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ADAPTIVE MANAGEMENT AND NEPA: HOW TO RECONCILE PREDICTIVE ASSESSMENT IN THE FACE OF UNCERTAINTY WITH NATURAL RESOURCE MANAGEMENT FLEXIBILITY AND SUCCESS

Robert L. Glicksman* & Jarryd Page**

Abstract

For years, public lands scholars lamented the limited success that federal agencies had in applying adaptive management decisionmaking processes in pursuit of their natural resource management responsibilities. Agency duties to comply with the National Environmental Policy Act (NEPA) have played a role in creating a disconnect between the theory and application of adaptive management. NEPA was designed to force agencies to predict (and consider ways to avoid) the adverse environmental impacts of actions before committing to them. Adaptive management is built on the premise that, at least in conditions of uncertainty such as those that often characterize natural resource management, acting on the basis of one-time predictive judgments is a prescription for failure. Instead, resource managers need to continuously track the consequences of their decisions, reevaluate their management approaches based on evolving evidence, and make appropriate adjustments before starting this iterative process anew.

Notwithstanding the tension between the decisionmaking approaches reflected in NEPA and adaptive management, the federal land management agencies have had to figure out how to implement their NEPA responsibilities as they have increasingly resorted to adaptive management strategies. This Article analyzes the inevitable litigation that these efforts have spurred, identifying how courts have applied various aspects of NEPA's mandates to agency resort to adaptive management. This analysis reveals that careful attention to NEPA's requirements makes reconciliation of the tension between NEPA and adaptive management possible. The Article gleans a series of best practices that should allow agencies to benefit from the flexibility that adaptive management affords its practitioners while satisfying NEPA's "stop and think" mandates.

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INTRODUCTION

The federal agencies responsible for managing lands and natural resources owned by the federal government often must make decisions in the face of uncertainty and incomplete information.¹ Both the agencies governed by multiple use management mandates, the U.S. Forest Service (Forest Service)² and the Bureau of Land Management (BLM),³ and the agencies charged

¹ See Robert L. Glicksman, *Bridging Data Gaps through Modeling and Evaluation of Surrogates: Use of the Best Available Science to Protect Biological Diversity Under the National Forest Management Act*, 83 IND. L. J. 465, 468-69 (2008); Holly Doremus, *Data Gaps in Natural Resource Management: Sniffing for Leaks Along the Information Pipeline*, 83 IND. L.J. 407, 408 (2008); see also Holly Doremus, *Precaution, Science, and Learning While Doing in Natural Resource Management*, 82 WASH. L. REV. 547, 579 (2007) [hereinafter Doremus, *Precaution*] (“Dealing with uncertainty is the signature challenge of environmental and natural resource decisionmaking.”).

² The Forest Service manages the national forests pursuant to the National Forest Management Act (NFMA), 16 U.S.C. §§ 1600-1687 (2020). It must adopt land and resource management plans that “provide for multiple use and sustained yield” of forest resources. *Id.* § 1604(a), (e)(2).

³ The BLM’s organic statute is the Federal Land Policy and Management Act (FLPMA), 43 U.S.C. §§ 1701-1787 (2020). FLPMA directs the BLM to manage the public lands in accordance with land use plans that “use and observe the principles of multiple use and sustained yield.” *Id.* § 1712(a)(c)(1).

with managing federal lands under their jurisdiction for dominant uses, the National Park Service (NPS)⁴ and U.S. Fish and Wildlife Service (FWS),⁵ face this problem.

The problem arises both temporally and geographically. Some management decisions relate to discrete actions that will be implemented immediately. Others are designed to craft policies that will be effective for years.⁶ Some land management agency decisions affect a relatively small location, such as approval of a timber sale in a specific portion of a national forest⁷ or approval of a right-of-way over a portion of the public lands.⁸ Other decisions specify permissible and prohibited uses for enormous tracts of land.

The task of making decisions that affect natural resources across a wide range of temporal and geographic scales is particularly challenging because of the attributes of natural systems—they are complex and ever-changing, rather than static.⁹ Climate change has accelerated the pace and magnitude of changes in natural systems.¹⁰ Further confounding the issue is the fact that these land management agencies, and the laws that govern them and their decision-making, were designed in an era that presumed ecosystems tended toward a state of equilibrium, well before the prevailing ecological understanding that exists today.¹¹ Current ecological science recognizes that natural systems do not evolve to one “ultimate” state but rather exist in a constantly shifting and dynamic disequilibrium.¹²

Notwithstanding pervasive uncertainty about the future condition of the natural resources under the jurisdiction of the federal land management agencies, environmental law often requires the federal land management agencies to predict the outcome, or at least a range of possible outcomes, of their management actions on those resources. Indeed, that is the core requirement

⁴ The NPS manages units of the National Park System under the National Park Service Organic Act, 16 U.S.C. §§ 101001-104909 (2020). That Act requires the Secretary of the Interior to manage the use of the National Park System in conformity with the fundamental purpose of System units, including conservation of scenery, natural and historic objects, and wildlife, and provision for enjoyment of those resources “in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” *Id.* § 100101(a).

⁵ The National Wildlife Refuge Administration Improvement Act, 16 U.S.C. §§ 668dd-668ee (2020), governs the FWS’s management of the National Wildlife Refuge System. The System’s mission is to conserve, manage, and restore “the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” *Id.* § 668dd(a)(2). For descriptions of the four agencies, see 1 GEORGE CAMERON COGGINS & ROBERT L. GLICKSMAN, PUBLIC NATURAL RESOURCES LAW §§ 6:14 to 6:17 (2d ed. 2007).

⁶ NFMA requires the Forest Service to revise its land and resource management plans, for example, only once every fifteen years. 16 U.S.C. § 1604(f)(5).

⁷ *See, e.g., id.* § 1604(g)(3)(E) (conditioning timber sales on land use plan provisions that ensure that “soil, slope, or other watershed conditions will not be irreversibly damaged”).

⁸ *See, e.g.,* 43 U.S.C. §§ 1761-1771 (governing the BLM’s issuance of rights-of-way).

⁹ *See* Fred P. Bosselman & A. Dan Tarlock, *The Influence of Ecological Science on American Law: An Introduction*, 69 CHI.-KENT L. REV. 847, 869(1994) (“Non-equilibrium ecology rejects the vision of a balance of nature. Change and instability are the new constants.”).

¹⁰ *See* Alejandro E. Camacho, *Transforming the Means and Ends of Natural Resources Management*, 89 N.C. L. REV. 1405, 1408 (2011) (“The biggest threat to natural resources management that accompanies climate change is information uncertainty.”).

¹¹ *Id.* at 863-69 (1994); Robert L. Glicksman, *Ecosystem Resilience to Disruptions Linked to Global Climate Change: An Adaptive Approach to Federal Land Management*, 87 NEB. L. REV. 833, 836-37 (2008).

¹² Jonathan H. Adler, *Dynamic Environmentalism and Adaptive Management: Legal Obstacles and Opportunities*, 11 J.L. ECON. & POL’Y 133, 136 (2015) (noting that “[c]ontemporary ecological science” recognizes “that ecological systems are always in flux. There is no true ‘natural’ state for ecosystems.”).

that the National Environmental Policy Act (NEPA)¹³ imposes on the land management agencies.¹⁴ NEPA is designed to ensure that federal agencies “stop and think” about the potential impact of their decisions on the natural environment and to publicly disclose the results of those deliberations.¹⁵ Doing so necessarily requires engaging in a forward-looking approach.

The NEPA documentation process, however, does not always square with the nature of a dynamic natural system in a state of disequilibrium. Particularly when an agency is considering a long-term project, a project covering expansive tracts of land, or an action likely to affect (or be affected by) climate change, it may have great difficulty predicting the course of events or foreseeing how its proposed action will affect a resource or ecosystem it is charged with protecting.¹⁶ The assumptions on which an agency bases the analysis in a NEPA document such as an environmental impact statement (EIS)¹⁷ may turn out to be completely at odds with the on-the-ground reality facing the agency when, or after, it implements its decision.¹⁸

Scientists, legal scholars, and policymakers alike have touted an analytical technique known as adaptive management to mitigate the difficulty of predicting the outcome of decisions that must be made based on currently available but incomplete information, despite the considerable possibility that circumstances will change in ways that could not have been, or were not, anticipated at the time of the decision. Adaptive management can provide policymakers with some assurance that they will have the flexibility to respond if their initial assumptions and projections about future resource conditions turn about to have been misinformed or if they were otherwise incapable of foreseeing the flow of future events.¹⁹

¹³ 42 U.S.C. §§ 4321-4370h (2020).

¹⁴ NEPA’s directives apply, of course to “all agencies of the Federal Government,” not just the federal land management agencies. *Id.* § 4332(2)(C).

¹⁵ See Robert L. Glicksman & Alejandro E. Camacho, *The Trump Card: Tarnishing Planning, Democracy, and the Environment*, 50 ENVTL. L. REP. (ELI) 10281, 10283 (2020).

¹⁶ See C.S. Holling & Gary K. Meffe, *Command and Control and the Pathology of Natural Resource Management*, 10 CONSERVATION BIOLOGY 328, 328 (1996); Ahjond Garmestani, Craig R. Allen & Heriberto Cabezas, *Panarchy, Adaptive Management, and Governance: Policy Options for Building Resilience*, 87 NEB. L. REV. 1036, 1038-40 (2009).

¹⁷ NEPA requires federal agencies to prepare a “detailed statement” (the EIS) to accompany each proposal for major federal action that significantly affects the quality of the human environment. 42 U.S.C. § 4332(2)(C). An EIS must analyze:

- (i) the environmental impact of the proposed action,
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
- (iii) alternatives to the proposed action,
- (iv) the relationship between local short-term uses of man’s environment and the maintenance and enhancement of long-term productivity, and
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Id.

¹⁸ See Bradley C. Karkkainen, *Toward A Smarter NEPA: Monitoring and Managing Government’s Environmental Performance*, 102 COLUM. L. REV. 903, 970 (2002) (concluding that agency efforts to produce “an accurate and comprehensive one time, synoptic, prospective assessment of environmental impacts and the full range of possible solutions . . . produces a massive, highly uncertain, tardy, and often, when all is said and done, not terribly informative document”).

¹⁹ See, e.g., Alejandro E. Camacho, *Adapting Governance to Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L.J. 1, 8 (2009) (promoting a process of “agency learning through adaptive governance—the systematic assessment and adaptation of management decisions and regulatory programs”); Robin

The concept of adaptive management centers on an iterative approach to management—using continual monitoring to find out what works and what does not in a particular management context. The information gleaned from those efforts can provide policymakers with the opportunity to modify management strategies to ensure that projects are capable of conforming to statutory or regulatory mandates or policymakers’ policy objectives.²⁰ According to C.S. Holling, one of the first proponents of adaptive management as a natural resource management strategy,²¹ “[a]daptive management is not really much more than common sense.”²² Professor Craig and Ruhl provide the following more fulsome explanation:

The idea of adaptive management is that agencies should be free to make more decisions, but that the timing of those decisions is spread out into a continuous process that makes differentiating between the “front end” and the “back end” of decisionmaking much less relevant. Rather than make one grand decision and move on, agencies employing adaptive management engage in a program of iterative decisionmaking following a structured, multistep protocol: (1) definition of the problem, (2) determination of goals and objectives for management, (3) determination of the baseline, (4) development of conceptual models, (5) selection of future actions, (6) implementation and management actions, (7) monitoring, and (8) evaluation and return to step (1).²³

Adaptive management is an attractive approach for both scientists and natural resource managers²⁴ because it aligns with ecological understandings of dynamic natural systems and allows agencies to react to unanticipated changes instead of being locked-in to a predetermined path with little or no easy or convenient exit strategy.²⁵ For example, rather than proposing and implementing a multi-year management strategy for a national forest without revisiting the plan until the end of the initial proposed period, adaptive management encourages using monitoring data throughout to modify and make changes to the overall strategy.²⁶

Kundis Craig, “Stationarity is Dead”—*Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 40-43 (2010) (proposing a “principled flexibility” model to respond to climate change with adaptive management).

²⁰ See J.B. Ruhl, *Regulation by Adaptive Management—Is It Possible?*, 7 MINN. J. L. SCI. & TECH. 21, 28 (2005) [hereinafter Ruhl, *Regulation*]; Doremus, *Precaution*, *supra* note 1, at 550 (describing adaptive management as “learning while doing”).

²¹ See INT’L SERIES ON APPLIED SYSTEMS ANALYSIS, ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT xv (C.S. Holling ed., 1978), <http://pure.iiasa.ac.at/id/eprint/823/1/XB-78-103.pdf> [hereinafter HOLLING, ADAPTIVE MANAGEMENT] (addressing “policy makers and managers who are dissatisfied with the traditional procedures and principles and who seek some effective and realistic alternatives”).

²² *Id.* at 136. Holling adds that adaptive management is “a concept based on the theories of adaptive control processes, a well-developed area of engineering.” *Id.* at 203.

²³ Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 VAND. L. REV. 1, 7 (2014) (footnote omitted).

²⁴ See J.B. Ruhl & Robert L. Fischman, *Adaptive Management in the Courts*, 95 MINN. L. REV. 424, 429–30 (2010) (describing “broad consensus among resource managers and academics that adaptive management is the only practical way to implement ecosystem management”).

²⁵ Cf. J.B. Ruhl, *Thinking of Environmental Law as a Complex Adaptive System: How to Clean Up the Environment by Making a Mess of Environmental Law*, 34 HOUS. L. REV. 933, 966 (1997) [hereinafter Ruhl, *Mess*] (contrasting adaptive management as a strategy for managing complex systems with the predominant “nonadaptive” model).

²⁶ See, e.g., National Forest System Land Management Planning, 70 Fed. Reg. 1023, 1025 (Jan. 5, 2005) (“During the 15-year life expectancy of a plan, information, science, and unforeseen circumstances evolve. It must be possible

The NEPA process, however, is largely a “front-end analytic” process²⁷ – agencies must analyze the potential environmental impacts of proposed actions as early in the planning process as possible.²⁸ As Eric Biber has noted, the NEPA process “imposes significant costs on active management through front-end analytic and public participation requirements” such that “the costs of doing environmental review analysis . . . and the associated costs of judicial review . . . deter agencies from making decisions. This undermines adaptive management, which requires the repeated reconsideration and reevaluation of decisions over time in response to new information”²⁹ For that reason, C.S. Holling “found conventional environmental management methods, particularly the environmental impact analysis process that lies at the core of [NEPA], at odds with the emerging model of ecosystem dynamics.”³⁰

The concept of adaptive management emerged from Holling’s concern that the “comprehensive and synoptic environmental analysis and assessment”³¹ that NEPA calls for “led

to adjust plans and the plan-monitoring program and to react to new information and science swiftly and efficiently. An environmental management system (EMS) approach will enhance adaptive planning and should be part of the land management framework.”).

²⁷ Eric Biber, *Adaptive Management and the Future of Environmental Law*, 46 AKRON L. REV. 933, 937 (2013); Eric Biber & Josh Eagle, *When Does Legal Flexibility Work in Environmental Law?*, 42 ECOLOGY L.Q. 787, 793 (2015) (footnotes omitted) (“By ‘front-end’ analysis, scholars and managers generally refer to the panoply of predecisional analytic requirements required by statutes such as the Administrative Procedure Act (APA), the National Environmental Policy Act (NEPA), and the Endangered Species Act (ESA) before an administrative agency decision can be finalized.”); Julie Thrower, Comment, *Adaptive Management and NEPA: How a Nonequilibrium View of Ecosystems Mandates Flexible Regulation*, 33 ECOLOGY L.Q. 871, 883 (“[T]he EIS process calls for a front-end analysis outlining with relative precision the environmental impact of a proposed project. . . .”). Under certain circumstances, agencies must prepare additional documents such as supplemental EISs to reflect changed circumstances or new information. See *infra* note 305 and accompanying text.

²⁸ The regulations of the Council on Environmental Quality (CEQ), which oversees implementation of NEPA across the federal government, for example, provide that:

An agency should commence preparation of an environmental impact statement as close as practicable to the time the agency is developing or receives a proposal so that preparation can be completed in time for the final statement to be included in any recommendation or report on the proposal. The statement shall be prepared early enough so that it can serve as an important practical contribution to the decision-making process and will not be used to rationalize or justify decisions already made. . . .

40 C.F.R. § 1502.5.

²⁹ Biber, *supra* note 27, at 97-38.

³⁰ Ruhl & Fischman, *supra* note 24, at 429. According to Professors Ruhl and Fischman:

The traditional management approach of natural resources policy was “to attack environmental stressors in piecemeal fashion, one at a time,” and to parcel decisionmaking “out among a variety of mission-specific agencies and resource-specific management regimes.” In contrast, the adaptive management framework is more evolutionary and interdisciplinary, relying on iterative cycles of goal determination, model building, performance standard setting, outcome monitoring, and standard recalibration.

Id. (footnote omitted). See also J.B. Ruhl, *The Disconnect Between Environmental Assessment and Adaptive Management*, ABA TRENDS, July/August 2005, at 1 [hereinafter Ruhl, *Disconnect*]. NEPA is not the only statute under which use of adaptive management may create friction with statutory goals or requirements. See, e.g., Nat. Res. Def. Council v. Kempthorne, 506 F. Supp. 2d 322, 352 (E.D. Cal. 2007) (“[A]daptive management schemes do not fit neatly within the [Endangered Species Act’s] existing regulatory structure.”).

³¹ Jonathan Poisner, *A Civic Republican Perspective on the National Environmental Policy Act’s Process for Citizen Participation*, 26 ENVTL. L. 53, 78 (1996) (“To some degree, NEPA furthers the synoptic cultural paradigm. . . . NEPA calls for a ‘systematic interdisciplinary’ planning process to evaluate the environmental impacts of a proposed action.”). Lynton Caldwell, a professor of public administration at Indiana University who urged adoption of NEPA’s environmental impact statement preparation mandate, conceived of NEPA as a vehicle for spurring

neither to better scientific understanding nor to well-informed agency decisionmaking.”³² Holling “offer[ed], as an alternative, the process of adaptive environmental management and policy design, which integrates environmental with economic and social understanding at the very beginning of the design process, in a sequence of steps during the design phase and after implementation.”³³ The challenge, then, is to reconcile the iterative approach that is at the core of the adaptive management approach with the front-loaded analytical duties that stem from agency NEPA obligations,³⁴ and to do so in a way that is likely to survive unscathed in the event of a lawsuit asserting alleged agency noncompliance with NEPA.

This Article provides an overview of the cases in which courts have assessed whether reliance by federal land management agencies on adaptive management strategies complied with applicable NEPA obligations. While this is not the first effort to explore judicial review of the relationship between NEPA and adaptive management,³⁵ it plows new ground by identifying plaintiff’s points of entry into NEPA litigation, and it provides a template that agencies may use to integrate adaptive management strategies into their NEPA compliance efforts in a way that will likely survive judicial review. Part I describes the use of adaptive management to date by the four primary federal resource management agencies. It examines the legislation, regulations, and various guidance documents that provide the legal framework which both authorizes and constrains the agencies’ capacity to resort to adaptive management in conducting their NEPA analyses. This discussion reveals that adaptive management has become an integral resource management tool for these agencies, even though the strategy has not always been consistently applied within an agency, across agencies, or in relation to specific project types.

Part II analyzes the case law addressing use of adaptive management strategies by the federal land management agencies to comply with NEPA.³⁶ It explores how courts have reconciled, or found it impossible to reconcile, adaptive management with different provisions of

“rational-comprehensive analysis proceeding from a clear objective through identification of all relevant alternatives and analysis of all consequences (environmental impacts, as well as economic and technical considerations) to an optimum decision.” Paul J. Culhane, *NEPA’s Impacts on Federal Agencies, Anticipated and Unanticipated*, 20 ENVTL. L. 681, 685 (1990).

³² Bradley C. Karkkainen, *Panarchy and Adaptive Change: Around the Loop and Back Again*, 7 MINN. J.L. SCI. & TECH. 59, 60-61 (2005); see also Bradley C. Karkkainen, *Adaptive Ecosystem Management and Regulatory Penalty Defaults: Toward A Bounded Pragmatism*, 87 MINN. L. REV. 943, 948 (2003) (“Holling developed the concept . . . by way of criticizing standard techniques of environmental impact assessment.”). Cf. A. Dan Tarlock, *Is There A There There in Environmental Law?*, 19 J. LAND USE & ENVTL. L. 213, 249 (2004) (“Adaptive management was developed in the late 1970s as a criticism of static or deterministic environmental assessment.”).

³³ HOLLING, ADAPTIVE MANAGEMENT, *supra* note 21, at 1; see also Hillary M. Hoffmann, *Climate Change and the Decline of the Federal Range: Is Adaptive Management the Solution?*, 15 VT. J. ENVTL. L. 262, 265-67 (2014) (reviewing adaptive management’s history).

³⁴ For an effort to reconcile NEPA and adaptive management, see Thrower, *supra* note 27.

³⁵ See, e.g., Ruhl & Fischman, *supra* note 24 (providing analysis of cases up to 2010).

³⁶ The federal land management agencies are not the only ones whose use of adaptive management has triggered NEPA litigation. See, e.g., *Humane Soc’y of the United States v. U.S. Dep’t of Agric.*, No. 20-03258 AB (GJSx), 2021 WL 1593243 (C.D. Cal. Mar. 26, 2021) (refusing to dismiss NEPA challenge to adoption by the Animal Plant and Health Inspection Service of an environmental assessment that included an adaptive management program for managing highly pathogenic Avian Influenza for lack of standing). This Article nevertheless largely confines its analysis of the adaptive management practice, and of the NEPA litigation it has prompted, to these agencies to illustrate the impact of adaptive management strategies on NEPA implementation.

NEPA and agency implementing regulations, identifying in the process the obstacles to reliance on adaptive management that NEPA may create.

Finally, based on the judicial treatment of the interplay between NEPA and adaptive management discussed in Part II, Part III provides suggestions for the adoption of best practices for incorporating adaptive management techniques into agency NEPA compliance regimes and for crafting adaptive management strategies that are likely to facilitate environmentally positive outcomes and to pass muster in the event of a judicial challenge. These criteria include procedural elements such as early acknowledgement of the intent to use adaptive management, solicitation and consideration of input from other relevant agencies, and meaningful public participation. Substantively, adaptive management initiatives should include clear program goals, performance standards that identify triggers for project modification, robust monitoring requirements to determine if triggering events have occurred, and a range of mitigating actions tied to specific triggering mechanisms.

These suggested best practices hold out the promise of resolving the tension between EPA's front-end analytical mandates and the benefits of the iterative learning opportunities that adaptive management provides. Their use will reduce the risk that judicial challenges will disrupt agency initiatives based on NEPA noncompliance and assist those seeking to challenge flimsy or insufficient adaptive management plans, while contributing to scientifically sound resource management strategies that promote healthy and resilient ecosystems on the federal lands.

I. THE LEGAL FRAMEWORK FOR USE OF ADAPTIVE MANAGEMENT BY THE FEDERAL LAND MANAGEMENT AGENCIES

Agency use of adaptive management to comply with NEPA, and more generally, has increased in the last several decades.³⁷ In part, this shift has occurred as a result of continuing scientific evidence supporting the use of adaptive management to manage complex ecosystem resources,³⁸ as well as growing momentum within government institutions based on recognition of the need for a more flexible decisionmaking framework.³⁹ To systematize the use of adaptive

³⁷ See A. Dan Tarlock, *Environmental Law: Ethics or Science?*, 7 DUKE ENVTL. L. & POL'Y F. 193, 194 (1996) (describing a "paradigm shift" in environmental law that "moves the emphasis from the simple permanent preservation of 'natural areas' as the dominant biodiversity strategy to a combination of strategies which seek the maintenance of dynamic healthy ecosystems, ecosystem restoration and the increased use of adaptive management"); see also Mary Jane Angelo, *Stumbling Toward Success: A Story of Adaptive Law and Ecological Resilience*, 87 NEB. L. REV. 950, 955 (2009) (describing the legal and scientific scholarly literature as "rife with calls for the increased use of adaptive management," but noting that, "although numerous examples exist where resource agencies adopted adaptive management policies, at least in name, as part of a variety of environmental management and/or restoration projects, examples of successful adaptive management are hard to find.").

³⁸ See Martin J. Westgate et al., *Adaptive Management of Biological Systems: A Review*, 158 BIOLOGICAL CONSERVATION 128, 136 (2013) (finding that "[d]espite the many difficulties in implementing [adaptive management] projects, there presently appears to be no alternative, viable, or clearly superior framework").

³⁹ See, e.g., J.B. Ruhl, *Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act*, 52 U. KAN. L. REV. 1249, 1263 (2004) [hereinafter Ruhl, *Case Study*]; Chris Wold, *Climate Change, Presidential Power, and Leadership: "We Can't Wait"*, 45 CASE W. RES. J. INT'L L. 303, 319 (2012) (quoting Dep't of Interior, Secretarial Order No. 3285, Renewable Energy Development by the Department of the Interior § 3 (Mar. 11, 2009)) (citing the Interior Department's 2009 adoption of a strategy "to increase scientific understanding of and development of effective adaptive management tools").

management, federal agencies have begun to incorporate adaptive management into both their legislative regulations and other, less formal documents. This Part describes efforts by the Council on Environmental Quality (CEQ) and the federal land management agencies to assimilate adaptive management strategies into their governance frameworks, including their NEPA compliance processes.

A. CEQ and Adaptive Management

While the term adaptive management does not appear in the NEPA statute itself, CEQ has endorsed its use,⁴⁰ both in its official regulations and in non-binding guidance documents.⁴¹ CEQ's endorsement is important because its regulations are designed to “provide direction to Federal agencies to determine what actions are subject to NEPA's procedural requirements and the level of NEPA review where applicable.”⁴²

At least as far back as 1997, CEQ recognized the value of adaptive management as a tool for NEPA analysis. In a report issued that year on the first twenty-five years of NEPA's implementation, CEQ remarked that “the utility of adaptive management — flexible project implementation to increase or decrease mitigation based on monitoring results — is now being recognized.”⁴³ Referring to monitoring and adaptive management as a “challenge for the future,” CEQ noted that

the NEPA process has been increasingly successful in modifying project proposals to minimize or avoid adverse environmental impacts before they occur. At the same time, our improved understanding of the functioning of ecosystems makes it clear that we often cannot predict with precision how components of an ecosystem will react to disturbance and stress over time.⁴⁴

At the same time, CEQ found that agencies were not then routinely collecting long-term data on the environmental impacts of their projects or gathering data on the effectiveness of mitigation measures, even though the CEQ regulations then in effect required adoption of a monitoring and

⁴⁰ NEPA created CEQ within the Executive Office of the President. 42 U.S.C. § 4341 (2020). CEQ's duties include reviewing federal programs and activities to determine the extent to which such programs and activities are contributing to the achievement of statutory policies” and “develop[ing] and recommend[ing] to the President national policies to foster and promote the improvement of environmental quality to meet the conservation, social, economic, health, and other requirements and goals of the Nation.” *Id.* § 4344(3)-(4).

⁴¹ NEPA guidance documents “are not legally binding.” Helen Leanne Serassio, *Legislative and Executive Efforts to Modernize NEPA and Create Efficiencies in Environmental Review*, 45 TEX. ENVTL. L.J. 317, 342 (2015). Courts have nevertheless relied on them when they have found the analysis in those documents to be persuasive. *See, e.g.,* San Juan Citizens All. v. U.S. Bureau of Land Mgmt., 326 F. Supp. 3d 1227, 1243 n.5 (D.N.M. 2018).

⁴² 40 C.F.R. § 1500.1(b). The regulations also provide, however, that “NEPA does not mandate particular results or substantive outcomes. NEPA's purpose is . . . to provide for informed decision making and foster excellent action.” *Id.* According to the Supreme Court, “it is now well settled that NEPA itself does not mandate particular results, but simply prescribes the necessary process. . . . Other statutes may impose substantive environmental obligations on federal agencies, but NEPA merely prohibits uninformed—rather than unwise—agency action.” *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-51 (1989).

⁴³ CEQ, THE NATIONAL ENVIRONMENTAL POLICY ACT: A STUDY OF ITS EFFECTIVENESS AFTER TWENTY-FIVE YEARS 28 (1997), <https://ceq.doe.gov/docs/ceq-publications/nepa25fn.pdf> [hereinafter CEQ, EFFECTIVENESS].

⁴⁴ *Id.* at 31.

enforcement program for applicable mitigation measures, monitoring to ensure that agency decisions were carried out, and sharing of monitoring results with other agencies and the public.⁴⁵ Significantly, CEQ acknowledged that “the courts have not generally found . . . a legal requirement [to engage in post-project monitoring] in NEPA itself.”⁴⁶

The 1997 report explained that “[t]he old paradigm for environmental management” of predicting, mitigating, and implementing” had begun to give way to a new paradigm that added monitoring and adapting after implementation,” and that the new paradigm “reflect[ed] the need to monitor the accuracy of predictions and allow enough flexibility in the process for mid-course corrections.”⁴⁷ The “traditional environmental impact analysis process” was “a one-time event; i.e., results from intensive research, modeling, and other computations or expert opinions are analyzed, the analysis of potential environmental impacts is prepared, mitigation measures are identified, and a document is released for public review.”⁴⁸ The problem, according to CEQ, was that “often the process end[ed] there,” such that

adequate environmental protection depend[ed] solely on the accuracy of the predicted impacts and expected mitigation results. Changes in conditions — whether as a result of surprises from nature or human action — are not taken into account. Over the life of the project, these surprises can negate any environmental protections envisioned in the original analysis.⁴⁹

Adaptive management was a vehicle for addressing that flaw by providing agencies with the means to adjust their management actions and directions in light of new information. “Adaptive management recognizes the limits of knowledge and experience and moves iteratively toward goals in the face of uncertainty.”⁵⁰ Rather than invest “extensive resources into the initial analysis,” adaptive management would help agencies develop “‘objective criteria’ for ‘significant’ environmental change in the status of the resource or ecosystem of concern,” approve a project with an uncertain outcome, monitor the actual impacts of the project, and then “make corrective changes to the project or mitigation plan to ensure that significant degradation does not occur. By incorporating adaptive management into their NEPA analyses, agencies can move beyond simple compliance and better target environmental improvement.”⁵¹

Several years later, a NEPA Task Force convened by the Chairman of CEQ published a specific set of adaptive management recommendations as part of an effort to “modernize NEPA implementation.”⁵² The Task Force’s objective was “to provide agencies with another tool to improve their NEPA implementation.”⁵³ Although the 1997 report had sought to explain the value

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.* at 32.

⁴⁸ *Id.*

⁴⁹ *Id.*

⁵⁰ *Id.*

⁵¹ *Id.* at 33. This description of an adaptive management process overlaps significantly with the suggested criteria in Part III below.

⁵² NEPA TASK FORCE, REPORT TO THE COUNCIL ON ENVIRONMENTAL QUALITY, MODERNIZING NEPA IMPLEMENTATION 44 (Sept. 2003), <https://www.energy.gov/sites/prod/files/2016/02/f29/finalreport.pdf>.

⁵³ *Id.* at xi, 46.

of integrating adaptive management into the NEPA process, many NEPA practitioners were still unfamiliar with the concept.⁵⁴ Further, the Task Force reported that the agencies with which it had consulted agreed that “there was insufficient existing guidance about how to integrate adaptive management into the NEPA process.”⁵⁵

Accordingly, the Task Force recommended establishing an adaptive management working group to consider revising CEQ’s NEPA regulations or providing new guidance to facilitate agencies’ ability to accomplish that integration.⁵⁶ The Task Force suggested that the working group consider establishing a definition of adaptive management in the context of NEPA; describe how adaptive management measures could be included in project alternatives (especially when they involve uncertainty); consider whether adaptive management could replace other methods of evaluating a project’s environmental impacts in the face of incomplete or unavailable information; use adaptive management for mitigation monitoring and enforcement; integrate adaptive management into environmental assessments; determine the relationship between adaptive management and assessment of cumulative impacts;⁵⁷ identify means of overseeing and enforcing adaptive management commitments; and allow the use of environmental management systems (EMSs) to serve as mitigation implementation vehicles.⁵⁸

The Task Force set forth a series of factors to help agencies determine whether an adaptive management approach is appropriate for a particular NEPA action. These included the ability to clearly define intended outcomes; the magnitude of potential impacts; the ability to specify impact thresholds or performance measures; monitoring requirements; costs of post-decision monitoring and corrective actions; the agency’s commitment to fund monitoring and implement adaptive measures; the need for management or response flexibility; and the degree to which adaptive management is accepted by relevant stakeholders.⁵⁹

The Task Force also explained the prerequisites to successful use of adaptive management in the NEPA process. Agencies must establish a monitoring scheme to examine the environmental effects of the action in question so that the agency could determine whether adjustments are needed to avoid unpredicted effects.⁶⁰ An adaptive management plan must include adaptive measures capable of being used within the range of alternatives whose impacts were analyzed. It must specify “technically and scientifically credible performance measures or thresholds used to assess progress and effects,” as well as quality control measures to ensure the integrity of the adaptive management technique. Finally, agencies relying on adaptive management must establish adequate public participation processes.⁶¹

⁵⁴ *Id.* at xi, 45.

⁵⁵ *Id.* at 45.

⁵⁶ *Id.* at xi.

⁵⁷ *See also id.* at 52-53.

⁵⁸ *Id.* at xii, 55-56. The Task Force defined an EMS as “that part of an organization’s overall management system that includes the organizational structure, planning elements, procedures, processes and resources for developing, implementing, accomplishing, reviewing, and continually improving the processes and actions an organization undertakes to meet its business and environmental goals.” *Id.* at 49.

⁵⁹ *Id.* at 46-47.

⁶⁰ *Id.* at 48.

⁶¹ *Id.* *See also id.* at 51.

A third component of the Task Force's guidance was identification of a set of factors relevant to assessing the effectiveness of monitoring in connection with adaptive management. The Task Force listed as factors to help determine whether an adaptive change is needed the agency's ability to establish clear monitoring objectives; agreement on the impact thresholds subject to monitoring; the identification of a baseline for the resources being monitored; access to technical means of identifying and measuring changes in affected resources and the ability to analyze those changes; and adequate resources to monitor and respond appropriately.⁶²

CEQ followed up on the Task Force's recommendations by publishing in 2007 a guide for agencies to assist them in using EMSs in their NEPA compliance efforts.⁶³ Like adaptive management, "[a]n EMS employs a continuous, rigorous, self-monitoring cycle for continual improvement of environmental performance. Improvement is achieved by identifying how the activities, products, and services interact with the environment to cause environmental impacts."⁶⁴ CEQ explained that an EMS can support use of an adaptive management approach under NEPA "when there are uncertainties in the prediction of the impacts or outcome of project implementation, or the effectiveness of proposed mitigation."⁶⁵ President Bill Clinton had previously issued an executive order requiring each federal agency to develop and implement EMSs to support environmental leadership programs, policies, and procedures that would include periodically reviewed measurable environmental goals and targets.⁶⁶ President Trump revoked a successor executive order issued by President Obama, replacing it with an order that did not refer to either adaptive management or EMSs, or to any obligation to take mid-course corrective actions to address unanticipated events.⁶⁷

During President Obama's first term, CEQ again encouraged the use of adaptive management techniques by offering guidance to agencies on how to properly implement the strategy to comply with NEPA.⁶⁸ The guidance focused on mitigating commitments identified in

⁶² *Id.* at 50.

⁶³ CEQ, ALIGNING NATIONAL ENVIRONMENTAL POLICY ACT PROCESSES WITH ENVIRONMENTAL MANAGEMENT SYSTEMS: A GUIDE FOR NEPA AND EMS PRACTITIONERS 4, 6-7, 13-14 (April 2007), <https://www.energy.gov/nepa/downloads/aligning-national-environmental-policy-act-process-environmental-management-systems>. This document defined an EMS as "a structure of procedures and policies used to systematically identify, evaluate, and manage environmental impacts of ongoing activities, products, and services." *Id.* at 2.

⁶⁴ *Id.* at 3.

⁶⁵ *Id.* at 6. *See also id.* at 13 ("Monitoring activities implemented for an EMS may subsume or complement the monitoring needed to accomplish adaptive management in the NEPA process.").

⁶⁶ Exec. Order No. 13148, §§ 201, 401, Greening the Government Through Leadership in Environmental Management, 65 Fed. Reg. 24595 (Apr. 26, 2000). President George W. Bush revoked the Clinton order, Exec. Order No. 13423, § 11(a)(iv), Strengthening Federal Environmental, Energy, and Transportation Management, 72 Fed. Reg. 3919 (Jan. 26, 2007), but nevertheless required the head of each federal agency to implement an EMS as "the primary management approach for addressing environmental aspects of internal agency operations and activities," and to collect, analyze, and report information to measure performance in implementing the Bush order. *Id.* § 3(b). President Obama, in turn, revoked the Bush order, Exec. Order No. 13693, Planning for Federal Sustainability in the Next Decade, § 16(b), 80 Fed. Reg. 15871 (Mar. 25, 2015), but continued to require agencies to implement formal EMSs when they had been proven effective. *Id.* § 7(i).

⁶⁷ Exec. Order 13,834, § 8, 83 Fed. Reg. 23771 (May 17, 2018).

⁶⁸ CEQ, Memorandum for Heads of Federal Departments and Agencies: Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact (Jan. 14, 2011),

NEPA documents, and in particular on the use of mitigation measures to justify a finding of no significant impact that allows an agency to avoid preparing an EIS. It required agencies to establish processes to ensure that mitigation commitments are carefully documented and that funding, permitting, or other agency approvals be conditioned on performance of those commitments.⁶⁹ Consistent with earlier guidance on adaptive management and EMSs, the Obama CEQ's guidance stated that mitigation commitments "should be carefully specified in terms of measurable performance standards or expected results, so as to establish clear performance expectations."⁷⁰ Further, the guidance discussed the need for a mitigation monitoring program to enable agencies to "adapt to changing circumstances by creating a sound mitigation implementation plan and through ongoing monitoring of environmental impacts and their mitigation."⁷¹ Monitoring would provide "feedback on the effectiveness of mitigation techniques."⁷² The guidance added that the use of adaptive management could assist agencies in taking corrective action on ongoing projects if initial mitigation commitments failed to achieve projected environmental outcomes.⁷³

CEQ's regulations never required agencies to engage in, or even referred to, adaptive management. The longstanding regulations issued in 1978 did not do so.⁷⁴ Nor did the revisions to the regulations adopted in 2020.⁷⁵ The preamble to those regulations refers to adaptive management only once, and that is simply to mention that one of the subjects that the NEPA Task Force established in 2002 was directed to examine was adaptive management.⁷⁶

B. The Federal Land Management Agencies and Adaptive Management

https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Mitigation_and_Monitoring_Guidance_14Jan2011.pdf CEQ cited NEPA and its own regulations as the source of its authority for the guidance. *Id.* at 1.

⁶⁹ *Id.* at 8.

⁷⁰ *Id.*

⁷¹ *Id.* at 9.

⁷² *Id.*

⁷³ *Id.* at 9-10.

⁷⁴ The 1978 regulations were published at 43 Fed. Reg. 55990 (Nov. 28, 1978).

⁷⁵ Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 43304 (July 16, 2020). For discussion of the proposed version of the 2020 regulations, which did not undergo significant changes prior to their adoption in 2020, see generally Glicksman & Camacho, *supra* note 15. In *Wild Virginia v. Council on Env'tl. Quality*, No. 3:20CV00045, 2021 WL 2521561 (W.D. Va. June 21, 2021), the court dismissed a facial challenge to the 2020 regulations on ripeness and standing grounds. *Center for Biological Diversity v. Walsh*, No. 18-cv-00558-MSK, 2021 WL 1193190 (D. Colo. Mar. 30, 2021), held that the 2020 regulations applied to a NEPA process conducted by the FWS before their adoption because the Administrative Procedure Act "requires a court to determine whether a decision is 'in accordance with law' as it exists at the time of review." *Id.* at *5.

The 2020 regulations required each federal agency to develop proposed procedures to implement the revised regulations within twelve months after September 14, 2020. 40 C.F.R. §1507.3(b). After the Biden Administration took office, CEQ issued an interim final rule giving agencies 36 months, not twelve, to develop those procedures. *Deadline for Agencies to Propose Updates to National Environmental Policy Act Procedures*, 86 Fed. Reg. 34154 (June 29, 2021). CEQ explained that it has begun a review of the 2020 regulations due to "substantial concerns about the legality" of those rules and the process that produced them. *Id.* at 34155. It added that some of the revised provisions "create confusion with respect to NEPA implementation, break from longstanding caselaw interpreting NEPA's statutory requirements, and may have the purpose or effect of improperly limiting relevant NEPA analysis, with negative repercussions in critical areas such as climate change and environmental justice . . ." *Id.* For analysis of some of the legal flaws in the proposed regulations that CEQ finalized in 2020, see Glicksman & Camacho, *supra* note 15.

⁷⁶ 85 Fed. Reg. at 43308.

Federal agencies have, to varying degrees, addressed the use of adaptive management in connection with their NEPA compliance responsibilities. The Interior Department (which houses three of the four principal federal land management agencies, as well as other resource management agencies such as the Bureau of Reclamation⁷⁷ and the Bureau of Ocean Energy Management)⁷⁸ has long endorsed the use of adaptive management by agencies fulfilling their NEPA responsibilities.⁷⁹ In 2007, the Department’s Adaptive Management Working Group issued a Technical Guide “to clearly and consistently define adaptive management and describe conditions for its implementation.”⁸⁰ The Guide referred to the “emerging view” that “sees the NEPA process as a powerful and potentially effective way to embody adaptive management.”⁸¹ It stated that if an EIS incorporates adaptive management, it must “clearly describe how the approach would be implemented.”⁸² The Guide also explained that the use of adaptive management might reduce the need to prepare supplemental NEPA documents to address significant new information,⁸³ and that environmental assessments could help integrate NEPA and adaptive management when supplementation of an EIS is necessary but the impacts are not expected to be significant.⁸⁴ The Working Group concluded that integration of adaptive management into agency NEPA processes “requires thoughtful ‘up-front’ planning, and involves an investment of time and resources by the agency and other stakeholders.”⁸⁵

In 2008, the Department issued regulations that codified the procedures to be used by its subsidiary agencies in complying with NEPA.⁸⁶ It clarified that “the use of adaptive management is not inconsistent with NEPA. . . . Each proposed action, including possible changes in management resulting from an AM approach, may be analyzed at the outset of the process, or these changes in management may be analyzed when actually implemented.”⁸⁷ On the other hand, the agency warned that “the use of an adaptive management approach does not preclude the necessity of complying with NEPA.”⁸⁸ The Department also stated, however, that “[t]he establishment of specific provisions with respect to the use of AM is beyond the scope of this rule.”⁸⁹

⁷⁷ Bureau of Reclamation, <https://www.usbr.gov/> (last visited Feb. 15, 2021).

⁷⁸ See Bureau of Ocean Energy Management, <https://www.boem.gov/> (last visited Feb. 15, 2021).

⁷⁹ The Interior Secretary declared in 2007 that the use of adaptive management was appropriate when:

- (a) there are consequential decisions to be made; (b) there is an opportunity to apply learning; (c) the objectives of management are clear; (d) the value of reducing uncertainty is high; (e) uncertainty can be expressed as a set of competing, testable models; and (f) an experimental design and monitoring system can be put in place with a reasonable expectation of reducing uncertainty.

Dep’t of Interior, Order 3270, 2007 WL 2473329 (Mar. 9, 2007).

⁸⁰ Dep’t of the Interior, Adaptive Management: The U.S. Department of the Interior Technical Guide (2007, revised 2009), <https://www.doi.gov/sites/doi.gov/files/uploads/TechGuide-WebOptimized-2.pdf>.

⁸¹ *Id.* at 10; see also *id.* at 19 (citing case studies that “suggest that adaptive management might make NEPA compliance more effective and efficient in some instances”).

⁸² *Id.* at 40.

⁸³ *Id.*

⁸⁴ *Id.* at 46.

⁸⁵ *Id.* at 47. The goal would be “to ensure that future actions and their effects are within the scope of the initial analysis and do not require subsequent environmental analysis.” *Id.*

⁸⁶ Implementation of the National Environmental Policy Act of 1969, 73 Fed. Reg. 61292 (Oct. 15, 2008).

⁸⁷ *Id.* at 61301.

⁸⁸ *Id.* at 61310.

⁸⁹ *Id.* at 61300-01.

The 2008 regulations remain in effect. They provide that bureaus within the Department should use adaptive management, as appropriate, particularly in circumstances where long-term impacts may be uncertain and future monitoring will be needed to make adjustments in subsequent implementation decisions. The NEPA analysis conducted in the context of an adaptive management approach should identify the range of management options that may be taken in response to the results of monitoring and should analyze the effects of such options. The environmental effects of any adaptive management strategy must be evaluated in this or subsequent NEPA analysis.⁹⁰

Agencies other than the Department of the Interior have also endorsed the use of adaptive management, both in connection with NEPA compliance and in other contexts.⁹¹ The remainder of this section focuses, however, on regulations and guidance documents that the four principal land management agencies – the NPS, the FWS, the Forest Service, and the BLM – have issued to govern the role of adaptive management in NEPA’s implementation.

1. *The National Park Service*

The NPS recognizes that “[a]daptive management promotes flexible decision-making in cases where natural resources are responsive to management, but there is uncertainty about the impacts of management interventions.”⁹² Its website states that “[c]ase studies show how adaptive management can be used for both management and learning.”⁹³ The NPS has not promulgated regulations to define adaptive management or its application.⁹⁴ But the agency’s 2006 Management Policies provide that, “[a]s a means for providing flexibility in the face of changing natural conditions, park managers are encouraged to use an adaptive management approach when appropriate.”⁹⁵

⁹⁰ 43 C.F.R. § 46.145. The regulations define adaptive management as “a system of management practices based on clearly identified outcomes and monitoring to determine whether management actions are meeting desired outcomes; and, if not, facilitating management changes that will best ensure that outcomes are met or re-evaluated. Adaptive management recognizes that knowledge about natural resource systems is sometimes uncertain.” *Id.* § 46.30. The Interior Department’s Departmental Manual also provides guidance on the use of adaptive management. *See, e.g.*, U.S. DEP’T OF THE INTERIOR, DEPARTMENTAL MANUAL § 1.6A(1), <https://www.doi.gov/elips/search?template=All&query=%22Chapter%201%3A%20%20Protection%20and%20Enhancement%20of%20Environmental%20Quality%22%203846&archived=0>. But the portion of the Manual on Managing the NEPA Process does not mention adaptive management. *Id.* ch. 3, <https://www.doi.gov/elips/search?template=All&query=%22Chapter%203%3A%20MANAGING%20THE%20NEPA%20PROCESS%22&archived=0>.

⁹¹ *See, e.g.*, 14 C.F.R. § 1216.309 (National Aeronautics and Space Administration regulation requiring monitoring in connection with use of mitigation measures, including adaptive management strategies); 33 C.F.R. § 332.7(c) (concerning the use of adaptive management to revise performance standards for compensatory mitigation under the Clean Water Act’s dredge and fill permit program); 40 C.F.R. § 230.97(c) (Environmental Protection Agency regulations governing the use of adaptive management in the same context).

⁹² NAT’L PARK SERV., ADAPTIVE MANAGEMENT: THE U.S. DEPARTMENT OF THE INTERIOR APPLICATIONS GUIDE, <https://mylearning.nps.gov/library-resources/adaptive-management-applications-guide/> (last visited Feb. 15, 2021).

⁹³ *Id.*

⁹⁴ Tony Prato, *Adaptive Management of National Park Ecosystems*, 23 THE GEORGE WRIGHT F. 72 (2006), <http://www.georgewright.org/231prato.pdf>, proposed an adaptive management framework for national park ecosystems.

⁹⁵ NAT’L PARK SERV., MANAGEMENT POLICIES 2006, at 27, <https://www.nps.gov/policy/MP2006.pdf>. The Policies also noted the need to use adaptive management in fire management, and as a method of avoiding, minimizing, or mitigating adverse resource impacts from activities in the parks, such as grazing. *Id.* at 50, 99, 116. The agency

In 2016, the NPS Director issued an order stating that to achieve its resource stewardship goals, the agency would “adopt the precautionary principle and adaptive management as guiding strategies for resource management to all existing authorities. These strategies will promote science-based decisions, help deal with uncertainty, and promote a culture of learning.”⁹⁶ The order identified measures of success for adaptive management, including “how well it (1) helps meet environmental, social, and economic goals; (2) increases scientific knowledge; and (3) reduces tensions among stakeholders.”⁹⁷ The order did not provide detailed directions on how to apply adaptive management, instead referring to the Interior Department’s 2007 Technical Guide.⁹⁸ It did promise that the NPS would incorporate references to adaptive management into other policy guidance and provide training for its application.⁹⁹

The NPS applies adaptive management techniques largely on a park-by-park basis. For example, the agency’s Rocky Mountain National Park website defines it as “the process of using information as it becomes available to adjust management actions.”¹⁰⁰ More specifically, in managing vegetation and elk herds in Rocky Mountain, NPS applies a 7-step approach: (1) collecting baseline data; (2) establishing future goals for the elk population; (3) establishing future goals for “aspen, riparian montane willow and upland herbaceous vegetation communities”; (4) applying management actions; (5) monitoring the effectiveness of management actions; (6) general surveillance for other resource effects; and (7) reconsideration of management actions if monitoring and other research show unsuccessful results.¹⁰¹ In some instances, it has integrated adaptive management into its NEPA processes. For example, the NPS has adopted a Winter Use Adaptive Management Plan for Yellowstone National Park. The Plan is comprised of three primary goals: (1) to evaluate the impacts of oversnow vehicle use and help managers keep those impacts within the range predicted by the EIS prepared for the Winter Use Plan; (2) to gather additional data about the comparability of the impacts of snowmobiles and snowcoaches; and (3) to reduce impacts on park resources by gathering additional data and using them to guide future management decisions.¹⁰²

2. *The Fish and Wildlife Service*

defined adaptive management as “a system of management practices based on clearly identified outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that will best ensure that outcomes are met or to re-evaluate the outcomes.” *Id.* at 156.

⁹⁶ Director’s Order # 100: Resource Stewardship for the 21st Century ¶ 6 (Dec. 20, 2016), https://www.nps.gov/policy/DOrders/DO_100.htm.

⁹⁷ *Id.* ¶ 6.2

⁹⁸ *Id.*

⁹⁹ *Id.* ¶ 6.2, 10.2.

¹⁰⁰ National Park Service, Rocky Mountain National Park: Adaptive Management, <https://www.nps.gov/romo/learn/management/adaptive-management.htm> (last visited Feb. 16, 2021).

¹⁰¹ *Id.*

¹⁰² Nat’l Park Serv., Winter Use Adaptive Management Plan, <https://parkplanning.nps.gov/projectHome.cfm?projectId=58858> (last visited Feb. 16, 2021).

The FWS has multiple natural resource responsibilities.¹⁰³ One of those is its administration of one of the two dominant use federal land systems,¹⁰⁴ the National Wildlife Refuge System (NWRS).¹⁰⁵ The nation’s foremost legal scholar on management of the refuges predicted that the FWS’s statutory mandate to “monitor the status and trends” on animals and plants in each refuge¹⁰⁶ would prompt the development of “an essential, yet chronically missing, element of adaptive management[,] feedback about the consequences of decisions in order to adjust them continually.”¹⁰⁷ Indeed, like the NPS, the FWS has incorporated adaptive management into its decisionmaking processes.¹⁰⁸ It has described adaptive management as a “cutting-edge decision-making process” that is “increasingly popular as a framework for projects on national wildlife refuges.”¹⁰⁹ The FWS’s Refuge Planning Manual lists as one of the goals of refuge planning¹¹⁰ “[t]o provide a basis for adaptive management by monitoring process, evaluating plan

¹⁰³ The FWS describes itself as the agency that is “responsible for implementing some of our Nation’s most important environmental laws, such as the Endangered Species Act, Migratory Bird Treaty Act, Pittman-Robertson/Dingell-Johnson wildlife and sportfish restoration laws, Lacey Act, North American Wetlands Conservation Act, and Marine Mammal Protection Act.” U.S. Fish and Wildlife Serv., About the U.S. Fish and Wildlife Serv., https://www.fws.gov/help/about_us.html (last visited Feb. 16, 2021).

¹⁰⁴ See *supra* note 5. The FWS is also one of the two agencies responsible for administering the ESA through activities such as listing and delisting of species and consultation with agencies to determine whether their actions may result in jeopardy to listed species or destruction or adverse modification of critical habitat. 16 U.S.C. §§ 1533, 1536(a)(2). This Article does not address the use of adaptive management in implementation of the ESA.

¹⁰⁵ U.S. Fish and Wildlife Serv., About the U.S. Fish and Wildlife Serv., https://www.fws.gov/help/about_us.html (last visited Feb. 16, 2021) (“Under the National Wildlife Refuge System Administration Act, we manage a network of 567 National Wildlife Refuges, with at least one refuge in each U.S. state and territory, and with more than 100 refuges close to major urban centers.”).

¹⁰⁶ 16 U.S.C. § 668dd(a)(4)(N) (2020).

¹⁰⁷ Robert L. Fischman, *The Significance of National Wildlife Refuges in the Development of U.S. Conservation Policy*, 21 J. LAND USE & ENVTL. L. 1, 19 (2005). *But cf.* Robert L. Fischman, *The National Wildlife Refuge System and the Hallmarks of Modern Organic Legislation*, 29 ECOLOGY L.Q. 457, 523 (2002) [hereinafter Fischman, *Hallmarks*] (“The lack of internal scientific expertise at the U.S. Fish & Wildlife Service will hamper its ability to be a leader in establishing modern scientific research programs and practicing adaptive management.”). Resource constraints can also hamper adaptive management initiatives. *Id.* at 578.

¹⁰⁸ See generally Clinton T. Moore et al., *Adaptive Management in the U.S. National Wildlife Refuge System: Science-Management Partnerships for Conservation Delivery*, 92 J. ENVTL. MGMT. 1395 (2011), <https://www.sciencedirect.com/science/article/pii/S030147971000397X> (describing two cooperative programs between the FWS and the U.S. Geological Survey to implement adaptive management at scales ranging from single refuges to multi-region projects). The FWS has also used adaptive management in fulfilling its other statutory responsibilities. See, e.g., 50 C.F.R. § 18.128(e)(2) (authorizing the use of adaptive management to protect Pacific walrus and polar bears under the Marine Mammal Protection Act); U.S. Fish and Wildlife Serv., ADAPTIVE HARVEST MANAGEMENT: 2018 HUNTING SEASON, <https://www.fws.gov/migratorybirds/pdf/management/AHM/AHMReport2018.pdf> (describing the use of adaptive management as an aid in setting duck hunting regulations). See also Robert L. Fischman, *Letting Go of Stability: Resilience and Environmental Law*, 94 IND. L.J. 689, 699–700 (2019) (footnote omitted) (arguing that “the recovery and maintenance of migratory waterfowl is among the greatest sustainability success stories . . . [and] was accomplished with the tool of adaptive management.”).

¹⁰⁹ Bill O’Brian, Adaptive Management = Science + Decision-Making, https://www.fws.gov/refuges/RefugeUpdate/NovDec_2011/adaptive.html (last visited Feb. 16, 2021).

¹¹⁰ The organic statute for the NWRS requires the FWS, in administering the System, to “plan and direct the continued growth of the System in a manner that is best designed to accomplish the mission of the System . . .” 16 U.S.C. § 668dd(a)(4)(C). See also Fischman, *Hallmarks*, *supra* note 108, at 539 (“Ideally, planning establishes a basis for adaptive management.”). On refuge planning, see generally 2 COGGINS & GLICKSMAN, *supra* note 5, §§ 6:6 to 6:16.

implementation, and updating refuges plans accordingly.”¹¹¹ It states that “[t]he process of adaptive management uses feedback from refuge research and monitoring, and evaluation of management actions to support or modify objectives and strategies at all planning levels.”¹¹² References to adaptive management appear in other Manual provisions that governs refuge management planning.¹¹³ Its 2006 Strategic Habitat Conservation “business model” also “[e]mploys elements of adaptive management in a range of applications across the FWS and the Refuge System.”¹¹⁴ While the FWS advocates for the use of adaptive management in refuge planning, it apparently has provided no official guidance on how to doing so relates to its NEPA implementation. responsibilities

3. *The Bureau of Land Management*

The BLM’s approach to adaptive management has shifted over time. In 2016, the BLM overhauled its resource management planning regulations.¹¹⁵ It explained that the focus of the new regulations would be on achieving desired outcomes and specific resource conditions. By identifying clear targets for management, “the BLM will more readily be able to apply adaptive management principles and respond to change over time.”¹¹⁶ The agency explained that it had already begun using adaptive management techniques to manage for uncertainty,¹¹⁷ and that improving the agency’s “ability to employ science-based decision-making and apply adaptive management techniques . . . are important to achieving [the revised planning] goals.”¹¹⁸ The regulatory preamble also tied adaptive management directly into the NEPA process. It indicated that if NEPA analysis were to reveal that a proposed action would prevent achieving planning goals, the use of adaptive management could provide “a measurable objective [to] identify a

¹¹¹ U.S. Fish and Wildlife Serv., Fish and Wildlife Service Manual, 602 FW 1, Refuge Planning Overview § 1.5E, <https://www.fws.gov/policy/602fw1.html> (last visited Feb. 16, 2021). The Manual defines adaptive management as “[t]he rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from refuge research and monitoring and evaluation of management actions to support or modify objectives and strategies at all planning levels.” *Id.* § 1.6A.

¹¹² *Id.* § 1.7.

¹¹³ See, e.g., 602 FW 3, Comprehensive Planning Process § 3.4C(7) (“Through adaptive management, evaluation of monitoring and research results may indicate the need to modify refuge objectives or strategies.”), <https://www.fws.gov/policy/602fw3.html>; 605 FW 1, General Guidelines for Wildlife-Dependent Recreation § 1.8B(1) (“Through successful monitoring, we can evaluate and adaptively manage to meet established standards (see sections 1.13B. and 1.14) and ensure that quality activities continue to be compatible.”), <https://www.fws.gov/policy/605fw1.html> (last visited Feb. 16, 2021).

¹¹⁴ 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, 7 (2011) (citing U.S. FISH & WILDLIFE SERV., STRATEGIC HABITAT CONSERVATION HANDBOOK: A GUIDE TO IMPLEMENTING THE TECHNICAL ELEMENTS OF STRATEGIC HABITAT CONSERVATION (Version 1.0 2008)).

¹¹⁵ Resource Management Planning, 81 Fed. Reg. 89580 (Dec. 12, 2016).

¹¹⁶ *Id.* at 89582.

¹¹⁷ *Id.* at 89586. For example, in 2015, the BLM published a document, ADVANCING SCIENCE IN THE BLM: AN IMPLEMENTATION STRATEGY (2015), https://www.blm.gov/sites/blm.gov/files/documents/files/Advancing%20Science%20in%20the%20BLM_Implementation%20Strategy.pdf, which stated that it was “essential” to be “science-informed” to enable “managers and staff to apply science in decisionmaking and adaptive management, at every level and in every program.” *Id.* at 1. The Strategy described a case study in which the BLM had used adaptive management techniques in grazing management in Las Cienegas National Conservation Area. *Id.* at 17.

¹¹⁸ 81 Fed. Reg. at 89586.

threshold that triggers a response, such as the initiation of a plan amendment.”¹¹⁹ The preamble cited the Interior Department’s technical guide on adaptive management, stating that the BLM “supports the use of these types of adaptive approaches.”¹²⁰ In particular, it deemed management measures and monitoring procedures to be “essential to the effective implementation of adaptive management procedures.”¹²¹ Nevertheless, the BLM cautioned that “the specific application of adaptive management principles depends on the unique circumstances of each planning effort, and it is not appropriate to prescribe how those principles will be applied in the final [planning] rule.”¹²² The regulations themselves did not mention adaptive management, but their mandates were consistent with its use. Each resource management plan, for example, had to include “[m]onitoring and evaluation standards [that] identify indicators and intervals for monitoring and evaluation to determine whether the resource management plan objectives are being met or there is relevant new information that may warrant amendment or revision of the resource management plan.”¹²³ Further, the regulations required monitoring and evaluation to determine whether planning objectives were being met and whether there was “relevant new information or other sufficient cause to warrant consideration of amendment or revision of the resource management plan.”¹²⁴

In 2017, Congress, using its authority under the Congressional Review Act (CRA),¹²⁵ repealed the 2016 planning rule.¹²⁶ The BLM subsequently opined that the effect of the repeal was that the 2016 rule would “be treated as if it had never taken effect.”¹²⁷ As a result, the agency’s planning rules “revert[ed] to the text of the regulations” that had been in effect before the adoption of the 2016 rule.¹²⁸ Those regulations made no mention of adaptive management, although they did state that a resource management plan “generally establishes . . . [i]ntervals and standards for monitoring and evaluating the plan to determine the effectiveness of the plan and the need for amendment or revision.”¹²⁹ The long-term consequences of the CRA repeal are less clear. The CRA provides that a regulation repealed under the CRA “may not be issued in substantially the same form.”¹³⁰ Because the scope of that prohibition has never been tested in court, its effect on any future BLM effort to codify adaptive management requirements remains uncertain.

¹¹⁹ *Id.* at 89600.

¹²⁰ *Id.* at 89603.

¹²¹ *Id.* at 89604.

¹²² *Id.* at 89655.

¹²³ *Id.* at 89664 (codified at 43 C.F.R. § 1610.1-2(b)(3)).

¹²⁴ *Id.* at 89669 (codified at 43 C.F.R. § 1610.604(a)).

¹²⁵ 5 U.S.C. § 801(b) (2020).

¹²⁶ Pub. L. No. 115-12, 131 Stat. 76 (2017).

¹²⁷ Effectuating Congressional Nullification of the Resource Management Planning Rule Under the Congressional Review Act, 82 Fed. Reg. 60554, 60554 (Dec. 21, 2017).

¹²⁸ *Id.* Those regulations, which are codified at 43 C.F.R. §§ 1601.0-1 to 1601.0-8, originated in 1983. Planning, Programming, Budgeting; Amendments to the Planning Regulations; Eliminated of Unneeded Provisions, 48 Fed. Reg. 20364 (May 5, 1983).

¹²⁹ 48 Fed. Reg. at 20369 (codified at 43 C.F.R. § 160.10-5(k)(8)); *id.* at 20373 (codified at 43 C.F.R. § 1610.4-9). *See also id.* at 20372 (codified at 43 C.F.R. § 1610.4-3 (requiring collection of data and stating that “[n]ew information and inventory data collection will emphasize significant issues and decisions with the greatest potential impact. Inventory data and information shall be collected in a manner that aids application in the planning process, including subsequent monitoring requirements”); *id.* at 20374 (codified at 43 C.F.R. § 1610.5-6 (requiring plan revisions “as necessary, based on monitoring and evaluation findings (§ 1610.4-9), new data, new or revised policy and changes in circumstances affecting the entire plan or major portions of the plan”).

¹³⁰ 5 U.S.C. § 801(b)(2).

Notwithstanding the repeal of the 2016 planning regulations, which focused heavily on the use of adaptive management, nonbinding agency manual provisions recognize the value of adaptive management in more discrete contexts. The BLM’s manual on land health, for example, lists as one of its functions providing “a monitoring and adaptive management strategy to ensure progress is being made toward achieving standards where management is changed for that purpose.”¹³¹ Its manual on national landscape conservation system (NLCS) management commits the agency to using NLCS units as a laboratory for testing innovative land management practices, including adaptive management, consistent with the conservation, protection, and restoration of the values for which these lands were designated.”¹³² The agency has also committed to protecting wild and scenic river values “in a proactive and adaptive manner (indicators and standards, management actions, monitoring, etc.).”¹³³ The manual provisions for special status species management makes district managers and field managers responsible for monitoring populations of special status species to determine whether management objectives are being met and requires that monitoring “be conducted consistent with the principles of adaptive management as defined in Department of Interior policy, as appropriate.”¹³⁴ None of these documents, however, provides any detail on how precisely land managers are supposed to implement adaptive management mandates or precisely how they are to fit into NEPA implementation.

4. *The U.S. Forest Service*

The Forest Service has by far the most developed set of instructions to date on how its officials are supposed to apply adaptive management techniques, particularly in the context of the agency’s approach to NEPA compliance. In its regulations governing the preparation of EISs, the agency specifies that the impact statement’s discussion of alternatives “may include adaptive management.”¹³⁵ If so:

An adaptive management proposal or alternative must clearly identify the adjustment(s) that may be made when monitoring during project implementation indicates that the action is not having its intended effect, or is causing unintended and undesirable effects. The EIS must disclose not only the effect of the proposed action or alternative but also the effect of the adjustment. Such proposal or alternative must also describe the monitoring that would

¹³¹ U.S. Dep’t of the Interior, Bureau of Land Mgmt., 4180—Land Health ¶ .01 (2009), https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual4180.pdf.

¹³² U.S. Dep’t of the Interior, Bureau of Land Mgmt., 6100—National Landscape Conservation System Management Manual (Public) 1-8 (2012), https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual6100.pdf.

¹³³ U.S. Dep’t of the Interior, Bureau of Land Mgmt., 6400—Wild and Scenic Rivers—Policy and Program Direction for Identification, Evaluation, Planning, and Management (Public) 7-10 (2012), https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual6400.pdf.

¹³⁴ U.S. Dep’t of the Interior, Bureau of Land Mgmt., 6480—Special Status Species Management ¶ .04D8e7, <https://www.blm.gov/sites/blm.gov/files/6840.pdf> (2008).

¹³⁵ 36 C.F.R. § 220.5(e)(2). The regulations define adaptive management as “[a] system of management practices based on clearly identified intended outcomes and monitoring to determine if management actions are meeting those outcomes; and, if not, to facilitate management changes that will best ensure that those outcomes are met or re-evaluated. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain.” *Id.* § 220.3.

take place to inform the responsible official during implementation whether the action is having its intended effect.¹³⁶

Likewise, the regulations provide that an environmental assessment must include the proposed action and one or more alternatives, which may include adaptive management.¹³⁷ The assessment must “disclose the environmental effects of any adaptive management adjustments.”¹³⁸

Forest Service planning regulations also address the use of adaptive management. Each land and resource management plan for an individual unit of the National Forest System must include a monitoring program for the plan area.¹³⁹ In addition, responsible officials must conduct “a biennial evaluation of new information gathered through the plan monitoring program and relevant information from the broader-scale strategy, and . . . issue a written report of the evaluation.”¹⁴⁰ The evaluation report “must indicate whether or not a change to the plan, management activities, or the monitoring program, or a new assessment, may be warranted based on the new information. The monitoring evaluation report must be used to inform adaptive management of the plan area.”¹⁴¹

Nonbinding Forest Service documents also provide guidance to agency officials on the use of adaptive management. The Forest Service Manual, for example, requires planning officials to “use a continual assessment, planning, and monitoring process that provides a feedback loop that allows the Forest Service to adapt to changing conditions and to improve plans based on new

¹³⁶ *Id.* § 220.5(e)(2).

¹³⁷ *Id.* § 220.7(b)(2)(iv).

¹³⁸ *Id.* § 220.7(b)(3)(ii). The Forest Service amended its NEPA regulations most recently in 2020. Neither the regulatory text nor the preamble referred to adaptive management. National Environmental Policy Act (NEPA) Compliance, 85 Fed. Reg. 73620 (Nov. 19, 2020). The proposed preamble noted that when the agency adopted its initial NEPA regulations in 2008, it intended to establish a “process that better fits with modern thinking on decisionmaking, collaboration, and adaptive management by describing a process for incremental alternative development and development of adaptive management alternatives” and to “*further* modernize the Agency’s NEPA policy by incorporating lessons learned and experienced gained over the past 10 years.” National Environmental Policy Act (NEPA) Compliance, 84 Fed. Reg. 27544, 27545 (June 13, 2019) (emphasis added) (quoting National Environmental Policy Act Procedures, 73 Fed. Reg. 43084 (July 24, 2008)). Thus, the 2020 revisions apparently did not back away from adaptive management as a NEPA compliance tool. On the other hand, the proposed preamble stated that the proposal was not intended to *require* adaptive management for any particular action because it lends itself to “condition-based management.” *Id.* The proposal would have moved the references to adaptive management from §§ 220.5(e)(2) and 220.7(b)(iv) to § 220.4(j), thereby “add[ing] adaptive management to the general requirements section of the regulation” instead of discussing it separately under the sections on EAs and EISs. *Id.* at 27546. The final regulations did not include that change. *See* 40 C.F.R. § 220.4(j). The proposal also would have codified, and encouraged more widespread use of, the pre-existing Forest Service practice of engaging in “condition-based management,” which refers to “a system of management practices based on implementation of specific design elements from a broader proposed action, where the design elements vary according to a range of on-the-ground conditions in order to meet intended outcomes.” 84 Fed. Reg. at 27544. According to the preamble, “[c]ondition-based management . . . allows the Agency to satisfy NEPA despite uncertainty through validation of data and assumptions relied upon in NEPA analysis prior to implementation.” *Id.* at 27550. The final rule, however, did not adopt those changes. 85 Fed. Reg. at 73621.

¹³⁹ 36 C.F.R. § 219.12(a)(1).

¹⁴⁰ *Id.* § 219.12(d)(1).

¹⁴¹ *Id.* § 219.12(d)(2).

information and monitoring.”¹⁴² The Manual also makes planning officials responsible for “[a]dapting the plan to changing situations through amendments and administrative changes”¹⁴³ and for “[e]nsuring the integration of assessment, planning, implementation, and monitoring into an adaptive management framework that facilitates continued management and planning improvements and changes as suggested by monitoring results.”¹⁴⁴ The Manual describes land management as “an adaptive process that includes social, economic, and ecological evaluations of conditions and trends that contribute to sustaining social, economic, and ecological systems.”¹⁴⁵ It describes objectives for managing inventory, monitoring, and assessment activities to include “[s]upport[ing] an adaptive land management process that includes social, economic, and ecological evaluations.”¹⁴⁶

The Forest Service Handbook provides a framework for incorporating adaptive management into the planning process. It provides that “[t]he three phases of planning (assessment, planning, and monitoring) . . . are designed to support a framework for adaptive management that will facilitate learning and continuous improvement in plans and Agency decisionmaking.”¹⁴⁷ Planning officials must “recognize the goals of adaptive management during each of the three phases.”¹⁴⁸ At the assessment stage, officials must gather and evaluate information and identify key assumptions, areas of uncertainty, and risks.¹⁴⁹ In planning, they must structure plan components so as to allow monitoring to “test assumptions, evaluate risks, reduce key uncertainties, and measure management effectiveness.”¹⁵⁰ After plan adoption or revision, planners must, among other things, analyze monitoring results to reduce uncertainty and improve understanding of system behavior, evaluate progress in achieving plan objectives, and adapt planning and management activities based on learning from analysis of monitoring results.¹⁵¹

Other Handbook provisions describe the role of adaptive management in various contexts. For example, the Handbook includes a section that provides detailed instructions on how to perform adaptive management in regulating grazing use of Forest System units, including how to conduct NEPA analysis. It provides, in part:

When livestock grazing is proposed using an adaptive management strategy, the proposed action shall set defined limits using adaptive management principles of what is allowed, such as timing, intensity, frequency, and duration of livestock grazing. These limits set standards that can be checked through monitoring to determine if actions prescribed were

¹⁴² U.S. FOREST SERV., FOREST SERVICE MANUAL § 1921.03(5), https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsm?1900! (citing 36 C.F.R. § 219.5). Section 219.5(a)(3) of the planning regulations provides that “[m]onitoring is continuous and provides feedback for the planning cycle by testing relevant assumptions, tracking relevant conditions over time, and measuring management effectiveness.”

¹⁴³ U.S. FOREST SERV., FOREST SERVICE MANUAL § 1921.04d(3)(a), https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsm?1900!.

¹⁴⁴ *Id.* § 1921.04d(3)(h).

¹⁴⁵ *Id.* FSM 1900, Chapter 1940 (introductory paragraph).

¹⁴⁶ *Id.* § 1940.2.

¹⁴⁷ U.S. FOREST SERV., FOREST SERVICE HANDBOOK § 1909.12, ch. 41, at 1 https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5409879.pdf.

¹⁴⁸ *Id.* at 4.

¹⁴⁹ *Id.*

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

followed, and if changes are needed in management. The NEPA analysis discloses the effects for these standards. Administrative actions within the defined limits of the resultant NEPA-based decision can then be implemented without additional NEPA. Examples of administrative decisions include:

- a. Determination of specific dates for grazing,
- b. Specific livestock numbers,
- c. Class of animal,
- d. Grazing systems, and
- e. Range readiness when these variables fit within the NEPA-based decision.¹⁵²

The Handbook adds that adaptive management is an interdisciplinary planning and implementation process that identifies site-specific desired conditions; defines appropriate decision criteria (constraints) to guide management; identifies pre-determined optional courses of action, as part of a proposed action to be used to make adjustments in management over time, and establishes “carefully focused project monitoring to be used to make adjustments in management over time.”¹⁵³ It further provides that “where changes in conditions warrant implementation of a management option that has not been provided for in the NEPA analysis, or when the predicted effects of implementation are determined to be greater than the effects originally predicted, a supplemental or new NEPA analysis and NEPA-based decision is needed.”¹⁵⁴ Summarizing, the Handbook states that “[w]ith a well-crafted adaptive management approach, the NEPA-based decision can remain viable for an extended period of time as long as there is periodic review of the actions for consistency with the NEPA-based decision.”¹⁵⁵

As the discussion in this Part demonstrates, CEQ and the land management agencies have long grappled with how to most effectively integrate adaptive management into their resource management strategies and NEPA implementation. Agency regulations and guidance consistently recommend the foundational elements of adaptive management, such as continued monitoring and changing course based on observed data and performance measures. But the procedural mechanisms for endorsing adaptive management have differed, with some agencies choosing to codify adaptive management mandates in legislative regulations, while others have been satisfied with the issuance of nonbinding documents. Likewise, NEPA has not always been part of the adaptive management equation. This somewhat haphazard approach has led to a somewhat uneven adoption and application of adaptive management strategies, even within different agencies (NPS, FWS, and BLM) within the same cabinet-level Department (Interior).

¹⁵² U.S. FOREST SERV., FOREST SERVICE HANDBOOK § 93.23b(1), https://www.fs.fed.us/cgi-bin/Directives/get_dirs/fsh?2209.13!.

¹⁵³ *Id.* § 92.23b(2). *See also id.* § 96.1 (“Management actions should be adjusted when monitoring indicates that those actions are not effective in reaching defined objectives. This is the basic premise behind adaptive management.”).

¹⁵⁴ *Id.* § 92.23b(3).

¹⁵⁵ *Id.* § 92.23b(6). *See also id.* (“In most cases, the only situations that would require an updated NEPA analysis would be where unforeseen changed conditions have occurred that require management actions that have not been considered, and which may produce effects outside the scope of those predicted within the original NEPA analysis document.”); *id.* § 96.2 (“When monitoring indicates the need for implementation of adaptive management modifications disclosed in the project-level NEPA-based decision, those modifications can be implemented without further NEPA review.”). The Handbook also requires the evaluation of a proposal’s environmental effects to include “[a]ll adaptive management options included in the alternatives.” *Id.* § 92.32.

II. JUDICIAL TREATMENT OF ADAPTIVE MANAGEMENT IN NEPA IMPLEMENTATION

The federal land management agencies have incorporated adaptive management into their decisionmaking processes, including NEPA compliance processes, to at least some degree. These practices have generated a stream of litigation challenging the adequacy of NEPA-linked adaptive management practices. This Part surveys the judicial reception to the use of adaptive management in NEPA cases. It breaks down the case law into different aspects of NEPA's mandates, including when adaptive management triggers those mandates, which aspects are likely to create a problematic mesh between NEPA and adaptive management, and which adaptive management practices are most likely to pass judicial muster.¹⁵⁶

A. Adaptive Management as a Methodology

For the most part, the federal courts have been receptive to the use of adaptive management as a natural resource management tool. In one case, for example, the Forest Service proposed the approval of an underground copper and silver mining operation in a wilderness area in the Kootenai National Forest.¹⁵⁷ The preferred alternative in the agency's EIS required sequential Forest Service approval at various phases: evaluation, construction, operations, and closure.¹⁵⁸ As a result, while the Forest Service had approved the full project, further analysis and authorization was required after the evaluation phase before the project could proceed.¹⁵⁹ The challengers claimed that the Forest Service, relying on an "approve now, study later" approach, violated NEPA by failing to obtain baseline data and improperly deferring analysis of certain aspects of the project, such as the environmental effects of a tailings facility.¹⁶⁰ The agency responded that an adaptive management approach was necessary because the anticipated effects of later phases of the project were not yet known. The court, noting that "the proposition presents precarious risks of environmental harm," nevertheless found that the Forest Service complied with NEPA by using available data to outline baseline conditions and projected impacts of mining that "acknowledge[d] shortcomings."¹⁶¹ The court concluded that "where the anticipated effects of later phases are not yet known" reliance on "available data to outline baseline conditions and projected impacts" of the project is sufficient.¹⁶² In effect, the court endorsed adaptive management as a viable strategy that would allow an agency approve the initial phases of a project but defer analysis of the environmental impacts of later phases until those aspects were better understood, particularly in circumstances where the agency was acutely aware of these potential knowledge gaps.

Another case also found that the Forest Service appropriately relied on adaptive management to fulfill its NEPA responsibilities, but only to a point. The agency prepared an EIS on trail and commercial pack stock management in two wilderness areas.¹⁶³ The Forest Service

¹⁵⁶ For an excellent survey of the case law that is now more than a decade old, see Ruhl & Fischman, *supra* note 24.

¹⁵⁷ *Save Our Cabinets v. U.S. Dep't of Agric.*, 254 F. Supp. 3d 1241 (D. Mont. 2017).

¹⁵⁸ *Id.* at 1247.

¹⁵⁹ *Id.* at 1248.

¹⁶⁰ *Id.* at 1262.

¹⁶¹ *Id.* at 1263.

¹⁶² *Save Our Cabinets*, 254 F. Supp. 3d at 1262-63.

¹⁶³ *High Sierra Hikers Ass'n v. Weingardt*, 521 F.Supp.2d 1065 (N.D. Cal. 2007).

established “destination quotas” to control the frequency of use of wilderness destinations by commercial pack stock operators. The court described destination management of this kind as “an adaptive management approach to ‘managing resources where the planning process includes recognizing the uncertainty in existing knowledge related to the resource being managed, and treats management actions as experiments or as hypotheses to be tested using monitoring specifically designed for the particular action.’”¹⁶⁴ The environmental group plaintiffs alleged that this adaptive management strategy allowed improper modifications of standards and limits specified in the agency’s record of decision without further NEPA compliance. The court found, however, that there was no indication that the Forest Service intended to avoid its NEPA obligations if it made future changes to destination quotas.¹⁶⁵ Instead, the agency committed to engaging in further NEPA analysis if management changes occurred, leading the court to hold that its adaptive management strategy did not violate NEPA.¹⁶⁶

The court reached a different conclusion with respect to another aspect of the Forest Service’s invocation of adaptive management, however. In a previous land and resource management plan, the Service prohibited all campfires above a certain elevation. It proposed to modify the plan to allow fires above the elevational boundary under certain conditions.¹⁶⁷ The court pointed out that the agency had previously acknowledged that campfires above elevational boundaries would create wildfire risks. The Service responded that it had adopted an adaptive management strategy which provided tools for allowing campfires above elevational closures if certain conditions were met or a ranger conducted an assessment and permitted campfires. The court found that the Service failed to adequately consider warnings from the managers of adjacent wilderness areas in the National Park System and held that it “improperly relied on adaptive management to control the campfire policy.”¹⁶⁸ This cryptic conclusion did little to clarify why the use of adaptive management was an appropriate method of analyzing the environmental impact of destination quotas but not campfires. Perhaps the absence of a commitment to engage in further NEPA analysis if and when rangers decided to permit campfires was the critical defect in the campfire strategy. Another possibility may be that the Forest Service’s failure to heed warnings from the NPS about the campfire policy was the fatal flaw, with interagency consultation not directly at issue in the destination quotas.

B. Applicability and Scope Questions

The use of adaptive management raises many questions concerning the applicability of NEPA requirements, the form of NEPA compliance that the statute and CEQ regulations require, and the scope of any NEPA analysis in which an agency must engage. This section analyzes how the courts have addressed these questions, providing insights on the scope of agency discretion to rely on adaptive management in its NEPA implementation efforts.

1. Major Federal Action

¹⁶⁴ *Id.* at 1080.

¹⁶⁵ *Id.* at 1083.

¹⁶⁶ *Id.* at 1083-84.

¹⁶⁷ *Id.* at 1090.

¹⁶⁸ *Id.* at 1091.

The obligation to prepare an EIS under NEPA applies only if an agency proposes to take a major federal action that significantly affects the quality of the human environment.¹⁶⁹ The use of adaptive management strategies may affect whether or not that threshold requirement is satisfied. The cases provide guidance on when adaptive management actions trigger EIS preparation obligations.

In one unreported district court case, the focus of NEPA analysis was an agreement (the Headwaters Accord) reached by timber companies, state and federal governments, and environmental groups concerning timber harvesting on lands that provided habitat for endangered species such as marbled murrelets.¹⁷⁰ Under the agreement, the FWS issued an incidental take permit under the Endangered Species Act to a timber company that allowed it to take murrelets under conditions described in a Conservation Plan and Implementation Agreement.¹⁷¹ Logging commenced after issuance of the permit. Environmental groups claimed that the adaptive management framework set forth in the Conservation Plan, take permit, and Implementation Agreement created a series of ongoing obligations that constituted a major federal action for NEPA purposes. These obligations included review, consultation, approval, denial, or modification of proposed activities near occupied murrelet stands to ensure minimization of disturbance of the birds and to decide whether to “release” old-growth areas for logging; implementation, monitoring, and assessment of compliance with the Conservation Plan; approval or disapproval of a schedule for completion of a watershed analysis for covered lands within five years of the take permit’s issuance; and provision of oversight and decisionmaking authority over sediment control.¹⁷² The plaintiffs asserted that these obligations created “discrete decision points” that require the Service to choose between alternative means of accomplishing its goals, but the agency responded that they did not qualify as major federal actions.¹⁷³

The court cited higher court precedents establishing that once the FWS issued the take permit, that action was complete, not ongoing, even though the components of the Accord required ongoing monitoring and perhaps responsive action.¹⁷⁴ The plaintiffs insisted, however, that the adaptive management strategy contained in the Accord involved the FWS in an “ongoing program of discretionary decisionmaking” to determine when, where, and how logging would proceed.¹⁷⁵ In rejecting this contention, the court effectively created a spectrum of agency actions that do or do not qualify as major federal actions. On the one end, if an agency has begun but not completed an action such as building a dam, continued construction would qualify as ongoing major federal action. On the other end, where an action such as adoption of a land use plan or issuance of an incidental take permit is complete, NEPA responsibilities also end.¹⁷⁶ The court regarded this case as falling between those two extremes because the major federal actions that required the EIS in

¹⁶⁹ 42 U.S.C. §§ 4332(2)(C). Agencies may need to prepare an environmental assessment that includes a finding of no significant impact to justify failing to prepare an EIS. 40 C.F.R. § 1501.6(a).

¹⁷⁰ *Envtl. Prot. Info. Ctr. v. U.S. Fish & Wildlife Serv.*, 2005 WL 3021939 (N.D. Cal. Nov. 10, 2005).

¹⁷¹ *Id.* at *2.

¹⁷² *Id.* at *5.

¹⁷³ *Id.*

¹⁷⁴ *Id.* (citing *Norton v. S. Utah Wilderness All.*, 542 U.S. 55, 73 (2004); *Cold Mountain v. Garber*, 375 F.3d 884, 894 (9th Cir. 2004)). The Supreme Court held in *Norton* that supplementation of an EIS is only required if “there remains ‘major Federal actio[n] to occur.’” *Norton*, 542 U.S. at 73.

¹⁷⁵ *Envtl. Prot. Info. Ctr.*, 2005 WL 3021939, *6.

¹⁷⁶ *Id.*

the first place (adoption of the Conservation Plan and issuance of the take permit) were complete and “[a]ll that remains” was adaptive management under the plan, permit, and agreement.¹⁷⁷ The court held that the FWS’s adaptive management duties did not qualify as ongoing major federal action. Indeed, the court expressed concern that a contrary result “might encourage the [FWS] to abandon adaptive management all together [sic] in favor of issuing a permit without any conditions that require the [FWS] to make any further decisions[,] . . . doom[ing] the use of such hands-on management in the future.”¹⁷⁸

The Ninth Circuit addressed a related issue in a case in which environmental groups challenged the BLM’s implementation of the Northwest Forest Plan (NWFP).¹⁷⁹ The Plan established “Survey and Manage” requirements to protect species that might not receive adequate protection from the plan’s land allocation provisions. One of those species was the red tree vole. Seven years after adopting the Plan, in 2001, the BLM and the Forest Service modified it by assigning the vole to a category of species that required surveying before any action that would disturb the vole’s habitat and an Annual Species Review (ASR) to acquire, evaluate, and apply new information to refine the Survey and Manage classifications. The agencies prepared an EIS on the Plan modification.¹⁸⁰ On the basis of its first ASR, the BLM downgraded the status of the vole, eliminating the requirement to conduct pre-disturbance species surveys. The next year, the BLM removed the vole’s Survey and Management designation in its entirety.¹⁸¹ When the agency prepared an EA for two proposed timber sales (which it ultimately awarded), it did not conduct a pre-disturbance survey in accordance with the vole’s downgraded status.

The plaintiffs sought to enjoin the timber sales, alleging NEPA violations.¹⁸² The BLM responded that “adaptive management is at the heart of the NWFP, and flexibility is a necessary element of this strategy.”¹⁸³ It claimed that the ASR process, and all decisions made pursuant to it, complied with NEPA because they were supported by the EIS it prepared on the 2001 NWFP modification. The court disagreed, finding that the vole’s annual review resulted in “adopting policies unequivocally rejected in previous agency actions and scientific analyses.”¹⁸⁴ The ASR decisions were not merely implementations of an already established agency policy (the ASR process). Instead, they were “actions” that triggered NEPA evaluation requirements because the ASR decisions changed the resource management plans substantially.¹⁸⁵ The case indicates that even if an agency prepares an EIS when it issues a land use plan that includes adaptive management provisions, and issuance of the plan qualifies as a completed agency action, subsequent modifications or implementing actions inconsistent with the plan may trigger additional NEPA requirements. Together, these cases suggest that while decisions made subsequent to the end of the NEPA process and pursuant to an adaptive management plan will not necessarily trigger additional NEPA analytical requirements that might otherwise discourage use of adaptation

¹⁷⁷ *Id.*

¹⁷⁸ *Id.*

¹⁷⁹ *Klamath Siskiyou Wildlands Ctr. v. Boody*, 468 F.3d 549 (9th Cir. 2006).

¹⁸⁰ *Id.* at 553.

¹⁸¹ *Id.*

¹⁸² *Id.* at 554.

¹⁸³ *Id.* at 559.

¹⁸⁴ *Id.* at 561.

¹⁸⁵ *Id.*

strategies, courts will not overlook major decisions that are significant departures from what was initially envisioned in the original EA or EIS.¹⁸⁶

2. *Categorical Exclusions*

The CEQ regulations allow agencies to identify categories of actions that normally do not have a significant effect on the human environment, and therefore do not require preparation of an [EA] or [EIS].”¹⁸⁷ If an agency determines that one of its categorical exclusions (CEs) applies, it may avoid further NEPA analysis unless there are extraordinary circumstances such that an otherwise excluded action may have a significant effect and the agency is unable to determine that there are circumstances that lessen the impacts in such a way as to avoid significant effects.¹⁸⁸

The relationship between adaptive management strategies and the use of CEs has arisen in the context of the Forest Service’s handling of grazing permits. In 2005, in an effort to address the backlog of NEPA analyses that needed to be conducted on reauthorized grazing permits, a congressional appropriations rider gave the Service the authority to categorically exclude some permits from NEPA provided, among other things, that monitoring indicated that current grazing management was meeting, or satisfactorily moving toward, land and resource management plan objectives.¹⁸⁹ One of those objectives was ensuring that management activities provide for the protection or enhancement from natural springs and wetlands.¹⁹⁰ The Forest Service applied CEs to hundreds of grazing permit reauthorizations in national forests in Oregon.

In one challenge to these decisions, environmental plaintiffs argued that monitoring did not demonstrate satisfactory progress towards that goal because it showed that most allotments had springs that showed signs of trampling or of having being affected by the presence of cattle. The Forest Service claimed that mitigation efforts satisfied the rider’s requirement to meet or move toward plan objectives, but the plaintiffs responded that proposed mitigating actions did not support invocation of the CE. The court concluded that the agency’s wetlands and spring mitigation measures, which were no more than “[a] plan to make a plan,” were not sufficiently developed to justify a CE.¹⁹¹ The agency’s failure to produce even an early version of the mitigation plans it relied on in invoking the CE, supported by analytical data to demonstrate their effectiveness, was especially troubling.¹⁹² The Forest Service argued that its mitigation plans were analogous to “adaptive mitigation management” measures approved in previous cases.¹⁹³ The

¹⁸⁶ See also *Cottonwood Env’tl. Law Ctr. v. Bernhardt*, 796 Fed. App’x 368, 371 (9th Cir. 2019) (finding the Interagency Bison Management “plan also adopts an adaptive-management approach under which ‘future management actions could be adjusted, based on feedback from implementation of the proposed risk management actions.’ Federal defendants’ active and dynamic implementation of the Management Plan demonstrates ongoing federal action.”)

¹⁸⁷ 40 C.F.R. § 1501.4(a).

¹⁸⁸ *Id.* § 1501.4(b).

¹⁸⁹ *Hells Canyon Pres. Council v. Connaughton*, 2012 WL 13047991, *1 (D. Or. 2012) (citing the FY 2005 Consolidated Appropriations Act, Pub. L. No. 108-447, § 339, 118 Stat. 2809, 3103).

¹⁹⁰ *Id.* at *9.

¹⁹¹ *Id.* at *11. The court characterized the agency’s intended measures as “substantially more inchoate than even a perfunctory plan description or a mere listing of mitigation measures, both of which are inadequate to satisfy NEPA’s requirements.” *Id.*

¹⁹² *Id.*

¹⁹³ E.g., *Theodore Roosevelt Conservation P’ship v. Salazar*, 616 F.3d 497, 517 (D.C. Cir. 2010).

court recognized that “adaptive management is the proper tool to address future, unanticipated impacts from complex, long-term projects.”¹⁹⁴ But when, as in that case, the Forest Service was faced with known grazing-related damage, “[m]ore concrete tools than adaptive management must be employed to mitigate these present effects before the Forest Service may rely on a categorical exception to NEPA requirements.”¹⁹⁵

In a different case, a court approved of the Forest Service’s reliance on adaptive management to justify reliance on the same CE created by the 2005 appropriations rider.¹⁹⁶ In that case, the agency had actually implemented or more fully described intended mitigating measures to address damage caused by grazing.¹⁹⁷ With respect to one allotment, however, even specification of intended mitigation measures did not justify invocation of the CE because the statute conditioned its use on a finding that a decision to authorize grazing was “consistent with agency policy concerning extraordinary circumstances.”¹⁹⁸ Even though grazing appeared likely to affect cultural resources in the affected area, the Forest Service failed to abide by its own policy on extraordinary circumstances, which precluded use of a CE unless the agency was certain that grazing would not have adverse effects on archaeological or Native American cultural sites. The agency failed to make that showing.¹⁹⁹

Thus, agencies seeking to rely on a CE to avoid further NEPA analysis should go beyond making vague promises to address environmental harm through unspecified adaptive management commitments. The more specific the intended measures, the more likely a CE will suffice to meet the agency’s NEPA obligations. Evidence of implementation of such measures will tend to further bolster reliance on a CE.

C. Mitigation

The CEQ regulations anticipate discussion in agency NEPA documents of anticipated measures to mitigate environmental effects that would otherwise result from proposed actions. If an agency makes a finding of no significant impact to avoid preparing an EIS, it must state the authority for any mitigation the agency has adopted, and if the finding is based on mitigation, the “mitigated finding of no significant impact” must describe any enforceable mitigation requirements or commitments that will be undertaken to avoid significant impacts.²⁰⁰ In determining the scope of an EIS, agencies must consider alternatives, including mitigation

¹⁹⁴ *Id.*

¹⁹⁵ *Id.*

¹⁹⁶ *W. Watersheds Project v. U.S. Forest Serv.*, 2012 WL 6589349 (D. Ariz. 2012).

¹⁹⁷ *Id.* at *8, 10, 18. *Cf. W. Watersheds Project v. Salazar*, 766 F. Supp. 2d 1095, 1111-12 (D. Mont. 2011), *aff’d in part*, 494 F. App’x 740 (9th Cir. 2012) (approving use of categorical exclusion for action intended to increase forage area for bison in the Yellowstone River Corridor); *WildEarth Guardians v. U.S. Forest Serv.*, 668 F. Supp. 2d 1314, 1327 (D.N.M. 2009) (approving use of a categorical exclusion pursuant to guidance letter committing the agency to follow allotment management plans or annual operation instructions that “reflect adaptive management flexibility and that has been responsive to needed adjustments in permitted actions”).

¹⁹⁸ Pub. L. No. 108-447, § 339(3), 118 Stat. 3103.

¹⁹⁹ *W. Watersheds Project*, 2012 WL 6589349, at *14-18.

²⁰⁰ 40 C.F.R. § 1501.6(c).

measures that are not part of the proposed action.²⁰¹ An EIS's discussion of environmental impacts must include the conservation potential of alternatives and mitigation measures for energy, natural resource, and other requirements and means to mitigate adverse impacts.²⁰² The regulations endorse tiering from an EA or EIS on an action at an early stage to a supplement an EA or EIS at a later stage (such as environmental mitigation).²⁰³ The alternatives section of an EIS must "[i]nclude appropriate mitigation measures not already included in the proposed action or alternatives."²⁰⁴ The record of decision that accompanies an EIS must "adopt and summarize, where applicable, a monitoring and enforcement program for any enforceable mitigation requirements or commitments."²⁰⁵ Mitigation conditions established in an EIS and committed as part of the accompanying decision to proceed with the proposed action "shall be implemented" by the lead or consenting agency.²⁰⁶ Many challenges to an agency's reliance on adaptive management are based on the contention that an agency violated NEPA because the mitigation actions planned are too vague or weak. As the cases described below demonstrate, the argument has generally been a difficult one to sustain absent an obvious abdication of agency analytical and descriptive responsibilities.

The cases involving an agency's proposed use of mitigation measures as part of an adaptive management strategy for complying with NEPA fall into four major categories: (1) challenges to an agency's use of baseline data in establishing the adaptive management plan; (2) challenges to monitoring and evaluation strategies that underpin mitigating actions; (3) challenges to the specific mitigating measures taken on the basis of those monitoring results; and (4) challenges to the ways an agency plans to keep tabs on ongoing projects or to its plan for addressing the evolving situation as data becomes available.

1. *Baseline Data*

One important prerequisite for the successful use of adaptive management is identification of the baseline conditions against which the effects of management actions will be assessed. Plaintiffs have attacked adaptive management plans based on their failure to identify appropriate or adequate baseline conditions against which future monitoring data would be compared. In one Ninth Circuit case, environmental groups challenged the BLM's EIS for the grant of a right-of-way to construct a wind energy facility.²⁰⁷ The record of decision that accompanied the EIS conditioned grant of the right-of-way on implementation of mitigation measures (which included an 85-page avian and bat protection plan that was incorporated by reference into the EIS) and monitoring programs.²⁰⁸ The environmental group plaintiffs asserted that the mitigation measures

²⁰¹ *Id.* § 1501.9(e)(2). The regulations define "mitigation measures" as those "that avoid, minimize, or compensate for effects caused by a proposed action or alternatives as described in an environmental document or record of decision and that have a nexus to those effects," and then provide several examples. *Id.* § 1508.1(s).

²⁰² *Id.* § 1502.16(a)(6)-(9).

²⁰³ *Id.* § 1501.11(c)(2).

²⁰⁴ *Id.* § 1502.14(e).

²⁰⁵ *Id.* § 1505.2(a)(3).

²⁰⁶ *Id.* § 1505.3. Further, the lead agency must condition funding of actions on mitigation and, upon request, inform others on progress in carrying it out. *Id.* § 1505.3(b)-(c).

²⁰⁷ *Protect Our Communities Found. v. Jewell*, 825 F.3d 571 (9th Cir. 2016).

²⁰⁸ "The FWS endorsed the Protection Plan, stating that it was 'appropriate in its adaptive management approach to avoid and minimize take of migratory birds, bats and eagles.'" *Id.* at 577-78.

referred to in the EIS were insufficiently detailed and that the EIS improperly deferred formulation of some of those measures until post-implementation monitoring and inspection through the use of an adaptive management plan. The court ruled, however, that the “comprehensive set of mitigation measures” developed by the BLM based on field studies conducted over a period of years provided “ample detail and adequate baseline data for the agency to evaluate the overall impact of the Project.”²⁰⁹ It added that an agency’s decision to incorporate an adaptive management plan into a comprehensive set of mitigation measures “does not mean that the agency lacked a sufficient foundation of current baseline data from which to evaluate the Project’s effects. Rather, the use of such a continuous monitoring system may complement other mitigation measures, and help to refine and improve the implementation of those measures as the Project progresses.”²¹⁰

This case indicates that as long as agencies identify relevant studies, analyze the data they produced, and provide a reasonably detailed description in their NEPA documents of baseline conditions and the measures they will consider if subsequent events reveal that initial plans or goals have been derailed, attacks on the use of adaptive management based on its uncertainty and reliance on future protective actions are not likely to prevail.

2. *Monitoring*

Beyond evaluating baseline data, agencies implementing adaptive management must detail the monitoring activities they plan to undertake to determine whether and what kinds of mitigation measures are necessary. Litigants have claimed that agency monitoring criteria are overly vague and lack specificity, often without success. It is clear that failure to provide any description of the monitoring component of an adaptive management program will not suffice.²¹¹ How much more than that is necessary to satisfy a court that the agency has fulfilled its NEPA responsibilities presents a harder question. Although reviewing courts have been reluctant to mandate detailed agency specification of monitoring methods, agencies will nevertheless be better situated to parry NEPA challenges if their adaptive management regimes provide more than a barebones commitment to monitor post-implementation events and pursue appropriate measures to address unanticipated adverse environmental impacts. This section explores illustrative cases.

A leading case on the validity of monitoring commitments as part of an adaptive management strategy is *Theodore Roosevelt Conservation Partnership v. Salazar*.²¹² The BLM approved a natural gas development project in Wyoming. The record of decision (ROD)

²⁰⁹ *Id.* at 582.

²¹⁰ *Id.* See also *Japanese Village, LLC v. Fed. Transit Admin.*, 843 F.3d 445, 461 470-71 (9th Cir. 2016) (finding that proposed mitigation measures to prevent subsidence caused by construction of underground light rail line was adequate in light of inclusion of expert study and that the agency’s study of baseline conditions and in-depth analysis of subsidence, vibration, traffic management, and noise impact of the project, and lengthy description of those impacts in the EIS, complied with NEPA).

²¹¹ See, e.g., *Nat. Res. Def. Council, Inc. v. U.S. Army Corps of Eng’rs*, 457 F. Supp. 2d 198, 233-34 (S.D.N.Y. 2006) (general promise in EA that the Corps would reevaluate need for altering channel dredging methods if they threatened the Environmental Protection Agency’s cleanup of contaminated harbor floor, and that it would follow adaptive management practices and change future contracts “should the data indicate it is necessary” rendered the agency’s finding of no significant impact arbitrary and capricious).

²¹² 616 F.3d 497 (D.C. Cir. 2010).

anticipated approval of about 2000 new natural gas wells over the span of 30 to 50 years. To mitigate the anticipated environmental damage the project would cause, the ROD and related EIS outlined conditions for approving a proposal to drill such a well. The ROD also included an adaptive management plan, which identified goals for monitoring and mitigating the project's adverse impacts on wildlife and other resources during the life of the project.²¹³ The ROD left many specific resource management decisions for case-by-case determinations when addressing individual drilling applications. After approving the ROD, the BLM approved some applications to drill by adopting plans of development (PODs) which include required mitigation measures. The agency prepared an EA for each POD.²¹⁴

Environmental groups challenged the ROD and related EIS. They argued that the ROD's adaptive management plan, and the mitigation measures it described, violated NEPA's requirement to discuss possible mitigation measures in an EIS. The court rejected the challenge. While the exact application of mitigation measures would be determined on a site-specific basis, the court noted that the adaptive management plan incorporated a detailed 13-page list of specific protective measures that officials reviewing individual applications to drill had to consider. Further, the ROD and EIS supplemented this detailed treatment with discussion of environmental studies that supported the BLM's decisions. The court held that "[b]y setting forth fixed mitigation measures and an adaptive management plan, the [ROD] amply fulfills NEPA's mandate to discuss mitigation measures."²¹⁵ The court added that NEPA does not "force agencies to make detailed, unchangeable mitigation plans for long-term development projects."²¹⁶ The BLM took a responsible approach to the inherent uncertainty of the impacts of drilling by including in its adaptive management plan a commitment to monitor "the real effects of the development it authorizes, and adapt its mitigation measures to specific drilling proposals in response to trends observed."²¹⁷

A district court in the D.C. Circuit relied on *Theodore Roosevelt Partnership* to turn aside a suit alleging that the BLM violated NEPA by failing to prepare an EIS for a resource management plan amendment that facilitated coalbed natural gas development and an oil company's plan of development for a 16-well drilling-stage project.²¹⁸ The agency enunciated performance standards (which included metrics relating to elk population size and the amount of available undisturbed elk habitat) and required plans of development submitted by oil companies to comply with them. It committed to closely monitoring the oil company whose plan it approved and indicated that it would increase the scope of authorized drilling if the company met the standards or decrease permissible drilling if it did not. The BLM characterized the performance standards as safeguards to ensure "a bottom threshold" governing the amount of allowable adverse impacts on the elk.²¹⁹ The plaintiffs took issue with the BLM's failure to discuss the specific mitigation measures that would be triggered if the standards' thresholds were exceeded. The court responded that *Theodore*

²¹³ *Id.* at 505-06.

²¹⁴ *Id.* at 506.

²¹⁵ *Id.* at 517.

²¹⁶ *Id.*

²¹⁷ *Id.*; see also *Protect Our Communities Found.*, 825 F.3d at 582 (discussed *supra* notes 208-11 and accompanying text) (stating that "the use of such a continuous monitoring system may complement other mitigation measures, and help to refine and improve the implementation of those measures").

²¹⁸ *Powder River Basin Res. Council v. U.S. Bureau of Land Mgmt.*, 37 F. Supp. 3d 59 (D.D.C. 2014).

²¹⁹ *Id.* at 70-71.

Roosevelt Partnership established that the use of an adaptive management plan that sets “fixed mitigation measures” is NEPA-compliant. In this case, the BLM outlined seven measurable performance standards, set forth a monitoring program to track compliance with the standards, and provided that a management team would then meet to determine whether to implement one of the six recommended mitigation measures described in the amended plan.²²⁰ The resource management plan and associated EA therefore provided sufficient certainty concerning the BLM’s response if performance standard thresholds were crossed, even though, consistent with an adaptive management approach, management changes would not automatically follow in such a case. “The point of such an adaptive approach is that BLM can address impacts at the time specific projects are proposed and choose the best mitigation measures to use based on the feedback from the monitoring team.”²²¹

Other courts have been similarly impressed by adaptive management strategies that included the establishment of standards or triggers,²²² the creation of monitoring regimes to assess whether the standards were violated or the triggers exceeded, and some description of the possible reactive measures if monitoring revealed problems. In one such case, a court approved the BLM’s preparation of an EA for its reauthorization of livestock grazing permits.²²³ The agency’s EA set forth goals for improving rangeland vegetation and stream conditions and forage utilization. It proposed a monitoring program to be used to determine the necessity for corrective measures.²²⁴ The plaintiffs argued that the EA’s discussion of mitigation was perfunctory, but the court noted the two-pronged monitoring strategy called for by the agency’s adaptive management strategy. Implementation monitoring would be used annually to determine range readiness and utilization levels; the EA described “multiple-indicator monitoring” that would assess whether grazing management strategies were achieving identified management goals.²²⁵ The second prong, effectiveness monitoring, included a best management practices evaluation program, which the EA described in detail.²²⁶

²²⁰ *Id.* at 80-81. The court also noted that the EA prepared by the BLM was programmatic, such that “the specifics of how each proposed development intends to meet the performance standards will be evaluated at the site-specific level.” *Id.* at 81. For further discussion of related timing issues, see *infra* § IID.

²²¹ *Powder River Basin Res. Council*, 37 F. Supp. 3d at 82.

²²² See, e.g., *Nat’l Parks Conservation Ass’n v. U.S. Dep’t of Interior*, 46 F. Supp. 3d 1254 (M.D. Fla. 2014), *adhered to on reconsideration*, 2015 WL 476163 (M.D. Fla. Feb. 5, 2015), *aff’d*, 835 F.3d 1377 (11th Cir. 2016) (approving of adaptive management strategy that identified “user capacity indicators and standards” to provide qualitative measurements of adverse impacts of off-road vehicle use on wildlife, water quality, soil conditions, vegetation, and visitor experience).

²²³ *Klamath Siskiyou Wildlands Ctr. v. Grantham*, 2013 WL 1420259 (E.D. Cal. Apr. 8, 2013), *aff’d in part, rev’d in part and remanded*, 642 F. App’x 742 (9th Cir. 2016).

²²⁴ *Id.* at *2.

²²⁵ *Id.* at *10.

²²⁶ *Id.* at *11. See also *W. Watersheds Project v. Bureau of Land Mgmt.*, 2011 WL 1630789, *2 (D. Nev. Apr. 28, 2011) (“NEPA specifically allows agencies to utilize adaptive management plans that, like the ABPP in this case, monitor the real environmental effects of a project and allow the BLM to adapt its mitigation measures in response to the trends observed.”). Cf. *Sierra Nevada Forest Prot. Campaign v. Rey*, 573 F. Supp. 2d 1316, 1339 (E.D. Cal. 2008) (rejecting claim that EIS on Forest Service land and resource management plan and site-specific fuels management project gave short shrift to impacts on species that preferred old-growth forest conditions, concluding that adaptive management strategies permitted the agency to respond to short-term impacts as they developed and relied on modeling projections to aid in thoroughly assessing such impacts), *aff’d in part, rev’d in part, and remanded on other grounds*, 646 F.3d 1161 (9th Cir. 2011).

In another case, the plaintiffs challenged a Forest Service EIS that covered a proposal to permit sheep grazing in a national forest and a scenic recreation area.²²⁷ The agency adopted an adaptive management strategy to improve range conditions. Initially, it committed to monitor the impacts of grazing under the strategy, but the district found it to be deficient because the EIS failed to explain the strategy or protocols behind the monitoring.²²⁸ In response, the Forest Service prepared a supplemental EIS (SEIS) that included a more detailed explanation of those protocols. The SEIS committed the Forest Service to monitor key natural conditions known as Annual Indicators, which were expressed in terms of goals to improve specific range conditions at pre-designated sites. The SEIS also provided that failure to meet those goals would trigger enumerated responses such as modifications of seasons of use, reductions in the number of livestock allowed to graze, and area closures. Noting that “[t]he selection of monitoring is a matter within the expertise of the Forest Service,” the court concluded that the agency had carefully considered its approach to monitoring and “strongly committed to conducting monitoring and improving range conditions.”²²⁹ By doing so, it complied with NEPA.

An unreported district court case involving the Forest Service’s decision to create a snowmobile trail in a national forest adjacent to the Boundary Waters Canoe Area Wilderness in Minnesota includes an in-depth NEPA discussion of the parameters of an adequate explanation of the monitoring components of an adaptive management plan.²³⁰ The agency’s record of decision (ROD) selected a route close to the wilderness area as its preferred alternative. It also adopted an adaptive management strategy that the accompanying EIS did not discuss. The ROD explained that if specific conditions were met, such as a determination that efforts to keep off-highway vehicles off the trail were ineffective or the use of the preferred routes caused excessive resource damage, the preferred route would be closed and an alternative trail constructed. Both the ROD and the EIS described the agency’s monitoring plan, which entailed regular field checks at different intervals for capacity issues, illegal off-trail activity, erosion, and invasive species infestations.²³¹ Environmental groups challenged the ROD’s monitoring plan. Although they conceded that the Forest Service’s NEPA regulations did not require disclosure of the monitoring plan it would use when implementing an adaptive management strategy, they claimed that the monitoring plan was not logically tied to the conditions it was supposed to monitor. Because the plan was drawn from the EIS, which predated the ROD’s adaptive management strategy, they argued that the monitoring plan was not designed with the adaptive management strategy and its conditions in mind. Moreover, they asserted that the conditions gave the Forest Service unlimited discretion in deciding whether to adopt an adaptive management strategy.²³²

The court rejected the challenge, concluding that the agency’s “hybrid approach” in its ROD qualified as a substantively sufficient adaptive management strategy. It reasoned that although “the adaptive management strategy’s conditions and monitoring plan could be more detailed, the level of detail provided was not arbitrary and capricious,” particularly given the simple policy choices reflected in the two alternative routes, each of which had been studied in

²²⁷ *W. Watershed Project v. U.S. Forest Serv.*, 780 F. Supp. 2d 1115 (D. Idaho 2011), *reconsideration denied*, 2011 WL 4442668 (D. Idaho, Sep. 22, 2011).

²²⁸ *Id.* at 1120.

²²⁹ *Id.* at 1121.

²³⁰ *Izaak Walton League of Am., Inc. v. Tidwell*, 2015 WL 632140 (D. Minn. Feb. 13, 2015).

²³¹ *Id.* at *4.

²³² *Id.* at *20.

detail.²³³ The conditions that would trigger a switch to the alternative route could have included specific numeric targets, but the court found nothing to require that degree of specificity.²³⁴ The “key question” in the court’s assessment of the adequacy of the monitoring plan was whether it corresponded with the triggering conditions that would lead to a change in management practices.²³⁵ Despite finding some discrepancies between the monitoring plan and the adaptive management strategies, the court held that the regular field checks provided sufficient monitoring methods to gather information on the types of problems that would trigger the adaptive management strategy’s conditions or require a switch to the alternative route.²³⁶

3. *Mitigating Actions*

The courts have found that agency use of adaptive management conformed to NEPA’s requirement to discuss mitigation measures when the adaptive management plan discussed potential responsive actions in reasonable detail. One such case involved a challenge to the NPS’s approval of special use permits and a right-of-way for an electric transmission line through three national parks.²³⁷ The environmental group plaintiffs argued that the discussion in the agency’s EIS was deficient because it only included “general mitigation measures that do not include the contents of the mitigation plans” or assessments about the actual mitigating effects of the plans.²³⁸ The court, citing the *Theodore Roosevelt Conservation Partnership* case discussed above,²³⁹ pointed out that NEPA does not require an EIS to include “detailed, unchangeable mitigation plans for long-term development projects.”²⁴⁰ The EIS in this case described a wide range of potential mitigation measures and plans for different aspects of the permitted activity (such as drilling, spill prevention and response, soil and erosion control, and vegetation management plans).²⁴¹ Because the EIS included reasonably detailed “fixed mitigation measures” (even though their exact application would be determined on a site-specific basis), the NPS complied with NEPA’s requirement to discuss mitigation measures.²⁴²

The same court had reached a similar result, perhaps based on a sketchier amplification of intended mitigation measures in an earlier case in which environmental groups challenged a joint NPS-FWS Bison and Elk Management Plan that committed to indefinite continuation of an artificial feeding program.²⁴³ The Plan provided for the adaptive management of the herd in ways

²³³ *Id.*

²³⁴ *Id.* at *21.

²³⁵ *Id.* at *22.

²³⁶ *Id.* The court also rejected the notion that the Forest Service’s approach was “bad policy.” *Id.* *But cf.* *Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015, 1029 (9th Cir. 2011) (invalidating delisting of grizzly bears under the ESA that was based on adaptive management because although the FWS established “an intensive management and monitoring framework . . . , it was not developed to be responsive to” the declines in food sources that threatened the bears’ viability).

²³⁷ *Nat’l Parks Conservation Ass’n v. Jewell*, 965 F. Supp. 2d 67 (D.D.C. 2013).

²³⁸ *Id.* at 75.

²³⁹ *See supra* notes 213-18 and accompanying text.

²⁴⁰ *Nat’l Parks and Conservation Ass’n*, 965 F. Supp. 2d at 75 (quoting *Theodore Roosevelt Conservation P’ship*, 616 F.3d at 517).

²⁴¹ *Id.* at 75.

²⁴² *Id.* at 76.

²⁴³ *Def. of Wildlife v. Salazar*, 698 F. Supp. 2d 141, 144 (D.D.C. 2010), *aff’d on other grounds*, 651 F.3d 112 (D.C. Cir. 2011).

that protected long-term biotic integrity and environmental health, including directives to the agencies to initiate habitat conservation projects for the improvement of forage and to assist in minimizing bison and elk feeding on private land.²⁴⁴ The Plan also provided for gradual transition away from artificial feeding based on triggers (that had not yet been developed) relating to factors such as the level of forage production, the desired herd sizes, the winter distribution of the animals, the prevalence of disease, and public support.²⁴⁵ The plaintiffs charged that the adaptive management plan was nothing more than “a plan to make a plan,” which was insufficiently detailed to allow a reasonably complete discussion of mitigation measures.²⁴⁶ Not so, the court replied. NEPA, the court opined, does not prevent agencies from adopting mitigation measures subject to adjustment depending on their effectiveness.²⁴⁷ Although the agencies had not “fill[ed] in every detail (which is to be expected in an adaptive management plan),” the Plan and the EIS provided enough specific mitigation measures (such as changing feed sites, decreasing the frequency of supplemental feeding, or vaccinating the herds to prevent disease) to qualify as a “reasonably complete discussion of mitigation.”²⁴⁸

Another example involved a challenge to BLM resource management plans for two national monuments in Arizona.²⁴⁹ Environmental group plaintiffs alleged that the plans allowed vehicle use that would harm monument objects that proposed mitigation efforts would not adequately address.²⁵⁰ They argued that the BLM violated NEPA by not sufficiently developing the mitigation measures and that it could not rely on an “adaptive mitigation approach” to do so.²⁵¹ The court began by noting that “the difference between adequate and inadequate mitigation discussions ‘appears to be one of degree.’”²⁵² That pronouncement is devoid of useful predictive value. In that case, however, the court concluded that the plans, despite their programmatic nature and the use of monitoring and adaptive strategies, contained a sufficient discussion of mitigation measures in that they “specifically propound[ed] and analyze[d] mitigation measures with respect to travel and grazing,” such as obscuring and rehabilitating unauthorized vehicular routes, limiting grazing on particular allotments, and incorporating a set of standards for rangeland health.²⁵³ The EIS also discussed the effectiveness of these mitigation measures.

In a Ninth Circuit case that did not involve federal lands management, fishermen’s associations challenged the National Marine Fisheries Service (NMFS)’s adoption of amendments to a fishery management plan formulated under the Magnuson-Stevens Fishery Conservation and

²⁴⁴ *Id.* at 145.

²⁴⁵ *Id.*

²⁴⁶ *Id.* at 149.

²⁴⁷ *Id.*

²⁴⁸ *Id.*

²⁴⁹ *Wilderness Soc’y v. U.S. Bureau of Land Mgmt.*, 822 F. Supp. 2d 933, 935 (D. Ariz. 2011), *aff’d*, 526 F. App’x 790 (9th Cir. 2013).

²⁵⁰ *Id.* at 935.

²⁵¹ *Id.* at 941.

²⁵² *Id.* (quoting *Okanogan Highlands Alliance v. Williams*, 236 F.3d 468, 473 (9th Cir. 2000)). *See also* *Biodiversity Conservation Alliance v. Bureau of Land Mgmt.*, 2010 WL 3209444, *13 (D. Wyo. June 10, 2010) (holding that the BLM complied with NEPA by including in its EIS on a decision to approve natural gas drilling an adaptive management plan that included mitigation measures and noting that “there is a natural limit to the specificity with which those measures can be described”).

²⁵³ *Wilderness Soc’y*, 822 F. Supp. 2d at 943.

Management Act.²⁵⁴ One of the amendments included two mitigation measures – an adaptive management program under which up to ten percent of the quota shares allocated to fishermen each year would be set aside to address unforeseen effects on fishing communities, and a quadrennial review (including a community advisory committee) to ensure that the program was meeting its goals. The plaintiffs argued that these mitigation measures were too vague and uncertain. But the court regarded the agency’s “reasonably detailed mitigation evaluations” to be sufficient to comply with NEPA.²⁵⁵ The absence of assurances that the reserve shares would be allocated to fishing communities was not problematic. The court deemed assurance that a particular share would be devoted to a particular purpose at a particular time to be “inconsistent with the notion of ‘adaptive management,’” and held that NEPA did not require it.²⁵⁶ The plan’s measures to protect local communities was likely an important aspect of court’s sanguinity with the adaptive management plan.

These cases notwithstanding, agencies cannot simply forego a reasonably detailed discussion of mitigation measures under the guise of adaptive management. The inadequacy of this feint at NEPA compliance is reflected in a case in which environmental groups challenged amendments to the Tahoe Regional Planning Agency (TRPA)’s amendment of its shorezone ordinances.²⁵⁷ An interstate compact approved by Congress authorized TRPA to regulate development in the area near Lake Tahoe. The compact precluded TRPA’s approval of any development project unless changes or alterations reduced the significant environmental effects that would otherwise occur to “a less than significant level” or TRPA decided that mitigation was not feasible.²⁵⁸ The initial ordinances imposed restrictions on piers, buoys, and other boating facilities to protect fish habitat. TRPA later concluded, however, that the restrictions were excessive and amended the ordinances by loosening them. The EIS on the amendments acknowledged that the changes could negatively affect air and water quality, recreational access, scenery, and noise, but the amendments included measures to mitigate those impacts and the EIS concluded that the measures would reduce impacts to a “less than significant” level, as the compact required.²⁵⁹

The plaintiffs challenged the adequacy of the EIS’s discussion of mitigation measures, and the court found it to be deficient. The EIS included neither discussion nor analytical data of the potential efficacy of the measures. TRPA claimed that it would impose sticker fees to fund mitigation measures but the EIS failed to explain how the money might be spent.²⁶⁰ The EIS provided more analysis of how funds from a buoy fee would be spent, but the EIS did not discuss how the fees would suffice to offset the air and water quality impacts of increased boating. TRPA protested that it had established an adaptive management program, which listed measures to reduce those impacts, but the court regarded the agency’s description of them as “perfunctory.”²⁶¹

²⁵⁴ Pac. Coast Fed’n of Fishermen’s Ass’ns v. Blank, 693 F.3d 1084 (9th Cir. 2012).

²⁵⁵ *Id.* at 1103.

²⁵⁶ *Id.*

²⁵⁷ League to Save Lake Tahoe v. Tahoe Reg’l Planning Agency, 739 F. Supp. 2d 1260 (E.D. Cal. 2010), *aff’d in part, vacated in part, remanded*, 469 F. App’x 621 (9th Cir. 2012).

²⁵⁸ *Id.* at 1266.

²⁵⁹ *Id.* at 1266-67.

²⁶⁰ *Id.* at 1283.

²⁶¹ *Id.* at 1284.

The court agreed with TRPA that “adaptive management is a sound policy” that was well suited to management of the Lake Tahoe region. The agency’s EIS, however, should have provided a mitigation proposal that was “already reasonably complete but that will be subject to later adaptation. Principles of adaptive management support leaving open the possibility, recognized in the NEPA caselaw, of a future change in mitigation strategy, but adaptive management does not provide a justification for postponing altogether the discussion of mitigation measures.”²⁶² TRPA’s insistence that it would “go slow” to ensure development and implementation of mitigation measures before harm occurred was essentially worthless. Moreover, it deprived the public of any meaningful opportunity to comment on mitigation measures²⁶³ before TRPA’s approval of the ordinance amendments.²⁶⁴

Interestingly, the court described TRPA’s adaptive management program as “reactive, imposing measures once the previous year’s mitigation efforts have been shown to be inadequate.”²⁶⁵ Adaptive measures taken in response to information gleaned from monitoring of initial project implementation are necessarily reactive. The court’s rejection of the adaptive management component of the EIS seems essentially to have been based on its perception that there was “no there there” in the program itself. TRPA would essentially make it up as it went along.

A promise to engage in mitigation that is devoid of specificity will fall short of NEPA’s demands.²⁶⁶ The cases discussed above indicate, however, that the agency can retain flexibility and avoid tying its hands if its adaptive management plan includes a reasonably detailed discussion of mitigation options, preferably tied to enunciated triggers and accompanied by an assessment of their predicted effectiveness in achieving agency management goals and avoiding unacceptable environmental degradation. Agency efforts to provide meaningful opportunities for stakeholders

²⁶² *Id.*

²⁶³ *Compare* Government of the Province of Manitoba v. Zinke, 273 F. Supp. 3d 145, 155-56 (D.D.C. 2017) (finding Manitoba’s claim that it was improperly excluded from participation in an Adaptive Management Plan to monitor the effectiveness of water treatment systems to monitor the adverse effects of an interbasin water transfer was premature); Izaak Walton League of Am., Inc. v. Tidwell, 2015 WL 632140, *17-19 (D. Minn. Feb. 13, 2015) (concluding that the Forest Service violated its own NEPA regulations by failing to describe adaptive management strategy for addressing adverse noise impacts of snowmobile use on wilderness areas in an EIS, but holding that the error was harmless because the record of decision did describe the strategy in detail and the agency sought and considered public comments on its main alternative and the backup alternative that the adaptive management framework would trigger).

²⁶⁴ *League to Save Lake Tahoe*, 739 F. Supp. 2d at 1284.

²⁶⁵ *Id.* at 1284 n.23. *Compare* Defenders of Wildlife v. Salazar, 877 F. Supp. 2d 1271, 1301-02 (M.D. Fla. 2012) (holding that adaptive management mechanisms for continual review and modification of ORV management plan in three phases over ten years that depended on new information from research and monitoring did not support NPS decision to reopen trails to ORV use).

²⁶⁶ *See, e.g.*, Government of the Province of Manitoba v. Zinke, 273 F. Supp. 3d 145, 155 (D.D.C. 2017) (citing Theodore Roosevelt Conservation P’ship v. Salazar, 616 F.3d 497, 516 (D.D.C. 2010); Neighbors of Cuddy Mountain v. U.S. Forest Serv., 137 F.3d 1372, 1380 (9th Cir. 1998)) (noting that one court found a 13-page list of protective measures to be sufficient, while another held that a two-paragraph “perfunctory description of mitigation measures” in an adaptive management plan was not).

to provide input into the formulation and implementation of mitigation measures will further bolster agencies' ability to thwart NEPA challenges.²⁶⁷

D. Timing and Scope Questions

The land management agencies frequently engage in phased decisionmaking, such as identification of areas that are suitable for mineral development, followed by authorization for development of specific parcels by particular companies or individuals. These multi-stage processes for determining which uses of federal lands to allow raise questions about the timing and scope of NEPA compliance duties. Although the use of adaptive management in these contexts can complicate resolution of these questions, given that adaptive management is itself a sequential process, courts have found properly structured adaptive management strategies to be consistent with NEPA's requirements.

1. Tiering

The CEQ encourage agencies to structure their NEPA analyses so as to promote efficient and informed consideration of the potential environmental impacts of their actions. The regulations endorse tiering, which they define as “the coverage of general matters in broader [EISs] or [EAs] . . . with subsequent narrower statements or environmental analyses . . . incorporating by reference the general discussions and concentrating solely on the issues specific to the statement subsequently prepared.”²⁶⁸ The regulations provide that “[a]gencies should tier their [EISs] and [EAs] when it would eliminate repetitive discussions of the same issues, focus on the actual issues ripe for decision, and exclude from consideration issues already decided or not yet ripe at each level of environmental review.”²⁶⁹ When an agency has prepared an EIS on a program or policy, a subsequent EIS or EA on an action to implement the program or policy (such as a site-specific action) “needs only to summarize and incorporate by reference the issues in the broader document. The tiered document shall concentrate on the issues specific to the subsequent action.”²⁷⁰

The application of adaptive management strategies in the context of adoption and subsequent implementation of a programmatic action such as a management plan is reflected in *Mayo v. Jarvis*, in which the NPS and the FWS issued a joint plan for managing elk and bison herds that migrate across Grand Teton National Park.²⁷¹ The plan called for flexible management of the elk and bison herds through an adaptive management approach that sought to reduce the elk herd in phases to sustainable levels. The plan called for the establishment of criteria for progressively transitioning from supplemental winter feeding to reliance on free-standing forage, the timing of which would be based on existing conditions, trends, new research findings, and

²⁶⁷ See, e.g., *Friends of Animals v. Romero*, 948 F.3d 579, 587-88 (2d Cir. 2020) (upholding NPS's deer management program, which included conducting surveys and monitoring, and directives to take responsive actions only when adjacent landowners requested it).

²⁶⁸ 40 C.F.R. § 1508.1.

²⁶⁹ *Id.* § 1501.11(a).

²⁷⁰ *Id.* § 1501.11(b).

²⁷¹ *Mayo v. Jarvis*, 177 F. Supp. 3d 91 (D.D.C.), *amended*, 203 F. Supp. 3d 31 (D.D.C. 2016), *aff'd*, 875 F.3d 11 (D.C. Cir. 2017)

other changing circumstances.²⁷² The D.C. Circuit affirmed, agreeing with the district court that the discussion in the EIS on the plan was comprehensive enough to preclude the need for annual supplementation.²⁷³ In another case, a court allowed the NPS to rely on EAs prepared in connection with general management plans that established “a system of adaptive management standards based on monitoring and analysis of field conditions” which had proven “effective in protecting [wilderness] resources” to avoid preparing additional NEPA documentation when it issued annual commercial use authorizations to stock operators allowing them to use horses and mules in a wilderness area.²⁷⁴

The BLM’s oil and gas leasing program has provided an opportunity for the agency to engage in adaptive management while tiering its NEPA analyses. The leasing process is a sequential one. First, the BLM selects the lands available for leasing, typically in a resource management plan. Second, after conducting a bidding process, it enters lease agreements. Third, the agency responds to individual applications to drill, which include drilling plans.²⁷⁵ Courts have long grappled with how the BLM must conduct its NEPA evaluations at each stage.²⁷⁶ In one case, a district court refused to find that the analysis in an EIS on a resource management plan of the potential health impacts of oil and gas development projected in the plan was inadequate.²⁷⁷ The environmental group plaintiffs asserted that the agency’s reliance on future adaptive management did not substitute for the analysis NEPA required in the plan and associated EIS.²⁷⁸ The BLM had committed to preparing EAs when issuing new leases, choosing to defer greater and more localized detail to subsequent stages of the leasing process, when more would be known about the specifics of development, and that the CEQ regulations authorized this kind of tiering.²⁷⁹ The court deferred to the BLM’s approach,²⁸⁰ rejecting the plaintiffs’ claims that the promise to engage in adaptive management after the plan’s adoption gave short shrift to the analysis of the human health impacts of leasing.²⁸¹

The decision is somewhat problematic in as much as it is not as clear whether the BLM’s adaptive management plan, its intention to conduct further analysis, or both were determinative.

²⁷² *Id.* at 100-01, 108. The EIS on the plan provided that decreases in supplemental feeding would be “based on established criteria and changing social, political, or biological conditions.” *Mayo v. Reynolds*, 875 F.3d 11, 17 (D.C. Cir. 2017).

²⁷³ *Mayo v. Reynolds*, 875 F.3d at 22-23.

²⁷⁴ *High Sierra Hikers Ass’n v. U.S. Dep’t of Interior*, 848 F. Supp. 2d 1036, 1062-63 (N.D. Cal. 2012). *Cf.* *Friends of Animals v. Sparks* 200 F. Supp. 3d 1114, 1126-27 (D. Mont. 2016) (finding no violation of NEPA in the BLM’s approval of a planned round-up of wild horses because it properly tiered to an EA prepared on a herd management plan, thereby incorporating population management actions to ensure genetic diversity, and proposed adaptive management to monitor and mitigate the effects of management actions on that diversity).

²⁷⁵ *See New Mexico ex rel. Richardson v. Bureau of Land Mgmt.*, 565 F.3d 683, 716 (10th Cir. 2009) (“Oil and gas leasing follows a three-step process”).

²⁷⁶ *See 2 COGGINS & GLICKSMAN, supra* note 5, § 17:26; *New Mexico ex rel. Richardson v. Bureau of Land Mgmt.*, 565 F.3d 683, 716-18 (10th Cir. 2009) (describing history of 10th Circuit cases).

²⁷⁷ *Wilderness Workshop v. U.S. Bureau of Land Mgmt.*, 342 F. Supp. 3d 1145 (D. Colo. 2018).

²⁷⁸ *Id.* at 1162.

²⁷⁹ *Id.*

²⁸⁰ *Id.* at 1163. *See also* *W. Org. of Res. Councils v. Bureau of Land Mgmt.*, 591 F. Supp. 2d 1206, 1211 (D. Wyo. 2008), *aff’d*, 608 F.3d 709 (10th Cir. 2010).

²⁸¹ *Wilderness Workshop*, 342 F. Supp. 3d at 1163-64. The court pointed to the creation of a “Comprehensive Air Resources Protection Protocol,” which serves a procedural function, and additional monitoring and “comprehensive definitions” in response to public comment, as adequate measures to address ongoing impacts. *Id.* at 1164.

The difference could matter. An effective adaptive management regime entails continuous monitoring, evaluation of impacts, and responsive changes as necessary. If the plan defines triggers and identifies required response strategies, improved natural resource protection can be anticipated. Under a tiered NEPA approach, the agency must still take stock of relevant impacts, but it is under no obligation to continue to monitor, reassess, and correct course.²⁸² The court's hesitance to give clear cut guidance on the issue here and its failure to give specific guidance on when the adaptive management would trigger a need for a tiered NEPA analysis potentially undermines both the effectiveness of adaptive management and the public's ability to know the full extent of a project's impacts.

2. *Cumulative Impacts*

Until the Trump Administration's revisions of the CEQ regulations, agencies had to consider cumulative effects in their NEPA documents.²⁸³ The pre-2020 regulations required agencies to assess whether the environmental effects²⁸⁴ resulting from their proposals would be "significant" based on considerations of both context (i.e., locale) and intensity (i.e., severity of impact).²⁸⁵ In evaluating intensity, the regulations required agencies to consider "[w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment."²⁸⁶ In addition, to determine the scope of an EIS, agencies had to consider "[c]umulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement."²⁸⁷

Courts have addressed the propriety of an agency's reliance on adaptive management to examine cumulative impacts. In one such case, the Forest Service proposed a series of activities that would expand the time and extent of permissible ORV use.²⁸⁸ Environmental groups contested the agency's finding of no significant impact, claiming, among other things, that the agency should have analyzed the effects of two projects involving expanded ORV use on wildlife together instead of considering each separately.²⁸⁹ The Forest Service pointed to a "literature review" that it had

²⁸² See ALEJANDRO E. CAMACHO & ROBERT L. GLICKSMAN, REORGANIZING GOVERNMENT: A FUNCTIONAL AND DIMENSIONAL FRAMEWORK 108-10 (2019) (criticizing NEPA's failure to require post-implementation monitoring and adjustment).

²⁸³ See Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act, 85 Fed. Reg. 43304, 43331 (July 16, 2020) ("CEQ proposed to strike references to direct, indirect, and cumulative effects. . . . CEQ makes these changes in the final rule with minor edits . . .").

²⁸⁴ The regulations defined "effects" to include direct, indirect, and cumulative effects. 40 C.F.R. § 1508.8(b) (2019).

²⁸⁵ *Id.* § 1508.27(a)-(b) (2019). The amended regulations define effects, in part, as "changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives." 40 C.F.R. § 1508.1.

²⁸⁶ *Id.* § 1508.27(b)(7) (2019). The regulations defined "cumulative impact," in part, as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." *Id.* § 1508.7. The regulations also defined CEs as categories of actions "which do not individually or cumulatively have a significant" environmental impact. *Id.* §§ 1500.4(p), 1508.4.

²⁸⁷ *Id.* § 1508.25(a)(2).

²⁸⁸ *Mountaineers v. U.S. Forest Serv.*, 445 F. Supp. 3d 1235 (W.D. Wash. 2006).

²⁸⁹ *Id.* at 1246.

commissioned, which sought to develop a model for assessing the effects of roads and trails on particular species. The court, however, pointed out that the study was qualitative, not quantitative, and that “no actual, in-the-field-study resulting in quantitative analysis . . . has yet been done for the entire ORV trail system.”²⁹⁰ The agency never incorporated any mandates for actual, system-wide wildlife studies into its decision. Instead, it proposed to construct new ORV trails and then apply an undefined adaptive management plan. The court referred to this as a “‘build-first, study later’ approach to resource management” and held that the Forest Service’s “backward-looking decision making” did not comply with its duty to consider cumulative impacts.²⁹¹

In other cases, the land management agencies have relied on adaptive management to meet their obligations to consider cumulative effects. For example, in one case the BLM planned to remove trees and vegetation in eastern Nevada to reduce the risk of fire and improve sage-grouse habitat.²⁹² It conducted an EA that explored the cumulative impacts of past, present, and future projects in the area with potential adverse impacts on sage grouse. The Ninth Circuit relied primarily on the adaptive management components of the plan for the proposed habitat restoration project actions to find appropriate consideration of the cumulative impacts on the sage-grouse and its habitat.²⁹³ The BLM’s documented success in limiting adverse effects in connection with past actions apparently helped convince the court that the agency’s reliance on adaptive management posed little risk to the sage grouse.²⁹⁴ These cases can be read to suggest that an adaptive management strategy is one way to address cumulative impacts. Further, an agency’s ability to demonstrate a track record of quality environmental outcomes can bolster an agency’s application of adaptive management to assess cumulative impacts.

3. Segmentation

Another aspect of NEPA involving the relationship between multiple projects is the so-called segmentation problem. The issue arises when there is an allegation that an agency chopped up a single large project and prepared separate NEPA documents (usually EAs) on each piece instead of a single EIS on the entire project. Doing so may allow the agency to conclude that the impacts of each of the pieces fall below the significance threshold that requires preparation of an EIS, whereas the consolidated impacts of the entire project would have exceeded that threshold.²⁹⁵ The courts have provided little guidance on the circumstances in which the use of adaptive management will be regarded as a legitimate way of evaluating the impacts of ongoing, phased

²⁹⁰ *Id.* at 1250.

²⁹¹ *Id.*

²⁹² *W. Watersheds Project v. Ruhs*, 701 F. Appx 651 (9th Cir. 2017).

²⁹³ *Id.* at 653-55.

²⁹⁴ *Cf. Audubon Soc’y v. U.S. Fish and Wildlife Serv.*, 2005 WL 1713086, *12-14 (D. Or. July 21, 2005) (noting the FWS’s promise to address impacts from the West Nile virus on threatened falcons through adaptive management to find adequate consideration of the cumulative effects of allowing limited takes of the birds).

²⁹⁵ *See* DANIEL R. MANDELKER ET AL., NEPA LAW AND LITIGATION § 9:14 (2020):

Federal agencies may plan a number of related actions but may decide to prepare impact statements [or EAs] on each action individually rather than prepare an impact statement on the entire group. This decision creates a ‘segmentation’ or ‘piecemealing’ problem. . . . In the segmentation cases, the courts must decide whether a federal action on which an impact statement has been prepared has been improperly segmented from other related actions that should have been considered as part of the same action.

projects or as a NEPA circumvention strategy that improperly segments a larger undertaking into artificial pieces.

One case raising the issue involved the BLM's efforts to reduce the presence of juniper that resulted from fire suppression, grazing, and climate change and that had crowded out native vegetation.²⁹⁶ The BLM proposed to use prescribed fires, removal of trees, fencing, seeding, and planting to achieve its habitat restoration goals. Doing so would require grading, graveling, and installation of culverts to move machinery from one area to another and the use of ORVs to treat remote areas, including wilderness study areas (WSAs). The BLM described the project as a "landscape-level project" that would be implemented through an adaptive management strategy comprised of identifying objectives, monitoring to evaluate progress toward those objectives, and adjustments if objectives were not being met.²⁹⁷ An environmental group brought suit to enjoin the project, alleging NEPA violations based on inadequate consideration of potential damage to sage grouse and its habitat because of the scope of the project and its implementation in WSAs and roadless areas.²⁹⁸ It argued that the BLM improperly segmented the project by failing to analyze each of the site-specific projects that were connected actions.²⁹⁹

The plaintiff characterized adaptive management as a "shell game" whereby an agency prepares an EIS that defers consideration of certain impacts, but later refuses to engage in supplemental analysis on the ground that the initial EIS already analyzed the impacts in question.³⁰⁰ The court did not agree, concluding that the BLM had not improperly segmented connected actions by preparing its landscape-level EIS. It reasoned that "with a project this size, adaptive management is the only logical way the BLM can proceed to undertake habitat restoration, providing the agency with the flexibility to respond to on-the-ground circumstances when they arise. Courts have approved the use of adaptive management."³⁰¹ Moreover, the plaintiff failed to identify any effects from the projects already underway that required supplemental NEPA analysis. Nor was the EIS the kind of programmatic EIS that required preparation of additional NEPA documents as the agency implemented the program.³⁰²

Because the court provided no meaningful discussion of the BLM's substantive adaptive management criteria, making any general assessment about the viability of a segmentation challenge and the ways agencies can properly address these concerns in preparing adaptive management plans is difficult. The opinion also provides little guidance on when a series of actions will be considered connected because it did not apply the three tests for whether actions are

²⁹⁶ Or. Nat. Desert Ass'n v. Bureau of Land Mgmt., 2011 WL 5830435 (D. Or. Nov. 15, 2011).

²⁹⁷ *Id.* at *2.

²⁹⁸ *Id.* at *3.

²⁹⁹ *Id.* at *17. The CEQ regulations define connected actions as those that "are closely related and therefore should be discussed in the same [EIS]." 40 C.F.R. § 1508.25(a)(1). Actions are connected if they:

- (i) Automatically trigger other actions which may require environmental impact statements.
- (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.
- (iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

Id.

³⁰⁰ Or. Natural Desert Ass'n, 2011 WL 5830435, *18 (quoting Michael Freeman & Meg Parish, *Supplementation of NEPA Analyses: Triggers and Requirement*, 2010 No. 4 RMMLF-INST. PAPER No. 6 (Oct. 28-29, 2010)).

³⁰¹ *Id.*

³⁰² *Id.* at *18-19.

connected from the CEQ regulations.³⁰³ Finally, the court's characterization of the issue as one involving segmentation is somewhat curious because the plaintiff apparently sought the preparation of additional NEPA documents, whereas the typical segmentation case involves an effort to force an agency to prepare a single, consolidated document that assesses project-wide impacts. The BLM prepared a landscape-level EIS on the entire project in this case. In short, the relationship between segmentation and adaptive management remains underdeveloped.

4. *Supplementation*

An agency's preparation of an EA or an EIS does not necessarily end its NEPA obligations, even if such a document meets all statutory and regulatory requirements at the time it is prepared. The CEQ regulations require an agency to prepare a supplemental EIS (SEIS) if (1) the agency makes substantial, environmentally relevant changes to the proposed action, or (2) environmentally relevant significant new circumstances or information arise which bear on the proposal or its impacts.³⁰⁴ The potential for adaptive management to trigger supplementation duties is obvious, given its use of monitoring to identify wrong turns in the original action and responsive adjustments. The issue is whether such adjustments trigger NEPA supplementation obligations.

The relationship between adaptive management and supplementation is reflected in a case in which environmental plaintiffs alleged that the Forest Service and the BLM violated the Northwest Forest Plan by authorizing a series of timber sales without conducting wildlife surveys and by failing to prepare an SEIS before approving more such sales.³⁰⁵ The plaintiffs identified five "alleged events" (as the court labeled them) that qualified as significant new information that had come to light since adoption of the plan. These included allowing timber sales without first conducting wildlife surveys, declining fish populations, deteriorating water quality, discovery of Canada lynx within the range of the northern spotted owl, and higher than expected levels of old-growth harvests and timber sales.³⁰⁶ The court contested characterization of any of these matters as significant new information. More to the point, the court pointed out that the ROD on the forest plan anticipated the availability of new information affecting forest management within the range of the owl and provided mechanisms by which agency officials would respond.³⁰⁷ The court deemed the plan's adaptive management approach to be "adequate to deal with any new information plaintiffs have identified. If circumstances warrant, the ROD gives the Forest Service and BLM the flexibility to reduce or halt logging in order to comply with their statutory mandates. . . . But they are not required to conduct a new SEIS at this point."³⁰⁸ The result might have been different, the court opined, if the agencies had abolished the requirement to conduct wildlife

³⁰³ See *supra* note 299.

³⁰⁴ 40 C.F.R. § 1502.9(c)(1).

³⁰⁵ Or. Nat. Res. Council Action v. U.S. Forest Serv., 59 F. Supp. 2d 1085, 1087 (W.D. Wash. 1999).

³⁰⁶ *Id.* at 1095.

³⁰⁷ *Id.* at 1096.

³⁰⁸ *Id.* See also Or. Nat. Desert Ass'n v. Bureau of Land Mgmt., 2011 WL 5830435, *15-16 (D. Or. Nov. 15, 2011) (holding that the BLM's decision to conduct "broadcast burn" near sage grouse lek did not require supplementation because ROD and EIS on juniper treatment project provided that project design elements would be "subject to change during the adaptive management process").

surveys before ground-disturbing activities could commence.³⁰⁹ The opinion indicates that implementation of adjustments anticipated in the original actions subject to adaptive management mechanisms may allow the agency to escape NEPA supplementation requirements.³¹⁰

The NPS avoided NEPA supplementation duties in connection with its management of the Yellowstone National Park bison herd in part because the 2000 Interagency Bison Management Plan (IBMP) to which it was a party included an adaptive management component.³¹¹ The IBMP relied on separation of bison from cattle to control the risk of bison transmitting brucellosis to cattle in the area. In 2007, the General Accounting Office audited the IBMP, identifying problems with the plan's implementation and criticizing its failure to include metrics for measuring the plan's success. The agencies responded by adopting an Adaptive Management Plan (AMP) in 2008. That plan required federal and state agencies to track the number of bison slaughtered in order to further one of AMP's goals – reducing the need for lethal removal of bison. The AMP replaced lethal removal with increased hazing, hunting, quarantine, and sending bison to alternate areas. The AMP aimed to increase tolerance for bison outside the Park, conserve a wild, free-ranging bison population, and prevent the spread of disease from bison to cattle.³¹²

Environmental groups argued that the NPS violated NEPA by failing to supplement the EIS it prepared upon adoption of the IBMP in 2000 as it altered its management approaches consistent with the AMP. For one, they claimed that the NPS did not respond to new information concerning genetic diversity in the Yellowstone herd. The court found that the NPS had considered the information and that it had diligently monitored the size and population characteristics of the herd throughout the IBMP period, as required by the AMP, to promote understanding of best practices to preserve the herd's genetic diversity. The plaintiffs therefore failed to identify significant new information that triggered a duty to supplement the EIS.³¹³

Further, the agency's adaptive management approach, which was included in the EA, "provides flexibility to address inherent uncertainty associated with the local effects of climate change" and drought, such that it was "routinely re-assessing the impact of drought and climate change and altering grazing practices accordingly."³¹⁴ The court also found that the IBMP managers "conscientiously examined the adaptive management changes made to the IBMP for the purpose of determining whether NEPA supplementation was necessary," determining in 2009 that the adaptive management changes would not affect the environment in a manner or to a degree not already considered.³¹⁵ None of the three adaptive management changes singled out by the plaintiffs – renewal of a special use permit allowing Montana to capture and test migrating bison as they

³⁰⁹ *Id.* The court held that the agencies violated the plan by exempting some timber sales from the survey requirements. *Id.* at 1091-95.

³¹⁰ See Courtney Schultz & Martin Nie, *Decision-making Triggers, Adaptive Management, and Natural Resources Law and Planning*, 52 NAT. RES. J. 443, 458 (2012) (stating that courts may not require additional NEPA analysis when new information comes to light if changes in action and predicted effects are within the range of what was analyzed in the original NEPA document).

³¹¹ *W. Watersheds Project v. Salazar*, 766 F. Supp. 2d 1095 (D. Mont. 2011), *aff'd in part*, 494 F. App'x 740 (9th Cir. 2012).

³¹² *Id.* at 1105-06.

³¹³ *Id.* at 1109.

³¹⁴ *Id.*

³¹⁵ *Id.* at 1111.

exited Yellowstone, issuance of a special use permit to a rancher to build a fence on federal land, or the decision to provide federal financing to Montana to support grazing restrictions – required supplementation because all of those actions were contemplated by the EIS on the IBMP or the AMP.³¹⁶

Most recently, several environmental groups challenged the decisions of the Forest Service to continue to approve livestock grazing in a national forest that contained critical habitat for sucker fish.³¹⁷ The agency prepared an EA, but the environmental group plaintiffs argued that climate change and observable drought conditions presented significant new information warranting the preparation of an SEIS in relation to the Forest Service’s approval of grazing permits. The new information related, among other things, to the publication of a FWS report concluding that climate change and severe drought had adversely posed threats to sucker populations throughout their range.³¹⁸ The court disagreed that the information was new; the Forest Service had acknowledged in the EA, albeit in general terms, that climate change and drought threatened the suckers.³¹⁹

Supplementation has a clear intersection with adaptive management. By definition, adaptive management plans are designed to be able to incorporate and adjust to new information. Thus far, courts, for the most part, have been reluctant to require agencies to respond to new information through supplementation rather than through implementation of an adaptive management plan whose NEPA documentation addressed potential future changes and developments.

E. Alternatives

One final intersection of NEPA and adaptive management concerns the identification and analysis of alternatives. NEPA itself requires an EIS to include discussion of alternatives to the proposed action.³²⁰ Agencies must even assess alternatives when they prepare EAs, as the statute includes a general mandate to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.”³²¹ The CEQ regulations require presentation in an EIS of “the environmental impacts of the proposed action and the alternatives in comparative form,” and require detailed evaluation of reasonable alternatives, including the no action alternative, and identification of the agency’s preferred alternative.³²² Litigants have challenged the selection of adaptive management as the preferred alternative for managing natural resources.

In one case, the state of California and several environmental groups challenged an EIS that the Forest Service prepared in promulgating land and resource management plans for four

³¹⁶ *Id.* at 111-12.

³¹⁷ *Oregon Wild v. Cummins*, 239 F. Supp. 3d 1247 (D. Or. 2017).

³¹⁸ *Id.* at 1274.

³¹⁹ *Id.* at 1276.

³²⁰ 42 U.S.C. § 4332(2)(C).

³²¹ *Id.* § 4332(2)(E).

³²² 40 C.F.R. § 1502.14(a)-(d). Before the 2020 revisions to its regulations, CEQ described the alternatives discussion as “the heart of the [EIS].” 40 C.F.R. § 1502.14(a) (2019).

national forests in southern California.³²³ The plaintiffs claimed that the agency failed to consider a reasonable range of alternatives. The groups had proposed a “Conservation Alternative,” opposing an adaptive management approach that they characterized as “one of the most abused concepts in current natural resource management.”³²⁴ The agency rejected that alternative, choosing instead to rely on adaptive management. The court refused to require the agency to consider alternatives other than adaptive management because doing so would require it to consider alternatives incompatible with its basic policy objectives. The court deferred to the Forest Service’s view that the adoption of an adaptive management strategy was “a fundamental policy choice to achieve the agency’s objectives.”³²⁵

The court nevertheless found a NEPA violation. The Forest Service conceded, and the EIS confirmed, that monitoring and evaluation standards had significant importance in the overall forest planning scheme.³²⁶ Yet, it proposed the same set of monitoring and evaluation indicators for every alternative discussed in the EIS. The agency, the court reasoned, described monitoring and evaluation as the linchpin of its management strategy, but it “fail[ed] to provide any alternatives whatsoever. The failure to present any alternatives pertaining to a critical decision violates the NEPA.”³²⁷ Thus, adaptive management is a legitimate alternative for natural resource management, but an agency’s failure to consider alternative components of such a strategy may run afoul of the duty to consider a reasonable range of alternatives.

Another case involved a court’s refusal to find deficient consideration of alternatives proposed by environmental groups.³²⁸ The groups challenged an EA prepared by the BLM to support its decision to approve a natural gas well development project. The groups contended that the BLM should have considered alternatives that would have restricted the extent to which the project would contribute to ozone pollution. The court concluded, however, that the EA tiered to a prior EIS whose adaptive management plan already required the agency and the natural gas company to refine air quality modeling predictions and develop and implement an ozone action plan. According to the court, that plan reflected the BLM’s commitment to work with EPA to implement emission control strategies through the use of identified mitigation measures under specified conditions. The BLM did not violate NEPA by failing to independently analyze the environmental group’s substantially similar proposed alternative.³²⁹

III. SUGGESTED BEST PRACTICES FOR USE OF ADAPTIVE MANAGEMENT IN NEPA COMPLIANCE

³²³ Cal. Res. Agency v. U.S. Dept of Agric., 2009 WL 6006102 (N.D. Cal. Sept. 29, 2009).

³²⁴ *Id.* at *16.

³²⁵ *Id.*

³²⁶ The plans described adaptive management as the foundation of forest planning. *Id.*

³²⁷ *Id.* at *17. *See also id.* (“Here, the Forest Service applies the same monitoring and evaluation requirements across the range of alternatives. The failure to analyze alternative regimes of monitoring and evaluation renders the public and decision makers unable to make a reasoned choice; it is an abuse of discretion and a violation of the NEPA.”). *Cf.* Sierra Forest Legacy v. U.S. Forest Serv., 652 F. Supp. 2d 1065, 1083 (N.D. Cal. 2009) (finding description in an EIS on a forest plan of the reasons for rejecting the “no action” alternative of retaining an adaptive management approach that included monitoring of management indicator species (MIS) to be sufficient, even though the Forest Service did not elaborate on the monitoring strategies for each of 60 different MIS).

³²⁸ S. Utah Wilderness Alliance v. U.S. Dep’t of the Interior, 2016 WL 6909036 (D. Utah Oct. 3, 2016).

³²⁹ *Id.* at *11-12.

The cases discussed in Part II reflect a significant degree of successful use by the land management agencies of adaptive management strategies that they have often been able to integrate into their NEPA compliance efforts. In some instances, however, reliance on adaptive management has posed difficulties, such as when an adaptive management plan provided inadequate monitoring regimes, vague triggers for responsive action, or wiggle room to avoid implementation of appropriate adjustments to management strategies. This Part provides suggestions for minimizing the risk that adaptive management will interfere with or defeat agencies' ability to satisfy their NEPA obligations. At the same time, these recommendations preserve agency flexibility to respond to developments that could not have been anticipated at the time of initial preparation of NEPA documents in a manner consistent with governing statutory mandates. Section A addresses the processes that agencies should consider using, while Section B provides guidance on the contents of adaptive management strategies that are likely to satisfy NEPA's requirements.

A. Procedural Strategies

Successful integration of adaptive management into the NEPA decisionmaking process requires attention to process as well as substance. The land management agencies, at least to some extent, have recognized as much. As others have pointed out, the Interior Department's Adaptive Management Technical Guide³³⁰ "emphasizes the need for group learning and ongoing improvement in how to manage collaborative decision-making."³³¹ Agencies, including the Interior Department, do not always pay heed to that advice, however.³³²

One key prerequisite for an effective and informed adaptive management process is identifying affected stakeholders.³³³ Including affected interests in the process of crafting an adaptive management program increases the chances of buy-in by those interests, even if the end result does not conform completely to their agendas.³³⁴ It also reduces the chances that disgruntled interests will sue the agency alleging NEPA noncompliance. Relatedly, agencies preparing NEPA documents that include adaptive management components should solicit and welcome robust

³³⁰ For discussion of the Guide, see *supra* notes 81-86 and accompanying text.

³³¹ Lawrence Susskind, Alejandro E. Camacho & Todd Schenk, *Collaborative Planning and Adaptive Management in Glen Canyon: A Cautionary Tale*, 35 COLUM. J. ENVTL. L. 1, 31 (2010).

³³² *Id.* ("Unfortunately, . . . the DOI has failed to incorporate at least six vital practices for achieving truly collaborative and adaptive management into" its adaptive management practices for projects such as operation of the Glen Canyon Dam.)

³³³ *Id.* at 32 (suggesting identification of stakeholder representatives by a neutral professional who conducts interviews with a group of stakeholders recommended by the convener of the collaborative process).

³³⁴ See Barry L. Johnson, *The Role of Adaptive Management as an Operational Approach for Resource Management Agencies*, 3 ECOLOGY & SOC'Y 8 (1999), https://pdfs.semanticscholar.org/9d8c/ad84b22009970f44c719abff99ca0957a832.pdf?_ga=2.210638037.195484358.0.1614546437-921185509.1613839161 ("Open communication and a free exchange of data among agencies, stakeholders, and the public should help to maintain cooperation, trust, and support among all parties."). Cf. Deborah R. Hensler, *Suppose It's Not True: Challenging Mediation Ideology*, 1 J. DISP. RESOL. 81, 88 (2002) ("People accorded legitimacy to – and were willing to comply with the outcomes of – dispute resolution procedures when the outcomes were unfavorable to them, as long as they viewed the processes used as fair."); Bruce Schindler & Kristin Aldred Creek, *Integrating Citizens in Adaptive Management: A Propositional Analysis*, 3 ECOLOGY & SOC'Y 9 (1999), <https://www.ecologyandsociety.org/vol3/iss1/art9/> ("Public involvement is usually considered more successful if the processes employed include all affected parties and aim for broad representation.").

public participation.³³⁵ The CEQ regulations require agencies to “[m]ake diligent efforts to involve the public in preparing and implementing their NEPA procedures.”³³⁶ The regulations also require agencies to solicit comments on a draft EIS from other federal agencies with expertise with respect to any environmental impact involved; state, local, and tribal agencies authorized to develop environmental standards; any agency that has requested notice of draft EISs; and the public.³³⁷ A failure to do so may become a decisive factor, as demonstrated by a court’s finding that although the Forest Service’s reliance on adaptive management for adjusting destination quotas was not itself improper, its implementation of the strategy to change campfire policies was deficient because it failed to pay heed to warnings from the NPS.³³⁸ Agencies preparing an EIS must invite comment on all alternatives and supporting analyses.³³⁹ Further, the adaptive management strategies contained within each alternative must be different in order to provide the public with some meaningful difference to distinguish between proposed approaches.³⁴⁰

Conscientious compliance with these mandates when an agency is formulating its adaptive management approach should not only reduce the chances of a judicial finding of NEPA procedural violations.³⁴¹ It will also allow the agency to supplement its own information in ways that minimize the chances that courts will hold that the agency acted in an arbitrary and capricious manner, such as by reaching results that conflict with the scientific record or by failing to consider an important aspect of the problem.³⁴² In addition, ensuring meaningful public participation in the NEPA process relating to initial adoption of an adaptive management plan may satisfy courts that such participation is not necessary when the agency makes adjustments in response to information gleaned from its monitoring efforts.³⁴³

³³⁵ See Alejandro E. Camacho, *Beyond Conjecture: Learning About Ecosystem Management from the Glen Canyon Dam Experiment*, 8 NEV. L.J. 942, 943 (2008) [hereinafter Camacho, *Conjecture*] (arguing that “meaningful stakeholder participation should serve a central role in the management of natural resources and the regulation of land use and that regulatory processes should account for the uncertainty inherent in regulatory decisions by making such processes more adaptive”).

³³⁶ 40 C.F.R. § 1506.6(a).

³³⁷ *Id.* § 1503.1(a)(1).

³³⁸ *High Sierra Hikers Assn v. Weingardt*, 521 F.Supp.2d at 1091 (discussed *supra* notes 163-66 and accompanying text).

³³⁹ 40 C.F.R. § 1503.1(a)(3).

³⁴⁰ See *Cal. Res. Agency v. U.S. Dept of Agric.*, 2009 WL 6006102, *17 (N.D. Cal. 2009) (discussed *supra* notes 323-27 and accompanying text).

³⁴¹ See *League to Save Lake Tahoe v. Tahoe Reg’l Planning Agency*, 739 F.Supp.2d 1260 (E.D. Cal. 2010), *aff’d in part, vacated in part, remanded*, 469 F. App’x 621 (9th Cir. 2012) (finding lack of meaningful opportunity to comment on mitigation measures); *supra* notes 257-65 and accompanying text.

³⁴² See *Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29 (1983). See also Schindler & Creek, *supra* note 334 (“Early and continuous involvement improves public understanding of the issues and managers[’] understanding of participant perspectives.”); Camacho, *Conjecture*, *supra* note 335, at 955 (“For a regulatory program to be effective—including but not limited to any program that relies on collaborative and adaptive features—the responsible agency must collect and respond to information learned about the program during its implementation.”).

³⁴³ Schultz & Nie, *supra* note 310, at 458 (“Courts do not always require additional NEPA analysis when new information comes to light, as long as any changes in action and predicted effects are within the range of what was analyzed in the original NEPA document.”); cf. J.B. Ruhl, *A Manifesto for the Radical Middle*, 38 IDAHO L. REV. 385, 404-05 (2002) (describing public participation as an “impediment” to policy deliberation and asserting that “[a]daptive management cannot work if citizens can challenge every recalibration decision with this full range of public participation tools”).

B. Substantive Strategies

Although NEPA is a purely procedural statute,³⁴⁴ adaptive management is a decisionmaking process for managing natural resources that is designed to achieve substantive resource management objectives. The literature on adaptive management, and the cases analyzed in Part II, indicate that the elements of effective incorporation of adaptive management into NEPA compliance efforts are likely to include clear specification of management goals, identification of baseline natural resource conditions, determination of triggers that reflect changes in resource conditions that require adjustments in management strategies, a monitoring program to determine whether the triggers have been exceeded, and a commitment to engage in particular mitigation actions (or to take action within a range of predetermined possibilities) if such an exceedance has occurred.

1. Goals

There is widespread agreement that a necessary prerequisite for successful invocation of adaptive management is the identification of clear management goals.³⁴⁵ Eric Biber has identified three reasons why goal identification is so important:

First, goals help determine what the important management or regulatory questions are, and therefore what information an adaptive management program can provide and how to design monitoring or experiments to reduce the relevant uncertainty. Second, goals help determine what kinds of tradeoffs are present in making decisions about whether and how to pursue adaptive management (i.e., what costs will be necessarily entailed by an adaptive management program, and whether those costs are worth paying). Finally, goals are required so that the adaptive management program can evaluate success or failure for various management options.³⁴⁶

Annecoos Wiersema contends that “[t]he aim is to find a process that can generate goals that are sufficiently specific that they can guide those responsible for implementation, monitoring, and adaptation, yet sufficiently broad that they can be generated a priori in circumstances of incomplete knowledge and information.”³⁴⁷ Reconciling goals among competing value systems can be an obstacle to formulating an effective management plan, and agencies are given fairly wide latitude to use their expert discretion in doing so. The federal land management agencies have

³⁴⁴ See *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350-51 (1989); *supra* note 42.

³⁴⁵ See, e.g., Holly Doremus et al., *Making Good Use of Adaptive Management*, CTR. FOR PROGRESSIVE REFORM WHITE PAPER # 1104, at 4 (2011), <http://progressivereform.org/our-work/energy-environment/Adaptive-Management-1104/> (noting general agreement that adaptive management embraces “[e]xplicitly stated goals and measurable indicators of progress toward those goals”); John A. Wiens et al., *Facilitating Adaptive Management in California’s Sacramento–San Joaquin Delta*, 15:2 S.F. ESTUARY & WATERSHED SCIENCE 1 (2017), <https://escholarship.org/uc/item/8w35m437> (“Adaptive management should begin by clearly identifying the problem, goals, and objectives; recognizing uncertainties; identifying decision points and alternative approaches; recognizing when adjustments are needed and having the flexibility to make them; and considering societal and political constraints.”).

³⁴⁶ Biber, *supra* note 27, at 955.

³⁴⁷ Annecoos Wiersema, *A Train Without Tracks: Rethinking the Place of Law and Goals in Natural Resources Law*, 38 ENVTL. L. 1239, 1296 (2008).

survived NEPA challenges when their adaptive management plans have identified discernable management goals.³⁴⁸ Failure to do so may halt the kind of experimentation that is the hallmark of adaptive management in its tracks.³⁴⁹ Adaptive management plans that provide clear descriptions of broad goals and more concrete subsidiary objectives are more likely to provide transparency and indicate to the public and courts that the agency is not merely making a “plan to make a plan” but has laid out (and considered the impacts of pursuing) a meaningful agenda in advance.³⁵⁰

2. *Baseline Conditions*

To determine whether management strategies are on track to achieve the goals established in an adaptive management plan, resource managers must know the baseline condition of the resources being managed.³⁵¹ Given that gathering and evaluation of data on resource conditions is at the heart of successful adaptive management, “[t]he first step in this process is identifying a baseline of conditions against which to evaluate changes in the environment over time.”³⁵² As Holly Doremus has explained, “[t]he lack of such baseline information can pose a serious problem for adaptive management because some types of learning cannot be rushed. Years of data are required to understand the extent of natural variability in some populations and habitat conditions, for example, and that understanding in turn may be crucial to interpreting population fluctuations.”³⁵³ In other words, when agencies engage in monitoring to determine whether the achievement of management goals is in jeopardy, they need to be able to answer the question: “compared to what?” The establishment of baseline conditions provides that answer.³⁵⁴ The land management agencies have succeeded when they have been able to demonstrate sufficient identification of baseline conditions.³⁵⁵ To anticipate an agency’s inability to eliminate all

³⁴⁸ *E.g.*, *Theodore Roosevelt Conservation P’ship v. Salazar*, 616 F.3d 497 (D.C. Cir. 2010) (discussed *supra* notes 212-17 and accompanying text); *Klamath Siskiyou Wildlands Ctr. v. Grantham*, 2013 WL 1420259 (E.D. Cal. Apr. 8, 2013), *aff’d in part, rev’d in part and remanded*, 642 F. App’x 742 (9th Cir. 2016) (discussed *supra* notes 223-26 and accompanying text); *W. Watershed Project v. U.S. Forest Serv.*, 780 F. Supp. 2d 1115 (D. Idaho 2011), *reconsideration denied*, 2011 WL 4442668 (D. Idaho, Sep. 22, 2011) (discussed *supra* notes 227-29 and accompanying text).

³⁴⁹ *See, e.g.*, Sandra Zellmer & Lance Gunderson, *Why Resilience May Not Always Be A Good Thing: Lessons in Ecosystem Restoration from Glen Canyon and the Everglades*, 87 NEB. L. REV. 893, 930 (2009) (“The primary impediment to making the most of the opportunities created by experimentation on the Grand Canyon is Congress’s unwillingness to articulate clear ecological priorities among conflicting societal values.”).

³⁵⁰ *See, e.g.*, *Hells Canyon Pres. Council v. Connaughton*, 2012 WL 13047991, *11 (D. Or. 2012) (discussed *supra* notes 189-92 and accompanying text).

³⁵¹ CEQ has noted that the identification of baseline conditions is a factor in assessing the effectiveness of monitoring. NEPA TASK FORCE, *supra* note 52, at 50 (and accompanying text).

³⁵² Daniel Schramm & Akiva Fishman, *Legal Frameworks for Adaptive Natural Resource Management in A Changing Climate*, 22 GEO. INT’L ENVTL. L. REV. 491, 500 (2010).

³⁵³ Holly Doremus, *Adaptive Management as an Information Problem*, 89 N.C. L. REV. 1455, 1476 (2011).

³⁵⁴ *See* Dinah Bear, *Some Modest Suggestions for Improving Implementation of the National Environmental Policy Act*, 43 NAT. RESOURCES J. 931, 948 (2003) (noting that the Valles Caldera Trust created to manage the Valles Caldera National Preserve in New Mexico “has invested heavily in the kinds of inventory and monitoring work needed to provide baseline information for the comparative evaluation of future resource conditions”).

³⁵⁵ *See, e.g.*, *Protect Our Communities Found. v. Jewell*, 825 F.3d 571 (9th Cir. 2016) (discussed *supra* notes 207-10 and accompanying text); *Save Our Cabinets v. U.S. Dep’t of Agric.*, 254 F.Supp.3d 1241, 1262-63 (D. Mont. 2017) (discussed *supra* notes 157-62 and accompanying text); *see also* *Japanese Village, LLC v. Fed. Transit Admin.*, 843 F.3d 445, 461 470-71 (9th Cir. 2016).

uncertainties concerning its understanding of baseline conditions, it may be advisable to acknowledge those shortcomings and explain how it intends to rectify them.³⁵⁶

3. *Triggers for Management Adjustments*

Adaptive management involves making adjustments when conditions indicate that implementation is not proceeding toward achievement of project goals.³⁵⁷ A critical question is when to make such adjustments. The designation of triggers in an adaptive management plan serves the purpose of providing such signals. By one account, a trigger “is a type of pre-negotiated commitment made by an agency within an adaptive management or mitigation framework specifying what actions will be taken if monitoring information shows x or y. In other words, predetermined decisions, or more general courses of action, are built into an adaptive framework from the beginning of the process.”³⁵⁸ A trigger defines a threshold level of harm which, if exceeded, mandates an agency response.³⁵⁹

To pass judicial muster, triggers must be sufficiently clear and detailed to allow resource managers to provide certainty about when, based on evaluation of current conditions, they are required to change course. Under those circumstances, the agency’s commitment to adjust under predetermined conditions is capable of being judicially enforced.³⁶⁰ Holly Doremus explained the need for specificity:

In order to ensure that adaptation occurs, management plans should set forth clear benchmarks for adapting to new information or changing circumstances. . . . [I]nitial management plans can establish clear thresholds that will trigger future adjustments to management, or at least put in motion specific procedures for making adaptation decisions. . . . Without clearly specified criteria and processes for making adjustments to a management plan, adaptive management can become a tool to rationalize uncertainty or cover flaws in initial decisions, rather than a mechanism for improving management over time.³⁶¹

Critics of the use of the manner in which federal agencies have used adaptive management have identified projects which have lacked such enforceable triggers.³⁶² The cases explored in Part

³⁵⁶ See *Save Our Cabinets*, 254 F. Supp. 3d at 1262-63 (D. Mont. 2017) (noting that the Forest Service included baseline data in the record that “acknowledge[d] shortcomings” and planned to collect additional data in later evaluation phases of the project).

³⁵⁷ “Mak[ing] corrective changes to the project” has been a critical element of adaptive management of CEQ guidance from the beginning. CEQ, EFFECTIVENESS, *supra* note 43, at 33.

³⁵⁸ Schultz & Nie, *supra* note 310, at 455; see also Biber, *supra* note 27, at 960 (“Triggers can be used to force adaptation in response to monitoring results; they can also be used to provide underlying guarantees that important resources will be protected from serious, irreversible impacts from adaptive management experiments.”).

³⁵⁹ See Schultz & Nie, *supra* note 310, at 465 (explaining that triggers serve as “indicators or warnings”).

³⁶⁰ See *id.* at 504 (“If triggers are written so that specific requirement to monitor x or y must take place before taking a particular action, this type of commitment is more enforceable.”).

³⁶¹ Doremus et al., *supra* note 345, at 11.

³⁶² See, e.g., Zellmer & Gunderson, *supra* note 349, at 930 (“[T]he Glen Canyon AMP does not mandate when information gleaned from such experiments must be used to adjust the management protocols.”); cf. Robert L. Fischman, *Letting Go of Stability: Resilience and Environmental Law*, 94 IND. L.J. 689, 705 (2019) (describing the

It also reflect judicial dissatisfaction with amorphous triggers or quantified objectives.³⁶³ The triggers must be responsive to identified threats to the resources being managed and protected).³⁶⁴ The more specific and relevant triggers are related to the project's resource management goals, the better chance they have of satisfying courts and contributing to better environmental outcomes. Triggers need not be expressed in numeric form to pass muster, however.³⁶⁵

4. *Monitoring and Evaluation*

Resource managers cannot tell if developing conditions have triggered the need for management adjustments unless they monitor those conditions as projects proceed. “An efficient monitoring plan is a critical part of any adaptive management application.”³⁶⁶ CEQ's guidance on implementing adaptive management during the NEPA process has recognized the integral role of monitoring.³⁶⁷ But monitoring alone is not enough. Although “[s]ystematic monitoring to collect that data is essential to adaptive management, [d]ata must not sit on a shelf. The learning effort must include systematic and ongoing data interpretation and evaluation, as well as data sharing within and between agencies so that learning diffuses from one action to others.”³⁶⁸ As one study of adaptive management in the natural resources law context put it, “without monitoring, there can be no improved understanding of conditions or responses to management actions, and therefore, no informed adjustment of on-the-ground practices.”³⁶⁹

The cases analyzed above³⁷⁰ provide examples of monitoring prescriptions that supported agency efforts to defeat NEPA challenges.³⁷¹ One court approved of the agency's “multi-indicator monitoring” approach.³⁷² Another deemed it critical that the monitoring program corresponded with the triggering conditions that would lead to a change in management practices.³⁷³ The cases reflect judicial inclination to defer to agency choices of monitoring targets, methods, and frequency, as long as the agency has made a commitment to monitor and the scope of the monitoring program corresponds to triggers for responsive actions.

challenge of retaining flexibility while imposing “enforceable constraints on actions that affect resilience in an undesirable way. Practitioners of adaptive management need new legal frameworks that force them to state measurable objectives for an action and to identify thresholds that will trigger specific responses to monitoring.”). Otherwise, management may drift from its objectives.

³⁶³ See *Nat. Res. Def. Council v. Kempthorne*, 506 F. Supp. 2d 322, 356-57 (E.D. Cal. 2007).

³⁶⁴ See, e.g., *Greater Yellowstone Coal., Inc. v. Servheen*, 665 F.3d 1015 (9th Cir. 2011) (discussed *supra* note 236).

³⁶⁵ See, e.g., *Izaak Walton League of Am., Inc. v. Tidwell*, 2015 WL 632140, *21 (D. Minn. Feb. 13, 2015) (discussed *supra* notes 230-36 and accompanying text); *Nat'l Parks Conservation Ass'n v. U.S. Dep't of Interior*, 46 F. Supp. 3d 1254 (M.D. Fla. 2014), *adhered to on reconsideration*, 2015 WL 476163 (M.D. Fla. Feb. 5, 2015), *aff'd*, 835 F.3d 1377 (11th Cir. 2016) (discussed *supra* note 222).

³⁶⁶ Johnson, *supra* note 334.

³⁶⁷ NEPA TASK FORCE, *supra* note 52, at 33; CEQ, EFFECTIVENESS, *supra* note 43, at 48, 50, 51.

³⁶⁸ Doremus et al., *supra* note 345, at 12.

³⁶⁹ Schultz & Nie, *supra* note 310, at 447.

³⁷⁰ See *supra* § IIIB.2.

³⁷¹ See, e.g., *Theodore Roosevelt Conservation P'ship v. Salazar*, 616 F.3d 497 (D.C. Cir. 2010) (discussed *supra* notes 212-17 and accompanying text); *Powder River Basin Res. Council v. U.S. Bureau of Land Mgmt.*, 37 F. Supp. 3d 59 (D.D.C. 2014) (discussed *supra* notes 218-21 and accompanying text).

³⁷² *Klamath Siskiyou Wildlands Ctr. v. Grantham*, 2013 WL 1420259, *10 (E.D. Cal. Apr. 8, 2013), *aff'd in part, rev'd in part and remanded*, 642 F. App'x 742 (9th Cir. 2016) (discussed *supra* notes 223-26 and accompanying text).

³⁷³ *Izaak Walton League*, 2015 WL 632140, at *21-22 (discussed *supra* notes 230-36 and accompanying text).

Important aspects of monitoring and evaluation also overlap with procedural strategies and identification of goals and objectives. When determining the scope of what needs to be monitored under an adaptive management plan, an agency would be wise to listen to the recommendations of external partners and agencies with relevant expertise as well as interested stakeholders. Likewise, monitoring should be tied to project or program goals, because if an agency fails to monitor for aspects that are relevant or important to the overall purpose, it increases the risk that a judge will notice the discrepancy and find the decision arbitrary and capricious.

5. *Adaptive Measures*

The final step in the implementation of an adaptive management program is the adoption of adjustments in response to evidence that applicable triggers have been exceeded in order to redress deviations from regulatory or management goals.³⁷⁴ According to Mark Squillace, “[m]onitoring serves little purpose unless it is used to inform future actions and guide timely amendments to existing plans. . . . This commitment should include a timetable for identifying and implementing remedial actions that will address deficiencies found during monitoring.”³⁷⁵ J.B. Ruhl has posited that “[a]daptive management, to be effective, does require institutions that ensure a rigorous implementation policy.”³⁷⁶ Thus, adaptive management involves follow-up in order to “do” based on what has been learned.³⁷⁷

The intersection of NEPA with this aspect of adaptive management relates most clearly to agency obligations to consider and describe mitigation measures and to consider alternatives to the proposed action.³⁷⁸ Agencies need not specify exactly what mitigating actions they will pursue in the event that mid-course corrections become necessary. The point of adaptive management is to retain management flexibility.³⁷⁹ In one case, an agency’s EIS sufficed by describing “fixed mitigation measures,” even though their exact application would be determined on a site-specific basis.³⁸⁰ An unadorned promise to engage in mitigation measures without indicating in any way

³⁷⁴ See Susskind, Camacho & Schenk, *supra* note 331, at 51-52 (“Adaptive management should include not only systematic monitoring, assessment, and adaptation in response to individual regulatory decisions made by the stakeholder group, but also reconsideration of the regulatory program itself.”).

³⁷⁵ Mark Squillace, *Rethinking Public Land Use Planning*, 43 HARV. ENVTL. L. REV. 415, 455 (2019). See also *id.* at 458 (stating that if adaptive management works, it “ensures that decisions will evolve to reflect the facts as they become evident from the experience of *actually taking action*”); Jonathan H. Adler, *Dynamic Environmentalism and Adaptive Management: Legal Obstacles and Opportunities*, 11 J.L. ECON. & POL’Y 133, 145-46 (2015) (“[A]daptive management is more than simple trial and error or contingency planning. It requires a meaningfully structured process than ensures iterative consideration of the problem to be solved, measurements of success at solving the problem, evaluation of existing measures, and modification of ongoing measures in response to new information and discovery.”).

³⁷⁶ Ruhl, *Case Study*, *supra* note 39, at 1278; cf. Ruhl, *Regulation*, *supra* note 20, at 30 (“Deliberate monitoring and a framework for altering course, rapidly and frequently if conditions warrant, thus are essential ingredients of adaptive management.”).

³⁷⁷ Doremus, *Precaution*, *supra* note 1, at 550 (describing adaptive management as “learning by doing”).

³⁷⁸ See *supra* §§ IIC & E.

³⁷⁹ Angelo, *supra* note 37, at 994 (“The ability to make such adjustments, to be flexible and to respond to unanticipated events is the hallmark of adaptive management.”).

³⁸⁰ Nat’l Parks Conservation Ass’n v. Jewell, 965 F. Supp. 2d 67, 76 (D.D.C. 2013) (discussed *supra* notes 237-42 and accompanying text); see also *Def. of Wildlife v. Salazar*, 698 F. Supp. 2d 141, 144 (D.D.C. 2010), *aff’d on other grounds*, 651 F.3d 112 (D.C. Cir. 2011) (discussed *supra* notes 243-48 and accompanying text).

what they will be or how the agency will choose among them is not likely to satisfy a reviewing court, however. By insisting on some degree of specificity and commitment to alter course if initial management strategies fail to promote resource management objectives, courts help steer adaptive management plans towards achieving quality environmental outcomes. Similarly, if a land management agency selects adaptive management as its preferred alternative in an EIS or EA, it should explain why that alternative holds out the best promise of achieving the agency's management goals.³⁸¹ It also should explore alternative means of implementing its adaptive actions both to determine the most promising avenue for achieving those goals and to enable it to justify the selected course of action in the event of judicial challenges.³⁸²

CONCLUSION

Adaptive management developed in response to dissatisfaction with a decisionmaking paradigm that involved formulation of natural resource management strategies based on a one-time evaluation of conditions and needs, with little if any required follow-up, reevaluation, and adjustment. NEPA was the poster child for this "synoptic cultural paradigm."³⁸³ Nevertheless, all four federal land management agencies have recognized the value of adaptive management and have authorized its use, requiring then to integrate it into their NEPA compliance mechanisms. It has been up to the agencies, and eventually to reviewing courts, to resolve the underlying tension between NEPA's front-end predictive thrust and adaptive management's call for iterative evaluation and responsive action.

The cases treated in this Article provide guidance to agencies seeking to apply NEPA's evaluative requirements to a decisionmaking process that is most likely to be invoked precisely when uncertainty makes predicting the consequences of management choices difficult if not impossible. Following the best practices gleaned from these cases should bolster the prospects for agency success, both as a legal matter and in achieving substantive resource management goals. They provide a way for agencies to thread a narrow needle. On the one hand, abiding by the prescriptions identified in this Article should facilitate an agency's ability to comply with NEPA's assessment duties even in the absence of complete information, while at the same time reducing the likelihood that additional NEPA analyses will need to be performed when course corrections become necessary. On the other hand, the careful practice of adaptive management should permit the agency to retain flexibility to make adjustments in response to feedback acquired through monitoring and evaluation of management performance in ways that align with the scientific understanding of complex natural systems and enhance the prospects of successful pursuit of resource management goals. Prospective litigants able to point to agency failures to abide by these recommendations are likely to fare well in alleging NEPA noncompliance.

³⁸¹ Cal. Res. Agency v. U.S. Dept of Agric., 2009 WL 6006102, *16 (N.D. Cal. Sept. 29, 2009) (discussed *supra* notes 323-27 and accompanying text).

³⁸² And it should consider alternative monitoring and evaluation methodologies. *See id.* at *17 ("The failure to present any alternatives pertaining to a critical decision violates the NEPA.")

³⁸³ Poisner, *supra* note 31, at 78.