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Adaptive Management in the Face of Climate Change and Endangered Species Protection

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In recent decades, new theories in resource management have emerged that have been specifically designed to account for the uncertainties and complexities inherent in ecosystem processes and structures. Adaptive management is one such theory and has become the dominant approach used by resource managers where degrees of scientific uncertainty are high. Adaptive management has been particularly recognized for its usefulness in addressing the impacts of climate change on wildlife species due to the high degree of complexity and scientific uncertainty climate change entails. Although adaptive management enjoys widespread support among resource managers and academics, guidance has been lacking in how to implement adaptive management plans effectively. The absence of clear statutory authority and regulatory standards has made the development, implementation and review of adaptive management plans challenging. The lack of adequate funding and personnel resources has often also greatly restricted an agency's ability to implement adaptive management plans effectively. This Note explores challenges to the use of adaptive management as a resource management approach with emphasis on challenges that have arisen in the context of managing the impacts of climate change on protected species. The recent decision by the Ninth Circuit Court of Appeals in Greater Yellowstone Coalition v. Servheen, 665 F.3d 1015 (2011) provides a backdrop for discussion. In Greater Yellowstone Coalition, the Ninth Circuit rejected an adaptive management plan for removal of a population of grizzly bears from the ESA's list of threatened species where ample scientific evidence indicated that the bear was adversely affected by climate change and the effects of

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climate change were not adequately addressed in the plan. The case is noteworthy not only because it established that climate change impacts must be addressed in adaptive management plans where adaptive management is the selected management approach, but also because it highlights difficulties agencies and courts have in developing, implementing and reviewing adaptive management plans where statutory authority, regulatory standards and funding for the plans are lacking.

The Note then considers the possible role of the National Fish Wildlife and Plants Climate Adaptation Strategy (FWP Strategy) recently developed under the direction of the Council for Environmental Quality and authorized by Executive Order. The FWP Strategy strongly endorses the development and implementation of adaptive management plans for U.S. species affected by climate change. While the FWP Strategy is still in its early stages of development and adaptive management plans devised under its guidance have yet to be tested, the Strategy appears to address several of the problems that have plagued agencies in obtaining judicial approval of adaptive management plans. On its face, the FWP Strategy stands to benefit the many species of fish, wildlife and plants in the United States whose survival is threatened by climate change, and may ultimately provide a viable solution for resolving current management issues involving these species that were raised in Greater Yellowstone Coalition.

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INTRODUCTION

It's not just the polar bear; an escalating number of species' survival is threatened by climate change.¹ Environmental groups are increasingly pressing agencies to consider climate change impacts in listing decisions and management actions taken under the Endangered Species Act (ESA).² The groups are taking their claims to court, and more often than not, they're winning.

The 2007 landmark U.S. Supreme Court case, *Massachusetts v. EPA*, galvanized the recent spate of lawsuits addressing the effects of global warming on protected species.³ In that case, Massachusetts claimed damage to its coastline due to sea-level rise caused by global warming and sued the Environmental Protection Agency (EPA) based on the Agency's refusal to regulate motor vehicle emissions under the Clean Air Act.⁴ The EPA argued that because climate change was not mentioned anywhere in the Act, it fell outside the Agency's regulatory purview.⁵ Reviewing Massachusetts' claims, the Supreme Court acknowledged that "the harms associated with climate change are serious and well recognized" and determined that the impacts from climate change constitute "injuries" to the environment.⁶ Based on these findings, the Court held the EPA had authority to promulgate rules for greenhouse gas emissions even though the Clean Air Act fails to reference climate change. As rationale for its decision, the Court stated "[t]he fact that a statute can be applied in situations not expressly anticipated by Congress does not demonstrate ambiguity. It demonstrates breadth."⁷ The case strongly suggests that agencies are obliged to address the injurious effects of climate change on the environment, even where a given environmental law does not include express climate change provisions.⁸

While *Massachusetts v. EPA* put agencies on notice that they could be compelled to address climate change in carrying out their statutory mandates to

1. The Intergovernmental Panel on Climate Change estimates that 20–30 percent of plant and animal species evaluated in climate change studies to date are at risk of extinction if temperatures reach levels projected to occur by the end of this century. See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: SYNTHESIS REPORT 48 (2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf.

2. Jessica Ferrell, *The Battle Over the Bear: Climate Change Playing a Larger Role in Species Protection*, MARTEN LAW (Nov. 14, 2007), available at <http://www.martenlaw.com/newsletter/20071114-esa-climate-change-role>.

3. 549 U.S. 497 (2007).

4. See *id.* at 504–05.

5. See *id.* at 510.

6. See *id.* at 521–23.

7. *Id.* at 532 (quoting Pa. Dep't of Corr. v. Yeskey, 524 U.S. 206, 212 (1998)).

8. See *id.* at 532–35; see also J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 BOSTON U. L. REV. 1, 8 (2008) (noting that after *Massachusetts v. EPA*, agencies cannot avoid responding to climate change; simply because Congress did not have climate change on its mind when it drafted a law does not mean that decades later the agency responsible for implementing the law can ignore the effects of climate change).

manage natural resources under their charge, agencies have struggled to marshal an effective response. It's not hard to appreciate why: developing an effective response requires that agencies adequately understand climate change, and, more importantly perhaps, that they understand its effects on the resources they manage. Climate change presents unique challenges to resource managers, however, because its effects are notoriously complex and difficult to predict.⁹

In recent decades, new theories in resource management have emerged that have been specifically designed to account for uncertainties and complexities of ecosystem processes and structures. Adaptive management is one such theory and has become the dominant approach used by resource managers where degrees of scientific uncertainty are high.¹⁰ As described in detail below, adaptive management theory accepts that scientific information about an environmental system is incomplete. To combat uncertainty, adaptive management emphasizes learning through experimentation or monitoring, and subsequently adapting management decisions based on the results of what is learned.¹¹ Adaptive management has been recognized for its usefulness in addressing challenges to protected species brought about by climate change due to the high degree of complexity and scientific uncertainty climate change entails.¹²

Although adaptive management enjoys widespread support among resource managers and academics, to date, guidance has been lacking in how to implement adaptive management plans effectively.¹³ The absence of clear statutory authority and regulatory standards has made the development, implementation, and review of adaptive management plans challenging.¹⁴ The lack of adequate funding and staffing has often also greatly restricted an agency's ability to implement adaptive management plans effectively.¹⁵

While courts generally support agencies' use of adaptive management plans in theory, they have been largely unimpressed with agencies' implementation of plans in the field.¹⁶ In order to implement an adaptive management plan subject to legal challenge, an agency must satisfy the judiciary that its plan meets the substantive legal standards of the

9. See J.B. Ruhl & Robert L. Fischman, *Adaptive Management in the Courts*, 95 MINN. L. REV. 424, 438 (2010) (observing that the impacts of climate change are "excruciatingly difficult to predict").

10. See Robin Kundis Craig & J.B. Ruhl, *Governing for Sustainable Coasts: Complexity, Climate Change and Coastal Ecosystem Protection*, 2 SUSTAINABILITY 1361, 1374 (2010).

11. See Craig R. Allen et al., *Adaptive Management for a Turbulent Future*, 92 J. ENVT'L MGMT. 1339 (2011).

12. See Ruhl & Fischman, *supra* note 9, at 484 (noting that "the effects of climate change on natural resources will be complex, dynamic, nonlinear, and frequently unpredictable over anything but short time frames, all of which are conditions that demand adaptive management responses").

13. See *id.* at 433.

14. See *id.* at 439-40.

15. Holly Doremus, *Adaptive Management, the Endangered Species Act, and the Institutional Challenges of "New Age" Environmental Protection*, 41 WASHBURN L.J. 50, 52-53 (2001).

16. Ruhl & Fischman, *supra* note 9, at 426.

environmental laws relevant to the circumstances.¹⁷ To date, only a handful of these plans have survived judicial review.¹⁸

Part I of this Note explores the theory behind adaptive management as a resource management approach and addresses challenges that have arisen in applying the theory in practice, with emphasis on challenges that have arisen in the context of managing the impacts of climate change on protected species.

Part II examines the recent decision by the Ninth Circuit Court of Appeals in *Greater Yellowstone Coalition v. Servheen*.¹⁹ In *Greater Yellowstone Coalition*, the court rejected an adaptive management plan for removal of a population segment of grizzly bears from the ESA's list of threatened species where ample scientific evidence indicated that the bear was adversely affected by climate change and the effects of climate change were not adequately addressed in the plan. The case is noteworthy not only because it established that climate change impacts must be addressed in plans where adaptive management is the selected management approach, but also because it highlights difficulties agencies and courts have in developing, implementing and reviewing adaptive management plans where statutory authority, regulatory standards and funding for the plans are lacking.

Part III of the Note reviews the National Fish Wildlife and Plants Climate Adaptation Strategy ("FWP Strategy")²⁰ released in March 2013 under the direction of the Department of Interior and Council on Environmental Quality (CEQ),²¹ and authorized by Executive Order.²² The FWP Strategy provides strong support for the development and implementation of adaptive management plans for species of fish, wildlife, and plants affected by climate change.²³ In 2009, Congress passed legislation that provided funding for

17. *Id.* at 471.

18. See Ruhl & Fischman, *supra*, note 9, at 445 (noting that of the thirty-one federal court decisions addressing the legality of adaptive management through 2010, federal agencies lost more than half of them). For an example of an adaptive management plan surviving judicial review, see *Pac. Coast Fed'n of Fishermen's Ass'ns v. Gutierrez*, 606 F. Supp. 2d 1122, 1185 (E.D. Cal. 2008), in which the court upheld an adaptive management plan for Chinook salmon affected by a water diversion project where the plan included specific "triggers" followed by predetermined and legally enforceable management actions.

19. 665 F. 3d 1015 (2011).

20. COUNCIL ON ENVTL. QUALITY, NATIONAL FISH, WILDLIFE AND PLANTS CLIMATE ADAPTATION STRATEGY (2012), available at <http://www.wildlifeadaptationstrategy.gov/pdf/NFWPCAS-Final.pdf> [hereinafter FWP Strategy].

21. The Council on Environmental Quality (CEQ) coordinates federal environmental efforts and works closely with agencies and other White House offices to develop environmental policies and initiatives. CEQ was established within the Executive Office of the President by Congress as part of the National Environmental Policy Act of 1969 and the Environmental Quality Act of 1970 assigned additional responsibilities. See *About*, COUNCIL ON ENVTL. QUALITY, <http://www.whitehouse.gov/administration/eop/ceq/about> (last visited Apr. 19, 2013).

22. Exec. Order No. 13514, Federal Leadership in Environmental, Energy, and Economic Performance (Oct. 5, 1999).

23. COUNCIL ON ENVTL. QUALITY, NATIONAL FISH WILDLIFE AND PLANTS CLIMATE ADAPTATION STRATEGY, PUBLIC REVIEW DRAFT (2012), available at http://www.wildlifeadaptationstrategy.gov/pdf/public_review_draft.pdf.

wildlife adaptation under the FWP Strategy with the specific aim of assisting wildlife species affected by climate change.²⁴

Part IV of the Note evaluates the potential for the FWP Strategy to improve the efficacy and success of adaptive management plans for species affected by climate change and draws upon issues raised in *Greater Yellowstone Coalition*. The Note concludes that—while the FWP Strategy is still in its early stages of development and adaptive management plans devised under its direction have yet to be tested by the courts—the Strategy appears to address several of the problems that have plagued agencies in obtaining judicial approval of adaptive management plans. On its face, the FWP Strategy stands to benefit the many species of fish, wildlife, and plants in the United States whose survival is threatened by climate change, and may ultimately provide a viable solution for resolving current management issues involving these species that were raised in *Greater Yellowstone Coalition*.

I. ADAPTIVE MANAGEMENT IN THEORY AND PRACTICE FOR CLIMATE CHANGE AND ENDANGERED SPECIES PROTECTION

A. *Adaptive Management in Theory*

Scientific uncertainty is a hallmark of environmental and natural resource regulation and decision making. Adaptive management is an approach to natural resource management based on the assumptions that scientific knowledge is incomplete and much of what we know may actually be wrong, but, despite these uncertainties, managers and policy makers must act.²⁵

Adaptive management theory was first introduced by C.S. Holling and his colleagues in 1978 as a means of addressing the complexities of ecosystem processes and structures.²⁶ Up until then, the traditional approach to resource management was to address environmental components and stressors in a piecemeal fashion—the air, the trees, the water, the species, and the specific challenges that confronted each of them. This resulted in decisions being made by a number of different mission-specific agencies, under resource-specific management regimes that often relied upon rigid, predetermined standards.²⁷ Decisions made under this approach were almost like those being made in a vacuum; not only did they fail to acknowledge the interconnectivity of the various components of an ecosystem, but also the varying degrees to which the different components affected one another.

Recognizing the dynamic and interconnected nature of ecosystems,

24. Department of the Interior, Environment, and Related Agencies Appropriations Act (2010), available at http://www.wildlifeadaptationstrategy.gov/pdf/2010_Legislative_Language_for_Adaptation_Strategy.pdf.

25. Allen et al., *supra* note 11, at 1339.

26. C.S. HOLLING ET AL., *ADAPTIVE ENVIRONMENTAL ASSESSMENT AND MANAGEMENT* (C.S. Holling, ed. 1978).

27. Ruhl & Fischman, *supra* note 9, at 428–30.

Holling and his peers sought to manage natural resources as they actually occurred—as ecologically functioning landscape units—rather than independent components. To accomplish this goal, they determined that decision making had to evolve from the reliance on standards for individual ecosystem components to the collection of information about the entire ecosystem through experimentation that would include continuous monitoring, assessment and recalibration. More specifically, under this new method of decision making, resource management efforts were to prioritize the collection of information, the establishment of success measurements, the monitoring of outcomes, the use of new information to adjust predetermined approaches, and the willingness to change management approaches in light of new information.²⁸

Although adaptive management theory has evolved since its inception, it continues to emphasize learning and the subsequent adaptation of management actions based on that learning. The process is iterative and strives to reduce uncertainty, build knowledge, and improve management over time in a goal-oriented and structured process.²⁹ However, beyond the most basic level, there is no consensus on what adaptive management requires³⁰ and there are presently no established norms. This has resulted in the application of numerous definitions and standards to the term, “ranging from highly detailed and rigorous” to overly simplistic.³¹ For instance, one article described modern adaptive management theory as a process in which expert agencies exercise professional judgment through iterative decision making processes emphasizing definition of goals, description of policy decision models, active experimentation with monitoring of conditions, and adjustment of implementation decisions as suggested by performance results.³² Others prefer the more simple definition of “learning by doing.”³³

While all types of adaptive management promote learning, an important distinction can be made between active and passive forms of adaptive management. Both forms of management are valuable and either may be considered more or less appropriate in a given situation.³⁴ Active adaptive management represents “a more scientifically-based, experimental approach to management, replete with formal study design, controls, and replication.”³⁵

28. HOLLING ET AL., *supra* note 26, 1–21.

29. Allen et al., *supra* note 11, at 1339.

30. Doremus, *supra* note 15, at 52.

31. *Id.*

32. Ruhl & Fischman, *supra* note 9, at 424.

33. Doremus, *supra* note 15, at 52.

34. Robin Gregory et al., *Deconstructing Adaptive Management: Criteria for Applications to Environmental Management*, 16 *ECOLOGICAL APPLICATIONS* 2411, 2412 (2006).

35. MARTIN NIE & COURTNEY SCHULTZ, *DECISION MAKING TRIGGERS IN ADAPTIVE MANAGEMENT: REPORT TO USDA PACIFIC NORTHWEST RESEARCH STATION, NEPA FOR THE 21ST CENTURY 7* (2011), available at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5367512.pdf.

Active adaptive management emphasizes learning through experimentation, and often involves testing competing hypotheses about the impact of proposed management activities on ecosystem functions.³⁶ Active adaptive management has the potential to yield more statistically testable information about an ecosystem in a shorter period of time.³⁷ Active approaches, however, “are only as good as their experimental design” and generally require significantly more resources to plan, implement, and monitor.³⁸

By contrast, passive adaptive management relies on monitoring to facilitate learning that then guides the adjustment of management actions. While monitoring is passive, a formal study design is helpful to facilitate learning under this approach so that elements of causality can be adequately understood to enable the appropriate adjustment of management actions.³⁹ Passive adaptive management is useful when there is high confidence in the anticipated ecosystem response, thus enabling managers to focus on refining management parameters or when regulatory or institutional constraints are strong.⁴⁰ A potential problem with the use of passive adaptive management is that it often degenerates into mere “trial-and-error” learning⁴¹ or ad hoc contingency planning,⁴² both of which fail to incorporate a structured procedure for learning. As discussed below, structured learning is the foundation of adaptive management.

Since its introduction, adaptive management has been widely embraced as a “solution to endless trial-and-error approaches to complex natural resource management challenges.”⁴³ Unlike trial-and-error approaches, adaptive management addresses environmental complexity and uncertainty through an intentional and structured approach that involves the identification of clear and measureable management objectives, which are then tested.⁴⁴ A key strength of adaptive management is that it forces resource managers to confront uncertainties in the environment in a thoughtful and deliberate manner with the aim of reducing them, or at least learning more about them.⁴⁵ While the theoretical benefits of adaptive management are well recognized and appreciated, as discussed below, the transition from theory to practice has not

36. Gregory et al., *supra* note 34, at 2412.

37. *Id.*

38. *Id.*

39. *Id.*

40. *Id.*

41. *Id.* (explaining that in trial and error learning, “explicit hypotheses are absent or vague, the use and updating of historical data is haphazard, monitoring is incomplete, and only incremental changes are made to monitoring plans”).

42. See Ruhl & Fischman, *supra* note 9, at 426 (“From theory to policy to practice, at each step forward in the emergence of adaptive management something has been lost in the transition. The end product is something we call ‘a/m-lite,’ a watered-down version of the theory that resembles ad hoc contingency planning more than it does planned ‘learning while doing.’”).

43. Allen et al., *supra* note 11, at 1339.

44. *See id.*

45. *See id.* at 1344.

been particularly smooth or successful.⁴⁶

B. Adaptive Management in Practice

Although adaptive management enjoys widespread support, successful implementation in the context of real world natural resource management has been and remains largely elusive. Several challenges to the effective implementation of adaptive management have been identified. Some of the more commonly recognized challenges include: 1) lack of a uniform definition and approach; 2) lack of statutory authority and regulatory standards; 3) lack of funding for the development and implementation of plans; and, 4) failure to engage stakeholders in the development of plans. As discussed below, each of these challenges has limited the practical impact of adaptive management to some degree, although the effects of some have been more detrimental than others.

A chief impediment to the successful application of adaptive management is that there is a lack of consensus about what it is and what it requires.⁴⁷ Adaptive management suffers from the fact that most agencies have often adopted their own definitions for the practice, although there are some commonalities among them.⁴⁸ Agency definitions range from the more simple (e.g., “learning by doing”) and generally progress along a “continuum of complexity” to more explicit definitions that incorporate aspects of experimental design.⁴⁹

For example, in its 2008 rule on forest planning the U.S. Forest Service has defined adaptive management rather simply 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. Adaptive management stems from the recognition that knowledge about natural resource systems is sometimes uncertain.⁵⁰

By comparison, the Department of the Interior defines adaptive management in a more detailed and purposeful way. They explain:

Adaptive management as described [in the Technical Guide] is infrequently implemented, even though many resource planning documents call for it and numerous resource managers refer to it. It is thought by many that

46. See Jamie E. McFadden et al., *Evaluating the Efficacy of Adaptive Management Approaches: Is There a Formula for Success?* 92 J. ENVTL. MGMT. 1354, 1357–58 (2011) (suggesting that adaptive management is still in a conceptual state and has not yet progressed to a point where it is practically implemented).

47. Doremus, *supra* note 15, at 52.

48. Ruhl & Fischman, *supra* note 9, at 431–36; McFadden et al., *supra* note 46, at 1335.

49. Allen et al., *supra* note 11, at 1342.

50. National Forest System Land Management Planning, 73 Fed. Reg. 21,468, 21,512 (Apr. 21, 2008).

merely by monitoring activities and occasionally changing them, one is doing adaptive management. Contrary to this commonly held belief, adaptive management is much more than simply tracking and changing management direction in the face of failed policies, and, in fact, such a tactic could actually be maladaptive. An adaptive approach involves exploring alternate ways to meet management objectives, predicting the outcomes of alternatives based on the current state of knowledge, implementing one or more of these alternatives, monitoring to learn about the impacts of management actions, and then using the results to update knowledge and adjust management actions.⁵¹

There is an obvious difference in intent, investment and prospects for success between approaches that propose to simply learn while doing and those that outline distinct feedback mechanisms dependent on the application of sound scientific principles.⁵²

The use of multiple definitions can present challenges to both agencies and reviewing courts when different agencies work together to develop and implement an adaptive management plan, as occurs commonly in protected species management. Inconsistent or contradictory definitions of adaptive management have resulted in confusion between managers and among all involved sectors, including stakeholders, policymakers, and the courts, about what adaptive management entails. For example, one sector involved with a particular management plan may believe active adaptive management is needed and apply a definition stressing features of experimental design, while another sector involved with the same plan may feel that passive adaptive management is required and apply a definition that merely requires monitoring. Use of inconsistent or contradictory definitions of adaptive management by different sectors has limited the ability to develop consistent and repeatable comprehensive adaptive management plans⁵³ or resulted in failure.⁵⁴

Just as adaptive management suffers from the lack of a uniform definition, it also suffers from the lack of a universally accepted approach.⁵⁵ Scientists, agencies, and political and legal institutions all appear to have different and often conflicting ideas about how adaptive management plans should function.⁵⁶ This can cause problems when these sectors work together to

51. U.S. INTERIOR DEP'T, ADAPTIVE MANAGEMENT: THE U.S. DEPARTMENT OF THE INTERIOR TECHNICAL GUIDE 1 (2009), available at <http://www.doi.gov/initiatives/AdaptiveManagement/TechGuide.pdf>.

52. Allen et al., *supra* note 11, at 1342.

53. *See id.*

54. Joseph J. Fontaine, *Improving Our Legacy: Incorporation of Adaptive Management into State Wildlife Action Plans*, 92 J. ENVTL. MGMT. 1403, 1407 (2011).

55. Allen et al., *supra* note 11, at 1342 (arguing that “[t]he definition of adaptive management is further confused because one of the powerful attributes of adaptive management is the ability to simultaneously address multiple needs of managers, scientists, and stakeholders”).

56. Inconsistent and even contradictory approaches and definitions of adaptive management have resulted in confusion and limited the ability of management organizations to develop consistent and repeatable comprehensive adaptive management programs. *Id.*

develop and implement an adaptive management plan, or when a plan is subject to judicial review. Scientists, for example, tend to emphasize formal experimentation in adaptive management plans, using replicates, controls, and extensive monitoring programs.⁵⁷ Agencies, on the other hand, value flexibility and discretion in the development and implementation of adaptive management plans which enable them to continue to act when financial and human resources may not be adequate, and to better respond to changing political and social situations.⁵⁸ Lastly, courts, environmental groups and legislators often seek the inclusion of specific criteria or “triggers” in adaptive management plans that will provide certainty and satisfy the substantive legal standards of relevant environmental laws.⁵⁹ Devising an adaptive management plan that satisfies the needs of all involved sectors has proven to be formidable.

Many of the above-noted impediments to adaptive management stemming from the lack of a uniform definition and approach could likely be eliminated through the enactment of statutory authority or adoption of well-defined regulatory standards. Providing statutory authority for adaptive management would advise agencies, courts, policymakers, and stakeholders when—and under what conditions—adaptive management was needed or warranted. Currently, adaptive management is merely agency policy and is not legally mandated.⁶⁰ This has largely resulted in agencies applying adaptive management only when and how they see fit.⁶¹ While statutory authority would more clearly establish when to apply adaptive management, regulatory standards would prescribe the necessary and suitable contents of adaptive management plans.⁶² The absence of clear statutory authority and well-defined regulatory standards has made the development, implementation and judicial evaluation of agency adaptive management plans difficult, as there have been no statutory standards for guidance or oversight and no concrete legal definitions for determining what qualifies as adaptive management. Professors J.B. Ruhl and Robert L. Fischman called for the passage of legislation that expressly requires adaptive management plans “to (1) clearly articulate measureable goals, (2) identify testable hypotheses . . . , and (3) state exactly what criteria should apply in evaluating management experiments.”⁶³ The few existing legal requirements for adaptive management plans have been

57. Doremus, *supra* note 15, at 53.

58. See Ruhl & Fischman, *supra* note 9, at 429–43.

59. See *id.*

60. *But see id.* at 447 (citing *Sw. Ctr. for Biodiversity v. Bartel*, 470 F. Supp. 2d 1118, 1145 (S.D. Cal. 2006) (nearly requiring adaptive management by holding that ESA habitat conservation plans must contain some provision to respond to “unforeseen circumstances”)).

61. The fact that adaptive management is not legally mandated renders it largely discretionary. See *id.* at 440 (“There are no statutory standards for oversight, no concrete legal definitions for determining what qualifies as adaptive management, and few binding steps in adopting adaptive management.”).

62. *Id.*

63. *Id.* at 482.

established under common law and are based on a relatively small number of cases. As will be discussed in the following section, these requirements are not particularly well defined and leave many unanswered questions.

Another factor which often significantly hinders the development and implementation of adaptive management plans is a lack of dedicated funding. Agencies cannot realistically be expected to conduct projects for which they have no funding.⁶⁴ This is especially true during an economic recession when state and federal appropriators have considerably trimmed agency budgets, funding only essential resource management activities and leaving field monitoring and experimentation to another time.⁶⁵ Current appropriation practice favors a reactive rather than proactive approach to funding, and along similar lines, often provides funding for the first stages of a program but not for subsequent stages.⁶⁶ These approaches are not conducive to effective adaptive management, which requires funding for both plan development and implementation activities, such as long-term monitoring and experimentation. Without funding to support it, adaptive management as originally conceptualized will simply not be possible;⁶⁷ indeed, without funding, adaptive management performed at even the most basic level is unlikely to be successful.

Although there have been no studies demonstrating a correlation between funding and the success of adaptive management plans to date, researchers have established a positive correlation between funding and the success of recovery plans under the ESA.⁶⁸ Not surprisingly, these studies have shown that the status of listed species with substantial government funds to support recovery efforts tends to improve, while the status of listed species without substantial funds tends not to improve and, on average, actually declines.⁶⁹ While the results of these studies may not be directly transferrable to the implementation of adaptive management plans, they illustrate the importance of funding in relation to agencies' abilities to meet statutorily required conservation objectives. Significantly, they also suggest the possible futility of developing recovery (or adaptive management) plans in the absence of funding to implement them. This is not to suggest that agencies do nothing if funds are

64. See *id.* at 442.

65. See *id.* at 440–41.

66. *Id.* at 481.

67. Allen et al., *supra* note 11, at 1343 (“We likely will not see adaptive management by U.S. agencies until Congress provides more funding for adaptive management and clear standards for the . . . process.”).

68. See Paul J. Ferraro et al., *The Effectiveness of the U.S. Endangered Species Act: An Econometric Analysis Using Matching Methods*, 54 J. ENVTL. ECON. & MGMT., 245, 245 (2007) (showing “that listing a species under the ESA is, on average, detrimental to species recovery if not combined with substantial government funds.”); see also Julie Miller et al., *The Endangered Species Act: Dollars and Sense?*, 52 BIOSCIENCE 163, 163–64 (2002) (analyzing 243 endangered species recovery plans and associated budgets, and finding that “[i]ncreased spending improves the chances for overall species recovery”).

69. Miller et al., *supra* note 68, at 165.

unavailable to implement adaptive management plans, but only that stakeholders should have realistic expectations about the success of plans under such circumstances.⁷⁰

The failure to engage stakeholders in the development of adaptive management plans can also impede implementation of the plans. To be effective, adaptive management must not only confront uncertainty in the natural environment, but also in the social dynamics of the human beings who will design, implement, and review performance of the plans.⁷¹ Participation of stakeholders is important in assessing and defining the resource problem and in determining management objectives.⁷² A lack of early engagement in the adaptive management process may lead stakeholders to reject results that vary from their expectations.⁷³ Failure to include critical stakeholders, because of neglect or malice, can have similar results.⁷⁴ While devising an adaptive management program for natural resources may involve issues that are contentious, resource managers should avoid attempting to anticipate stakeholders' views without bringing them to the table. Doing so may increase the prospect of unwelcome surprise when agencies' attempts to implement plans are thwarted by unengaged stakeholders raising challenges that were previously unknown or considered in the decision-making process.⁷⁵ It may also increase the chances of litigation over plan implementation as stakeholders uninformed with the process may be more likely to seek relief from the courts when dissatisfied with the outcomes than those who were actively engaged. Litigation, in turn, significantly increases the financial costs of adaptive management and reduces the amount of already scarce funds that are available to protect natural resources.

Given these challenges agencies face in attempting to develop and implement adaptive management plans, it is not surprising that, to date, the number of successful agency applications of adaptive management has remained relatively low. This in itself can be viewed as an additional impediment, given that agencies have had few examples of real world

70. See Ruhl & Fischman, *supra* note 9, at 441 ("The difference between adaptive management, as practiced, and the adaptive management concept universally praised as essential for dealing with the complexities of natural systems does not illustrate a disagreement about how adaptive management should work as much as it reveals the budgetary and political limitations of agencies responsible for implementation.").

71. See Andrew J. Tyre & Sarah Michaels, *Confronting Socially Generated Uncertainty in Adaptive Management*, 92 J. ENVTL. MGMT. 1365, 1369 (2011) (concluding that "recognizing socially generated uncertainty is an essential component of practicing adaptive management").

72. See Byron K. Williams, *Adaptive Management of Natural Resources—Framework and Issues*, 92 J. ENVTL. MGMT. 1346, 1348 (2011).

73. Craig R. Allen & Lance H. Gunderson, *Pathology and Failure in the Design and Implementation of Adaptive Management*, 92 J. ENVTL. MGMT. 1379, 1381 (2011).

74. *Id.*

75. See Allen et al., *supra* note 11, at 1343.

successes on which to model their own adaptive management attempts.⁷⁶

C. The Application of Adaptive Management to Climate Change and Endangered Species Protection

As acknowledged by the U.S. Supreme Court in *Massachusetts v. EPA*, there is broad scientific consensus that the Earth's climate is changing due to increased emissions of heat-trapping greenhouse gases.⁷⁷ While consensus exists that climate change is occurring, there is considerable uncertainty involved in predicting, understanding, and interpreting climate change and its effects on the environment.⁷⁸

In 2008, the EPA noted that “[c]limate change creates new situations of added complexity for which an adaptive management approach may be the only way to take management action today while allowing for increased understanding and refinement tomorrow.”⁷⁹ Commentators agree that “the effects of climate change on natural resources will be complex, dynamic, nonlinear, and frequently unpredictable over anything but short time frames, all of which are conditions that demand adaptive management responses.”⁸⁰ Indeed, climate change has been deemed the “quintessential adaptive management problem.”⁸¹

Because the degrees of complexity and uncertainty associated with climate change are so considerable, flexibility will be a necessary component of effective adaptive management plans addressing climate change. As highlighted below, this is in stark contrast to the requirements for successful adaptive management plans for protected species under the ESA.

To date, the ESA has served as the primary legal tool for species preservation in the United States. Policies and judicial doctrines formed under the ESA exemplify “the institutionalism of caution.”⁸² Under the Act, species extinction is to be avoided at all costs.⁸³

76. See *id.* at 1341 (noting the paucity of success stories as a challenge to implementing adaptive management).

77. See 549 U.S. 497, 504–05 (2007); FEDERAL AGENCY CLIMATE CHANGE ADAPTATION PLANNING, SUPPORT DOCUMENT 9 (Mar. 4, 2011), available at http://www.whitehouse.gov/sites/default/files/microsites/ceq/adaptation_support_document_3_3.pdf.

78. See, e.g., Jill S. Baron et al., *Chapter 4: National Parks*, in PRELIMINARY REVIEW OF ADAPTATION OPTIONS FOR CLIMATE-SENSITIVE ECOSYSTEMS AND RESOURCES 1, 24 (Susan Herrod Julius & Jordan M. West eds., 2008) available at <http://downloads.globalchange.gov/sap/sap4-4/sap4-4-final-report-all.pdf>.

79. Ruhl & Fischman, *supra* note 9, at 483 (citing Baron et al., *supra* note 78, at 1, 26–27).

80. *Id.* at 484.

81. Robin Kundis Craig, “Stationarity is Dead”—*Long Live Transformation: Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 65 (2010) (responding to this problem by encouraging agencies and lawmakers to “[b]e serious about using adaptive management—and change both natural resources and administrative laws to allow for it”).

82. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 178 (1978).

83. Olivia Odom Green & Ahjond S. Garmestani, *Adaptive Management to Protect Biodiversity: Best Available Science and Endangered Species Act*, 4 DIVERSITY 164, 165 (2012).

As a means of preventing extinction, the ESA includes several substantive requirements that compel agencies to take a prescribed course of action under a given set of circumstances, leaving little room for flexibility. Examples of this include the mandatory and uncompromising listing requirements for species determined “endangered” or “threatened” with extinction under section 4,⁸⁴ and, the “no jeopardy” requirements of section 7 under which federal agencies must ensure, through a biological opinion prepared in consultations with outside agencies, including the Fish and Wildlife Service and the National Marine Fisheries Service, that actions they take, fund, or authorize are “not likely to jeopardize the continued existence of” any listed species.⁸⁵ In reviewing adaptive management plans developed for ESA-managed species, courts have required that agencies meet the substantive requirements of the statute and have shown little tolerance for flexibility or discretion, in conformance with the existing law.⁸⁶

A 2002 Arizona District Court case, *Center for Biological Diversity v. Rumsfeld*, provides an early example of how management plans addressing ESA requirements have fared under judicial review.⁸⁷ In *Rumsfeld*, the Department of the Army sought to expand its development and groundwater pumping activities at Fort Huachuca, near a federally protected and managed riparian area. The riparian area included critical habitat for the threatened willow flycatcher (bird) and water umbrel (plant).⁸⁸ The Army prepared a water management plan as part of the section 7 consultation process, required under the ESA.⁸⁹ The plan included several alternative methods for project implementation that were incorporated in a Memorandum of Agreement (MOA) between the Army and the Fish and Wildlife Service, and on which the Service based its “no jeopardy” determination, allowing the project to move forward.⁹⁰ In reviewing the Army’s water resource management plan, which included the alternative methods of implementation addressed in the MOA, the court held:

Mitigation measures must be reasonably specific, certain to occur, and capable of implementation; they must be subject to deadlines or otherwise-enforceable obligations; and most important, they must address the threats to species in a way that satisfies the jeopardy and adverse modification standards.⁹¹

The criteria established for the Army’s water resource management plan that was developed under section 7 of the ESA in *Rumsfeld*—that plans must

84. 16 U.S.C. § 1533 (a)–(b) (2012).

85. 16 USC § 1536(a)(2).

86. Ruhl & Fischman, *supra* note 9, at 439–40.

87. 198 F. Supp. 2d 1139 (D. Ariz. 2002).

88. *See id.* at 1139–43.

89. *See id.* at 1144.

90. *See id.*

91. *Id.* at 1152.

include specific mitigation measures that are certain to occur—has been generally followed in adaptive management case law involving species protected by the ESA.⁹²

For example, in *Natural Resources Defense Council v. Kempthorne*, the Eastern District of California rejected an adaptive management plan for the threatened Delta smelt that was contained in a biological opinion prepared by the Fish and Wildlife Service pursuant to section 7 of the ESA.⁹³ The biological opinion was prepared in support of a water diversion project in the California Bay Delta and concluded that project operations, including the adaptive management plan set forth in the opinion, would not jeopardize the continued existence of the Delta smelt or adversely modify its critical habitat.⁹⁴ In evaluating the Service's adaptive management plan for the smelt, the court determined that it was "in substance an organizational flow chart" that prescribed certain administrative processes (e.g., meetings) when trigger criteria were exceeded.⁹⁵ The court noted, "Although mitigation measures are identified, no defined mitigation goals are required, nor is any time for implementation prescribed."⁹⁶ Citing *Rumsfeld*, the court stated that "a mitigation strategy must have some form of measureable goals, action measures, and a certain implementation schedule."⁹⁷ The *Kempthorne* court took little solace in the fact that the Fish and Wildlife Service promised to hold meetings and make recommendations for action if monitoring data indicated certain trigger points were met or exceeded.⁹⁸ While one could argue the Service's plan in essence satisfied the basic criteria for an adaptive management plan of "learning while doing"—albeit not on an established schedule—*Kempthorne* reaffirmed that courts require more from plans involving protected species than promises for future action. They require certainty that action will occur under predetermined circumstances.

One year later, in *Pacific Coast Federation of Fishermen's Ass'ns v. Gutierrez*, the same court upheld an adaptive management plan contained in a biological opinion for a threatened salmon affected by the same California Bay Delta water diversion project.⁹⁹ In this case, the adaptive management plan prepared by the National Marine Fisheries Service (NMFS) included specific triggers, or "action-mitigation thresholds" which were detailed and followed by pre-determined management actions that were made part of the express terms

92. Martin A. Nie & Courtney A. Schultz, *Decision-Making Triggers in Adaptive Management*, 26 CONSERVATION BIOLOGY 1137, 1139 (2012).

93. 506 F. Supp. 2d 322 (E.D. Cal. 2007).

94. *See id.* at 328.

95. *Id.* at 355.

96. *Id.*

97. *Id.*

98. *See id.* at 356 (complaining that "[a]lthough the *process* must be implemented . . . , nothing requires that any *actions* ever be taken").

99. 606 F. Supp. 2d 1122 (E.D. Cal. 2008).

and conditions of the biological opinion's Incidental Take Statement (ITS),¹⁰⁰ and were therefore enforceable under civil and criminal law.¹⁰¹ In addressing the enforceability of the plan, the court noted that the biological opinion's terms and conditions were a specific part of the ITS and that "it is well established that any biological opinion's ITS constitutes a permit authorizing the agency to 'take' the endangered or threatened species so long as the agency respects those terms and conditions."¹⁰² *Pacific Coast Federation* again emphasizes that the necessary ingredients for successful adaptive management plans for ESA protected species are specific, predetermined mitigation measures that are somehow legally enforceable.

These cases together demonstrate how the mandatory and uncompromising nature of key ESA provisions can constrain agencies and limit their ability to employ the flexibility in decision making that is required by both adaptive management and climate change. The *Kemphorne* court expressly recognized this challenge, when referencing the Fish and Wildlife Service's adaptive management plan for the protected smelt:

The conflict between Defendants' choice of a flexible management approach and Plaintiffs' concern to ensure enforceable protective actions are taken when necessary highlights the extent to which overly flexible adaptive management may be incompatible with the requirements of the ESA. . . . The case law sheds little light on how to harmonize these competing objectives.¹⁰³

The court went on to recognize that "[a]ll parties agree that adaptive management can be beneficial and that flexibility is a necessary incident of adaptive management. The law requires that a balance be struck between the dual needs of flexibility and certainty."¹⁰⁴ As the cases reviewing adaptive management plans for ESA protected species have shown to date, however, certainty trumps flexibility.

Indeed, commentators have largely agreed that adaptive management does not fit neatly within the ESA's existing statutory scheme.¹⁰⁵ This is not entirely

100. If the proposed federal project is likely to adversely affect an endangered species or its critical habitat, the agency is required to obtain a biological opinion (BO) and incidental take statement (ITS), also known as an Endangered Species Permit, to allow the agency to authorize or fund the project. An ITS provides express terms and conditions under which ESA listed species or critical habitat may be "taken" incidental to a federal activity approved pursuant to sections 7(b) and 7(o)(2) of the ESA. See 16 USC § 1536(b), (o)(2) (2012).

101. *Pac. Coast Fed'n of Fishermen's Ass'ns v. Gutierrez*, 606 F. Supp. 2d 1122, 1185 (E.D. Cal. 2008). Although NMFS' adaptive management plan for the salmon survived judicial review, the court struck down the biological opinion based on the court's finding that it that it was "unlawfully silent" regarding the impacts of global climate change on critical habitat. *Id.*

102. *Id.*

103. *Kemphorne*, 506 F. Supp. 2d at 352-53.

104. *Id.* at 356.

105. J.B. Ruhl, *Taking Adaptive Management Seriously: A Case Study of the Endangered Species Act*, 52 KAN. L. REV. 1249, 1265 (2004) (lamenting that "the ESA's statutory structure does not always

surprising given that the ESA was enacted in 1973 and was only meaningfully updated in 1982, before adaptive management or even climate change appeared on the collective radar. Because climate change has been deemed to be a circumstance that demands adaptive management, it has been suggested that there may be no practical way to administer the ESA in its current form to assist protected species affected by climate change.¹⁰⁶ Even a popular environmental law case book has pondered whether the ESA may become obsolete in response to climate change, by posing the question, “[a]re the ESA’s rationales dwarfed by the current reality of global climate change?”¹⁰⁷

Greater Yellowstone Coalition, discussed below, is the most recent case to review an agency’s attempt to implement an adaptive management plans for an ESA protected species affected by climate change. The case establishes how climate change impacts are to be addressed in adaptive management plans for protected species when adaptive management is the selected management approach. The case also illustrates how several of the challenges to adaptive management discussed in the previous section (e.g., lack of uniform definition, statutory authority, regulatory standards and funding) affect an agency’s ability to develop and implement a plan, as well as how a court deals with these issues upon reviewing the plan.

II. *GREATER YELLOWSTONE COALITION V. SERVHEEN*

A. *Prior History*

In 1975, the U.S. Fish and Wildlife Service (Service) listed the grizzly bear (*Ursus arctos horribilis*) as a threatened species under the ESA due to declining populations of the bear across the lower forty-eight states.¹⁰⁸ At the time of listing, the population estimate for grizzly bears in the Greater Yellowstone Area (GYA) ranged between 136 and 312 individuals.¹⁰⁹ In 1982, the Service developed and issued a Grizzly Bear Recovery Plan, as required for all ESA-listed species.¹¹⁰ The purpose of the Recovery Plan was to foster viable, self-sustaining populations of grizzly bears to previously occupied areas, including the GYA.¹¹¹ Because the Recovery Plan’s ultimate goal was the delisting of grizzly bear populations, population-based recovery criteria were established and monitored for each identified population area.¹¹² In 1993,

match up well with the adaptive management model” because “[t]he statute as a whole lacks a cohesive adaptive management architecture”).

106. Ruhl, *supra* note 8, at 7.

107. ZYGUMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY, NATURE, LAW, AND SOCIETY 783 (3d ed. 2004).

108. See *Greater Yellowstone Coal. v. Servheen*, 665 F. 3d 1015, 1020 (9th Cir. 2011).

109. *Id.*

110. *Id.*

111. *Id.*

112. *Id.*

the Service revised the Recovery Plan to include habitat-based criteria for each population area and also required the development of a “conservation strategy” to guide management and monitoring of bear populations and their habitats in the event of delisting.¹¹³

The Grizzly Bear Recovery Plan was considered a great success and had resulted in annual population growth rates for grizzlies in the GYA between 4.2 and 7.6 percent between 1982 and 2002.¹¹⁴ The Service determined in 2006 that the Recovery Plan’s population and habitat criteria for grizzlies in the GYA had been met. At this time, the population was estimated to be more than 500 bears and was approaching the carrying capacity of Yellowstone National Park.¹¹⁵

In March 2007, the Service completed and released the Final Conservation Strategy for the Grizzly Bears in the Greater Yellowstone Area (“Conservation Strategy”).¹¹⁶ The Conservation Strategy was the product of eight different federal and state management agencies, each of which signed a Memorandum of Understanding (MOU) agreeing to implement it.¹¹⁷ The participating agencies included: the Service; the U.S. Forest Service; the National Park Service; the U.S. Geological Survey; the Bureau of Land Management; the Montana Department of Fish, Wildlife and Parks; the Wyoming Game and Fish Department; and the Idaho Department of Fish and Game.¹¹⁸ The Conservation Strategy’s chief mechanisms for maintaining a recovered grizzly bear population were set forth in Chapter 2, containing its population standards and monitoring protocols,¹¹⁹ and, in Chapter 3, containing its habitat standards and monitoring protocols.¹²⁰ Ostensibly, the Conservation Strategy was to be implemented and funded by the eight federal and state agencies involved in its

113. *Id.*

114. *Id.*

115. *Id.*

116. U.S. FISH & WILDLIFE SERV., FINAL CONSERVATION STRATEGY FOR THE GRIZZLY BEAR IN THE GREATER YELLOWSTONE AREA (2007) [hereinafter CONSERVATION STRATEGY], available at <http://www.fws.gov/mountain-prairie/species/mammals/grizzly/ConservationStrategygrizzlybearGYA.pdf>.

117. *Id.* at 12–13.

118. *Greater Yellowstone Coal.*, 665 F.3d at 1021.

119. Population standards in the Conservation Strategy include the demographic criteria needed to achieve recovery and the criteria necessary to maintain it. The total population standard of 500 bears is the level needed to maintain recovery and ensure a minimum loss of genetic diversity. In addition, sixteen of eighteen bear units must be occupied by females and young within the recovery zone. Monitoring protocols provide the means to assess whether the population standards are being met. CONSERVATION STRATEGY, *supra* note 116, at 25–38.

120. Habitat standards in the Conservation Strategy include factors in the grizzly bear habitat that will need to be maintained or secured to maintain recovery of the bear population. Habitat standards include secure habitat standard; developed site standard; livestock allotment standard; secure habitat and motorized access route display; developed sites; livestock grazing; major foods; habitat effectiveness and habitat value; hunter numbers; private land development; and habitat connectivity. Monitoring protocols provide the means to assess whether habitat standards are being met. CONSERVATION STRATEGY, *supra* note 116, at 38–56.

development. With regard to funding, the MOU for implementation of the Conservation Strategy expressly provided:

Funding of this MOU is subject to approval and appropriations by approved state and federal entities. All agencies will take appropriate steps to seek funding to implement this document. The adequacy of the regulatory mechanisms demonstrated by this Conservation Strategy are dependent upon funding being available to fully implement the management and monitoring actions detailed in this document.¹²¹

Funding for implementation of the Conservation Strategy in the event of delisting was therefore not guaranteed, but was merely subject to availability.

Upon completion of the Conservation Strategy, the Service published its “Final Rule Removing the Yellowstone Distinct Population Segment of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife.”¹²² The Final Rule provided the scientific basis for the Service’s decision to delist the Yellowstone grizzly bear population and incorporated the Conservation Strategy as part of the Service’s justification for delisting. The Final Rule relied heavily upon adaptive management to support its delisting decision and expressly provided:

*Recovery of a species is a dynamic process requiring adaptive management (defined as a 6-step feedback loop including assessment, design of management actions and associated monitoring and research, implementation of management according to design, monitoring, evaluation of outcomes, and adjustment of management based on evaluation of initial management actions) that may or may not, fully follow the guidance provided in a recovery plan. In the end, any determination of whether a species is no longer in need of the protections of the Act must be based on an assessment of the threats to the species.*¹²³

In further support of its reliance on adaptive management, the Final Rule described the Conservation Strategy as “an adaptive, dynamic document that establishes a framework to incorporate new and better scientific information as it becomes available or necessary in response to environmental challenges.”¹²⁴ Thus, the Service considered the Conservation Strategy as an adaptive management plan that would guide management actions in the event of delisting.

121. CONSERVATION STRATEGY, *supra* note 116, at 12.

122. Final Rule Designating the Greater Yellowstone Area Population of Grizzly Bears as a Distinct Population Segment; Removing the Yellowstone Distinct Population Segment of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife; 90-Day Finding on a Petition to List as Endangered the Yellowstone Distinct Population of Grizzly Bears, 72 Fed. Reg. 14,866 (Mar. 29, 2007) [hereinafter Final Rule].

123. *Id.* at 14,869.

124. *Id.* at 14,874; *see also id.* at 14,936 (“The [Conservation] Strategy and appended State grizzly bear management plans effectively satisfy the requirements for having a post-delisting monitoring plan for the Yellowstone DPS . . . [the Conservation Strategy and appended State plans] will provide a highly sensitive system to monitor the health of the population and its habitat and provide a sound scientific basis to respond to any changes or needs with adaptive management actions.”).

The Final Rule provided a summary of the population growth for the GYA grizzly bear, as provided above. It also described the feeding and foraging habits of the bear and included a lengthy discussion regarding the effects of climate change on the whitebark pine, a key food source for the Yellowstone grizzly.¹²⁵ Specifically, the Final Rule presented the following scientific findings with regard to the whitebark pine: 1) the seeds of the whitebark pine are one of only four food sources “important to grizzly bear survival and reproductive success”¹²⁶; 2) the pine seeds “serve as an important fall food due to their high fat content and abundance as a pre-hibernation food, and the bears consume them ‘extensively’ and ‘predominantly’ when available”¹²⁷; 3) there is “a general concern among the world’s best scientists that climate change is occurring, and that the magnitude of the change in the northern Rocky Mountains, including the GYA, has been particularly great”¹²⁸; 4) climate change is believed to accelerate the proliferation of mountain pine beetles and blister rust, pest species to the whitebark pine that have led to increased mortality rates for the trees in the GYA at levels ranging from 10 to 25 percent¹²⁹; 5) there is a “well-documented” association between reduced whitebark pine seed abundance and increased grizzly bear mortality¹³⁰; and 6) the impact of whitebark pine declines on the Yellowstone grizzly distinct population segment (DPS) is difficult to predict with certainty.¹³¹

The Final Rule explicitly recognized that the impact of whitebark pine declines due to climate change and their resultant effects on the Yellowstone

125. The whitebark pine (*Pinus albicaulis*) is a five-needled conifer classified as a stone pine. Stone pines are distinguished by large, dense seeds that lack wings and therefore depend upon birds and squirrels for dispersal. The whitebark pine is ecologically very significant in maintaining snow pack and regulating runoff, initiating succession after fire or disturbance, and providing seeds that are high energy foods for many species of wildlife. The species is experiencing an overall long-term pattern of decline due to threats posed by environmental effects resulting from climate change, white pine blister rust, mountain pine beetle infestation, catastrophic fire and the inadequacy of existing regulatory mechanisms. In July 2011, the U.S. Fish and Wildlife Service determined the whitebark pine warrants protection under the Endangered Species Act. The Service claims that the species appears to be in danger of extinction, potentially within as few as two to three generations. *Endangered Species: Mountain-Prairie Region: Whitebark Pine*, U.S. FISH & WILDLIFE SERV. (July 18, 2011), <http://www.fws.gov/mountain-prairie/species/plants/whitebarkpine/>.

126. Final Rule, 72 Fed. Reg. at 14,867. The other three major food sources for the Yellowstone grizzly bears are winter-killed ungulates, cutthroat trout, and cutworm moths. Evidence contained in the Final Rule also suggests that the abundance and distribution of cutworm moths may be affected by climate change. *See id.* at 14,932 (“Climate change may affect army cutworm moths by changing the distribution of plants that the moths feed on or the flowering times of those plants due to an increased growing season. Food plant distribution could be affected by shifting the range and distribution of alpine plant communities, upon which army cutworm moths feed. There is a possibility that high elevation plant communities might disappear entirely in the GYA, as they have been predicted to do in Britain.”).

127. *Id.* at 14,933.

128. *Id.* at 14,927.

129. *Id.* at 14,928–29.

130. *Id.* at 14,899.

131. *Id.* at 14,929.

grizzly bear population were difficult to predict with certainty.¹³² It then described how the Service intended to apply adaptive management to address the scientific uncertainty stemming from effects of climate change on the whitebark pine (and other food sources) following delisting of the grizzly bear. In relevant part, the Final Rule provided:

In light of the potential threats to the survival of several of these important, high-energy grizzly bear foods, especially whitebark pine which has been linked to grizzly bear survival and reproduction, we believe the best approach is one of adaptive management. The Study Team, working with the USDA Forest Service and National Park Service will continue to monitor the abundance and distribution of major grizzly bear foods such that any decline in the grizzly bear population as a result of these declines is detected in sufficient time and addressed through adaptive management actions by the Coordinating Committee. Because of this flexible and responsive management framework, we do not anticipate that the Yellowstone DPS is likely to become endangered in all or a significant portion of its range in the foreseeable future due to changes in food sources

If declines in any of the four major foods occur and, using the best scientific data and techniques, the Study Team concludes that these are related to significant increases in known and probable bear mortalities, and such increases could threaten the grizzly population, the Study team would recommend appropriate management responses to the Coordinating Committee, or submission of a relisting petition to us. Although we believe such an outcome is unlikely, we can also relist the Yellowstone DPS independent of the petition process. This final rule and the Conservation Strategy describe a comprehensive monitoring and management system that will be in place for the Yellowstone grizzly bear DPS upon delisting. The dynamic nature of the Conservation Strategy and its regulatory framework provide us with reasonable assurance that the Yellowstone DPS is not likely to become endangered in all or a significant portion of its range in the foreseeable future.¹³³

The language in the Final Rule failed to articulate exactly how the Service's adaptive management plan for the grizzly bear would address declines of the whitebark pine brought about by climate change, other than to state it would be "dynamic" and "flexible" enough to support consideration of a relisting petition for the species, if bear mortalities increased significantly.

Within months of the Service publishing its Final Rule and Conservation Strategy for the Yellowstone grizzly DPS, the Greater Yellowstone Coalition¹³⁴ filed suit in the U.S. District Court of Montana, claiming the

132. *Id.*

133. *Id.* at 14,933.

134. The Greater Yellowstone Coalition is a non-governmental organization based in Bozeman, Montana, comprised of "people protecting the lands, water and wildlife of the Greater Yellowstone

Service's decision to delist the grizzly was arbitrary, capricious and violated the ESA's section 4 listing criteria on several grounds.¹³⁵ The Montana District Court agreed with the Coalition on two of its claims and held that the Service failed to: 1) rationally support its conclusion that a projected decline in whitebark pine due to climate change did not threaten the Yellowstone grizzly under ESA section 4(E); and 2) rationally support its conclusion that the Conservation Strategy provided adequate regulatory mechanisms to maintain a recovered Yellowstone grizzly population after delisting under ESA section 4(D). The Montana District Court's ruling enjoined the Service from removing the Yellowstone grizzly DPS from the ESA's list of threatened species.¹³⁶ The Service appealed.

B. The Court's Review of the Service's Use of Adaptive Management

The Ninth Circuit reviewed the Service's decision to delist the Yellowstone grizzly pursuant to the substantive listing requirements of the ESA. Under section 4 of the ESA, a species must be listed if it is determined to be "endangered"¹³⁷ or "threatened"¹³⁸ because of any one or a combination of the following factors: "(A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence."¹³⁹

Agencies must make decisions about listing or delisting a species "solely on the basis of the best available scientific and commercial information regarding a species' status, without reference to economic or other impacts of such determination."¹⁴⁰ A species may be delisted if the best scientific and commercial data available demonstrate that the species is no longer endangered or threatened because of (1) extinction, (2) recovery, or (3) error in the original data used to classify the species.¹⁴¹

ecosystem, now and for future generations." See GREATER YELLOWSTONE COAL., <http://greateryellowstone.org/> (last visited May 16, 2013).

135. Greater Yellowstone Coal. v. Servheen, 672 F. Supp. 2d 1105, 1109 (D. Mont. 2009) ("[The Coalition] claims the delisting decision violates the ESA on four grounds: (1) there are inadequate regulatory mechanisms to protect the grizzly near once it is delisted; (2) the Service did not adequately consider the impacts of global warming and other factors on whitebark pine nuts, a grizzly food source; (3) the population is unacceptably small and dependent on translocation of outside animals for genetic diversity; and (4) the Service did not properly consider whether the grizzlies are recovered across a significant portion of their range.").

136. *Id.* at 1126; Greater Yellowstone Coal. v. Servheen, 665 F. 3d 1015, 1023 (9th Cir. 2011).

137. An endangered species is "any species which is in danger of extinction throughout all or a significant portion of its range." 16 U.S.C. § 1532(6) (2012).

138. A threatened species is "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1532 (20).

139. 16 U.S.C § 1533(a)(1); 50 C.F.R. § 424.11(c) (2013).

140. 50 C.F.R. § 424.11 (b).

141. *Id.* § 424.11 (d).

A species reaches “recovery” when there is improvement in its status such that it is no longer “threatened” or “endangered.”¹⁴² The analysis for a delisting due to recovery must include an evaluation of the threats that existed at the time of listing as well as those that currently exist or could potentially affect the species in the foreseeable future once the protections of the Act are removed. The impacts of climate change on whitebark pine communities in the GYA, and therefore, on the GYA grizzly bear, were one of the factors the Service evaluated under its ESA section 4(E) analysis, and, as noted above, was a factor the Service proposed to manage through the use of adaptive management.¹⁴³

Climate change impacts fall solidly within the realm of ESA section 4(E): “other natural or manmade factors affecting [a species]’ continued existence.”¹⁴⁴ Greenhouse gas emissions are indisputably a “manmade factor” affecting the grizzly bear’s continued existence, particularly if one employs a broad interpretation of statutory terms with application to climate change management as called for by the Supreme Court in *Massachusetts v. EPA*. The Service’s ESA section 4(E) analysis concluded that any changes in whitebark pine attributable to climate change were not likely to affect the Yellowstone grizzly DPS to a point where it is likely to become an endangered species in the foreseeable future.¹⁴⁵

In reviewing the Service’s factor E analysis, the Ninth Circuit determined: “On the basis of the information the Service presents in the Rule, it cannot reasonably be denied that whitebark pine loss presents at least a potential threat to the Yellowstone grizzly population.”¹⁴⁶ While the court recognized the Service’s express acknowledgements that “the specific amount of decline in whitebark pine distribution and the rate of this decline are difficult to predict with certainty” and “[t]he specific response of the grizzly bears to declines in whitebark cone production is even more uncertain,”¹⁴⁷ it concluded that “the Rule presents no data showing that whitebark population declines will not threaten the Yellowstone grizzly population and considerable data pointing in the opposite direction.”¹⁴⁸

The court then addressed the Service’s repeated reliance in the Final Rule on adaptive management as apparent justification for its decision to delist the Yellowstone grizzly in light of the noted scientific uncertainties relating to whitebark pine.¹⁴⁹ First, the court stated it was not enough for the Service to

142. *Id.* § 402.02 (2013).

143. Final Rule, 72 Fed. Reg. 14,929 (Mar. 29, 2007).

144. Ruhl, *supra* note 8, at 32 (discussing the ESA’s listing requirement under factor E: “[t]he effects of climate change . . . are unambiguously within the ambit of listing criteria, leaving no room for the FWS to argue that it may leave climate change out of the listing calculus.”).

145. Final Rule, 72 Fed. Reg. at 14,929.

146. *Greater Yellowstone Coal. v. Servheen*, 665 F.3d 1015, 1024–25 (9th Cir. 2011).

147. *Id.* at 1028.

148. *Id.* at 1029.

149. *Id.* at 1028; *see* Final Rule, 72 Fed. Reg. at 14,933 (In reference to its reliance on adaptive management actions, the Service states “[b]ecause of this flexible and responsive management

simply claim “scientific uncertainty” to support its actions to delist the bear and manage it through adaptive management. If the Service was going to depend on scientific uncertainty to justify its actions, the court required that the Service rationally explain why uncertainty regarding the impact of whitebark pine loss on the grizzly favored delisting then, as opposed to conducting more study on the whitebark pine.¹⁵⁰

The court noted the Service’s use of adaptive management to address scientific uncertainties related to climate change impacts on the whitebark pine, but, rejected “out of hand” any suggestion that the future possibility of relisting a species—which was the Service’s proposed course of action if the grizzly population declined under the Conservation Strategy—could operate as a reasonable justification for delisting.¹⁵¹ Then, the court found that the Service failed to provide any specific details regarding the adaptive management actions it planned to take if increases in grizzly mortalities were noted through its monitoring programs, or, why they would reasonably be likely to reduce bear mortalities caused by whitebark pine loss.¹⁵² The court determined that for adaptive management of a potential threat (e.g., whitebark pine loss due to climate change) to suffice as a basis for a delisting determination, “more specific management responses, tied to more specific triggering criteria are required.”¹⁵³

Finally, the court stated, “[j]ust as it is not enough to invoke ‘scientific uncertainty’ to justify an agency action, it is not enough to invoke ‘adaptive management’ as an answer to scientific uncertainty.”¹⁵⁴ The court provided additional support for its determination by acknowledging that although the Conservation Strategy establishes an intensive management and monitoring framework, “it unfortunately was not developed to be responsive to whitebark pine declines. In fact, it does not even specifically discuss them.”¹⁵⁵ The court opined that because the Conservation Strategy was not developed to specifically address whitebark pine declines caused by climate change, its “effectiveness as a response [was] speculative.”¹⁵⁶

Like the Montana District Court before it, the Ninth Circuit held that the Service failed to articulate a rational connection between the data before it and its conclusion that whitebark pine declines due to global warming were unlikely to threaten the Yellowstone grizzly. On this basis, the court rejected the Service’s factor (E) determination and struck down the Service’s Final Rule

framework, we do not anticipate that the Yellowstone DPS is likely to become endangered in all or a significant portion of its range in the foreseeable future due to changes in its food source.”).

150. *Greater Yellowstone Coal.*, 665 F.3d at 1028.

151. *Id.* at 1029.

152. *Id.*

153. *Id.* (citing *Natural Res. Def. Council v. Kempthorne*, 506 F. Supp. 2d 322, 341 (E.D. Cal. 2007)).

154. *Id.*

155. *Id.* at 1029.

156. *Id.*

delisting the Yellowstone grizzly DPS as well as the Service's adaptive management plan.¹⁵⁷ While the Ninth Circuit's rejection of the Service's ESA section 4(E) determination was enough to strike the Final Rule and prevent delisting of the Yellowstone grizzly DPS, the court reviewed the Service's determination that adequate regulatory mechanisms were in place to maintain a recovered Yellowstone grizzly population following delisting, as required by ESA section 4(D). The court found that adequate regulatory mechanisms existed and reversed the Montana District Court's decision on this issue.¹⁵⁸ The majority for the Ninth Circuit based its decision on the fact that the habitat conservation standards contained in the Conservation Strategy had been incorporated into 1) the National Park Superintendents' Compendiums for Yellowstone and Grand Teton National Parks, and 2) the Forest Plan for the Greater Yellowstone Area National Forests, both of which the court found to have federal regulatory force, and therefore a means of enforcement.¹⁵⁹

As a result of the Ninth Circuit's decision, the Yellowstone grizzly remains on the ESA's list of threatened species. At least for the time being, anyway. In July 2012, reports surfaced that the Service and other agencies expected to complete an analysis of the effect of the decline of the whitebark pine on bear populations by early 2014, and anticipated publishing a new delisting petition in 2014 or 2015.¹⁶⁰

C. *Lessons About Adaptive Management Resulting from the Court's Decision*

The Ninth Circuit's holding in *Greater Yellowstone Coalition* raises several notable issues relating to agencies' use of adaptive management, including their use of adaptive management to manage protected species affected by climate change.

As a preliminary matter, the court's upholding of the Service's decision to analyze climate change impacts to the whitebark pine (and ultimately the grizzly bear) under ESA section 4(E), as "manmade factors affecting a species'

157. *Id.* at 1030.

158. *Id.* at 1032.

159. *Id.* at 1030–33. Judge Sidney Thomas provided a dissenting opinion on this issue based on his determination that compliance with the Conservation Strategy was "purely voluntary" given the provision in the Final Rule stating that "[t]he Strategy cannot legally compel any of the [agencies] to implement management policies or obligate funding." *Id.* at 1033–36 (Thomas, J., dissenting).

160. Ben Neary, *Interior Secretary Calls for Grizzly Delisting by 2014*, ASSOCIATED PRESS (July 23, 2012), http://missoulian.com/news/state-and-regional/interior-secretary-calls-for-grizzly-bear-delisting-by/article_19a977bc-d50f-11e1-96c4-0019bb2963f4.html. The article notes that as a result of four deaths from grizzly maulings in Yellowstone National Park during 2010 and 2011, politicians, local residents and park users called for enhanced efforts to delist the bear. *See also* Dave Smith, *Yellowstone Grizzlies and Glacier Grizzlies Will Be Delisted in 2014*, EXAMINER.COM (June 3, 2012), <http://www.examiner.com/article/yellowstone-grizzlies-glacier-grizzlies-will-be-delisted-2014>. This report states that Serveen and his colleagues already knew when Yellowstone grizzlies will be delisted, but that he was not willing to share that information with the public.

existence,” provides additional support for the view that climate change impacts on protected species should be regulated under the ESA. This is in line with the Supreme Court’s ruling in *Massachusetts v. EPA*, which endorsed broad interpretation of statutory terms having application to climate change management.

The Service’s categorization of climate change as a manmade factor affecting grizzly bears’ existence is not the first time an agency has successfully applied the ESA in this manner to regulate a species adversely affected by climate change. In 2005, NMFS successfully proposed listing Elkhorn and Staghorn coral as threatened species where evidence showed both species were exposed to the effects of persistent elevated temperatures and sea-level rise as a result of increased global air and sea surface temperatures relating to heightened carbon dioxide levels.¹⁶¹ NMFS’s listing analysis under ESA section 4 in support of its listing petition addressed climate change impacts on the corals under both factor E (natural and manmade factors affecting the species’ existence) and factor A (present or threatened destruction, modification, or curtailment of its habitat or range).¹⁶²

More recently, NMFS has proposed listing an additional sixty-six species of coral, largely due to climate change impacts.¹⁶³ For several of the coral species, NMFS indicated that “high vulnerability due to ocean warming,” supported listing under ESA section 4(E).¹⁶⁴ NMFS’s recent listing proposal for corals provides a glimpse of what the future is likely to hold with regard to the increasing number of species likely to be affected by climate change, and evinces the need for clarity in the laws regarding the regulation and management of these species—including laws pertaining to the implementation of adaptive management measures—so agencies and courts will be prepared to handle the volumes of cases with which they are likely to be presented in the not too distant future. Although it was not a prominent factor in *Greater Yellowstone Coalition*, the Ninth Circuit’s analysis of climate change impacts on a protected species under ESA section 4(E) suggests that agencies must include climate change impacts in their listing analysis under the ESA.

As to adaptive management itself, *Greater Yellowstone Coalition*

161. 70 Fed. Reg. 24,359, 24,359–65 (May 9, 2005).

162. *Id.* at 24,361–62.

163. Proposed Listing Determination of 82 Reef Building Coral Species; Proposed Reclassification of *Acropora palmate* and *Acropora cervicornis*, 77 Fed. Reg. 73,220 (proposed Dec. 7, 2012) (to be codified at 40 C.F.R. pt. 223–24); see also, Press Release, Nat’l Res. Comm., *Coral ESA Proposal Recognizes Ocean is Ground Zero for Climate Change* (Nov. 30, 2012), available at <http://democrats.naturalresources.house.gov/press-release/markey-coral-esa-proposal-recognizes-ocean-ground-zero-climate-change> (“This proposal of coral species recognizes that our oceans are ground zero for the damaging effects of climate change. Protecting coral will also protect people, and the foundations of the marine economies that are dependent on healthy coral reefs.”).

164. In addition to ocean warming, NMFS also analyzed threats posed to the coral species by ocean acidification under ESA section 4, factor E, and sea-level rise under factor A, *supra* note 163, at 27. See Determination of Threatened Status of Polar Bear (*Ursus maritimus*) Throughout its Range, 73 Fed. Reg. 28,277 (May 15, 2008).

established that where scientific evidence of climate change impacts to an ESA protected species is presented, and adaptive management is relied upon to manage the effects of climate change on the species, agencies must adequately address climate change in their plans to survive judicial review.¹⁶⁵ The court determined the Service's adaptive management plan for the grizzly bear—which called for monitoring of the bear populations in light of evidence of climate change impacts and consideration of a relisting petition if bear mortalities increased significantly—failed to address climate change impacts on the bear adequately. In reaching this determination, the court applied the rule of law for adaptive management plans for ESA protected species set forth in *Kemphorne* and *Pacific Coast Federation*; that adaptive management plans for threats affecting these species include specific, predetermined management responses, tied to specific triggering criteria in fulfillment of the ESA's substantive requirement that the plans be enforceable and therefore certain to occur.¹⁶⁶ While the court acknowledged that the climate change impacts on the bear were uncertain—as climate change impacts generally are—its ruling provides agencies with little room to incorporate flexibility into their plans, as climate change management demands.¹⁶⁷

Moreover, because the number of protected species affected by climate change is rapidly increasing, and because adaptive management is the recommended management approach for species affected by climate change, an unintended consequence of *Greater Yellowstone Coalition* is that species recovery and delisting is likely to become harder to attain for species affected by climate change. Agencies will have difficulty crafting effective adaptive management plans for these species that are able to survive judicial review by simultaneously meeting the mandatory de-listing requirements of ESA section 4 while incorporating the requisite flexibility to address climate change. The case further illustrates the need for changes in the law relating to adaptive management plans for protected species affected by climate change that will appropriately balance the needs of flexibility and certainty.

In addition to factors specifically relating to climate change, *Greater Yellowstone Coalition* also reveals how several of the challenges to adaptive management discussed above in Part I.B (e.g., lack of uniform definition, statutory authority, regulatory standards, and dedicated funding) can affect an agency's ability to effectively develop and implement an adaptive management plan, as well as a court's ability to effectively review it.

In *Greater Yellowstone Coalition*, the Service defined adaptive management in the Final Rule as

a 6-step feedback loop including assessment, design of management actions and associated monitoring and research, implementation of management

165. *Greater Yellowstone Coal. v. Servheen*, 665 F.3d 1015, 1030 (9th Cir. 2011).

166. *Id.* at 1029.

167. *See id.* at 1028.

according to design, monitoring, evaluation of outcomes, and adjustment of management based on evaluation of initial management actions, that may or may not, fully follow the guidance provided in a recovery plan.¹⁶⁸

In comparison, the Service defined the Conservation Strategy—its adaptive management plan—as “an adaptive, dynamic document that establishes a framework to incorporate new and better scientific information as it becomes available or necessary in response to environmental challenges.”¹⁶⁹ The Ninth Circuit, in reviewing the Service’s adaptive management plan for the Yellowstone grizzly, applied yet a third definition for adaptive management, and described it as “a structured process for learning by doing” and “a method for examining alternative strategies for meeting measureable biological goals and objectives, and then, if necessary, adjusting future conservation management actions according to what is learned.”¹⁷⁰ Differences in semantics aside, the three definitions for adaptive management vary markedly in their levels of complexity, ranging from the elaborate “six-step feedback loop” contained in the Final Rule, to the simple “framework” of the Conservation Strategy, to the court’s “method for examining alternative strategies” that seems to fall somewhere in the middle. While the general gist of the three definitions is somewhat similar, it is unclear whether the Service and the court were in agreement about what an adaptive management plan is, and how it should function. The success of an adaptive management plan could be compromised where an agency applies one definition for adaptive management, and devises and implements its plan according to that definition, and a reviewing court, in subsequently evaluating the legality of the plan, applies another definition, involving a different level of complexity, or set of requirements. Developing a uniform definition for adaptive management will ensure that all agencies and sectors involved with the development, implementation and review of adaptive management plans have a common understanding about what is involved in the process. Not only will establishment of a uniform definition reduce confusion among different agencies and sectors involved with a particular plan, but it will allow agencies to develop and implement their plans according to the same standard they know a court will impose in reviewing it. Developing an adaptive management plan under a predetermined definition employed by all sectors will enhance a plan’s likelihood of surviving judicial review.

Many of the problems stemming from the lack of a uniform definition could be resolved—at least in part—through the enactment of statutory authority and adoption of well-defined regulatory standards. In their absence, all sectors must independently decide *when* adaptive management plans are appropriate, *how* they should be implemented, and *what* they should include.

168. 72 Fed. Reg. 14,866, 14,869 (Mar. 29, 2007).

169. 72 Fed. Reg. at 14,874.

170. *Greater Yellowstone Coal.*, 665 F.3d at 1029 n.5.

This can result in problems when the different sectors are not in sync. In *Greater Yellowstone Coalition*, not only did the Service and the court apply different definitions, but the court also evaluated the contents of the Service's plan under the rule of law provided in *Kemphorne* and *Pacific Coast Federation*, which were decided, respectively, in December of 2007 and May of 2008—*after* the Service had finalized its Final Rule and Conservation Strategy. Thus, while the Service did not have the benefit of these cases at the time it developed and implemented its adaptive management plan for the grizzly, both the Montana District Court and Ninth Circuit did at the time these courts reviewed the Service's plan. It is unknown whether the Service would have applied the holdings and analysis of the *Kemphorne* and *Pacific Coast Federation* decisions to the development of its adaptive management plan, but it is clear the Service did not have the opportunity to do so. The court's application of a legal standard and analysis that were not available to the Service may have contributed to the failure of the Service's proposed adaptive management plan. Moreover, the rule articulated in *Kemphorne* and on which the Ninth Circuit relied—that adaptive management plans for threats affecting protected species include specific, predetermined management responses, tied to specific triggering criteria—provides minimal guidance to agencies regarding the contents of a plan, and no guidance regarding when plans are necessary or appropriate. *Greater Yellowstone Coalition* reaffirms the need for statutory authority and well-defined standards for adaptive management plans that clearly articulate when adaptive management is needed or permissible, the criteria that should be included in plans, and how plans should be implemented. This will assist all sectors involved with the development, implementation, and review of adaptive management plans by ensuring they are operating under the same criteria, which will enhance a plan's chance of success.

Although the majority in *Greater Yellowstone Coalition* did not address the lack of definite funds to implement the Service's proposed adaptive management plan for the grizzly, adequate funding is vital for a plan's success and merits some discussion. In *Greater Yellowstone Coalition*, the MOU for the Conservation Strategy expressly provided that funding was "subject to approval and appropriations by approved state and federal entities," and that the ability to fully implement the management and monitoring actions contained in the Conservation strategy was "dependent on funding being available."¹⁷¹ The agencies were therefore clear that funding to implement the plan was not guaranteed, but merely speculative. This fact was further demonstrated by the Service's response to a reviewer's question concerning the availability of resources to ensure implementation of the Conservation Strategy, which was provided in the Final Rule.¹⁷² The Service stated: "While the Strategy cannot legally compel any of the signatories to implement management policies or

171. CONSERVATION STRATEGY, *supra* note 116, at 12.

172. 72 Fed. Reg. at 14,904.

obligate funding, the various Federal agencies' and State governments' signatures on the Strategy clearly indicate their intention to manage the grizzly bears according to the Strategy." Dissenting Judge Sidney Thomas noted this passage of the Final Rule, and cited it as partial justification for his rejection of the Conservation Strategy under ESA section 4(D) (inadequacy of existing regulatory mechanisms).¹⁷³

Greater Yellowstone Coalition thus also demonstrates that judicial approval—and therefore implementation of an adaptive management plan—may not be possible without a clear source of funding. Agencies should not be required to conduct projects where funding is not available, and are understandably hesitant to fully commit to elaborate plans where funding is speculative for fear of being sued if funding fails to materialize and they are unable to meet their legal obligations under the plans. The case further confirms that dedicated funding is needed for adaptive management plans to better ensure full agency commitment throughout the course of a given plan. The Natural Resources Defense Council—an interested stakeholder in the case that filed an amicus brief to prevent delisting—recently raised the need for dedicated funding to support management actions in the event of a future delisting. It noted that if the Yellowstone grizzlies are eventually delisted, federal funds would be lost—including those provided under ESA section 6's Cooperative Endangered Species Conservation Fund.¹⁷⁴ To obtain dedicated funding, appropriations practices must be altered to favor a proactive approach to funding species conservation efforts rather than the reactive approach currently employed. Also, in order to support plan effectiveness, dedicated funding should provide for both development and implementation activities, including monitoring and experimentation over the long term.

The preceding discussion of points raised by *Greater Yellowstone Coalition* support the contention made by several commentators that we are not likely to see adaptive management by U.S. agencies (at least as conceptualized) until Congress provides more funding for adaptive management and clear standards for the process.¹⁷⁵ Given climate change's impact on an escalating number of U.S. species and the fact that adaptive management is the prescribed course of management for these species, congressional action is urgently needed. While it is not likely to eliminate all of the concerns surrounding the management of species impacted by climate change, the FWP Strategy, discussed in the next Part, may provide the best hope for preserving these species.

173. *Greater Yellowstone Coal.*, 665 F.3d at 1034; *see also supra* note 159.

174. Irene Roxanne Tejaratchi, *The Good, the Bad and the Grizzly: Delisting the Grizzly*, PBS.ORG (Nov. 2004), available at <http://www.pbs.org/wnet/nature/episodes/the-good-the-bad-and-the-grizzly/delisting-the-grizzly/118>; *see also* Motion to File Supplemental Brief, *Greater Yellowstone Coal. v. Servheen*, 665 F.3d at 1034 (9th Cir. 2010) (No. 09-36100), 2010 WL 5810059.

175. *See* Allen et al., *supra* note 11, at 1343.

III. THE NATIONAL FISH, WILDLIFE AND PLANTS CLIMATE ADAPTION STRATEGY

A. History of the FWP Strategy

On October 5, 2009, President Barack Obama signed Executive Order 13514 (EO 13514) focused on Federal Leadership in Environmental, Energy, and Economic Performance.¹⁷⁶ The Order sets sustainability goals for federal agencies and focuses on making improvements in their environmental, energy, and economic performance.¹⁷⁷ Under the EO, each federal agency assesses climate change risks and vulnerabilities to manage the effects of climate change on its mission, programs and operations.¹⁷⁸ EO 13514 was developed by the Council on Environmental Quality (CEQ), the Office of Management and Budget (OMB) and the Office of the Federal Environmental Executive.¹⁷⁹

While the Order's primary focus is to make reductions in greenhouse gas emissions a priority for federal agencies, section 16 of the EO requires agencies to participate in the Interagency Climate Change Adaptation Task Force,¹⁸⁰ which is developing domestic and international facets of the U.S. strategy for climate change adaptation, and, to devise policies that are compatible with and will reinforce that strategy.¹⁸¹ Section 8(i) of the EO requires each federal agency to evaluate the effects of climate change on the agency's mission and operations.¹⁸² EO 13514 acknowledges the Federal government's obligation to conduct adaptation planning based on the wide-ranging effects climate change has on federal services, operations programs, and assets—including land, water, and natural resources—and demonstrates the Administration's commitment to climate change.¹⁸³

176. Press Release, The White House Office of the Press Sec'y, President Obama signs an Executive Order Focused on Federal Leadership in Environmental, Energy and Economic Performance (Oct. 5, 2009), available at http://www.whitehouse.gov/the_press_office/President-Obama-signs-an-Executive-Order-Focused-on-Federal-Leadership-in-Environmental-Energy-and-Economic-Performance.

177. *Id.*

178. *Climate Change Adaptation Task Force*, COUNCIL ON ENVTL. QUALITY, <http://www.whitehouse.gov/administration/eop/ceq/initiatives/adaptation> (last visited May 16, 2013).

179. *Id.* The Office of the Federal Environmental Executive is responsible for promoting sustainability and environmental stewardship throughout Federal government operations. The Office was created by Executive Order in 1993. It is housed at the President's Council on Environmental Quality, and is administered by EPA and stewards the interagency Steering Committee on Federal Sustainability. See OFEE, www.ofee.gov/ (last visited May 16, 2013).

180. See COUNCIL ON ENVTL. QUALITY, *supra* note 178. In 2009, the Obama Administration established the Interagency Climate Change Adaptation Task Force (IACCATF), co-chaired by the Council on Environmental Quality (CEQ), Office of Science and Technology Policy (OSTP), and the National Oceanic and Atmospheric Administration (NOAA) and including representatives from more than 20 Federal agencies.

181. Exec. Order No. 13514, *supra* note 22.

182. *Id.*

183. COUNCIL ON ENVTL. QUALITY, INSTRUCTIONS FOR IMPLEMENTING CLIMATE CHANGE ADAPTATION PLANNING IN ACCORDANCE WITH EXECUTIVE ORDER 13514 (2011), available at

The President was not the only one to promote a federal strategy to address climate change. In 2009, Congress provided significant funding towards the development of a federal climate change strategy through its passage of the Department of the Interior, Environment and Related Agencies Appropriations Act of 2010.¹⁸⁴ The Act represents a major investment in the science and management aspects of global warming and provides over \$400 million to accomplish substantial scientific and management activities addressing climate impacts on fish, wildlife and plants.¹⁸⁵ Under the Act, the federal budget designated \$130 million to the Department of the Interior in 2010 specifically to fund activities to help fish and wildlife adapt to the impacts of climate change, including planning for such activities. In 2011, funding was increased by nearly \$40 million to \$168 million to enable the Department to address the impacts of climate change in land management plans and related activities.¹⁸⁶

The Conference Report for the Act calls upon the CEQ, working closely with the Department of the Interior as the lead agency to “develop a national, government-wide strategy to address climate impacts on fish, wildlife, plants, and associated ecological processes.”¹⁸⁷ In the fall of 2010, the Fish and Wildlife Service, acting on behalf of the Department of Interior, and the CEQ invited the National Oceanic and Atmospheric Administration, state wildlife agencies, and tribal partners to participate in the development of what was to become the FWP Strategy. In January 2012, the FWP Strategy was released as a public review draft document.¹⁸⁸ Although the public draft provided that the FWP Strategy was slated for final completion and implementation by June 2015,¹⁸⁹ it was released on March 26, 2013.¹⁹⁰

The FWP Strategy is designed to build upon and complement other existing climate adaptation efforts such as the U.S. Global Climate Change

http://www.whitehouse.gov/sites/default/files/microsites/ceq/adaptation_final_implementing_instructions_3_3.pdf.

184. DEPARTMENT OF THE INTERIOR, ENVIRONMENT, AND RELATED AGENCIES APPROPRIATIONS ACT, 2010, CONFERENCE REPORT (2010), available at http://www.wildlifeadaptationstrategy.gov/pdf/2010_Legislative_Language_for_Adaptation_Strategy.pdf [hereinafter APPROPRIATIONS ACT CONFERENCE REPORT].

185. *Id.*

186. FEDERAL CLIMATE CHANGE EXPENDITURES REPORT TO CONGRESS (2010), available at http://www.whitehouse.gov/sites/default/files/omb/assets/legislative_reports/FY2011_Climate_Change.pdf. The current level of funding for climate change programs was unable to be determined at the time of this writing.

187. APPROPRIATIONS ACT CONFERENCE REPORT, *supra* note 183.

188. *Development*, NATIONAL FISH WILDLIFE AND PLANTS CLIMATE ADAPTATION STRATEGY, <http://www.wildlifeadaptationstrategy.gov/development.php> (last visited May 16, 2013).

189. COUNCIL ON ENVTL. QUALITY, *supra* note 23, at 80.

190. Notice by U.S. Fish and Wildlife Service, 78 Fed. Reg. 19,514 (Apr. 1, 2013); see also Neela Banerjee, *Federal Plan Aims to Help Wildlife Adapt to Climate Change*, L.A. TIMES (March 27, 2013), <http://articles.latimes.com/2013/mar/27/nation/la-na-adaptation-strategy-20130327>.

Research Program,¹⁹¹ the National Climate Assessment¹⁹² and state strategies such as those developed by Washington,¹⁹³ Alaska,¹⁹⁴ and California.¹⁹⁵ It represents the first joint effort of three levels of government—federal, state and tribal—that have primary authority and responsibility for U.S. wildlife resources to determine what must be done to assist them in adapting to and surviving a warming climate.¹⁹⁶ The FWP Strategy is not a final agency action subject to judicial review or an administrative rule, and is therefore not enforceable.¹⁹⁷ Indeed, its stated purpose is to “inspire” and “enable” natural resource managers, legislators, and other professionals to take action to protect species in a changing climate.¹⁹⁸ As described below, the FWP Strategy is intended to serve as a blueprint for action by identifying major management goals and outlining specific strategies and actions to achieve them.¹⁹⁹

B. Contents of the FWP Strategy

The FWP Strategy includes seven overarching “Goals” for resource managers coping with the effects of climate change on fish, wildlife, and plants. The Goals, developed collectively by teams of federal, state and tribal technical experts, include: “1) Conserve habitat to support healthy wildlife

191. The U.S. Global Climate Change Research Program (USGCCRP) coordinates and integrates federal research on changes in the global environment and their implications for society. Among the activities the USGCCRP undertakes are the following: observing and understanding short and long-term changes in climate, the ozone layer, and land cover; identifying the impacts of these changes on ecosystems and society; estimating future change in the physical environment and vulnerabilities and risks associated with those changes; and providing scientific information to enable effective decision making to address the threats and opportunities posed by climate and global change. Thirteen departments and agencies participate in the USGCCRP. The program is steered by the Subcommittee on Global Change Research under the Committee on Environment and Natural Resources, overseen by the Executive Office of the President, and facilitated by the National Coordination Office. See GLOBAL CHANGE RESEARCH PROGRAM, <http://www.globalchange.gov> (last visited May 16, 2013).

192. The National Climate Assessment provides a report to the President and Congress every four years that integrates, evaluates and interprets findings of the USGCCRP, analyzes the effects of global change on the natural environment, agriculture, energy production and use, land and water resources, transportation, human health and welfare, human social systems and biological diversity, and analyzes trends in global change. See *id.*

193. See DEPT’ OF ECOLOGY, WASH. STATE, WASHINGTON STATE INTEGRATED CLIMATE CHANGE RESPONSE STRATEGY (2012), available at http://www.ecy.wa.gov/climatechange/ipa_responsestrategy.htm (“[A] framework decision-makers can use to help protect Washington’s communities, natural resources and economy from the impacts of climate change.”).

194. See ADAPTATION ADVISORY GROUP TO THE ALASKA CLIMATE CHANGE SUB-CABINET, ALASKA’S CLIMATE CHANGE STRATEGY: ADDRESSING IMPACTS IN ALASKA (2010), available at http://www.climatechange.alaska.gov/aag/docs/aag_all_rpt_27jan10.pdf.

195. See CA CLIMATE CHANGE PORTAL, <http://www.climatechange.ca.gov/adaptation/strategy/index.html> (May 23, 2013). California Climate Change Strategy of 2009 summarizes climate change impacts and recommends adaptation strategies across seven sectors: public health; biodiversity and habitat; oceans and coastal resources; water; agriculture; forestry; and transportation and energy.

196. FWP Strategy, *supra* note 20, at 3.

197. See *id.* (“Disclaimer”).

198. *Id.*

199. *Id.* at 4, 7.

populations and ecosystem functions”; “2) Manage species and habitats to protect ecosystem functions and provide sustainable cultural, subsistence, recreational, and commercial uses”; “3) Enhance capacity for effective management”; “4) Support adaptive management”; “5) Increase knowledge and information about the impacts of climate change on species”; “6) Increase public awareness and response”; and “7) Reduce non-climate stressors.”²⁰⁰

Recognizing the high degree of uncertainty associated with determining the specific effects of climate change on natural resources, the FWP Strategy strongly endorses support for adaptive management as one of its overarching goals—Goal 4. To this end, the FWP Strategy provides: “The continuous learning principles of adaptive management should be used to monitor the response to management actions, evaluate effectiveness, gain new knowledge, and improve and inform future management decisions.”²⁰¹ To achieve the goal of supporting adaptive management, Goal 4 of the FWP Strategy has two underlying strategies. Strategy 4.1 urges resource managers to “support, coordinate, and where necessary develop distributed but integrated inventory, monitoring, observation, and information systems at multiple scales to detect and describe climate impacts on fish, wildlife, plants, and ecosystems.”²⁰² Among the prescribed actions associated with the development of adaptive management monitoring procedures, the FWP Strategy calls upon agencies to: (1) “[d]evelop consensus standards and protocols that enable multi-partner use and data discovery”;²⁰³ (2) “[d]evelop, refine, and implement monitoring protocols that provide key information needed for managing species and ecosystems in a changing climate”;²⁰⁴ and (3) [u]se existing or define new indicators at appropriate scales that can be used to monitor [species’ and ecosystems’] response[s] to climate change.”²⁰⁵ The development of consensus standards and protocols for adaptive management plans will assist agencies by providing a range of standard “triggers” and appropriate responses that should be undertaken in managing wildlife species affected by climate change. This can assist agencies in devising plans that are more likely to survive judicial review. In *Greater Yellowstone Coalition*, the Service’s failure to include specific triggers tied to management actions that were certain to occur in its adaptive management plan resulted in the court striking down the plan under ESA section 4(E). Current ESA case law indicates that specific triggers and responses that are certain to occur are necessary components of an adaptive management plan for protected species.²⁰⁶

200. *Goals, NAT’L FISH, WILDLIFE & PLANTS CLIMATE ADAPTATION STRATEGY*, <http://www.wildlifeadaptationstrategy.gov/goals.php> (last visited Apr. 22, 2013).

201. FWP Strategy, *supra* note 20, at 67.

202. *Id.* at 68.

203. *Id.*

204. *Id.*

205. *Id.*

206. *See* *Natural Res. Def. Council v. Kempthorne*, 506 F. Supp. 2d 322, 341 (E.D. Cal. 2007).

Goal 4 of the FWP Strategy further supports adaptive management through Strategy 4.2, which urges agencies to collaborate with scientists, economists and stakeholders to “identify, develop, and employ decision support tools for managing wildlife under uncertainty.”²⁰⁷ This Strategy expressly promotes the use of monitoring systems “in an adaptive management framework to evaluate the effectiveness of specific management actions and adapt management actions appropriately.”²⁰⁸ In designing and implementing adaptive management plans, Goal 4 also calls upon agencies to engage scientists, economists and stakeholders in the planning process. As discussed above, in Part I.B, the inclusion of stakeholders—including those with diverging or conflicting interests—is especially important as a means of reducing uncertainty and surprise, which may otherwise jeopardize the success of a plan. Stakeholders excluded from the process may be more likely to challenge adaptive management plans in court and can increase the cost of implementing a plan, or, prevent its implementation altogether.²⁰⁹

To improve the likelihood of success of adaptive management plans developed pursuant to Goal 4 of the FWP Strategy, Goal 3—enhancing management capacity—urges agencies to review existing legal, regulatory, and policy frameworks that govern protection and restoration of habitats and ecosystem services and identify opportunities to improve their utility to address climate change impacts.²¹⁰ Relatedly, Goal 3 also calls upon agencies to continue ongoing work of the Joint State-Federal Task Force on ESA Policy to ensure that policies governing implementation of the ESA provide appropriate flexibility to address climate change impacts on protected species.²¹¹ These two FWP Strategy actions regarding enhancement of management capacity have potential to lead to implementing authority for adaptive management plans assisting species affected by climate change. Significantly, by working to ensure that policies governing ESA implementation provide appropriate flexibility to address climate change impacts, the FWP Strategy promotes establishment of authority designed to survive judicial review under the ESA, which has proven difficult under the existing common law rule set forth in *Kemphorne*.²¹²

In addition, the establishment of enforceable adaptive management plans for species affected by climate change, either through statutory amendment or rulemaking, will assist agencies in creating plans that satisfy the mandatory requirements of ESA section 4(D) requiring adequate regulatory measures. In

207. FWP Strategy, *supra* note 20, at 69.

208. *Id.*

209. It is unclear whether and to what extent the Greater Yellowstone Coalition participated in the Service’s decision to delist the Yellowstone grizzly DPS, or, in the development of the Conservation Strategy.

210. FWP Strategy, *supra* note 20, at 66.

211. *Id.*

212. *See* Natural Res. Def. Council v. Kemphorne, 506 F. Supp. 2d 322, 341 (E.D. Cal. 2007).

Greater Yellowstone Coalition, the Ninth Circuit determined that the Service's adaptive management plan contained in its Conservation Strategy was an adequate regulatory measure only because it was amended to enforceable National Park Compendia and Forest Plans.²¹³ The establishment of enforceable adaptive management plans under Goal 3 of the Forest Strategy would eliminate courts having to go to such lengths to find an enforceability "hook" and provide managers with more assurance that their plans will survive judicial review on their own merit. Enforceability of adaptive management plans will also help to provide accountability for agencies implementing them and will prevent agencies from taking advantage of the flexibility inherent in the plans as a means to avoid making tough decisions.

Along these lines, one commentator has argued that laws relating to the implementation of adaptive management measures must clearly differentiate between aspects of flexibility and discretion.²¹⁴ While flexibility is a necessary component of adaptive management, in order to allow agencies to adapt plans in response to new information learned through them, agencies should not be permitted to use flexibility as a means to avoid taking action or to deviate materially from approved plans and underlying goals.²¹⁵ Limits of flexibility and discretion should be clearly defined in laws regarding implementation of adaptive management measures.

Also providing additional support for use of adaptive management is the FWP Strategy's Goal 5—increase knowledge and information regarding the effects of climate change on species.²¹⁶ Goal 5 encourages agencies to conduct basic research on life histories and food web dynamics of wildlife species to gain an understanding of how particular species and other species on which their survival depends are likely to respond to climate change.²¹⁷ The information gained through basic research can then be incorporated into adaptive management plans developed under Goal 4.²¹⁸ *Greater Yellowstone Coalition* highlighted the need for basic research on related forest species, as the court struck down the Service's Final Rule proposing delisting of the grizzly bear because it failed to include enough information about the effects of climate change on one of the grizzly's major foods, the whitebark pine.

While not among the seven FWP Strategy Goals, the implementation provisions of the Strategy merit discussion. In terms of individual agency action, the FWP Strategy essentially provides that agencies with programs that affect wildlife are to incorporate elements of the Strategy into the agency

213. *Id.* at 1031.

214. Kundis Craig, *supra* note 81, at 17–18.

215. *Id.*

216. FWP Strategy, *supra* note 20, at 71.

217. *Id.* at 73.

218. *Id.* at 67 ("When coupled with research on specific impacts to fish, wildlife, plants, and habitats and their response to climate change . . . , managers will be better equipped to implement effective management actions.").

adaptation plans they are developing under EO 13514.²¹⁹ Thus agencies are not required to implement the FWP Strategy at this time, although they are encouraged to do so under the Executive Order. The fact that in its current form, the FWP Strategy contains no enforceable or mandatory provisions renders its efficacy questionable. This has the potential to change, however, as the Strategy calls for the establishment of an inter-jurisdictional coordinating body comprised of federal, state, and tribal representatives that will meet every two years to monitor performance and propose revisions to the Strategy.²²⁰ The FWP Strategy acknowledges that its successful implementation must include the ability to amend its provisions in order to achieve its goals.²²¹

IV. DISCUSSION

Climate change is happening, and it's happening right now. The scope, severity, and rate of future climate change are difficult to predict. In the United States, the average year-round temperature has already risen by more than 2°F over the past fifty years and is expected to continue to increase in the future.²²²

As temperatures continue to rise, an increasing number of species are becoming threatened by climate change. Environmentalists have been steadily pressuring agencies to devote more attention to addressing the effects of climate change in devising their wildlife management plans. Because the effects of climate change are so complex and difficult to predict, this has proven to be easier said than done.

Over the past few decades adaptive management has emerged as the “go to” strategy for resource managers confronted by scientific uncertainty. Based on theories of ecosystem management, adaptive management was designed to address problems of environmental complexity and scientific uncertainty and promotes the basic concept of learning while doing. Adaptive management is widely recommended for use in managing ecosystems affected by climate change.²²³

While strong in theory, adaptive management has proven challenging to put into practice. Its effectiveness suffers from the lack of a uniform definition, well-defined regulatory standards and clear implementing authority. There's also the additional issue of funding, which weighs heavy on the minds of resource managers struggling to do too much with too little. Without adequate funding, agencies cannot successfully develop or implement adaptive management plans.

219. *Id.* at 91.

220. *See id.* (the first Strategy revision is slated for June 2014).

221. *See id.* at 90.

222. COUNCIL ON ENVTL. QUALITY, PROGRESS REPORT OF THE INTERAGENCY CLIMATE CHANGE ADAPTATION TASK FORCE: RECOMMENDED ACTIONS IN SUPPORT OF A NATIONAL CLIMATE CHANGE ADAPTATION STRATEGY 6 (2010), available at <http://www.whitehouse.gov/sites/default/files/microsites/ceq/Interagency-Climate-Change-Adaptation-Progress-Report.pdf>.

223. *See Ruhl & Fischman, supra* note 9, at 444–46.

Adaptive management has proven especially difficult to implement as a strategy to manage ESA protected species affected by climate change. On the one hand, agencies must satisfy the judiciary that their management plans meet the mandatory and inflexible provisions of the ESA as set forth in *Kempthorne*; on the other hand, they need flexibility to alter the plan in response to new scientific information obtained through the plan and to the availability of funding, which may not be guaranteed at the outset.

The Ninth Circuit's review of the Service's adaptive management plan for the delisting of a threatened grizzly bear population in *Greater Yellowstone Coalition* highlights many of the challenges resource managers face in developing and implementing adaptive management plans for protected species affected by climate change, including the lack of a uniform definition, statutory authority, well-defined regulatory standards and dedicated funding.

The recently developed FWP Strategy has the potential to ultimately resolve many of the issues agencies are struggling with in attempting to successfully implement adaptive management plans for protected species affected by climate change. The FWP Strategy provides strong support for use of adaptive management plans to assist species affected by climate change and prescribes the development of consensus standards and monitoring protocols. This may help to resolve questions surrounding "how" adaptive management plans are to function and, more specifically, "what" they should include. The development of consensus standards and protocols promotes the inclusion of specific triggers and management responses and will better guide agencies in developing their plans and courts in reviewing them.

Another benefit of the FWP Strategy is its call for the inclusion of all stakeholders in the development of management plans and policies for species affected by climate change. The inclusion of stakeholders will help to reduce uncertainties and surprise associated with negative stakeholder response to proposed adaptive management plans that fail to address their concerns, as well as the potential for litigation, which can substantially drive up the cost of implementing a plan.

The availability of funding to implement the FWP Strategy, as well as adaptive management plans developed under its direction, will no doubt play a role in the Strategy's success. As illustrated in *Greater Yellowstone Coalition*, the lack of dedicated funding may prevent agencies from fully committing to the implementation of a plan for fear they may not have the resources to fully implement them.²²⁴ While the 2010 Appropriations Act provided significant start-up funds for the FWP Strategy, it is unclear whether funding will continue. In this vein, continued congressional support for the FWP Strategy is critical. Congress ought to adopt an appropriation practice for natural resource management that favors a proactive approach and supports programs such as the FWP Strategy, which establishes an adaptation response for the United

224. *Greater Yellowstone Coal. v. Servheen*, 665 F.3d 1015, 1034 (9th Cir. 2012).

States and its natural resources from climate change impacts. Funding the FWP Strategy will help to ensure that the country's valuable fish, wildlife, plants, and ecosystems continue to provide important products and services to communities nationwide.²²⁵ Perhaps support for funding the FWP Strategy and other U.S. climate change initiatives will grow when Congress and the Nation begin to fully appreciate the potentially staggering economic costs associated with climate change.²²⁶

The current lack of enforcement powers or a specific mechanism to ensure agency accountability casts doubt on the effectiveness of the FWP Strategy as a management tool. This has the potential to change, however. As discussed above, Goal 3 of the Strategy calls upon agencies to identify opportunities where its elements can be incorporated into existing legal and regulatory frameworks that govern species and habitat protection involved with climate change. Goal 3 of the FWP Strategy reaffirms the sentiments of those who have advocated for the inclusion of comprehensive adaptive management requirements and procedures addressing climate change into our natural resource management statutes and administrative rules.²²⁷ Laws relating to the implementation of adaptive management measures developed under the FWP Strategy should clearly differentiate between aspects of flexibility needed to adapt plans in response to newly obtained information and discretion, and provide well-defined limits for both.²²⁸ This will help to ensure agency accountability.

While the FWP Strategy elements are not yet enforceable, it is important to recognize that the lack of enforceability has not prevented the ability of other environmental laws, policies and strategies from stimulating focused action that has led to positive change. The FWP Strategy's chief strength comes from the fact that it provides a common framework for action to lead the country towards a meaningful adaptation response to climate change.²²⁹ In adaptive

225. The level of future Congressional funding for the FWP Strategy is at this time unknown. One Congressional staffer suspects there may be less enthusiasm on the current Appropriations Subcommittees to support the Strategy than in 2009–2010, when both the House and the Senate were interested in supporting climate change. See E-mail from Alan Yamamoto, Envtl. Aid, Office of Senator Daniel Inouye (December 12, 2012) (on file with author).

226. Hurricane Sandy is estimated to have generated \$50 billion in economic losses. See Andrew Holland, *Sandy Shows Costs of Climate Change*, THE CONGRESS BLOG (Nov. 6, 2012), available at <http://thehill.com/blogs/congress-blog/economy-a-budget/266187-sandy-shows-costs-of-climate-change>. In addition to economic losses stemming from storms, significant economic losses can also result from loss of wildlife resources. For example, hunting, fishing, and other wildlife-related recreation contribute an estimated \$120 billion to our nations' economy each year, and, marine ecosystems sustain a U.S. seafood industry that supports approximately 1 million jobs and \$116 billion in economic activity annually. See *National Strategy Will Help Safeguard Fish, Wildlife and Plants in a Changing Climate*, NOAA (Mar. 26, 2013), available at http://www.noaanews.noaa.gov/stories2013/20130326_climate_adaptation_strategy.html.

227. Kundis Craig, *supra* note 81, at 65–66.

228. *Id.* at 17–18.

229. At least one commentator has suggested a similar approach to the FWP Strategy by proposing that agencies develop a multi-party oversight board for adaptive management plans that would be

management parlance, the FWP Strategy can be considered a form of “adaptive governance” or “adaptive co-management,” in which both formal institutions and informal groups at multiple levels are incorporated for purposes of collaborative environmental management.²³⁰ This type of management has been determined to be most effective when there is: leadership with a vision for the system of interest; legislation favoring adaptive management; funds for adaptive management; monitoring of the ecological systems; information flow (e.g., cross-scale linkages); a variety of sources of knowledge; and a venue for collaboration.²³¹ The FWP Strategy encompasses or promotes all the elements of effective adaptive co-management entities and is, theoretically, poised for success. A key example of adaptive governance is the U.N. Framework Convention on Climate Change,²³² to which the United States is a party, and which undoubtedly served as a catalyst for the FWP Strategy and other United States and even state government climate change initiatives such as those initiated in California, Washington, and Alaska. Although change may take time, progress has to begin somewhere, and an unenforceable but unified plan for assisting the Nation’s wildlife in adapting to climate change certainly seems better than no plan at all. Whether or not the FWP Strategy succeeds is more likely to depend on its ability to continue to garner financial support²³³ and acceptance from all involved sectors than it is on its current lack of enforceability.²³⁴

responsible for designing, conducting, and interpreting plans. As conceived, such a board would ensure transparency and work with “others” to identify a realistic funding strategy before a plan is implemented and would provide specific details about what to do if the envisioned funds failed to materialize. *See* NIE & SCHULTZ, *supra* note 35, at 7.

230. Allen et al., *supra* note 11, at 1343.

231. *Id.*

232. United Nations Framework Convention on Climate Change, 1771 U.N.T.S. 107, UN Doc A/AC.237/18 (1992).

233. Continued financial support for the FWP Strategy could potentially be provided through the establishment of a federal cap and trade program for carbon-credits, as was successfully implemented in California under its state climate change program in 2012. California’s first carbon-credit auction raised \$290 million. *See* Ricardo Lopez, *California’s First Carbon-Credit Auction Raises \$290 Million*, L.A. TIMES (Nov. 20, 2012), available at articles.latimes.com/2012/nov/20/business/la-fi-pollution-credits-20121120. The possibility of a federal cap and trade program is not entirely remote. In 2011, the Obama Administration included at \$3.8 trillion cap-and-trade placeholder in its annual budget. A line item in the budget called for a “comprehensive market-based climate change policy,” receipts from which “will be reserved for investments to reduce greenhouse gas emissions, including support for clean energy technologies, and in adapting to the impacts of climate change.” *See* Darren Samuelson, *Obama’s \$3.8 T Budget Includes Cap-And-Trade Placeholder*, N.Y. TIMES (Feb. 1, 2010), available at <http://www.nytimes.com/gwire/2010/02/01/01greenwire-obamas-38t-budget-includes-cap-and-trade-placeholder>.

234. The FWP Strategy enjoys wide public support. During agency review, comments were received from 17 federal agencies, 15 state agencies, and 5 tribes and tribal commissions. During the public review period, comments were received from 54,847 individuals, 51 non-governmental organizations, and 17 governmental entities. The vast majority of comments were supportive of the Strategy. COUNCIL ON ENVTL. QUALITY, FREQUENTLY ASKED QUESTIONS: NATIONAL FISH, WILDLIFE AND PLANTS CLIMATE ADAPTATION STRATEGY (2012), available at <http://www.wildlifeadaptationstrategy.gov/pdf/NFWPCA-FAQs.pdf>.

Because the FWP Strategy is still in its start-up phase, it will likely be some time before any adaptive management plans that are devised under its directives are reviewed by the courts or implemented in the field. But on its face, the FWP Strategy has significant potential to ultimately benefit the growing number of U.S. species whose survival—like that of the mighty Yellowstone grizzly—is threatened by climate change and appears to provide workable solutions to many of the problems resource managers, courts, and stakeholders have recently encountered in attempting to protect them.

We welcome responses to this Article. If you are interested in submitting a response for our online companion journal, *Ecology Law Currents*, please contact ecologylawcurrents@boalt.org.

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