When Does Legal Flexibility Work in Environmental Law?

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Environmental law scholars, practitioners, and policymakers have wrestled for some time with the implications of climate change for environmental law. There is widespread, although not universal, agreement that climate change requires greater flexibility in environmental legal systems. Flexibility—reduced procedural requirements for administrative agency decision making and less rigid substantive standards—would allow the agencies that implement environmental law to adapt to a future world characterized by dynamic, uncertain changes in natural resource systems. According to its proponents, flexibility would make it easier for agencies to more frequently update their management or regulatory decisions to respond to changed conditions, and also to facilitate adaptive management. However, there has been little exploration of the conditions under which flexibility improves or undermines the effectiveness of environmental law.

This Article examines two areas of environmental law that have historically had a great deal of flexibility: hunting law and marine fisheries law. In both areas, management and regulatory decisions are updated on a regular basis by the relevant agencies, often annually. Procedural requirements for making decisions are often streamlined. And the substantive standards that apply to agency decisions are often quite broad and flexible, leaving substantial discretion to the agency. Yet these two areas of environmental law have experienced very different outcomes in terms of implementation: fisheries management in the United States is often perceived as failing, while hunting law is seen as quite successful in achieving its goals.

This Article concludes that these different outcomes are the result of the interaction of legal flexibility with two other factors: the level of uncertainty about the condition or status of the natural resource being managed and the

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political context for regulatory or management decisions. Fisheries management is characterized by much greater levels of uncertainty about population levels than hunting management. Moreover, fisheries are the one area in the U.S. economy where there is still a substantial commercial industry based on the capture of wildlife for human use. The combination of scientific uncertainty and flexible law creates a substantial discretionary space in which decision makers can operate. In other words, decision makers have a wide range of legally defensible management choices. The fishing industry is able to exploit this fact to argue for weaker, but still legally defensible, regulation. The industry has every incentive to organize in pursuit of this goal. In contrast, commercial hunting was eliminated in the United States in the nineteenth century. Thus, there are no major interest groups with a stake in increasing hunting quotas, and therefore there is no substantial effort to manipulate a flexible legal system to weaken regulatory standards. Whether flexibility will be successful in a regulatory or management system will depend in part on the scientific and political context for the resource being protected or managed. Flexibility is not a panacea that can be applied uniformly throughout environmental law.

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INTRODUCTION

Scholars have long debated the merits of incorporating flexibility into environmental laws.[1] Flexibility puts decisions in the hands of agencies, which— compared to legislatures—have more time and the expertise to study proposed means and targets, to put proposals out for public comment, and to monitor the results after rules have been adopted. On the other hand, inflexibility—mandating or strictly constraining agency choice in the language of a statute—might save time and resources for the agency and, more important, can prevent rules from being delayed or watered down by pressure applied by regulated industries during the agency rulemaking processes.

Climate change has revitalized the debate, while at the same time narrowing the divide between proponents of flexibility and inflexibility. Climate change will almost certainly bring about environmental conditions beyond what existing regulatory systems have previously encountered. Due to the difficulty in predicting the effects of climate change on natural resources and the environment, many if not most scholars believe that addressing climate change requires a more flexible version of environmental law. The majority view appears to be that environmental laws ought to be changed so that agencies have more freedom to respond to unpredictable developments such as new migratory patterns, unforeseeable alterations of terrestrial and marine habitats, sea level rise, and changes in precipitation and runoff patterns among others. The logic is straightforward: climate change will lead to previously unseen rates and directions of change; increased uncertainty will decrease the value of past data in modeling the future; thus our inability to see over the horizon makes it imperative that we amend environmental law so as to permit decision makers to be more agile and responsive.[2] Some scholars, aware of the potential downsides of flexibility, have attempted to circumscribe the prescribed new, enhanced flexibility by using terms such as "principled

1. With the caveat that "flexibility" has taken on many meanings in the context of this particular debate (a topic we discuss later in this Article), examples of works highlighting the advantages of flexibility include BRUCE ACKERMAN & WILLIAM T. HASSLER, CLEAN COAL/DIRTY AIR (1981); Stephen Breyer, *Analyzing Regulatory Failure Mismatches, Less Restrictive Alternatives, and Reform*, 92 HARV. L. REV. 547 (1979); William F. Pedersen, *Why the Clean Air Act Works Badly*, 129 U. PA. L. REV. 1059 (1981). Works emphasizing the benefits of inflexibility (or less flexibility) include DAVID SCHOENBROD, POWER WITHOUT RESPONSIBILITY: HOW CONGRESS ABUSES THE PEOPLE THROUGH DELEGATION (1993); Howard Latin, *Ideal Versus Real Regulatory Efficiency Implementation of Uniform Standards and "Fine-Tuning" Regulatory Reforms*, 37 STAN. L. REV. 1267 (1985); Oliver Houck, *Tales from a Troubled Marriage Science and Law in Environmental Policy*, 302 SCIENCE 1926 (2003).

2. *See* Ahjond S. Garmestani et al., *Panarchy, Adaptive Management and Governance Policy Options for Building Resilience*, 87 NEB. L. REV. 1036, 1039 (2009) (arguing that environmental law must change in order "to confront emerging, cross-scale, and cross-boundary challenges.").

flexibility."[3] However, not many people seem to be arguing for greater *inflexibility*.

This Article has several purposes. The first is to provide specific historical examples of contexts—recreational hunting and marine fisheries—in which legislative grants of substantial flexibility have and have not, respectively, led to good outcomes. Consistent with arguments made by past proponents of inflexibility, our examples suggest that flexibility, especially when combined with scientific uncertainty, can render decision-making processes vulnerable to harmful pressure from concentrated interests. Second, these observations suggest that legislators should not import enhanced flexibility into environmental statutes across the board. And they ought to be particularly careful when enhancing flexibility in contexts featuring high interest-group power differentials and high degrees of scientific uncertainty. This observation is particularly salient given universal agreement that climate change will increase levels of uncertainty across all natural resources. In fact, it leads to a paradox: On the one hand, uncertainty and flexibility appear to be dangerous in combination, as uncertainty allows regulators the flexibility to bestow favorable decisions on powerful groups. On the other hand, uncertain conditions would seem to demand more flexibility. Resolving this paradox in specific statutory contexts will require serious thinking.

We begin in Part II by summarizing the environmental law and management scholarship that has called for greater flexibility in the face of climate change. From that literature, we distill three key components of the discussions about flexibility: the need for procedural streamlining; the need for more nuanced substantive standards; and the need to reduce reliance on historic baselines as the basis for substantive standards. In Part III, we summarize the history of flexibility in fisheries law and management. We describe the history of the Magnuson-Stevens Act, the primary federal fisheries law, and how it has moved over time from greater to lesser flexibility, both procedurally and substantively. We note that the success of federal fisheries law appears to have increased over time, just as flexibility has decreased. In Part IV, we discuss flexibility in state and federal hunting laws. We note the extreme levels of flexibility in most of these laws and the general conclusion that they have been highly successful in their goal of restoring populations of the wildlife species that are the main focus of hunting. In Part V, we discuss the implications of our case studies. Our conclusion is that flexibility in fisheries law failed because of the interaction of significant uncertainty in fisheries science and management with the presence of significant, entrenched interest groups with a stake in increasing take levels.

3. *See, e.g.*, Robin Kundis Craig, *"Stationarity is Dead" — Long Live Transformation Five Principles for Climate Change Adaptation Law*, 34 HARV. ENVTL. L. REV. 9, 17 (2010).

I. THE CALL FOR FLEXIBILITY

Climate change creates a range of challenges for law in general and for environmental law in particular. It creates a dynamic future in which historical baselines about environmental conditions will change, sometimes significantly. It adds to existing uncertainty, because we often have little information about how much change will occur, what direction change will occur in, and how changes in different environmental resources will interact with each other.[4]

A widespread response in the academic literature has been to argue that resource management agencies will need greater flexibility to allow for appropriate responses and adaptation to climate change.[5] The argument is that flexibility will be required to address the dynamic nature of climate change. For example, some management agencies have implemented some resource laws through the use of historical baselines as a guideline or factor in goal setting.[6] However, climate change may render these baselines obsolete in the future, and new reference points or regulatory standards that can move in concert with the dynamic changes caused by climate change may represent a more desirable, not to mention feasible, approach to resource management.[7]

These scholars also argue that flexibility is required for agencies to deploy "adaptive management," widely seen as a central component of any effective response to climate change.[8] Adaptive management can take a range of forms, most of which involve iterative cycles of management, monitoring, and adjustment in future management in response to the on-the-ground impacts of

4. *See generally* MARINE ECOSYSTEMS AND GLOBAL CHANGE (Manuel Barange et al. eds., 2010); WILDLIFE IN A CHANGING WORLD—AN ANALYSIS OF THE 2008 IUCN RED LIST OF THREATENED SPECIES (Jean-Christophe Vié, Craig Hilton-Taylor & Simon N. Stuart eds., 2008); CLIMATE VARIABILITY, CLIMATE CHANGE AND FISHERIES (Michael H. Glantz ed., 1992).

5. Scholars and managers also identify a range of nonlegal challenges for climate change adaptation, such as political pressure, budget limitations, and fragmented agency authority. Robert L. Fischman & Jillian R. Rountree, *Adaptive Management*, *in* THE LAW OF ADAPTATION TO CLIMATE CHANGE: U.S. AND INTERNATIONAL ASPECTS 19, 22 (Michael B. Gerrard & Katrina Fischer Kuh eds., 2012).

6. *Id.* at 20 (describing the U.S. Fish & Wildlife Service's approaches to managing the National Wildlife Refuge system and to implementing the Endangered Species Act).

7. *See, e.g.*, Carl Folke et al., *The Problem of Fit Between Ecosystems and Institutions Ten Years Later*, 12 ECOLOGY AND SOC'Y, June 2007, at art. 30 ("[M]odern natural resource management has been successful at rapidly achieving a set of narrowly defined goals . . . . The field has relied on the use of fixed rules for achieving constant yields, as in fixed carrying capacity of animals and fixed maximum sustainable yields (MSY) of fish and forest products. . . . [However,] [m]anagement institutions, like fisheries, forestry, and agricultural and other governmental boards, became more rigid and less responsive to critical changes in the ecosystem."); Adam Markham, *Potential Impacts of Climate Change on Ecosystems A Review of Implications for Policymakers and Conservation Biologists*, 6 CLIMATE RES. 179, 188 (1996) ("Climate change too is often seen as a future problem that is currently insignificant in comparison to more immediate pressures. This results in development of conservation strategies that will sometimes be in place for decades, but which have not taken future environmental changes, including climate, into account.").

8. Fischman & Rountree, *supra* note 5, at 19 ("There is a virtual consensus that adaptive management must be a key element of adaptation in conservation and environmental management.").

management.[9] Adaptive management takes an experimental view of management actions and values quick responses to new information or emergent problems.[10] The appeal of this approach in the context of climate change is that it can help reduce the uncertainty about the impacts of climate change on environmental resources as well as the uncertainty about the appropriate management responses to those impacts.[11] Adaptive management features an iterative process that allows for ongoing and continual change in management, potentially necessary in the face of the dynamism associated with climate change.[12]

Given our objective of evaluating whether flexibility has historically been successful in environmental and natural resources law and management, we require a more specific and operationalized definition of flexibility. Two main themes stand out from the literature: one, less "front-end" analysis before management decisions are made, and more "back-end" analysis based on ongoing monitoring that allows for repeated reconsideration and adjustment of management decisions;[13] and two, less rigid management or regulatory

9. For an overview of adaptive management, see DEP'T OF INTERIOR, CHAPTER 1: WHAT IS ADAPTIVE MANAGEMENT?, https://www.doi.gov/sites/doi.gov/files/migrated/ppa/upload/Chapter1.pdf; CARL WALTERS, ADAPTIVE MANAGEMENT OF RENEWABLE RESOURCES (1986).

10. WALTERS, *supra* note 9.

11. Fischman & Rountree, *supra* note 5, at 19 (Adaptive management's "strengths of flexibility and 'learning while doing' recommend it across the full spectrum of adaptation challenges."); *see also id.* at 23–24 ("[L]aws, policies, and management that pertain to climate change must be supple enough to confront this uncertainty" created by climate change).

12. *See, e.g.*, Emma L. Tompkins & W. Neil Adger, *Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change?*, 9 ECOLOGY AND SOC'Y, Dec. 2004, at art. 10 ("Action to adapt and maintain resilience in the face of climate change requires adjustment by governments . . . In effect, sustainable resource management requires government structures that are empowered to make collective decisions."); Steven M. Winnett, *Potential Effects of Climate Change on U.S. Forests A Review*, 11 CLIMATE RES. 39, 47 (1998) ("As no model accounts adequately for all of the components important to determining forests' response to climate change, it is important that no model's projections be taken as the ultimate answer. All results need to viewed with an eye to what they say about a piece of the whole picture and how they help reduce the uncertainty in the understanding of these issues.").

13. Alejandro E. Camacho, *Transforming the Means and Ends of Natural Resources Management*, 89 N.C. L. REV. 1405, 1414 (2011) ("In most instances, virtually all agency attention and resources are directed at the initial decision, regardless of how little information there is to make the decision. Once an initial decision is made . . . the agency rarely revisits it in any systematic way to adjust the decision or learn from its successes or limitations for future actions."); J.B. Ruhl, *General Design Principles for Resilience and Adaptive Capacity in Legal Systems—With Applications to Climate Change Adaptation*, 89 N.C. L. REV. 1373, 1392–93 (2011) [hereinafter Ruhl, *General Design Principles*] ("The system's fixation on predecisional environmental assessment, cost-benefit analysis, records of decisions, and judicial review litigation has pushed the system toward a 'front-end' focus on reliability and efficiency that has made adaptive management exceptionally difficult to implement."); *id*. at 1396 (arguing there is a need to "deemphasize the front-end focus, which assumes all effects can be predicted and assessed before the decision, and introduce formal follow-up mechanisms demanding that the decision maker integrate new information into an ongoing decision adjustment process"); Robin Kundis Craig & J.B. Ruhl, *Designing Administrative Law for Adaptive Management*, 67 VAND. L. REV. 1, 42 (2014) ("[W]e should recast administrative procedure not as a one-time, final-agency-decision-then-judicial-review process, but rather as a recurring process of punctuated 'final' decision[ ]making,

standards overall, with standards that are more easily changed or altered to reflect changing environmental conditions.[14]

A. Procedural Flexibility

By "front-end" analysis, scholars and managers generally refer to the panoply of predecisional analytic requirements required by statutes such as the Administrative Procedure Act (APA),[15] the National Environmental Policy Act (NEPA),[16] and the Endangered Species Act (ESA)[17] before an administrative agency decision can be finalized.[18] These requirements may include, but are not necessarily limited to, thorough responses to public comments on draft regulations,[19] analysis of whether a proposed agency decision will jeopardize the existence of a species listed for protection under the ESA,[20] and analysis of the environmental impacts of the proposed action and reasonable alternatives in an environmental impact statement, all of which must be completed before any

public participation, and judicial review somewhat akin to continuing jurisdiction in the courts."); J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENVTL. L. 363, 416 (2010) [hereinafter Ruhl, *Climate Change Adaptation*] ("[L]egal scholars have begun to question the efficacy of using conventional comprehensive front-end environmental impact assessments and cost-benefit analyses in climate change adaptation decisions . . . [and] rather to shift their methodological fundamentals toward a more adaptive 'back-end' approach. The critical component of this approach is to scale back (but not abandon) the comprehensive front-end focus, which assumes all effects can be predicted and assessed before the decision, and introduce formal follow-up mechanisms demanding that the decision maker integrate new information into an ongoing decision adjustment process.").

14. *See, e.g.*, Craig R. Allen et al., *Adaptive Management for a Turbulent Future*, 92 J. ENVTL. MGMT. 1339, 1343 (2011); Craig, *supra* note 3, at 63 (calling decision makers to "[i]nterpret or amend existing laws to allow principled flexibility regarding environmental management goals to reflect changing baseline conditions"); J.B. Ruhl & James Salzman, *Gaming the Past The Theory and Practice of Historic Baselines in the Administrative State*, 64 VAND. L. REV. 1, 16, 53–54. (2011). Unfortunately, beyond that level of generality, the literature often has broadly divergent opinions about how these principles should be implemented in specific ways for specific laws.

15. Administrative Procedure Act of 1946, 5 U.S.C. §§ 551–59, 701–06, 1305, 3105, 3344, 5372, 7521 (2012).

16. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370h (2012)

17. Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2012).

18. *See, e.g.*, Fischman & Rountree, *supra* note 5, at 21 (discussing NEPA); Sandra Zellmer & Lance Gunderson, *Why Resilience May Not Always Be a Good Thing Lessons in Ecosystem Restoration from Glen Canyon and the Everglades*, 87 NEB. L. REV. 893, 946 (2009) (discussing the ESA); J.B. Ruhl, *Regulation by Adaptive Management—Is It Possible?*, 7 MINN. J.L. SCI. & TECH. 21, 50, 53 (2005) (discussing APA).

19. *See* 40 C.F.R. § 1502.9 (2015) (NEPA regulation setting forth the stages for environmental impact statements (EIS), including preparation of a Draft EIS, a period to receive public comments, and issuance of a Final EIS to respond to such comments).

20. 16 U.S.C. § 1536 ("Each Federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical.").

agency decision can proceed.[21] The critique is that these significant front-end analytic requirements impose high fixed costs on any individual agency decision—and therefore deter agencies from making decisions in the first place.[22] Agency aversion to repeated decision making is problematic for climate change adaptation in two ways. First, the dynamic nature of climate change might require the regular revision of management or regulatory decisions in order to keep pace with changing environmental conditions; second, adaptive management necessarily requires the ability to be ready, willing, and able to undertake repeated reconsideration and revision of prior management or regulatory decisions.[23]

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21. *See* Fischman & Rountree, *supra* note 5, at 35 (noting current legal system involves "use of 'front-end' analytical tools comprehensively conducted *and concluded* prior to making the decision final"). Additional analytic requirements may also be imposed by other statutes, regulations, or executive orders. For instance, regulations that have a "major" economic impact frequently have to undergo a thorough cost-benefit analysis, and some scholars have identified these requirements as also impeding adaptive management. *See* Ruhl, *Climate Change Adaptation*, *supra* note 13, at 413–17.

22. Fischman & Rountree, *supra* note 5, at 21 ("Administrative procedure is a slow and cautious process, reflecting the priority that courts and legislators place on circumscribing agency authority and facilitating public participation."); *id.* at 21–22 (stating that processes such as NEPA "can discourage change even when the proposed actions pertain to conservation or natural resources" and that NEPA's "demand for fully articulated, long-term analysis—paired with the theory that nature can and should stay the same—stiffens law and policy. While procedural safeguards provide increased assurance that the agency is not overstepping its bounds, such procedures can limit an agency's ability to adapt."); Ruhl, *supra* note 18, at 30, 35 (arguing that "front-end" analysis by agency deters adaptive management by making decisions more costly and therefore reducing the incentive to do regular updates of decisions); *id*. at 38 (noting that agencies that do nothing avoid NEPA compliance requirements, creating a "strong disincentive to establishing and retaining long-term adaptive management programs"); Allen et al., *supra* note 14, at 1343; Camacho, *supra* note 13, at 1413–17, 1437; Craig & Ruhl, *supra* note 13, at 30, 33, 43–44; *id.* at 36–37 (noting that while agency rules in theory are open to ongoing adjustment, "under contemporary administrative law, each rulemaking effort—even the amendment or modification of a prior rule—is evaluated as a separate legal event, not an ongoing process of agency learning and adaptation.").

23. *See, e.g.*, Zellmer & Gunderson, *supra* note 18, at 946 ("Adaptive management may also be hindered by legal obstacles posed by the ESA, which requires consultation for all discretionary federal actions that may adversely affect a listed species or its critical habitat. Adaptive management requires sufficient flexibility in applicable management mandates and sufficient resilience in ecological resources in order to experiment."); Fischman & Rountree, *supra* note 5, at 31 ("Adaptive management's iterative cycles of planning, monitoring, evaluating, and recalibrating fine-tunes information, expertise, and (ultimately) management."); Camacho, *supra* note 13, at 1414 ("[A]gencies are not required or encouraged to monitor past decisions, adjust such decisions to reflect new information or changed circumstances, or be more effective over time at achieving regulatory goals."); Craig & Ruhl, *supra* note 13, at 37 ("[T]he agency is supposed to 'get it right' at each pronouncement and to 'keep it right' until new information or changed circumstances justifies a change" but "adaptive management allows—even demands—continual managerial flexibility in the face of system complexity.").

Scholars and managers often argue that the rigidity of environmental and administrative law contributes to agency cultures that avoid risk taking and decision making, again problematic in a world of a changing climate. Fischman & Rountree, *supra* note 5, at 20 ("Inertia dominates environmental law and its implementing institutions. Institutional caution and risk aversion may hamper environmental law's ability to adapt and remain functional in the face of sweeping changes, such as climate change."); *id.* at 21–22 ("[M]ost federal agencies maintain a culture of 'status quo.' Deviating from the status quo involves political risk. New information may show that agency change is necessary or prudent, but some personnel treat information as 'troublesome' because of its tendency to provoke change.").

While the diagnosis of the problem is fairly universal in the literature, there is less consensus about the remedy for the malady. The most common proposal is to adjust or reduce public participation in, and judicial review of, administrative agency decisions.[24] The theory is that these are the elements that drive the (excessively) thorough front-end analysis: Public participation imposes burdens by creating a forum in which the agency must respond to comments through additional analysis.[25] Judicial review directly burdens agencies by requiring them to defend their front-end actions in court, and to redo the various procedural steps if the court finds the agency's efforts inadequate. It also imposes indirect burdens because agencies, aware of the possibility of judicial review, spend extra resources to make their analyses and responses to comments "bulletproof."[26]

The utility of these front-end analyses is often questioned in light of the dynamism and uncertainty produced by climate change. If the future will change, and in uncertain ways, the benefits of a thorough, upfront analysis of environmental impacts may be reduced. *See* Fischman & Rountree, *supra* note 5, at 35 (noting current legal system involves "the assumption of a robust capacity to predict and assess environmental impacts and overall costs and benefits of a proposed action"); Melinda Harm Benson & Asako B. Stone, *Practitioner Perceptions of Adaptive Management Implementation in the United States*, 18 ECOLOGY AND SOC'Y, Sept. 2013, at art. 32 ("NEPA makes a number of assumptions that are at odds with [adaptive management], including the assumption that . . . resource managers already have the knowledge of natural systems needed to assess environmental impacts."); Melinda Harm Benson & Ahjond S. Garmestani, *Embracing Panarchy, Building Resilience, and Integrating Adaptive Management Through a Rebirth of the National Environmental Policy Act*, 92 J. ENVTL. MGMT. 1420, 1424 (2011) (stating that front-end analytic requirements under NEPA assume knowledge and predictability of ecosystems that does not exist and place managers "in an untenable position."); Garmestani et al., *supra* note 2, at 1042 (stating that front-end analysis is difficult or impossible given dynamism and uncertainty of climate change impacts); Camacho, *supra* note 13, at 1436–37 ("In general administrative law continues to task natural resource agencies with providing front-end, comprehensive, and conclusive strategies for managing what are typically very complex systems and problems about which there regularly is incomplete information."); Ruhl, *General Design Principles*, *supra* note 13, at 1396 ("[E]nvironmental law . . . must be unshackled from comprehensive rational planning and other 'front-end' decision process methods such as predecisional environmental assessment and cost-benefit analysis. These methods depend too heavily on assumptions of stationarity and predictability to respond effectively to the realities of climate change.").

24. Ruhl *Climate Change Adaptation*, *supra* note 13, at 419 (stating that adaptive management "will require that environmental law relax its front-end gatekeeper grip as well as accommodate new forms of public participation and judicial review"); Craig, *supra* note 3, at 66–67 ("[P]ublic lands managers may need some form of general planning requirements coupled with abbreviated administrative procedures for specific implementation decisions, periodic rather than continual judicial review for rationality, the ability to rely on postdecisional evaluations rather than predecisional justifications, or increased emergency authorities in order to achieve true capacity for adaptive management in the face of climate change impacts.").

25. Public participation may also, in and of itself, create time delays to allow for the public to participate, and these delays may impede repeated agency reconsideration of its decisions. *See* Fischman & Rountree, *supra* note 5, at 32 ("[I]ncreased flexibility in rulemaking procedures might allow for faster action when necessary to deal with some of the fast-spreading problems of climate change, such as drought or flood.").

26. Ruhl, *supra* note 18, at 30, 35 (arguing that public participation and judicial review create strong incentives for agencies to do thorough front-end analysis) ("Most of this pre-decisional activity is geared toward serving two goals: public participation and judicial review."); *id.* at 36 ("It is little wonder that, having to operate in an atmosphere in which each decision involves so much 'front-end'

Adjustment or reduction in both public participation and judicial review would reduce the incentives for agencies to "front-end" analyses, and therefore increase their willingness to do the repeated review and reconsideration of decisions that is necessary for climate change adaptation.[27] Some scholars frame this as reducing the heavy emphasis that administrative law generally places on thoroughly vetting agency decisions before they can become "final" such that an agency can implement them.[28] Scholars in general do not call for the complete elimination of public participation or judicial review, but instead for focusing public participation and judicial review on more significant agency decisions, and leaving smaller-scale agency implementation decisions with reduced or no public participation or judicial review requirements.[29] However, some scholars do specifically focus on litigation as a primary obstacle to effective adaptive management and climate change adaptation.[30]

Alternatively, there are some commentators who argue that the appropriate legal response to encourage climate change adaptation is more public

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preparation designed largely in anticipation of the onslaught of the public's 'participation' and judges' 'hard looks,' many agencies display an aversion to adaptation.").

27. *See* Craig & Ruhl, *supra* note 13, at 36 (making proposals to adjust public participation and judicial review in order to shift these incentives).

28. Fischman & Rountree, *supra* note 5, at 19 ("[T]he fixed nature of environmental law and the importance of finality in administrative procedure raise difficulties when grafting adaptive management onto existing legal regimes."); Benson & Stone, *supra* note 23 ("NEPA makes a number of assumptions that are at odds with [adaptive management], including the assumption that there is a single, final 'agency action' rather than a series of iterative processes."); Allen et al., *supra* note 14, at 1343 (2011) ("Legal certainty does not mesh well with environmental unpredictability . . . . The certainty of law and institutional rigidity often limit the experimentation that is necessary for adaptive management." (citations omitted)); *id.* ("[W]e see the fundamental conflict between a linear legal process (i.e., administrative law) based on 'stationarity' versus an environmental management framework (i.e., adaptive management) based on the realization of dynamic systems characterized by 'surprise.'" (citations omitted)); Benson & Garmestani, *supra* note 23, at 1426 (A "significant obstacle is the fact that administrative law regimes assume there is a 'final agency action' that allows for judicial review." (citations omitted)); Camacho, *supra* note 13, at 1437; Craig & Ruhl, *supra* note 13, at 36 ("[T]he many procedural drivers toward finality in administrative law—the extensive requirements for front-end justification to produce a judicially defensible final agency action—effectively end further deliberation and debate over the agency's decision, both publicly and within the agency. As such, they act as barriers to full agency implementation of true adaptive management." (citations omitted)).

29. *See* Mary Jane Angelo, *Stumbling Toward Success A Story of Adaptive Law and Ecological Resilience*, 87 NEB. L. REV. 950, 1002–03 (2009) (suggesting public participation requirements in environmental law may need to be tailored or changed in order to allow for adaptive management by limiting participation for implementation, but maintaining it for major decisions); Craig & Ruhl, *supra* note 13, at 30, 33, 43–44 (proposing statutory revisions in which judicial review and public participation would be focused on major decisions with less public participation for implementation details). For an example of scholars calling for maintenance of some level of judicial review even in the context of adaptive management, see Benson & Garmestani, *supra* note 23, at 1426 ("[Any] iterative process will need to be held accountable through enforceable mechanisms in administrative law.").

30. *See* Ruhl, *Climate Change Adaptation*, *supra* note 13, at 428; *see also* Benson & Stone, *supra* note 23 (describing a survey of natural resource practitioners participating in adaptive management training that found that a majority see law as an obstacle to adaptive management, specifically the presence of lawsuits).

participation in environmental decision making.[31] Others argue that NEPA analyses may facilitate climate change adaptation by forcing agencies to consider climate change impacts that might otherwise have gone ignored.[32]

B. Substantive Flexibility

In the second category are proposals to alter the substance (rather than the procedure) of environmental law to account for the dynamic future that climate change will produce by adopting less rigid management or regulatory standards. In this context, many scholars argue that current environmental and natural resources law relies heavily on a preservationist or baseline approach, where historical conditions are used to judge whether management or regulatory standards have been satisfied, or whether restoration or mitigation goals have been met.[33] These historical standards, however, will be much less useful in a future where environmental conditions are changing with the climate.[34]

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31. Alejandro E. Camacho, *Can Regulation Evolve? Lessons from a Study in Maladaptive Management*, 55 UCLA L. REV. 293, 307, 350 (2007) (calling for more public participation to make regulation more adaptive by bringing in more information, perspectives, and monitoring).

32. For instance, a survey of public land management professionals found that they believe that NEPA can enable adaptation by forcing consideration of climate change impacts in agency decision making, but statutes with substantive standards such as the ESA or NPS Organic Act are more of an obstacle to adaptation. Robert L. Glicksman, *Governance of Public Lands, Public Agencies, and Natural Resources*, *in* THE LAW OF ADAPTATION TO CLIMATE CHANGE: U.S. AND INTERNATIONAL ASPECTS, *supra* note 5, at 441, 466 (citing Lesley Jantarasami et al., *Institutional Barriers to Climate Change Adaptation in U.S. National Parks and Forests*, 15 ECOLOGY AND SOC'Y, Dec. 2010, at art. 33); *see also* JOEL B. SMITH ET AL., PEW CTR. ON GLOB. CLIMATE CHANGE, ADAPTING TO CLIMATE CHANGE: A CALL FOR FEDERAL LEADERSHIP 29 (2010) (identifying NEPA as key component of adaptation for similar reasons); *see also* Benson & Garmestani, *supra* note 23, at 1424–25 (calling for a substantive standard under NEPA to mandate environmental resilience, "an affirmative obligation to engage in mitigation of environmental impacts.").

33. Fischman & Rountree, *supra* note 5, at 20 ("The substantive standards of environmental law generally reflect a homeostatic view of nature, attempting to preserve or, when necessary, restore natural areas to some previous state.").

34. Michael B. Gerrard, *Introduction and Overview*, *in* THE LAW OF ADAPTATION TO CLIMATE CHANGE: U.S. AND INTERNATIONAL ASPECTS, *supra* note 5, at 3, 12 ("Much of environmental law assumes a baseline environment and seeks to preserve it. Where that environment has been degraded, the law seeks to restore it. But as a result of climate change the environmental baseline is shifting in many ways; attempting to stay in the same place is often futile, and laws that try to tie us down to where we have been can prevent us from moving as gracefully as possible to where we must go."); Fischman & Rountree, *supra* note 5, at 23 ("The slow, fixed governance within environmental law will be a problem for climate change adaptation. As will be further explored in the next section, climate change demands flexibility. Moreover, climate change will prove unpredictable and transformative. Consequently, fixed laws relying on a preservationist or restorationist perspective will appear out of touch and will eventually fail in the face of climate change."); Garmestani et al., *supra* note 2, at 1039 ("The problem is that the rigidity of current environmental law, laws that were so successful at protecting the environment for many years, is now the aspect of the law that does not allow it to confront emerging, cross-scale, and cross-boundary challenges."); Camacho, *supra* note 13, at 1426–27; Ruhl, *Climate Change Adaptation*, *supra* note 13, at 392; Holly Doremus, *Adapting to Climate Change with Law That Bends Without Breaking*, 2 SAN DIEGO J. CLIMATE & ENERGY L. 45, 63–74 (2010); Craig, *supra* note 3, at 17, 35.

Relatedly, some scholars argue that rigid management or regulatory standards are problematic because they obstruct the experimentation needed for adaptive management or to adjust to new climate conditions,[35] and because they prevent agencies from acknowledging the uncertainty inherent in their management and regulatory decisions.[36] Practitioners appear to agree with these critiques—particularly with respect to the ESA.[37]

In general, the calls by scholars are not for the wholesale repeal of the relevant standards, but instead for tweaks that will allow for the adjustment of relevant standards where climate change has made them irrelevant, unattainable, or where they create too much interference the experimentation adaptive management requires.[38] Proposals generally recognize the need for some enforceability in the system based on clear, specific prescriptive statutory standards, but call for fewer of those standards, or at least standards with somewhat softer edges.[39]

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35. Fischman & Rountree, *supra* note 5, at 31–32 (citing Project XL, an EPA pilot project, as a model of flexibility because it eased regulation where other benefits were provided and gave grants for experimentation with new procedures for regulation).

36. Craig & Ruhl, *supra* note 13, at 47–48 (arguing that agencies need the ability to say admit there is uncertainty about whether a proposed management choice will achieve the relevant statutory goals and that under current law this admission will often lead courts to strike down the agency's decision).

37. Benson & Stone, *supra* note 23 (describing a survey of natural resource practitioners participating in adaptive management training that found a majority see law as an obstacle to adaptive management, specifically the requirement of specific management outcomes); Glicksman, *supra* note 32, at 466 (survey of public land management professionals found that they believe statutes with substantive standards such as the ESA or NPS Organic Act are an obstacle to adaptation); *see also* Garmestani et al., *supra* note 2, at 1040 ("In its current form, the ESA does not have the necessary flexibility in its regulatory language to effectively implement adaptive responses to changing environmental conditions.").

38. *See, e.g.*, Doremus, *supra* note 34, at 63–74 (suggesting the use of "moving baselines" to allow for change while still constraining our desire to satisfy short-term, myopic preferences at the expense of long-term environmental degradation); Craig, *supra* note 3, at 17 (noting the need to balance flexibility required for climate change adaptation with ability to prevent political pressure that weakens environmental law by using "principled flexibility" which would "distinguish in legally significant ways uncontrollable climate change impacts from controllable anthropogenic impacts on species, resources, and ecosystems that can and should be actively managed and regulated, and . . . implement consistent principles for an overall climate change adaptation strategy."). In outlining her proposal, Craig emphasizes that many existing historic standards might still be maintained because they retain their utility even in a future dominated by climate change. *Id.* at 63–64. For instance, many "anti-backsliding requirements" in pollution control law may be still useful and "many existing laws already contain provisions that are sufficiently flexible to address climate change impacts to baseline ecological conditions." *Id.* at 63. However, CWA antidegradation provision may have to be changed. *Id.* at 64.

39. *See* Ruhl, *General Design Principles*, *supra* note 13, at 1397 ("Rigidly relying on fixed, uniform regulatory instruments, such as technology standards and regulatory prescriptions, forecloses adaptation to the kind of evolving, complex problems climate change adaptation will present. Governance institutions will need a broader array of instruments—ranging from 'hard' prescriptive mandates to 'soft' incentive- and information-based tools—to test for leverage over the more tractable attributes of climate change adaptation problems over time."); *see also* Ruhl, *Climate Change Adaptation*, *supra* note 13, at 425.

However, there is less consensus on these points compared to proposals to change the procedural structure of environmental law. Some scholars argue that reducing or eliminating clear, specific standards and goals risks undermining the effectiveness of environmental law, in particular its ability to resist political pressure and reject myopic decision making that would sacrifice long-term environmental quality for short-term economic gain.[40] For example, the "maximum sustained yield" (MSY) standard that is the basis for fisheries management in the United States has been criticized as too malleable to ensure effective environmental protection and therefore inadequate to ensure adaptation to climate change.[41] A related concern is that agencies may abuse the discretion granted to them by procedural and substantive reforms intended to facilitate adaptive management.[42]

To provide a specific standard that we can use in our analysis in this Article, we have synthesized these various perspectives to characterize the dominant trends. According to this literature, a flexible natural resource management law is one that motivates and empowers management agencies to respond to changes in the availability or condition of natural resources. Specifically, a flexible regime will:

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40. *See, e.g.*, Annecoos Wiersema, *A Train Without Tracks Rethinking the Place of Law and Goals in Environmental and Natural Resources Law*, 38 ENVTL. L. 1239 (2008); Doremus, *supra* note 34, at 63–74. As an example of the tension that balancing flexibility and rigidity creates for some of these proposals, see Zellmer & Gunderson, *supra* note 18, at 942 (contending agencies need clear guidance to overcome inertia and special interests, but management "must be unfettered from rigid consensus building requirements and free to experiment 'without constant micromanagement.'"); *see also* Folke et al., *supra* note 7, at 46 ("Resource users may have very specific desires from a highly complex ecosystem, and they may tend to focus their management actions narrowly, ignoring side effects. In the area of environmental regulation, bureaucratic micromanagement through command-and-control policies often causes unintended consequences, or drives the regulated user to search for loopholes."); *but see* Ronald A. Heiner, *The Origin of Predictable Behavior*, 73 AM. ECON. REV. 560, 564 (1983) ("[A]llowing flexibility to react to information or to select actions will not necessarily improve performance if there is uncertainty about how to use that information or about when to select particular actions. Thus, an agent's overall performance may actually be improved by restricting flexibility to use information or to choose particular actions.").

41. *See* Zellmer & Gunderson, *supra* note 18, at 902 (citing the Magnuson-Stevens Act's MSY and related Optimum Yield standards as examples because they are overly vague and allows for too much special interest manipulation); Craig, *supra* note 3, at 47 ("[O]ne of the more troubling legacies of natural resource management in the United States is that 'sustainable yield' standards tend to err on the side of more human harvest or extraction rather than institutionalizing any kind of precautionary principle or margin of error in favor of the species or ecosystem."); *see also* Brian Walker et al., *Resilience, Adaptability, and Transformability in Social-Ecological Systems*, 9 ECOLOGY AND SOC'Y, Dec. 2004, at art. 5 (critiquing MSY standards as ineffective and unsustainable); *but see* Folke et al., *supra* note 7, at 38 (arguing that the MSY concept is an example of rigid, inflexible legal structure that interferes with effective natural resource management).

42. *See, e.g.*, Courtney Schultz & Martin Nie, *Decision-Making Triggers, Adaptive Management, and Natural Resource Law and Planning*, 52 NAT. RESOURCES J. 443, 450–51, 518–20 (2012) (pointing to Forest Service 2005 and 2008 draft planning regulations as example of the risk that agencies will abuse discretion granted by adaptive management and calling for enforceable, clear, and reliable monitoring and triggers for effective adaptive management in order to constrain agency discretion).

- Give agencies the power to act quickly by curtailing or streamlining ordinary procedural mechanisms, such as environmental review, public participation, and judicial review;
- Contain less concrete and more nuanced substantive standards (less specific statutory restrictions on agency action, more substantive agency discretion); or,
- Free agencies from the obligation to use preservationist or historical baselines for purposes of goal setting.

II. FLEXIBILITY IN FISHERIES LAW

Within the field of natural resources law, two of the most flexible legal regimes are federal laws regulating commercial and recreational ocean fishing, primarily the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act),[43] and state laws regulating recreational hunting.[44] Congress and state legislatures incorporated flexibility features into these legal regimes primarily because wildlife populations fluctuate naturally and, often, unpredictably.[45] Given these variable populations, the only way to ensure that fishing and hunting will be sustainable over the long term is to allow management agencies the freedom to adjust harvest levels in response to changes in the condition of the resource.[46] Because populations can fluctuate rapidly, laws must also allow management agencies to make decisions quickly.

A. The Marine Fisheries Regime

The U.S. Department of Commerce and its National Oceanic and Atmospheric Administration (NOAA) are responsible for overseeing the management of marine fisheries in U.S. waters, that is, from three to two hundred nautical miles offshore.[47] In 1976 Congress passed what is now known

43. *See* 16 U.S.C. §§ 1801–1883 (2012). Other laws that indirectly regulate ocean fishing include the Marine Mammal Protection Act, 16 U.S.C. §§ 1361–1421 (2012), and the Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2012).

44. *See, e.g.*, CAL. CODE REGS. tit. 14, § 4501 (2015).

45. *See* GA. DEP'T OF NAT. RES., GEORGIA'S DEER MANAGEMENT PLAN: 2015-2024, at 6 (2014), http://www.georgiawildlife.com/sites/default/files/uploads/wildlife/hunting/pdf/Game_Mgmt/Deer%20Plan%202015-2024%20Final%20Draft%2011-19-14.pdf ("Starting in 1998 deer population estimates gradually declined and dipped below 1 million in 2004, remaining stable at 900,000 to 1 million deer since that time. This reduction in deer population to the current level was an objective of Georgia's Deer Management Plan 2005–2014."); *Annual Hunting Regulations*, U.S. FISH & WILDLIFE SERV., http://www.fws.gov/migratorybirds/RegulationsPolicies/regs.html (last updated Apr. 11, 2011) ("The purpose of annual hunting regulations is to keep harvests at levels compatible with a population's ability to maintain itself.").

46. In other words, a constant harvest rate cannot work if the population drops to a point at which the resource is being mined. A constant harvest rate might work if it were set at an extremely low level.

47. There are some exceptions. The federal government manages fisheries from 9 to 200 nautical miles off the coast of Texas and the west coast of Florida. *See Primer on Ocean Jurisdictions Drawing Lines in the Water*, *in* AN OCEAN BLUEPRINT FOR THE 21ST CENTURY 70–71 (2004), http://govinfo.library.unt.edu/oceancommission/documents/full_color_rpt/03a_primer.pdf. States can

as the Magnuson-Stevens Act.[48] The Act established a "Fishery Conservation Zone" stretching from the shores of the United States to a distance of two hundred miles as well as a set of rules and institutions for managing fishing activities within that zone.[49] At the center of Congress's approach to domestic fisheries management are eight Regional Fishery Management Councils, each of which is responsible for managing fisheries within a sizeable fraction of federal waters.[50]

The voting membership of each council is comprised of two groups. The first group consists of what are known as "mandatory" members.[51] These are state and federal officials: the head of each coastal state or territory's marine fisheries agency and the NOAA Regional Administrator from that region of the country.[52] The second group of voting members consists of "appointed" members.[53] These members are citizens who have been nominated by coastal state governors and then appointed to the council by the Secretary of Commerce.[54] Traditionally, governors draw heavily from fishing or fishing-related industries in nominating citizens for council membership.[55] Since the Act was passed, industry representatives have filled, on average, about 80 percent of appointed seats.[56]

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regulate fisheries occurring in federal waters in some cases. *See* Josh Eagle, *Domestic Fishery Management*, *in* OCEAN AND COASTAL LAW AND POLICY 275–77 (Donald C. Baur, Tim Eichenberg & Michael Sutton eds., 2008).

48. Fishery Conversation and Management Act, Pub. L. No. 94-265, 90 Stat. 331 (1976). In 1980, Congress renamed it the Magnuson Fishery Conservation and Management Act; in 1996, it became the Magnuson-Stevens Fishery Conservation and Management Act. Pub. L. No. 96-561, 94 Stat. 3275 (1980); Pub. L. No. 104-208, 110 Stat. 3009 (1996).

49. 16 U.S.C. §§ 1801–1883 (2012).

50. *Id.* § 1852(a). NOAA directly regulates Atlantic and Gulf of Mexico fisheries for "highly migratory species" such as sharks, tunas, and swordfish. *Id.* § 1854(g).

51. *Id.* § 1852(b)(1)(A).

52. *Id.*

53. *Id.* § 1852(b)(2)(A).

54. *Id.* The 2006 Reauthorization Act added a requirement that the National Marine Fisheries Service train new council members in the basic science and economics of fishery management. *Id.* § 1852(k).

55. Thomas A. Okey, *Membership of the Eight Regional Fishery Management Councils in the United States*: *Are Special Interests Over-Represented?*, 27 MARINE POL'Y 193 (2003); JOSH EAGLE ET AL., TAKING STOCK OF THE REGIONAL FISHERY MANAGEMENT COUNCILS 12, 24 (2003), http://www.apo-observers.org/docs/pew_science_taking_stock.pdf. In this Article, the word "industry" refers to commercial and recreational fishing, as well as fish processing. Although those groups and their subgroups, for example, commercial line and trawl fishermen, often have conflicting interests, they generally share important common interests: the maintenance of high catch levels and the minimization of restrictions on fishing. Where we are discussing a subgroup in particular (often commercial fishing), we mention that specifically in the text. The 2006 Reauthorization Act added a requirement that, with respect to the Gulf of Mexico Council only, governors must include the name of one nonindustry person on nomination lists submitted to the Secretary of Commerce. 16 U.S.C. § 1852(b)(2)(D).

56. EAGLE ET AL., *supra* note 55, at 24.

B. Flexibility Measures in the Magnuson-Stevens Act

Since the late nineteenth century, fisheries scientists, fishermen, and regulators have understood that the size and location of marine fish populations are subject to frequent, unpredictable, and sometimes rapid change.[57] Causes of population variability include predator-prey dynamics, diseases, disturbances, and climate cycles.[58] Flexibility measures incorporated into the Magnuson-Stevens Act provide evidence that Congress was fully aware of the challenges that constant and uncertain variability present to natural resource decision makers.[59] The table in Appendix A provides an example of changing scientific advice and harvest limits in one fishery, Gulf of Mexico king mackerel.[60] The data show managers' ability to adjust catch limits quickly and dramatically, for example, reducing the limit by about 25 percent in 1987 and increasing it by about 28 percent in 1997.

Managers also have the power to readily adjust long-term goals in light of new information. The Magnuson-Stevens Act does not obligate managers to restore fish populations to predetermined, historical levels. Instead, the Act directs managers to maintain fish populations at levels that produce something the statute calls "optimum yield."[61] If key aspects of the marine environment such as food availability and water temperatures change over time, and these changes affect a particular fishery's optimum yield, there is nothing in the Act that prevents managers from resetting the target.

Adjustments to the target population in the Pacific groundfish fishery between 1997 and 2009 provide a good example of goal-setting flexibility.[62] From 1982 to 1997, managers estimated that the optimum population (the population that produces optimum yield) for ninety species managed under the plan was 35 percent of the prefishing population.[63] In 1997 based on three scientific papers published between 1993 and 1995, managers adopted a more conservative estimate, 40 percent of prefishing levels, for a subset of rockfish

57. *See generally* ERIK CHAPMAN, N.H. SEA GRANT COLL. PROGRAM, CLIMATE CHANGE & FISH POPULATIONS, http://nsgl.gso.uri.edu/nhu/nhug10001.pdf (last visited Mar. 23, 2015).

58. *Id.*

59. For example, the Regional Fishery Management Councils were established "to exercise sound judgment in the stewardship of fishery resources through the preparation, monitoring, and revision of such plans under circumstances (A) which will enable the States, the fishing industry, consumer and environmental organizations, and other interested persons to participate in, and advise on, the establishment and administration of such plans, and (B) which take into account the social and economic needs of the States." 16 U.S.C. § 1801(b)(5) (2012).

60. SE. DATA, ASSESSMENT, & REVIEW (SEDAR), SEDAR 38 STOCK ASSESSMENT REPORT: SOUTH ATLANTIC KING MACKEREL 29 tbl.2.5.4 (2014), sedarweb.org/docs/sar/SEDAR_38_SA_SAR.pdf.

61. 16 U.S.C. §§ 1802(33), 1851(a)(1) (2012).

62. Management of this fishery is detailed in PAC. FISHERY MGMT. COUNCIL, PACIFIC COAST GROUNDFISH FISHERY MANAGEMENT PLAN: FOR THE CALIFORNIA, OREGON, AND WASHINGTON GROUNDFISH FISHERY 22 (2014), http://www.pcouncil.org/wp-content/uploads/GF_FMP_FINAL_May2014.pdf.

63. *Id.* at 21–22.

species included in the groundfish fishery.[64] In 2000 "after an intensive review of historic harvest rates, and current scientific literature on harvest rates and stock productivity," the Pacific Fishery Management Council's scientific advisors adopted new targets for some species, ranging from 30 to 50 percent of prefishing levels.[65]

1. Procedural Flexibility: Giving Managers the Ability to Act Quickly

As a general matter, two statutes—the Administrative Procedure Act[66] and the National Environmental Policy Act[67]—regulate the decision-making processes of federal natural resource management agencies.[68] Agency compliance with the procedural requirements of these statutes is time consuming and mandatory; thus while these laws do not necessarily restrict agencies' ability to implement new measures or change course, they do limit agencies' ability to do so quickly.[69] Due to the unique decision-making structure of the Magnuson-Stevens Act, which gives primary authority for decision making to the councils while giving NOAA the responsibility to formally approve council decisions, the NEPA-compliance issues in federal fishery management are particularly complex.[70]

That being said, in practice the fisheries governance system has managed to produce thousands of annual management measures for the hundreds of fisheries under management for nearly forty years.[71] As illustrated by the example of the Gulf of Mexico king mackerel fishery, the governance system also often produces management measures that differ significantly from those in place in prior years.

2. Flexibility in Substantive Standards and Goal Setting

The Magnuson-Stevens Act has always given NOAA and the councils a great amount of discretion in setting population goals for specific fisheries. The

64. *Id.* at 22. A higher target population represents a more conservative approach because it means that managers must leave more fish in the sea or, if the fishery is overfished, enter into a longer, more stringent rebuilding protocol.

65. *Id.*

66. Administrative Procedure Act of 1946, 5 U.S.C. §§ 551–59, 701–06, 1305, 3105, 3344, 5372, 7521 (2012).

67. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370h (2012).

68. *See, e.g.*, Endangered Species Act of 1973, 16 U.S.C. §§ 1531–1544 (2012).

69. *See, e.g.*, Lucas Bergkamp & Turner T. Smith, Jr., *Legal and Administrative Systems Implications for Precautionary Regulation*, *in* THE REALITY OF PRECAUTION: COMPARING RISK REGULATION IN THE UNITED STATES 434, 463 (Jonathan B. Wiener et al. eds., 2001) ("[T]he APA rulemaking process can slow down government decision[ ]making, particularly in conjunction with the judicial review process.").

70. For a discussion of this division of roles and responsibilities, see Memorandum from Samuel D. Rauch III, Deputy Assistant Adm'r for Regulatory Programs, to Reg'l Adm'rs & Council Coordination Comm., Nat'l Marine Fisheries Serv. (Feb. 19, 2013), http://www.nmfs noaa.gov/sfa/reg_svcs/Councils/ccc_2013/G_NMFS_NEPA_Policy_Directive.pdf.

71. EAGLE ET AL., *supra* note 55, at 32.

Act's National Standard One provides that "[c]onservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry."[72] The Act currently defines "optimum yield" as "the amount of fish which . . . is prescribed . . . on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factor."[73]

The determination of a fishery's MSY is not dependent on any historical baseline. Rather, it is a function of the current marine environment—the potential of each stock of fish is dictated by environmental conditions such as ocean temperature. Thus MSY changes with the underlying environmental conditions. As three leading fisheries scientists put it, "environmental and human factors . . . cause us to expect that reproductive surplus relationships [that is, sustainable yields] will not be stable in time."[74] Nothing in the Magnuson-Stevens Act prevents managers from adjusting MSY goals, as shown by the example of the changes in goals for the Pacific groundfish fishery.

The current language of the Magnuson-Stevens Act and implementing regulations, quoted above, actually provide management councils with less discretion than they had under the Act's original language. The original version of the Act gave the councils wide latitude in setting annual catches, explicitly allowing them to sacrifice biological goals, such as managing the fishery for MSY, in order to produce short-term economic gains for the fishing industry. Specifically, the original Act provided that catches should be set on the basis of a fishery's MSY, "as modified by any relevant economic, social, or ecological

72. 16 U.S.C. § 1851(a)(1) (2012). The Magnuson-Stevens Act contains ten National Standards for fishery management. § 1851(a)(1)-(10). The National Standards express Congress's goals in the form of enforceable statutory mandates. *See* Eagle, supra note 47 at 280–81.

73. 50 C.F.R. § 600.310(e)(3)(i)(A) (2015). As discussed shortly, this definition of optimum yield is a narrower one than originally existed under the Act.

MSY is the annual yield of fish (harvest) that is "as large as possible but nevertheless sustainable in the long term." Andre E. Punt and Anthony D.M. Smith, *The Gospel of Maximum Sustainable Yield in Fisheries Management Birth, Crucifixion and Reincarnation*, in CONSERVATION OF EXPLOITED SPECIES (John D. Reynolds et. al. eds., 2001). MSY is predicated on the assumption that fish populations are density-dependent, that is, the degree to which the population can grow in a given period is related to the size of the population at the beginning of that period. *Id.* Prior to human fishing a population will be stable at its "carrying capacity" due to limited amounts of food or space resources. Specifically, since resources sufficient to support a fish from birth to adulthood become available only as adult fish die, the population's rate of increase equals its rate of natural mortality. *Id.* When natural or human forces increase the mortality rate, the resulting availability of resources translates to a higher rate of increase. If mortality rates become too high, overall productivity will decrease due to the lower numbers of spawning adults. *Id.* The goal of fishery management is to maintain the spawning population at the point at which total long-term productivity is at its highest, known as MSY, or P_{MSY}. *See* WORLD WILDLIFE FUND, COMMON FISHERIES POLICY REFORM: GETTING MSY RIGHT 1 (2011), http://awsassets.panda.org/downloads/wwf_msy_oct2011_final.pdf.

74. Ray Hilborn et al., *Sustainable Exploitation of Natural Resources*, 26 ANN. REV. ECOLOGY & SYSTEMATICS 45, 55 (1995).

factor."[75] Throughout the 1980s and early 1990s, some of the councils regularly used the "as modified" language to increase catches above MSY—in effect using it as a loophole to avoid taking the politically difficult steps required for proper long-term management.[76] Similarly, while National Standard One in both the original and current Act requires councils to "prevent overfishing,"[77] the original Act contained no guidance to the councils as to how they should do so and, more importantly, no required timeline for rebuilding overfished stocks.

Prior to amending the Act in 1996, and again in 2006, Congress heard testimony about the high rate of council management failures.[78] During this period, about 25 to 40 percent of council-managed fisheries were "overfished" or "subject to overfishing"; testimony suggested that one of the primary causes of these problems was that councils often did not follow scientific advice, allowing them to avoid taking the controversial steps necessary to rebuild overfished stocks and to end overfishing.[79]

In response, Congress made important changes in the Sustainable Fisheries Act of 1996. First, Congress changed the definition of optimum yield, substituting the word "reduced" for "modified."[80] This change meant that, in theory, the councils would no longer be free to set catch levels above those recommended by their science advisors. The Sustainable Fisheries Act also addressed the question of how the councils should respond to information suggesting that stocks were overfished. Congress added a requirement that the councils rebuild overfished stocks within a time period "as short as possible . . .

75. Fishery Conservation and Management Act of 1976, Pub. L. No. 94-265, § 3, 90 Stat. 331, 336 (amended 1996, 2006).

76. *See, e.g.*, MICHAEL L. WEBER, FROM ABUNDANCE TO SCARCITY: A HISTORY OF U.S. MARINE FISHERIES POLICY 177 (2002); Timothy Hennessey & Michael Healey, *Ludwig's Ratchet and the Collapse of New England Groundfish Stocks*, 28 COASTAL MGMT. 187, 199–205 (2000).

77. § 301, 90 Stat. at 346.

78. *See, e.g.*, *Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act Field Hearing Before the Subcomm. on Oceans and Fisheries of the Comm. on Commerce, Sci., and Transp.*, 106th Cong. 41 (2000) (statement of Russell Sherman, Treasurer, Gulf of Maine Fisherman's Alliance) ("I believe I have also experienced and suffered through one of the most dismal failures of the management process . . . [which] has turned into an allocation fight, with the winners being special interest groups, represented by well-funded lobbyists able to garner support on, or who are actually members of, the New England Fishery Management Council. As a result, small owner operated vessels from small fishery dependent coastal communities are forced out of the industry.").

79. *See, e.g.*, *Reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act Hearing Before the Comm. on Commerce, Sci., and Transp.*, 109th Cong. 20 (2005) (statement of Admiral James D. Watkins, Chairman, U.S. Comm'n on Ocean Policy) ("The Commissioners felt strongly that the Regional Fisheries Management Councils should be required to adhere to scientific advice provided by the [Scientific and Statistical Committees]. This requirement is based on information that a lack of adequate scientific information has not been the main culprit in most instances of overfishing. Rather, a 2002 National Research Council report concluded that the problem in many cases of overfishing was that the Regional Councils disregarded or downplayed valid scientific information when setting harvest guidelines.") (citing NAT'L RESEARCH COUNCIL, SCIENCE AND ITS ROLE IN THE NATIONAL MARINE FISHERIES SERVICE (2002)).

80. Sustainable Fisheries Act, Pub. L. No. 104-297, sec. 102, § 3, 110 Stat. 3559, 3562 (1996).

and not to exceed ten years, except in cases where the biology of the stock of fish [or] environmental conditions . . . dictate otherwise."[81]

In 2006 Congress once again attempted to narrow fishery managers' substantive discretion.[82] Most important, the 2006 amendments made each council's Scientific and Statistical Committee responsible for setting limits on the discretion to set catch levels for the council. The amended Act required that the councils "develop annual catch limits for each [managed fishery] that may not exceed the fishing level recommendations of its scientific and statistical committee."[83] In addition, Congress required the councils to develop accountability measures, that is, steps that councils would take in the event that their decisions, in retrospect, turned out to be insufficient to rectify overfishing problems or overfished conditions.[84] These provisions were clearly directed at increasing managers' fidelity to science and encouraging more conservative decision making.[85]

C. Fisheries Management Not as Successful as Desired

Measuring the success of fisheries management under the Magnuson-Stevens Act is a difficult undertaking. There are at least four ways to ask the question "what would success look like?" Two metrics focus on biological or ecological measures. First, are managed fish populations at levels close to or above the levels that produce MSY? Second, have NOAA and the councils taken steps, mandated by the statute, toward a broader, ecosystem approach to management?[86] Examples of a broader approach could include protecting fish habitats from damage by fishing gear and minimizing the extent to which fishing kills species such as seabirds, sea turtles, and marine mammals. The third and fourth measures would focus on the attainment of economic and political goals: Have NOAA and the councils managed fisheries toward reducing the amount of excess capital in the fishing industry, a goal that many

81. Sec. 109, § 304, 110 Stat at 3585.

82. *See* Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006, Pub. L. No. 109-479, 120 Stat. 3575 (2007).

83. 16 U.S.C. § 1852(h)(6) (2012).

84. *Id.* § 1852(h)(5).

85. *See Hearing Before the Comm. on Commerce, Sci., and Transp.*, *supra* note 79, at 20 (statement of Admiral James D. Watkins, Chairman, U.S. Comm'n on Ocean Policy) ("Further exacerbating the problem of exceeding total allowable catch levels is the fact that neither NOAA Fisheries nor the Secretary of Commerce have adequately exercised their authority to prevent the Councils from taking such risky actions. . . . Thus we are suggesting establishment of a safeguard in the process by allowing SSC to set a total allowable catch that cannot be exceeded. . . The Commission also made recommendations to help ensure the qualification and impartiality of SSC members, as well as suggestions for strengthening and mandating a peer review process for fisheries information . . . Full implementation of this collection of measures would represent an important step toward reinstilling confidence in the process by which fisheries science is collected, analyzed and used, reducing grounds for unnecessarily burdensome lawsuits and the diversion of scarce resources toward competing science.").

86. *See* 16 U.S.C. § 1882 (2012).

see as key to long-term sustainability?[87] To what extent does the fishery management process allow meaningful input from traditionally underrepresented groups, such as nonconsumptive users (conservation groups) and, in some regions, recreational fishing interests?[88]

At a basic level, all interested parties would agree that the first question, relating to the maintenance of healthy fish stocks, is the most important. NOAA is the only source of comprehensive data on the status of the United States' fish stocks. The agency began sporadically publishing reports on the overall condition of U.S. fisheries in the early 1990s.[89] These reports put each fish stock into one of four categories: "unknown" (stock cannot be assessed due to insufficient data); "overutilized" (stock has been negatively impacted by historically excessive levels of fishing); "underutilized" (stock could support increased fishing pressure in the future); and "fully exploited" (population somewhere between under- and overutilized). The data from these years show a consistently high rate of overutilization, a clear symptom of management failure.[90]

Table 1: Problems with U.S. Marine Stocks in the Early 1990s

Year	Number of Overutilized Stocks (as percentage of all "known" stocks)
1991	65 (42%)
1992	67 (43%)
1995	56 (44%)

In the 1996 amendments to the Magnuson-Stevens Act, Congress mandated that NOAA publish annual data on the status of stocks. As set out in

87. *See id.* § 1861a(b) (implementing a "fishing capacity reduction" program).

88. *See id.* § 1852(b)(2)(B) ("The Secretary . . . shall . . . ensure a fair and balanced apportionment, on a rotating or other basis, of the active participants (or their representatives) in the commercial and recreational fisheries under the jurisdiction of [each Regional Fishery Management] Council.").

89. NAT'L OCEANIC & ATMOSPHERIC ADMIN., OUR LIVING OCEANS: REPORT ON THE STATUS OF U.S. LIVING MARINE RESOURCES, 1995 (1996), http://babel.hathitrust.org/cgi/pt?id=uiug.30112075692829;view=1up;seq=3; NAT'L OCEANIC & ATMOSPHERIC ADMIN., OUR LIVING OCEANS: REPORT ON THE STATUS OF U.S. LIVING MARINE RESOURCES, 1993 (1994), http://babel.hathitrust.org/cgi/pt?id=uc1.31822009056540;view=1up;seq=309 (enter "157" into "Jump to" search box near upper left of page corner, then select "Go"); NAT'L OCEANIC & ATMOSPHERIC ADMIN., THE STATUS OF U.S. LIVING MARINE RESOURCES, 1992 (1992); NAT'L OCEANIC & ATMOSPHERIC ADMIN., OUR LIVING OCEANS: REPORT ON THE STATUS OF U.S. LIVING MARINE RESOURCES, 1991 (1991), http://babel.hathitrust.org/cgi/pt?id=uc1.31822009056540;view=1up;seq=1.

90. Some of these early reports reported on two types of fisheries problems: overutilization and overfished populations. The former, also known as "overfishing," occurs when the amount of fishing effort in a fishery exceeds the amount needed to catch the MSY. The latter refers to a condition of the stock, specifically, that the population of fish is significantly below the level capable of producing the MSY. Because these early reports were inconsistent in their assessments of overfished populations, we chose to put only data on overutilization in the table. The numbers on stock condition were similarly consistent with overall management problems. Beginning in 2000, the government produced annual statistics on overfishing and overfished fisheries.

the table in Appendix B, these data show that management has been slowly improving over the last fifteen years.[91] NOAA's reports address not one, but two types of management failures: "overfished" stocks, that is, stocks whose population is well below the level necessary to produce an optimum annual yield; and, stocks experiencing "overfishing," that is, a level of pressure greater than needed to catch the optimum yield. This latter type of failure is the same one the agency earlier called "overutilization." Since 2000, thirty-four total stocks have been rebuilt, the number of stocks on the overfishing list decreased from seventy-two to twenty-eight, and the number of stocks on the overfished list decreased from ninety-two to forty.[92] These figures are based only on stocks with a "known" status; for example, in 2013, 478 stocks and stock complexes were federally managed, but overfished status determinations could only be made for 48 percent of those.[93]

What is important to note about this data is that stocks improved as the law became less flexible—i.e., as it imposed greater constraints on the discretion of management councils and NOAA. Overfishing declined after the 1996 amendments, and continued to decline after the 2006 amendments.

II. FLEXIBILITY IN HUNTING LAW

A. General Flexibility of Hunting Laws in United States

Hunting is primarily (though not exclusively) regulated at the state level in the United States.[94] Hunting regulations are usually promulgated and enforced by state fish and game agencies. In general, state legislatures give tremendous leeway to these agencies in the development of hunting regulations:[95] the

91. Each of the individual reports to Congress is available on NOAA's website. *See Stock Status Archive*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/archive/stock_status_archive.html (last visited Oct. 6, 2015).

92. Based on 2013 data. *See* NAT'L OCEANIC & ATMOSPHERIC ADMIN., STATUS OF STOCKS 2013: ANNUAL REPORT TO CONGRESS ON THE STATUS OF U.S. FISHERIES (2013), http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/archive/stock_status_archive.html.

93. *Id.* at 2.

94. Both federal and state agencies regulate waterfowl and other migratory bird hunting. *See infra* notes 115–119.

95. *See* ERIC T. FREYFOGLE & DALE D. GOBLE, WILDLIFE LAW: A PRIMER 139 (2009) ("Many legislatures, however, have given agencies scant guidance on how they should go about exercising their considerable delegated powers."). A survey of state wildlife laws in the early 1990s showed that most states give great leeway to administrative agencies in setting hunting seasons, bag limits, and often methods of hunting as well. *See* RUTH S. MUSGRAVE & MARRY ANNE STEIN, STATE WILDLIFE LAWS HANDBOOK (1993). For examples of states that granted broad discretion to their agencies to set hunting rules, see *id.* at 73–74 (Arizona); *id.* at 121–22 (Colorado); *id.* at 190–92 (Idaho); *id.* at 218 (Indiana); *id.* at 243 (Kansas); *id.* at 251–52 (Kentucky); *id.* at 413–17 (Nevada); *id.* at 446–52 (New Jersey); *id.* at 462 (New Mexico); *id.* at 504–05 (North Dakota); *id.* at 540–43 (Oregon); *id.* at 612–14 (Tennessee); *id.* at 638 (Utah); *id.* at 675–76 (Washington). Some states imposed significant statutory restrictions on hunting, but in general those restrictions focused on the methods of hunting, rather than on the duration of hunting seasons or on bag limits. *See, e.g.*, *id.* at 281–84 (Maine statutory rules focus on methods of hunting); *id.* at 147 (Delaware statutory rules set some hunting season dates); *id.* at 170–73 (Georgia

relevant statutory language is often a sweeping delegation of power to regulate as needed to protect fish and wildlife populations.[96]

For example, in California the state Fish and Wildlife Commission (Commission) is given "the power to regulate the taking or possession of birds, mammals, fish, amphibia, and reptiles" in the state, except for commercial hunting and fishing.[97] The Commission can apply a regulation "to all or any

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statutory provisions focus on hunting methods); *id.* at 206–10 (Illinois statutory provisions focus on hunting methods); *id.* at 266–68 (Louisiana statutory provisions restrict hunting methods and set some season dates that can be altered by agency); *id.* at 295–99 (Maryland statutory provisions restrict hunting methods); *id.* at 310–14 (Massachusetts statutory provisions restrict hunting methods); *id.* at 347–51 (Minnesota statutes impose some method and bag limit restrictions); *id.* at 368–72 (Mississippi statutory provisions restrict hunting methods, set seasons and bag limits); *id.* at 430–34 (New Hampshire statutory provisions restrict hunting methods and set some season lengths); *id.* at 470–74 (New York statutory provisions restrict hunting methods, set bag limits and season lengths); *id.* at 490–93 (North Carolina statutory provisions impose some restrictions on hunting methods); *id.* at 556–61 (Pennsylvania statutory provisions impose some hunting method restrictions); *id.* at 586–91 (South Carolina sets most hunting rules through statutory provisions); *id.* at 649–53 (Vermont statutes set deer season and hunting methods but otherwise grant broad discretion to agency); *id.* at 699–702 (Wisconsin statutory provisions set some restrictions on hunting methods).

State courts have generally concluded that broad grants of regulatory authority to fish and game agencies are constitutional delegations of power. *See, e.g.*, Bean v. McWherter, 953 S.W.2d 197, 198 (Tenn. 1997); Armstrong v. State, 958 P.2d 1010, 1012 (Wash. Ct. App. 1998); Wyo. Coal. v. Wyo. Game & Fish Comm'n, 875 P.2d 729, 734 (Wyo. 1994); FREYFOGLE & GOBLE, *supra* at 139.

96. *See, e.g.*, WYO. STAT. ANN. § 23-1-302(a)(i) (2015) (giving the state fish and game agency the power "[t]o fix season and bag limits, open, shorten or close seasons . . . on any species or sex of wildlife for any type of legal weapon, except predatory animals, predacious birds, protected animals, and protected birds, in any specified locality of Wyoming, and to give notice thereof"); S.D. CODIFIED LAWS § 41-2-18 (2015) (authorizing state game, fish, and parks commission to issue regulations for the "hunting, taking, killing, possession, sale, and transportation of all wild birds, wild animals, and wild fish . . . [t]he devices, weapons, ammunition, traps, tackle, bait, lures, and equipment which may be used to hunt, kill, capture or late any wild animal or fish if use of the above items would adversely affect the health, safety, or welfare of people or wildlife resources" and the "establishment of, and the opening, closing, modifying, or curtailing of hunting, fishing, and trapping seasons, if the seasons are not established by statute"); WASH. REV. CODE § 77.04.047 (2015) (giving state fish and game commission broad authority to set hunting rules that govern time, manner, and place of legal hunting); *see also* ARK. CONST. amend. XXXV, § 8 (providing that state fish and game "[c]ommission shall have the exclusive power and authority to issue licenses and permits, to regulate bag limits and the manner of taking game and fish and furbearing animals, and shall have the authority to divide the State into zones, and regulate seasons and manner of taking game, and fish and furbearing animals therein, and fix penalties for violations. No rule or regulations shall apply to less than a complete zone, except temporarily in case of extreme emergency.").

97. CAL. FISH & GAME CODE § 200 (West 2015). In California, as in many other states, regulatory and enforcement authority is divided between two agencies. The Fish and Wildlife Commission generally promulgates hunting regulations and sets overall hunting policy in the state; the Department of Fish and Wildlife enforces the Commission's regulations, provides data and proposed regulations for the Commission's consideration, and has some limited powers to promulgate regulations as well. *See About the Fish and Game Commission, California Department of Fish and Wildlife*, CAL. FISH & GAME COMM'N, http://www.fgc.ca.gov/public/information/ (last visited Oct. 9, 2015); *Proposed Regulation, California Department of Fish and Wildlife*, CA.GOV, https://www.wildlife.ca.gov/Notices/Regulations (last visited Oct. 9, 2015). For an example of a regulation promulgated directly by the Department, see *Proposed Regulations for Possession of Mountain Lion Carcasses for Scientific or Educational Purposes, California Department of Fish and Wildlife*, CAL. DEP'T OF FISH & WILDLIFE, https://www.wildlife.ca.gov/Notices/Regulations/Lion-Carcass-Possession (last visited Oct. 9, 2015).

areas, districts, or portions thereof" in the state "at [its] discretion" for "any or all species or subspecies" of game birds and mammals in the following ways:

(a) Establish, extend, shorten, or abolish open seasons and closed seasons.
(b) Establish, change, or abolish bag limits and possession limits.
(c) Establish and change areas or territorial limits for their taking.
(d) Prescribe the manner and means of taking.
(e) Establish, change, or abolish restrictions based upon sex, maturity, or other physical distinctions.[98]

Both the voters and the legislature in California (as in other states) have imposed specific constraints on this regulatory discretion, but those constraints are relatively narrow. For instance, the legislature in California has retained regulatory authority over commercial fishing,[99] has imposed specific standards for hunting regulations for elk and antelope,[100] prohibits the taking of certain kinds of deer,[101] prohibits hunting while intoxicated,[102] prohibits hunting from powerboats or airplanes,[103] prohibits internet-controlled hunting,[104] prohibits hunting within 150 yards of homes,[105] and prohibits the use of leaded ammunition in California condor habitat.[106] The voters of California have imposed their own specific limits on agency discretion, prohibiting certain kinds of traps to capture fur-bearing mammals,[107] and the hunting of mountain lions in most circumstances.[108]

Most of these specific constraints are relatively narrow, especially in comparison to the sometimes excruciating detail of hunting regulations promulgated by agencies in most states.[109] The legislature has even given the

98. FISH & GAME § 203. The Commission has similar discretion for the taking of fish, amphibian, and reptiles. *Id.* § 205.

99. *Id.* § 200.

100. *Id.* §§ 204(b)–(c), 331, 332. The constraints on agency discretion primarily relate to hunting permit fees and the use of funds from those fees. *Id.*

101. *Id.* § 204(d) (prohibiting the Commission from authorizing hunting of "spotted fawns" which are "young deer born that year which has spotted pelage and "spike bucks" which are "male deer with unbranched antlers on both sides which are more than three inches in length."); *id.* §§ 458–459 (allowing certain counties to prevent the hunting of antlerless deer within their borders).

102. *Id.* § 3001.

103. *Id.* § 3002. State law also prohibits using motor vehicles to pursue or herd birds or mammals for hunting. *Id.* § 3003.5.

104. *Id.* § 3003.

105. *Id.* § 3004.

106. *Id.* § 3004.5. Leaded ammunition has been identified as a major threat to the survival of the endangered condor. Other specific statutory constraints include protections for listed state endangered species. *See, e.g.*, *id.* § 3511 (birds). And also restrictions on the use of dogs to chase bears and bobcats. *Id.* §§ 3960.1–.6.

107. *Id.* § 3003.1. The legislature has imposed additional limits on trapping of fur-bearing mammals. *See id.* § 4004.

108. *Id.* §§ 4800–4810. The legislature has granted the Commission authority to allow the taking of mountain lions in certain circumstances despite the initiative ban on mountain lion hunting.

109. For instance, the "user-friendly" version of the California's 2015–16 hunting regulations for mammals (the version distributed to the hunting public) fills a seventy-one page book. *See* CALIFORNIA 2015-2016 MAMMAL HUNTING REGULATIONS HANDBOOK (2014), https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=102351&inline.

Commission the power to override statutory limits in its discretion in emergency circumstances.[110] Thus, even with these specific statutory constraints, the Commission's discretion remains extremely broad.

Preservationist or historical baselines play a relatively minor role in the California regulatory system. The overall policy for California's fish and game management is to "encourage the preservation, conservation, and maintenance of wildlife resources under the jurisdiction and influence of the state," including the "perpetuat[ion] of all species of wildlife" in the state—but this latter goal is balanced with other objectives such as "provid[ing] for the beneficial use and enjoyment of wildlife by all citizens of the state" and "maintain[ing] diversified recreational uses of wildlife, including the sport of hunting."[111]

The California statutory provisions authorize the Commission to undertake regulatory efforts to prevent "scarcity" of "game fish, resident or migratory birds, game or fur-bearing mammals, or amphibia."[112] But the provisions only authorize—rather than mandate—agency action; and note that the species included in the provision can be nonnative introduced "game" species as well, thus authorizing the Commission to protect introduced species as well as native ones.[113] Even here, the terms that are used (such as "scarcity" or "surplus")[114] are general enough that they need not be interpreted relative to historical baselines, but instead relative to other standards (such as whether sufficient game exist to support hunting activities).

The federal government's primary involvement in hunting law involves regulation of the hunting of migratory birds such as waterfowl. The Migratory Bird Treaty Act implements a series of treaties between the U.S. government

110. FISH & GAME § 219 (allowing Commission regulations to "supersede any section of this code" where "necessary for the protection of fish, wildlife, and other natural resources under the jurisdiction of the commission," and where the Commission "determines that an emergency exists or will exist unless the action is taken"). Regulations under this provision can only be in place for up to twelve months. *Id.* § 219(b).

111. *Id.* § 1801.

112. *Id.* § 307; *see also id.* §§ 314–315 (authorizing agency to close land areas or streams to protect newly stocked population or where necessary to "properly conserve" a population). Other provisions authorize agency action to protect specific species or groups of species. *Id.* § 302 (black bears); *id.* §§ 308.5 (mountain sheep generally); *id.* §§ 4900–4903 (bighorn sheep specifically); *id.* §§ 450–460 (deer); *id.* §§ 3951–3952 (elk). The deer provisions do require the agency to develop management plans to provide for "the restoration and maintenance of healthy deer herds in the wild state" but in conjunction with the "high quality and diversified use of deer." *Id.* § 453. The tule elk provisions allow for "relocation" of tule elk in the state in areas that are "suitable" habitat, with no restriction as to historical range. *Id.* § 3951.

113. *See, e.g.*, *id.* § 3950 (defining game mammals to include "feral pigs and European wild boars").

114. *See, e.g.*, *id.* § 307; *id.* § 325 (agency may increase hunting to manage "surplus" of game animals, including where surplus is "damaging public or private property, or are overgrazing their range").

and foreign countries to regulate the hunting of migratory birds.[115] Federal law also gives the relevant agency—the U.S. Fish and Wildlife Service (FWS)—extremely broad discretion as to whether and how to regulate hunting of migratory birds:

> Subject to the provisions and in order to carry out the purposes of the conventions, referred to in section 703 of this title, the Secretary of the Interior is authorized and directed, from time to time, having due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the conventions to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations.[116]

As the text of the statute makes plain, the FWS can implement almost any regulatory system it wishes so long as it does not conflict with the relevant migratory bird treaty. The treaties themselves do not impose many constraints: The U.S. treaty with Canada only requires a closed season for migratory game birds from March 10 to September 1, a maximum three-and-one-half month open season for migratory game birds, and an absolute prohibition on the hunting of migratory nongame birds, the commercial sale of migratory birds, and the hunting of eggs and nests of migratory birds.[117] But the treaty sets no limits on the total number of migratory game birds that can be taken during the open season, on the total number of migratory game birds that an individual can take, or on methods of hunting migratory game birds.[118] There is also no mention in the statute or the relevant treaties about historical baselines or population levels that must be maintained or are used to measure agency performance (other than the initial listing of protected species).[119]

Of course, all the substantive flexibility in the world for agency regulation can be meaningless if, in practice, the agency is either unable to regularly update its regulations because of strict procedural requirements or because the agency is reluctant to update its regulations for legal, political, or institutional reasons. However, in the context of hunting laws state and federal agencies

115. Specifically, Canada, Mexico, Russia, and Japan. *See* Migratory Bird Treaty Act, 16 U.S.C. § 712(1) (2012).

116. *Id.* § 704(a); *see also id.* § 712(2) ("The Secretary of the Interior is authorized to issue such regulations as may be necessary to implement the provisions of the" various migratory bird treaties.).

117. Protocol Amending the 1916 Convention for the Protection of Migratory Birds, U.S.-Can., Dec. 5, 1995, S. Treaty Doc. 104-28 (1996), art. II. Exceptions on these prohibitions exist for indigenous subsistence hunting. *Id.*

118. Federal law does prohibit the use of bait to hunt migratory game birds. 16 U.S.C. § 704(b).

119. A federal court held that the FWS was required to protect a nonnative migratory species, mute swans, under the Act. Hill v. Norton, 275 F.3d 98, 99 (D.C. Cir. 2001). Congress later overrode that ruling, restricting the MBTA's scope to species "that are native to the United States or its territories." *Id.* § 703(b).

often have streamlined procedural requirements that allow for the regular updating of their regulations, and they frequently do update those regulations in practice.

For instance, in California, deer hunting regulations are produced over a three-meeting process. At the first meeting, the Commission receives recommendations from its staff, the Department of Fish and Wildlife (DFW), other public agencies, and the public.[120] At the second meeting, the Commission leaves time for public discussion of the regulations that were presented at the first meeting, as well as time for presentations from DFW regarding the proposed regulations and any objections raised to the regulations.[121] At the end of the second meeting, the Commission must announce the regulations it intends to add, amend, or repeal.[122] At the third meeting, the Commission can choose to hear additional public comment regarding the regulations.[123] Final regulations must be published and distributed within forty-five days.[124] The entire process usually takes about five months (the Commission's meetings occur roughly monthly).[125] The Commission can also issue emergency regulations based on a single meeting.[126] And while government actions in California generally must undergo environmental review pursuant to the California Environmental Quality Act (CEQA), a process that can add substantial amounts of time to the regulatory procedure, state deer hunting regulations are exempt from CEQA because the regulatory process is deemed functionally equivalent to CEQA review.[127]

In practice, the Commission regularly updates its deer hunting regulations. Every year, the Commission revises the number of deer that can be legally harvested in various hunting zones and from deer herds around the state. The quotas for any given zone may stay constant, but changes are made to the quotas for at least some zones in every year.[128]

California's trout fishing regulations are also regularly revised. The Commission has general regulations that apply to each of the seven regions

120. CAL. FISH & GAME CODE § 207(b) (West 2015).

121. *Id.* § 207(c).

122. *Id.*

123. *Id.*

124. *Id.* § 207(e).

125. For the Commission's 2013 regulatory schedule, which indicates the meeting dates when deer hunting regulation revisions are to be considered, see Fish & Game Comm'n, Timetables For 2013 Commission Regulatory Actions (2013), http://www.fgc.ca.gov/regulations/2013/2013regulatory calendar.pdf. The Commission revises its regulations for mammals, including deer, in the meetings between December and April. *Id.* Under state law, California's DFW must provide recommendations to the Commission for revising deer hunting regulations by December 15. FISH & GAME § 457. Counties have the ability to object to proposed deer hunting regulations, but must object by February 1. *Id.* § 459.

126. *Id.* § 240.

127. CAL. CODE REGS. tit. 14, § 15252 (2015); CAL. PUB. RES. CODE § 21080.5 (West 2015).

128. *See* Appendix C.

within the state; those regulations are generally revised on a triennial basis.[129] It also has special regulations for particular state waters, and those regulations can be revised annually.[130] For every cycle of revisions there are changes to bag and possession limits (the total number of fish a fisher can catch and possess in a given day) and season dates for various waterways.[131]

Likewise, the procedures for revision of federal waterfowl hunting regulations are relatively simple and are regularly used, particularly with respect to the numbers of waterfowl that can be taken.[132] The FWS waterfowl regulations are updated annually. The process begins with recommendations provided by state and provincial fish and game officials and FWS officials, beginning in January.[133] The FWS then proposes regulations for the upcoming fall hunting season, takes public comment, and finalizes them by September. The proposed and final regulations are published in the Federal Register;[134] however, they are not codified in the Code of Federal Regulations.[135] Different regulations apply to different regions, with the most important regions being the four "flyways": Pacific, Central, Mississippi, and Atlantic.[136]

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129. For the current general trout regulations, see CAL. CODE REGS. tit. 14, § 7.00. For an overview of the process by which fishing regulations are revised, see CAL. FISH & GAME COMM'N, NEW AND PROPOSED REGULATIONS—2013, http://www.fgc.ca.gov/regulations/2013/index.aspx (last visited Mar. 24, 2015). For a year-by-year history of revisions to trout regulations, see the list of regulatory revisions at CAL. FISH & GAME COMM'N, FISH AND GAME REGULATIONS, http://www.fgc.ca.gov/regulations/2015/index.aspx (last visited Nov. 13, 2015).

130. The Klamath River basin general regulations are also revised annually. *See generally* CAL. FISH & GAME COMM'N, FISH AND GAME REGULATIONS, *supra* note 129 (showing that generally the regulations are revised annually).

131. *See, e.g.*, CAL. FISH & GAME COMM'N, FINAL STATEMENT OF REASONS FOR REGULATORY ACTION RE: SPORT FISHING BAG LIMITS (2009), http://www.fgc.ca.gov/regulations/2009/5_00fsor.pdf (providing overview of the proposed revisions for 2009).

132. For a brief overview of the process, see Byron K. Williams & Fred A. Johnson, *Adaptive Management and the Regulation of Waterfowl Harvests*, 23 WILDLIFE SOC'Y BULL. 430, 432 (1995); James D. Nichols et al., *Adaptive Harvest Management of North American Waterfowl Populations A Brief History and Future Prospects*, 148 J. ORNITHOLOGY S343, S344–S345 (2007).

133. *See* Press Release, U.S. Fish & Wildlife Serv., Service Proposes Waterfowl Hunting Season 2015-2016 Frameworks, Streamlines Process for Setting Game Bird Hunting Seasons (Aug. 3, 2015), http://www.fws.gov/news/ShowNews.cfm?ID=F3C2EF87-5056-AF00-5B65A8B872D98718.

134. *See, e.g.*, Migratory Bird Hunting; Proposed Frameworks for Early-Season Migratory Bird Hunting Regulations; Notice of Meetings, 77 Fed. Reg. 42,920 (proposed July 20, 2012) (to be codified at 50 C.F.R. pt. 20).

135. Instead, the Code of Federal Regulations has the following placeholder language:

> (a) [I]t is necessary to make annual adjustments in the schedules to limit the harvests of migratory game birds to permissible levels.
>
> (b) The development of these schedules involves annual data gathering programs to determine migratory game bird population status and trends, evaluations of habitat conditions, harvest information, and other factors having a bearing on the anticipated size of the fall flights of these birds. The proposed hunting schedules are announced early in the spring, and following consideration of additional information as it becomes available, as well as public comment, they are modified and published as supplemental proposals.

Annual Seasons, Limits, and Shooting Hours Schedules, 50 C.F.R. § 20.100 (2015).

136. *General Flyways Info*, FLYWAYS.US, http://flyways.us/flyways/info (last visited Mar. 24, 2015). Each flyway is a distinct avian migration corridor. *Id.*

Environmental review is not undertaken for each individual revision of the regulations; instead, the FWS conducts NEPA review for the entire adaptive management framework of its overall hunting regulatory system.[137]

A few examples show how the FWS has used this regulatory framework to make regular changes to waterfowl regulations. Blue-winged teal are a representative waterfowl species that are monitored in order to assess harvest potential for teal generally.[138] The population of blue-winged teal, like other waterfowl populations, has fluctuated over the years due to environmental factors, hunting regulations, and other management practices.[139] In 2007 the blue-winged teal population was estimated to be 6.7 million.[140] That year, the FWS authorized a special September season for all species of teal in the Atlantic flyway. The season was not to exceed nine consecutive days between September 1 and September 30 with a daily bag limit of four teal.[141] In 2008 the teal population was estimated to be 6.6 million birds, based on surveys of blue-winged teal.[142] The FWS again authorized a special September season with the same parameters as in 2007.[143] In 2009 the teal population was estimated to be 7.4 million.[144] The FWS expanded the special September season from nine to sixteen days whenever the breeding population of teal was over 4.7 million.[145] The extended season allowed an increased harvest without overly depleting the population.[146] In 2010 the estimated total population of blue-winged teal was 6.3 million.[147] The FWS maintained the sixteen-day

137. Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds, 53 Fed. Reg. 31,341, 31,341 (Aug. 18, 1988). The FWS is currently updating this EIS, but it continues to operate under the 1988 EIS in the meantime. Draft Supplemental Environmental Impact Statement on the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds, 75 Fed. Reg. 39,577, 39,577 (July 9, 2010).

138. TEAL HARVEST POTENTIAL WORKING GRP., AN ASSESSMENT OF THE HARVEST POTENTIAL OF NORTH AMERICAN TEAL 4 (2013), http://www.fws.gov/migratorybirds/NewReportsPublications/Teal/Final%20Teal%20Assessment%20Report%20Mar%2012%202013.pdf.

139. *See Adaptive Harvest Management*, U.S. FISH & WILDLIFE SERV., http://www.fws.gov/migratorybirds/currentbirdissues/management/ahm/ahm-intro.htm (last visited Mar. 24, 2015); *see generally* U.S. FISH & WILDLIFE SERV., ADAPTIVE HARVEST MANAGEMENT 2016 HUNTING SEASON (2015).

140. Migratory Bird Hunting; Final Frameworks for Early-Season Migratory Bird Hunting Regulations, 72 Fed. Reg. 49,622, 49,623 (Aug. 28, 2007) (to be codified at 50 C.F.R. pt. 20).

141. *Id.* at 49,627. A bag limit is the total number of birds a hunter can take in a given day.

142. Migratory Bird Hunting; Final Frameworks for Early Season Migratory Bird Hunting Regulations, 73 Fed. Reg. 50,678, 50,679 (Aug. 27, 2008) (to be codified at 50 C.F.R. pt. 20).

143. *Id.*

144. Migratory Bird Hunting; Final Frameworks for Early-Season Migratory Bird Hunting Regulations, 74 Fed. Reg. 43,008, 43,009 (Aug. 25, 2009) (to be codified at 50 C.F.R. pt. 20).

145. *Id.* The proposal was based on analysis of the relationship between harvest data and population estimates. *Id.*

146. *See* Migratory Bird Hunting; Final Frameworks for Early-Season Migratory Bird Hunting Regulations, 75 Fed. Reg. 52,873, 52,875 (Aug. 30, 2010) (to be codified at 50 C.F.R. pt. 20).

147. *Id.*

special September season with a four-bird daily bag limit for the 2010 season.[148]

A second example is the regulation of scaup, another species of duck; they are hunted in the late season from September to January.[149] In 2007 data showed that the continental scaup population had been declining for over twenty years, and the total breeding population was estimated to be 3.45 million, the third lowest estimate on record.[150] The FWS maintained the same restrictive daily bag limits as in 2006: six ducks total, not more than two of which are scaup in the Atlantic, Mississippi and Central Flyways and seven ducks total, not more than three of which are scaup in the Pacific Flyway.[151] In 2008 the estimated breeding population was 3.74 million, still well below the long-term average. [152] Through population surveys and monitoring, the FWS determined that the optimal harvest for the 2008–09 season was 200,000, necessitating a change in regulations because 295,000 scaup were harvested under the 2007 regulations.[153] The FWS adopted a three-year trial of a comprehensive regimen of restrictive, moderate, and liberal regulations, based on population size, and imposed restrictive regulations for 2008.[154] The Atlantic and Mississippi Flyways allowed hunters to harvest six ducks per day, two of which could be scaup for up to twenty consecutive days during the season.[155] For the remainder of the season, hunters could harvest up to six ducks per day, only one of which could be scaup.[156] The Pacific Flyway reduced its scaup limit to two of the seven ducks that could be harvested each day during the season.[157] The Central Flyway maintained a seventy-four-day duck season with up to two scaup each day and either a five or six duck total daily limit depending on the state.[158]

148. *Id.* at 52,880.

149. Migratory Bird Hunting; Final Framework for Late Season Migratory Bird Hunting Regulations, 72 Fed. Reg. 53,882, 53,883 (Sept. 20, 2007) (to be codified at 50 C.F.R. pt. 20). The FWS manages the two species of scaup, Greater Scaup (*Aythya marila*) and Lesser Scaup (*A. affinis*), as a single population. *SCAUP POPULATION ESTIMATES*, FLYWAYS.US (June 29, 2010), http://flyways.us/status-of-waterfowl/population-estimates/scaup-population-estimates. Duck season is 60 days long in the Atlantic and Mississippi Flyways, 74 days long in the Central Flyway, and 107 days long in the Pacific Flyway. Migratory Bird Hunting; Final Framework for Late Season Migratory Bird Hunting Regulations, 72 Fed. Reg. at 53,890–91, 53,893.

150. Migratory Bird Hunting; Final Framework for Late Season Migratory Bird Hunting Regulations, 72 Fed. Reg. at 53,885.

151. *Id.* at 53,890–91, 53,893.

152. Migratory Bird Hunting; Proposed Frameworks for Late-Season Migratory Bird Hunting Regulations, 73 Fed. Reg. 51,124, 51,125, 51,128 (Aug. 29, 2008) (to be codified at 50 C.F.R. pt. 20).

153. *Id.* at 51,128.

154. *Id.* at 51,128–29.

155. *Id.* at 51,134–35.

156. *Id.*

157. *Id.* at 51,137; Migratory Bird Hunting; Proposed Frameworks for Late-Season Migratory Bird Hunting Regulations, 72 Fed. Reg. 50613, 50,626 (Aug. 31, 2007) (to be codified at 50 C.F.R. pt. 20).

158. Migratory Bird Hunting; Proposed Frameworks for Late-Season Migratory Bird Hunting Regulations, 73 Fed. Reg. at 51,136.

By 2009 the breeding population estimate for scaup had grown to 4.17 million.[159] Based on the increased population, the FWS loosened the hunting regulations. In the Atlantic and Mississippi Flyways, for the entire season, up to two of the six ducks harvested each day could be scaup.[160] The Pacific Flyway also increased harvest levels by shortening the hunting season for scaup, during which time up to three of the seven-bird daily limit could be scaup.[161] During the remainder of the season there was a seven duck daily bag limit, but none could be scaup.[162] The Central Flyway allowed the take of six ducks per day, no more than two of which are scaup.[163] An estimated 229,000 scaup were harvested in 2008–09[164] and the population continued to grow to 4.24 million in 2010.[165]

The FWS maintained the same harvest regulations in all flyways for 2010 and 2011. In 2011 the population was 4.32 million,[166] after 277,000 scaup were harvested in 2009–10.[167] The number of scaup harvested rose to 358,000 in 2010–11,[168] and the scaup population reached 5.24 million in 2012.[169] In 2012 the FWS allowed the harvest of more scaup in all of the flyways. In the Atlantic and Mississippi Flyways, up to four of the six duck daily limit could be scaup.[170] In the Central Flyway, there was no restriction on scaup beyond the six duck daily limit.[171] In the Pacific Flyway there was no additional restriction for season or bag limits, so hunters could harvest up to seven scaup per day for the entire 107-day duck season.[172]

B. Hunting Regulations Generally Seen as Successful in Accomplishing Goals

Wildlife managers generally perceive American hunting law at both the state and federal level as having been extremely successful in restoring fish and game populations to record highs in the late twentieth century, less than one

159. Migratory Bird Hunting; Final Frameworks for Late-Season Migratory Bird Hunting Regulations; Final Rule, 74 Fed. Reg. 48,822, 48,824 (Sept. 24, 2009) (to be codified at 50 C.F.R. pt. 20).

160. *Id.*

161. *Id.*

162. *Id.*

163. *Id.*

164. *Id.*

165. Migratory Bird Hunting; Final Frameworks for Late-Season Migratory Bird Hunting Regulations, 75 Fed. Reg. 58,250, 58,254 (Sept. 23, 2010) (to be codified at 50 C.F.R. pt. 20).

166. Migratory Bird Hunting; Final Frameworks for Late-Season Migratory Bird Hunting Regulations, 76 Fed. Reg. 58,682, 58,684 (Sept. 21, 2011) (to be codified at 50 C.F.R. pt. 20).

167. 75 Fed. Reg. at 58,254.

168. 76 Fed. Reg. at 58,684.

169. Migratory Bird Hunting; Final Frameworks for Late-Season Migratory Bird Hunting Regulations, 77 Fed. Reg. 58,444, 58,447 (Sept. 20, 2012) (to be codified at 50 C.F.R. pt. 20).

170. *Id.* at 58,446–47.

171. *Id.* This policy allowed hunters to take scaup throughout the entire waterfowl hunting season, not just during a limited period.

172. *Id.*

hundred years after many fish and game species were extirpated from large portions of the United States.[173]

In the late nineteenth century, the populations of many fish and game species fell dramatically due to habitat destruction and overhunting.[174] Many migratory waterfowl species sharply declined as a result of hunting pressure and conversion of wetlands habitat to human uses. Other migratory bird species collapsed from being hunted for meat and feathers. Once common game species such as beaver, turkeys, and deer disappeared from large portions of the United States due to both habitat destruction and overharvesting.[175] A particularly extreme example of population collapse was the near-extinction of buffalo from the Great Plains, whose populations once numbered in the tens of millions;[176] even more dramatic was the complete extinction of the passenger pigeon, whose populations likely measured in the billions. Both species disappeared in large part because of hunting pressure.[177]

These population collapses were a significant contributing factor to the rise of the nascent conservation movement in the United States, which focused on wisely managing natural resources for human use over the long run.[178] A

173. *See* Valerius Geist, *How Markets in Wildlife Meat and Parts, and the Sale of Hunting Privileges Jeopardizes Wildlife Conservation*, 2 CONSERVATION BIOLOGY 15, 17 (1988) (stating that modern American wildlife law has produced a "recovery of wildlife [that] had been decimated over most of the southern and central parts of the continent. . . . Today there are about 30 million big game animals in the United States and Canada . . . Bison musk oxen, prong-horned bucks, and wood duck returned from the verge of extinction; most big game species increased."); THOMAS R. DUNLAP, SAVING AMERICA'S WILDLIFE 6–7 (1988) (describing collapse of wildlife populations in nineteenth-century America).

174. *See* J.F. ORGAN ET AL., WILDLIFE SOC'Y, THE NORTH AMERICAN MODEL OF WILDLIFE CONSERVATION 3 (2012), http://emwh.org/pdf/conservation/North%20American%20Model%20of%20Wildlife%20Conservation.pdf; SPORTING CONSERVATION COUNCIL, U.S. DEP'TS OF INTERIOR & AGRIC., STRENGTHENING AMERICA'S HUNTING HERITAGE AND WILDLIFE CONSERVATION IN THE 21ST CENTURY: CHALLENGES AND OPPORTUNITIES vii (2008) ("Two centuries of settlement and development of our nation's lands and waters, unregulated market hunting, and a belief that wildlife was an impediment to and an unlimited food source for civilization devastated wildlife populations and their habitats across the continent."); S P. Mahoney et al., *The North American Model of Wildlife Conservation Enduring Achievement and Legacy*, *in* WILDLIFE CONSERVATION IN THE 21ST CENTURY, *supra* at 7; Ian McTaggart-Cowan, *Man, Wildlife, and Conservation in North America Status and Change*, *in* WILDLIFE CONSERVATION POLICY: A READER 277, 294–96 (Valerius Geist & Ian McTaggart-Cowan eds., 1995).

175. *See, e.g.*, McTaggart-Cowan, *supra* note 174, at 296–97 (describing collapse of beaver populations); Thomas R. McCabe & Richard E. McCabe, *Recounting Whitetails Past*, *in* THE SCIENCE OF OVERABUNDANCE: DEER ECOLOGY AND POPULATION MANAGEMENT 11, 16–18 fig.2.2 (William J. McShea et al. eds., 1997) (describing massive wave of hunting of white-tailed deer in the late nineteenth century, and accompanying collapse in deer populations in North America); W. Matt Know, *Historical Changes in the Abundance and Distribution of Deer in Virginia*, *in* THE SCIENCE OF OVERABUNDANCE: DEER ECOLOGY AND POPULATION MANAGEMENT, *supra* at 27, 28 (similar pattern in Virginia).

176. *See, e.g.*, McTaggart-Cowan, *supra* note 174, at 294–95 (describing collapse of bison).

177. THOMAS A. LUND, AMERICAN WILDLIFE LAW 58–59 (1980).

178. *See* ORGAN ET AL., *supra* note 174, at 3–4 (describing how the collapse of bird and mammal populations in the United States led a prominent natural scientist, George Grinnell and President Teddy Roosevelt to create the Boone and Crockett Club, which advocated for the creation and implementation of fish and game laws); SPORTING CONSERVATION COUNCIL, *supra* note 174, at vii ("The unrestrained

key goal for that movement was the development of state and federal wildlife and hunting laws and policies that would curtail overhunting of fish and game species and allow for the restoration of populations that were adequate for recreational hunting.[179]

This movement would eventually form the basis for the creation of a new profession and scientific discipline—wildlife management—that would have its own journals, university departments, and professional societies.[180] Wildlife managers would staff the new fish and game departments created at the state and federal level to protect and restore fish and game populations throughout the United States.[181]

Conservationists and wildlife managers advocated for—and usually succeeded in persuading state and federal agencies to (eventually) adopt—a wide range of laws and policies to protect and restore fish and game populations: the purchase and protection of important habitat, efforts to reintroduce fish and game species to areas from which they had been

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slaughter of the American bison and unsustainable forest, rangeland, and agricultural land practices in the late 1800s motivated a clarion call from individuals like George Bird Grinnell, Gifford Pinchot, Theodore Roosevelt, and others to take clear and decisive action. In response, the nation's hunters and conservationists established new organizations dedicated solely to protect and conserve wildlife."); Mahoney et al., *supra* note 174, at 7; JOHN F. REIGER, AMERICAN SPORTSMEN AND THE ORIGINS OF CONSERVATION 94–104 (3d ed. 2001) (arguing that the collapse of passenger pigeon, buffalo, and migratory bird populations as a result of hunting inspired the conservation movement); DALE D. GOBLE & ERIC T. FREYFOGLE, WILDLIFE LAW: CASES AND MATERIALS 771–73 (2d. ed. 2010) (quoting KURKPATRICK DORSEY, THE DAWN OF CONSERVATION DIPLOMACY: U.S.-CANADIAN WILDLIFE PROTECTION TREATIES IN THE PROGRESSIVE ERA 12, 13–14 (1998)).

179. *See* ORGAN ET AL., *supra* note 174, at 4, 15 (describing how the Boone and Crockett Club pushed for the enactment of the Migratory Bird Treaty Act and the Lacey Act, which prohibited interstate commerce in game caught in violation of state law); *id.* at 15 ("The Boone and Crockett Club was responsible for important legislation at the state and federal levels."); *id.* at 17 (State agencies ensured that "[h]unting methods were regulated to conform to accepted standards of fair chase as outlined by the Boone and Crockett Club, which would ideally minimize opportunities for hunters to exceed bag limits."); SPORTING CONSERVATION COUNCIL, *supra* note 174, at vii ("This citizen-driven conservation movement ultimately led to the development of treaties, conventions, laws, regulations, and protections for wildlife and their habitat."); REIGER, *supra* note 178, ch. 6 (describing history of Boone and Crockett Club, its goal of changing state and federal hunting laws, and its effectiveness in making changes in the law), 152–53 (noting the tremendous power of the Club's membership, including many of the leading American politicians and businessmen of the day); DUNLAP, *supra* note 173, at 11 ("Sportsmen wanted to outlaw 'unsporting' methods that gave the game no chance. . . . They wanted to reduce annual kills through lower bag limits, shorter seasons, and regulations on the kind of firearms hunters could use. They sought the abolition of spring hunting. They wanted all these new laws enforced, preferably by a professional set of wardens under the direction of a state game commission.").

180. *See* Eric Biber, *Which Science? Whose Science? How Scientific Disciplines Can Shape Environmental Law*, 79 U. CHI. L. REV. 471, 495, 511 (2012); DUNLAP, *supra* note 173, at 76, 78 (describing the development of game management as a separate academic discipline from ecology, noting that the Wildlife Society was founded in 1936, with the Journal of Wildlife Management first published two years later in 1938); Thomas R. Dunlap, *Organization and Wildlife Preservation The Case of the Whooping Crane in North America*, 21 SOC. STUD. SCI. 197, 200–01 (1991); SAMUEL P. HAYS, BEAUTY, HEALTH, AND PERMANENCE: ENVIRONMENTAL POLITICS IN THE UNITED STATES, 1955–1985, at 19 (1987); ORGAN ET AL., *supra* note 174, at 15.

181. *See* Biber, *supra* note 180, at 495, 511–12; DUNLAP, *supra* note 173, at 76, 78.

eradicated, and education efforts to convince the public to support conservation of wildlife resources.[182] But for our purposes here, it is most important that they also advocated for the development of government regulations controlling the hunting of wildlife.[183]

Those regulations imposed consistent, strict, and effectively enforced regulation on the taking of most fish and game species for the first time in American history.[184] They effectively terminated the use of hunting game species for most commercial purposes (such as feathers or meat).[185] They were dramatic changes from the prior legal status quo, under which hunting was seen as a fundamental American right, and landowners could not even prosecute hunters for trespassing on their lands.[186] Indeed, the new regulations prompted fierce political and judicial resistance.[187]

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182. *See* ORGAN ET AL., *supra* note 174, at 4–5 (noting how wildlife managers called for federal laws to not only restrict hunting, but also provide funding for wildlife restoration and habitat acquisition, protection, and management). There is a significant class aspect to the wildlife conservation movement in the late nineteenth and early twentieth centuries; the membership of these organizations was often from the social elite, and the effect of their efforts was to restrict or eliminate hunting for subsistence or commercial purposes (more often pursued by lower class hunters) in favor of recreational "sportsman" hunting (more often pursued by upper class hunters). *See* FREYFOGLE & GOBLE, *supra* note 95, at 49–50 (noting how "[m]uch of this early game conservation work was undertaken by wealthy, often socially elite sportsmen in eastern cities concerned about disappearing game"); DUNLAP, *supra* note 173, at 12 (making same point).

183. *See supra* notes 178–179 and accompanying text; *see also* FREYFOGLE & GOBLE, *supra* note 95, at 49–50 (describing how conservation organizations pursued political lobbying to increase enforcement of, and enactment of stricter game laws, and sometimes even funded their own private enforcement efforts); REIGER, *supra* note 178, ch. 6 (discussing role of Boone and Crockett Club in pushing for hunting reforms); DUNLAP, *supra* note 173, at 12 (noting success of conservation movement in changing laws).

184. *See* LUND, *supra* note 177, at 57–59 (describing the futility of many state hunting laws established before the late nineteenth century). The most important change appears to have been the imposition of hunting licenses with associated fees. This created revenue for the enforcement of state laws, and also allowed the development of effective "bag limits" in which hunters could only take a certain number of wildlife in a given season; neither of these had been present earlier, and rendered earlier systems ineffectual. *Id.* at 62–67.

185. *See id.* at 63–64; Geist, *supra* note 173, at 16–17; ORGAN ET AL., *supra* note 174, at 14–15. Trapping of fur-bearing mammals for the commercial fur market was generally exempted from these prohibitions.

186. *See, e.g.*, McConico v. Singleton, 9 S.C.L. (2 Mill) 244 (1818) (holding that hunters can enter unenclosed land without permission of landowner); Broughton v. Singleton, 11 S.C.L. (2 Nott & McC.) 338 (1820) (same); GOBLE & FREYFOGLE, *supra* note 178, at 137–38 (noting that some states allowed hunters to enter unenclosed private land without permission); FREYFOGLE & GOBLE, *supra* note 95, at 44–49 ("The idea that governed early America was that citizens had free use of all unenclosed lands, even when privately owned and without regard for the landowner's wishes," and noting that some early state constitutions protected that right for hunters); GOBLE & FREYFOGLE, *supra* note 178, at 135–36 (describing resistance in early nineteenth-century America to hunting and game laws because of the history of draconian British game laws that reserved game for the aristocracy, and a perception that the ability to hunt without legal restriction was a fundamental American right), 136–37 (noting that early American state constitutions protected a right to hunt).

187. *See, e.g.*, GOBLE & FREYFOGLE, *supra* note 178, at 147–49 (discussing political and judicial resistance to the enactment and enforcement of state hunting laws).

Though consistent and strict, the regulations also incorporated flexibility. The dominant ideology of the wildlife management profession emphasized professional expertise in assessing the conservation needs of fish and game species, and creating professional agencies that would be legally empowered to change regulations as needed to meet those needs.[188] As a result, even early on many state fish and game agencies had tremendous discretion to enact and alter hunting regulations.[189]

This new model of wildlife management—what scholars have called the North American Model of Wildlife Conservation[190]—is generally seen as having been extremely successful at accomplishing its goal: recovering and restoring fish and game populations across the United States.[191] Populations of important game species such as deer, turkey, and beaver rebounded and were reintroduced to most of the United States.[192] While habitat protection and

188. For instance, the foundational textbook in the field was Aldo Leopold's Game Management. Leopold argued that it was essential to separate the regulation and administration of hunting laws from politics, and that a good game administration required large regulatory powers. ALDO LEOPOLD, GAME MANAGEMENT 227, 407–08 (1933); *see also* REIGER, *supra* note 178, at 175–76 (noting calls by then-New York Governor Teddy Roosevelt for the separation of politics from hunting regulation).

189. *See*, e.g., Reiger, *supra* note 178, at 175–76 (describing power of New York's Fish, Game, and Forests Commission around the turn of the twentieth century); *see also* Migratory Bird Treaty Act of 1918, 16 U.S.C. § 704(a) (giving great discretion to the Fish & Wildlife Service, including the ability "to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the conventions to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same").

190. *See* ORGAN ET AL., *supra* note 174, at 1–2; *see also* DUNLAP, *supra* note 173, at 34 ("In the decades around the turn of the century, Americans laid the institutional and intellectual foundations for a wildlife policy.").

191. *See* Geist, *supra* note 173, at 15; ORGAN ET AL., *supra* note 174 ; *Executive Summary*, *in* WILDLIFE CONSERVATION IN THE 21ST CENTURY, *supra* note 174; Valerius Geist et al., *Why Hunting Has Defined the North American Model of Wildlife Conservation*, *in* TRANSACTIONS OF THE SIXTY-SIXTH NORTH AMERICAN WILDLIFE AND NATURAL RESOURCES CONFERENCE 2001, at 175, 175 (Jennifer Rahm & Richard McCabe eds., 2001) ("wildlife conservation was the greatest environmental success story of the twentieth century"). The very success of the North American Model has raised new problems. Overpopulation of deer populations, for instance, has created a range of conflicts (such as car accidents and the increase in tick-borne diseases). The Model has also been criticized for its single-minded focus on species that are desired for human recreational use in the form of hunting and fishing, and for ignoring the impacts of wildlife management on "non-game" wildlife species. *See* Michael P. Nelson, et al., *An Inadequate Construct? North American Model What's Flawed, What's Missing, What's Missing*, Wildlife Prof'l 58, 58–60 (Summer 2011). Indeed, it was this focus of wildlife management on fish and game wildlife species that prompted the creation of the competing discipline and profession of conservation biology, which is interested in the protection and restoration of the entire range of biodiversity. *See* Reed F. Noss, *Some Principles of Conservation Biology, As They Apply to Environmental Law*, 69 CHI.-KENT L. REV. 893, 894–95 (1994).

192. *See, e.g.*, Valerius Geist, *Great Achievements, Great Expectations Successes of North American Wildlife Management*, *in* COMMERCIALIZATION AND WILDLIFE MANAGEMENT: DANCING WITH THE DEVIL 47, 54 (Alex W.L. Hawley ed., 1993) (arguing that the North American Model has fostered a tremendous rebound in game populations from near extinction in the late nineteenth century); J.J. Jackson, III, *An International Perspective on Trophy Hunting*, *in* TOURIST HUNTING IN TANZANIA 1, 7 fig.1 (N. Leader-Williams et al. eds., 1996) (chart showing rebound of common game animals in North America, such as deer, elk, turkey, antelope, and duck, from extremely low levels to levels that

active reintroduction efforts were certainly part of this success,[193] wildlife management scholars have also credited state and federal hunting laws with contributing to this successful outcome.[194]

Deer are perhaps the most important game animal in North America, and their management history shows both the flexibility of hunting regulations over time and their relative success in restoring and managing deer populations. In Wisconsin, for instance, between 1908 and 1954 the season length and the regulations on how many and what type of deer hunters could kill changed twenty-eight times.[195] In that time frame, deer populations in Wisconsin rebounded from a low in the early twentieth century to over carrying capacity, and then returned to more sustainable levels.[196] At least some of the credit for the increase, and the later ability to reduce population numbers, was given to the flexible use of hunting regulations.[197]

More recently, at the federal level, the flexible federal waterfowl regulatory system has been identified as one of the few examples of highly successful adaptive management, resulting in significant increases in many waterfowl populations.[198]

IV. IMPLICATIONS

Hunting and fishing law have traditionally had the same central objective: to manage human use of wildlife in a way that results in maximization of hunting and fishing opportunities over the long term.[199] But the two areas of

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are multiple orders of magnitude higher); *see also* C. Davison Ankney, *An Embarrassment of Riches Too Many Geese*, 60 J. WILDLIFE MGMT. 217, 217–18 (1996) (noting that goose populations have increased "exponentially during the past 30 years"); McCabe & McCabe, *supra* note 175, at 11, 16–18 fig.2.2 (describing rebound of deer populations in North America in the twentieth century); Know, *supra* note 175, at 33–34 (similar pattern in Virginia).

193. *See* ORGAN ET AL., *supra* note 174, at 5 ("[B]y the 1920s it was clear that the system's emphasis on restrictive game laws was insufficient in itself to stem wildlife's decline."); DUNLAP, *supra* note 173, at 65–75 (noting mixed success of hunting laws by the 1930s and arguing that a key problem was a lack of scientific understanding of the ecology of game species).

194. *See, e.g.*, Geist, *supra* note 173; Ankney, *supra* note 192, at 217 (arguing that conservative hunting regulations have "served us well in the 20th century as we have dug ourselves out of the hole created by gross overharvests in the 19th century").

195. *See* BURTON L. DAHLBERG & RALPH C. GUETTINGER, THE WHITE-TAILED DEER IN WISCONSIN 208–09 tbl.50 (1956). Additional changes continued after 1954, including the addition of varying hunting rules within the state. *See* William A Creed et al., *Harvest Management The Wisconsin Experience*, *in* WHITE-TAILED DEER: ECOLOGY AND MANAGEMENT 243, 243–246 (Lowell K. Halls ed., 1984). These changes were made by both the legislature and the relevant state commissions in charge of regulating game hunting. *See* DAHLBERG & GUETTINGER, *supra* at 243 (describing system in 1980s that is run through the state fish and game agency with review by the legislature), 243–45 app. A (providing overview of history of Wisconsin hunting laws noting that some changes were made by legislature, and that commissions in charge of hunting did not receive their full authority until 1933).

196. *See* DAHLBERG & GUETTINGER, *supra* note 195, at 26, 28 figs.2, 33, 203 & 236.

197. *See id.* at 38 (stating that deer hunting law "was successful in building up deer populations").

198. *See* Nichols et al., *supra* note 132, at S346–S348.

199. There are other objectives in both fisheries and hunting law besides maximizing the potential harvest of fish or game animals. In the context of fisheries, the Magnuson-Stevens Act seeks to advance

law have produced very different results. Hunting law has been perceived over time as highly successful.[200] Fisheries law, on the other hand, has often produced poor management outcomes—even measured by the most utilitarian, human-centered perspective of maximizing stock productivity over the long run.[201] What explains the difference in outcomes?

A. Assessing the Reasons for Differing Outcomes

There are three factors that might explain the relative success of hunting law. First, fish populations are far more difficult to study than wildlife populations, resulting in greater uncertainty regarding population levels and dynamics. Greater uncertainty translates to a greater likelihood of error in management decisions. Second, the substantive standards in hunting law are noticeably more flexible than those contained in the Magnuson-Stevens Act. In theory, flexible standards allow managers to quickly adjust rules in response to new information. Finally, the political economy of marine fisheries features concentrated interests, that is, industry groups with incentives both to organize and to push against more stringent regulation.

1. The Effects of Greater Scientific Uncertainty

There is no question that uncertainty for resource managers is higher in the context of fisheries management than in wildlife management.[202] Our ability to assess what is occurring in the oceans—both for fish populations directly and for their habitat—is much more limited than for, say, white-tailed deer.[203] Scientific uncertainty gives resource managers more discretionary space within which to operate. As uncertainty increases, managers will accrue a larger and larger set of legally and politically defensible management options. Thus, at least on this metric, fishery managers have more discretion than their wildlife counterparts.

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protection of marine ecosystems as well as economic efficiency in commercial fisheries. *See, e.g.*, Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1851(a)(5) (2012) (requiring fisheries management plans "where practicable" to "consider efficiency in the utilization of fishery resources); *id.* § 1853(b)(2)(B) (allowing fisheries management plans to protect deep sea corals from fishing damage); *id.* § 1855(b) (requiring designation of essential fish habitat). Likewise, in the context of the protection of terrestrial ecosystems and species, there has been a substantial shift away from focusing simply on protection of species that are useful for recreational hunting and fishing, and a move towards protecting ecosystems and species more broadly. *See* Biber, *supra* note 180, at 493–500, 511–12.

200. *See supra* notes 192–194.

201. *See, e.g.*, MICHAEL L. WEBER, FROM ABUNDANCE TO SCARCITY: A HISTORY OF U.S. MARINE FISHERIES POLICY 177 (2002); Timothy Hennessey & Michael Healey, *Ludwig's Ratchet and the Collapse of New England Groundfish Stocks*, 28 COASTAL MGMT. 187, 199–205 (2000).

202. Marc Mangel, *Irreducible Uncertainties, Sustainable Fisheries and Marine Reserves*, 2 EVOLUTIONARY ECOLOGY RES. 547, 547 (2000).

203. *See generally* COMM. ON FISH STOCK ASSESSMENT METHODS, NAT'L RESEARCH COUNCIL, IMPROVING FISH STOCK ASSESSMENTS (1998), http://www.nap.edu/catalog/5951/improving-fish-stock-assessments (available to read online or as free download).

An example helps to illustrate the point. Imagine that there are two fish stocks, one of which spends most of its time in rivers ("river fish"), while the other is purely a marine animal ("marine fish"). Because it is easier to assess the river species, river fish scientists can say that there is a 95 percent probability that the optimal population, that is, the population capable of producing MSY, is between 40 and 50 percent of the prefishing population level. Due to the scale of the marine environment, and the difficulty of working there, marine fish scientists have a much more difficult time measuring and understanding the reproductive behavior of marine fish. As a result, they can only say, with 95 percent confidence, that the optimal population of marine fish is between 10 and 90 percent of the prefishing level. This example illustrates how uncertainty creates flexibility: marine fish managers could more easily defend MSY choices of 20 or 80 percent than could the river-fish managers.

The example also illustrates how greater uncertainty reduces the likelihood of successful management by increasing the potential distance between each management decision and what would have been the correct decision in that instance. This feature of uncertainty likely explains some of the difference in results obtained through hunting and fishing laws.

The greater uncertainty in fisheries management has a range of implications for decision making: It makes it more difficult to assess the status or trends of fish species or populations; it makes it more difficult to identify causal relationships between management choices and those status or trends; and it makes it more difficult to assess management—which makes improving management that much harder. Accordingly, we might expect that fisheries, as the area with greater uncertainty, have worse management outcomes.

The environmental law literature has argued that appropriate flexibility is needed to respond to uncertainty. Thus to respond to the risks outlined above, we need to give management and regulatory agencies the ability to change positions quickly as we gain additional information. In other words, we need more flexibility to respond to uncertainty by experimenting in management, so that we can pursue adaptive management in order to both acquire additional information as well as change in response to those improvements in information.

Yet the discretion that uncertainty gives to a management or regulatory agency is a form of flexibility, albeit different from that identified as a positive feature of environmental law that can adapt to climate change. And our history of the Magnuson-Stevens Act makes clear that it was the *reduction* of flexibility that appears to have produced improved outcomes in the context of fisheries management.[204] That indicates that the relationship between uncertainty and flexibility may not be so direct.

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204. This conclusion is consistent with previous observations about the important role that *inflexibility* can play in environmental law. *See, e.g.*, Eric Biber, *Climate Change and Backlash*, 17 N.Y.U. ENVTL. L.J. 1295, 1316 (2009); Doremus, *supra* note 34 at 51–59; Oliver Houck, *Tales from a*

2. The Effects of Flexible Standards

Under most hunting laws, managers are permitted to set annual harvest limits on an almost unlimited basis.[205] From 1976 to 1996, the same could be said of the Magnuson-Stevens Act. Admittedly the Act was nominally more stringent than hunting laws insofar as it required the councils to strive for a particular goal (optimum yield as derived from MSY). Yet as noted above, this constraint was often honored in the breach—hence Congress significantly tightening the reins in 1996 and 2006.

Throughout the period prior to 1996, when both hunting laws and the Magnuson-Stevens Act featured a great degree of substantive flexibility, the two legal regimes produced starkly different results. It was only after Congress reduced the amount of substantive flexibility in fisheries law that the statistics on overfishing and overfished stocks began to improve. Decreased flexibility meant better, though still not ideal, outcomes.

One could argue that the Magnuson-Stevens Act provided the wrong kind of flexibility compared to hunting law. Fisheries management still relies on the MSY concept as the basis for the optimum yield standard that is supposed to guide management council decisions. The MSY concept has been sharply criticized as being ineffective, based on out-of-date ecological conceptions, and impossible to implement given informational limits.[206] Hunting law, in contrast, has no comparable guiding standard.

Is this reliance on a problematic standard at the heart of the failures of fisheries management? An MSY-based standard might lead to overexploitation of a resource because it is an engineering-like approach, the goal of which is to fish up to the edge of what is sustainable, rather than to leave room for error. Given the uncertainty in fisheries science, this exercise is as challenging as "balancing a marble on top of a dome."[207] It should thus be no surprise that fisheries managers often fail to achieve the Magnuson-Stevens Act's goal of sustainable fisheries.

Troubled Marriage Science and Law in Environmental Policy, 302 SCIENCE 1926, 1928 (2003). Along the same lines, the precautionary principle, one of the most important environmental policy concepts of the past thirty years, can be viewed as a call for greater inflexibility: it commands action, limits the option of inaction, and thus constrains decision makers. For a complete discussion of the precautionary principle, its history, and its meaning, see Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003 (2003).

205. For an extreme example, see the Migratory Bird Treaty Act, 16 U.S.C. § 704(a) (2012) (The Secretary of the Interior is authorized to "determine when, to what extent, if at all, and by what means . . . to allow hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same, in accordance with such determinations.").

206. Punt & Smith, *supra* note 73, at 46; *see also* Joan Roughgarden & Fraser Smith, *Why Fisheries Collapse and What to Do About It*, 93 PROC. NAT'L ACAD. SCI. 5078, 5078 (1996); *see supra* note 41 and accompanying text.

207. Roughgarden & Smith, *supra* note 206, at 5078.

But if the problem is a standard that allows for managers to exploit a resource up to the edge of sustainability, the situation in hunting law is even worse than in fisheries law. Hunting laws place almost no constraint on agencies in terms of the level of hunting pressure that is permitted. Nonetheless, they have had much greater success over time than fisheries laws.

3. The Interaction of Political Economy and Flexibility

A third possible explanation for the difference in outcomes between hunting and fisheries law is the different political context for the two resource management problems. Economic forces drive the commercial and recreational exploitation of fisheries, with billions of dollars in revenue and billions of dollars of capital investments such as fishing boats and processing facilities.[208] Tens of thousands of Americans are directly employed in fishing; jobs in many coastal communities depend on the vitality of the fishing industry.[209] And the commercial fishing industry is composed of a wide range of economic actors, including large, integrated, multinational corporations.

The fishing industry—particularly the commercial fishing industry—has a direct, short-term incentive to maximize the take of fish from the ocean. It therefore has a strong incentive to push regulators to authorize higher levels of legal fishing. Of course, high levels of legal fishing create a range of risks: for instance, the risk to the long-term sustainability of the commercial fishery, and the risk of harm to other marine resources.[210] Society has a strong interest in providing for long-term sustainable fisheries, as well as in protecting other marine resources. However, those interests are shared by society as a whole, while the benefits of short-term maximization of fishing activity are concentrated within the commercial fishing industry.[211] This creates a classic public choice problem. Interest groups that have fewer members who will receive higher per capita gains from a regulatory decision (here, commercial fishers), have a significant organizational advantage over the interest groups

208. According to NOAA, "U.S. commercial and recreational saltwater fishing generated more than $199 billion in sales and supported 1.7 million jobs in 2012." NOAA REPORT, *supra* note 92, at 1.

209. *Id.*

210. In addition to impacts on target species and their food webs, fishing can harm marine ecosystems in two other important ways. First, the use of some kinds of fishing gear can lead to temporary or permanent damage to ocean habitats; this, in turn, can harm the species dependent on those habitats. Douglas J. McCauley et al., *Marine Defaunation Animal Loss in the Global Ocean*, 347 SCIENCE 1,255,641, 1,255,641–44 (2015). Second, fishing gear often kills nontargeted animals, such as endangered turtles, in a phenomenon known as "by-catch." *See, e.g.*, Rebecca L. Lewison et al., *Global Patterns of Marine Mammal, Seabird, and Sea Turtle Bycatch Reveal Taxa-Specific and Cumulative Megafauna Hotspots*, 111 PROC. NATL ACAD. SCI. 5271, 5271 (2014); Shelby Oliver et al., *Global Patterns in the Bycatch of Sharks and Rays*, 54 MARINE POL'Y 86, 86 (2015).

211. Of course, commercial fishers should have an interest in the long-term sustainability of fish stocks. However, people may focus too much on the short term in making decisions. Cass R. Sunstein, *Endogenous Preferences, Environmental Law*, 22 J. LEGAL STUD. 217, 239 (1993).

that have lower per capita gains from a regulatory decision and that have more members (here, the broader public).[212]

The high levels of uncertainty in fisheries science interact with this public choice dynamic in important ways. Uncertainty means a wide range of catch choices are scientifically justifiable. And industry, naturally, would prefer a catch allotment near the top of that range and pressures the councils accordingly. Yet because a choice higher in the recommended range has a greater chance of leading to overfishing than a lower one, a consistent pattern of higher choices enhances the risks of overfishing and long-term unsustainable fisheries. Indeed, in this context the failure of MSY management standards in the fisheries context makes sense, because the interaction of interest group pressures and uncertainty would consistently result in setting catch levels at or above MSY, increasing the risk of overfishing.

Congress has attempted to defuse this dynamic. In the 2006 amendments to the Magnuson-Stevens Act, Congress gave each council's Scientific and Statistical Committee responsibility for choosing an annual catch level from the range of uncertain options.[213] It had good reason. A study conducted prior to this change, when the councils set the annual catch level, showed that some councils regularly selected annual catch levels that were at or above the high end of the range recommended by scientists.[214] This is either a predictable response to the political dynamic described above, a logical outcome of industry-dominated councils, or a combination of the two. It is not clear that the 2006 changes will completely eliminate the problem by giving decision-making authority to the Scientific and Statistical Committees. There is some data suggesting that council scientists are not immune to the pressure for higher quotas.[215]

Hunting law has a very different political backdrop. There is almost no commercial hunting industry in the United States today.[216] Most contemporary hunting is either recreational or subsistence-based. That is no accident. One of the first reforms states implemented in the late nineteenth century was prohibiting commercial hunting of animals.[217] Those regulations—combined with federal enforcement of state laws by restricting interstate transport of wildlife taken in violation of state law—effectively eliminated what had been a very large industry.[218]

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212. This advantage will be particularly strong when some of the interests at issue are public goods, for instance the existence or option value of the protection of marine diversity.

213. Magnuson-Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1852(h)(6) (2012).

214. Josh Eagle & Barton H. Thompson, Jr., *Answering Lord Perry's Question Dissecting Regulatory Overfishing*, 46 OCEAN & COASTAL MGMT. 649, 659–60 (2003).

215. *Id.*

216. The exception is a limited amount of commercial trapping of fur-bearing mammals.

217. *See supra* note 186 and accompanying text.

218. The federal Lacey Act prohibits interstate transportation of wildlife taken in violation of state law. *See* 16 U.S.C. § 3372(a)(1).

Thus, in the context of hunting, there is no large, powerful, concentrated interest group with a stake in increasing the levels of take for animals. Of course, there are a lot of hunters and recreational fishers in the United States, and they do buy a lot of gear; there is, accordingly, a large industry that makes and sells recreational hunting and fishing equipment. But that industry simply has a stake in the continued existence of legal hunting. Whether the bag limit for deer in a season is one, two, or three does not have a major impact on the purchase of items such as rifles, binoculars, or clothing. Indeed, the recreational hunting and fishing industry has a stake in ensuring high population levels for game animals in order to make recreational hunting as appealing as possible.

For hunting laws, there is no powerful interest group that has an incentive to use the flexibility of the legal structure to push for higher exploitation of the resource. That leads to the possibility that the political context determines whether flexibility can be more successful in managing the uncertainties of resource management.

B. How to Ensure Flexibility Will Do More Good than Harm

Our two case studies highlight the need to understand the political, ecological, and economic context of a management and regulatory system to grasp when and how flexibility will produce better outcomes. Arguments for a broader use of flexibility in environmental law must take that context into account if we are to achieve better outcomes.

The most basic lesson from our case studies is that we should be more skeptical about flexibility, or be more careful about how flexibility is used, when faced with powerful interest groups that can capture the regulatory or management system—just as the fishing industry has historically dominated fisheries decision making. This does not mean that we should not have flexibility in these legal systems, but rather that we should structure that flexibility in ways that reduce the influence or ability of dominant interest groups to control outcomes.

In fact, various elements of the Magnuson-Stevens Act, particularly the amendments made in 1996 and 2006, can be seen as ways to balance between the need for flexibility to respond to changed circumstances and prevent the manipulation of outcomes by powerful interest groups. That balance was struck in two major ways.

First, the 1996 amendments that altered the definition of optimum yield and created mandatory time limits for rebuilding overfished stocks clearly limited the councils' discretion. In doing so, the Act created clear markers that guided decision making—markers that could be enforced both within the agency (e.g., NOAA review of council decisions) and, perhaps more importantly, by outside parties through judicial review. It is still very, very hard for plaintiffs to successfully challenge a fishery management plan or

regulations—but clear standards should make it easier to prove agency noncompliance.

This method of constraining flexibility is important because it identifies the ways in which interest groups are most likely to alter agency decision making—by pushing for overfishing—and it creates a hard, enforceable barrier to restrict the impact of that pressure. Both clarity and enforceability are important here, because they each reinforce the other. The clear mandates make it more likely courts will enforce the restrictions, and external enforcement is essential to ensure that the mandates are actually complied with in decision making.

The second category includes the Magnuson-Stevens Act's various efforts to require the use of up-to-date scientific information in decision making. The second of ten "National Standards for Fishery Management"—enacted in the original version of the Act—requires that decision makers acquire and use the "best scientific information available."[219] It can be inferred from Congress' inclusion of the adjectives "best" and "available" that it intended for managers to gather and input scientific information on a continuing basis.

Other provisions reinforce this conclusion. With respect to the gathering of information, the statute mandates that managers "develop . . . multi-year research priorities for fisheries, fisheries interactions, habitats, and other areas of research that are necessary for management purposes," and that these research priorities "be updated as necessary."[220] Congress added this provision in 2006. It is clear that Congress intended for managers to consider research findings and, if needed, incorporate those findings into fisheries regulation: the Act requires that decision makers "review on a continuing basis, and revise as appropriate," estimates of each fishery's optimum yield and issue management measures consistent with those estimates.[221] To ensure that managers make appropriate revisions, another 2006 addition to the Act requires that fishery management plans include accountability measures, that is, rules meant to force managers to penalize themselves for decisions that lead to excessive fishing.[222]

The technical nature of this information could hinder efforts to incorporate it into management measures. Put differently, the use of decision makers unfamiliar with the terms and concepts of fisheries science and management would interpose substantial transaction costs between information and action. In the original version of the Act, Congress sought to reduce these costs by requiring that appointed council members be "knowledgeable regarding the conservation and management, or the commercial or recreational harvest, of the fishery resources of the geographical area concerned."[223] The 2006

219. 16 U.S.C. § 1851(a)(2).
220. *Id.* § 1852(h)(7).
221. *Id.* § 1852(h)(5).
222. *Id.* § 1853(a)(15).
223. *Id.* § 1852(b)(2)(A). Over time, appointed members have been more likely to be familiar with "harvest" than "conservation and management." *See supra* note 40 and accompanying text.

amendments added a requirement that each member of the public appointed to a council after 2006 take a training course that, among other things, provides council members with education on fisheries science and management.[224]

To further ensure that incoming science is more readily available to the decision-making process, from the beginning the Act has mandated that each regional fishery management council establish a "scientific and statistical committee."[225] Each committee is responsible for helping to translate science into management, by "provid[ing] its Council ongoing scientific advice for fishery management decisions."[226] With respect to the most important operative rule in any fishery—annual limits on total catch—the 2006 amendments significantly limited council discretion (flexibility): the Act now prohibits a council from setting an annual limit for a fishery that exceeds the limit recommended by that council's Scientific and Statistical Committee.[227]

If uncertainty facilitates the use of political pressure by powerful interest groups to skew agency decision making—as we discussed above—then these provisions make a lot of sense. They directly require the agency to use up-to-date science in ways that should help to reduce uncertainty over time. Even more importantly, they set up institutional structures that can increase the likelihood that the up-to-date science will be used, rather than ignored.

Of course, science is not a cure all for uncertainty. There will be inevitable residual uncertainty given the difficulties of managing fisheries. And updating the science may at times increase uncertainty.

But the key here is the interaction of uncertainty with powerful interest groups, and the importance of maintaining integrity in decision making by basing the process on science.[228] The most egregious problems that arise from the interaction of uncertainty with powerful interest groups occur when interest groups use the uncertainty to mask policy choices—for instance, to claim that a fishing quota is conservative when in fact it is insufficiently stringent and increases long-term risk to the health of the fishery. A blatant example of this kind of manipulation is the retroactive revision by fisheries management councils of the scientific estimates of what would be sustainable fishing levels.[229] This kind of tampering reduces transparency for regulatory and management decision making and accordingly accountability for decision

224. 16 U.S.C. § 1852(k)(1).

225. *Id.* § 1852(g)(1)(A).

226. *Id.* § 1852(g)(1)(B).

227. *Id.* § 1852(h)(6). In the alternative, a council can opt to use a peer-review process to generate recommendations on annual catch limits. *Id.* § 1852(g)(1)(E). For examples of how the councils, prior to 2006, sometimes ignored scientific advice, see Eagle & Thompson, *supra* note 214, at 655.

228. *See* Holly Doremus, *Scientific and Political Integrity in Environmental Policy*, 86 Texas L. Rev. 1601, 1601–02 (2008).

229. *See supra* Part II.B.2 (discussing the manipulation of data by fisheries management councils).

makers and interest groups.[230] External bodies like Scientific and Statistical Committees make it harder for this kind of manipulation to occur.

Both direct mandates to use science in decision making and agency structures that ensure science is used transparently and effectively reduce the flexibility of agencies. They both constrain the substance of outcomes and add complexity to the procedures that must be followed. But again, if uncertainty accentuates the influence of powerful interest groups over regulatory or management decisions, then these kinds of constraints may be essential where both uncertainty and powerful interest groups exist.

Such coexistence is common—powerful interest groups and uncertainty are both endemic to environmental law. So it seems likely to us that the two elements of restraint on flexibility present in the Magnuson-Stevens Act will be important elements for a wide range of environmental laws—regardless of flexibility's importance. And also note that neither of these elements—clear and enforceable substantive constraints on certain management or regulatory outcomes, and mandates to use the best science—necessarily have to seriously reduce the virtues of flexibility. The fishery management councils in the Magnuson-Stevens Act continue to regularly update fishing regulations, for instance.

CONCLUSION

There are surely other lessons to draw from other case studies about when and how flexibility is beneficial for environmental law. There will be other economic, political, social, and ecological factors that will counsel in favor of, or against, flexibility. In turn, those factors will suggest specific legal or institutional design features to reduce the risks of flexibility and increase its benefits. We do not believe that our brief survey of these two case studies has fully answered all of these questions. But if we are to dive into a brave new world of increased flexibility in environmental law in order to facilitate climate change adaptation, it is essential that we start asking and answering these questions.

These questions will come up repeatedly—because political pressure on management and regulatory programs will not go away. In May of 2014, Congressman Hastings of Washington introduced a bill entitled the "Strengthening Fisheries Communities and Increasing Flexibility in Fisheries Management Act," intended to give the councils the same levels of discretion they enjoyed prior to the 1996 and 2006 amendments.[231]

230. *See* Wendy E. Wagner, *The Science Charade in Toxic Risk Regulation*, 95 COLUM. L. REV. 1613, 1614–17 (1995).

231. *See* Press Release, House Comm. On Nat. Res., Chairman Hastings Seeks Public Input on Draft Plan to Strengthen and Improve our Nation's Fisheries Unveils Draft Proposal to Reauthorize the Magnuson-Stevens Fishery Conservation and Management Act (Dec. 19, 2013), http://natural resources.house.gov/news/documentsingle.aspx?DocumentID=364840; Sean Cosgrove, *Rep. Hastings' Empty Oceans Act Is a Surefire Disaster for New England's Ocean, Fisheries and Communities*,

We also think that answering and asking these questions will usually have to be done with a fairly high degree of specificity—at least until we can get a more general theory of how flexibility does and does not work in environmental law.

The case of recreational fisheries and "marine reserves"—areas of the sea that bar fishing—makes clear why specificity in this kind of analysis is so important. One general lesson we might take from our case studies is that if we were to somehow (improbably, and probably undesirably) ban all commercial fishing, just as commercial hunting was banned, our fishing regulatory system would somehow operate much better. In other words, if we eliminated the political pressure that stems from the existence of a large commercial fishing industry, the major challenges in our regulatory system would disappear.

That hypothetical might or might not hold true for commercial fisheries. But it would not hold true for recreational fisheries. Recreational fisheries are often in worse shape than their commercial counterparts, with heavier fishing pressures on populations that are at greater risk.[232] Recreational fishing organizations often have significant political weight.[233] Due to the number of vessels involved, monitoring and enforcement of fishing rules is also much more difficult in recreational fishing than in commercial fishing.

One solution to the challenges that recreational fishing poses to the sustainability of fisheries is to create more marine reserves. A wide range of marine ecologists, fisheries scientists, and fisheries managers endorse the concept of marine reserves.[234] They are seen as a useful tool for a variety of reasons: they are perhaps more resistant to the constant pressure of commercial fishing interests to increase quota levels; a total ban on fishing can be easier to enforce than quotas; they can protect a wide range of species and habitats that might otherwise not be protected under species-specific provisions; and they protect against the harm of fishing, regardless of its source (commercial or recreational fishing).[235]

TALKINGFISH.ORG (Feb. 3, 2014), http://www.talkingfish.org/opinion/rep-hastings%E2%80%99-empty-oceans-act-is-a-surefire-disaster-for-new-england%E2%80%99s-ocean-fisheries-and-communities?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+talkingfish%2FtfWC+%28Talking+Fish%29.

232. Felicia C. Coleman, et al., *The Impact of United States Recreational Fisheries on Marine Fish Populations*, 305 SCIENCE 1958, 1958 (2004).

233. Suzanna Smith & Michael Jepson, *Big Fish, Little Fish Politics and Power in the Regulation of Florida's Marine Resources*, 40 SOC. PROBS. 39, 40, 47 (1993.

234. *See* NATIONAL CENTER FOR ECOLOGICAL ANALYSIS AND SYNTHESIS, SCIENTIFIC CONSENSUS STATEMENT ON MARINE RESERVES AND MARINE PROTECTED AREAS (2001).

235. *See* Donna R. Christie, *Marine Reserves, the Public Trust Doctrine and Intergenerational Equity*, 19 J. LAND USE & ENVTL. L. 427, 429–32 (2004). *See also* Jane Lubchenco et al., *Plugging a Hole in the Ocean The Emerging Science of Marine Reserves*, 13 ECOLOGICAL APPLICATIONS S-3 (2003).

While there has been some halting implementation of marine reserves, they have run into a firestorm of political controversy.[236] Often the most significant opponents are recreational fishing groups. Note how in this context, the politics are quite different from the story we have told about catch quotas and commercial fishing interests. For commercial fishing interests, the key is to have higher catch quotas; they may well be willing to accept having certain areas of the ocean off limits, as long as they can take the same amount of fish out of the ocean overall.

But for recreational fishing groups, particular places in the ocean may be valued as a place to enjoy fishing activities, regardless of how many fish can be caught. Marine reserves are a much more threatening regulation to recreational fishers than catch quotas; they are also much more threatening to the interest groups aligned with recreational fishers, such as the manufacturers of fishing equipment.

Thus, if we really want to use marine reserves as a regulatory tool, we will have to consider how to make that regulatory system appropriately flexible to allow for changes in reserve design, extent, and regulatory framework while making reserves resistant to the constant pressures from recreational fishing groups to open areas of the ocean up to fishing. That might require a very different regulatory structure, predicated on pressures from a very different political context—even as compared to the apparently closely aligned problem of catch quotas for commercial fishers.

The case studies also lay the groundwork for a discussion about what "flexibility" actually means. The vocabulary of flexibility is stunted. There are no words to describe relative degrees of flexibility or to describe it in absolute terms. Along the same lines, flexibility derives from several different sources. Congress may intentionally give agencies space within which they can lawfully act; scientific uncertainty also creates space by making it possible for agencies to defend a wide range of decisions. We have no terminology to source flexibility, or adjectives for describing kinds of flexibility as beneficial or not. It will always be the case that some kinds of flexibility, such as the flexibility to readjust management choice in light of new information, are good, and other kinds, such as the flexibility to implement flawed policy, are bad. Other kinds of flexibility—such as procedural streamlining or shortcuts—may be beneficial sometimes and not others.

The precautionary principle provides an example of shortcomings in our vocabulary. A common statement of the principle can be found in the 1992 *Rio Declaration on Environment and Development*: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental

236. *See* Josh Eagle, *The Practical Effects of Delegation Agencies and the Zoning of Public Lands and Seas*, 55 PEPP. L. REV. 835, 883–88 (2008).

degradation."[237] Is this a call for greater flexibility because it encourages decision makers to make decisions, even where information is lacking, instead of rigidly sticking to the status quo? Or, is the precautionary principle a call for greater *inflexibility* because it asks decision makers to eliminate the option of inaction, even where information is lacking?

As used in academic literature, the term "flexibility" is almost always synonymous with "freedom," more specifically, with administrative freedom to act.[238] Freedom to act is more than just agency discretion, which describes a space within which agencies are legally free to make, or not to make, substantive decisions. Particularly in the climate change literature, flexibility includes not only the concept of greater agency discretion, but also the idea that administrative and judicial processes limit agencies' freedom to act.

Administrative freedom to act, in its purest form, cannot possibly be what scholars have in mind. Simply increasing agency discretion would allow agencies to do both more desirable things and more undesirable things. Reducing public and judicial scrutiny of rulemaking would allow agencies to act more quickly but also in illogical and nontransparent manners.

Can we clarify the intended goals of enhanced flexibility and develop a vocabulary consistent with those goals? One objective in the literature is to free agencies from the impossible task of attempting to restore resources to historical conditions. Provisions meant to do this might more accurately be called "dynamic baseline" measures than flexibility measures. Similarly, provisions for greater agency freedom to collect and act on new information might be better described as "responsiveness" than "flexibility": the goal is not freedom, but awareness and action.

These are questions we can only begin to answer with this article. However, understanding what we mean by flexibility, and refining our definitions of the term (or the various elements that might make up the concept) is also essential if we are to rely on increased flexibility as a tool to address the impacts of climate change on natural resources and the environment.

237. U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), annex I (Aug. 12, 1992).

238. *See supra* Part I. The Call for FlexibilityI.

APPENDIX A

Year	Allowable Biological Catch (science advice in millions of lbs.)[239]	Total Annual Catch (limit in millions of lbs.)
1986	1.2–2.9	2.9
1987	0.6–2.7	2.2
1988	0.5–4.3	3.4
1989	2.7–5.8	4.25
1990	3.2–5.4	4.25
1991	4–7	5.75
1992	4–10.79	7.8
1993	1.9–8.1	7.8
1994	1.9–8.1	7.8
1995	1.9–8.1	7.8
1996	4.7–8.8	7.8
1997	6–13.7	10.6
1998	7.1–10.8	10.6
1999	8–12.5	10.6
2000	5.5–8.8	10.2
2001	5.3–9.6	10.2
2002	5.3–9.6	10.2
2003	5.3–9.6	10.2
2004	5.3–9.6	10.2
2005	5.3–9.6	10.2
2006	5.3–9.6	10.8
2007	5.3–9.6	10.8
2008	5.3–9.6	10.8
2009	5.3–9.6	10.8
2010	5.3–9.6	10.8
2011	5.3–9.6	10.8

239. In some years, namely 1992 to 1995, the Gulf of Mexico Fishery Management Council officially modified scientists' advice on the range of allowable biological catch, increasing the upper of the "safe" range. For the original scientific recommendations for those years, see Eagle & Thompson, *supra* note 214 at 657; s*ee also* GULF OF MEXICO FISHERY MGMT. COUNCIL, FRAMEWORK SEASONAL ADJUSTMENT OF HARVEST LEVELS AND PROCEDURES UNDER THE FISHERY MANAGEMENT PLAN FOR COASTAL MIGRATORY PELAGICS IN THE GULF OF MEXICO: INCLUDES ENVIRONMENTAL ASSESSMENT AND REGULATORY IMPACT REVIEW A-5 (1995), http://www.gulfcouncil.org/docs/amendments/Mackerel%20Regulatory%20Amendment%20-%201995-05.pdf.

APPENDIX B

Year	No. of stocks subject to overfishing (as a percentage of known stocks)	No. of overfished stocks (as a percentage of known stocks)
1997	--	96 (34%)
1998	--	100 (33%)
1999	--	103 (45%)
2000	72 (26%)	92 (38%)
2001	65 (22%)	81 (33%)
2002	66 (24%)	86 (36%)
2003	60 (21%)	76 (36%)
2004	44 (18%)	56 (28%)
2005	45 (19%)	54 (26%)
2006	48 (20%)	47 (25%)
2007	41 (17%)	45 (24%)
2008	41 (16%)	46 (23%)
2009	38 (15%)	46 (23%)
2010	40 (16%)	48 (23%)
2011	36 (14%)	45 (21%)
2012	29 (10%)	41 (19%)
2013	28 (9%)	40 (17%)

APPENDIX C: RECENT CHANGES TO CALIFORNIA DEER HUNTING TAG QUOTAS[240]

Hunting Zone	2008	2009	2010	2011	2012	2013
Maximum number of tags issued						
A	65,000	65,000	65,000	65,000	65,000	65,000
B	55,500	55,500	55,500	35,000	35,000	35,000
C	8575	8150	8150	8150	8150	8150
D 3-5	33,000	33,000	33,000	33,000	33,000	33,000
D-6	10,000	10,000	10,000	10,000	10,000	10,000
D-7	9000	9000	9000	9000	9000	9000
D-8	8000	8000	8000	8000	8000	8000
D-9	2000	2000	2000	2000	2000	2000
D-10	700	700	700	700	700	700
D-11	5500	5500	5500	5500	5500	5500
D-12	950	950	950	950	950	950
D-13	4000	4000	4000	4000	4000	4000
D-14	3000	3000	3000	3000	3000	3000
D-15	1500	1500	1500	1500	1500	1500
D-16	3000	3000	3000	3000	3000	13,000
D-17	500	500	500	500	500	500
D-19	1500	1500	1500	1500	1500	1500
X-1	2280	2370	1275	1275	1150	935
X-2	180	185	190	180	175	180
X-3a	250	240	230	280	310	295
X-3b	845	825	875	935	935	835
X-4	425	275	355	355	385	395
X-5a	60	60	65	60	65	75
X-5b	85	110	110	140	140	55
X-6a	325	325	325	325	325	320
X-6b	275	370	370	315	315	310
X-7a	205	200	200	230	230	220
X-7b	125	120	120	140	140	130
X-8	230	220	220	240	240	220
X-9a	775	650	650	650	650	650
X-9b	325	325	325	325	325	325
X-9c	325	325	325	325	325	325
X-10	400	400	400	400	400	400

240. All data compiled from California DFW regulations. *See Fishing and Hunting Regulations*, CAL. DEP'T OF FISH & WILDLIFE, https://www.wildlife.ca.gov/Regulations (last visited Mar. 24, 2015). "Number of tags" refers to the number of deer tags issued in each hunting zone; each tag authorizes the take of one deer by a hunter. For maps of the hunting zones, see *California Deer Zone Map*, Cal. Dep't of Fish & Wildlife, http://www.dfg.ca.gov/wildlife/hunting/deer/cazonemap.html (last visited Mar. 24, 2015). "A" hunting zones are for archery hunts. Some of the hunting zones are on military bases, and tags in those zones are divided between the general public and military personnel. Special thanks to Mary Loum for compiling this table.

Hunting Zone	2008	2009	2010	2011	2012	2013
X-12	850	760	760	860	860	680
G-1	2850	2170	2170	2170	2170	2710
G-3	35	35	35	35	35	35
G-6	50	50	50	50	50	50
G-7	20 Military	20 Military	20 Military	20 Military	20 Military	20 Military
G-8	10 Military 10 Public	10 Military 10 Public	10 Military 10 Public	10 Military 10 Public	10 Military 10 Public	10 Military 10 Public
G-9	15 Military 15 Public	15 Military 15 Public	15 Military 15 Public	15 Military 15 Public	0	0
G-10	400 Military	400 Military	400 Military	400 Military	400 Military	400 Military
G-11	500 Military/ DOD	500 Military/ DOD	500 Military/ DOD	500 Military/ DOD	500 Military/ DOD	500 Military/ DOD
G-12	30	30	30	30	30	30
G-13	300	300	300	300	300	300
G-19	35	35	35	35	35	25
G-21	35	35	35	35	35	25
G-37	25	25	25	25	25	25
G-38	300	300	300	300	300	300
G-39	5	5	5	5	5	5
M-3	20	20	20	20	20	20
M-4	10	10	10	5	10	10
M-5	10	10	10	5	5	5
M-6	80	80	80	80	80	80
M-7	150	150	150	150	150	150
M-8	20	20	20	20	20	20
M-9	15	15	15	10	10	15
M-11	20	20	20	20	20	20
MA-1	150	150	150	150	150	150
MA-3	150	150	150	150	150	150
J-1	25	25	25	25	25	25
J-3	15	15	15	15	15	15
J-4	15	15	15	15	15	15
J-7	15	15	15	15	15	15
J-8	15	15	15	15	15	15
J-9	5	5	5	5	5	5
J-10	10 Military 75 Public	10 Military 75 Public	10 Military 75 Public	10 Military 75 Public	10 Military 75 Public	10 Military 75 Public
J-11	40	40	40	40	40	40
J-12	10	10	10	10	10	10
J-13	40	40	40	40	40	40
J-14	30	30	30	30	30	30

Hunting Zone	2008	2009	2010	2011	2012	2013
J-15	10	10	10	10	10	10
J-16	75	75	75	75	75	75
J-17	25	25	25	25	25	25
J-18	75	75	75	75	75	75
J-19	25	25	25	25	25	25
J-20	20	20	20	20	20	20
J-21	50	50	50	50	50	50
Archery Hunts						
A-1 (C Zones)	2045	1945	1945	1945	1945	1945
A-3 (Zone X-1)	255	270	130	130	125	135
A-4 (Zone X-2)	15	10	10	20	15	10
A-5 (Zone X-3a)	35	25	30	35	40	25
A-6 (Zone X-3b)	95	80	90	90	90	90
A-7 (Zone X-4)	135	140	115	135	140	110
A-8 (Zone X-5a)	25	20	15	15	10	15
A-9 (Zone X-5b)	10	5	5	5	5	5
A-11 (Zone X-6a)	55	55	55	55	55	50
A-12 (Zone X-6b)	140	140	140	110	110	100
A-13 (Zone X-7a)	60	50	50	50	50	45
A-14 (Zone X-7b)	20	25	25	25	25	25
A-15 (Zone X-8)	55	40	40	50	50	40
A-16 (Zone X-9a)	150	140	140	140	140	140
A-17	300	300	300	300	300	300

Hunting Zone	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
(Zone X-9b)						
A-18 (Zone X-9c)	350	350	350	350	350	350
A-19 (Zone X-10)	120	120	120	120	120	100
A-20 (Zone X-12)	200	170	170	190	190	100
A-21	25	25	25	25	25	25
A-22	1000	1000	1000	1000	1000	1000
A-24	100	100	100	100	100	100
A-25	35	35	35	35	35	35
A-26	30	30	30	30	30	30
A-27	10	10	10	5	5	5
A-30	40	40	40	40	40	40
A-31	1000	100	100	100	100	1000
A-32	250	250	250	250	250	250
A-33	25 Military 25 Public	25 Military 25 Public	25 Military 25 Public	25 Military 25 Public	25 Military 25 Public	25 Military 25 Public

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