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

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For years, public lands scholars lamented the limited success that federal agencies had in applying adaptive management decision-making 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 decision-making 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 an agency that resorts 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.

Table of Contents

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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 multi-

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.").

ple-use management mandates, the U.S. Forest Service ("Forest Service")[2] and the Bureau of Land Management ("BLM"),[3] and the agencies charged 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 forest[7] 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

2. The Forest Service manages the national forests pursuant to the National Forest Management Act ("NFMA"), 16 U.S.C. §§ 1600–1687. 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. BLM's organic statute is the Federal Land Policy and Management Act ("FLPMA"), 43 U.S.C. §§ 1701–1787. FLPMA directs 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).

4. NPS manages units of the National Park System under the National Park Service Organic Act, 16 U.S.C. §§ 100101–104909. 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–ee, governs 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 GEORGE CAMERON COGGINS & ROBERT L. GLICKSMAN, PUBLIC NATURAL RESOURCES LAW §§ 6:14–6:17 (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 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.").

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 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 its analysis in a NEPA docu-

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. Bosselman & Tarlock, *supra* note 9, at 863–69; 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 (2009).

12. Jonathan H. Adler, *Dynamic Environmentalism and Adaptive Management: Legal Obstacles and Opportunities*, 11 J.L. Econ. & Pol'y 133, 136 (2015) ("Contemporary ecological science . . . [recognizes] that ecological systems are always in flux. There is no true 'natural' state for ecosystems.").

13. 42 U.S.C. §§ 4321–4370h.

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 Env't L. Rep. 10,281, 10,283 (2020).

16. *See* C.S. Holling & Gary K. Meffe, *Command and Control and the Pathology of Natural Resource Management*, 10 Conservation Biology 328, 332 (1996); Ahjond Garmestani et al., *Panarchy, Adaptive Management, and Governance: Policy Options for Building Resilience*, 87 Neb. L. Rev. 1036, 1039–40 (2009).

ment 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, described more fully below,[19] 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 unexpectedly. 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 were misinformed or they were incapable of foreseeing the flow of future events.[20] The question posed in this Article is whether it is possible to reconcile NEPA's front-end, forward-looking approach with the adaptive management process, which envisions iterative management based on learning from past experience.

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

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) [T]he 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 infra* Part I.A.

20. *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 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).

and adaptive management,[21] it plows new ground by identifying plaintiffs' points of entry into NEPA litigation. It also 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 defines adaptive management and describes its use to date by the four primary federal resource management agencies. It examines the legislation, regulations, and various guidance documents that provide the legal framework that 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 the use of adaptive management strategies by federal land management agencies to comply with NEPA.[22] It explores how federal courts have reconciled, or found it impossible to reconcile, adaptive management with different provisions of NEPA and agency implementing regulations, identifying in the process the obstacles to reliance on adaptive management that NEPA may create. This evaluation demonstrates a growing acceptance by courts of adaptive management as a viable natural resource management strategy, but also displays that courts are not likely to rubberstamp these plans. On the contrary, when conducting NEPA analysis, many courts explicitly engage with specific elements of an agency's adaptive management plan.

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 manage-

21. *See, e.g.*, J.B. Ruhl & Robert L. Fischman, *Adaptive Management in the Courts*, 95 MINN. L. REV. 424, 427 (2010) (providing analysis of cases up to 2010).

22. 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 U.S. v. U.S. Dep't of Agric., No. 20-03258, 2021 WL 1593243, at *1–3 (C.D. Cal. Mar. 26, 2021) (refusing to dismiss for lack of standing a NEPA challenge to the 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). 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.

ment 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 NEPA'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 based on NEPA non-compliance will disrupt agency initiatives 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 federal lands.

I. The Legal Framework for Use of Adaptive Management by the Federal Land Management Agencies

Agency use of adaptive management, both to comply with NEPA and more generally, has increased in the last several decades.[23] In part, this shift has occurred as a result of continuing scientific evidence supporting the use of adaptive management to manage complex ecosystem resources,[24] as well as growing momentum within government institutions based on recognition of the need for a more flexible decision-making framework.[25] To systematize the use of adaptive management, federal agencies have begun to incorporate adap-

23. *See* A. Dan Tarlock, *Environmental Law: Ethics or Science?*, 7 Duke Env't 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").

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

25. *See, e.g.*, Chris Wold, *Climate Change, Presidential Power, and Leadership: "We Can't Wait"*, 45 Case W. Rsrv. J. Int'l L. 303, 319 (2012) (citing the Interior Department's 2009 adoption of a strategy "to increase scientific understanding of and development of effective adaptive management tools" (quoting Dep't of the Interior, Secretarial Order No. 3285, Renewable Energy Development by the Department of the Interior § 3 (Mar. 11, 2009))); 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*] ("Adaptive management is the only practical way to implement ecosystem management policy.").

tive 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. The Troublesome Fit Between Adaptive Management and NEPA

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 policy objectives.[26] According to C.S. Holling, one of the first proponents of adaptive management as a natural resource management strategy,[27] "[a]daptive management is not really much more than common sense."[28] Professors 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 decision-making much less relevant. Rather than make one grand decision and move on, agencies employing adaptive management engage in a program of iterative decision-making 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).[29]

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26. *See* J.B. Ruhl, *Regulation by Adaptive Management—Is It Possible?*, 7 MINN. J.L. SCI. & TECH. 21, 30 (2005) [hereinafter Ruhl, *Regulation*]; Doremus, *Precaution*, *supra* note 1, at 550 (describing adaptive management as "learning while doing").

27. *See* INT'L SERIES ON APPLIED SYSTEMS ANALYSIS, ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT, at xv (C.S. Holling ed., 1978) [hereinafter HOLLING, ADAPTIVE MANAGEMENT], https://perma.cc/CFP5-6ETC (addressing "policy makers and managers who are dissatisfied with the traditional procedures and principles and who seek some effective and realistic alternatives").

28. *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 202.

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

Adaptive management is an attractive approach for both scientists and natural resource managers[30] 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.[31] 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 monitoring data throughout to modify and make changes to the overall strategy.[32]

The NEPA process, however, is largely a "front-end analytic" process[33]—agencies must analyze the potential environmental impacts of proposed actions as early in the planning process as possible.[34] As Eric Biber has noted, the

30. *See* Ruhl & Fischman, *supra* note 21, at 429–30 ("[T]here has been broad consensus among resource managers and academics that adaptive management is the only practical way to implement ecosystem management.").

31. *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, 996 (1997) (contrasting adaptive management as a strategy for managing complex systems with the predominant "nonadaptive" model).

32. *See, e.g.*, National Forest System Land Management Planning, 70 Fed. Reg. 1023, 1025 (Jan. 5, 2005) (to be codified at 36 C.F.R. pt. 219) ("During the 15-year life expectancy of a plan, information, science, and unforeseen circumstances evolve. It must be possible 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.").

33. 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) ("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." (footnotes omitted)); Julie Thrower, Comment, *Adaptive Management and NEPA: How a Nonequilibrium View of Ecosystems Mandates Flexible Regulation*, 33 ECOLOGY L.Q. 871, 883 (2003) ("[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 394 and accompanying text.

34. The regulations of 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 (2020).

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 . . . ."[35] 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."[36]

The concept of adaptive management emerged from Holling's concern that the "comprehensive and synoptic environmental analysis and assessment"[37] that NEPA calls for "led neither to better scientific understanding nor to well-informed agency decisionmaking."[38] Holling "offer[ed], as an alternative, the

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35. Biber, *supra* note 33, at 937–38.

36. Ruhl & Fischman, *supra* note 21, 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 decision-making "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. (citations omitted); *see also* J.B. Ruhl, *The Disconnect Between Environmental Assessment and Adaptive Management*, 36 TRENDS 1, 1 (2005). 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.").

37. Bradley C. Karkkainen, *Panarchy and Adaptive Change: Around the Loop and Back Again*, 7 MINN. J.L. SCI. & TECH. 59, 59–60 (2005) [hereinafter Karkkainen, *Panarchy*]; *see also* Jonathan Poisner, *A Civic Republican Perspective on the National Environmental Policy Act's Process for Citizen Participation*, 26 ENV'T 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 EIS statement preparation mandate, was among those who conceived of NEPA as a vehicle for spurring "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 ENV'T L. 681, 685 (1990).

38. Karkkainen, *Panarchy*, *supra* note 37, at 60–61; *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 & ENV'T L. 213, 249 (2004) ("Adap-

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."[39] 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,[40] and to do so in a way that is likely to survive unscathed in the event of a lawsuit alleging agency noncompliance with NEPA.

B. CEQ and Adaptive Management

While the term adaptive management does not appear in the NEPA statute itself, CEQ has endorsed its use,[41] both in its official regulations and in non-binding guidance documents.[42] 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."[43]

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tive management was developed in the late 1970s as a criticism of static or deterministic environmental assessment.").

39. HOLLING, ADAPTIVE MANAGEMENT, *supra* note 27, at 1; *see also* Hillary M. Hoffmann, *Climate Change and the Decline of the Federal Range: Is Adaptive Management the Solution?*, 15 VT. J. ENV'T L. 262, 265–67 (2014) (reviewing adaptive management's history).

40. *Cf.* Robert L. Fischman, *Letting Go of Stability: Resilience and Environmental Law*, 94 IND. L.J. 689, 705 (2019) ("Federal agencies have succeeded in undertaking adaptive management within the framework of NEPA, but it is an awkward fit with the comprehensive rationality of administrative law."). For an effort to reconcile NEPA and adaptive management, see Thrower, *supra* note 33.

41. NEPA created CEQ within the Executive Office of the President. 42 U.S.C. § 4342. 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).

42. 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. ENV'T L.J. 317, 330 n.100 (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).

43. 40 C.F.R. § 1500.1(b) (2020). 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.* § 1500.1(a). 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).

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."[44] Referring to monitoring and adaptive management as a "challenge for the future," CEQ noted that:

> [T]he 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.[45]

At the same time, CEQ found that agencies were not routinely collecting data on the long-term environmental impacts of their projects or the effectiveness of mitigation measures, even though the CEQ regulations then in effect required adoption of a monitoring and 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.[46] Significantly, CEQ acknowledged that "the courts have not generally found . . . a legal requirement [to engage in post-project monitoring] in NEPA itself."[47]

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."[48] 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."[49] The problem, according to CEQ, was that "often the process end[ed] there," such that:

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44. CEQ, The National Environmental Policy Act: A Study of Its Effectiveness After Twenty-Five Years 28 (1997) [hereinafter CEQ, Effectiveness], https://perma.cc/46RL-C3EQ.

45. *Id.* at 31.

46. *Id.*

47. *Id.*

48. *Id.* at 32.

49. *Id.*

> [A]dequate 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.[50]

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."[51] 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."[52]

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."[53] The Task Force's objective was "to provide agencies with another tool to improve their NEPA implementation."[54] Although the 1997 report had sought to explain the value of integrating adaptive management into the NEPA process, many NEPA practitioners were still unfamiliar with the concept.[55]

Accordingly, the Task Force recommended establishing an adaptive management working group to consider revising CEQ's NEPA regulations or provide 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

50. *Id.*

51. *Id.*

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

53. NEPA Task Force, Report to the Council on Environmental Quality, Modernizing NEPA Implementation 44 (2003), https://perma.cc/7N9D-RHJB.

54. *Id.* at xi; *see also id.* at 46.

55. *Id.* at xi; *see also id.* at 45.

56. *Id.* at xi.

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 ("EAs"); 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 factors 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 set forth the prerequisites to successful use of adaptive management in the NEPA process. Agencies must establish a monitoring scheme to examine a proposed action's environmental effects to enable later determinations of whether adjustments are needed to avoid unpredicted effects.[60] An adaptive management plan must include adaptive measures capable of being used for identified alternatives. 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]

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

57. *Id.* at 55.

58. *Id.* at xii, 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 n.57.

59. *Id.* at 46–47.

60. *Id.* at 49.

61. *Id.* at 51; *see also id.* at 17–19.

the ability to analyze those changes; and adequate resources to monitor and respond appropriately.[62]

In 2007, CEQ followed up on the Task Force's recommendations by publishing a guide to assist agencies in using EMSs in their NEPA compliance efforts.[63] CEQ 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."[64] 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."[65] 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."[66] 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.[67] President Donald Trump revoked a successor executive or-

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 (2007), https://perma.cc/5DGP-M2FY.

64. *Id.* at 2.

65. *Id.* at 3. An EMS is broader than, but may include, adaptive management components. For example, the Forest Service in its 2008 planning rule defined an EMS as "[t]he part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing, and maintaining environmental policy." National Forest System Land Management Planning, 73 Fed. Reg. 21,468, 21,512 (Apr. 21, 2008) (codified at 36 C.F.R. § 219.16 (2017)). It defined "adaptive management" as "[a] system of management practices based on clearly identified outcomes and monitoring to determine if management actions are meeting desired outcomes, and if not, to facilitate management changes that will best ensure that outcomes are met or re-evaluated." *Id.* One source explains that, in certain contexts, "environmental management systems seem to constitute the main opportunity for implementing adaptive management." Errol E. Meidinger, *The New Environmental Law: Forest Certification*, 10 Buff. Env't L.J. 211, 247 n.89 (2003). A former General Counsel of CEQ adds that "both EMS and adaptive management . . . require post-decisional monitoring," and that EMS is "an approach developed initially in a business and industrial context," while adaptive management is "a term most often used in the land management and natural resources context." Dinah Bear, *Some Modest Suggestions for Improving Implementation of the National Environmental Policy Act*, 43 Nat. Res. J. 931, 946 (2003).

66. CEQ, *supra* note 63, 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.").

67. Exec. Order No. 13,148, §§ 201, 401, 3 C.F.R. 241, 242, 245 (2001). President George W. Bush revoked the Clinton order, Exec. Order No. 13,423, § 11(a)(iv), 3 C.F.R. 193, 198

der issued by President Barack Obama that prompted agencies to "increase efficiency and improve their environmental performance,"[68] replacing it with an order that committed the federal government to operating "in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment," but that did not refer to either adaptive management or EMSs, or to any obligation to take mid-course corrective actions to address unanticipated events.[69] As Mary Jane Angelo has noted, "[t]he ability to make such adjustments, to be flexible and to respond to unanticipated events is the hallmark of adaptive management."[70]

During President Obama's first term, CEQ again encouraged the use of adaptive management by offering guidance to agencies on how to properly implement the strategy to comply with NEPA.[71] The guidance focused on mitigating commitments identified in 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.[72] 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 expecta-

(2008), 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), 3 C.F.R. 195. President Obama, in turn, revoked the Bush order, Exec. Order No. 13,693, § 16(a), 3 C.F.R. 281, 292 (2016), but continued to require agencies to implement formal EMSs when they had been proven effective. *Id.* § 7(i), 3 C.F.R. 290.

68. Exec. Order No. 13,693, § 1, 3 C.F.R. 281 (2016).

69. Exec. Order No. 13,834, §§ 1, 8, 3 C.F.R. 814, 814, 816 (2019).

70. Angelo, *supra* note 23, at 994; *see also* Holly Doremus, *The Endangered Species Act: Static Law Meets Dynamic World*, 32 WASH. U. J.L. & POL'Y 175, 227 (2010) ("Adaptive management aims to create policies that can help organizations, managers, and other stakeholders respond to and take advantage of unanticipated events."); John C. Dernbach, *Toward a National Sustainable Development Strategy*, 10 BUFF. ENV'T L.J. 69, 79 (2003) (describing adaptive management as a natural resource protection strategy that responds to the limited availability of information by enabling adjustments over time "based on new and perhaps unanticipated information and events").

71. 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 (2011), https://perma.cc/FJ8H-3VG5. CEQ cited NEPA and its own regulations as the source of its authority for the guidance. *Id.* at 1.

72. *Id.* at 8.

tions."[73] 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."[74] Monitoring would provide "feedback on the effectiveness of mitigation techniques."[75] 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.[76]

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,[77] most likely because the concept had not yet taken firm root in the literature or in natural resource management practice.[78] The first and only substantial update to the 1978 regulations, adopted in 2020, did not do so either.[79]

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73. *Id.*

74. *Id.* at 9.

75. *Id.*

76. *Id.* at 9–10.

77. The 1978 regulations were published at 43 Fed. Reg. 55,990 (Nov. 28, 1978).

78. *See* Bryan G. Norton, *The Rebirth of Environmentalism as Pragmatic, Adaptive Management*, 24 VA. ENV'T L.J. 353, 356 (2005) (stating that C.S. Holling's book conceptualizing adaptive management, which was published the same year as the adoption of the regulations, had "invented" adaptive management); J.B. Ruhl, *Working Both (Positivist) Ends Toward a New (Pragmatist) Middle in Environmental Law*, 68 GEO. WASH. L. REV. 522, 544 (2000) (reviewing DANIEL FARBER, ECO-PRAGMATISM: MAKING SENSIBLE ENVIRONMENTAL DECISIONS IN AN UNCERTAIN WORLD (1999)) ("[M]ost of [adaptive management's] advocates trace its origins to C.S. 'Buzz' Holling's influential book from the late 1970s.").

79. Update to the Regulations Implementing the Procedural Provisions of NEPA, 85 Fed. Reg. 43,304 (July 16, 2020) (to be codified at scattered parts of 40 C.F.R.). 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 Environmental 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. *Id.* at *14. *Center for Biological Diversity v. Walsh*, No. 18-cv-00558, 2021 WL 1193190 (D. Colo. Mar. 30, 2021), held that the 2020 regulations applied to a NEPA process conducted by 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 (quoting New York v. U.S. Dep't of Health & Hum. Servs., 414 F. Supp. 3d 475, 535 (S.D.N.Y. 2019)).

The 2020 regulations required each federal agency to develop proposed procedures to implement the revised regulations within twelve months after September 14, 2020. Update to the Regulations Implementing the Procedural Provisions of NEPA, 85 Fed. Reg. at 43,373. After the Biden Administration took office, CEQ issued an interim final rule giving agencies thirty-six months, not twelve, to develop those procedures. Deadline for Agencies to Propose Updates to NEPA Procedures, 86 Fed. Reg. 34,154, 34,158 (June 29, 2021) (to be codified at 40 C.F.R. pt. 1507). CEQ explained that it began a review of the 2020 regulations due to "substantial concerns about the legality" of those rules and the process that produced them. *Id.* at 34,155. It added that some of the revised provisions "create confusion

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.[80] The Trump CEQ's refusal to endorse adaptive management may have been part and parcel of the Administration's blanket repudiation of the Obama Administration's climate change policies, which had relied heavily on adaptive management.[81] Thus, federal land management agencies lacked guidance from the agency responsible for overseeing NEPA's administration on how to incorporate adaptive management into the NEPA evaluative process.

C. The Federal Land Management Agencies and Adaptive Management

Federal agencies have, to varying degrees, addressed the use of adaptive management in connection with their NEPA compliance responsibilities. The Department of the Interior (which houses three of the four principal federal land management agencies, as well as other resource management agencies such as the Bureau of Reclamation and the Bureau of Ocean Energy Management)[82] has long endorsed the use of adaptive management by agencies fulfilling their NEPA responsibilities.[83] 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."[84] The Technical Guide referred to the "emerging view" that "sees the NEPA process

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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.

80. Update to the Regulations Implementing the Procedural Provisions of NEPA, 85 Fed. Reg. at 43,308.

81. *See* Thomas O. McGarity & Wendy E. Wagner, *Deregulation Using Stealth "Science" Strategies*, 68 DUKE L.J. 1719, 1765 (2019).

82. *See Bureaus & Offices*, U.S. DEP'T OF THE INTERIOR, https://perma.cc/8N38-JBP5.

83. 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 systems can be put in place with a reasonable expectation of reducing uncertainty.

U.S. Department of the Interior, SOI Order 3270: Adaptive Management (2007), 2007 WL 2473329.

84. U.S. DEP'T OF THE INTERIOR, ADAPTIVE MANAGEMENT: THE U.S. DEPARTMENT OF THE INTERIOR TECHNICAL GUIDE, at i (2007, rev. 2009), https://perma.cc/EV7L-Z7TM.

as a powerful and potentially effective way to embody adaptive management."[85] It stated that if an EIS incorporates adaptive management, it must "clearly describe how the approach would be implemented."[86] The Technical Guide also explained that the use of adaptive management might reduce the need to prepare supplemental NEPA documents to address significant new information,[87] and that EAs could help integrate NEPA and adaptive management when supplementation of an EIS is necessary, but the impacts are not expected to be significant.[88] 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."[89]

In 2008, the Department issued regulations that codified the procedures to be used by its subsidiary agencies in complying with NEPA.[90] It clarified that "the use of [adaptive management] is not inconsistent with NEPA. . . . Each proposed action, including possible changes in management resulting from an [adaptive management] approach, may be analyzed at the outset of the process, or these changes in management may be analyzed when actually implemented."[91] On the other hand, the agency warned that "the use of an adaptive management approach does not preclude the necessity of complying with NEPA."[92] The Department also stated, however, that "[t]he establishment of specific provisions with respect to the use of [adaptive management] is beyond the scope of this rule."[93]

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

85. *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").

86. *Id.* at 40.

87. *Id.*

88. *Id.* at 46.

89. *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.*

90. Implementation of the National Environmental Policy Act of 1969, 73 Fed. Reg. 61,292 (Oct. 15, 2008) (to be codified at 42 C.F.R. pt. 46).

91. *Id.* at 61,301.

92. *Id.* at 61,310.

93. *Id.* at 61,300–01.

effects of such options. The environmental effects of any adaptive management strategy must be evaluated in this or subsequent NEPA analysis.[94]

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.[95] The remainder of this section focuses, however, on regulations and guidance documents that the four principal land management agencies—the NPS, FWS, the Forest Service, and BLM—have issued to govern the role of adaptive management in NEPA's implementation. Notably, the agencies' approaches to the use of adaptive management have varied, complicating the task of judicial determination of the circumstances in which the use of adaptive management is appropriate.

1. The National Park Service

The NPS's website states that "[c]ase studies show how adaptive management can be used for both management and learning."[96] The agency does not currently have regulations to define adaptive management or its application.[97] 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."[98]

94. 43 C.F.R. § 46.145 (2008). 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* U.S. DEP'T OF THE INTERIOR, DEPARTMENTAL MANUAL § 1.6A(1) (2009), https://perma.cc/5EHG-GBTG. But the portion of the Manual on Managing the NEPA Process does not mention adaptive management. *See id.* §§ 3.1–3.6, https://perma.cc/ASH2-9G6W.

95. *See, e.g.*, 14 C.F.R. § 1216.309 (2012) (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) (2008) (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) (2008) (EPA regulations governing the use of adaptive management in the same context).

96. NAT'L PARK SERV., ADAPTIVE MANAGEMENT: THE U.S. DEPARTMENT OF THE INTERIOR APPLICATIONS GUIDE (2012), https://perma.cc/86RH-GK6A.

97. *Cf.* Tony Prato, *Adaptive Management of National Park Ecosystems*, 23 GEORGE WRIGHT F. 72, 72 (2006) (proposing adaptive management regulatory framework for NPS), https://perma.cc/VR86-SXQS.

98. NAT'L PARK SERV., MANAGEMENT POLICIES 2006, at 27 (2006), https://perma.cc/K9EN-6U7Z. 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 defined adaptive management as "a system of management practices based on clearly identified outcomes, monitoring

In 2012, the NPS provided more specific guidance on the use of adaptive management by issuing its adaptive management *Applications Guide*.[99] The Guide specifically addresses the use of that analytical technique in the performance of NEPA responsibilities, providing that "an adaptive management approach must comply with statutory and regulatory requirements, most notably the National Environmental Policy Act."[100] Thus, the NPS is acutely aware of the need to integrate adaptive management into its NEPA processes. The Guide also provides that:

> An EIS incorporating adaptive management needs to describe clearly how the approach would be implemented. This not only includes the types of actions that are proposed initially, but also the results that are anticipated from monitoring and assessment, and future actions that may be implemented on the basis of those results. Decision makers and the public must be able to see how the adaptive management approach would be implemented, including potential future actions and anticipated impacts on the environment. The anticipated impacts of such potential future actions may either be analyzed in NEPA analysis prepared at the point of the initial decision to take an adaptive approach, or may be considered in NEPA analysis prepared to support a new decision or decisions when it becomes clear, as a result of monitoring and assessment, that such actions are warranted.[101]

The NPS reconciled the two analytical processes by positing that:

> [A]daptive management and NEPA share an emphasis on learning. A common challenge in making adaptive management work in natural resource decision making is that ongoing monitoring and assessment may reveal new information that requires a new decision to be made to alter the management situation. A proposal to make a new decision or take a new action triggers the requirement to comply with NEPA.[102]

It concluded that "[t]he overall goal is to analyze the impacts of different management alternatives in a way that sustains maximum flexibility in selecting the appropriate option without triggering the requirement for a new or supplemental NEPA review."[103] The NPS recognizes that "[a]daptive management

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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.

99. NAT'L PARK SERV., *supra* note 96.

100. *Id.* at v; *see also id.* at 31–32.

101. *Id.* at 33.

102. *Id.*

103. *Id.* at 34.

can be useful in cases where natural resources are responsive to management, but there is also uncertainty about the impacts of management interventions."[104]

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 subject to all existing authorities. These strategies [would] promote science-based decisions, help deal with uncertainty, and promote a culture of learning."[105] 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."[106] The order did not provide detailed directions on how to apply adaptive management, instead referring to the Interior Department's 2009 Technical Guide.[107] It did promise that the NPS would incorporate references to adaptive management into other policy guidance and provide training for its application.[108]

The NPS applies adaptive management techniques largely on a park-by-park basis. In some instances, the NPS has integrated adaptive management into its NEPA processes. For example, the NPS 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.[109] In the process of preparing a supplemental EIS ("SEIS") on the Plan, the NPS emphasized the need to "consider additional information" on substantial new issues, including adaptive management.[110] The SEIS, published in 2013, referred to adaptive management 129 times, noting that the requirement that the Park's managers "incorporate adaptive management initiatives that are designed to assist the park in meeting" the plan's goals was common to all alternatives the NPS considered.[111] The SEIS stated that "[a]daptive management—learning by doing and then adapting/adjusting—is an important tool for resource management," which is "based on the assump-

104. *Id.* at v.

105. Director's Order #100: Resource Stewardship for the 21st Century ¶ 6 (Dec. 20, 2016), https://perma.cc/F7AF-7FDF.

106. *Id.* ¶ 6.2

107. *See id.*

108. *Id.* ¶¶ 6.2, 10.2.

109. *Winter Use Adaptive Management Plan*, Nat'l Park Serv., https://perma.cc/T4ZZ-X9DF.

110. Winter Use Plan, Supplemental Environmental Impact Statement, Yellowstone National Park, Idaho, Montana, and Wyoming, 77 Fed. Reg. 6581, 6581 (Feb. 8, 2012).

111. Nat'l Park Serv., Yellowstone National Park: Winter Use Plan/Supplemental Environmental Impact Statement, at viii (2013), https://perma.cc/J4VQ-7DEZ.

tion that current scientific knowledge is limited and there is uncertainty in plans."[112] The SEIS devoted an entire Appendix to a description of the Plan's collaborative adaptive management and monitoring framework,[113] which was designed to "provide a structured process, involving the public and interested stakeholders, to continually evaluate the effectiveness of the winter use plan and seek to provide information to inform uncertainties and improve management over time."[114]

2. The Fish and Wildlife Service

Like the NPS, FWS has incorporated adaptive management into its decision-making processes.[115] FWS has multiple natural resource responsibilities.[116] One of those is its administration of one of the two dominant-use federal land systems,[117] the National Wildlife Refuge System ("NWRS").[118] The nation's foremost legal scholar on management of the refuges predicted that FWS's

112. *Id.* at 51.

113. *Id.* at D-1 to -5.

114. *Id.* at D-1.

115. *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. ENV'T MGMT. 1395 (2011) (describing two cooperative programs between FWS and the U.S. Geological Survey to implement adaptive management at scales ranging from single refuges to multi-region projects). FWS has also used adaptive management in fulfilling its other statutory responsibilities. *See, e.g.*, 50 C.F.R. § 18.126(a) (2020) (authorizing the use of adaptive management to protect Pacific walruses and polar bears under the Marine Mammal Protection Act); U.S. FISH & WILDLIFE SERV., ADAPTIVE HARVEST MANAGEMENT: 2018 HUNTING SEASON, https://perma.cc/ZX4Z-AYN4 (describing the use of adaptive management as an aid in setting duck hunting regulations); *see also* Fischman, *supra* note 40, at 699–700 ("[T]he recovery and maintenance of migratory waterfowl is among the greatest sustainability success stories . . . [and] was accomplished with the tool of adaptive management." (footnote omitted)).

116. 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." *About the U.S. Fish and Wildlife Service*, U.S. FISH & WILDLIFE SERV., https://perma.cc/2LTQ-YXKY.

117. *See supra* note 5. FWS is also one of the two agencies responsible for administering the Endangered Species Act ("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.

118. *About the U.S. Fish and Wildlife Service*, *supra* note 116 ("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.").

statutory mandate to "monitor the status and trends" on animals and plants in each refuge[119] 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."[120] That prediction has proven accurate. FWS has described adaptive management as a "cutting-edge decision-making process" that is "increasingly popular as a framework for projects on national wildlife refuges."[121] FWS's Refuge Planning Manual lists as one of the goals of refuge planning[122] "[t]o provide a basis for adaptive management by monitoring process, evaluating plan implementation, and updating refuges plans accordingly.[123] 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."[124] References to adaptive management appear in other Manual provisions that govern refuge management planning.[125] Its 2006 Strategic Habitat Conservation "business model" also "[e]mploy[s] elements of adaptive management in a

119. 16 U.S.C. § 668dd(a)(4)(N).

120. Robert L. Fischman, *The Significance of National Wildlife Refuges in the Development of U.S. Conservation Policy*, 21 J. LAND USE & ENV'T 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.

121. Bill O'Brian, *Adaptive Management = Science + Decision–Making*, NAT'L WILDLIFE REFUGE SYS., https://perma.cc/7HTW-NL24. For criticism of FWS's use of adaptive management, see Karkkainen, *Panarchy*, *supra* note 37, at 71–72.

122. The organic statute for the NWRS requires 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 120, at 538 ("Ideally, planning establishes a basis for adaptive management."). On refuge planning, see generally COGGINS & GLICKSMAN, *supra* note 5, §§ 6:6 to 6:16.

123. U.S. FISH & WILDLIFE SERV., FISH AND WILDLIFE SERVICE MANUAL, 602 FW 1, REFUGE PLANNING OVERVIEW § 1.5E (2000), https://perma.cc/QTX2-KLYU. 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.

124. *Id.* § 1.7.

125. *See, e.g.*, U.S. FISH & WILDLIFE SERV., FISH AND WILDLIFE SERVICE MANUAL, 602 FW 3, COMPREHENSIVE PLANNING PROCESS § 3.4C(7) (2000), https://perma.cc/3E34-AG23. ("Through adaptive management, evaluation of monitoring and research results may indicate the need to modify refuge objectives or strategies."); U.S. FISH & WILDLIFE SERV., FISH AND WILDLIFE SERVICE MANUAL, 605 FW 1, GENERAL GUIDELINES FOR WILDLIFE-DEPENDENT RECREATION § 1.8B(1) (2000), https://perma.cc/4MYR-8PXC ("Through successful monitoring, we can evaluate and adaptively manage to meet established standards . . . and ensure that quality activities continue to be compatible.").

range of applications across the FWS and the Refuge System."[126] While FWS advocates for the use of adaptive management in refuge planning, it has apparently provided no official guidance on how doing so relates to its NEPA implementation responsibilities. Even without this explicit connection however, FWS's commitment to adaptive management will inevitably become an issue in litigation if the agency uses the strategy as part of its NEPA analysis.

3. The Bureau of Land Management

BLM's approach to adaptive management has shifted over time. In 2016, BLM overhauled its resource management planning regulations.[127] 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, "BLM will more readily be able to apply adaptive management principles and respond to change over time."[128] The agency explained that it had already begun using adaptive management techniques to manage for uncertainty,[129] 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."[130] 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 threshold that triggers a response, such as the initiation of a plan amendment."[131] The preamble cited the Interior Department's technical guide on adaptive management, stating that BLM "supports the use of these types of adaptive approaches."[132] In particular, it deemed management measures and monitoring procedures to be "essential to the effective implementation of adap-

126. 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. RES. J. 1, 6 (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), https://perma.cc/GNP3-5U29).

127. *See generally* Resource Management Planning, 81 Fed. Reg. 89,580 (Dec. 12, 2016) (to be codified at 43 C.F.R. pt. 1600).

128. *Id.* at 89,582.

129. *Id.* at 89,586. For example, in 2015, BLM published a document that 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." BUREAU OF LAND MGMT., ADVANCING SCIENCE IN THE BLM: AN IMPLEMENTATION STRATEGY 1 (2015), http://perma.cc/FL69-XAH2. The Strategy described a case study in which BLM had used adaptive management techniques in grazing management in Las Cienegas National Conservation Area. *See id.* at 17.

130. Resource Management Planning, 81 Fed. Reg. at 89,586.

131. *Id.* at 89,600.

132. *Id.* at 89,603.

tive management procedures."[133] Nevertheless, 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."[134] 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 [were] being met or there [was] relevant new information that may warrant amendment or revision of the resource management plan."[135] 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."[136]

In 2017, Congress, using its authority under the Congressional Review Act ("CRA"),[137] repealed the 2016 planning rule.[138] BLM subsequently opined that the effect of the repeal was that the 2016 rule would "be treated as if it had never taken effect."[139] 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.[140] Those regulations make no mention of adaptive management, although they do 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."[141] The

133. *Id.* at 89,604.

134. *Id.* at 89,655.

135. *Id.* at 89,664 (codified at 43 C.F.R. § 1610.1-2(b)(3) (2017)).

136. *Id.* at 89,669 (codified at 43 C.F.R. § 1610.6-4(a)(2) (2017)).

137. 5 U.S.C. § 801(b).

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

139. Effectuating Congressional Nullification of the Resource Management Planning Rule Under the Congressional Review Act, 82 Fed. Reg. 60,554, 60,554 (Dec. 21, 2017) (to be codified in 43 C.F.R. pt. 1600).

140. *Id.* Those regulations, which are codified at 43 C.F.R. §§ 1601.0-1 to 1601.0-8 (2017), originated in 1983. Planning, Programming, Budgeting; Amendments to the Planning Regulations; Elimination of Unneeded Provisions, 48 Fed. Reg. 20,368 (May 5, 1983).

141. Planning, Programming, Budgeting; Amendments to the Planning Regulations; Elimination of Unneeded Provisions, 48 Fed. Reg. at 20,368 (codified at 43 C.F.R. § 1601.0-5(n)(8) (2020)); Effectuating Congressional Nullification of the Resource Management Planning Rule Under the Congressional Review Act, 82 Fed. Reg. at 60,555 (codified at 43 C.F.R. § 1610.4-9 (2020)); *see also* Planning, Programming, Budgeting, 48 Fed. Reg. at 20,372 (codified at 43 C.F.R. § 1610.4-3 (2020)) (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 20,374 (codified at 43 C.F.R. § 1610.5-6 (2020)) (requiring

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."[142] 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.

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. 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."[143] Its Manual on National Landscape Conservation System ("NLCS") management commits the agency to using NLCS units as "laborator[ies] 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."[144] 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.)."[145] The Manual provisions for special status species management make district managers and field managers responsible for monitoring populations of special status species to determine whether management objectives are being met and require that monitoring "be conducted consistent with the principles of adaptive management as defined in Department of Interior policy, as appropriate."[146] None of these documents, however, provides any detail as to how precisely land managers are supposed to implement adaptive management mandates or how they fit into NEPA implementation.

4. The 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 tech-

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").

142. 5 U.S.C. § 801(b)(2).

143. Bureau of Land Mgmt., 4180 – Land Health, at .01 (2009), https://perma.cc/XN45-NNJL.

144. Bureau of Land Mgmt., 6100 – National Landscape Conservation System Management Manual 1–8 (2012), https://perma.cc/LY8F-39DH.

145. Bureau of Land Mgmt., 6400 – Wild and Scenic Rivers – Policy and Program Direction for Identification, Evaluation, Planning, and Management (Public) 7–10 (2012), https://perma.cc/7SVU-HVEG.

146. Bureau of Land Mgmt., 6840 – Special Status Species Management, at .04(E)(7) (2008), https://perma.cc/9RYH-97WL.

niques, particularly in the context of the agency's approach to NEPA compliance. A number of Forest Service rules and non-binding documents address adaptive management. In its regulations governing the preparation of EISs, the agency specifies that the impact statement's discussion of alternatives "may include adaptive management."[147] 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 take place to inform the responsible official during implementation whether the action is having its intended effect.[148]

Likewise, the EIS regulations provide that an EA must include the proposed action and one or more alternatives, which may include adaptive management.[149] The assessment must "disclose the environmental effects of any adaptive management adjustments."[150]

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147. 36 C.F.R. § 220.5(e)(2) (2020). 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.

148. *Id.* § 220.5(e)(2).

149. *Id.* § 220.7(b)(2)(iv).

150. *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. 73,620 (Nov. 19, 2020) (to be codified at 36 C.F.R. pt. 220). 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 experience gained over the past 10 years." National Environmental Policy Act (NEPA) Compliance, 84 Fed. Reg. 27,544, 27,545 (proposed June 13, 2019) (to be codified at 36 C.F.R. pt. 220) (emphasis added) (quoting National Environmental Policy Act Procedures, 73 Fed. Reg. 43,084 (July 24, 2008) (to be codified at 36 C.F.R. pt. 220)). 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 27,546. The final

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.[151] 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."[152] 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."[153] It also must "be used to inform adaptive management of the plan area."[154]

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 information and monitoring."[155] The Manual also makes planning officials responsible for "[a]dapting the plan to changing situations through amendments and administrative changes"[156] 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."[157] 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,

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regulations did not include that change. *See* 36 C.F.R. § 220.4(j) (2020). 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." National Environmental Policy Act (NEPA) Compliance, 84 Fed. Reg. at 27,545. 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 27,550. The final rule, however, did not adopt those changes. National Environmental Policy Act (NEPA) Compliance, 85 Fed. Reg. at 73,621.

151. 36 C.F.R. § 219.12(a)(1) (2020).

152. *Id.* § 219.12(d)(1).

153. *Id.* § 219.12(d)(2).

154. *Id.*

155. U.S. Forest Serv., Forest Service Manual § 1921.03(5) (2015) (citing 36 C.F.R. § 219.5(a)). 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." 36 C.F.R. § 219.5(a)(3) (2020).

156. U.S. Forest Serv., *supra* note 155, § 1921.04d(3)(a).

157. *Id.* § 1921.04d(3)(h).

economic, and ecological systems."[158] 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."[159]

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."[160] Planning officials must "recognize the goals of adaptive management during each of the three phases."[161] At the assessment stage, officials "must gather and evaluate information" and "identify key assumptions, areas of uncertainty, and risks."[162] In planning, they must structure plan components so as to allow monitoring to "test assumptions, evaluate risks, reduce key uncertainties, and measure management effectiveness."[163] 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.[164]

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 an adaptive management strategy is proposed for livestock grazing, the proposed action should describe the outer limits of what is allowed in terms of timing, intensity, frequency, occurrence and period of livestock grazing along with various management tools such as rangeland improvements. This ensures that the environmental analysis clearly identifies the adjustment(s) that may be made when monitoring during project implementation indicates that the action is not having its intended effect . . . . If monitoring demonstrates that the intended effects are not being achieved through the initial management action, the action can be modified using one or more of the

158. *Id.* § 1940 (introductory paragraph).

159. *Id.* § 1940.2(2).

160. U.S. Forest Serv., Forest Service Handbook § 1909.12, ch. 41 (2013), https://perma.cc/U4EM-LNLX.

161. *Id.* at 4.

162. *Id.*

163. *Id.*

164. *Id.*

> identified adaptive management actions in a way that better achieves the intended effects.
>
> So long as monitoring indicates that the environmental effects of each action do not exceed the bounds of those anticipated in the original environmental analysis and the actions serve to move the project toward the intended effects, implementation continues using the "implement-monitor-adapt" cycle without the need for a new environmental analysis or NEPA review . . . .
>
> Examples of some possible adjustments or acceptable tools that could be used to modify the initial action to achieve the intended effects include but are not limited to: determination of specific dates for grazing, specific livestock numbers, class of animal, grazing systems, range readiness and rangeland improvements (structural and nonstructural). The list of possible management practices developed in the plan-to-project analysis may provide a source for adaptive management actions.[165]

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."[166] 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."[167] 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."[168]

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165. U.S. Forest Serv., Forest Service Handbook § 91.39, https://perma.cc/V8CH-5CYS.

166. *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.").

167. *Id.* § 92.23b(3).

168. *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 im-

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 an uneven adoption and application of adaptive management strategies, even among different agencies (the NPS, FWS, and BLM) within the same cabinet-level department (Interior).

II. Judicial Treatment of Adaptive Management in NEPA Implementation

The federal land management agencies have incorporated adaptive management into their decision-making 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.[169]

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.[170] The preferred alternative in the agency's EIS required sequential Forest

plemented 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.

169. For an excellent survey of the case law that is now more than a decade old, see Ruhl & Fischman, *supra* note 21.

170. *See* Save Our Cabinets v. U.S. Dep't of Agric., 254 F. Supp. 3d 1241, 1246 (D. Mont. 2017).

Service approval at various phases: evaluation, construction, operations, and closure.[171] 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.[172] 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.[173] The agency responded that an adaptive management approach was necessary because the anticipated effects of later phases of the project were not yet known.[174] 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."[175] 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.[176] In effect, the court endorsed adaptive management as a viable strategy that would allow an agency to 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 if the agency committed to engaging in further NEPA analysis if new information resulted in significant project changes.[177] The agency prepared an EIS on trail and commercial pack stock management in two wilderness areas.[178] The Forest Service established "destination quotas" to control the frequency of use of wilderness destinations by commercial pack stock operators.[179] 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.'"[180] The environmental group plaintiffs alleged that this adaptive management strategy allowed im-

171. *Id.* at 1247.
172. *Id.* at 1248.
173. *Id.* at 1262.
174. *Id.* at 1263.
175. *Id.*
176. *Id.*
177. High Sierra Hikers Ass'n v. Weingardt, 521 F. Supp. 2d 1065, 1083–84 (N.D. Cal. 2007).
178. *Id.* at 1072.
179. *Id.* at 1080.
180. *Id.*

proper modifications of standards and limits specified in the agency's record of decision ("ROD") without further NEPA compliance.[181] 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.[182] 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.[183]

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 Forest Service prohibited all campfires above a certain elevation.[184] It proposed to modify the plan to allow fires above the elevational boundary under certain conditions.[185] The court pointed out that the agency had previously acknowledged that campfires above elevational boundaries would create wildfire risks.[186] The Forest Service responded that it had adopted an adaptive management strategy that provided tools for allowing campfires above elevational closures if certain conditions were met or a ranger conducted an assessment and permitted campfires.[187] 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."[188] 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, while interagency consultation was 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 ad-

181. *Id.* at 1083.
182. *Id.*
183. *Id.* at 1083–84.
184. *Id.* at 1090.
185. *Id.*
186. *Id.*
187. *Id.*
188. *Id.* at 1091.

dressed these questions, providing insights on the scope of agency discretion to rely on adaptive management in its NEPA implementation efforts.

1. Major Federal Action

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.[189] 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 and indicate that additional NEPA analysis may be needed when an agency makes decisions that go beyond implementing existing policy but rather represent significant departures from what the original EA or EIS studied.

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, including marbled murrelets.[190] Under the agreement, 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.[191] Logging commenced after issuance of the permit.[192] 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.[193] 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 decision-making authority over sediment control.[194] The plaintiffs asserted that these obligations created "discrete decision points" that required the Forest Service to choose

189. 42 U.S.C. § 4332(2)(C). Agencies may need to prepare an EA that includes a finding of no significant impact to justify failing to prepare an EIS. 40 C.F.R. § 1501.6(a) (2020).

190. Env't Prot. Info. Ctr. v. U.S. Fish & Wildlife Serv., No. 04-04647, 2005 WL 3021939, at *1 (N.D. Cal. Nov. 10, 2005).

191. *Id.* at *2.

192. *Id.* at *5.

193. *Id.*

194. *Id.*

between alternative means of accomplishing its goals, but the agency responded that they did not qualify as major federal actions.[195]

The court cited higher court precedents establishing that once 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.[196] The plaintiffs insisted, however, that the adaptive management strategy contained in the Accord involved FWS in an "ongoing program of discretionary decisionmaking" to determine when, where, and how logging would proceed.[197] 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.[198] The court regarded this case as falling between those two extremes because the major federal actions that required the EIS in 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.[199] The court held that FWS's adaptive management duties did not qualify as ongoing major federal action.[200] 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 take 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."[201]

The Ninth Circuit addressed a related issue in a case in which environmental groups challenged BLM's implementation of the Northwest Forest Plan ("NWFP").[202] The Plan established "Survey and Manage" requirements to protect species that might not receive adequate protection from the plan's land allocation provisions.[203] One of those species was the red tree vole.[204] Seven years after adopting the Plan, in 2001, BLM and the Forest Service modified it

195. *Id.*

196. *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.

197. *Env't Prot. Info. Ctr.*, 2005 WL 3021939, at *6.

198. *Id.*

199. *Id.*

200. *See id.* at *7.

201. *Id.* at *6.

202. Klamath Siskiyou Wildlands Ctr. v. Boody, 468 F.3d 549, 552–54 (9th Cir. 2006).

203. *Id.* at 553.

204. *Id.*

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.[205] The agencies prepared a final SEIS on the Plan modification.[206] On the basis of its first ASR, BLM downgraded the status of the vole, eliminating the requirement to conduct pre-disturbance species surveys.[207] The next year, BLM removed the vole's Survey and Management designation in its entirety.[208] 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.[209]

The plaintiffs sought to enjoin the timber sales, alleging NEPA violations.[210] BLM responded that "adaptive management is at the heart of the NWFP, and flexibility is a necessary element of this strategy."[211] 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.[212] The court disagreed, finding that the vole's annual review resulted in "adopting policies unequivocally rejected in previous agency actions and scientific analyses."[213] 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.[214] 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 strategies, courts will not overlook major decisions that are significant departures from what was initially envisioned in the original EA or EIS.[215]

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205. *Id.*
206. *Id.*
207. *Id.*
208. *Id.*
209. *Id.*
210. *Id.* at 554.
211. *Id.* at 559.
212. *Id.* at 561.
213. *Id.*
214. *Id.*
215. *See* Cottonwood Env't Law Ctr. v. Bernhardt, 796 F. App'x 368, 371 (9th Cir. 2019) ("[The Interagency Bison Management P]lan also adopts an adaptive-management approach under

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]."[216] 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.[217] Courts have been particularly alert to agency attempts at using a CE in the adaptive management context, and an agency is likely to have difficulty invoking a CE if it makes vague promises to mitigate unforeseen environmental harm without specifying in some detail what those measures will be or providing evidence that it has actually implemented them.[218]

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.[219] One of those objectives was ensuring that management activities provide for the protection or enhancement of natural springs and wetlands.[220] The Forest Service applied CEs to hundreds of grazing permit reauthorizations in national forests in Oregon.[221]

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 having been affected by the presence of cattle, including trampling.[222] 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

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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." (citation omitted)).

216. 40 C.F.R. § 1501.4(a) (2020).

217. *Id.* § 1501.4(b)

218. *Id.*

219. Hells Canyon Pres. Council v. Connaughton, No. 3:11-cv-00023, 2012 WL 13047991, at *1 (D. Or. Aug. 10, 2012) (citing FY 2005 Consolidated Appropriations Act, Pub. L. No. 108447, § 339, 118 Stat. 2809, 3103 (2004)).

220. *Id.* at *9.

221. *See id.*

222. *See id.* at *9–10.

actions did not support invocation of the CE.[223] The district 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.[224] 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.[225] The Forest Service argued that its mitigation plans were analogous to "adaptive mitigation management" measures approved in previous cases.[226] The court recognized that "adaptive management is the proper tool to address future, unanticipated impacts from complex, long-term projects."[227] 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."[228]

In a different case, the U.S. District Court for the District of Arizona approved of the Forest Service's reliance on adaptive management to justify reliance on the same CE created by the 2005 appropriations rider.[229] In that case, the agency had actually implemented or more fully described intended mitigating measures to address damage caused by grazing.[230] 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."[231] 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

223. *Id.* at *10.

224. *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.*

225. *Id.*

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

227. *Hells Canyon Pres. Council*, 2012 WL 13047991, at *11.

228. *Id.*

229. W. Watersheds Project v. U.S. Forest Serv., No. CV-11-08128, 2012 WL 6589349, at *19 (D. Ariz. Dec. 17, 2012).

230. *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 a CE 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, 1327–28 (D.N.M. 2009) (approving use of a CE 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").

231. Pub. L. No. 108-447, § 339(3), 118 Stat. 2809, 3103 (2004).

a CE unless the agency was certain that grazing would not have adverse effects on archaeological or Native American cultural sites.[232] The agency failed to make that showing.[233]

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.[234] In determining the scope of an EIS, agencies must consider alternatives, including mitigation measures that are not part of the proposed action.[235] 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.[236] The regulations endorse tiering from an EA or EIS on an action at an early stage to supplement an EA or EIS at a later stage (such as environmental mitigation).[237] The alternatives section of an EIS must "[i]nclude appropriate mitigation measures not already included in the proposed action or alternatives."[238] The ROD that accompanies an EIS must "adopt and summarize, where applicable, a monitoring and enforcement program for any enforceable mitigation requirements or commitments."[239] Mitigation conditions established in an EIS and committed as part of the accompanying decision to proceed with the proposed

232. *W. Watersheds Project*, 2012 WL 6589349, at *15

233. *Id.* at *14–18.

234. 40 C.F.R. § 1501.6(c) (2020).

235. *Id.* § 1501.9(e)(2). The regulations define "mitigation" as "measures 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." *Id.* § 1508.1(s). Several other examples are provided. *Id.*

236. *Id.* § 1502.16(a)(6)–(9).

237. *Id.* § 1501.11.

238. *Id.* § 1502.14(e).

239. *Id.* § 1505.2(a)(3).

action "shall be implemented" by the lead or consenting agency.[240] 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 three 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; and (3) challenges to the specific mitigating measures taken on the basis of those monitoring results or to an agency's plan for addressing the evolving situation as data become 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 BLM's EIS for the grant of a right-of-way to construct a wind energy facility.[241] The ROD that accompanied the EIS conditioned grant of the right-of-way on implementation of mitigation measures (which included an eighty-five-page avian and bat protection plan that was incorporated by reference into the EIS) and monitoring programs.[242] The environmental group plaintiffs asserted that the mitigation measures 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.[243] The court ruled, however, that the "comprehensive set of mitigation measures" developed by 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."[244] It added that an agency's decision to incorporate an adaptive management plan into a comprehensive set of mitigation mea-

240. *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).

241. Protect Our Communities Found. v. Jewell, 825 F.3d 571, 576 (9th Cir. 2016).

242. *Id.* at 577–78 ("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.'" (citation omitted)).

243. *Id.* at 582.

244. *Id.*

sures 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."[245]

This case indicates that as long as agencies identify relevant studies, analyze the data those studies 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 the agency's failure to provide any description of the monitoring component of an adaptive management program will not suffice,[246] but 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 bare bones 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 the D.C. Circuit's decision in *Theodore Roosevelt Conservation Partnership v. Salazar*.[247] BLM approved a natural gas

245. *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).

246. *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 the 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).

247. 616 F.3d 497 (D.C. Cir. 2010).

development project in Wyoming. The ROD anticipated approval of about 2,000 new natural gas wells over the span of thirty to fifty years.[248] 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.[249] 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.[250] The ROD left many specific resource management decisions for case-by-case determinations when addressing individual drilling applications.[251] After approving the ROD, BLM approved some applications to drill by adopting plans of development ("PODs") which included required mitigation measures.[252] The agency prepared an EA for each POD.[253]

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.[254] The court rejected the challenge.[255] 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 thirteen-page list of specific protective measures that officials reviewing individual applications to drill had to consider.[256] Further, the ROD and EIS supplemented this detailed treatment with discussion of environmental studies that supported BLM's decisions.[257] The court held that "[b]y setting forth both fixed mitigation measures and an adaptive management plan, the [ROD] amply fulfills NEPA's mandate to discuss mitigation measures."[258] The court added that NEPA does not "force agencies to make detailed, unchangeable mitigation plans for long-term development projects."[259] It said that 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."[260]

248. *Id.* at 505.
249. *Id.*
250. *Id.* at 505–06.
251. *Id.* at 506.
252. *Id.*
253. *Id.*
254. *Id.* at 515.
255. *Id.*
256. *Id.* at 516.
257. *Id.*
258. *Id.* at 517.
259. *Id.*
260. *Id.*; *see also* Protect Our Communities Found. v. Jewell, 825 F.3d 571, 582 (9th Cir. 2016) (discussed *supra* notes 241–44 and accompanying text) ("[T]he use of such a continuous

The U.S. District Court for the District of Columbia relied on the *Theodore Roosevelt Conservation Partnership* decision to turn aside a suit alleging that 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 sixteen-well drilling-stage project.[261] The agency enunciated performance standards (which included metrics relating to elk population size and the amount of available undisturbed elk habitat) and required PODs submitted by oil companies to comply with them.[262] 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.[263] BLM characterized the performance standards as safeguards to ensure "a bottom threshold" governing the amount of allowable adverse impacts on the elk.[264] The plaintiffs took issue with BLM's failure to discuss the specific mitigation measures that would be triggered if the standards' thresholds were exceeded.[265] The court responded that the *Theodore Roosevelt Partnership* established that the use of an adaptive management plan that sets "fixed mitigation measures" is NEPA-compliant.[266] In this case, 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.[267] The resource management plan and associated EA therefore provided sufficient certainty concerning 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.[268] "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."[269]

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monitoring system may complement other mitigation measures, and help to refine and improve the implementation of those measures.").

261. Powder River Basin Res. Council v. U.S. Bureau of Land Mgmt., 37 F. Supp. 3d 59, 90 (D.D.C. 2014).

262. *Id.* at 70.

263. *Id.* at 80.

264. *Id.* at 70–71.

265. *Id.* at 80.

266. *Id.*

267. *Id.* at 80–81. The court also noted that the EA prepared by 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* Part II.D.

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

269. *Id.*

Other courts have been similarly impressed by adaptive management strategies that included the establishment of standards or triggers,[270] 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 district court in California approved BLM's preparation of an EA for its reauthorization of livestock grazing permits.[271] The agency's EA set forth goals for improving rangeland vegetation and stream conditions and forage utilization.[272] It proposed a monitoring program to be used to determine the necessity for corrective measures.[273] 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.[274] 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.[275] The second prong, effectiveness monitoring, included a best management practices evaluation program, which the EA described in detail.[276]

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

270. *See, e.g.*, Nat'l Parks Conservation Ass'n v. U.S. Dep't of the 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).

271. Klamath Siskiyou Wildlands Ctr. v. Grantham, No. 2:11-cv-01647, 2013 WL 1420259 (E.D. Cal. Apr. 8, 2013), *aff'd in part, rev'd in part, remanded*, 642 F. App'x 742 (9th Cir. 2016).

272. *Id.* at *2.

273. *Id.*

274. *Id.* at *9.

275. *Id.* at *10.

276. *Id.* at *11; *see also* W. Watersheds Project v. Bureau of Land Mgmt., No. 3:11-cv-00053, 2011 WL 1630789, at *2 (D. Nev. Apr. 28, 2011) ("NEPA specifically allows agencies to utilize adaptive management plans that, like the [Avian and Bat Protection Plan] 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 Nev. 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, and 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, remanded on other grounds*, 646 F.3d 1161 (9th Cir. 2011).

area.[277] The agency adopted an adaptive management strategy to improve range conditions.[278] Initially, it committed to monitor the impacts of grazing under the strategy; the district court found this commitment to be deficient because the EIS failed to explain the strategy or protocols behind the monitoring.[279] In response, the Forest Service prepared an SEIS that included a more detailed explanation of those protocols.[280] 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.[281] 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.[282] Noting that "[t]he selection of criteria for monitoring is a matter within the expertise of the Forest Service," the U.S. District Court for the District of Idaho concluded that the agency had carefully considered its approach to monitoring and "strongly committed to conducting monitoring and improving range conditions."[283] By doing so, it complied with NEPA.

An unreported case from the U.S. District Court for the District of Minnesota involving the Forest Service's decision to create a snowmobile trail in a national forest adjacent to the Boundary Waters Canoe Area Wilderness included an in-depth NEPA discussion of the parameters of an adequate explanation of the monitoring components of an adaptive management plan.[284] The agency's ROD selected a route close to the wilderness area as its preferred alternative.[285] It also adopted an adaptive management strategy that the accompanying EIS did not discuss.[286] 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.[287] 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.[288] Environmental

277. W. Watershed Project v. U.S. Forest Serv., 780 F. Supp. 2d 1115 (D. Idaho 2011), *reconsideration denied*, 2011 WL 4442668 (D. Idaho Sept. 22, 2011).
278. *Id.* at 1120.
279. *Id.*
280. *Id.*
281. *Id.*
282. *Id.* at 1121.
283. *Id.*
284. Izaak Walton League of Am., Inc. v. Tidwell, No. 06-3357, 2015 WL 632140, at *15–22 (D. Minn. Feb. 13, 2015).
285. *Id.* at *21.
286. *Id.* at *17.
287. *Id.* at *4.
288. *Id.*

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.[289] Because the plan was drawn from the EIS, which pre-dated 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.[290] Moreover, they asserted that the conditions gave the Forest Service unlimited discretion in deciding whether to adopt an adaptive management strategy.[291]

The court rejected the challenge, concluding that the agency's "hybrid approach" in its ROD qualified as a substantively sufficient adaptive management strategy.[292] 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 detail.[293] 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.[294] 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.[295] 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.[296]

3. Mitigating Actions

The courts have found that agency use of adaptive management conformed to NEPA's requirement to discuss mitigation measures when the adap-

289. *Id.* at *20.
290. *Id.*
291. *Id.*
292. *Id.*
293. *Id.*
294. *Id.* at *21.
295. *Id.* at *22.
296. *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 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).

tive 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.[297] 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.[298] The U.S. District Court for the District of Columbia, citing *Theodore Roosevelt Conservation Partnership*, discussed above,[299] pointed out that NEPA does not require an EIS to include "detailed, unchangeable mitigation plans for long-term development projects."[300] 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).[301] 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.[302]

The U.S. District Court for the District of Columbia had reached a similar result, perhaps based on a faulty 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.[303] The Plan provided for the adaptive management of the herd in ways 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.[304] 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.[305] The plaintiffs charged that the adaptive management plan was nothing more than "a plan to make a plan," which was insufficiently de-

297. Nat'l Parks Conservation Ass'n v. Jewell, 965 F. Supp. 2d 67, 71 (D.D.C. 2013).

298. *Id.* at 75.

299. *See supra* notes 247–59 and accompanying text.

300. *Nat'l Parks Conservation Ass'n*, 965 F. Supp. 2d at 75 (quoting Theodore Roosevelt Conservation P'ship v. Salazar, 616 F.3d 497, 517 (D.C. Cir. 2010)).

301. *Id.* at 76.

302. *Id.*

303. Defs. of Wildlife v. Salazar, 698 F. Supp. 2d 141, 144 (D.D.C. 2010), *aff'd on other grounds*, 651 F.3d 112, 118 (D.C. Cir. 2011).

304. *Id.* at 145.

305. *Id.*

tailed to allow a reasonably complete discussion of mitigation measures.[306] Not so, the court replied. NEPA, the court opined, does not prevent agencies from adopting mitigation measures subject to adjustment depending on their effectiveness.[307] 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."[308]

Another example involved a challenge to BLM resource management plans for two national monuments in Arizona.[309] Environmental group plaintiffs alleged that the plans allowed vehicle use that would harm monument objects that proposed mitigation efforts would not adequately address.[310] They argued that BLM violated NEPA by not sufficiently developing the mitigation measures and that it could not rely on an "adaptive mitigation approach" to do so.[311] The U.S. District Court for the District of Arizona began by noting that "the difference between adequate and inadequate mitigation discussions 'appears to be one of degree.'"[312] 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.[313] The EIS also discussed the effectiveness of these mitigation measures.[314]

In a Ninth Circuit case that did not involve federal lands management, fishermen's associations challenged the National Marine Fisheries Service's ("NMFS") adoption of amendments to a fishery management plan formulated

306. *Id.* at 149.

307. *Id.*

308. *Id.*

309. 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).

310. *Id.* at 935.

311. *Id.* at 941.

312. *Id.* (quoting Okanogan Highlands All. v. Williams, 236 F.3d 468, 473 (9th Cir. 2000)); *see also* Biodiversity Conservation All. v. Bureau of Land Mgmt., No. 09-CV-08-J, 2010 WL 3209444, at *13 (D. Wyo. June 10, 2010) (holding that 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").

313. *Wilderness Soc'y*, 822 F. Supp. 2d at 943.

314. *Id.*

under the Magnuson-Stevens Fishery Conservation and Management Act.[315] 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.[316] The plaintiffs argued that these mitigation measures were too vague and uncertain.[317] But the court regarded the agency's "reasonably detailed mitigation evaluations" to be sufficient to comply with NEPA.[318] The absence of assurances that the reserve shares would be allocated to fishing communities was not problematic.[319] 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.[320] The plan's measures to protect local communities were likely an important aspect of the 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's ("TRPA") amendment of its shorezone ordinances.[321] An interstate compact approved by Congress authorized TRPA to regulate devel-

315. Pac. Coast Fed'n of Fishermen's Ass'ns v. Blank, 693 F.3d 1084, 1086 (9th Cir. 2012).

316. *Id.* at 1103.

317. *Id.*

318. *Id.*

319. *Id.*

320. *Id.* The court in *Stop B2H Coalition v. Bureau of Land Management*, No. 2:19-cv-1822, 2021 WL 3410039 (D. Or. Aug. 4, 2021), relied on *Pacific Coast Federation of Fishermen's Ass'ns v. Blank*, 693 F.3d 1084, as well as *Protect Our Communities* (discussed at *supra* notes 241–44 and accompanying text) to reject the claim that BLM's compensatory mitigation plan for the siting of a powerline transmission project violated NEPA. *Stop B2H Coal.*, 2021 WL 3410039, at *16–20. Analogizing the plan to the adaptive management plan in *Protect Our Communities*, the court held that "BLM's treatment of mitigation, including requiring compensatory mitigation through a yet-to-be-finalized plan for which BLM provides a process and significant guidance, was not arbitrary or capricious." *Id.* at *20. BLM "set forth many specific mitigation measures, discussed their effectiveness in a succinct manner, anticipated residual impacts on Greater Sage-Grouse despite these measures, required monitoring, and required flexible compensatory mitigation to be tailored after the effects of the B2H Project are better known." *Id.* at *19. In addition, the agency committed to mitigation that would produce a new conservation benefit for the Sage-Grouse, required a specific and detailed compensatory mitigation plan as part of the project's approval process, mandated that the plan be reviewed by cooperating agencies, and required that the plan be consistent with state conservation strategies and guidance documents that were incorporated by reference into its compensatory mitigation framework. *Id.* at *19–20.

321. League to Save Lake Tahoe v. Tahoe Reg'l Plan. Agency, 739 F. Supp. 2d 1260, 1271 (E.D. Cal. 2010), *aff'd in part, vacated in part, remanded*, 469 F. App'x 621 (9th Cir. 2012).

opment in the area near Lake Tahoe.[322] 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.[323] The initial ordinances imposed restrictions on piers, buoys, and other boating facilities to protect fish habitat.[324] TRPA later concluded, however, that the restrictions were excessive and amended the ordinances by loosening them.[325] 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.[326]

The plaintiffs challenged the adequacy of the EIS's discussion of mitigation measures, and the court found it to be deficient.[327] The EIS included neither discussion nor analytical data of the potential efficacy of the measures.[328] TRPA claimed that it would impose sticker fees to fund mitigation measures but the EIS failed to explain how the money might be spent.[329] The EIS provided more analysis of how funds from a buoy fee would be spent, but did not discuss how the fees would suffice to offset the air and water quality impacts of increased boating.[330] 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."[331]

The district court agreed with TRPA that "adaptive management is a sound policy" that was well suited to management of the Lake Tahoe region.[332] TRPA'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."[333] TRPA's insistence that it would "go slow" to ensure development and implementation of mitigation measures before harm

322. *Id.* at 1265.
323. *Id.* at 1266.
324. *Id.*
325. *Id.*
326. *Id.* at 1266–67.
327. *Id.* at 1272.
328. *Id.* at 1283.
329. *Id.*
330. *Id.*
331. *Id.* at 1283–84.
332. *Id.* at 1284.
333. *Id.*

occurred was essentially worthless.[334] Moreover, it deprived the public of any meaningful opportunity to comment on mitigation measures[335] before TRPA's approval of the ordinance amendments.[336]

Interestingly, the court described TRPA's adaptive management program as "reactive, imposing measures once the previous year's mitigation efforts ha[d] been shown to be inadequate."[337] 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.[338] 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 to provide input into the formulation and implementation of mitigation measures will further bolster agencies' ability to thwart NEPA challenges.[339]

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334. *Id.*

335. *Compare* Gov't of Man. 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), *with* Izaak Walton League of Am., Inc. v. Tidwell, Civil No. 06-3357, 2015 WL 632140, at *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 ROD 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).

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

337. *Id.* at 1284 n.23; *cf.* Defs. 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 off-road vehicle ("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).

338. *See, e.g.*, *Gov't of Man.*, 273 F. Supp. at 155 (citing Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 351 (1989)); Neighbors of Cuddy Mountain v. U.S. Forest Serv., 137 F.3d 1372, 1380 (9th Cir. 1998) (holding that a two-paragraph "perfunctory description of mitigation measures" in an adaptive management plan was not adequate).

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

D. Timing and Scope Questions

The land management agencies frequently engage in phased decision-making, 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

CEQ encourages 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."[340] 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."[341] 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."[342]

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*,[343] in which the NPS and FWS issued a joint plan for managing elk and bison herds that migrate across Grand Teton National Park.[344] 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.[345] The plan called for the establish-

340. 40 C.F.R. § 1508.1(ff) (2020).

341. *Id.* § 1501.11(a).

342. *Id.* § 1501.11(b).

343. 177 F. Supp. 3d 91 (D.D.C. 2016), *amended*, 203 F. Supp. 3d 31 (D.D.C. 2016), *aff'd sub nom*. Mayo v. Reynolds, 875 F.3d 11 (D.C. Cir. 2017).

344. *Id.* at 97.

345. *Id.*

ment 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 other changing circumstances.[346] 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.[347] 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.[348]

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, 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.[349] Courts have long grappled with how BLM must conduct its NEPA evaluations at each stage.[350] In one case, the U.S. District Court for the District of Colorado 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.[351] 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.[352] BLM had committed to preparing EAs when issuing new leases, choosing to defer greater and more localized

346. *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 at 17.

347. Mayo v. Reynolds, 875 F.3d at 22–23.

348. High Sierra Hikers Ass'n v. U.S. Dep't of the 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 that, while BLM's approval of a planned round-up of wild horses violated NEPA for other reasons, the agency 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).

349. *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.").

350. *See* COGGINS & GLICKSMAN, *supra* note 5, § 17:26; *New Mexico ex rel. Richardson*, 565 F.3d at 716–18 (describing history of Tenth Circuit cases).

351. Wilderness Workshop v. U.S. Bureau of Land Mgmt., 342 F. Supp. 3d 1145, 1167 (D. Colo. 2018).

352. *Id.* at 1162.

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.[353] The court deferred to BLM's approach,[354] 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.[355]

The decision is somewhat problematic, as it is not as clear whether BLM's adaptive management plan, its intention to conduct further analysis, or both were determinative. 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.[356] 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 undermine 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.[357] The pre-2020 regulations required agencies to assess whether the environmental effects[358] resulting from their proposals would be "significant" based on considerations of both context (i.e., locale) and intensity (i.e., severity of impact).[359] In

353. *Id.*

354. *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).

355. *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.

356. *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).

357. *See* Update to the Regulations Implementing the Procedural Provisions of NEPA, 85 Fed. Reg. 43,304, 43,331 (July 16, 2020) (to be codified at scattered parts of 40 C.F.R.) ("CEQ proposed to strike references to direct, indirect, and cumulative effects. . . . CEQ makes these changes in the final rule with minor edits . . . .").

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

359. *Id.* § 1508.27(a)–(b). The amended regulations define effects, in part, as "changes to the human environment from the proposed action or alternatives that are reasonably foreseeable

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."[360] 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."[361] The Trump Administration's regulations abandoned the requirement that agencies separately evaluate cumulative impacts,[362] but the validity of those regulations has been challenged in court.[363]

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 off-road vehicle ("ORV") use.[364] 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.[365] The Forest Service pointed to a "literature review" that it had commissioned, which sought to develop a model for assessing the effects of roads and trails on particular species.[366] The district court, however, pointed out that the study was qualitative, not quantitative, and that "no actual, in-the-field-study resulting in quantitative analysis . . . ha[d] yet been done for the entire ORV trail system."[367] The agency never incorporated any mandates for actual, system-wide wildlife studies into its decision; instead, it proposed to construct new ORV

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and have a reasonably close causal relationship to the proposed action or alternatives." 40 C.F.R. § 1508.1(g) (2020).

360. 40 C.F.R. § 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.

361. *Id.* § 1508.25(a)(2).

362. Update to the Regulations Implementing the Procedural Provisions of NEPA, 85 Fed. Reg. at 43,343 ("[A]gencies have devoted substantial resources to categorizing effects as direct, indirect, or cumulative, which, as noted above, are not terms referenced in the NEPA statute. CEQ eliminates these references in the final rule.").

363. *See* Wild Va. v. Council on Env't Quality, No. 3:20CV00045, 2021 WL 2521561, at *14 (W.D. Va. June 21, 2021) (holding that plaintiffs lacked standing and that the case was not ripe for review).

364. Mountaineers v. U.S. Forest Serv., 445 F. Supp. 2d 1235, 1238 (W.D. Wash. 2006).

365. *Id.* at 1246.

366. *Id.* at 1242.

367. *Id.* at 1250.

trails and then apply an undefined adaptive management plan.[368] 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.[369]

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, BLM planned to remove trees and vegetation in eastern Nevada to reduce the risk of fire and improve Sage-Grouse habitat.[370] 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.[371] 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.[372] 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.[373] 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.[374] The courts have provided little guidance

368. *Id.*

369. *Id.*

370. W. Watersheds Project v. Ruhs, 701 Fed. App'x 651, 652 (9th Cir. 2017).

371. *Id.* at 653–54.

372. *Id.* at 653–55.

373. *Cf.* Audubon Soc'y v. U.S. Fish & Wildlife Serv., No. 04-670, 2005 WL 1713086, at *12–14 (D. Or. July 21, 2005) (noting 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).

374. *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

on the circumstances in which the use of adaptive management will be regarded as a legitimate way of evaluating the impacts of ongoing, phased projects or as a NEPA circumvention strategy that improperly segments a larger undertaking into artificial pieces.

One case raising the issue involved BLM's efforts to reduce the presence of juniper that resulted from fire suppression, grazing, and climate change, causing the invasive species to crowd out native vegetation.[375] BLM proposed to use prescribed fires, removal of trees, fencing, seeding, and planting to achieve its habitat restoration goals.[376] 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").[377] 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.[378] 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.[379] It argued that BLM improperly segmented the project by failing to analyze each of the site-specific projects that were connected actions.[380]

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.[381] The U.S. District Court

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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.").

375. Or. Nat. Desert Ass'n v. Bureau of Land Mgmt., No. 08-1271-KI, 2011 WL 5830435, at *2 (D. Or. Nov. 15, 2011).

376. *Id.*

377. *Id.*

378. *Id.*

379. *Id.* at *2–3.

380. *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) (2020). 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.

381. *Or. Nat. Desert Ass'n*, 2011 WL 5830435, at *18 (citation omitted).

for the District of Oregon did not agree, concluding that BLM had not improperly segmented connected actions by preparing its landscape-level EIS.[382] It reasoned that "with a project this size, adaptive management is the only logical way 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."[383] Moreover, the plaintiff failed to identify any effects from the projects already underway that required supplemental NEPA analysis.[384] Nor was the EIS the kind of programmatic EIS that required preparation of additional NEPA documents as the agency implemented the program.[385]

Because the court provided no meaningful discussion of 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 as to when a series of actions will be considered connected because it did not apply the three tests for whether actions are connected from the CEQ regulations.[386] 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. 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 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.[387] 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 trig-

382. *Id.* at *29.

383. *Id.* at *18.

384. *Id.*

385. *Id.* at *19.

386. *See supra* note 378.

387. 40 C.F.R. § 1502.9(d)(1)(i)–(ii) (2020).

ger NEPA supplementation obligations. Thus far, the courts have been reluctant to conclude that they do.

The relationship between adaptive management and supplementation is reflected in a case in which environmental plaintiffs alleged that the Forest Service and BLM violated the NWFP by authorizing a series of timber sales without conducting wildlife surveys and by failing to prepare an SEIS.[388] 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: 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.[389] The district court contested characterization of any of these matters as significant new information.[390] 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.[391] 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."[392] The result might have been different, the court opined, if the agencies had abolished the requirement to conduct wildlife surveys before ground-disturbing activities could commence.[393] 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.[394]

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

389. *Id.* at 1095.

390. *Id.* at 1095–96.

391. *Id.* at 1096.

392. *Id.*; *see also* Or. Nat. Desert Ass'n v. Bureau of Land Mgmt., Civil No. 08-1271-KI, 2011 WL 5830435, at *15–16 (D. Or. Nov. 15, 2011) (holding that 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").

393. *Or. Nat. Res. Council Action*, 59 F. Supp. 2d at 1096. The court held that the agencies violated the plan by exempting some timber sales from the survey requirements. *See id.* at 1091–95.

394. *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).

The NPS, by contrast, 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.[395] The IBMP relied on separation of bison from cattle to control the risk of bison transmitting brucellosis to cattle in the area.[396] In 2007, the Government Accountability Office audited the IBMP, identifying problems with the plan's implementation and criticizing its failure to include metrics for measuring the plan's success.[397] The agencies responded by adopting an Adaptive Management Plan ("AMP") in 2008.[398] 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.[399] The AMP replaced lethal removal with increased hazing, hunting, quarantine, and sending bison to alternate areas.[400] 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.[401]

Environmental groups challenged the agency's actions in the U.S. District Court for the District of Montana, arguing 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.[402] For one, they claimed that the NPS did not respond to new information concerning genetic diversity in the Yellowstone herd.[403] 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.[404] The plaintiffs therefore failed to identify significant new information that triggered a duty to supplement the EIS.[405]

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

395. 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).
396. *Id.* at 1105.
397. *Id.*
398. *Id.*
399. *Id.*
400. *Id.*
401. *Id.* at 1105–06.
402. *Id.* at 1111.
403. *Id.* at 1108–09.
404. *Id.* at 1109.
405. *Id.* at 1106–09.

manner or to a degree not already considered.[406] 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 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.[407]

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.[408] 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.[409] 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.[410] The district 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.[411]

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 for which 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.[412] 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

406. *Id.* at 1111.

407. *Id.* at 1111–12.

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

409. *Id.* at 1274–76.

410. *Id.* at 1274.

411. *Id.* at 1276.

412. 42 U.S.C. § 4332(2)(C).

concerning alternative uses of available resources."[413] 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.[414] 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 national forests in southern California.[415] The plaintiffs claimed that the agency failed to consider a reasonable range of alternatives.[416] 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."[417] The agency rejected that alternative, choosing instead to rely on adaptive management.[418] The U.S. District Court for the Northern District of California 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.[419] 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."[420]

The court nevertheless found a NEPA violation.[421] The Forest Service conceded, and the EIS confirmed, that monitoring and evaluation standards had significant importance in the overall forest planning scheme.[422] Yet, it proposed the same set of monitoring and evaluation indicators for every alternative discussed in the EIS.[423] 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 per-

413. *Id.* § 4332(2)(E).

414. 40 C.F.R. § 1502.14(a)–(d) (2020). 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).

415. Cal. Res. Agency v. U.S. Dep't of Agric., No. C 08-1185, 2009 WL 6006102, at *1 (N.D. Cal. Sept. 29, 2009).

416. *Id.* at *12.

417. *Id.* at *16.

418. *Id.*

419. *Id.*

420. *Id.*

421. *Id.* at *17.

422. *Id.* at *16. The plans described adaptive management as the foundation of forest planning. *Id.*

423. *Id.* at *17.

taining to a critical decision violates the NEPA."[424] 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 the consideration of alternatives proposed by environmental groups.[425] The groups challenged an EA prepared by BLM to support its decision to approve a natural gas well development project.[426] The groups contended that BLM should have considered alternatives that would have restricted the extent to which the project would contribute to ozone pollution.[427] The district court concluded, however, that the EA tiered to a prior EIS in which the 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.[428] According to the court, that plan reflected BLM's commitment to work with the Environmental Protection Agency to implement emission control strategies through the use of identified mitigation measures under specified conditions.[429] BLM did not violate NEPA by failing to independently analyze the environmental group's substantially similar proposed alternative.[430]

The cases involving the connection between adaptive management and NEPA's requirement to consider alternatives to the proposed action indicate that adaptive management itself may be a flexible enough management strategy to encompass multiple alternatives. The mere recitation of adaptive management, however, is not likely to satisfy the duty to consider alternatives if the adaptive management plan does not include options for the agency to pursue that differ according to the feedback it receives on initial project implementation. In this regard, the public must be able to distinguish between, and thus comment on, alternatives in a way that provides for meaningful involvement consistent with NEPA's overarching goals.

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424. *Id.*; *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, 1084 (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 sixty different MIS).

425. S. Utah Wilderness All. v. U.S. Dep't of the Interior, No. 2:13-cv-01060, 2016 WL 6909036, at *1 (D. Utah Oct. 3, 2016).

426. *Id.* at *2.

427. *Id.* at *11.

428. *Id.* at *12.

429. *Id.*

430. *Id.* at *11–12.

III. Suggested Best Practices for Use of Adaptive Management in NEPA Compliance

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,[431] vague triggers for responsive action,[432] or wiggle room to avoid implementation of appropriate adjustments to management strategies.[433] 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 decision-making 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 Guide[434] "emphasizes the need for group learning and ongoing improvement in how to manage collaborative decision-making."[435] However, agencies, including the Interior Department, do not always heed that advice.[436]

431. *See, e.g.*, Cal. Res. Agency v. U.S. Dep't of Agric., No. C 08-1185, 2009 WL 6006102, at *17 (N.D. Cal. Sept. 29, 2009).

432. *See, e.g.*, Greater Yellowstone Coal., Inc. v. Servheen, 665 F.3d 1015, 1029 (9th Cir. 2011) (taking issue with FWS's use of "an intensive management and monitoring framework [that] was not developed to be responsive to" the declines in food sources that threatened the bears' viability).

433. *See, e.g.*, High Sierra Hikers Ass'n v. Weingardt, 521 F. Supp. 2d 1065 (N.D. Cal. 2007) (discussed *supra* notes 178–88 and accompanying text).

434. For discussion of the Guide, see *supra* notes 84–89 and accompanying text.

435. Lawrence Susskind, Alejandro E. Camacho & Todd Schenk, *Collaborative Planning and Adaptive Management in Glen Canyon: A Cautionary Tale*, 35 Colum. J. Env't L. 1, 31 (2010).

436. *Id.* ("Unfortunately, . . . the [Department of the Interior] 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] . . . .").

One key prerequisite for an effective and informed adaptive management process is identifying affected stakeholders.[437] Including affected interests in the process of crafting an adaptive management program increases the likelihood of buy-in by those interests, even if the end result does not conform completely to their agendas.[438] 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 public participation.[439] The CEQ regulations require agencies to "[m]ake diligent efforts to involve the public in preparing and implementing their NEPA procedures."[440] 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.[441] 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 heed to warnings from the NPS.[442] Agencies preparing an EIS must invite comment on all alternatives and supporting analy-

437. *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).

438. *See* Barry L. Johnson, *The Role of Adaptive Management as an Operational Approach for Resource Management Agencies*, 3 ECOLOGY & SOC'Y, art. no. 8, at 7 (1999), https://perma.cc/GAD4-95MR ("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."); Bruce Schindler & Kristin Aldred Creek, *Integrating Citizens in Adaptive Management: A Propositional Analysis*, 3 ECOLOGY & SOC'Y, art. no. 9, at 5 (1999), https://perma.cc/M26U-4M6X ("Public involvement is usually considered more successful if the processes employed include all affected parties and aim for broad representation."); *cf.* Deborah R. Hensler, *Suppose It's Not True: Challenging Mediation Ideology*, 1 J. DISP. RESOL. 81, 88 (2002) ("[In the context of arbitration dispute resolutions,] 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.").

439. *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*] ("[M]eaningful stakeholder participation should serve a central role in the management of natural resources and the regulation of land use and . . . regulatory processes should account for the uncertainty inherent in regulatory decisions by making such processes more adaptive.").

440. 40 C.F.R. § 1506.6(a) (2020).

441. *Id.* § 1503.1(a)(1).

442. High Sierra Hikers Ass'n v. Weingardt, 521 F. Supp. 2d 1065, 1091 (N. D. Cal. 2007) (discussed *supra* note 348 and accompanying text).

ses.[443] 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.[444]

Conscientious compliance with these mandates when an agency is formulating its adaptive management approach will do more than reduce the chances of a judicial finding of NEPA procedural violations.[445] 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.[446] 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.[447]

B. Substantive Strategies

Although NEPA is a purely procedural statute,[448] adaptive management is a decision-making 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

443. 40 C.F.R. § 1503.1(a)(3) (2020).

444. *See* Cal. Res. Agency v. U.S. Dep't of Agric., No. C 08–1185, 2009 WL 6006102, at *17 (N.D. Cal. Sept. 29, 2009) (discussed *supra* notes 415–23 and accompanying text).

445. *See* League to Save Lake Tahoe v. Tahoe Reg'l Plan. Agency, 739 F. Supp. 2d 1260, 1284 (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 321–32 and accompanying text.

446. *See* Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983); *see also* Schindler & Creek, *supra* note 438 ("Early and continuous involvement improves public understanding of the issues and managers[’] understanding of participant perspectives."); Camacho, *Conjecture*, *supra* note 439, 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.").

447. Schultz & Nie, *supra* note 394, 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").

448. *See* Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350–51 (1989); *supra* note 43.

are likely to include (1) clear specification of management goals; (2) identification of baseline natural resource conditions; (3) determination of triggers that reflect changes in resource conditions that require adjustments in management strategies; (4) a monitoring program to determine whether the triggers have been exceeded; and (5) 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.[449] 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.[450]

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."[451] Reconciling goals among competing value systems can be an obstacle to formulating an effective management plan, and agencies are given

449. *See, e.g.*, HOLLY DOREMUS ET AL., CTR. FOR PROGRESSIVE REFORM, WHITE PAPER #1104, MAKING GOOD USE OF ADAPTIVE MANAGEMENT 2 (2011), https://perma.cc/8F99-7G6Q (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 S.F. ESTUARY & WATERSHED SCI., art. no. 2, at 1 (2017), https://perma.cc/XFP7-G2UU ("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.").

450. Biber, *supra* note 33, at 955.

451. Annecoos Wiersema, *A Train Without Tracks: Rethinking the Place of Law and Goals in Natural Resources Law*, 38 ENV'T L. 1239, 1296 (2008).

fairly wide latitude to use their expert discretion in doing so. The federal land management agencies have survived NEPA challenges when their adaptive management plans have identified discernable management goals.[452] Failure to do so may halt in its tracks the kind of experimentation that is the hallmark of adaptive management.[453] 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.[454]

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.[455] 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."[456] As Holly Doremus has explained, "The 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."[457] In other words, when agencies engage in monitoring to deter-

452. *E.g.*, Theodore Roosevelt Conservation P'ship v. Salazar, 616 F.3d 497, 516–17 (D.C. Cir. 2010) (discussed *supra* note 226 and accompanying text); Klamath Siskiyou Wildlands Ctr. v. Grantham, No. 2:11-cv-01647, 2013 WL 1420259, at *8–9 (E.D. Cal. Apr. 8, 2013), *aff'd in part, rev'd in part, remanded*, 642 F. App'x 742 (9th Cir. 2016) (discussed *supra* notes 271–75 and accompanying text); W. Watershed Project v. U.S. Forest Serv., 780 F. Supp. 2d 1115, 1121 (D. Idaho 2011), *reconsideration denied*, 2011 WL 4442668 (D. Idaho Sept. 22, 2011) (discussed *supra* notes 277–82 and accompanying text).

453. *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.").

454. *See, e.g.*, Hells Canyon Pres. Council v. Connaughton, No. 3:11-cv-00023, 2012 WL 13047991, at *11 (D. Or. 2012) (discussed *supra* notes 219–27 and accompanying text).

455. CEQ has noted that the identification of baseline conditions is a factor in assessing the effectiveness of monitoring. NEPA TASK FORCE, *supra* note 53, at 50 (and accompanying text).

456. Daniel Schramm & Akiva Fishman, *Legal Frameworks for Adaptive Natural Resource Management in a Changing Climate*, 22 GEO. INT'L ENV'T L. REV. 491, 500 (2010).

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

mine 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.[458] The land management agencies have succeeded when they have been able to demonstrate sufficient identification of baseline conditions.[459] To anticipate an agency's inability to eliminate all uncertainties concerning its understanding of baseline conditions, it may be advisable to acknowledge those shortcomings and explain how it intends to rectify them.[460]

3. Triggers for Management Adjustments

Adaptive management involves making adjustments when conditions indicate that implementation is not proceeding toward achievement of project goals.[461] A critical question is when to make such adjustments. The designation of triggers in an adaptive management plan provides 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.[462]

458. *See* Bear, *supra* note 65, at 948 (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").

459. *See, e.g.*, Protect Our Communities Found. v. Jewell, 825 F.3d 571 (9th Cir. 2016) (discussed *supra* notes 241–44 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 170–76 and accompanying text); *see also* Japanese Village, LLC v. Fed. Transit Admin., 843 F.3d 445, 461, 470–71 (9th Cir. 2016).

460. *See Save Our Cabinets*, 254 F. Supp. 3d at 1262–63 (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).

461. "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 44, at 32–33.

462. Schultz & Nie, *supra* note 394, at 455; *see also* Biber, *supra* note 33, 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.").

A trigger defines a threshold level of harm which, if exceeded, mandates an agency response.[463]

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.[464] 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.[465]

Critics of the manner in which federal agencies have used adaptive management have identified projects that have lacked such enforceable triggers.[466] The cases explored in Part II also reflect judicial dissatisfaction with amorphous triggers or quantified objectives.[467] The triggers must be responsive to identified threats to the resources being managed and protected,[468] although they need not be expressed in numeric form to pass muster.[469] Amorphous triggers, like vague adaptive management goals, can be a convenient way for land management

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463. *See* Schultz & Nie, *supra* note 394, at 465 (explaining that triggers serve as "indicators or warnings").

464. *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.").

465. DOREMUS ET AL., *supra* note 449, at 11.

466. *See, e.g.*, Zellmer & Gunderson, *supra* note 453, 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.* Fischman, *supra* note 40, at 705 (describing the challenge of retaining flexibility while imposing "enforceable constraints on actions that affect resilience in an undesirable way" and stating that "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.

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

468. *See, e.g.*, Greater Yellowstone Coal., Inc. v. Servheen, 665 F.3d 1015, 1030 (9th Cir. 2011) (discussed *supra* note 432).

469. *See, e.g.*, Izaak Walton League of Am., Inc. v. Tidwell, No. 06-3357, 2015 WL 632140, at *21 (D. Minn. Feb. 13, 2015) (discussed *supra* notes 284–95 and accompanying text); Nat'l Parks Conservation Ass'n v. U.S. Dep't of the Interior, 46 F. Supp. 3d 1254, 1288 (M.D.

agencies "to avoid politically tough decisions" entailing the economic development sacrifices necessary to achieve resource protection, and to reassure the public that "any harm can be corrected through later changes," without any meaningful guarantee that those changes will actually occur or that they will have a realistic chance of succeeding.[470] The more specific and relevant triggers are to the project's resource management goals, the better chance they have of satisfying courts and contributing to improved environmental outcomes.[471]

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."[472] CEQ's guidance on implementing adaptive management during the NEPA process has recognized the integral role of monitoring.[473] 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."[474] 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."[475]

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 270).

470. *See* Holly Doremus, *Adaptive Management, the Endangered Species Act, and the Institutional Challenges of "New Age" Environmental Protection*, 41 WASHBURN L.J. 50, 73 (2001); *see also id.* at 88–89 ("Adaptive management can be used as a smokescreen to conceal political accommodations that sacrifice the protection of species or natural systems."). Professors Craig and Ruhl have warned against agencies' use of adaptive management "lite," which, "[a]t its worst, . . . allows agencies to defer hard decisions indefinitely by shifting them into the adaptive management black box." Craig & Ruhl, *supra* note 29, at 11. Craig and Ruhl also point out that "when uncertainty and controllability are low and risk is high, investing in adaptive management would be wasteful or even dangerous." *Id.* at 20.

471. *See* Kalyani Robbins, *The Biodiversity Paradigm Shift: Adapting the Endangered Species Act to Climate Change*, 27 FORDHAM ENV'T L. REV. 57, 76 (2015) ("Detailed initial plans for what to monitor and how to respond to certain feedbacks or changes helps to avoid excessive discretion, which of course may be subject to conflicted influences.").

472. Johnson, *supra* note 438.

473. NEPA TASK FORCE, *supra* note 53, at 45; CEQ, EFFECTIVENESS, *supra* note 44, at 31–34.

474. DOREMUS ET AL., *supra* note 449, at 12.

475. Schultz & Nie, *supra* note 394, at 447.

The cases analyzed above[476] provide examples of monitoring prescriptions that supported agency efforts to defeat NEPA challenges.[477] One court approved of the agency's "multiple-indicator monitoring" approach.[478] Another deemed it critical that the monitoring program corresponded with the triggering conditions that would lead to a change in management practices.[479] 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.

Agencies should craft the nature and scope of monitoring commitments by taking into account public input and project goals. 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.[480] 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

476. *See supra* Part II.C.2.

477. *See, e.g.*, Theodore Roosevelt Conservation P'ship v. Salazar, 616 F.3d 497 (D.C. Cir. 2010) (discussed *supra* note 226 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 261–69 and accompanying text).

478. Klamath Siskiyou Wildlands Ctr. v. Grantham, No. 2:11-cv-01647, 2013 WL 1420259, at *10 (E.D. Cal. Apr. 8, 2013), *aff'd in part, rev'd in part, remanded*, 642 F. App'x 742 (9th Cir. 2016) (discussed *supra* notes 271–75 and accompanying text).

479. Izaak Walton League of America v. Tidwell, No. 06–3357, 2015 WL 632140, at *21–22 (D. Minn. Feb. 13, 2015) (discussed *supra* notes 284–95 and accompanying text).

480. *See* Susskind, Camacho & Schenk, *supra* note 435, 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.").

monitoring."[481] Professor Ruhl has posited that "[a]daptive management, to be effective, does require institutions that ensure a rigorous implementation policy."[482] Thus, adaptive management involves follow-up in order to "do" based on what has been learned.[483]

The intersection of NEPA with the adjustments that are the hallmark of adaptive management is most clearly reflected in agency obligations to consider and describe mitigation measures and alternatives to the proposed action.[484] 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.[485] 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.[486] An unadorned promise to engage in mitigation measures without indicating in any way 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 toward 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.[487] It also should explore alternative means of implementing its adaptive actions both to determine the most promising avenue

481. 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*"); Adler, *supra* note 12, at 145–46 ("[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.").

482. Ruhl, *Case Study*, *supra* note 25, at 1278; *cf.* Ruhl, *Regulation*, *supra* note 26, at 30 ("Deliberate monitoring and a framework for altering course, rapidly and frequently if conditions warrant, thus are essential ingredients of adaptive management.").

483. Doremus, *Precaution*, *supra* note 1, at 550 (describing adaptive management as "learning while doing").

484. *See supra* Parts II.C, II.E.

485. Angelo, *supra* note 23, at 994 ("The ability to make such adjustments, to be flexible and to respond to unanticipated events is the hallmark of adaptive management.").

486. Nat'l Parks Conservation Ass'n v. Jewell, 965 F. Supp. 2d 67, 76 (D.D.C. 2013) (discussed *supra* notes 297–02 and accompanying text); *see also* Defs. of Wildlife v. Salazar, 698 F. Supp. 2d 141, 144 (D.D.C. 2010), *aff'd on other grounds*, 651 F.3d 112, 117 (D.C. Cir. 2011) (discussed *supra* notes 303–08 and accompanying text).

487. Cal. Res. Agency v. U.S. Dep't of Agric., No. C 08–1185, 2009 WL 6006102, at *16 (N.D. Cal. Sept. 29, 2009) (discussed *supra* notes 415–44 and accompanying text).

for achieving those goals and to enable it to justify the selected course of action in the event of judicial challenges.[488]

Conclusion

Adaptive management developed in response to dissatisfaction with a decision-making 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."[489] Nevertheless, all four federal land management agencies have recognized the value of adaptive management and have authorized its use, requiring it to be integrated 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 decision-making process 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 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 be required 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.

The emphasis in adaptive management on reacting to information gleaned from implementation of plans or projects and the unanticipated adverse effects they have caused is somewhat ironic. The modern pollution control statutes that Congress adopted beginning in the 1970s were a reaction to the failure of

488. 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.").

489. Poisner, *supra* note 37, at 78.

common law tort actions, which at the time comprised the primary legal tool for addressing pollution, to prevent environmental harm before it occurred—to reduce the risk of such harm. The new statutory core of federal environmental law reflected "a paradigm shift from the common law because Congress authorized regulators to act on the basis of anticipated harm."[490] Statutory environmental law "therefore changed the baseline of government regulation in fundamental ways: 'Regulation based on risk permits regulatory action based on *ex ante* collective danger rather than *ex post* individual injury, and also operates preventively to avert injury to the public as whole.'"[491] The enhanced planning provisions of the statutes governing management of the federal lands that Congress also adopted in the 1970s were similarly forward-looking in character.[492] Adaptive management is essentially based on the recognition that preventive action alone does not always suffice; it needs in some contexts to be supplemented with reactive responses based on evaluation of the efficacy (or lack thereof) of preventive steps already taken.[493] Thus, the integration of adaptive management (a backward-facing reactive evaluative mechanism that sets the stage for necessary adjustments to previously adopted plans and projects) into the process of implementing NEPA (a statute whose thrust is forward-looking) reflects the continuation of a decades-long effort to strike an appropriate balance between reactive and preventive tools for protecting the environment. Both have an important role to play.

490. SIDNEY A. SHAPIRO & ROBERT L. GLICKSMAN, RISK REGULATION AT RISK: RESTORING A PRAGMATIC APPROACH 6 (2003). *Compare* Noga Morag Levine, *Between Choice and Sacrifice: Constructions of Community Consent in Reactive Air Pollution Regulation*, 28 L. & SOC'Y REV. 1035, 1040–41 (1994) (describing pre-1970 efforts to control air pollution as a "reactive regime"), *with* Ethyl Corp. v. Env't Prot. Agency, 541 F.2d 1, 28 (D.C. Cir. 1976) (referring to the "the precautionary purpose" of the Clean Air Act).

491. SHAPIRO & GLICKSMAN, *supra* note 490, at 6 (quoting John S. Applegate, *The Perils of Unreasonable Risk: Information, Regulatory Policy, and Toxic Substances Control*, 91 COLUM. L. REV. 261, 273 (1991)).

492. *See* Craig Anthony (Tony) Arnold, *Planning Milagros: Environmental Justice and Land Use Regulation*, 76 DENVER U. L. REV. 1, 90 (1998) (describing public land use planning as "primarily prospective, rather than remedial").

493. Similarly, statutes and regulations governing planning by the federal land management agencies require periodic reevaluation. *See, e.g.*, 16 U.S.C. § 1601(a) (requiring updating by the Forest Service of Renewable Resource Assessments every ten years); 36 C.F.R. § 219.7(a) (2020) (requiring revisions in national forest land and resource management planning at least every fifteen years).