textsuperscript{93} Camacho, \textit{supra} note 53, at 44.

\textsuperscript{94} Sullivan, \textit{supra} note 52, at 62 (noting that “bright-line rules are arbitrary at the border”).

\textsuperscript{95} See Craig, \textit{supra} note 12, at 64 (“Of course, increasing regulatory flexibility always opens the door to potential abuse.”); see also Robert L. Glicksman, \textit{Ecosystem Resilience to Disruptions Linked to Global Climate Change: An Adaptive Approach to Federal Land Management}, 87 NEB. L. REV. 833, 836-37, 862 (2009) (describing the problematic nature of excessive grants of discretion). Some have argued, for example, that the flexible multiple use mandate that governs USFS and BLM land management has resulted in such a skewing of agency priorities. See, e.g., Jan G. Laitos & Thomas A. Carr, \textit{The Transformation on Public Lands}, 26 ECOLOGY L.Q. 140, 212 (1999).

\textsuperscript{96} Biber, \textit{supra} note 90, at 949.

Choosing the desirable level of a legal system’s procedural legal adaptive capacity turns on similar tradeoffs. A non-adaptive system that relies on front-end decision making is likely to be less resource-intensive. An iterative process such as adaptive management has both direct implementation costs and opportunity costs, as do information-sharing frameworks. In addition, some forms of process flexibility (such as the authority to craft policy through non-legislative rules) can lead to reduced public participation, which can impair the information base on which agencies make decisions and reduce accountability. Further, flexibility and back-end techniques may delay decision-making to a time when resource constraints prevent or impair the quality of agency management actions. Furthermore, agencies purporting to engage in adaptive management or other forms of iterative decision-making may actually be “kicking the can down the road” by deferring difficult decisions to an undetermined future time. Such an approach obviously reduces accountability. Policymakers should consider whether they are comfortable with the likelihood that experimentation with context-specific solutions will sometimes fail. Such failures may result in lost or impaired resources; however, reliance on an inflexible management regime to deal with changed circumstances may produce similar or even greater harm. Finally, reducing uncertainty beyond a certain point may be impossible, and problems may demand immediate attention that do not provide the luxury of learning through iterative approaches such as adaptive management.

On the other hand, heightened procedural legal adaptive capacity may allow agencies to act more quickly than under a less adaptive system. An agency that has the choice of pursuing statutory policies through either

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99 See Flatt, supra note 14, at 284 (noting that detrimental impact of underfunding on information-sharing).
100 Biber, supra note 90, at 949. See also Gregory N. Mandel & Gary E. Marchant, The Living Regulatory Challenges of Synthetic Biology, 100 IOWA L. REV. 155, 195 (2014).
101 Biber, supra note 90, at 950.
102 See DOREMUS ET AL., supra note 92, at 11 (“One of the most significant weaknesses of adaptive management to date has been that agencies have promised future adaptation but not delivered it.”); J.B. Ruhl & Robert L. Fischman, Adaptive Management in the Courts, 95 MINN. L. REV. 440, 461 (2010) (discussing “temptation of adaptive management . . . to lavish attention on the iterative process at the expense of addressing the substantive management criteria required by law”).
103 Biber, supra note 90, at 947.
104 Id. at 940-42.
legislative or non-legislative rules, for example, can respond more quickly to the need for action by avoiding the procedural steps that accompany adoption of a binding rule. Another important potential advantage of more iterative forms of expansive procedural legal adaptive capacity is to afford agencies and other decision-makers the flexibility to make decisions based on less-than-perfect information, monitor the results, re-evaluate the initial decision, and, if appropriate, adjust future management. Many scholars and policymakers have extolled the benefits of adopting processes that integrate continued monitoring and adjustment, including increased effectiveness, legitimacy, and potentially even long-term implementation costs. The benefits of increased procedural adaptive capacity may be particularly strong in regulatory contexts where there is incomplete understanding and the regulated system is changing.

In short, those designing or refashioning a legal regime, including one that governs natural resource management in the era of climate change, should consider the tradeoffs involved in identifying the appropriate degree of both substantive and procedural legal adaptive capacity. Of course, the desirability of more or less adaptive legal regimes will depend on context, and the assessment of such tradeoffs may itself vary if the regime’s underlying circumstances fundamentally change. Adaptability, substantive or procedural, may be the superior choice in situations characterized by dynamism and complexity, but not where those features are lacking and malleability gains do not offset the loss of values like predictability and accountability.

II. CLIMATE DISRUPTION AND LEGAL ADAPTIVE CAPACITY

Unfortunately, global climate change is shifting both the physical and regulatory landscape for federal conservation lands to such an extent that it makes reconsideration of the legal adaptive capacity of longstanding management regimes appropriate. Over the next several decades, climate change is widely anticipated to have significant effects on the various

105 See Craig & Ruhl, supra note 1, at 4.
107 See DOREMUS ET AL., supra note 92, at 5.
108 See Biber, supra note 90, at 958-59. Biber adds, however, that “where dynamism and complexity [are] so high that learning is impossible, we might again be better off with relatively rigid, inflexible standards based on front-end analysis.”
federal lands.\textsuperscript{109} Even if significant and widespread mitigation strategies are adopted that substantially reduce carbon emissions worldwide, federal lands will experience substantial and potentially detrimental effects for decades.\textsuperscript{110} All four major land systems will be affected. Species may become separated from key habitat in federal wildlife refuges. For example, projected sea level rise may significantly alter habitat at coastal refuges for protected plant and animal species.\textsuperscript{111} Sea-level rise is expected to affect 173 wildlife refuges.\textsuperscript{112} Climate change is also anticipated to significantly alter the natural resources in national parks. According to the U.S. Geological Survey (USGS), for example, some of the largest glaciers in Glacier National Park may melt by 2030.\textsuperscript{113} On the BLM public lands, climate change may exacerbate existing stressors such as wildfires and invasive species, impairing the BLM’s ability to manage those lands for multiple uses.\textsuperscript{114} Persistent droughts, for example, may force the BLM to limit livestock grazing to protect drought-stressed plant and animal species.\textsuperscript{115} Wildfires, invasive species, and extreme weather events are already affecting national forests, and will be exacerbated by climate change.\textsuperscript{116} These physical and biological changes raise fundamental challenges to the resilience of natural ecosystems\textsuperscript{117} and thus to the agencies charged with managing the nation’s federal public lands.

More fundamentally, there is growing recognition that these physical and biological effects are already putting substantial stress on existing natural resource legal regimes, and these regimes increasingly will

\textsuperscript{110} Cf. Robert L. Glicksman, Climate Change Adaptation: A Collective Action Perspective on Federalism Considerations, 40 ENVTL. L. 1159, 1160-62 (2010) (discussing climate change to which the world is already committed, notwithstanding future mitigation efforts).
\textsuperscript{113} GAO, supra note 111, at 14.
\textsuperscript{115} Id. at 16-17.
\textsuperscript{116} Id. at 9.
have trouble coping with these stressors.\textsuperscript{118} Climate change considerably elevates the level of uncertainty for resource management due to the increased complexity and various potentially confounding variables.\textsuperscript{119} This increased uncertainty, when combined with the limited adaptive capacity of existing natural resource laws and management institutions,\textsuperscript{120} is a more serious concern than climate change’s potential physical effects.\textsuperscript{121} Climate change raises serious impediments to the capacity of the laws and institutions governing public land management to serve the purposes for which they were established.\textsuperscript{122}

Various scholars thus assert that existing law and institutions need to adapt to manage effectively the challenges raised by climate change.\textsuperscript{123} More precisely, scholars and policymakers increasingly acknowledge that climate change necessitates improved procedural adaptive capacity. Many have encouraged the integration of procedural or structural adaptation strategies to increase regulatory institutions’ ability to manage the uncertainty of climate change, such as scenario planning,\textsuperscript{124} adaptive management,\textsuperscript{125} or agency structures that promote learning through the

\textsuperscript{118} See Craig, supra note 12, at 30 (asserting that climate change adaptation “challenges . . . the existing capacity of legal institutions”); Ruhl, supra note 29, at 1375-76.
\textsuperscript{121} See Camacho II, supra note 1, 12-15 (demonstrating how existing governance is poorly equipped to deal with impediments to climate change adaptation due to unprecedented uncertainty).
\textsuperscript{122} Similar challenges to existing legal regimes are often posed by technological changes. See, e.g., Mandel & Marchant, supra note 100, at 162.
\textsuperscript{124} See generally Ecosystems and Human Well-Being: Scenarios, Volume 2 (Steve R. Carpenter et al. eds., 2005).
\textsuperscript{125} Tompkins & Adger, supra note 21, at 1–2; J. Michael Scott et al., National Wildlife Refuges, in Preliminary Review of Adaptation Options for Climate-Sensitive Ecosystems and Resources 37, 121 (Susan Herrod Julius & Jordan M. West eds., 2008), available at http://downloads.climatescience.gov/sap/sap4-4/sap4-4-final-report-all.pdf; Camacho II, supra note 1, at 70-76.
collection, dissemination, and use of information about climate effects and management strategies.\textsuperscript{126}

However, few scholars or policymakers have paid sufficient attention to the significance of substantive legal adaptive capacity. Professor Craig has described a mismatch between climate change adaptation and the preservation and restoration goals in certain pollution control and natural resource laws.\textsuperscript{127} Similarly, one of us has raised questions about the long-term compatibility of natural resources laws that primarily focus on promoting historical or wilderness preservation with the promotion of ecological health in the face of climate change.\textsuperscript{128} Eric Biber and Elisabeth Long have addressed the capacity of agencies managing wilderness to accommodate climate change.\textsuperscript{129} The remainder of this Article systematically evaluates the relationship between federal land law goals and the production of effective responses to climate change impacts as an example of how substantive legal adaptive capacity can influence responses to unanticipated regulatory challenges or changing circumstances.

III. ASSESSING FEDERAL LAND LEGAL ADAPTIVE CAPACITY AND CLIMATE ADAPTATION

Although Congress has not adopted comprehensive climate change adaptation legislation, federal agencies have engaged in adaptation planning activities for over a decade, to varying degrees. The five major federal natural resource management systems—national forests, public lands, national wildlife refuges, national parks, and designated wilderness—have been subject to a similar suite of initiatives at the White House or Departmental level to engage in climate change adaptation activities. The President, DOI, and USDA have repeatedly directed and provided guidance to agencies to integrate climate change adaptation into their policies and programs. Nonetheless, these five land systems have been subject to a wide

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\textsuperscript{126} See Camacho II, supra note 1, at 1 (recommending development of “adaptive governance” framework); Progress Report of the Interagency Climate Adaptation Task Force, supra note 112, at 6 (recommending “a commitment to dynamic engagement, iterative understanding of results, and rigorous evaluation”); Camacho, supra note 120, at 1825-31.

\textsuperscript{127} See Craig, supra note 12, at 31-39. Professor Craig’s prescriptions, however, largely focus on promoting procedural adaptive capacity. See id. at 40-69.

\textsuperscript{128} See Alejandro E. Camacho, Assisted Migration: Redefining Nature and Natural Resource Law under Climate Change, 27 Yale J. on Reg. 171, 244-45 (2010); Camacho, supra note 12, at 1426-36 (detailing the weak adaptive capacity of natural resources laws premised on historical and/or wilderness preservation goals).

\textsuperscript{129} Elisabeth Long & Eric Biber, The Wilderness Act and Climate Change Adaptation, 44 Envtl. L. 623, 627 (2014). For further discussion of their analysis, see infra at notes 443-445 and accompanying text.
variation in the types and degree of climate change adaptation. This Part explores the extent to which legal adaptive capacity correlates with the extent of adaptation planning and implementation activities to date for each of the five land regimes.

Historically, the approaches to land and resource management have differed sharply among federal land systems. The BLM and the USFS, often referred to as multiple use agencies, for significant parts of their histories, tended to be driven—and some assert captured—by consumptive uses. The USFS has been considered by many to be primarily focused on timber harvesting. The BLM has long been closely linked to facilitating grazing and mineral development. These two agencies’ organic statutes, the Federal Land Policy and Management Act (FLPMA) and the National Forest Management Act (NFMA), are largely pragmatic, utilitarian, and instrumental. They literally endorse sustainability—which, under at least some interpretations, amounts to maintenance of ecological function or integrity—and delegate broad discretion to do what is necessary to achieve it. The substantive management mandates under these two statutes are also highly flexible. The multiple-use, sustained-yield standards that govern the BLM and the

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130 Cf. Archie et al., supra note 14 (finding that “[t]he only statistically robust predictor of being farther along in the adaptation process was the agency identity itself”).

131 See generally 3 GEORGE CAMERON COGGINS & ROBERT L. GLICKSMAN, PUBLIC NATURAL RESOURCES LAW ch. 30 (2d ed. 2007).


133 See, e.g., Steven Daugherty, The Unfulfilled Promise of an End to Timber Domination on the Tongass: Forest Service Implementation of the Tongass Timber Reform Act, 24 ENVTL. L. 1573, 1632 n.67 (1994).


USFS “breathe discretion at every pore.” Accordingly, we argue that the BLM and the USFS have relatively expansive legal adaptive capacity and are therefore relatively well positioned to engage in meaningful climate change adaptation activities.

Wilderness management aside, the USFS has in fact responded with greater alacrity and precision to the White House or Departmental prompts than agencies responsible for managing any of the other land systems. This includes the BLM, even though presidential directives apply equally to the two agencies and DOI began imposing adaptation mandates on its agencies about a decade before USDA. Though differences in the extent that goal modification was compulsory may account for these disparities, the BLM’s slower responsiveness is likely due in part to other factors that hindered its willingness or ability to take advantage of its adaptive authority.

Other federal land systems are subject to different management prescriptions. The FWS and the NPS, which are sometimes characterized as dominant use agencies, are often regarded as more committed to the conservation of the natural resources they manage than the USFS or the BLM. One might therefore expect the FWS and the NPS to be more attentive to the potential effects of climate change on their jurisdictional lands and to be more apt to embrace the task of preparing to adapt to these changes.

Yet, the rules governing the NPS’ and the FWS’ management authority afford them less substantive legal adaptive capacity than provided for national forests and BLM lands. The organic statute and interpretive policies that govern management of the national parks, and the FWS’s implementing regulations and policies for the National Wildlife Refuge

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140 Wyom. v. U.S. Dep’t of Agric., 661 F.3d 1209, 1235 (10th Cir. 2011); Perkins v. Bergland, 608 F.2d 803, 806 (9th Cir. 1979).
141 Cf. Archie et al., supra note 14 (arguing that institutional contexts such as statutory mandates and missions “also greatly affect how an agency can interpret a more flexible fire management regime and potentially climate change adaptation”).
142 See infra Part IV.
144 The NPS manages the national parks through the authority granted it under the National Park Service Organic Act, 16 U.S.C. § 1 (2006).
145 See 3 COGGINS & GLICKSMAN, supra note 131, at pt. H (characterizing the organic statutes of the NPS and the FWS dominant use laws).
147 See Fischman, et al., supra note 9, at 993.
System (NWRS), seek to preserve those lands, typically by reference to an historical baseline. Importantly, agency interpretations and management “ha[ve] historically been based on the idea of maintaining current environmental conditions or restoring species and habitats to some desired former condition.”148 For NPS lands and wildlife refuges in Alaska or that include official wilderness, the preferred if not required approach is minimalist management to non-intervention. Official wilderness that is part of the National Wilderness Preservation System is subject to management mandates under the Wilderness Act of 1964 that are most closely rooted in non-intervention.

Neither the historical nor wildness preservation goal fits well with the management approaches needed to promote ecological health in a changing climate. Climate change may obliterate historical conditions, making management to retain them very costly if not impossible. It also will increasingly require active management to retain or restore ecological health. In short, the NWRS’s integration of historical preservation with more flexible sustainability goals makes it subject to a moderate level of substantive legal adaptive capacity; national parks, which are more heavily tied to historical preservation, are governed under a regime with limited substantive legal adaptive capacity; while the emphasis on non-intervention in official wilderness provides the least adaptive capacity.

It is therefore not surprising to us that these regimes have not incorporated climate change adaptation into their decision-making frameworks yet to the same extent that the USFS has. In fact, the extent of adaptation activities correlates with the substantive adaptive capacity of the land regime, with refuges having made more progress on adaptation, followed by national parks. In the context of wilderness management, climate change adaptation has essentially gone missing.

A. Executive Branch and Department-Wide Initiatives

President Barack Obama has consistently prioritized climate preparedness. He issued an executive order in 2009 establishing a task force to create an initial adaptation strategy and directing all federal agencies to develop vulnerability assessments and adaptation plans.149 Subsequently, the President directed agencies to protect biodiversity and conserve natural resources in the face of climate change.150 A second executive order issued in 2013 replaced the initial task force with a multi-agency Council on

148 GAO, supra note 111, at 19 (2013).
Climate Preparedness and Resilience tasked with recommending actions to encourage climate preparedness and resilience.\textsuperscript{151}

In 2014, the Council issued a report\textsuperscript{152} identifying priority strategies to make the nation’s natural resources more resilient to climate change, including (1) fostering climate-resilient lands and waters and (2) modernizing federal programs to build resilience.\textsuperscript{153} The report concluded that despite progress in pursuing the first strategy, \textsuperscript{154} “management at the landscape scale is not yet the norm.”\textsuperscript{155} It directed agencies to develop and provide decision-support tools to improve their capacity to manage for resilience and to select priority areas for conservation, restoration, or other investments to build resilience.\textsuperscript{156} The report further directed specific agencies, including DOI and USDA, to develop “resilience metrics.”\textsuperscript{157} With respect to the second priority, the Council directed agencies with natural resources responsibilities to identify best practices for applying resilience criteria to program management.\textsuperscript{158} For the most part, the Council’s directives apply to all federal agencies with natural resources-related responsibilities. The details of implementation in many cases, however, are left to departments or individual agencies within departments.

DOI has long engaged in department-wide climate change adaptation initiatives. In 2001, the Interior Secretary issued an order directing DOI agencies to consider climate change impacts in planning, priority-setting, and resource management.\textsuperscript{159} In 2009, Interior Secretary Kenneth Salazar replaced that order with Secretarial Order 3289,\textsuperscript{160} which established a Climate Change Response Council to execute a coordinated Department-wide strategy.\textsuperscript{161} The Secretary directed the Council to work with the USGS to rename previously created “regional hubs” as Regional

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\textsuperscript{152} Council on Climate Preparedness and Resilience, Priority Agenda: Enhancing the Climate Resilience of America’s Natural Resources (Oct. 2014), http://www.whitehouse.gov/sites/default/files/docs/\textcolor{black}{enhancing_{\textsuperscript{\textit{climate}}}\_\textsuperscript{\textit{resilience}}\_\textsuperscript{\textit{of}}\_\textsuperscript{\textit{americas}}\_\textsuperscript{\textit{natural}}\_\textsuperscript{\textit{resources}}.pdf}.
\textsuperscript{153} \textit{Id.} at 5-6, 14.
\textsuperscript{154} \textit{Id.} at 16-18.
\textsuperscript{155} \textit{Id.} at 18.
\textsuperscript{156} \textit{Id.} at 19-20.
\textsuperscript{157} \textit{Id.} at 20.
\textsuperscript{158} \textit{Id.} at 51.
\textsuperscript{160} Secretarial Order 3289, Addressing the Impacts of Climate Change on America’s Water, Land, and Other Natural and Cultural Resources (Sept. 14, 2009), http://www.doi.gov/whatwedo/climate/cop15/upload/SecOrder3289.pdf.
\textsuperscript{161} \textit{Id.} § 3(a).
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Climate Change Response Centers (CSCs) to develop adaptation tools for use by DOI managers.\(^{162}\) It also called for the development of Landscape Conservation Cooperatives (LCCs) to coordinate regional adaptation efforts.\(^ {163}\) With the FWS serving as primary coordinator, each LCC serves as a conduit for interagency communication on regional landscape conservation.\(^ {164}\) Like its predecessor, Order 3289 imposed uniform mandates on all DOI agencies.

In 2012, DOI included in its Departmental Manual new provisions relating to climate change adaptation.\(^ {165}\) The provisions commit DOI to integration of climate change adaptation strategies into its policies, planning, programs, and operations, including park, refuge, and public land management; habitat restoration; species and ecosystem conservation; water management; and land acquisition.\(^ {166}\) The Manual specifies that DOI will manage uncertainty through tools such as scenario planning and adaptive management, and will promote landscape-scale, ecosystem-based management approaches to enhance resilience and sustainability of linked human and natural systems.\(^ {167}\) It commits DOI to develop performance metrics in management plans and regularly assess whether such measures are succeeding.\(^ {168}\) Bureau and office heads must incorporate adaptation into planning processes, develop and implement adaptation plans, and update decision-making processes to integrate the policy’s principles and values.\(^ {169}\) However, DOI specified that the policy is only designed to improve its internal management, creates no enforceable rights, and “does not alter or affect any existing duty or authority of individual bureaus.”\(^ {170}\)

The DOI issued a Climate Change Adaptation Plan in 2013 that recognized that “[v]ulnerabilities to climate change impacts vary widely across the Department’s mission areas. Bureaus’ climate change adaptation priorities and needs depend on the particular vulnerabilities of their mission

\(^ {162}\) Id. § 3(b). DOI subsequently created eight such Center. U.S. Department of the Interior, Climate Science Centers, http://www.doi.gov/csc/index.cfm. For a description of the CSCs, see USGCRP, SYNTHESIS, supra note 8, at 41-42.

\(^ {163}\) Secretarial Order 3226, supra note 159, § 3(c). For a description of the functions of the LCCs, see USGCRP, SYNTHESIS, supra note 8, at 39-41.

\(^ {164}\) http://lccnetwork.org/.


\(^ {166}\) Id.

\(^ {167}\) Id. § 1.4A(7), (9).

\(^ {168}\) Id. § 1.4B.

\(^ {169}\) Id. § 1.5C. Agency heads also must ensure full engagement with LCCs and CSCs. Id.

\(^ {170}\) Id. § 1.6.
and assets.” The plan nevertheless enunciated “guiding principles” for all bureaus and offices. These included ensuring enhancing the ability of ecosystems and wildlife populations to absorb change and maintain key qualities through means such as protection and restoration of contiguous blocks of un-fragmented habitat and enhanced connectivity among habitat blocks. The plan also stated that DOI would require individual agencies to establish adaptation-related planning priorities.

In 2014, DOI issued a more elaborate plan, which described its “evolving” approach to climate change adaptation. This plan identified climate adaptation priorities for the three DOI land management agencies. For the BLM, these included conducting vulnerability assessments and strengthening landscape level planning efforts. For the NPS, they included developing guidance for incorporating climate change science into park and strategic plans and implementing those plans at the field level, and evaluation of risk and prioritization of adaptation actions to protect facilities and cultural and historical resources. For the FWS, the priorities included facilitating sustainable landscapes through LCC-based collaborative planning and management and developing a climate change policy framework.

The 2014 plan also identified five principal strategies for managing climate risks and building resilience. One strategy is to mainstream and integrate climate change adaptation into both agency-wide and regional planning efforts. An example is the FWS’s efforts through LCCs and CSCs to develop shared adaptation goals with conservation partners and develop resilient landscape designs. As of fiscal year 2014, the design of these efforts was underway or project activity had been initiated. Another strategy is to enforce protocols that reflect projected health and safety impacts of climate change. One example is NPS efforts to factor sea level rise and storm surge science into hurricane response plans for coastal parks. Progress is again seemingly described as rudimentary: design underway or project activity initiated. Yet another strategy involves updating external

172 Id. at 4-8.
173 Id. at 11-12.
175 Id. at 11.
176 Id. at 12-13.
177 Id. at 13.
178 Id. at 26-27.
179 Id. at 28.
programs and policies (e.g., through grants and technical assistance) to incentivize planning for and addressing climate impacts. What is striking about all of these examples is how far from broad scale, on-the-ground implementation all of them appear to be.

USDA began planning for climate change about a decade after DOI. Departmental Regulation 1070-001, issued in 2011, established a USDA-wide directive to integrate climate change adaptation planning and actions into programs, policies, and operations. The Regulation required USDA agencies to analyze how climate change may affect missions and program objectives, identify necessary budgetary adjustments, and specify areas in which legal analysis is needed to implement the Regulation. It also directed agencies to consider climate impacts in long-term planning.

Two years later, USDA issued a Strategic Sustainability Plan that committed it to develop, prioritize, implement, and evaluate actions to minimize climate risks. The plan identified nine sustainability goals, the last of which was promoting climate change resiliency. By fiscal year 2014, USDA would implement agency-specific adaptation plans. It would also incorporate preparedness and resilience into planning and implementation guidelines for specific projects.

USDA’s 2014 Climate Change Adaptation Plan noted the need for flexibility to adapt to the uncertainty reflected in climate change projections. The Plan identified five strategic goals, including ensuring that the national forests are “conserved, restored, and made more...”

180 USDA, Departmental Regulation 1070-001, at 1 (June 3, 2011), available at http://www.ocio.usda.gov/sites/default/files/docs/2012/DR%201070-001%20USDA%20Policy%20on%20Climate%20Change.pdf. USDA had issued a strategic plan the year before which included as one of four strategic goals promoting resilience to climate change. It also released a Climate Change Science Plan that year, which sought to incorporate climate change into USDA’s scientific missions. USGCRP, SYNTHESIS, supra note 8, at 16-17.

181 Id. at 2.

182 Id. at 2-3.


184 Id. at xi-xii.

185 Id. at 33.

186 Id. at 34.


resilient to climate change.” The Plan included adaptation plans by individual USDA agencies, including the USFS’s plan, which is discussed below.

B. The National Forests

The USFS’s management of national forests entails considerable legal adaptive capacity as a result of both flexible substantive management goals that focus on promoting sustainable ecological function and the integration of flexible processes for resource management. The USFS has leveraged this substantial legal adaptive capacity to engage in the most extensive climate-related planning of the four land management agencies and to integrate consideration of and preparation for climate change into its management processes.

1. Adaptive Capacity under NFMA

The USFS derives its management and regulatory authority from the National Forest Management Act (NFMA). NFMA’s focus on promoting long-term ecological sustainability and diversity as part of a multiple-use, sustained-yield regime provides a flexible resource management goal that is able to accommodate ecological change.

In advancing its focus on long-term productive use of national forests, NFMA is replete with references to the need to accommodate change in management. The statute’s very first subsection includes a congressional finding that “the management of the Nation’s renewable resources is highly complex and the uses, demand for, and supply of the various resources are subject to change over time.” The statute enunciates that the public interest is served by the Forest Service’s

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189 USDA Climate Change Adaptation Plan, supra note 187, at 2. To achieve that goal, USDA sought to improve forest and grassland heath, lead efforts to mitigate and adapt to climate change, protect and enhance water resources, and reduce the risk of catastrophic wildfire. USDA, Strategic Plan FY 2014-2018, supra note 187, at 3, 14-18. USDA established seven regional climate hubs to strengthen resource management under increasing climate variability. Id. at 20. These hubs involve USDA coordination with DOI CSCs and LCCs, as well as other agencies. Id. at 26-27. The USFS hosts five of the hubs. Id. at 67.
190 Id. at 57-88.
191 See infra Part III.B.2. In 2015, USDA issued a directive on the establishment and revision of its climate change adaptation plan. The directive requires USDA agencies to integrate climate change adaptation planning, implementing actions, and performance metrics into its programs, policies, and operations. It also requires agencies to identify areas in which budget adjustments or legal analysis is needed to carry out actions identified in the directive. USDA, Departmental Regulation 1070-001 (June 15, 2015), available at http://www.ocio.usda.gov/document/departmental-regulation-1070-001.
193 Id. § 1600(1).
assessment of the nation’s renewable resources and periodic preparation, review, and updating of a national renewable resource program. Other indications that Congress sought to afford the USFS the tools to react to changing conditions and needs are reflected in congressional findings that new knowledge derived from scientific research will promote “a sound technical and ecological base for effective management, use, and protection of the Nation’s renewable resources,” and that the USFS has a responsibility and opportunity to “be a leader in assuring that the Nation maintains a natural resource conservation posture that will meet the needs of our people in perpetuity.” NFMA also directs the USFS to maintain on a continuing basis a detailed, comprehensive inventory of National Forest System lands that “reflect[s] changes in conditions and identifies new and emerging resources and values.”

Indeed, in a provision added by the Food, Agriculture, Conservation, and Trade Act of 1990, NFMA specifically requires the periodic resource assessment to include “an analysis of the potential effects of global climate change on the condition of renewable resources on the forests and grasslands of the United States.” Similarly, the 1990 amendments to NFMA require the USFS to periodically prepare and submit to the President a Renewable Resource Program which must include management recommendations which “account for the effects of global climate change on forest and rangeland conditions, including potential effects on the geographic ranges of species, and on forest and rangeland products.”

The USFS’s authority (and duty) to manage the forests in light of changing conditions is also integrally woven into NFMA’s basic management standards. The statute declares a policy that the forests be maintained in appropriate forest cover “to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans.” It requires the USFS to periodically adopt detailed management plans for each national forest and assure that the plans

194 Id. § 1600(2).
195 Id. § 1600(4).
196 Id. § 1600(6).
197 Id. § 1603.
200 Id. § 1602(5)(F).
201 Id. § 1601(d)(1).
“provide for multiple use and sustained yield of the products and services obtained therefrom.” The USFS must “determine forest management systems” in light of multiple-use and sustained-yield principles, as borrowed from the Multiple-Use, Sustained Yield Act of 1960. The 1960 Act defines multiple use as management of the national forests so that they are used in the combination that best meets the nation’s needs, providing “sufficient latitude for periodic adjustments in use to conform to changing needs and conditions.”

NFMA therefore provides the USFS considerable flexibility in determining the appropriate balance of multiple uses in its planning and management activities. As indicated above, the courts have described the multiple-use, sustained-yield standards as “breathing discretion at every pore.” They also have characterized those standards as failing to provide any guidance on how to assess agency management activities.

Nevertheless, the NFMA imposes some substantive constraints on agency discretion. It requires that land and resource management plans “provide for diversity of plant and animal communities . . . in order to meet overall multiple-use objectives” in light of the suitability and capability of a particular national forest unit. Further, the multiple-use, sustained-yield management mandate can be read to encompass management for ecosystem health.

Even viewed from the narrowest perspective of its role—as an agricultural manager of timber production—sustainability and adaptation to future conditions threatening to disrupt forest function has always been critical to the USFS’s mission. However, the USFS has in recent years demonstrated a much broader commitment to ecological sustainability, as

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202 Id. § 1604(e)(1). The statute identifies recreation, range, timber, watershed, wildlife and fish, and wilderness as relevant multiple uses. Id.
203 Id. § 1604(3)(2).
205 16 U.S.C. § 531(a). The 1960 Act defines “sustained yield of the several products and services” as “the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land. Id. § 531(b). Both the USFS and the BLM “have effectively applied that definition only in the context of one resource, timber.” 3 Coggins & Glucksman, supra note 131, at § 32:27.
206 See Jan G. Laits, Natural Resources Law 163 (2002).
207 Perkins v. Bergland, 608 F.2d 803, 806 (9th Cir. 1979).
208 Sierra Club v. Marita, 845 F. Supp. 1317, 1328 (E.D. Wis. 1994), aff’d, 46 F.3d 606 (7th Cir. 1995).
209 16 U.S.C. § 1604(g)(3)(B) (2006). It also requires “to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan.” Id.
210 See 3 Coggins & Glucksman, supra note 131, at § 30:5 (arguing that “multiple use, sustained yield management “may implicitly encompass” ecosystem management).
reflected in its latest planning and roadless rules. The stated purpose of the agency’s 2012 planning regulations is to produce plans that:

promote the ecological integrity of national forests and grasslands and other administrative units of the [National Forest System (NFS)]. Plans will guide management of NFS lands so that they are ecologically sustainable and contribute to social and economic sustainability; consist of ecosystems and watersheds with ecological integrity and diverse plant and animal communities; and have the capacity to provide people and communities with ecosystem services and multiple uses that provide a range of social, economic, and ecological benefits for the present and into the future.211

Similarly, the USFS justified its 2001 regulations restricting timber harvesting and road construction as necessary to protect the social and ecological values and characteristics of roadless areas, whose watershed values and ecosystem health would be at risk without immediate action.212 These commitments increase the likelihood that the USFS will take rapid and extensive adaptation planning and implementation seriously.

The USFS’s expansive substantive legal adaptive capacity is accompanied by its embrace of procedural legal adaptive capacity through flexible adaptive management procedures in its planning rules. The USFS has integrated adaptive management and similar back-end mechanisms into and throughout its management process. The regulations, adopted in 2012, define the planning process as an “iterative” one comprised of assessment, plan development or revision, and monitoring.213 Indeed, one of the defects in the 1982 planning regulations that the 2012 regulations sought to remedy was their failure to reflect current adaptive management practices.214 Among other things, agency officials must prepare monitoring evaluations indicating whether or not a change to management activities may be warranted based on the new information, and use the results to inform adaptive management of the plan area.215 Courts have endorsed the USFS’s use of adaptive management processes in national forest management.216 Both substantively and procedurally, the USFS has ample legal adaptive

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211 36 C.F.R. § 219.1(c) (2014).
213 36 C.F.R. §219.5(a) (2014). “Monitoring is continuous and provides feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness . . . .” Id. § 219.5(a)(3).
capacity that should situate it well to respond to changing needs and conditions arising from climate change.

2. Evaluating Adaptation Activities of the USFS

The USFS’s legal adaptive capacity has translated into the most extensive adaptation planning and integration of adaptation into management processes of any of the federal land management agencies. As early as 2008, the USFS developed a Strategic Framework for responding to climate change.\textsuperscript{217} That Framework characterized climate change as one of the greatest challenges to sustainable management forests and grasslands and to human well-being we have ever faced, because rates of change will likely exceed many ecosystems’ capabilities to adapt naturally. Without fully integrating consideration of climate change impacts into planning and actions, the Forest Service can no longer fulfill its mission.\textsuperscript{218}

The agency recognized that many forest ecosystem services may be lost or significantly altered if forests are not managed adaptively.\textsuperscript{219} It asserted that “strategies based on historical or current conditions will need to be adjusted or replaced with approaches that support adaptation to the changing conditions of the future.”\textsuperscript{220} The agency announced its intention to engage in “facilitated adaptation,” which would include both anticipatory and opportunistic actions.\textsuperscript{221} The Framework established seven goals, including understanding the environmental, economic, and social implications of climate change;\textsuperscript{222} enhancing the capacity of forests to adapt to climate stresses so as to maintain ecosystem services; and integrating climate change into USFS policies, program guidance, and communications.\textsuperscript{223} The Framework included five pages of specific recommendations to achieve the seven goals.\textsuperscript{224}

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\textsuperscript{218} \textit{Id.} at 2.
\textsuperscript{219} \textit{Id.} at 4.
\textsuperscript{220} \textit{Id.} at 3-4.
\textsuperscript{221} For a description of the difference between anticipatory and opportunistic actions, see \textit{id.} at 4.
\textsuperscript{222} In 2009, the USFS also issued its Global Change Research Strategy to guide its research efforts to bolster capacity to sustain and provide ecosystem services, including research concerning adaptation. USGCRP, \textit{Synthesis}, \textit{supra} note 8, at 18-19.
\textsuperscript{223} USFS, \textit{Strategic Framework}, \textit{supra} note 217, at 7. The document stated that “[t]he primary focus of efforts on National Forest System lands will be to facilitate the adaptation of ecosystems to the effects of climate change.” \textit{Id.} at 8.
\textsuperscript{224} \textit{Id.} at 14-18. For example, the agency recommended assessment of how management measures may be modified to facilitate adaptation at various spatial scales. \textit{Id.} at 15.
In 2010, the USFS adopted a “performance scorecard” to be completed annually by each unit of the NFS.\textsuperscript{225} The scorecard provides an annual assessment of unit performance in four areas – organizational capacity, engagement, adaptation, and mitigation and sustainable consumption. Among the questions relating to adaptation is whether an adaptation strategy is in place that helps incorporate resource vulnerability into priority setting and management actions.\textsuperscript{226} By 2015, each unit should be able to answer “yes” to seven of the ten scorecard questions.\textsuperscript{227}

The next year, the USFS issued a National Roadmap for Responding to Climate Change.\textsuperscript{228} It provided a litany of actions to facilitate adaptation in three areas: assessment of climate risks and knowledge gaps, engagement with employees and stakeholders, and management for resilience.\textsuperscript{229} In each area, the Roadmap identified ongoing, immediate, and longer-term initiatives. For example, the ongoing management actions included treating overgrown forests to make them less vulnerable to wildfire and insects, controlling invasive species, relocating roads and facilities to resist floods, and reforesting land damaged by fires or weather events.\textsuperscript{230} The immediate actions included connecting habitats through measures such as removal of impediments to the movement of species most likely to be affected by climate change.\textsuperscript{231} Longer-term initiatives included restoring disturbed areas by replanting stock from seed sources and species capable of adapting to changing conditions, developing seed and plant stocks appropriate for re-vegetation, and development of comprehensive strategies to maintain and restore habitat connectivity.\textsuperscript{232}

In 2012, the USFS issued perhaps its most forceful adaptation initiative through its revised planning regulations.\textsuperscript{233} The regulatory preamble identified eight overriding purposes and needs, two of which relate explicitly to climate change: emphasize restoration of natural

\textsuperscript{226} \textit{Id.}
\textsuperscript{227} \textit{Id.} at 23.
\textsuperscript{228} \textit{Id.} at 25.
\textsuperscript{229} \textit{Id.} at 26.
resources to enhance resilience; and contribute to sustainability by ensuring that plans will be responsive and can adapt to challenges such as climate change.\(^{234}\) Consistent with the Roadmap and Scorecard, the regulations incorporate a strategic framework for adaptive management to help determine if there are measurable changes related to climate change and other stressors that need to be addressed.\(^{235}\) Most significantly, the regulations require agency officials to take climate change into account when developing plan components for ecological sustainability.\(^{236}\) Officials also must consider climate change when providing for ecosystem services and multiple uses.\(^{237}\)

In 2015, the USFS issued Land Management Planning Directives that revised Forest Service Handbook and Manual provisions establishing procedures and responsibilities for implementing the planning regulations.\(^{238}\) The Directives address the role of climate change in the planning process in greater detail than the regulations. For example, the regulations require planners to identify and evaluate information for system drivers of key ecosystem characteristics, including a changing climate.\(^{239}\) The Directives elaborate:

The Interdisciplinary Team\(^{240}\) should assess predominant climatic regimes by reviewing existing information such as vulnerability assessments and scenario planning. . . . Note that climate change is both a system driver and a stressor. The Interdisciplinary Team shall document the assumptions used to assess predominant climate regimes.\(^{241}\)

The Directives also guide agency officials in designing plan components to sustain functional ecosystems, defined as those that sustain critical

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\(^{234}\) Id. at 21,164, 21,173.

\(^{235}\) 77 Fed. Reg. at 21,176.


\(^{237}\) Id. § 219.10(a)(8). In 2012, the USFS also issued a Climate Project Screening Tool to that included a detailed list of recommended actions to address climate change in connection with activities such as fuels management, restoration, grazing, road maintenance and construction, recreation planning, and mitigation. Toni L. Morelli et al., Climate Project Screening Tool: An Aid for Climate Change Adaptation, Research Paper PSW-RP-263, at 6-7, 16-21 (Feb. 2012), available at http://www.fs.fed.us/psw/publications/documents/psw_rp263/psw_rp263.pdf.


\(^{239}\) 36 C.F.R. § 219.6(b) (2014).

\(^{240}\) The USFS’s planning regulations require planning officials to “establish an interdisciplinary team” to prepare assessments and plan revisions and monitoring programs. Id. § 219.5(b). The regulations do not further define the term.

ecological functions over time to provide ecosystem services. In doing so, planners must take into account the effects of a changing climate. Specific climate-related issues that may be relevant to planning and management decisions include the effects of climate change on stream flows that may affect the size of riparian management zones, changes in occurrence of extreme storm events that may affect soil productivity, and warming trends at higher elevations, which may alter the capability of some forests to provide ecological conditions needed to maintain viable populations of species such as the American pika.

Some national forests have already incorporated these requirements into specific management plans or otherwise addressed climate change. The 2013 Land and Resource Management Plan for the San Juan National Forest in Colorado, for example, devotes an eight-page appendix to climate change trends and management strategies for species and ecosystems that are already changing. Other plans address climate-related impacts such as declines in permanent snowpack that provides a water source for wildlife or effects on wildlife habitat, physiology, phenology, and biotic interactions. The agency has developed a template for assessing climate change impacts and management options, and is applying it in revising

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242 Id. 23.11.
243 Id. 23.11(2)(d).
244 Id. 23.11f(e)(f).
245 Id. 23.12f(b)(f).
246 Id. 23.13c(4)(c).
247 Officials at several national forests have entered partnerships with other federal agencies, states, tribes, and non-governmental organizations in community-based adaptation efforts. See USGCRP, SYNTHESIS, supra note 8, at 19-20. They also have partnered with scientists within the agency and at local universities to facilitate adaptation. Id. at 22-23.
248 SAN JUAN NATIONAL FOREST LRMP (2013), http://www.fs.usda.gov/detail/sanjuan/landmanagement/planning/?cid=stelprdb5432707. These strategies include: (1) securing a reliable source of local seed stock for native species to be used for re-vegetation and restoration after disturbance; (2) enhancing the resiliency of alpine ecosystems and providing refugia for alpine-dependent species by removing non-climate stressors such as unmanaged livestock grazing and motorized recreation from alpine habitat; (3) allowing fires to promote the heterogeneity of spruce-fir forests; and (4) eradicating invasive species. Id. Appendix G, at G-3 to G-4, available at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5435653.pdf. The descriptions in the appendix merely summarize references to climate challenges and responsive management strategies discussed throughout the plan itself. Id. at G-2.
land use plans. It has conducted vulnerability assessments at NFS units to identify management constraints and options. It also has conducted pilot assessments in eleven national forests of potential hydrologic changes and watershed vulnerability.

In its 2014-2018 Strategic Plan, USDA estimated that as of 2012, 35% of national forests and grasslands were in compliance with a climate change adaptation and mitigation strategy. Its goal was 100% compliance by 2020. USDA also estimated that 58.5 million acres in the NFS were in a desired condition to reduce catastrophic wildfire risks in 2009, a figure it sought to increase to 60.7 million acres by 2018. By the end of fiscal year 2013, 49% of NFS units had met the performance scorecard target. Specific initiatives also had made progress. For example, studies on how to conserve genetic diversity in the face of climate change were completed or underway. A climate-sensitive version of the agency’s Vegetation Simulator Model was implemented for the western conterminous United States. Resource constraints such as insufficient field resources, however, slowed the pace of land use plan revisions, restoration work needed to increase resilience, treatment of forests infested with western bark beetles, and conservation of genetic diversity.

The USFS clearly has prioritized climate change adaptation, required that forest plans address it, established fairly specific guidance and

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256 Id.
257 USDA Climate Change Adaptation Plan, supra note 187, at 69.
258 Id. at 86.
259 Id. at 87.
260 Id. at 74.
261 Id. at 78.
262 Id. at 79. On the manner in which available forest management strategies may affect the scope and distribution of forest damage caused by bark beetle infestations, see Charles Sims et al., Complementarity in the Provision of Ecosystem Services Reduces the Cost of Mitigating Amplified Natural Disturbance Events, 111 Proc. Nat’l Acad. Sci. 1111 (Nov. 25, 2014).
263 Id. at 86.
tools to assist in planning, and begun to apply the guidance at the unit level. If not for budgetary constraints, the agency would have done even more.\textsuperscript{264} Though historically not an agency particularly associated with proactive ecological conservation, its relatively substantial legal adaptive capacity makes it less surprising that the USFS would be the resource agency most engaged in climate change adaptation planning and implementation.\textsuperscript{265}

The 1990 amendments to NFMA\textsuperscript{266} long ago added specific mandates that renewable resource assessments include an analysis of the effects of climate change on resource conditions.\textsuperscript{267} These statutory changes and the USFS’s periodic Renewable Resource Program recommendations may account for the effects of climate change on forest and rangeland conditions.\textsuperscript{268} have driven the agency’s efforts to address climate change. There is no evidence to support that hypothesis, however. The 2010 Strategic Framework, the 2011 National Roadmap and, most notably, the 2012 planning regulations and accompanying preamble all lack even a single reference to these statutory provisions relating to climate change.\textsuperscript{269} Indeed, the preamble to the planning regulations explains that provisions to meet the purpose and need of the environmental impact statement prepared in connection with the regulations “\textit{but not otherwise required by NFMA}, were included . . . to ensure that plans would be responsive to the challenges of climate change . . . .”\textsuperscript{270} Instead, the agency attributed the planning requirements relating to climate change to the statutory multiple-use mandate.\textsuperscript{271} The agency’s expansive substantive

\textsuperscript{264} The fiscal year 2016 budget justification for the Forest Service refers repeatedly to the need for actions to prepare for and respond to forest management challenges that are being exacerbated by climate change, including drought, invasive species, wildfires, and insect and disease outbreaks. U.S. DEP’T OF AGRIC., FOREST SERV., FISCAL YEAR 2016 BUDGET OVERVIEW 6 (Feb. 2015), http://www.fs.fed.us/sites/default/files/media/2015/07/fy2016-budget-overview-update.pdf; see also id. at 9, 10, 12, 20, 30. The agency sought a $20.7 million increase in funding above enacted 2015 levels for wildfire management, and a $16.5 million increase for land acquisition, which it described as intended to meet the goals of the President’s Climate Action Plan for species conservation. Id. at 10, A-1.

\textsuperscript{265} The USFS also has a history of leadership on some conservation issues, such as wilderness preservation, that may have contributed to its early commitment to addressing climate-related threats to ecological function. See Robert L. Glicksman, \textit{Wilderness Management by the Multiple Use Agencies: What Makes the Forest Service and the Bureau of Land Management Different?}, 44 ENVTL. L. 447 (2014).

\textsuperscript{266} See supra notes 198–200 and accompanying text.


\textsuperscript{268} Id. § 1602(5)(F).

\textsuperscript{269} The preamble to the planning regulations cite as the underlying legal authority NFMA §§ 1604 and 1613, not 1601 or 1602. 77 Fed. Reg. at 21,260. The preamble states that “[c]onsideration of changing conditions in planning is not new to the Forest Service,” but makes no reference to the 1990 amendments bearing on climate change. Id. at 21,176.

\textsuperscript{270} Id. at 21,170 (emphasis added).

\textsuperscript{271} Id. (citing 36 C.F.R. § 219.10, which requires that land and resource management plans “provide for ecosystem services and multiple uses”).
legal adaptive capacity appears to be a more important factor in explaining its progress on planning and managing for climate change.

C. The Public Lands

In contrast with the USFS, the BLM has been much slower off the mark in engaging in climate change adaptation on the public lands it manages. The BLM has legal adaptive capacity that is analogous to that available to the USFS, and its parent agency, DOI, began establishing mechanisms for integrating climate change adaptation considerations into its planning and management before USDA did. As discussed in Part IV, we attribute the BLM’s hesitation to other factors.

1. Adaptive Capacity under FLPMA

FLPMA, which is the chief statute governing BLM management of the public lands,\(^{272}\) imposes on the BLM essentially the same multiple-use, sustained-yield mandate that governs USFS management of the national forests. FLPMA lacks the multitudinous references to the need for adjustments in management policies and approaches in response to changing needs and conditions found in NFMA, and it does not explicitly refer to climate change. Like NFMA, however, it dictates management on the basis of multiple-use, sustained-yield principles,\(^ {273}\) and it requires the BLM to apply those principles through the adoption and implementation of land use plans called resource management plans.\(^ {274}\) Moreover, FLPMA’s definition of “multiple use,” like the one that governs the USFS under the 1960 Multiple-Use, Sustained Yield Act,\(^ {275}\) refers to management that “provide[s] sufficient latitude for periodic adjustments in use to conform to changing needs and conditions.”\(^ {276}\) The courts have construed the multiple-use, sustained-yield mandate to vest broad discretionary authority in the BLM, just as they have for the USFS under NFMA.\(^ {277}\)

FLPMA also incorporates very flexible ecological goals. The statutory definition of “multiple use” refers to “harmonious and coordinated

\(^{272}\) FLPMA defines “public lands” as lands owned by the United States and managed by the BLM, with certain exceptions. 43 U.S.C.A. § 1702(e) (2006).


\(^{274}\) Id. § 1732(a).

\(^{275}\) See supra notes 204-205 and accompanying text.

\(^{276}\) 43 U.S.C. § 1702(c) (2006). For FLPMA’s definition of “sustained yield,” see id. § 1702(h). FLPMA also requires the BLM to maintain a public lands inventory “so as to reflect changes in conditions and to identify new and emerging resources and other values.” Id. § 1711(a). The statute adds, however, that the inventory “shall not, of itself, change or prevent change of the management or use of public lands.” Id.

\(^{277}\) See, e.g., Theodore Roosevelt Conservation P’ship v. Salazar, 616 F.3d 497, 518 (D.C. Cit. 2010) (stating that the BLM has “wide discretion to determine how these principles should be applied”).
management of the various resources without permanent impairment of the productivity of the land and the quality of the environment.\(^{278}\) BLM lands, however, are not subject to any requirement akin to the NFMA’s diversity requirement; the only definitive BLM planning standards require the designation and protection of areas of critical environmental concern and compliance with pollution control laws.\(^{279}\) The statute requires that the BLM, in managing the public lands, “by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands.”\(^{280}\) In addition, the BLM must manage areas being studied for possible designation as wilderness so as “to prevent unnecessary or undue degradation or to afford environmental protection.”\(^{281}\)

The lack of procedural specificity in FLPMA has likewise allowed the BLM to resort to procedural devices of its choosing. Within limits, the courts have often approved the BLM’s use of adaptive management measures, just as they have for the USFS.\(^{282}\)

FLPMA thus creates a flexible core mission for the BLM to manage the public lands to promote the sustainability of ecological resources in service of consumptive and other utilitarian goals, recognizing that the particular ecological constituents that promote this objective are likely to change over time. This malleable mandate, coupled with the agency’s use of procedurally adaptive techniques such as adaptive management, appears to afford the BLM legal adaptive capacity perhaps even greater than the USFS’s under NFMA. It ought to provide the BLM with the tools needed to manage in the face of climate change.

### 2. Evaluating the BLM’s Adaptation Activities

Yet, the BLM’s climate-related efforts appear to pale in comparison to the USFS’s initiatives. The BLM claims to have embarked on a “landscape approach” comprised of five interconnected components: rapid


\(^{279}\) Id. § 1712(c)(3), (8). Areas of critical environmental concern are defined at id. § 1702(a).

\(^{280}\) Id. § 1732(b).

\(^{281}\) Id. § 1782(c).

\(^{282}\) See, e.g., Theodore Roosevelt Conservation P’ship v. Salazar, 616 F.3d 497, 515–17 (D.C. Cir. 2010); Wilderness Soc’y v. U.S. Bureau of Land Mgmt., 822 F. Supp. 2d 933, 942–43 (D. Ariz. 2011), aff’d on other grounds, 2013 WL 2303526 (9th Cir. 2013) (table); In re Montana Wilderness Ass’n, 807 F. Supp. 2d 990, 996 (D. Mont. 2011), aff’d in part, rev’d in part on other grounds, 725 F.3d 988 (9th Cir. 2013). But see Klamath Siskiyou Wildlands Center v. Boody, 468 F.3d 549, 555–60 (9th Cir. 2006) (refusing to allow timber sales inconsistent with a resource management plan on ground that sales were “adaptive management modifications” contemplated by the plan).
ecoregional assessments (REAs),

ecoregional direction, field implementation, monitoring for adaptive management, and science integration.

REAs map areas of high ecological value and gauge potential climate risks. Ecoregional direction seeks to use the results of the REAs to identify management priorities and priority areas for conservation and development, and provide a “blueprint” for implementing these priorities. Field implementation will put management strategies identified in ecoregional direction into practice on the ground, such as by amending resource management plans or revising mitigation measures for authorized land uses. Monitoring will provide information for adaptive management that refines implementation actions. Finally, science provided by the DOI’s CSCs and other sources should facilitate implementation of measures to adapt to climate impacts.

Unfortunately, these efforts largely are not yet reflected in significant management activities, such as resource management plans or project approvals, and some of the actions taken are short on substantive analysis of climate change impacts or strategies for responding to them. A 47-page report issued by the BLM in 2010 on “lessons learned” from ecological assessment processes included only two vague references to climate change, and one of those was in the literature review portion of the report.

Another report, issued in 2011, describing the BLM’s Assessment, Inventory and Monitoring Strategy (AIM) developed in connection with the monitoring component of the landscape approach referred to climate change just once.

Consistent with the cursory nature of these reports, the U.S. Government Accountability Office (GAO) concluded in May 2013 that the BLM lacked strategic direction to help guide field and district offices in addressing climate change.

The GAO opined that the BLM’s ecoregional assessments eventually “may prove useful in addressing climate change

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283 Citations to the reports on REAs are collected at USGCRP, SYNTHESIS, supra note 8, at 44-45.
285 Id.
288 GAO, supra note 111, at 51.
adaptation.”289 It also noted with approval the BLM’s pending adoption of a field guide for vulnerability assessments.290 The GAO noted BLM’s plans to develop a high-level climate adaptation strategy by the end of the summer 2013,291 but as of February 2015, no such strategy had been publicly released. The GAO also reported that the BLM had not provided guidance to its offices on how to incorporate climate change adaptation into natural resource planning and management, although agency guidance on issues such as drought and invasive species may indirectly help resource managers address climate change.292

In addition, the little work BLM is doing on climate change has mostly been limited to gathering information on resource vulnerabilities rather than developing management strategies. The GAO found that some of REAs are important first steps. The Colorado Plateau REA, for example, notes that invasive species such as cheatgrass and tamarisk have the potential to shift their ranges in response to climate change.293 The agency considered multiple climate projections in preparing the REA,294 and the resulting report includes a “climate change scenario” section which revealed that prairie dogs and sage grouse are at risk of very high climate stress by 2060, while big sagebrush and pinyon-juniper woodland also are likely to be adversely affected.295 The REA poses a series of management questions, several of which focus on climate change.296 Other completed REAs include similar discussion.297 Such analyses are steps to assist BLM resource managers account for climate change, but they are assessments rather than decisions that reflect on-the-ground management decisions.298

Though still inchoate, the BLM has issued a wildfire management strategy that recognizes a variety of stressors, including climate change, that

289 Id.
290 Id. at 54.
291 Id. at 51.
292 Id.
294 Id. at x.
295 Id. at xi-xii.
296 Id. at 11 (including questions about where/how the distribution of dominant native and invasive species may change from climate change in 2060; where species distribution change between 2010 and 2060 will be; and which aquatic/riparian areas are at risk from climate change).
298 For links to REAs at various stages of completion, see BLM Rapid Ecoregional Assessments, http://www.blm.gov/wo/st/en/prog/more/Landscape_Approach/reas.html.
are exacerbating fire risks and sketches out the broad parameters of an approach to manage those risks. In January 2015, Interior Secretary Jewell issued an order establishing a Rangeland Fire Task Force to reduce the likelihood and severity of rangeland fires and commit resources to preparation for and response to such fires. The Task Force issued a report later that year outlining a recommended strategy for managing wildfire risks in the 2015 and 2016 Western fire seasons, although many of the actions discussed are not scheduled for completion until well after that time or are framed in broad generalities. Nonetheless, the report provides that the strategy should consider “risks from climate change, fire, invasive species, development, and other change agents,” and the task force identified focus areas for science and research, one of which is the “[i]mplications of climate change, grazing and other land uses.” A few of the climate-related recommendations are more specific, such as the development of a strategy to create a long-term seed bank to ensure conservation of germplasm to promote climate resilience and rangeland health. If adopted by the Secretary, the strategy represents a series of early steps in a recommended approach to managing climate-related threats to ecosystem health.

Significantly, in marked contrast to the USFS’s planning regulations, as of mid-2015, the BLM’s land use planning regulations did not include a single reference to climate change. Neither did the BLM Manual provisions on land use planning. In 2014, the BLM did unveil

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299 Secretarial Order No. 3336 §§ 5-6 (Jan. 5, 2015), reproduced in FIRE MANAGEMENT, supra note 114, at 76-80.
300 See, e.g., FIRE MANAGEMENT, supra note 114, at 31 (recommending development of a conservation and restoration strategy for the sagebrush-steppe “that considers emerging science, particularly ecological resistance, and resilience in habitat management, fuels treatment and restoration projects.”).
301 Id. at 32. Similarly, the report recommends development of a national invasive species detection and response program in response to a directive in President Obama’s calls to increase the climate resilience of America’s natural resources. Id. at 37.
302 Id. at 39.
303 Id. at 42.
304 The authors conducted a search in Westlaw’s database for federal regulations for “43 C.F.R.” and “climate change.” The result produced no documents.
its “Planning 2.0” initiative, which seeks to create a more dynamic planning process and plan across landscapes and at multiple scales. Adoption of changes to the agency’s planning regulations do not seem imminent, however. In any event, the agency’s Summary Report on the initiative made only one minor reference to climate change, noting that public comments urged the agency to designate in resource management plans restoration, innovation, and observation zones. Even on this issue, the report provides no indication of how the agency might respond.

At the individual unit level, adaptation planning by the BLM also appears embryonic. A 2013 draft RMP from the Billings Field Office identified as a goal management of “diverse, healthy landscapes to be resilient to stresses, including climate change, and incorporate flexible management actions to adjust to changing climatic conditions.” It also endorsed the use of adaptive management. The draft plan is devoid of specific management components, however, providing only that the agency will “[p]rovide for flexible, adaptive management that allows for timely responses to changing climatic conditions” and that planning officials should “[a]djust the timing of BLM-authorized activities as needed to accommodate long-term changes in seasonal weather patterns.” Other recently released draft plans include similarly vacuous prescriptions. In its budget request for fiscal year 2016, the BLM noted the need to support landscape-level conservation to address the impacts of stressors such as

what roles weather conditions played in the establishment of existing vegetation, and what those influences will be in the future. Id. § 5000-1.12B(2)(b)(3). The provisions on National Landscape Conservation System Management (Part 6100), Conducting Wilderness Characteristic Inventory of BLM Lands (Part 6310), Considering Lands with Wilderness Characteristics in the BLM Land Use Planning Process (Part 6320), Management of BLM Wilderness Study Areas (Part 6330), Management of Designated Wilderness Areas (Part 6340), and even Fire Planning (Part 9211), all fail to include any mention of climate change.

306 BLM, Planning 2.0: Improving the Way We Plan Together, http://www.blm.gov/wo/st/en/prog/planning/planning_overview/planning_2_0.html. 307 Id. at 2. 308 Id. at 7. 309 BLM, Billings Draft Resource Management Plan and Environmental Impact Statement 2-52 (March 2013), available at http://www.blm.gov/mt/st/en/fo/billings_field_office/rmp/drmp.html. 310 Id. (“Adapting management . . . allows the BLM to adjust management to best meet the challenges of climate change.”). 311 Id. at 2-53. 312 See, e.g., BLM, Winnemucca District Proposed Resource Management Plan and Final Environmental Impact Statement 4-12 (August 2013), available at http://www.blm.gov/nv/st/en/fo/wfo/blm_information/rmp/proposed_final_rmp.html (“This RMP is also based on the concept of adaptive management, so it is dynamic enough to account for changes in resource conditions (such as changes due to climate change or large-scale wildfire), new information and science, and changes in regulation and policies.”).
climate change. The budget purportedly sought to broaden the scope of BLM programs to enhance understanding of and preparation for climate change. Yet, of the $1.2 billion increase sought over the previous year’s enacted budget, only $10 million (or less than one percent) was specifically earmarked for these purposes, an amount that does not appear to prioritize climate-related initiatives.

D. The National Wildlife Refuges

As compared to other federal land management agencies, the FWS has engaged in a relatively moderate level of adaptation planning and integration of adaptation measures into refuge management. This pace and extent of adaptation is congruent with the moderate level of legal adaptive capacity that the FWS enjoys in managing the national wildlife refuges.

1. The FWS’s Adaptive Capacity

The goals and orientation of the National Wildlife Refuge System Improvement Act (NWRSIA) allow the FWS a moderate level of flexibility in selecting management goals and the means to achieve them, though the FWS has interpreted the NWRSIA to require an emphasis on historical preservation. The FWS must administer the NWRS “for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” It must “plan and direct the continued growth of the System in a manner that is best designed to accomplish” this mission, or, significantly, “to contribute to the conservation of the ecosystems of the United States.” In addition, the NWRSIA directs the FWS to manage each individual refuge to fulfill not only the mission of the System as a whole, but also the specific purposes for which that refuge was established. Accordingly, the goals of individual refuges may vary depending on the specific purposes of that refuge. In this sense, the goals of NWRS management are more individually tailored and fragmented than that of other federal lands.

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314 Id., at BH-10, BH-16 (referring to increased funding for the Challenge Cost Share program and climate resilient landscapes).
317 Id. § 668dd(a)(4)(C).
318 Id. § 668dd(a)(3)(A). The term “purposes of the refuge” is defined by reference to the purposes derived from the law that established or authorized a refuge. Id. § 668ee(10).
319 Cf. Fischman, supra note 83, at 463 (“Statutes attempting to provide comprehensive authority and management requirements for the Refuge System explicitly limit their application to circumstances where they do not conflict with the particular purposes
Considering only the language of NWRSIA, this management regime is not necessarily restricted to preserving historical ecological conditions. The FWS’s mandates include “conservation” and “restoration,” terms that might be interpreted as envisioning retention or re-creation of historical conditions. However, the statutory definition of “conservation” is broader than historical preservation. The term means “to sustain and, where appropriate, restore and enhance, healthy populations of fish, wildlife, and plants.” The statutory reference to conservation of ecosystems arguably reinforces the FWS’s duty to conserve function, not a pre-existing resource mix or state. Moreover, the statute authorizes the use of management methods and procedures “associated with modern scientific resource programs, including propagation and transplantation.” The reference to transplantation seems potentially broad enough to cover the movement into a refuge of species that were never there before. The statute directs the FWS to “ensure that the biological integrity, diversity, and environmental health of the System are maintained. . . .” While maintenance seems geared toward retention of the status quo, what the FWS is supposed to maintain is biological integrity and environmental health, not particular historical conditions. The FWS also has a little-used emergency power to “temporarily suspend, allow, or initiate any activity... if the Secretary determines it is necessary to protect the health and safety of the public or a fish or wildlife population.”

Professor Fischman asserts that the mandate to ensure maintenance of the Refuge System’s biological integrity, diversity, and health is “the most ecologically informed, of any legislative criterion for public land management. Congress clearly intended that the refuges should protect nature in accordance with the latest scientific understanding.” He argues that the 1997 amendments to the FWS’s organic statute reflects “a heightened emphasis on integrity as an overarching management goal.”

Although he concedes that the meaning of the key statutory provision is established for individual refuges.”). Nonetheless, direct conflict between individual unit purposes and the NWRSIA is rare. See id. at 592.

321 Id. § 668ee(4).
322 Id. § 668dd(a)(4)(C).
323 Id. § 668dd(a)(4)(B).
324 Id. § 668dd(k). Judicial interpretations of this provision provide limited direction on its scope. See, e.g., Wyoming v. United States, 279 F.3d 1214, 1240 (10th Cir. 2002) (indicating only that because the program at issue was commenced “over a decade ago... the ‘temporary’ nature of FWS’s action has long since passed”).
326 Id. at 991.
“not self-evident,” by closely parsing the statutory text and analyzing statutory context and legislative history, he concludes that the reference to integrity reflects “the emerging consensus meaning of ‘integrity,’ [which] encompasses all of the pieces now understood to constitute functioning landscapes,” and that this provision has the potential to equal the NFMA’s diversity provision as a strong constraint on agency discretion.

Accordingly, notwithstanding a conservation-oriented mandate, the NWRSIA provides the FWS some ability to manage wildlife refuges in ways that allow modification of ecological constituents over time. As a result, taken alone the statute appears to provide the agency a significant amount of substantive legal adaptive capacity in its management of refuges. That flexibility could be a valuable management tool as climatic changes make existing refuges less compatible with certain historically occurring species and more harmonious with others.

However, even Professor Fischman acknowledges that “[t]he temporal dimension of integrity and health addresses the dynamic variation in ecological processes through the limits of historic conditions.” Moreover, a review of the FWS’s internal rules interpreting Congress’s delegation reveals a reluctance by the FWS to recognize or take full advantage of its available statutory substantive legal adaptive capacity. The FWS’s current interpretation of the biological integrity provision is contained in the agency’s manual for refuge management, which serves as policy guidance to FWS officials. It defines biological integrity as “[b]iotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities,” and environmental health as “composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment.” These definitions reflect a commitment to

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329 Fischman, supra note 326, at 992.
330 Id. at 1024-25.
331 Id. at 1025.
334 Id.
preserve historic conditions which the statutory text arguably does not compel.

The agency’s treatment of non-native species points in the same direction as these manual definitions. The FWS has customarily been, and still remains, largely focused on promoting native species and ecosystems where they have historically existed. It has interpreted the NWRSIA, for example, to allow non-native introductions, but only in rare situations. Both the FWS’s Manual and Refuge Manual address non-native introductions. The FWS Manual generally prohibits introduction of “species on refuges outside their historic range.” However, an exception is made for circumstances in which “such introduction is essential for the survival of a species and prescribed in an endangered species recovery plan, or is essential for the control of an invasive species and prescribed in an integrated pest management plan.” Even when undertaking such non-native introductions, the FWS states that it strives “to minimize unnatural effects and to restore or maintain natural processes and ecosystem components to the extent practicable without jeopardizing refuge purpose(s).” The FWS Refuge Manual is also restrictive, barring reintroduction of naturally extirpated exotics, exotic birds, or species anticipated to be invasive or to cause detrimental effects on the receiving area. Other provisions consistently emphasize that the primary ecological goal of the refuges is promoting historical conditions. Moreover, some individual units may have individual unit purposes that seek to promote particular preexisting species. The FWS has at times decided to “privilege (sometimes outdated) individual [unit] purposes over...

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337 FWS Manual, supra note 335, pt. 601, § 3.14(F).
338 Id.
339 See id. pt. 601, § 3.11(C).
340 See FWS Refuge Manual, supra note 336, §§ 7-8.6(B), 8.7.
341 FWS Manual, supra note 335, pt. 601, § 3.10(B)(1) (“The System’s focus is on native species and natural communities such as those found under historic conditions.”); id. pt. 601, § 3.14 B; id. pt. 601, § 1.9(A) (“The overarching goal of the Refuge System is to conserve a diversity of fish, wildlife, and plants and their habitats . . . with a focus on native species.”); id. pt. 601, § 3.15C (“We do not allow refuge uses or management practices that result in the maintenance of non-native plant communities unless we determine there is no feasible alternative.”); FWS Refuge Manual, supra note 336, pt. 7, § 8.1; id. pt. 7, § 12.2.
342 See, e.g., Richard L. Schroeder, Jeanne I. Holler & John P. Taylor, Managing National Wildlife Refuges for Historic or Non-Historic Conditions: Determining the Role of the Refuge in the Ecosystem, 44 Nat. Resources J. 1185, 1199 (2004) (describing FWS decision that the goal of managing the Sherburne National Wildlife Refuge should be “the restoration and maintenance (as close as possible with present constraints) of the historic upland landscape, including the globally endangered oak savanna ecotype, while providing migratory habitat for waterfowl.”).
the superb (modern) system ones to a greater extent than that required by legislation.”

This focus on historical fidelity had the advantage of serving as a clear and concrete counterweight to those interests more focused on maximizing refuges for hunting uses. However, the FWS’s focus on promoting native species and ecosystems where they have historically existed also may be in part a product of its dual role as refuge manager and principal implementer/enforcer of the Endangered Species Act (ESA) for land and freshwater species. The FWS’s implementation of the ESA has traditionally been heavily based on maintaining historical baselines, protecting species in their pre-existing range, and conserving and restoring native ecosystems and native species. For example, the ESA’s extensive protections only apply if a species is listed as “endangered,” which is expressly defined as occurring only if the species is “in danger of extinction throughout all or a significant portion of its range.”

Moreover, the ESA heavily focuses its conservation and recovery activities in historically native areas. FWS regulations implementing the ESA make clear that non-native introduction is supposed to be very rare, and the FWS goes to great pains to limit such introductions. ESA regulations allow the introduction of an experimental population “outside of the species’ current natural range,” but generally only “within its probable historic range.” The only circumstance in which an introduction outside of a species’ historical native range is allowed is in “the extreme case that the primary habitat of the species has been unsuitably and

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343 Id. at 94, 94 n.63 (providing specific examples). Individual refuge unit purposes “may be as much as a century old.” Robert L. Fischman, From Words to Action: The Impact and Legal Status of the 2006 National Wildlife Refuge System Management Policies, 26 STAN. ENVTL. L.J. 77, 116 (2007); see also id. at 80 (noting that “individual refuge purposes, which tend to focus more on traditional fish and game concerns than on the newer 1997 systemic mission”); id. at 86 (referring to the centrifugal tendency of refuges to hew to local custom and individual purposes at the expense of promoting distinctive system goals”).

344 See Camacho, supra note 128, at 245-46. See also infra note 500 and accompanying text.


346 See id. § 1532(15); id. § 1533(a)(2). The FWS shares responsibility for implementing the ESA with the Commerce Department’s National Marine Fisheries Service. The FWS’s historical focus also may stem from its commitment to maintaining a network of migratory bird habitats that meets “important life history needs” of these species. See U.S. FISH & WILDLIFE SERV., THE FISH AND WILDLIFE SERVICE MANUAL pt. 601, § 1.8 (describing the goals of the refuge system).

347 See Camacho, supra note 53, at 15. As two prominent scholars put it, the ESA “offers a minefield of historic baselines.” Ruhl & Salzman, supra note 1, at 38.


349 50 C.F.R. § 17.81(a) (2013).
irreversibly altered or destroyed.” The FWS, in adopting this regulation, emphasized that nonnative introductions should be extremely rare, and the agency in fact has only allowed non-native introductions in two circumstances, both of which were supposed to be temporary. In doing so, the FWS affirmed the importance of focusing conservation efforts on promoting species where they existed historically and minimizing exotic species. Perhaps as a result of this dual role, the FWS’s management of the NWRS has also been heavily influenced by promoting historical fidelity. Thus, though the NWRSIA may allow the FWS to actively manage national wildlife refuges away from historical conditions, the FWS rules and policies have cabined this substantive legal adaptive capacity to a moderate degree.

The NWRSIA affords the FWS procedural legal adaptive capacity that is of a piece with the capacities of the USFS under NFMA and the BLM under FLPMA. The statute requires the FWS to adopt a conservation plan for each refuge or complex of refuges and revise the plan “as may be necessary,” but at least once every fifteen years. Notably, the statute directs the FWS to revise a plan “at any time if [it] determines that conditions that affect the refuge or planning unit have changed significantly.” It must then manage the refuge in a manner consistent with the plan. The statute establishes procedural requirements for the planning process, but they do not appear to be particularly onerous, encompassing the usual inter-agency coordination and public participation opportunities. The NWRSIA also provides a boilerplate general grant of rulemaking authority to the FWS in its management of the refuges.

The FWS has also embraced iterative decision-making processes. Of the nine goals of refuge planning it identified after adoption of the NWRSIA, one is providing a basis for adaptive management. One study

350 Id.
352 See Camacho, supra note 128, at 203.
354 See supra notes 335-341 and accompanying text.
356 Id. § 668dd(a)(1)(E).
357 Id. § 668dd(e)(1)(E).
358 Id. § 668dd(e) (3)-(4).
359 Id. § 668dd(b)(5).
found, however, that the FWS’s recently adopted land use plans tend to lack specific criteria for success, making it difficult for refuge managers to know whether and how to adjust management actions on the basis of information generated by monitoring. The FWS nevertheless has ample procedural legal adaptive capacity, both under the NWRSIA and its own planning regulations, to pursue the changes needed to effectively respond to climate change.

2. Evaluating the FWS’s Adaptation Activities

In light of this moderate level of substantive legal adaptive capacity, it makes sense that the FWS has taken significant steps to engage in climate change adaptation, but has mostly confined these measures to conceptual organizational initiatives, vulnerability assessments, and vague goals that have yet to lead to concrete integration of climate change adaptation into land management. Other than serving as the primary facilitator for the DOI’s LCCs, the FWS’s primary climate change adaptation activities in its capacity as manager of the national wildlife refuges has been drafting the National Fish, Wildlife, and Plants Climate Adaptation Strategy finalized in 2012. The 2012 Strategy establishes seven broad climate adaptation goals: (1) enhancing the capacity for effective management; (2) supporting adaptive management; (3) increasing knowledge on impacts and responses of fish, wildlife and plants; (4) increasing awareness and motivating action to safeguard fish, wildlife, and plants; (5) reducing non-climate stressors to help ecosystems adapt; (6) conserving habitat to support healthy fish, wildlife, and plant populations and ecological functions; and (7) managing species and habitats to protect ecological function and provide sustainable cultural, subsistence, recreational, or commercial use. Encouragingly, the last two goals suggest a possible re-thinking of conservation approaches. The Strategy explains that the goal is not to keep current conservation areas as they are, but rather to ensure that a network of habitat conservation areas maximizes the chances that the majority of species will have sufficient

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361 Fischman, et al., supra note 9, at 999; see also Vicky J. Meretsky & Robert L. Fischman, Learning from Conservation Planning for the U.S. National Wildlife Refuges, 28 CONSERVATION BIOLOGY 1415 (2014) (discussing obstacle to adaptive management arising from lack of specific criteria in FWS comprehensive conservation plans).

362 See supra notes 163-164 and accompanying text.

363 FWS, NATIONAL FISH, WILDLIFE, AND PLANTS CLIMATE ADAPTATION STRATEGY (2012), http://www.wildlifeadaptationstrategy.gov/strategy.php [hereinafter FWS, CLIMATE ADAPTATION STRATEGY]. The FWS prepared a Strategic Plan for Responding to Accelerated Climate Change in 2010, which addressed the effects of climate change on fish and wildlife. A draft action plan for implementing the strategic plan was never finalized, although the draft continues to provide guidance. See USGCRP, SYNTHESIS, supra note 8, at 51.

364 FWS, CLIMATE ADAPTATION STRATEGY, supra note 363, at 54.
habitat somewhere. However, this broad policy document has yet to affect any existing management processes used by the FWS.

Until recently, most of the agency’s focus has been on facilitating assessments of the potential effects of climate change on NWRS resources. However, in 2013 the agency adopted a new chapter in the FWS Manual that established overarching FWS policy and staffing responsibilities on climate change adaptation. These manual provisions tend to be couched in broad generalities, such as establishing a policy “to effectively and efficiently incorporate and implement climate change adaptation measures into the Service’s mission, programs, and operations”; use the best available science in coordinating appropriate adaptive responses; integrate adaptation strategies into all aspects of policy, planning, programs, and operations; work with partners and LCCs; “deliver landscape conservation actions that build resilience or support the ability of fish, wildlife, and plants to adapt; and monitor populations and habitats to assess the impacts of management strategies in the face of climate change.

Segments of new FWS guidance do attempt to grapple with the difficulties of managing climate change, including the challenge of promoting historical fidelity despite a changing climate. In July 2014, the FWS published guidance for resource managers across agencies on scenario planning for managing uncertainty, including from climate change. Later that year, it issued generalized guidance to NWRS managers that illustrates the challenges the FWS faces in managing for substantial changing conditions despite its internal constraints on substantive legal adaptive capacity. The guidance provides examples of potentially appropriate management actions to adapt to climate change, such as revision of land acquisition plans and restoration of acquired lands to enhance resilience.

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365 Id.
367 Id. § 1.6. Another new Manual chapter, issued in 2014, established the FWS Climate Adaptation Network to guide the agency “to enhance preparedness, adaptation, and resilience in the face of the impacts of climate change and its interaction with non-climate influences” on fish, wildlife, plants, and ecosystems. FWS MANUAL 056 FW 2 (June 20, 2014), http://www.fws.gov/policy/056fw2.html.
370 Id. at 9. In describing several case studies, the guidance provided examples of possible management actions to address particular problems. See, e.g., id. at 40-41 (construction of deep wetlands); id. at 49 (strategic fire management).
Importantly, the FWS continues to assert that the framework for fulfilling the NWRSIA’s mandate to maintain biological integrity, diversity, and environmental health is to maintain “historic conditions,” but it reframes historical conditions to focus on preexisting processes rather than particular constituents of the ecosystem. It defines “historic conditions” as “[c]omposition, structure, and functioning of ecosystems resulting from natural processes that we believe . . . were present prior to substantial human related changes to the landscape.” The agency added that its goal is “to induce management for natural conditions and with natural processes, using historic conditions to help identify such conditions and processes.” The FWS expressly acknowledged that “[t]he concept of ecological integrity and the cohesion of ecological integrity policies are challenged and undermined by anthropogenic climate change.” It also noted that managers have “a certain degree of latitude and flexibility in responding to climate change,” and that “prospective adaptation” may be appropriate to “fit ecologically with climate change trajectories.” The FWS thus continues to treat retention of historical conditions as the key substantive goal, but it is attempting to reinterpret a fixed historical baseline to allow more flexible application as ecological conditions change.

Despite this activity, relatively little of this guidance has found its way into refuge management plans—the core management regime for national wildlife refuges. A 2014 study found that many NWRS units lack land use plans that meaningfully address climate change adaptation. Only 73 of the 185 refuges for which comprehensive conservation plans (CCPs) were completed between 2005 and 2011 even mentioned prescriptions for climate change. Coastal refuges were most advanced, integrating planning for rises in sea level, but many refuges failed to consider sufficiently the spread of harmful parasites and diseases and the

371 *Id.* at 14. As Professors Ruhl and Salzman have argued, “There is no other way to manage for historic conditions than to use a historic baseline.” Ruhl & Salzman, *supra* note 12, at 18. The FWS’s frame of reference extends from 88 to 1800 AD. *Id.* at 14.

372 *Id.*

373 *Id.*


375 See Fischman, et al., *supra* note 9, at 993. Cf. Archie et al., *supra* note 14 (finding that the FWS “may be the farthest along” of the four land management agencies in incorporating climate change adaptation in its land use planning, based on surveys and interviews conducted in 2011 (before the USFS amended its planning regulations) in three western states).

376 *Id.* at 994. Later plans were more likely to address management actions than earlier ones. *Id.*
potential increase in wildfires. Of those that prescribe adaptation measures, most focused on continued monitoring and assessment or persisted in the same conservation activities in which refuges engage to maintain resilience generally. The plan prescriptions generally did not meet the FWS’s own criteria that prescriptions be specific, measurable, achievable, results-oriented, and time-fixed. Scenario planning, which can describe plausible futures using quantitative or qualitative data, was not evident in the plans. The study concludes that the CCPs adopted between 2005 and 2011 increased the extent to which they described climate-change impacts, but did not consistently respond to those impacts with prescriptions for adaptive responses to monitoring results.

The agency’s commitment to pursuing concrete measures to facilitate adaptation fortunately appears to be increasing. In September 2014, the FWS incorporated a new Strategic Growth Policy in the FWS Manual. Among its objectives are ensuring that future growth of the refuge system furthers “an ecologically-connected network of public and private lands that are resilient to climate change and support a broad range of species under changed conditions.” Even though this reference to changed conditions appears in a portion of the Manual governing new additions to the refuge system, it may reflect an emerging broader recognition that movement away from a solely historic focus is necessary in an era of disruptive climate change.

In addition, in its fiscal year 2016 budget request, the FWS identified climate change adaptation as a priority goal. In particular, it indicated that by September 2015, the Interior Department “will demonstrate maturing implementation of climate change adaptation . . .

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377 Id. at 993.
378 Id. at 994 (“Although the majority of plans prescribed monitoring, much less than half indicated an intent to act on the results of monitoring or described specific actions that should follow from monitoring results.”).
379 Id.
380 Fischman, et al., supra note 9, at 997.
381 See also Meretsky & Fischman, supra note 361, at 1418 (calculating proportion of CCPs completed between 2005 and 2011 that addressed various climate-change threats).
382 Fischman, et al., supra note 9, at 1003. At the same time, however, the study postulates that “the CCPs tend to be more current than plans for other public land systems and are therefore more likely to address climate change.” Id. at 994. That assessment, however, relates to plans prepared before the 2012 amendments to the USFS planning regulations described above. See supra notes 233-237 and accompanying text. As Professor Fischman has noted elsewhere, “the prescriptive sections [of CCPs] are the engines that generate real management actions.” See also Meretsky & Fischman, supra note 361, at 1423.
384 See id. § 5.5A(1) (noting the increasing importance in planning and directing the growth of the Refuge System of recognizing the “[u]nparalleled changes related to climate change and non-climate stressors”).
when implementing strategies in its Strategic Sustainability Performance Plan." The agency plans to track progress on a quarterly basis to consider the incremental level of accomplishment achieved in development of policies or processes, or the number of “deliverables” or completed projects. The strategic goals include mainstreaming and integrating climate change adaptation into agency-wide and regional planning actions, ensuring that agency principals demonstrate commitment to adaptation efforts through internal communications and policies, ensuring that workforce protocols reflect projected health and safety impacts of climate change, constructing or modifying facilities and infrastructure with consideration for potential climate impacts, and updating external programs and policies to incentivize planning for and addressing the impacts of climate change. The FWS also requested budget increases for specific activities linked to climate change adaptation, including fish passage improvements, ecosystem restoration, and development of adaptive science.

In sum, the FWS has engaged in a moderate level of climate change adaptation planning, which has recently accelerated as the agency has completed CCPs. The NWRSIA and the FWS’s interpretive regulations provide the FWS with some substantive legal adaptive capacity that may be useful in adapting to climate change, even if not as much as that provided by the statutes that govern management of the multiple use lands. The FWS also has committed to the use of adaptive management (and, to a lesser extent, scenario planning), thereby affording itself procedural legal adaptive capacity, though the absence of meaningful metrics has detracted from the value of these iterative processes.

Nevertheless, the agency’s evaluation of the threats to refuge resources posed by climate change has by and large not yet translated into specific management prescriptions, even in most recently adopted CCPs. Moreover, the FWS’s adaptation efforts have been restrained, at least until very recently, by a fundamental focus on promoting ecological historical fidelity, so that it arguably has not taken full advantage of the substantive legal adaptive capacity that its organic statute provides. The agency may have begun to remove these self-imposed shackles, as its Strategic Growth Policy and most recent budget request seem to indicate. Resource constraints may have limited the FWS’s progress in incorporating adaptation goals into plans and management actions, and may continue to

386 Id.
387 Id. at EX-19 to EX-20.
388 Id. at EX-11, ES-16 (California Bay Delta restoration), SS-3.
do so even if the agency does more fully shift away from a focus on historic preservation.\textsuperscript{389}

\textbf{E. The National Parks}

The NPS has undertaken even less climate change adaptation planning and integration of adaptation measures than the FWS in managing the National Park System. The limited adaptation activity is again consistent with the System’s fairly limited substantive legal adaptive capacity due to its primary focus on promoting historical conditions.

1. The NPS’s Adaptive Capacity

The NPS must manage the National Park System under the National Park Service Organic Act’s core preservation mandate to “conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”\textsuperscript{390} Like the FWS, the NPS “is primarily a nature preservation agency.”\textsuperscript{391} Although the NPS has broad discretion in interpreting its statutory authority,\textsuperscript{392} it is constrained in the ways it can use that authority to address climate change. Climate change is causing and will continue to cause fundamental ecological changes from prior conditions, creating tension with the Organic Act’s historical preservation mandate.\textsuperscript{393}

The NPS has long interpreted the Organic Act to require it to focus on protecting historical conditions and preexisting biota.\textsuperscript{394} Established NPS interpretations stipulate that the NPS should take a historical preservationist approach to existing natural resources in national parks. If

\textsuperscript{389} See GAO, supra note 111, at 44-45.
\textsuperscript{390} 16 U.S.C. § 1 (2006). See also U.S. NAT’L PARK SERV., MANAGEMENT POLICIES § 1.4.3 (2006), available at http://www.nps.gov/policy/MP2006.pdf [hereinafter NPS MANAGEMENT POLICIES] (The fundamental purpose of the national park system, established by the Organic Act . . . , as amended, begins with a mandate to conserve park resources and values.”). The NPS defines “conserve” to mean “to protect from loss or harm. Historically, the terms conserve, protect, and preserve have come collectively to embody the fundamental purpose of the NPS—preserving, protecting and conserving the national park system.” Id. at 1565 (Glossary).
\textsuperscript{391} Keiter, supra note 146, at 955.
\textsuperscript{392} See Davis v. Latschar, 202 F.3d 359, 365 (D.C. Cir. 2000).
\textsuperscript{393} Camacho, supra note 12, at 1426 (arguing that prioritizing preservationism and minimizing human interaction with natural systems “is incongruent with the dynamic nature of ecosystems and the pervasiveness of the human-nature relationship, particularly in light of modern anthropogenic climate changes”).
\textsuperscript{394} See NPS MANAGEMENT POLICIES, supra note 390, § 4.4.1 (“The National Park Service will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems.”); id. § 4.1 (“[P]reserving park resources and values unimpaired is the core or primary responsibility of NPS managers.”).
any management strategy or adaptation measure could lead to the impairment of park resources or values, it cannot be approved. As such, the NPS often engages in active steps to promote or restore preexisting ecological conditions. This focus on preserving historical conditions is congruent with the NPS’s other programs directed at historic preservation of the built environment. These include administering National Historical Parks, National Historic Landmarks, National Heritage Areas, the National Register of Historic Places, and historic preservation grants and historic rehabilitation tax credits.

Paired with that historical goal is a secondary presumption that the agency must protect existing natural resources from human activity or management, as well as a strong preference for relying on “natural” processes for protecting and restoring pre-existing native species. Yet even then historical preservation remains the primary goal; the agency has declared that it will not intervene in natural biological or physical processes except “to restore natural ecosystems functioning that has been disrupted by past or ongoing human activities.” If biological or physical processes have been altered in the past by human activities, active management may be appropriate, but the goal of such action is

395 Id. § 4.1.
396 See id. § 4.4.2.2 (stating that the NPS “will strive to restore extirpated native plant and animal species . . . .”); id. § 4.4.2.5 (“In altered plant communities managed for a specified purpose, plantings will consist of species that are native to the park or that are historically appropriate for the period or event commemorated.”); id. § 4.4.2.3 (“The Service will survey for, protect, and strive to recover all species native to national park system units that are listed under the [ESA] . . . . The Service will inventory other native species that are of special management concern to parks . . . . and will manage them to maintain their natural distribution and abundance.”); id. § 4.4.1.2 (“The Service will strive to protect the full range of genetic types (genotypes) of native plant and animal populations in the parks.”).
397 See NORMAN TYLER ET AL., HISTORIC PRESERVATION: AN INTRODUCTION TO ITS HISTORY, PRINCIPLES, AND PRACTICE 33 (2ND ED. 2009).
398 See NPS MANAGEMENT POLICIES, supra note 390, § 4.1 (“In cases of uncertainty as to the impacts of activities on park natural resources, the protection of natural resources will predominate.”). Cf. id. at 36 (“The Service recognizes that natural processes and species are evolving, and the Service will allow this evolution to continue—minimally influenced by human actions.”).
399 Id. § 4.4.2 (“Whenever possible, natural processes will be relied upon to maintain native plant and animal species and influence natural fluctuations in populations of these species.”).
400 In fact, some NPS policies conflate historical preservation with non-intervention by purporting to promote native species through minimizing human management. See id. § 4.4.1.2 (“The Service will strive to protect the full range of genetic types (genotypes) of native plant and animal populations in the parks by perpetuating natural evolutionary processes and minimizing human interference with evolving genetic diversity.”).
401 Id. § 4.1. Additional limited justifications for such intervention are congressional authorization, emergencies that pose risks to human life and property, and as needed to protect other park resources, human health and safety, or facilities. Id.
fundamentally historical preservationist: “to restore them to a natural condition or to maintain the closest approximation of the natural condition when a truly natural system is no longer attainable.” Legislation creating individual NPS units may reinforce the agency’s focus on maintaining historic conditions.

The NPS’s approach to its statutory management mandate generally functions to minimize the possibility of proactive management to promote future ecological function. NPS managers have the discretion (and sometimes obligation) to reintroduce extirpated populations of vulnerable native species. NPS managers generally are prohibited from introducing non-native species except when needed to meet a specific management need, all feasible measures are taken to reduce the risk, and the introduced species is closely related to an extirpated native species or improved variety of a native species where the natural variety cannot survive current, human-altered environmental conditions. NPS managers are expected to actively seek to remove any non-native species.

This focus on promoting historical fidelity provides limited substantive legal adaptive capacity for NPS managers to engage in proactive adaptation measures. The tension between fostering active climate change adaptation strategies that seek to advance future ecological health and the NPS’s fundamentally historical preservation goals is obvious.

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402 Id. § 4.1.
403 See, e.g., 16 U.S.C. § 79a (2006) (stating purpose of creating Redwood National Park as “preserv[ing] significant examples of the primeval coastal redwood (Sequoia sempervirens) forests and the streams and seashores with which they are associated for purposes of public inspiration, enjoyment, and scientific study”); id. § 160 (stating that the purpose of establishing Voyageurs National Park “is to preserve, for the inspiration and enjoyment of present and future generations, the outstanding scenery, geological conditions, and waterway system which constituted a part of the historic route of the Voyageurs who contributed significantly to the opening of the Northwestern United States”). The historic preservation focus is even more explicit for units such as national historical parks. See, e.g., id. § 282 (describing the purpose of San Juan Island National Historical Park as “interpreting and preserving the sites of the American and English camps on the island, and of commemorating the historic events that occurred from 1853 to 1871 on the island in connection with the final settlement of the Oregon Territory boundary dispute”).
404 Id. § 2.3.4 (“Implementation plan details may vary widely and may direct a finite project (such as reintroducing an extirpated species . . .”); id. § 4.4.1 (“The Service will successfully maintain native plants and animals by . . . restoring plant and animal populations in parks when they have been extirpated by past human-caused actions”); id. § 4.4.2.3 (stating that the NPS will “reestablish extirpated populations as necessary to maintain the species and the habitats upon which they depend”).
405 Id. § 4.4.4.1.
406 Id.
407 But cf. Keiter, supra note 9, at 334 (arguing that the non-impairment mandate of the NPS’s organic statute “constitutes a clear, substantive standard that gives priority to
agency is not similarly saddled with low procedural legal adaptive capacity, however. NPS policies encourage the “appropriate” use of adaptive management in general management plans for park units as “a means for providing flexibility in the face of changing natural conditions.” In addition, NPS policies appear to leave agency officials considerable flexibility in determining the appropriate nature and extent of public participation in agency planning endeavors. They also leave decisions about the frequency of general management plan revisions largely to agency discretion. The processes for implementation of general management plan provisions are even more amorphous than the ones that apply to plan adoption.

2. Appraising the NPS’s Adaptation Activities

The NPS has engaged in even more modest climate change adaptation activities in managing the National Park System than the FWS. NPS actions have primarily focused on developing science and data on the possible effects of climate change and seeking to educate the public about climate change’s effects. The agency promoted better monitoring of ecological responses to climate change and distributed information about climate change effects. It has begun compiling data on sea level changes and storm surges that may be useful in crafting hurricane response plans for coastal parks in the Southeast and Northeast Regions.

408 The Organic Act mandates the adoption of general management plans “for the preservation and use of each unit of the National Park System.” 16 U.S.C. § 1a-7(b) (2006).
409 NPS MANAGEMENT POLICIES, supra note 390, § 2.3.4.
410 Id. § 2.3.1.5 (“Public involvement strategies, practices, and activities will be developed and conducted within the framework of civic engagement.”).
411 Id. § 2.3.1.12 (stating that if conditions remain substantially unchanged, deferring review of existing plans beyond 10 to 15 years would be “acceptable”).
412 See id. § 2.3.4.
414 E.g., NPS and USGS, Coastal Vulnerability Index (CVI), http://woodshole.er.usgs.gov/project-pages/nps-cvi/ (including maps of vulnerable coastal areas that quantify future physical changes on shorelines due to sea level rise).
The NPS’s most prominent climate change adaptation initiative to date has been its 2012 Climate Change Action Plan. The plan outlined criteria for incorporating climate change considerations into NPS operations and described how NPS managers might anticipate future conditions. It listed eight high-priority areas of emphasis, but virtually all were either modest, “business-as-usual” initiatives or vague and inoffensive commitments. These include: (1) to enhance workforce climate literacy; (2) to engage youth and their families; (3) to develop effective planning frameworks and guidance; (4) to provide climate change science to parks; (5) to implement the Green Parks Plan; (6) to foster robust partnerships; (7) to apply appropriate adaptation tools and options; and (8) to strengthen communication. The agency noted the need to “rethink traditional planning process” in light of climate change, but the document was devoid of specifics. Likewise, the discussion of appropriate adaptation tools provided as examples “listening sessions” with NPS employees, pilot adaptation planning processes that connect vulnerability assessments and scenarios to park planning, decision frameworks for navigating resource adaptation options and practices, and a national interpretive plan for climate change. These measures may provide a necessary underpinning for future unit-specific management decisions to deal with climate change, but they are couched in much more general terms than the efforts of the other federal land agencies. The plan promised a substantive revision in 2014. As of mid-2015, however, NPS management policies on Park System Planning do not refer to climate change even once.
At the unit or regional level, the agency is developing climate change adaptation strategies, but many remain inchoate and unspecific. For example, the NPS Intermountain Region released a 2012 report that merely stated that the Region was working on a handbook to refine adaptation strategies. Some parks seem to have advanced a little further. Officials at Glacier National Park, for example, have engaged in research to establish baseline measures of species abundance and distribution to detect changes in populations of at risk species such as pika. Park officials have also begun planting trees in new habitats, managing invasive plants, and restoring native vegetation. They indicated that they had no current plans to revise the park’s general management plan because they deemed it an adequate management tool, even though it does not directly address climate change. They did indicate that they would develop a “foundation plan” describing the park’s purpose, significant resources, and planning needs which “likely” will address climate change. Efforts to implement specific responses to climate change at Glacier seem to be the exception rather than the rule, however.

The NPS’s adaptation efforts, like those of the other agencies, have suffered from resource limitations. In fiscal year 2011, the NPS was allocated $10 million for adaptation activities. That figure dropped to $3 million the next year. Efforts to address climate-related threats to park resources at Glacier National Park, for example, have suffered due to lack of adequate funding for monitoring, vulnerability assessments, and responses to insect infestations. For fiscal year 2016, the NPS requested

of how priority resource management issues can be used to provide important direction to the structure of an inspection and maintenance program. Id. at 13.

The NPS has conducted climate change scenario planning workshops focused on training, research, or the role of adaptation in decision making or strategic plans. See USGCRP, SYNTHESIS, supra note 8, at 50.


Id. at 51. This constraint is not limited to the NPS. See USGCRP, SYNTHESIS, supra note 8, at vi (“Federal agencies are making significant progress in climate change
$16.4 million for climate change-related activities (out of a total of $213.4 million in targeted programmatic increases for all NPS activities), representing an increase of $13.5 million over the enacted budget for 2015. Of that amount, $3.5 million would be to implement resiliency-building natural resources projects, assist planning efforts, help agency communications with the public, and collaborate with other agencies and academic in designing science-based resiliency-building projects in the parks. An additional $10 million would support partnerships with non-federal entities on projects to increase landscape resilience to extreme weather events and the challenges posed by wildfire, flooding, and drought.432

F. Federal Wilderness Areas

Wilderness is a special designation Congress overlays on parts of already existing federal lands. The federal agency that manages the land before Congressional designation is charged with administering the area specifically as wilderness. Because wilderness areas were established primarily to minimize active human management and secondarily to promote historical conditions, they generally have the least legal adaptive capacity of all federal conservation lands. A prohibition on active resource management severely restricts management alternatives in response to the effects of climate change. Moreover, an historical baseline for whatever management occurs is likely to create a conundrum if climate change precludes retention of or return to that baseline. Unsurprisingly, therefore, wilderness lands have been subject to virtually no climate change adaptation planning or incorporation of climate change concerns into its on-the-ground management by any of the federal land agencies.

1. Adaptive Capacity under the Wilderness Act

The Wilderness Act of 1964 is not primarily concerned with promoting ecological health. Areas designated by Congress as official

adaptation, although lack of financial resources has slowed implementation of climate-focused activities.”). But cf. id. at viii (“The number and quality of adaptation efforts that have evolved during a period of declining Federal budgets are encouraging, signaling that adaptation has moved from conceptual to real.”).

432 Id. at ONPS-ResStew-5 to ONPS-REsStew-6.
433 Glicksman, supra note 265, at 448-49.
434 Camacho, supra note 12, at 1407, 1426-27 (describing the Wilderness Act as the primary federal example of a passive resource management statute).
435 Id. §§ 1131-1136 (2006).
wilderness must be protected above all to preserve their natural conditions and wild character. The Act defines “wilderness” as:

[A]n area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. [It is] an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which . . . generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable.  

Federal agencies must ensure that wilderness areas are administered to “leave them unimpaired for future use and enjoyment as wilderness” and “so as to preserve [their] natural conditions.”

The objectives of the Wilderness Act appear to be limited to either minimizing human management (wildness preservation) or active management to maintain or restore historical conditions (historical preservation). On the one hand, the statute could be construed to prohibit substantial active management. Alternatively, it could be understood to require active agency management to ensure that human activities do not interfere with the statutory goals of preserving wilderness character and natural conditions. The Act implicitly contemplates some level of temporary, ancillary, and insubstantial human interference. As such, it is not completely opposed to human interaction with and management of wilderness areas. In a few instances, the Act provides explicit authorization for active management. It allows the USFS, for example, to take necessary measures "in the control of fire, insects, and diseases."

The statute and judicial interpretations, however, do not provide definitive guidance on how much active management is generally allowed.

436 Id. § 1131(c).
437 Id.
438 See Wilderness Soc’y., 316 F.3d at 923-24 (discussing these alternative interpretations).
439 Wilderness Watch, Inc. v. U.S. Fish and Wildlife Serv., 629 F.3d 1024, 1033 (9th Cir. 2010) (concluding that Congress did not intend “a museum notion of wilderness’’); Izaak Walton League of Am., Inc. v. Kimbell, 516 F. Supp. 2d 982 (D. Minn. 2007) (concluding that the duty to preserve wilderness character may extend beyond wilderness boundaries).
440 See 16 U.S.C. § 1131(c) (2006) (emphasis added) (excluding only “permanent improvements or human habitation” and ensuring that an area “generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable”).
441 Id. § 1133(d)(1) (2006).
Eric Biber and Elisabeth Long contend that the Wilderness Act provides significant discretion for agencies to engage in active management, stating that “the vast majority of management options are available to management agencies in wilderness areas.” Nonetheless, even their analysis found that some of the more active management strategies are not allowed in wilderness and that the other strategies that might be allowed could be subject to “some procedural and substantive hoops.” The statute might allow active management of wilderness, but its express language indicates an agency may do so only in furtherance of the preservation of pre-existing wilderness character and natural conditions. As such, agencies in charge of wilderness preservation may not rely on robust activities primarily oriented toward promoting future ecological function at the expense of historical fidelity.

Regardless of the exact scope of the land management agencies’ authority to actively manage to preserve wilderness character, climate change makes achieving both wilderness preservation and historical preservation goals increasingly costly or impossible. It also pits the Wilderness Act’s tandem objectives of passive management and historical preservation increasingly against each other, as it will be impossible to concurrently leave ecosystems alone and keep things as they were. More significantly, climate change makes each goal increasingly at odds with promoting ecological health. Wilderness areas thus have the least substantive legal adaptive capacity of any federal conservation lands. They also have the least procedural legal adaptive capacity, with minimal integration of adaptive management or other flexible processes into wilderness management protocols.

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442 In Wilderness Soc’y v. U.S. Fish & Wildlife Serv., 353 F.3d 1051, 1062 (9th Cir. 2003) (en banc), one of the few reported cases considering if active management of wilderness is permissible, the court addressed whether a fishery enhancement project was allowed in a wilderness area. The initial Ninth Circuit panel considered the permissible level of human interference in wilderness areas. See Wilderness Soc’y v. U.S. Fish & Wildlife Serv., 316 F.3d 913, 924 (9th Cir. 2003) (concluding that “[w]hile the wilderness must be ‘protected’ so that its natural processes dominate, it also must be ‘managed’ so that human activities from outside the area do not interfere unduly”). The ultimate en banc decision, however, sidestepped this issue, concentrating instead on the project’s violation of the Wilderness Act’s prohibition on commercial enterprises. Wilderness Soc’y, 353 F.3d at 1067.

443 Long & Biber, supra note 129, at 627.

444 Id.

445 See Camacho, supra note 128, at 199.

446 Id.

447 See Craig, supra note 12, at 18 (urging “an across-the-board shift in legal objectives, from preservation and restoration to the improvement of resilience and adaptive capacity”).

2. Adaptation Activities in Wilderness

Congruent with this incompatibility between wilderness goals and climate change, the agencies charged with implementation of the Wilderness Act have engaged in the least amount of climate change adaptation planning and proactive adaptation measures in their respective wilderness lands. When faced with ecological risks from climate change, wilderness managers appear to avoid engaging in active measures that would promote ecological health.

USFS, BLM, and NPS wilderness management policies fail to even refer to climate change. The one agency that has staked out a position, the FWS, seems committed to a non-interventionist approach that may not bode well for its ability to nimbly and effectively respond to climate-related threats.

Wilderness preservation allows refuge managers to hedge their bets against the possibilities of inaccurate climate change projections and experimental management techniques that could lead to unintended consequences.

However, the congruence of wilderness preservation and ecological integrity is not always perfect or absolute, because in designated wilderness there is also the need to avoid manipulative management to the extent possible. This is challenging to managers who attempt to maintain natural species assemblages for purposes of ecological integrity, but find it difficult to accomplish without hands-on management. Most controversial wildlife management activities result from the need to balance the ideals of natural and non-natural manipulated conditions.

However, in the context of climate change, the non-manipulation ideal of wilderness offers one distinct advantage over the natural conditions ideal. The non-manipulation ideal is stable and clear in any context, whereas anthropogenic climate change results in confusion about the appropriateness and techniques for maintaining natural conditions. In such cases, the non-manipulation ideal tilts the scales toward leaving species and community evolution to take its own course.

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450 FWS, PLANNING FOR CLIMATE CHANGE ON THE NATIONAL WILDLIFE REFUGE SYSTEM 70-71 (emphasis added).
To date, agencies with wilderness management duties have done little to adapt to the effects of climate change in wilderness areas. For example, on Isle Royale National Park in Lake Superior, the wolf population has been reduced to a record low of one pack with eight individuals. In the past, wolves from the mainland introduced new genes into the isolated population by migrating to the island over the frozen lake. Climate change has decreased ice bridges that allow such migrations, and these bridges are not expected to form after 2040. Ostensibly to promote wilderness values of passive management, the NPS has not intervened.451 One wilderness advocacy group opposes genetic rescue, even with the threat of genetic and harmful trophic cascades. It asserts that wilderness conservation should not include active management because wilderness in national parks must be kept “untrammeled.”452 This approach appears to be representative of how the land management agencies are preparing for climate-related threats to wilderness areas.

The agency that appears to have done the most to accommodate wilderness management policies to climate change is the USFS, but even its actions are of limited scope. In 2012, the USFS Climate Change Resource Center published a report on wilderness and climate change.453 It recognized the incongruity between the Wilderness Act’s “hands-off” approach to management and maintaining “natural conditions” in light of climate change.454 It also argued for the need to redefine what it means to maintain and protect natural conditions to include active management.455 Yet even this analysis is merely exploratory. No agency, including the USFS, has demonstrated a sustained effort to consider how if at all to incorporate strategies for adapting to the extensive effects of climate change on valued wilderness resources.

IV. LEGAL ADAPTIVE CAPACITY AND OTHER FACTORS SHAPING CLIMATE CHANGE ADAPTATION

As Part III illustrates, there appears to be a significant relationship between legal adaptive capacity and the extent to which federal land management agencies have engaged in climate change adaptation. With one key exception, the range of progress in adaptation largely reflects the adaptive capacity of the various governing laws/regulations to address dynamic ecological change. Of the land management systems considered in Part III, wilderness areas are subject to the legal regime that is most tied to non-interventionist management structures. Because wilderness management requirements are least congruent with active management, the
agencies that manage wilderness have very little substantive legal adaptive
capacity. Wilderness areas to date are virtually climate change adaptation
free, and the inaction in the face of climate-related threats to wilderness
areas reflects that limited capacity.

The national parks are managed under a statute that reflects a
historical preservation priority and, to a somewhat lesser extent, a
presumption against active management. The NPS Organic Act and NPS
policies interpreting and applying it primarily focus on keeping preexisting
resources where they are and keeping out those not there before. It is as if
the agency took a snapshot of each park as it existed at some point in the
past when the agency regarded it as well serving statutory purposes, and has
used that photograph as a blueprint for future management actions so that
conditions can be preserved as they were. This focus on historical and
wildness preservation, however, is in tension with managing for future
ecological conditions. The NPS’s previous management strategy may have
worked well for much of the past century, when ecological conditions
varied within a relatively narrow range, but it is not well suited to promoting
long-term ecological health in the context of unprecedented ecological
stress resulting from global climate change.

Not surprisingly, the NPS, which therefore lacks substantive legal
adaptive capacity, also has not responded with alacrity to the threats posed
to the national parks by climate change. As at least a partial consequence
of this limited legal adaptive capacity, the NPS has developed broad
planning goals in its action plan, but few concrete adaptation strategies. The
agency’s limited ability or reluctance to accommodate the need to depart
from a historical preservation orientation and a hesitation to engage in active
management may be hindering, and is certainly not facilitating, its efforts
to get a meaningful adaptation program underway.

Federal wildlife refuge goals provide moderate flexibility to manage
as needed for future ecological conditions. The NWRSIA’s mandate to
ensure maintenance of the biological integrity and environmental health of
the national wildlife refuges affords the FWS more expansive substantive
legal adaptive capacity than that provided by either the Wilderness Act or
the NPS Organic Act.456 Consistent with our thesis that the scope of an
agency’s substantive legal adaptive capacity affects its ability to integrate
climate change adaptation into management policies and programs, the
FWS has taken climate change adaptation planning and implementation
further than the NPS or any of the agencies in their management of
wilderness areas. Its actions include establishing agency-wide adaptation
goals and proposed adaptation requirements for new acquisitions.457
Moreover, the FWS’s commitment to meaningful analysis of and responses

457 See supra notes 364-374 and accompanying text.
to the effects of climate change on the wildlife refuges appears to be accelerating.

Nevertheless, the FWS’s interpretations of the NWRSIA as requiring it to rely on a historical management approach has constrained its ability to move forward on its climate change adaptation commitments. Moreover, the NWRSIA’s commitment to decentralized goal setting, in which place-based individual refuge goals take precedence over system-wide objectives, further limits the program’s legal adaptive capacity. This fragmented approach to goal-setting is of particular concern in an era of climate change; if shifting climatic conditions radically alter the ecological characteristics of a refuge, the original individualized purpose for creating that refuge are particularly vulnerable to not being achievable. Consistent with this level of substantive legal adaptive capacity, the FWS has only moderately adapted its management decisions to climate change.

As indicated above, DOI’s 2014 climate change adaptation plan enunciated the priorities of the NPS and the FWS in preparing to manage for climate change. The plan’s identification of the need for development of NPS guidance for incorporating climate change science into planning and developing a FWS climate change policy framework is particularly striking. DOI has demanded these initiatives of its component agencies since at least 2001. That these fundamental tasks remain unaccomplished after thirteen years reflects poorly on the status of climate change adaptation policy efforts at both agencies.

The USFS and the BLM both have broader substantive legal adaptive capacity to adjust to changing conditions than the NPS or the FWS. In the past, this flexibility has allowed these agencies to be less conservation-oriented. However, it also provides the most adaptive capacity to manage the effects of climate change on vulnerable ecological resources. The USFS has taken advantage of this capacity, most notably by requiring development of responses to climate-related threats in the 2012 planning rule, as well as in early efforts to craft management approaches for individual projects that take account of climate change. The U.S. Global Change Research Program has singled out the USFS for developing systematic accountability for developing adaptation strategies, requiring field units to assess resource sensitivity to climate change and develop adaptation responses (as reflected in the USFS Climate Change

458 See supra notes 318-319 and accompanying text.
459 Changes in temperature or precipitation, for example, have the potential to alter refuge habitat in ways that drive out species that historically populated a refuge and facilitate invasion and entrenchment by non-native species.
460 See supra notes 174-177 and accompanying text.
Performance Scorecard), and adopting regulations that require that climate change be considered in development of target conditions and management actions in restoration planning.\footnote{USGCRP, SYNTHESIS, supra note 8, at 62.}

In contrast, the BLM has taken no concrete steps other than conducting some vulnerability assessments. FLPMA’s goals and delegations of management authority afford the BLM substantive legal adaptive capacity in its management of the public lands that is analogous to the USFS’s adaptive capacity under NFMA. In addition, the BLM seems as committed to the use of adaptive management processes as the USFS. Yet, the BLM has lagged behind its sister multiple-use agency in its climate change adaptation planning and implementation.

The absence of clear and enforceable directives to exercise legal adaptive capacity is a potential factor in explaining the difference between BLM and USFS adaptation. The criteria for development and revision of land use plans are much more amorphous under FLPMA than under NFMA,\footnote{Compare 43 U.S.C. § 1712(c) (2006) with 16 U.S.C. § 1604(g) (2006). See also 2 COGGINS & GLICKSMAN, supra note 131, §16:19 (noting FLPMA § 1712’s “open-ended” planning mandate and stating that, unlike NFMA, “FLPMA does not require promulgation of substantive, detailed planning regulations”).} arguably affording the BLM that much more freedom to determine appropriate management policies and uses for particular parcels. As one court put it, the BLM planning process acts as nothing more than a “course filter.”\footnote{Chihuahuan Grasslands Alliance v. Norton, 507 F. Supp. 2d 1216, 1221 (D.N.M. 2007), vacated and remanded on other grounds, 545 F.3d 884 (10th Cir. 2008).} FLPMA’s mandate “to prevent unnecessary or undue degradation” of the public lands\footnote{43 U.S.C. § 1732(b) (2006).} could easily be construed to require the BLM to take affirmative steps to tackle climate-related threats to the public lands with the potential to cause resource degradation. The BLM, however, has at times interpreted this mandate narrowly,\footnote{See, e.g., Gregory M. Adams, Bringing Green Power to Public Lands: The Bureau of Land Management’s Authority and Discretion to Regulate Wind-Energy Developments, 21 J. ENVTL. L. & LITIG. 445, 474 (2007) (arguing that regulation interpreting §1732(b) in the context of mining activities established a “prudent operator standard” that “completely ignored the requirement for prevention of undue degradation”).} and the judicial interpretation has significantly weakened if not eliminated this anti-degradation duty.\footnote{In Theodore Roosevelt Conservation P’ship v. Salazar, 661 F.3d 66 (D.C. Cir. 2011), for example, the court equated § 1732(b)’s anti-degradation mandate with FLPMA’s overarching multiple-use, sustained-yield standard: [B]y following FLPMA’s multiple-use and sustained-yield mandates, the Bureau will often, if not always, fulfill FLPMA’s requirement that it prevent environmental degradation because the former principles already require the Bureau to balance potentially degrading uses—e.g., mineral extraction, grazing, or timber harvesting—with conservation of the}
Whether regulatory adaptation is permissive or mandatory may affect legal adaptive capacity and the extent to which an agency actually uses it to address changed conditions. Thus, the permissiveness in the BLM’s legal framework toward adapting its substantive goals may account for its failure to translate delegated adaptive authority into adaptation activities as extensively as the USFS has done under NFMA’s imperatives to adjust its management strategies as uses, demand for, and supply of forest resources change.\textsuperscript{467}

Although the focus of this Article is on substantive legal adaptive capacity, two aspects of procedural adaptive capacity bear mentioning as possible explanations for the BLM’s relatively poor record on adaptation compared to that of the USFS. First, agency organizational structure may have played a role in the delayed BLM response to climate change. The BLM has a more decentralized decision-making structure,\textsuperscript{468} which may have contributed to its delays in prioritizing climate change adaptation for two reasons. Local officials may have greater discretion to choose not to respond to changes in policy direction at the top,\textsuperscript{469} leading to a less widespread inculcation of the importance of adaptation throughout the agency.\textsuperscript{470} Second, a local decision-making locus may have made BLM resource managers more susceptible to capture by proponents of consumptive and extractive uses important to local economies.\textsuperscript{471} The interests of these parties do not necessarily align with the changes in natural environment. If the Bureau appropriately balances those uses and follows principles of sustained yield, then generally it will have taken the steps necessary to prevent unnecessary or undue degradation.

\textsuperscript{467}Id. at 76.
\textsuperscript{469}BLM land managers reported in 2011 that lack of specific agency direction was the most important barrier to adaptation planning. Archie et al., supra note 14. The percentage of BLM employees identifying this factor as a barrier to adaptation planning was higher than for any of the other three agencies. Id. at Fig. 7.
\textsuperscript{470}In contrast, the congressional practice of dictating USFS decisions line by line in the agency’s budget may have contributed to the absence of comparable local discretion in USFS officials. See 1 COGGINS & GLICKSMAN, supra note 131, § 7:11 (citing John H. Cushman, \textit{Forest Service Is Rethinking Its Mission}, N.Y. TIMES, Apr. 24, 1994, http://www.nytimes.com/1994/04/24/us/forest-service-is-rethinking-its-mission.html).
\textsuperscript{471}Cf. Keiter, supra note 9, at 336 (“[L]ong accustomed to meeting the commodity needs of local Western communities, some agency employees harbor the suspicion (shared by many local residents) that ecosystem-management proposals will ignore local economic concerns”).
management approaches that may be needed to respond effectively to climate change.\textsuperscript{472}

The second aspect of procedural adaptive capacity that may be relevant relates to the manner in which the two multiple-use agencies factor scientific considerations into their decisional processes. The NFMA integrates scientific input into the USFS’s decision-making processes in a way that FLPMA does not. The NFMA requires the Secretary of Agriculture to appoint a committee of scientists not employed by the agency to provide scientific and technical advice to assure that “an effective interdisciplinary approach” is used in the adoption of USFS planning regulations.\textsuperscript{473} The committee has induced the agency to pursue management approaches that are responsive to changed conditions.\textsuperscript{474} FLPMA does not institutionalize the role of scientific input into BLM decision-making processes in a similar manner, and, according to at least some observers, the result has been that the agency sometimes pays less

\textsuperscript{472} Cf. Glicksman, supra note 110, at 465-69 (describing the impact of different agency cultures and organizational structures on wilderness management policies).
\textsuperscript{474} See Erin Madden, Seeing the Science for the Trees: Employing Daubert Standards to Assess the Adequacy of National Forest Management Under the National Forest Management Act, 18 J. ENVTL. L. & LITIG. 321, 332 (2003) (“In the Committee's opinion, a regulatory system that required “continued evaluation and periodic revisions” when new information became available was critical. Moreover, the Committee understood the vital role that research would play in managing forests based on the evolving body of scientific knowledge of forest ecosystems.”); cf. Robert B. Keiter, Taking Account of the Ecosystem on the Public Domain: Law and Ecology in the Greater Yellowstone Region, 60 U. COLO. L. REV. 923, 969 (1989) (“The NFMA’s mandate to appoint an independent committee of scientists to provide ‘scientific and technical advice’ on the proposed implementing regulations reflects a serious congressional commitment to integrating ecologically based management principles into the Forest Service's multiple-use practices.”). The USFS also may be better situated than the Interior Department agencies to integrate the latest science into its management decisions. The Interior Secretary in the 1990s transferred most FWS scientists, for example, to the National Biological Survey, which Congress then incorporated into the U.S. Geological Survey. As a result, as the leading legal academic on the national wildlife refuges has surmised, the FWS “suffers from . . . a dearth of scientists. . . . So, without sufficient scientific expertise to determine the full range of consequences of a use, and without funding for new studies to better understand impacts, the Service may fail to forecast many interferences with or detractions from the purposes of the refuge.” Fischman, supra note 83, at 555. The NPS’s science arm suffered a similar fate. See Paul C. Pritchard, Our National Parks: Assumptions, Metaphors and Policy Implications, 8 FORDHAM ENVTL. L.J. 421, 424 (1997) (stating that the NPS “research function has been decimated in recent years,” with “many Park Service researchers have been transferred to the National Biological Survey (NBS) in the interest of efficiency and increased effectiveness”). The level of scientific input into NPS management decisions dropped sharply after those shifts. Id. at 424-25.
attention to current science than it should, in part because of the influence of consumptive users referred to above.475

The difference between the climate adaptation track records of the USFS and the BLM may also be the result of factors that have nothing to do with either the substantive or procedural legal adaptive capacities of the two agencies.476 The USFS has long had a top-down management culture, which places a premium on following policy directions established by agency leadership.477 Relatedly, one possibility is that the BLM historically has a less robust tradition of natural resource protection even as compared to the USFS. The USFS, for example, has long played a leadership role in wilderness preservation that the BLM has not.478 Similarly, it is possible that there has been a mistaken belief that natural resources on BLM lands — such as range — are not as vulnerable to a changing climate as USFS lands, or that, even if they are, they are less ecologically valuable and therefore not worth devoting as many resources to save. Some have referred to the BLM lands as “the lands no one wanted,” having been unclaimed and unreserved during the federal government’s disposition of the public domain, and “many viewed them as a vast arid wasteland of little use to anyone.”479

The wooded areas and spectacular scenery characteristic of

475 See, e.g., Debra L. Donahue, Western Grazing: The Capture of Grass, Ground, and Government, 35 ENVTL. L. 721, 782 (2005) (“Of all federal agencies, however, the BLM best epitomizes rancher capture. Its bias is frequently apparent in management decisions that disregard available science and policy guidance.”).

476 Others have noted the role of extra-statutory factors in other agencies’ failure to pursue adaptive approaches. See Archie et al., supra note 14 (concluding that “[d]ifferences between the . . . BLM and USFS were apparent [in survey responses from land managers at the two agencies] despite their similar multiple use mandates,” and attributing dissimilar management practices to different “structure and culture, funding, use of science, collaboration with stakeholders, and political power”); Flatt & Tarr, supra note 123, at 1499 (attributing U.S. Army Corps of Engineers’ failure to use statutory flexibility in managing water storage to factors such as the absence of analogous past challenges, inertia, close relationships with interests that benefit from entrenched ways of doing things, resource constraints, and decentralized decision-making structures).

477 Glicksman, supra note 265, at 468-69; 1 COGGINS & GLICKSMAN, supra note 131, § 7:11 (concluding that, despite the USFS’s professed adherence to a strong tradition of delegated authority, “for a variety of reasons,” including “the professionalism and esprit de corps that are also a part of the Forest Service tradition,” local officials tend to conform to policies established at higher levels within the agency). Another reason for this tendency of local officials to defer to policies and decisions of higher-level officials is the agency’s decision to pattern decision-making practices “on the top-heavy, hierarchical business management practices of the 1940s and the 1950s.” Id.

478 See Glicksman, supra note 265, at 460. According to Archie et al., supra note 14, “more robust leadership in natural resource management can facilitate improved transitioning to new management styles.”

479 Nolen, supra note 135, at 774.
some national forest tracts, on the other hand, may more readily prompt the conclusion that adaptation to preserve ecological function is critical.\textsuperscript{480}

The BLM lands do have ecological value, however, and one of FLPMA’s goals is management that protects ecological and environmental values.\textsuperscript{481} Moreover, even if some BLM lands may be less ecologically rich than other federal lands, this may change (or need to change) as the climate does. The nearly 248 million acres of BLM lands—the largest of the federal land agencies\textsuperscript{482}—may be essential components of a resilient approach to resource management as climate conditions shift and biota need to migrate to more compatible locations. Finally, degree of historical commitment to resource preservation is not itself determinative—the NPS and, to a somewhat lesser extent, the FWS, have lagged in their management responses to climate change notwithstanding strong resource protection traditions. Perhaps the Forest Service’s more robust response to the challenges of climate change stems from the highly visible adverse impacts already being experienced in the national forests from drought, heat, insect infestation, and disease.\textsuperscript{483} The threats that climate change poses to some of the national parks and wildlife refuges, such as glacial melting and saltwater intrusion from sea level rise,\textsuperscript{484} are more gradual, more geographically confined, and perhaps, at least to some, more contestable as to causation.

Resource constraints also may contribute to the BLM’s less impressive performance.\textsuperscript{485} Congress provided significantly higher levels of discretionary funding to the USFS than the BLM between 2001 and 2014. The USFS received $63.5 billion dollars in discretionary spending, compared to $21.3 billion for the BLM for the same period,\textsuperscript{486} even though the BLM manages more acreage.\textsuperscript{487} This differential seems consistent with a longer pattern of congressional failure to adequately fund the BLM, which may have forced it to prioritize some management goals and initiatives at

\begin{itemize}
  \item \textsuperscript{480} Cf. Glicksman, supra note 265, at 459 (noting that the national forests “tend to feature more spectacular scenery and opportunities for hiking and camping in wooded areas” than the public lands).
  \item \textsuperscript{481} 43 U.S.C. § 1701(a)(8) (2006).
  \item \textsuperscript{482} Gorte et al., supra note 2, at 13.
  \item \textsuperscript{483} See supra note 116 and accompanying text.
  \item \textsuperscript{484} See supra notes 111-113 and accompanying text.
  \item \textsuperscript{485} Cf. Ruhl & Fishman, supra note 102, at 442 (“[W]e cannot expect agencies to carry out projects for which they have no funding.”).
  \item \textsuperscript{487} Glicksman, supra note 265, at 450 (193 million acres for the USFS, compared to 247 million acres for the BLM).
\end{itemize}
the expense of others.488 It would not be surprising if the BLM were to respond to resource shortages by moving climate change adaptation, a task with which it is relatively unfamiliar, to the back burner.

Regardless of the persuasiveness of these potential alternative explanations, the salient point here is that differences between the two agencies do not seem linked to significant differences in their substantive legal adaptive capacities. Substantive legal adaptive capacity may therefore be a necessary but not sufficient precondition to effective land management agency responses to climate change. Without sufficient substantive legal adaptive capacity, even agency personnel committed to accommodating climate change will be unable to do so in a manner that conforms to rigid, inapt goals. If, however, statutory goals are expansive and malleable enough to permit management shifts to meet the challenges of climate change, an agency’s recalcitrance to make those shifts can stymie significant progress in implementing adaptation measures.

V. IMPROVING FEDERAL LAND LEGAL ADAPTIVE CAPACITY

Climate change poses significant challenges to management of all the major federal natural resource systems. It would have been surprising if the management agencies had responded to these challenges with equal alacrity and enthusiasm, notwithstanding government-wide presidential decrees to anticipate climate change. If differences were to exist, one might have expected the land systems most closely tied to resource protection—the national parks, the national wildlife refuges, and official wilderness areas—to best reflect integration of climate change adaptation considerations into management decisions. That is not what has happened. Climate change adaptation has been almost entirely absent from wilderness management, the NPS has not moved much beyond information-gathering and establishment of planning frameworks, and the FWS has gone somewhat but not considerably further than the NPS. Instead, the agency that is most advanced in its commitment to climate change adaptation is the USFS, an agency maligned for much of its history as a captured agency concerned more with maximizing timber cuts than protecting ecological forest health. The only agency whose climate-related posture is neither notably beyond nor behind what its past management priorities might have predicted is the BLM.

488 See, e.g., Archie et al., supra note 14 (quoting BLM employee, who identified as significant resource-based barriers to additional progress in climate change adaptation because the agency lacks “the capacity to fund adaptation projects, or to hire the staff to participate in the projects.”); see also George Cameron Coggins & Parthenia Blessing Evans, *Multiple Use, Sustained Yield Planning on the Public Lands*, 53 U. COLO. L. REV. 411, 447-48 (1982) (attributing the BLM’s inability to plan in part to inadequate funding); Edith Sanders, *Alternative Ranch Experiments: Better than the BLM*, 27 WM. & MARY ENVTL. L. & POL’Y REV. 265, 276 (2002) (noting repeated cuts during the 1970s to BLM budgets and personnel, which “reflected the control of ranch interests”).
We suggest that these largely counterintuitive results stem from the four agencies’ relative legal adaptive capacities. Although scholars have recognized the role of legal adaptive capacity in the pursuit of statutory goals, their focus on procedural adaptive capacity has obfuscated another, perhaps more important, factor—substantive legal adaptive capacity. The disparate responses of the land management agencies to climate-related threats demonstrates the critical role that factor plays in an agency’s response to changed circumstances such as those caused by global climate change. The statutory regimes that govern management of official wilderness and the national parks are rooted in historical and wilderness preservation goals that impair agencies’ ability to meet climate-related threats. The FWS’s organic statute seems more amenable to addressing climate change given its emphasis on protection of ecological function, but the FWS has to a certain degree tied its own hands by interpreting its mandate as oriented toward historical preservation. The USFS and the BLM operate under mandates that afford them ample authority to adjust management strategies as resource conditions change, positioning them well to prepare for climate-related impacts. The USFS has taken advantage of this substantive legal adaptive capacity, setting an example for the other agencies. The BLM has not, for reasons that may include agency culture, organizational structure, and resource limitations.

Given these differential responses, and in light of the pervasive threats that climate change poses to all federal lands systems, we urge refashioning the standards, statutory and otherwise, that govern federal lands to enhance the land management agencies’ substantive legal adaptive capacity. The reforms we envision would remove the shackles that currently create a mismatch between the relatively constrained legal adaptive capacity of some agencies and their duties to achieve applicable management goals in a changing world.

The fact that the USFS, which has expansive adaptive capacity, has done the most to date to integrate climate change considerations into its policies and programs does not suggest that the only or best way to enhance the adaptive capacity of the other agencies to manage climate change is through adoption of multiple use, sustained-yield goals for all land systems. Instead, we favor as the touchstone the promotion of ecological health on all federal land systems.\(^{489}\) Moreover, the emphasis should be on protecting the integrity of ecosystems or essential ecological processes and functions (such as biodiversity, carbon sequestration, water cleaning, waste decomposition, or nutrient cycling) instead of individual species or resources at risk because of climate change.\(^{490}\) The question is how to craft

\(^{489}\) See Camacho, supra note 12, at 1407-08 (urging legal changes to permit better adaptation to a dynamic world, “includ[ing] an increased emphasis not on preserving the past or minimizing human involvement, but rather on limiting bad interactions and promoting the function of valuable ecological processes and constituents.”).

\(^{490}\) Glicksman, supra note 95, at 881-84; Camacho, supra note 128, at 249-50.
management regimes that afford the agencies adequate legal adaptive capacity to pursue that goal without unduly sacrificing other valuable ends, such as historical or wilderness preservation, with which efforts to promote ecological function may conflict in the climate change era.

Put differently, not all substantive legal capacity is created equal; the flexibility of the goal is just one factor to be considered in evaluating how much and what kind of adaptive capacity to provide. In the federal lands context, two flexible goals might differ and have different results. For example, a consumptive but flexible goal (such as that sometimes pursued by the USFS and the BLM under multiple-use, sustained-yield management standards) might be harmful to ecological health, but a flexible goal that requires promoting future ecological health or biodiversity might be beneficial for ecological function. Similarly, historical preservation and wilderness preservation are both rigid goals but they are very different from each other.

To make the legal regimes governing national parks, national wildlife refuges, and wilderness areas more responsive to climate change, we recommend at least a partial shift away from current mandates to premise management strategies primarily on preservation of obsolete historical norms or non-interventionist approaches of questionable efficacy that increasingly may be harmful to ecological health. The use of historical baselines, while useful in some contexts (such as historical preservation), limit government’s adaptive capacity in a dynamic world to conserve healthy ecological resources. Similarly, a hands-off posture is increasingly likely to disrupt the functioning of climate-challenged systems in ways that interfere with continued ecological health. These changes may come in the form of statutory amendments to the Park Service Organic Act or the Wilderness Act to require primacy for promoting long-term ecological health, articulated through the protection of specific ecological processes. In some cases, however, the changes could originate administratively. The NWRSIA’s substantive goals and mandates are flexible enough to accommodate a shift by the FWS away from its past emphasis on maintenance of historic baselines and toward protecting the integrity of ecosystems or essential ecological processes and functions.491

491 For a discussion of the FWS’s commitment to preserving historical baselines, see supra notes 335-354 and accompanying text. Fischman and Adamcik argue that, in addressing climate-related threats, the FWS’s management objectives for the national wildlife refuge system “can no longer rely solely upon past population levels and habitat relationships or even upon heretofore known species assemblages and biotic communities.” Robert L. Fischman & Robert S. Adamcik, Beyond Trust Species: The Conservation Potential of the National Wildlife Refuge System in the Wake of Climate Change, 51 NAT. RESOURCES J. 1, 26 (2011). Instead, they posit that “[a] core complementary focus” on protecting trust species and “ecosystem function and services, ecological integrity, and natural systems” is better suited to providing a robust response to climate change.” Id. at 27. “The adaptation
The changes we recommend in the governing mandates of the multiple use agencies would not all result in an expansion of their substantive legal adaptive capacity, which is already ample. Rather, they would shift from one flexible substantive mandate to another. The multiple uses to which the national forests and the public lands are committed include various extractive uses. These lands have mineral and renewable resources from which the nation should continue to benefit. If multiple use management on either land system interferes with ecological health, however, it should yield to strategies that preserve the health of the affected lands and resources.\textsuperscript{492} One way to accomplish that would be to replace the goal, reflected in the current definition of “sustained yield,” of maintaining “a high-level annual or regular periodic output” of renewable resources on the public lands\textsuperscript{493} with a goal of maintaining well-functioning ecological processes or ecosystem services.\textsuperscript{494} Additionally, as detailed below, the BLM’s experience suggests that a further desirable change unrelated to the scope of its legal adaptive capacity may be to reduce or eliminate agency discretion \textit{not} to manage adaptively.\textsuperscript{495}

Just as there are tradeoffs implicated by expanding procedural legal adaptive capacity through techniques such as adaptive management,\textsuperscript{496} similar tradeoffs necessarily accompany expansion or contraction of substantive legal adaptive capacity.\textsuperscript{497} In the federal land management context, rigid goals that require maintaining an historical baseline or that require non-intervention in federal lands have value. For historical baselines, one possible set of benefits mirrors the reasons for historic preservation law generally.\textsuperscript{498} There may be cultural, educational, aesthetic, or economic reasons for maintaining or restoring property or resources to a prior state, as a reminder of how things are or used to be.\textsuperscript{499} Furthermore, a rigid historical baseline is relatively clear, and at least previously actions commonly recommended for protected areas, such as connectivity enhancement and protection of climate change refugia, more directly emerge from an ecological approach than one primarily prioritizing species.” \textit{Id.}

\textsuperscript{492} Cf. Glicksman, \textit{supra} note 95, at 876-77 (urging a change in the balance of permitted federal land uses).
\textsuperscript{494} The uses that in particular contexts might clash with ecological health are not limited to resource extraction; certain forms of intensive recreational use also may do so.
\textsuperscript{495} See \textit{infra} notes 513-517 and accompanying text.
\textsuperscript{496} See, \textit{e.g.}, Doremus, \textit{supra} note 1, at 1460 (“Both the decision to employ adaptive management and decisions about how to implement it involve tradeoffs.”); Biber, \textit{supra} note 90, at 955 (discussing “tradeoffs [that] are present in making decisions about whether and how to pursue adaptive management”).
\textsuperscript{497} See \textit{infra} Part I.C.
\textsuperscript{498} See, \textit{e.g.}, National Historic Preservation Act, 16 U.S.C. § 470(b)(4) (2006) (finding that the preservation of “irreplaceable” heritage is in the public interest).
\textsuperscript{499} Camacho, \textit{supra} note 12, at 1435.
proponents may have considered it a rough but sufficient proxy for guarding ecological health against consumptive use.\textsuperscript{500} For passive wildness preservation, many have identified economic,\textsuperscript{501} scientific,\textsuperscript{502} psychological,\textsuperscript{503} spiritual,\textsuperscript{504} and existence value\textsuperscript{505} from the maintenance of undisturbed landscapes. In light of the pervasiveness of global anthropogenic climate change—making virtually every land at least indirectly shaped by human activities\textsuperscript{506}—those benefits might more appropriately be identified as the value of maintaining less disturbed, or at least less directly disturbed, lands. Moreover, the rigidity of at least the strictest version of non-intervention is well-defined, providing relative ease in its application. A baseline of minimal management also by definition helps ensure relatively low administrative costs for management activities.

Efforts to increase substantive legal adaptive capacity by allowing agencies to deviate from historical or wildness preservation dictates in the face of climate change will necessarily diminish or forfeit some of these benefits. In their analysis of the Wilderness Act, Eric Biber and Elisabeth Long queried whether the procedural and substantive barriers to active management “might still be too much of a constraint to allow for effective adaptation to climate change.”\textsuperscript{507} However, stating that they “do not think so,” they argue that the costs from the Wilderness Act’s constraints on legal adaptive capacity are worth the “substantial benefits to restraint and passive management for climate change adaptation—at least in the particular context of wilderness areas.”\textsuperscript{508}

\textsuperscript{500}Ruhl & Salzman, supra note 1, at 14 (noting that a historic baseline can provide “a clear goal and temporal reference point”); Camacho, supra note 128, at 245-46.
\textsuperscript{502}CHRIS MASER, THE REDESIGNED FOREST 174 (1988) (“[W]e have to maintain some original, unmanaged old-growth forest, mature forest, and young-growth forest as parts catalog, maintenance manual, and service department from which to learn to practice restoration forestry.”).
\textsuperscript{503}See William Cronon, The Trouble with Wilderness, in THE GREAT NEW WILDERNESS DEBATE 471, 483 (J. Baird Callicott & Michael P. Nelson eds., 1998) (“[W]ilderness offers us the illusion that we can escape the cares and troubles of the world in which our past has ensnared us.”).
\textsuperscript{504}See, e.g., John Copeland Nagle, The Spiritual Value of Wilderness, 35 ENVTL. L. 955, 979-84 (2005) (detailing the repeated emphasis on the spiritual significance of wilderness in congressional hearings on the Wilderness Act).
\textsuperscript{505}See, e.g., John V. Krutilla, Conservation Reconsidered, 57 AM. ECON. REV. 777, 781 (1967) (“There are many persons who obtain satisfaction from mere knowledge that part of wilderness North America remains . . . .”).
\textsuperscript{506}Camacho, supra note 128, at 225-26; Camacho, supra note 12, at 1432-33.
\textsuperscript{507}See Long & Biber, supra note 129, at 627.
\textsuperscript{508}Id.
Though we agree that there undoubtedly are benefits to more passive and reactive strategies as well as tradeoffs from more active management, with the projected rapid and even convulsive effects of climate change we think the scales tilt heavily toward adjusting public land laws more toward more substantive legal adaptive capacity at the expense of rigid adherence to historical preservation or nonintervention. Climate change substantially increases the costs in ecological function of absolute bars and/or significant impediments to active management strategies. Relying on inflexible regulatory goals that emphasize stasis and/or minimal management will severely limit the ability of resource managers to manage the detrimental ecological effects of climate change.\footnote{509} Perhaps the starkest quandary facing an agency subject to those constraints will be choosing between translocating endangered species to lands upon which they have never previously existed or presiding over species extinction.\footnote{510} Moreover, climate change will increasingly render the two goals of wilderness preservation and historical preservation irreconcilable. Additionally, each also will be increasingly incompatible with the need of promoting ecological functions in a rapidly changing world.\footnote{511} As such, we maintain that the ecological costs of non-intervention or historical fidelity will increasingly outweigh the precautionary or cultural benefits.

Nonetheless, the general expansion of substantive legal adaptive capacity we favor need not, and probably should not, apply uniformly, even to lands currently governed by historical or wilderness preservation mandates. For some landscapes, the historical and cultural benefits of historical preservation and the lower administrative costs of wilderness preservation may trump the benefits of a more flexible, adaptive management approach. Such an approach, for example, might be appropriate when an area is expected to be fairly ecologically stable notwithstanding climate change, is exceptionally pristine, or has a poorly understood ecological function.\footnote{512} For other lands, maintaining historical conditions will be increasingly costly and even impossible. Avoiding human disturbance will almost always be possible, but it too may generate unacceptable costs. Thus, if historical or wilderness preservation remains the goal, it should be because policymakers decide that pursuit of that goal is worth the resulting loss of ecological diversity and/or productivity.

\footnote{509} Cf. Iris Braverman: Wild Life: The Institution of Nature 9-10 (Stanford Univ. Press 2015) (arguing that climate change is among the factors making existing species habitat less viable, so that “[i]n many cases, what conservationists refer to as natural habitat must be actively managed alongside the construction of an alternative one”).
\footnote{510} Camacho, supra note 128, at 181-83.
\footnote{511} See Camacho & Beard, supra note 117, at 235 (urging a shift away from maintaining historical baselines and avoiding human management and toward maximizing ecological function in light of climatic and other changing environmental conditions).
\footnote{512} Camacho, supra note 12, at 1446-47.
Finally, the Article’s analysis of substantive legal adaptive capacity provides broader insights about the contours of delegated agency discretion generally. As illustrated through the federal lands context, agency discretion and legal adaptive capacity are related but distinct phenomena. In the context of procedural legal adaptive capacity, there is a temptation to equate more management flexibility with more agency discretion.\textsuperscript{513} However, a process may be flexible but still promote accountability through constraints on when or how the agency is allowed to exercise that flexibility.\textsuperscript{514} For example, a governing authority may compel stakeholder participation, use of adaptive management, or the integration of clear triggers within an adaptive management process, rather than make them optional.\textsuperscript{515}

Likewise, the comparison of BLM and USFS management in the face of climate change illustrates that the effectiveness of substantive legal adaptive capacity may vary depending on whether it is mandatory or permissive. The absence of directives in the BLM’s governing legal regime requiring the agency to adjust management strategies in response to changes in information or circumstances may have played a role in its failure to engage in adaptation activities. In one sense, \textit{requiring} compliance with a flexible substantive goal reduces agency discretion, but in a way that minimizes the potential for other factors to derail effective adaptation to change. For example, if a statute requires an agency to use its adaptive capacity, it is less likely that the agency will respond to budgetary constraints by deferring or giving short shrift to efforts to adapt to change than if the agency has unconstrained discretion to take advantage of its adaptive capacity or leave it lying dormant. Similarly, if a statute demands that an agency take an adaptive posture, agency leadership may face less resistance in imposing top-down directives to alter management approaches to address novel challenges. Such directives may generate buy-in throughout the agency even if, like the BLM, the agency has a decentralized structure that tends to hinder changes in policy direction from the top or deviations from traditional operating practices. Required flexibility also

\textsuperscript{513} DOREMUS ET AL., \textit{supra} note 76, at 3 (discussing risk that adaptive management will promote unbounded agency discretion).

\textsuperscript{514} Cf. Craig, \textit{supra} note 12, at 64 (describing ways to minimize potential for abuse of discretion from regulatory flexibility).

\textsuperscript{515} See, e.g., Camacho I, \textit{supra} note 1, at 331, 349-51 (detailing the limited effectiveness of an adaptive management experiment that allowed but did not require procedural adaptation); DOREMUS ET AL., \textit{supra} note 76, at 11 (calling for integration in adaptive management of clear benchmarks mandating when decisions must be adapted to account for new information or changed circumstances).
may promote accountability by providing a basis for more meaningful judicial review.\footnote{516}

It therefore may be desirable to reduce an agency’s “regulatory discretion” by precluding it from deciding not to act adaptively, even when a change in “legislative discretion” is not needed because the agency operates under a substantive mandate that affords it adequate flexibility to respond to changing needs and conditions.\footnote{517} Mandating the advancement of, and periodic re-assessment against, a flexible regulatory goal—such as the promotion of ecological health in light of changing conditions—may maximize the chance for effective adaptation to change rather than impede it.

**CONCLUSION**

The degree of an agency’s flexibility, procedural and substantive, in implementing its statutory mandate can significantly influence both its capacity and willingness to adapt to changing needs and circumstances. As a rich literature attests, an agency’s exercise of procedural legal adaptive capacity through techniques such as adaptive management can facilitate its responsiveness to change, albeit at the potential cost of a loss of accountability. As the comparative analysis of the five federal land systems above illustrates, substantive legal adaptive capacity plays at least as significant a role in supplying an agency with the tools it needs to meet the challenges posed by changing conditions such as those arising from climate change. Policymakers designing the contours of substantive legal adaptive capacity must make several judgments. They need to consider the tradeoffs implicated in affording more or less legal adaptive capacity. If such capacity is desirable, they should recognize that alternative programmatic goals may be equally flexible, but that some may prove more effective in accommodating change than others. Finally, unused legal adaptive capacity, no matter how it is defined, will not effectively accommodate change, so it may be appropriate to narrow agency discretion to decide whether or not to act adaptively.

\footnote{516} A mandate to act adaptively may check agency discretion by facilitating suits to compel agency action unlawfully withheld or unreasonably delayed. 5 U.S.C. § 706(1) (2006). Similarly, such a mandate may increase accountability by triggering less deferential review under the arbitrary and capricious test. Id. § 706(2)(A).

\footnote{517} See Sidney A. Shapiro & Robert L. Glicksman, Congress, the Supreme Court, and the Quiet Revolution in Administrative Law, 1988 DUKE L.J. 819, 821 (1988) (distinguishing between an agency’s “regulatory discretion,” or its authority to determine whether to regulate, and its “legislative discretion,” or its authority to determine how to regulate. Congress can choose constraints that maximize or minimize each type of discretion.”).