Does NEPA Help or Harm ESA Critical Habitat Designations? An Assessment of Over 600 Critical Habitat Rules

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Introduction....830
I. The ESA and Its Relation to NEPA....833
A. The Endangered Species Act....833
B. The National Environmental Policy Act....836
C. Circuit Split on NEPA's Applicability to Critical Habitat Designation....838
II. Analysis of Critical Habitat Rules Shows that NEPA Did Not Cause Undue Delay....840
A. The Critical Habitat Dataset....840
B. Time Required to Complete the NEPA Analysis....841
1. NEPA Versus No NEPA....842
2. Threatened Versus Endangered Species....843
3. Difference Between Species Classes....844
4. Hawaiian Versus Non-Hawaiian Species....845
5. Rules Designating Habitat for Multiple Species....846
6. Difference Between Service Region....847
C. Size of the Critical Habitat Area and Change Between Proposed and Final Rules....849
1. NEPA Versus No NEPA....850
2. Threatened Versus Endangered Species....852
3. Difference Between Species Class....853
4. Hawaiian Versus Non-Hawaiian Species....855
5. Rules Designating Habitat for Multiple Species....856
6. Difference Between Service Region....857
III. Observations and Recommendations....860
A. NEPA Analysis Does Not Delay Critical Habitat Rule Development....860
B. Critical Habitat Designations that Undergo NEPA Change Slightly Less than Rules that Forego NEPA Analysis....861
Conclusion....862

INTRODUCTION

The National Environmental Policy Act (NEPA)[1] is the centerpiece of federal environmental law. This "broadest and perhaps most important" of environmental laws requires federal agencies to publicly weigh environmental impacts before proceeding with federal actions.[2] NEPA has been criticized because it can delay development.[3] Other critics describe NEPA as "bureaucratic red-tape"[4] and claim that repealing NEPA "would not make a whit of difference to the environment or public health."[5] NEPA's defenders counter that "for more than four decades, [NEPA] has provided the foundation for countless improvements in our environmental laws. It gives us cleaner water, cleaner air, and a safer and healthier environment."[6] Others laud NEPA for its public involvement opportunities and for requiring consideration of reasonable alternatives to limit environmental damage.[7]

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1. National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321–4370m-12 (2012).

2. Or. Nat. Desert Ass'n v. Bureau of Land Mgmt., 625 F.3d 1092, 1100 (9th Cir. 2010) (citing Calvert Cliffs' Coordinating Comm. v. U.S. Atomic Energy Comm'n, 449 F.2d 1109, 1111 (D.C. Cir. 1971)).

3. U.S. GOV'T ACCOUNTABILITY OFFICE, REP NO. GAO-14-370, REPORT TO CONGRESSIONAL REQUESTERS: NATIONAL ENVIRONMENTAL POLICY ACT: LITTLE INFORMATION EXISTS ON NEPA ANALYSES 1 (2014). *See also* Diane Katz, *Time to Repeal the Obsolete National Environmental Policy Act (NEPA)*, 3293 BACKGROUNDER: THE HERITAGE FOUND. 1, 4 (2018).

4. Michael Blumm & Keith Mossman, *The Overlooked Role of the National Environmental Policy Act in Protecting the Western Environment NEPA in the Ninth Circuit*, 2 WASH. J. ENVTL. L. & POL'Y 193, 193 (2012) (citing NEPA's critics).

5. Katz, *supra* note 3, at 2.

6. *See Recognizing the Importance of the National Environmental Policy Act*, 113th Cong. E1637 (2013) (statement of Rep. Quigley).

7. Robert W. Adler, *In Defense of NEPA The Case of The Legacy Parkway*, 26 J. LAND, RESOURCES & ENVTL. L. 297, 317 (2006).

With revisions to NEPA's implementing regulations looming,[8] this Article investigates whether NEPA delays federal decision making, and whether the NEPA process results in significant changes to the substance of federal decisions. These are important questions because efforts to "streamline" NEPA by imposing deadlines and strict page limits for NEPA documents are gaining traction. In 2017, President Trump signed an Executive Order directing that

> the time for the Federal Government's processing of environmental reviews and authorization decisions for new major infrastructure projects should be reduced to not more than an average of approximately 2 years, measured from the date of the publication of a notice of intent to prepare an environmental impact statement or other benchmark deemed appropriate by the Director of [the Office of Management and Budget].[9]

Shortly thereafter, the Secretary of the Interior issued an order directing agencies within the Department of the Interior to limit Environmental Impact Statements (EISs) to no more than 150 pages or 300 pages for "unusually complex projects."[10] The Secretary also directed agencies to "complete each Final EIS . . . within 1 year from the issuance of a Notice of Intent (NOI) to prepare an EIS."[11] The Secretary further directed each agency within Interior to propose page limits and time deadlines for the preparation of environmental assessments.[12] The White House Council on Environmental Quality then announced its intent to amend NEPA's implementing regulations.[13]

Some NEPA practitioners, however, note that "significant unintended consequences could potentially result from such truncated reviews."[14] As the former Acting General Counsel of the White House Council on Environmental Quality argued recently:

> The law in action is never straightforward, and NEPA is no exception; it epitomizes the long, messy arc of democracy. Because of this statute, we learn of unforeseen impacts and unanticipated controversy and we are provided the opportunity of an informed decision. While improving efficiency has been ongoing and should continue, "reforms" that excise important analysis or affected constituencies violate the law. Beyond endangering compliance, these reforms estrange entire communities—from local residents to expert scientists—whom NEPA was designed to pull into

8. *See generally* Advance Notice of Proposed Rulemaking, Update to the Regulations for Implementing Procedural Provisions of the National Environmental Policy Act, 83 Fed. Reg. 28,591 (June 20, 2018) (to be codified at 50 C.F.R. pts. 1500–08) (proposing updates to NEPA).

9. Exec. Order No. 13807, 82 Fed. Reg. 40,463, 40,464 (Aug. 24, 2017).

10. Dep't of the Interior, Sec. Order No. 3355 § (4)(a)(1) (Aug. 31, 2017).

11. *Id.* at § (4)(a)(2).

12. *Id.* at § (4)(b).

13. 83 Fed. Reg. at 28,591.

14. Nathan Frey & Jessica Ferrell, *NEPA Overhaul Proposed by Trump Administration Depends on Second Term*, MARTEN L. (Feb. 25, 2019), www.martenlaw.com/newsletter/20190225-nepa-overhaul-trump-administration.

> the discussion for the sake of better outcomes. Selective hearing undermines the quality and legitimacy of final decisions.[15]

Both sides in the ongoing debate agree that NEPA compliance can be made more efficient. We contend that reform should reflect a careful analysis of how this bedrock statute is applied in practice. Well-intentioned reforms, if not based on objective facts about the benefits and costs of NEPA compliance, could fail to ease the NEPA compliance burden while also undermining NEPA's goal of "promot[ing] efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man."[16]

To illuminate NEPA reform efforts we empirically tested whether NEPA delays federal decision making, and whether the NEPA process results in statistically significant changes to the substance of federal decisions. To answer these questions, we reviewed 643 federal rules designating critical habitat for species that are protected under the Endangered Species Act (ESA).[17] Our study focused on critical habitat designations for two key reasons. First, because of split in authority between federal appellate courts,[18] some of these rules were subject to NEPA review while others were not. Second, all but one of the rules that underwent NEPA review were analyzed in an Environmental Assessment (EA). This created a natural experiment and allowed for a statistical comparison of otherwise substantively and procedurally identical federal decisions completed with and without NEPA review.

We found that on average, critical habitat rules that underwent NEPA review were completed more than three months faster than rules that did not undergo NEPA review. Based on the rulemaking efforts that we reviewed, and contrary to conventional wisdom, NEPA analysis does not appear to unduly delay federal permitting or decision making.

We also found that rules subject to NEPA underwent less change between the proposed and final rule in the size of the habitat area than those that were exempted. While available data do not allow us to say how this difference relates to NEPA's public input provisions, it does appear that NEPA provides opportunities for the public to influence federal decisions that differ from the public comment process for critical habitat rules. It may be that NEPA analysis facilitates broader stakeholder participation. Decisions that undergo NEPA review may also receive more rigorous analysis before issuance of a proposed rule and therefore change less through the rulemaking process. NEPA may also help agencies more fully consider indirect and cumulative effects prior to

15. Marna McDermott, *Streamlining Energy Dominance*, THE ENVTL. FORUM 26, 31–32 (2019).

16. 42 U.S.C. § 4321.

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

18. *Compare* Douglas Cty. v. Babbitt, 48 F.3d 1495, 1507–08 (9th Cir. 1995) (holding that NEPA analysis is not required for critical habitat designations), *with* Catron Cty. v. U.S. Fish & Wildlife Serv., 75 F.3d 1429, 1439 (10th Cir. 1996) (holding that NEPA analysis is required for critical habitat designations).

rendering a decision. While our dataset does not allow us to test these hypotheses, these explanations do comport with NEPA's goal of increasing public involvement and careful consideration of potential impact.

In Part I we provide an overview of the ESA and its requirements to designate critical habitat for threatened and endangered species. We then discuss NEPA and the process for reviewing proposed federal decisions, as well as conflicting federal circuit court opinions regarding NEPA's applicability to critical habitat designations. Part II discusses the dataset that we utilized to compare decisions made with and without NEPA, and our analysis of both the time required to complete the NEPA process and the manner in which decisions changed during rulemaking. Part III offers our observations and recommendations.

I. THE ESA AND ITS RELATION TO NEPA

The ESA was enacted to protect imperiled species and the habitat upon which they depend. NEPA is a procedural statute requiring federal agencies to consider the environmental impacts of their actions before making or authorizing decisions. Although NEPA applies to multiple federal agency actions, our study focused on the ESA as a microcosm of some of the questions raised by NEPA analysis. Determining the protections needed to ensure the continued viability of ESA-listed species raises the kinds of questions that are often addressed through NEPA analysis, but because of a circuit split, not all ESA critical habitat designations undergo NEPA analysis. This creates a natural experiment, allowing us to compare decisions made with and without NEPA and thereby quantify the NEPA compliance burden. Before comparing these two classes of rules we first briefly summarize relevant aspects of the ESA and NEPA. We then discuss the competing circuit court opinions regarding NEPA's applicability to critical habitat designations.

A. The Endangered Species Act

Congress enacted the ESA in 1973 to conserve imperiled species and the ecosystems upon which they depend.[19] Under the Act, the Secretaries of the Interior and Commerce determine if habitat loss, exploitation, disease or predation, inadequate regulatory protections, or other factors imperil any species.[20]

A species may be listed as "endangered" or "threatened" under the ESA. Endangered means a species is at risk of extinction throughout all or a significant

19. 16 U.S.C. § 1531(b).

20. 16 U.S.C. § 1533(a)(1). The Secretary of the Interior is charged with ESA implementation for terrestrial species while the Secretary of Commerce is charged with ESA implementation for oceangoing species. *See* 16 U.S.C. § 1533(a).

portion of its range.[21] Threatened means a species is likely to become endangered within the foreseeable future.[22] The listing decision is based solely on the basis of the species' biological status and threats to their existence; economic factors are not considered at the listing phase.[23] Once a species is listed, the ESA prohibits any "act which actually kills or injures [threatened or endangered] wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."[24]

The ESA requires the designation of "critical habitat" for both threatened and endangered species when that designation is "prudent and determinable . . . ."[25] Critical habitat includes geographic areas that contain physical or biological features essential to species conservation and that may need special management or protection.[26] Critical habitat may include areas that are not occupied by the species at the time of listing but are essential to species conservation.[27] Unlike the initial listing decision, which must be based solely on the risk of species extinction and cannot consider economic factors, an area can be excluded from critical habitat designation if the economic benefits of excluding it outweigh the benefits of designation, unless failure to designate the area as critical habitat may lead to extinction of the listed species.[28] Department of Defense lands may also be excluded under certain circumstances.[29] Federal agencies must avoid "destruction" or "adverse modification" of designated critical habitat, and cannot authorize actions that would affect such a result.[30]

All critical habitat designations require rulemaking in accordance with the Administrative Procedure Act (APA).[31] Under the APA, rulemaking is an iterative process that generally begins when a federal agency publishes a Notice of Proposed Rulemaking in the Federal Register.[32] A Notice of Proposed Rulemaking describes and solicits public comments on a proposed regulatory action.[33] Under the APA, this notice must include: a statement of the time, place,

21. 16 U.S.C. § 1532(6).
22. 16 U.S.C. § 1532(20).
23. *See* 16 U.S.C. § 1533(b)(1)(A).
24. 50 C.F.R. § 17.3 (2018).
25. 16 U.S.C. § 1533(a)(3)(A).
26. 16 U.S.C. § 1532(5)(A)(i).
27. 16 U.S.C. § 1532(5)(A)(ii).
28. 16 U.S.C. § 1533(b)(2).
29. 50 C.F.R. § 424.12(h) (1996). The Service, for example, exempted 14,313 acres of Joint Base Lewis-McChord in Washington State from critical habitat designation during the most recent revision to critical habitat for the Northern Spotted Owl. Endangered and Threatened Wildlife and Plants; Designation of Revised Critical Habitat for the Northern Spotted Owl; Final Rule, 77 Fed. Reg. 71,876, 71,890 (Dec. 4, 2012).
30. 16 U.S.C. § 1536(a)(2).
31. Administrative Procedure Act, 5 U.S.C. §§ 551, 701–706 (2012).
32. 5 U.S.C. § 553(b).
33. 5 U.S.C. § 553(b)–(c).

and nature of the rulemaking proceeding; a reference to the legal authority under which the rule is being proposed; and either the terms or substance of the proposed rule or a description of the subjects and issues involved.[34] The agency then publishes a proposed rule and solicits comments on that rule.[35] The agency next considers those comments, revising the rule and responding to comments as necessary.[36] The rulemaking process concludes with issuance of a final rule.[37] From 1999 through 2017, the U.S. Fish and Wildlife Service and NOAA Fisheries promulgated critical habitat rules for more than 600 ESA listed species, all of which were completed in accordance with the APA's procedural requirements.[38]

The ESA includes both substantive and procedural requirements for critical habitat designations that parallel and expand on APA requirements. Under the ESA, critical habitat designation also requires publication of the proposed rule in the Federal Register.[39] The Federal Register notice must include a detailed description of the proposed rule and a summary of the data upon which the rule is based, as well as a summary of factors affecting the species or its designated critical habitat.[40] The Fish and Wildlife Service or NOAA Fisheries must also notify and solicit comments from each state and county where the species is potentially found and notify other federal agencies, private individuals, and organizations affected by the rule.[41] The proposed rule is subject to a sixty-day public comment period, and a public hearing must be held if requested by a member of the public.[42] The rulemaking process concludes with issuance of a final rule.[43]

Prior to finalizing critical habitat designations, the applicable Secretary must consider the "probable economic, national security, and other relevant impacts of the designation upon proposed or ongoing activities."[44] The Secretary may also exclude habitat if the "benefits of such exclusion outweigh the benefits of specifying the particular area as part of the critical habitat," unless "the failure to designate that area as critical habitat will result in the extinction of the species concerned."[45] Lands and waters that are controlled by the Department of Defense

34. 5 U.S.C. § 553(b).
35. 5 U.S.C. § 553(c).
36. *Id*.
37. 50 C.F.R. § 424.18 (2018).
38. *See* ECOS (ENVIRONMENTAL CONSERVATION ONLINE SYSTEM), USFWS THREATENED & ENDANGERED SPECIES ACTIVE CRITICAL HABITAT REPORT (last visited Oct. 30, 2019), https://ecos.fws.gov/ecp/report/table/critical-habitat.html.
39. 50 C.F.R. § 424.12(c) (2018).
40. 50 C.F.R. § 424.16(b).
41. 50 C.F.R. § 426.16(c)(1).
42. 50 C.F.R. §§ 424.16(2)–(3).
43. 50 C.F.R. § 424.18.
44. 50 C.F.R. § 424.19(b).
45. 50 C.F.R. § 424.19(c).

are exempted from critical habitat provided that the lands are adequately protected in an integrated natural resources management plan that benefits the species.[46]

B. The National Environmental Policy Act

NEPA fits hand-in-glove with substantive environmental laws like the ESA. NEPA declares that it is our national policy to "encourage productive and enjoyable harmony between man and his [or her] environment; [and] to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man . . . ."[47] NEPA's lofty goals are met through requirements that federal agencies identify and analyze impacts on the environment prior to taking, authorizing, or funding "major Federal actions significantly affecting the quality of the human environment."[48] NEPA, however, "does not mandate particular results," nor does it require agencies to choose the least environmentally damaging alternative.[49] Instead, NEPA requires that agencies take a "hard look" at the environmental impacts of their actions and consider a range of alternative means of achieving agency goals before undertaking federal actions.[50]

All critical habitat rules are promulgated pursuant to the APA and ESA, and some rules also undergo NEPA analysis.[51] Regardless of whether a critical habitat rule undergoes NEPA review or not, it must satisfy all of the substantive requirements in the ESA and the procedural requirements imposed by the APA. The main distinction for rules promulgated pursuant to NEPA is that the NEPA process may consider a broader range of factors during the rulemaking process than are normally considered under the APA. NEPA documentation may also include public engagement and input opportunities that go beyond those required under the ESA and APA rulemaking.

NEPA, in short, requires federal agencies to look before they leap. When a federal project's impacts are known to be "significant" in terms of their context and intensity, compliance requires completion of an Environmental Impact Statement (EIS) before the proposed federal action can proceed.[52] Most federal actions, however, do not involve significant environmental impacts and therefore

46. 50 C.F.R. § 424.12(h); *see also* 77 Fed. Reg. at 71,890.
47. 42 U.S.C. § 4321.
48. 42 U.S.C. § 4332(2)(C).
49. Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 350 (1989).
50. *Id.*
51. *Compare* Douglas Cty. v. Babbitt, 48 F.3d 1495, 1507–08 (9th Cir. 1995) (holding that NEPA analysis is not required for critical habitat designations), *with* Catron Cty. v. U.S. Fish & Wildlife Serv., 75 F.3d 1429, 1439 (10th Cir. 1996) (holding that NEPA analysis is required for critical habitat designations).
52. 40 C.F.R. § 1508.27 (2018).

do not require preparation of an EIS.[53] If it is unclear whether an action will have significant environmental impacts, the agency prepares an Environmental Assessment (EA).[54] If the analysis summarized in the EA indicates that the project's impacts are not significant, the agency issues a Finding of No Significant Impact, and the NEPA review process is complete.[55] If the proposed action is determined to have a significant impact, then an EIS is required.[56] Agencies may also promulgate regulations that specify categories of actions that do not individually or cumulatively have a significant effect on the environment. These are known as Categorical Exclusions (CEs).[57] Actions that fall within one of these regulatory CEs can be approved without an EIS or EA, provided that the action does not involve "extraordinary circumstances."[58]

Preparation of an EA or an EIS begins with a public "scoping" period during which the agency invites comments on the potential environmental impacts that are likely to result from the proposal, potential alternatives that satisfy the purpose and need for the proposed action while minimizing environmental impacts, and the analysis that is needed to accurately assess the environmental impacts.[59] The agency then prepares the EA or Draft EIS, which considers the environmental impacts of the various alternatives, including the impacts of the "no action alternative."[60] The agency next releases the EA or a Draft EIS for public review and comment. If a Draft EIS is issued, the agency then prepares a Final EIS that reflects comments on the Draft EIS. Following release of the Final EIS, the agency issues a Record of Decision which concludes the NEPA process.[61] If an EA is issued, the agency reviews and considers public comments and prepares either a Finding of No Significant Impact, or a decision to prepare an EIS.[62] The agency can also issue revised or supplemental NEPA documents if comments identify gaps in the NEPA analysis.[63]

As noted earlier, the question at the heart of proposed NEPA reforms is whether NEPA's benefits justify the compliance burden. Diverging federal court opinions create a natural experiment and allow us to empirically assess the NEPA compliance burden. By comparing critical habitat designations that underwent

53. The U.S. Government Accountability Office estimates that 95 percent of NEPA decisions are consummated in Categorial Exclusions (CEs), nearly 5 percent in EAs, and less than 1 percent in EISs. U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 3, at 8.

54. 40 C.F.R. § 1508.9.

55. 40 C.F.R. §§ 1501.4(e), 1508.13.

56. 40 C.F.R. § 1501.4.

57. 40 C.F.R. §§ 1508.4, 1507.3(b)(1)–(2)(ii) (2018).

58. 40 C.F.R. § 1508.4.

59. 40 C.F.R. § 1501.7.

60. 40 C.F.R. §§ 1502.14, 1502.16 (2018). The "no action alternative" reflects continuation of current management. Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18,026, 18,027 (Mar. 23, 1981).

61. 40 C.F.R. § 1502.9.

62. 40 C.F.R. § 1505.2.

63. 40 C.F.R. § 1502.9(c).

NEPA analysis to those that did not, we were able to see whether NEPA actually extended the rulemaking process.

C. Circuit Split on NEPA's Applicability to Critical Habitat Designation

Critical habitat designation under the ESA is a federal action that may impact environmental quality, and until 1983, the Fish and Wildlife Service conducted a NEPA analysis before issuing any critical habitat rule.[64] In 1981, the Sixth Circuit ruled that the Service was not required to prepare an EIS before listing a species as threatened or endangered under the ESA.[65] In reaching this conclusion, the court held that Congress intended that listing decisions be based exclusively on the biological factors enumerated in the ESA, "and not upon environmental impact concerns found in NEPA."[66] Preparing an EIS, according to the court, would not advance the ESA's purpose because the majority of factors addressed in the EIS involve matters other than the species' biological status and threats to their existence, and these considerations would be irrelevant to the listing decision.[67]

Two years later, the Fish and Wildlife Service issued a "rule-related notice" indicating that a NEPA analysis was not required for critical habitat designations.[68] The notice was based on the Sixth Circuit's opinion and advice from the White House Council on Environmental Quality.[69] The Service also noted that they had prepared over 130 EAs on ESA listings, de-listings, reclassifications, and critical habitat designations—all of which resulted in a Finding of No Significant Impact.[70]

The conclusion that critical habitat designations did not require NEPA analysis was subject to debate because, while critical habitat designations must be based on the best available science,[71] the statute requires that such designations also "tak[e] into consideration the economic impact, the impact on national security, and any other relevant impact, of specifying any particular area as critical habitat."[72] These additional factors could result in a broader range of critical habitat designation scenarios being considered, and the heightened level

64. Endangered and Threatened Wildlife and Plants; Preparation of Environmental Assessments for Listing Actions under the Endangered Species Act, 48 Fed. Reg. 49,244, 49,244 (Oct. 25, 1983).
65. Pac. Legal Found. v. Andrus, 657 F.2d 829, 835 (6th Cir. 1981).
66. *Id*. at 840.
67. *Id*. at 832–33, 841.
68. 48 Fed. Reg. at 49,244.
69. *Id*.
70. *Id*.
71. 16 U.S.C. § 1533(b)(1)(A) (2012).
72. 16 U.S.C. § 1533(b)(2).

of discretion involved in selecting between alternatives was seen by some as necessitating a NEPA analysis.[73]

Questions regarding NEPA's applicability to critical habitat designations came to a head when the Service listed the Northern Spotted Owl as a threatened species. In 1995, the Ninth Circuit held that these critical habitat designations do not require NEPA review.[74] As the court explained:

> NEPA does not apply to the Secretary's decision to designate a habitat for an endangered or threatened species under the ESA because (1) Congress intended that the ESA critical habitat procedures displace the NEPA requirements, (2) NEPA does not apply to actions that do not change the physical environment, and (3) to apply NEPA to the ESA would further the purposes of neither statute.[75]

The Fish and Wildlife Service followed the approach adopted by the Ninth Circuit.[76] But in 1996, the Tenth Circuit created a split with the Ninth Circuit when it held that critical habitat designations *do* require NEPA analysis.[77] The Tenth Circuit concluded that the procedural requirements of the ESA did not displace NEPA's procedural requirements, that the critical habitat designation could result in potentially significant environmental impacts, that an EA would help the Service determine those effects, and that NEPA therefore compliments rather than displaces the ESA.[78] According to the Tenth Circuit, "[t]he preparation of an EA will enable all involved to determine what the effect will be."[79] Compliance with NEPA, the court concluded, would therefore further the ESA's goals, including informing the public of pending federal decisions.[80]

In the wake of this circuit split, from 1999 through 2017, the Fish and Wildlife Service and NOAA Fisheries promulgated critical habitat rules for 643 ESA listed species.[81] The only major procedural difference in rulemaking was that rules for species with habitat in states in the Tenth Circuit's jurisdiction were subject to NEPA analysis while rules for species residing outside of the Tenth Circuit were not. We can therefore compare critical habitat rules that were prepared with and without NEPA to determine how NEPA affects the rulemaking process. This, in turn, allows us to quantify the burden imposed by NEPA

73. This was the position adopted by Douglas County in *Douglas County v. Babbitt*, 48 F.3d 1495 (9th Cir. 1995).

74. *Id*. at 1507–08.

75. *Id*.

76. *See* Otay Mesa Prop., L.P. v. U.S. Dep't of the Interior, 144 F. Supp. 3d 35, 43 (D.D.C. 2015) (explaining that the Service has taken the position that "outside the jurisdiction of the U.S. Court of Appeals for the Tenth Circuit, we do not need to prepare environmental analyses as defined by NEPA in connection with designating critical habitat under the Act").

77. Catron Cty. v. U.S. Fish & Wildlife Serv., 75 F.3d 1429, 1439 (10th Cir. 1996).

78. *Id*. at 1436.

79. *Id*.

80. *Id*.

81. *See* ECOS, *supra* note 38. ECOS includes information on rules promulgated by NOAA Fisheries as well as the Fish & Wildlife Service. *Id.*

compliance, and that information can inform revisions to NEPA's implementing regulations.

II. ANALYSIS OF CRITICAL HABITAT RULES SHOWS THAT NEPA DID NOT CAUSE UNDUE DELAY

Our analysis focuses on two areas: The number of days between publication of the proposed and final rules in the Federal Register, and the change in the size of the critical habitat area between the draft and final rules. We found that critical habitat rule designations that underwent NEPA review were completed an average of three months faster than rules that did not. We also found that the average size of the critical habitat area was reduced between the proposed and final rules for both rules that underwent NEPA review and rules that did not. The manner in which rules evolved differed, indicating that changes attributable to the NEPA process differ from the changes attributable to the ESA or APA rulemaking. We also evaluated five additional factors that may explain differences in the critical habitat designation process. We begin with a discussion of the data upon which our analysis is based before addressing the time required to complete critical habitat designations and the change between the proposed and final rules.

A. The Critical Habitat Dataset

Our analysis of the burden associated with NEPA compliance is based on 643 critical habitat rules promulgated by the U.S. Fish and Wildlife Service and NOAA Fisheries from 1999 through 2017. This eighteen-year period corresponds to the circuit split regarding applicability of NEPA to ESA critical habitat designations and therefore allows us to compare decisions promulgated with and without NEPA.

We created a database containing information on each of these rules. We began by utilizing the Fish and Wildlife Service's Environmental Conservation Online System (ECOS) database[82] to identify the name of each species, where the species was listed, the species group for each species, the office that led critical habitat designation efforts, whether the species was listed as threatened or endangered under the ESA, the date on which the final critical habitat rule was published in the Federal Register, and the amount of habitat contained in the final rule.

We also reviewed the text of each rule to identify the date upon which each proposed rule was published in the Federal Register, adding this information to our database. We also reviewed each final rule published in the Federal Register and compared the amount of habitat designated in the rule to the amount of habitat shown in ECOS. Where the two differed, we relied on size figures

82. *Id.*

published in the Federal Register.[83] Where the critical habitat area was described in acres, we converted acres into square miles in order to have a common unit of measurement. We distinguished between square miles of terrestrial habitat and miles of linear habitat (usually stream or river miles).

The Federal Register notice for many final critical habitat rules discussed changes between the proposed and final rules, including the amount of habitat covered in the proposed rule. Where this information was available in the final rule, we added it to our database. Where the final rule did not quantify the amount of habitat contained in the proposed rule, we reviewed the proposed rule as published in the Federal Register and added that information to our database. From the Federal Register notices, we also determined whether each rule underwent NEPA review.

Data entry was completed, and several quality control measures were utilized to ensure that there were no data entry errors.[84] We excluded rules that did not quantify the size of either the proposed or final habitat area or where we were unable to locate both the proposed and final rule. Where rulemaking for multiple species occurred in the same rule, because of overlapping habitat types or because more than one species occupied the same habitat, we treated each species as a separate rule. The Service, for example, issued one Federal Register notice documenting critical habitat designations for 135 species endemic to the Hawaiian Islands, most of which were flowering plants. We treated critical habitat designations for each species as a separate rule for our analysis.[85]

We then calculated the amount of time required to complete rulemaking as measured by the number of days between Federal Register publication of each proposed and final rule. We also calculated the change in size of the critical habitat area between proposed and final rule by subtracting the final critical habitat area from the proposed area. Our final sample included completion times for 607 critical habitat designations and habitat area for 526 critical habitat rules.

B. Time Required to Complete the NEPA Analysis

We compared the time required to complete the rulemaking process based on six factors: whether the critical habitat rule underwent NEPA analysis,

83. While discrepancies were rare, we relied on Federal Register data as the official statement of the rule.

84. Data entry was conducted by second- and third-year law students. Data entry was done in blocks of rules promulgated during a single year, with quality control occurring for each year before proceeding to the next block of rules. Data entry was reviewed by a third-year law student, and a random sample of all entries was then reviewed by law school faculty. A second random sampling of data entry occurred following completion of all data entry. Data entry was done utilizing Microsoft Excel and all analysis was completed utilizing SPSS.

85. *See, e.g.*, Endangered and Threatened Wildlife and Plants; Designation and Nondesignation of Critical Habitat on Molokai, Lanai, Maui, and Kahoolawe for 135 Species, 81 Fed. Reg. 17,790, 17,790 (Mar. 30, 2016).

whether the rule involved a threatened or an endangered species, the class of the species addressed by the rule, whether the species was located exclusively in Hawai'i, whether the rulemaking effort involved multiple species, and the agency and region that had lead responsibility for the rulemaking effort.

Of the 607 critical habitat rules for which we had completion time data, 36 were subject to NEPA review. The vast majority, 571, involved species that were located entirely within states that are not subject to the Tenth Circuit's requirement that critical habitat designations undergo NEPA. In all but one instance where NEPA review occurred, the Fish and Wildlife Service utilized an EA rather than an EIS.[86] Our analysis therefore also reflects a comparable level of analysis across critical habitat designations that underwent NEPA review. None of the critical habitat rules promulgated by NOAA Fisheries underwent NEPA analysis.

1. NEPA Versus No NEPA

The time required for rulemaking varied dramatically across the full data set, taking from 125 to 2,134 days. Mean completion time for all rules (n = 607) was 683 days (median = 413). Mean completion time for rules that were subject to NEPA review (n = 36) was 596 days (median = 383), while rules that were promulgated without NEPA (n = 571) took an average of 93 days longer, or 689 days (median = 413).[87] Median times may be a better indicator of central tendency because they are influenced less by outlying cases. But under both measures of central tendency, critical habitat rules that were subject to NEPA were completed faster than those that were not.

Table 1.
Number of Days Required to Complete Critical Habitat Rules by NEPA Status

	Mean	Median	Maximum	Minimum	Standard Deviation	Count
With NEPA	596	383	1,757	158	422.7	36
Without NEPA	689	413	2,134	125	447.1	571
All Rules	683	413	2,134	125	445.9	607

86. The Rio Grande Silvery Minnow was the only species whose critical habitat area designation was evaluated in an EIS. *See generally* Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Rio Grande Silvery Minnow, 64 Fed. Reg. 36,724 (July 6, 1999) (designating critical habitat for the Rio Grande Silvery Minnow, while noting that FWS determined that an EIS need not be prepared in designating critical habitat, but that the Tenth Circuit ordered an EA).

87. *See infra* Table 1.

Utilizing a general linear model, we ran an analysis of variance (ANOVA) to determine whether differences in mean completion time between rules completed with and without NEPA were statistically significant. We found no statistically significant difference between the completion times for critical habitat rules promulgated with and without NEPA ($p = 0.226$).

Because of the difference between mean and median values, we plotted a histogram of the time required to complete rulemaking for each species. The histogram indicated that our distribution was highly skewed, and that a small group of rulemaking efforts that took exceptionally long may mask an otherwise statistically significant relationship. For example, critical habitat designation for three flowering plants that are endemic to Hawai'i took 2,134 days to complete.[88] This is more than a year longer than the next-longest rulemaking period for a species and four years longer than the mean. To account for distributional outliers, we split rulemaking time into six equal bins using SPSS. We retested and found that the relationship between the completion times for the six bins of critical habitat rules promulgated with and without NEPA was still not statistically significant ($p = 0.178$).

2. Threatened Versus Endangered Species

We next compared completion times for critical habitat designations involving species that were listed as "threatened" ($n = 103$) versus those listed as "endangered" ($n = 504$). Critical habitat rules took longer to complete for "endangered" than for "threatened" species, averaging 718 days (median = 413) compared to 512 days (median = 383), respectively. Completion time data by ESA listing status is summarized in Table 2.

Table 2.
Number of Days Required to Complete Critical Habitat Rules by ESA Listing Status

	Mean	Median	Maximum	Minimum	Standard Deviation	Count
Endang-ered	718	413	2,134	162	459.7	504
Threat-ened	512	383	1,700	125	321.7	103
All Rules	683	413	2,134	125	445.9	607

88. These species are the Ko'oko'olau (*Bidens micrantha ssp. Ctenophylla*), Kula wahine noho (*Isodendrion pyrifolium*), and the Uhi uhi (*Mezoneuron kavaiense*), all three of which are flowering plants endemic to the Hawaiian Islands and for which critical habitat was designated in a consolidated rulemaking process. *See* 81 Fed. Reg. at 17,791–92.

The difference in completion times for threatened versus endangered species was statistically significant (p <0.001). We retested utilizing binned rule completion time data and we found that the relationship was not statistically significant (p = 0.978). This anomalous result is explained by the skewed distribution of completion time data, which is evident in the difference between mean and median values and the small relative change between median values (7.3 percent) compared to the change between mean values (28.7 percent).

3. Difference Between Species Classes[89]

We then compared the time required to promulgate critical habitat designation rules based on the class of species involved, as identified in the ECOS database, and found a high level of variability.[90] Completion time data by species class are summarized in Table 3. Critical habitat designations for ferns and allies[91] (n = 14) took the longest, averaging 988 days (median = 1,388), while critical habitat rules for corals (n = 2) proceeded most swiftly, requiring just 294 days. But with critical habitat designations for only two species of coral, these times may be outliers. The difference in completion times between species groups was statistically significant (p < 0.001) both for binned and un-binned completion time data.

Table 3.
Number of Days Required to Complete Critical Habitat Rules by Species Class

	Mean	Median	Maxi-mum	Minimum	Standard Deviation	Count
Amphibians	565	409	1,219	181	339.5	20
Arachnids	349	357	378	273	31.6	8
Birds	640	455	1,700	187	452.9	21
Clams	472	463	926	356	123.7	39
Corals	294	294	294	294	0	2
Crustaceans	746	552	1,695	327	458.1	11
Ferns and Allies	988	1,388	1,388	413	480.8	14
Fishes	523	370	1,757	258	378.1	43
Flowering Plants	778	471	2,134	125	476.9	371
Insects	430	372	1,367	215	198.3	35
Mammals	429	398	1,000	162	179.2	23
Reptiles	341	341	472	209	186.0	2

89. For a definition of species groups, see U.S. Fish & Wildlife Service, *Endangered Species* (last updated Feb. 21, 2019), www.fws.gov/endangered/species/us-species.html.

90. *See* ECOS, *supra* note 38.

91. Allies are fern-like plants that have a slightly different leaf structure.

Snails	521	350	1,388	204	405.2	18
All Species	683	413	2,134	125	445.9	607

To better understand these differences, we ran post-hoc tests using Tukey's test for least significant difference[92] and we found that statistically significant differences between classes of species ($p < 0.05$) were most common for ferns and allies than any other species class. The longer period of time required to complete critical habitat rules for ferns and allies was statistically significant compared to all species except crustaceans. Promulgating critical habitat rules for flowering plants also tended to take longer than for other species groups, with statistically significant differences when compared to amphibians, arachnids, clams, fishes, insects, mammals, and snails.

We believe the longer period of time required to complete critical habitat rules for flowering plants as well as ferns and allies[93] may be attributed to the Fish and Wildlife Service's practice of combining habitat designations for multiple species in a single rule.[94] The Service engaged in this practice more frequently with plants than with animals. While this practice appears to increase the overall time required to complete the rulemaking process, it may result in economies of scale that improve overall efficiency compared to the time that would be required if each species was evaluated separately. Addressing multiple species in a single rule could, for example, streamline the Federal Register notice process, reduce the number of public meetings, and minimize the number of overlapping comments and comment responses.

4. Hawaiian Versus Non-Hawaiian Species

Roughly half of all listed species in our database are found exclusively in Hawai'i. We suspected Hawai'i's small land mass and the endemic nature of most protected species there could result in statistically significant differences in the time required to complete rulemaking. We therefore compared the time required to designate critical habitat for Hawaiian species and those in other U.S. states. Critical habitat rulemaking completion times for Hawaiian and non-Hawaiian species are shown in Table 4.

92. Tukey's test is used in conjunction with an analysis of variance to identify any difference between two means that is greater than the expected standard error.

93. All ferns and allies for which critical habitat has been designated are endemic to Hawai'i, and critical habitat for these species were all designated in rulemaking efforts conducted concurrently with other species.

94. *See, e.g.*, 81 Fed. Reg. at 17,790 (of the species included in this notice, 121 were flowering plants).

Table 4.
Number of Days Required to Complete Critical Habitat Rules for Hawaiian and Non-Hawaiian Species

	Mean	Median	Maximum	Minimum	Standard Deviation	Count
Hawaiian	875	539	2,134	372	489.7	305
Non-Hawaiian	490	371	1,757	125	289.3	302
All Rules	683	413	2,134	125	445.9	607

We found that critical habitat designation rulemaking for species endemic to Hawai'i ($n = 305$) took longer than rulemaking for species outside Hawai'i ($n = 302$). Critical habitat designation for Hawaiian species took, on average, 875 days (median = 539), while rulemaking for non-Hawaiian species took an average of 490 days (median = 371). The difference in critical habitat rule completion times between Hawaiian and non-Hawaiian species was statistically significant ($p < 0.001$) based on both binned and un-binned completion time data.

With roughly half of all species in our analysis endemic to Hawai'i, and with the mean amount of time required to promulgate listing rules for these species taking more than a year longer than rulemaking for non-Hawaiian species, inclusion of Hawaiian species in rule promulgation times may overstate the time required for ESA compliance in most of the United States.[95]

5. Rules Designating Habitat for Multiple Species

We also noted that critical habitat for many Hawaiian species were designated in rules that often included a dozen or more separate species.[96] We found that rulemaking efforts that involved multiple species predictably took longer to complete than those that involved just one. Multi-species rulemaking ($n = 489$) took an average of 735 days to complete (median = 455), while rulemaking efforts involving a single species ($n = 118$) took an average of 470 days to complete (median = 371).[97] This difference was statistically significant ($p < 0.001$) based on both binned and un-binned completion time data.

95. Regional differences in staffing level may partially explain these differences, as could the practice of combining multiple species in a single rule, which is more common in Hawai'i and discussed below.

96. *See, e.g.*, 81 Fed. Reg. at 17,790 (while these combined rules designated critical habitat for multiple species at one time, critical habitat areas for each species often varied by species).

97. *See infra* Table 5.

Table 5.
Number of Days Required to Complete Critical Habitat Rules When Multiple Species are Included in the Same Rule

	Mean	Median	Maximum	Minimum	Standard Deviation	Count
Single Species Rule	470	371	1,700	125	288.3	118
Multi Species Rule	735	455	2,134	181	461.9	489
All Rules	683	413	2,134	125	445.9	607

While critical habitat rules that address multiple species take longer to complete than single-species rules, we suspect that combined rulemaking may result in overall efficiency improvements that can be attributed to economies of scale. Notably, the practice of designating critical habitat for multiple species in a single rule is more common in Hawai'i than other states. Because of the high number of protected plant species in Hawai'i, which are covered by U.S. Fish and Wildlife Service Region 1, practices for designating plants in groups might skew our results for regions and species class.

6. Difference Between Service Region

Finally, we compared the average time required to promulgate critical habitat rules by the office that led rule rulemaking efforts.[98] This analysis reflects the eight Fish and Wildlife Service regions and rules promulgated by NOAA Fisheries.

We found that Region 5 ($n = 5$), which included Northeastern states ranging from Maine to West Virginia was the fastest, taking an average of 391 days (median = 392) to promulgate a critical habitat rule.[99] Conversely, Region 1 ($n = 338$), which included parts of the Pacific Northwest and Hawai'i, spent more time than its peers on rule promulgation, averaging 834 days (median = 539). We also found that the regional difference between mean critical habitat rule

98. *See infra* Table 6.

99. Region 1 includes Idaho, Oregon (other than the Klamath River Basin), Washington, Hawai'i, and the Pacific Islands; Region 2 includes Arizona, New Mexico, Oklahoma, and Texas; Region 3 includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin; Region 4 includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Puerto Rico/Virgin Islands, South Carolina, and Tennessee; Region 5 includes Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia; Region 6 includes Colorado, Kansas, Montana, North Dakota, Nebraska, South Dakota, Utah, and Wyoming; Region 7 includes Alaska; Region 8 includes California and Nevada. U.S. Fish & Wildlife Service, *Regional Contacts* (last visited Oct. 30, 2019), https://www.fws.gov/ecological-services/about/contacts.html. NOAA Fisheries is responsible for oceangoing species.

completion times was statistically significant at less than the 0.001 level based on both binned and un-binned completion time data.

Table 6.
Number of Days Required to Complete Critical Habitat Rules by Service Region

	Mean	Median	Maximum	Minimum	Standard Deviation	Count
Region 1	834	539	2,134	187	485.4	338
Region 2	488	363	1,502	194	321.7	51
Region 3	637	539	1,367	305	399.8	6
Region 4	424	372	926	181	127.6	79
Region 5	391	392	455	287	70.3	5
Region 6	589	383	1,757	158	515.7	14
Region 7	348	345	404	296	46.8	4
Region 8	566	399	1,700	202	335.7	92
NOAA Fisheries	398	266	1,136	125	292.9	18
All Offices	683	413	2,134	125	445.91	607

Most of the critical habitat rules within Region 1 involved species endemic to Hawai'i. As noted earlier, rulemaking for non-Hawaiian species generally proceeds more rapidly than rulemaking for Hawaiian species.[100] This difference appears attributable to the Fish and Wildlife Service's practice of combining rulemaking for multiple Hawaiian species. Not surprisingly, the difference in mean rulemaking completion times for Region 1 was statistically significant when measured against the mean rulemaking time for all other regions except Region 3 (where only six rules were promulgated). Statistically significant differences between other regions were much less common.

In sum, we found that NEPA analysis did not delay critical habitat rule promulgation. To the contrary, critical habitat rules that underwent NEPA analysis were completed on average three months *faster* than rules that did not. While NEPA's expediting effect was not statistically significant, the fact that rules that underwent NEPA review were completed faster than those that did not calls into question the widely held assumption that NEPA delays decision making.

Rulemaking times also vary by species class, though this portion of our analysis is limited by a small sample size for many species and the differences were not statistically significant. Critical habitat designations take significantly longer when multiple species are evaluated together, though this practice may result in an overall improvement in efficiency that we could not quantify from

100. *See supra* Part II.B.5.

our dataset. This practice, which was common for Hawaiian species, may explain why rulemaking for species endemic to Hawai'i also takes longer than rulemaking for non-Hawaiian species.

C. Size of the Critical Habitat Area and Change Between Proposed and Final Rules

This subpart seeks to determine whether differences in the size of critical habitat area[101] in the final and proposed rules depended on whether the rule underwent NEPA review. As we did in Part II, we analyzed five additional factors that had the potential to explain these iterative changes: whether the rule involved a threatened or an endangered species, the class of the species addressed by the rule, whether the species was located exclusively in Hawai'i, whether the rulemaking effort involved multiple species, and the agency and region that had lead responsibility for the rulemaking effort.

As with data on the amount of time required to complete critical habitat rules, we found that the change was skewed by outlying values. Critical habitat for the Spectacled Eider (*Somateria fischeri*) for example,[102] changed by over 35,500 square miles between the proposed and final rules—a reduction roughly equivalent to the state of Maine. This change was more than forty-six times the size of the average final critical habitat area: 762 square miles. Similarly, riverine habitat for the Atlantic salmon (*Salmo salar*) changed by 114,464 miles between the draft and final rules, a change that was 115 times the size of the average linear critical habitat designation of 993 miles. To control for these types of outlying values, we again sorted the change in critical habitat area between draft and final rules into six equal sized bins using SPSS and tested both binned and un-binned data for statistical significance.

Throughout this section we encountered what at first appeared to be inexplicable differences between area and linear habitat. We suspect that these differences, and their impact on our statistical analysis, are attributable to the nature of linear habitat, which is by definition long and narrow. A comparatively large reduction to the length of a river segment would result in less change to the total size of that habitat area than a comparatively minor change in the width of the river corridor. Changes to linear habitat may therefore have less impact to the size of the designated area than an equal change along one axis of a square habitat area.

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101. For most species, and all terrestrial plants and animals, critical habitat area was measured in terms of square miles (or acres which were converted into square miles). Critical habitat for most fishes and some other aquatic species that inhabit streams and rivers was quantified in terms of linear miles. We did not attempt to convert linear habitat into square miles because we lacked information about the width of linear habitat features.

102. Spectacled eiders are large sea ducks historically found along most of the Alaskan coastline.

In reviewing the text of the rules, we also noted improved mapping and information were commonly cited reasons for revising critical habitat designations. In revising critical habitat for the Canada lynx (*Lynx canadensis*), for example, the Service modified the proposed rule by adding about 39,000 acres of federal land and 25,000 acres of private lands to its critical habitat designations because of improved mapping.[103] The Service simultaneously removed about over 46,000 acres of federal land, 49,000 acres of private land, and 18,000 acres of state trust near Flathead National Forest in Montana for the same reason.[104] Improved mapping and information also allowed the Service to remove almost 347,000 acres of federal lands, 4,000 acres of state lands, and 45,000 acres of private lands around the Gallatin and Custer National Forests in Montana and BLM lands in Wyoming.[105] An additional 279,000 acres were exempted because the Service deemed that the lands were adequately protected by Habitat Conservation or Habitat Management plans.[106] While improved information clearly plays an important role in rule revisions, we were unable to quantify and isolate this factor in our analysis.

1. NEPA Versus No NEPA

We began by looking at the mean size of critical habitat area contained in both the proposed and final rules and found that both proposed and final habitat areas subject to NEPA review were larger than those that did not undergo NEPA analysis, when measured in terms of mean area. The inverse relationship occurs when critical habitat is measured in terms of linear distance—both proposed and final habitat designations that did not undergo NEPA review were larger than those that did.

Critical habitat designation rules that underwent NEPA analysis and which were measured in square miles ($n = 24$) were reduced between the proposed and final rule by 15.9 percent. Rules which were measured in square miles and that did not undergo NEPA analysis ($n = 411$) were reduced by 23.4 percent between the proposed and final rules. The same relationship occurred when the critical habitat area is measured in terms of miles; those that underwent NEPA analysis experienced less change than those that were not subject to NEPA. These results are shown in Table 7.

As with our analysis of the time required to complete critical habitat rule promulgation, we utilized a general linear model to analyze the variance between

103. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Contiguous United States Distinct Population Segment of the Canada Lynx and Revised Distinct Population Segment Boundary; Final Rule, 79 Fed. Reg. 54,803, 54,824 (Sept. 12, 2014).

104. *Id*.

105. *Id*. at 54,804.

106. *Id*. at 54,803–04. An additional 603,000 acres were excluded because they were included in the Natural Resource Conservation Service's Healthy Forest Reserve Program. *Id*. at 54,803.

means. We found no statistically significant difference between the change in the number of square miles between rules that underwent NEPA and those that did not (p = 0.600). Because of our skewed distributions, we sorted the change into six bins and analyzed the change between each of those bins for statistical significance. The relationship remained statistically insignificant (p = 0.222).

Table 7.
Extent of Critical Habitat by NEPA Status

		Proposed Mi²	**Final Mi²**	**Change Mi²**	**Proposed Miles**	**Final Miles**	**Change Miles**
NEPA	mean	2,795.0 (*n* = 24) (*sd* = 9,503)	2,181.9 (*n* = 26) (*sd* = 7,951)	-445.3 (-15.9%) (*n* = 24) (*sd* = 1,624)	731 (*n* = 14) (*sd* = 785)	459 (*n* = 14) (*sd* = 450)	-272 (-37.2%) (*n* = 14) (*sd* = 320)
	median	16.4 (*n* = 24)	15.6 (*n* = 26)	-0.3 (-2.0%) (*n* = 24)	315 (*n* = 14)	290 (*n* = 14)	79 (-25.1%) (*n* = 14)
No NEPA	mean	877.6 (*n* = 411) (*sd* = 10,668)	672.1 (*n* = 411) (*sd* = 9,458)	-205.5 (-23.4%) (*n* = 411) (*sd* = 2,199)	2,654 (*n* = 77) (*sd* = 14,561)	1,091 (*n* = 76) (*sd* = 2,628)	-1,563 (-58.9%) (*n* = 77) (*sd* = 5,255)
	median	16.1 (*n* = 411)	12.2 (*n* = 411)	-0.8 (-4.7%) (*n* = 411)	484 (*n* = 77)	472 (*n* = 76)	0 no change (*n* = 77)
All Rules	mean	983.4 (*n* = 435) (*sd* = 10,597)	762.0 (*n* = 437) (*sd* = 9,374)	-218.7 (-22.2%) (*n* = 435) (*sd* = 2,171)	2,358 (*n* = 91) (*sd* = 13,402)	993 (*n* = 90) (*sd* = 2,431)	-1,365 (-57.9%) (*n* = 91) (*sd* = 11,997)
	median	16.1 (*n* = 435)	12.2 (*n* = 437)	-0.7 (-4.4%) (*n* = 435)	472 (*n* = 91)	472 (*n* = 91)	0 no change (*n* = 91)

Running the same analysis for the change in critical habitat area between proposed and final rules for linear habitat areas, we found no statistically significant difference between the change in the length of critical habitat between rules that underwent NEPA and those that did not (p = 0.713). To control for the skewed distribution of data, we ran the same analysis based on binned change in length between the proposed and final rules and found that the difference between rules completed with and without NEPA was statistically significant (p <0.001). In sum, for three out of four model runs we found that rules that underwent NEPA review changed in ways that differ from rules that were exempt from NEPA, but those differences were not statistically significant.

2. Threatened Versus Endangered Species

We next compared the size of the critical habitat in rules for threatened versus endangered species.[107] We found that for habitat that was measured in square miles, both the mean proposed and final habitat areas for threatened species were significantly larger than mean proposed and final critical habitat area for endangered species ($p < 0.001$ for both). This relationship held true for final rules measured in terms of miles of linear habitat ($p = 0.033$) but did not persist for linear habitat in proposed critical habitat rules ($p = 0.860$).

Table 8.
Mean Extent of Critical Habitat by ESA Listing Status

	Proposed Mi²	**Final Mi²**	**Change Mi²**	**Proposed Miles**	**Final Miles**	**Change Miles**
Endangered	49.8 (*n* = 360) (*sd* = 132.9)	38.0 (*n* = 362) (*sd* = 122.6)	-12.6 (-25.2%) (*n* = 360) (*sd* = 34.7)	2,533 (*n* = 61) (*sd* = 1,616)	615 (*n* = 61) (*sd* = 1,571)	-1,919 (-75.8%) (*n* = 61) (*sd* = 14,652)
Threatened	5,464.6 (*n* = 75) (*sd* = 25,178)	4,256.3 (*n* = 75) (*sd* = 22,421)	-1,208.3 (-22.1%) (*n* = 75) (*sd* = 5,142)	2,022 (*n* = 30) (*sd* = 4,096)	1,763 (*n* = 30) (*sd* = 3,511)	-239 (-11.8%) (*n* = 30) (*sd* = 735)
All Rules	983.4 (*n* = 435) (*sd* = 10,597)	762.0 (*n* = 437) (*sd* = 9,374)	-218.7 (-22.2%) (*n* = 435) (*sd* = 2,171)	2,358 (*n* = 91) (*sd* = 13,402)	993 (*n* = 90) (*sd* = 2,431)	-1,365 (-57.9%) (*n* = 91) (*sd* = 11,997)

We then compared the change in the mean size of the critical habitat area for endangered and threatened species. As noted in the prior section, NEPA review status did not drive statistically significant differences in change between the proposed and final rules.[108] We therefore tested to see whether differences in listing status were statistically significant indicators of change between the proposed and final rules. We found that the mean difference between the number of square miles of proposed and final critical habitat area was statistically significant ($p < 0.001$) for endangered compared to threatened species. The difference between the mean distance of linear habitat between endangered and threatened species was not statistically significant ($p = 0.533$). Re-running the analysis based on binned data for the change in habitat areas, we found that difference between endangered and threatened species was not statistically

107. *See infra* Table 8.
108. *See supra* Part II.C.2.

significant for either habitat measured in square or linear miles ($p = 0.931$ and $p = 0.867$, respectively).

3. Difference Between Species Class

We also tested whether there was a statistically significant difference between the class of species in terms of the change in the amount of proposed and designated critical habitat. Aside from clams, which were the species group with the highest number of linear habitat designations ($n = 39$) and which experienced a 5.6 percent *increase* in critical habitat between the proposed and final rules, all other species saw a reduction in critical habitat between proposed and final rules. But with thirteen separate categories of species, several categories of species had insufficient sample sizes to draw meaningful conclusions.[109]

Species with habitat that was measured in linear miles ($n = 91$) saw a larger mean reduction, 57.9 percent, compared to species for which habitat was measured in square miles ($n = 435$), which experienced a 22.2 percent reduction in habitat size between proposed and final rules. Differences between the mean change in critical habitat area between the proposed and final rules were statistically significant ($p < 0.001$) when measured in terms of both square miles and binned square miles. The difference between the mean change in the size of linear critical habitat features between the proposed and final rules was not statistically significant ($p = 0.992$) when measured in terms of miles but was significant when the change in miles was placed into bins ($p = 0.010$).[110] This difference appears attributable to the uneven distribution of designation area sizes.

Flowering plants were the subject of more critical habitat rule designations than any other species ($n = 289$) and experienced below average change between proposed and final rules regardless of whether critical habitat was measured in terms of area (square miles) or linear habitat.

Table 9.
Mean Extent of Critical Habitat by Species Class

	Proposed Mi²	**Final Mi²**	**Change Mi²**	**Proposed Miles**	**Final Miles**	**Change Miles**
Amphibians	384.8 ($n = 19$) ($sd = 747.3$)	350.4 ($n = 19$) ($sd = 696.0$)	-34.4 (-8.9%) ($n = 19$) ($sd = 85.8$)	347 ($n = 2$) ($sd = 456$)	220 ($n = 2$) ($sd = 283$)	-127 (-36.6%) ($n = 2$) ($sd = 173$)
Arachnids	1.9 ($n = 7$) ($sd = 2.6$)	0.7 ($n = 7$) ($sd = 1.0$)	-1.2 (-63.4%) ($n = 7$)	-- ($n = 0$)	-- ($n = 0$)	-- -- ($n = 0$)

109. *See supra* Table 7.

110. We were unable to perform post-hoc testing because of the small number of reptiles.

			(*sd* = 2.3)			--
Birds	9,012.2 (*n* = 17) (*sd* = 19,012)	4,429.4 (*n* = 18) (*sd* = 9,757)	-4,341.4 (-48.2%) (*n* = 17) (*sd* = 9,873)	1,140 (*n* = 2) (*sd* = 1344)	714 (*n* = 2) (*sd* = 725)	-426 (-37.4%) (*n* = 2) (*sd* = 619)
Clams	-- (*n* = 0)	-- (*n* = 0)	-- -- (*n* = 0)	573 (*n* = 39) (*sd* = 393)	606 (*n* = 39) (*sd* = 416)	+32 (+5.6%) (*n* = 39) (*sd* = 112)
Corals	-- (*n* = 0)	-- (*n* = 0)	-- -- (*n* = 0)	4,931 (*n* = 2) (*sd* = 0)	2,959 (*n* = 2) (*sd* = 0)	-1,972 (-4.0%) (*n* = 2) (*sd* = 0)
Crustaceans	3.1 (*n* = 7) (*sd* = 3.9)	1.3 (*n* = 7) (*sd* = 1.8)	-1.8 (-59.2%) (*n* = 7) (*sd* = 2.6)	-- (*n* = 0)	-- (*n* = 0)	-- -- (*n* = 0) --
Ferns and Allies	84.4 (*n* = 10) (*sd* = 57.3)	50.1 (*n* = 10) (*sd* = 31.1)	-34.3 (-40.6%) (*n* = 10) (*sd* = 30.2)	-- (*n* = 0)	-- (*n* = 0)	-- -- (*n* = 0)
Fishes	270.2 (*n* = 16) (*sd* = 188.6)	240.5 (*n* = 16) (*sd* = 292.5)	-29.7 (-11.0%) (*n* = 16) (*sd* = 58.4)	4,736 (*n* = 37) (*sd* = 20,924)	1,486 (*n* = 37) (*sd* = 3700)	3,250 (-68.6%) (*n* = 37) (*sd* = 18,799)
Flowering Plants	32.6 (*n* = 289) (*sd* = 36.2)	22.6 (*n* = 290) (*sd* = 23.7)	-10.0 (-30.6%) (*n* = 289) (*sd* = 17.6)	83 (*n* = 2) (*sd* = 43)	52 (*n* = 2) (*sd* = 1)	-31 (-37.3%) (*n* = 2) (*sd* = 44)
Insects	18.2 (*n* = 32) (*sd* = 38.0)	13.5 (*n* = 32) (*sd* = 23.7)	-4.7 (-25.9%) (*n* = 32) (*sd* = 15.6)	-- (*n* = 0)	-- (*n* = 0)	-- -- (*n* = 0) --
Mammals	11,971.6 (*n* = 21) (*sd* = 44,142)	11,171.2 (*n* = 21) (*sd* = 41,207)	-800.4 (-6.7%) (*n* = 21) (*sd* = 2,938)	1,058 (*n* = 3) (*sd* = 1,309)	1,047 (*n* = 3) (*sd* = 1,316)	-12 (-1.1%) (*n* = 3) (*sd* = 11)
Reptiles	635.5 (*n* = 1)	635.5 (*n* = 1)	0 no change (*n* = 1) --	739 (*n* = 1)	685 (*n* = 1)	-54 (-7.3%) (*n* = 1) --
Snails	1.3 (*n* = 16) (*sd* = 2.2)	0.8 (*n* = 16) (*sd* = 1.9)	-0.5 (-36.1%) (*n* = 16) (*sd* = 1.0)	32 (*n* = 3) (*sd* = 27)	31 (*n* = 3) (*sd* = 28)	-1 (-3.1%) (*n* = 3) (*sd* = 2)

All Rules	983.4 (*n* = 435) (*sd*= 10,597.4)	762.0 (*n* = 437) (*sd*= 9,374.2)	-218.7 (-22.2%) (*n* = 435) (*sd*= 2,171)	2,358 (*n* = 91) (*sd* = 13,402)	993 (*n* = 90) (*sd* = 2,431)	-1,365 (-57.9%) (*n* = 91) (*sd* = 11,997)

4. Hawaiian Versus Non-Hawaiian Species

As noted above, Hawai'i is unique because of the high number of endemic species found there, and because the Service often designates critical habitat for multiple Hawaiian species in a combined rulemaking effort. In comparing critical habitat rules for Hawaiian species (*n* = 228) and non-Hawaiian species (*n* = 207), we found that both the mean size of the proposed and final critical habitat area were much larger for non-Hawaiian than Hawaiian species. This is not surprising given the small land mass of the Hawaiian Islands and the endemic nature of most protected species that are found there. While Hawai'i's small land mass contributed to a smaller mean absolute change in the size (square miles) of critical habitat area between the proposed and final rules, the mean percentage change between proposed and final rules for Hawaiian species was nearly twice that of their North American counterparts, -31.7 percent compared to -17.7 percent, respectively.[111]

Table 10.
Mean Extent of Critical Habitat by Hawaiian and Non-Hawaiian Species

	Proposed Mi²	**Final Mi²**	**Change Mi²**	**Proposed Miles**	**Final Miles**	**Change Miles**
Hawaiian	43.8 (*n* = 228) (*sd* = 45.0)	29.9 (*n* = 228) (*sd* = 28.9)	-13.9 (-31.7%) (*n*= 228) (*sd* = 21.2)	-- (*n* = 0) --	-- (*n* = 0) --	-- -- (*n* = 0) --
Non-Hawaiian	2,018.4 (*n* = 207) (*sd* = 15,315)	1,560.6 (*n* = 209) (*sd* = 813,526)	-444.4 (-17.7%) (*n* = 207) (*sd* = 3,135)	2,538 (*n* = 91) (*sd* = 13,402)	993 (*n* = 91) (*sd* = 2,431)	-1,365 (-53.8%) (*n* = 91) (*sd* = 11,997)
All Rules	983.4 (*n* = 435) (*sd* = 10,597)	762.0 (*n* = 437) (*sd* = 9,374)	-218.7 (-22.2%) (*n* = 435) (*sd* = 2,171)	2,358 (*n* = 91) (*sd* = 13,402)	993 (*n* = 90) (*sd* = 2,431)	-1,365 (-57.9%) (*n* = 91) (*sd* = 11,997)

111. *See infra* Table 10.

The change in the mean size of critical habitat areas between the proposed and final critical habitat rules for Hawaiian and non-Hawaiian species was statistically significant ($p = 0.039$). When we controlled for the skewed distribution of habitat sizes by utilizing binned habitat area change data, we found that the difference was statistically even stronger ($p < 0.001$).

The Fish and Wildlife Service did not propose or designate any linear critical habitat in Hawai'i. Looking solely at linear habitat for non-Hawaiian species, we found that the amount of linear habitat ($n = 91$) changed far more between proposed and final rules than the amount of area habitat, -53.8 percent compared to -17.7 percent, respectively. The different rate of change may be partially attributable to the manner in which habitat is measured: linear versus area. Changes to linear habitat occur along the known long axis of a habitat area (river length) rather than the unknown and variable shorter axis (river width). Reductions to the long axis would reduce the size of the protected area at a lower rate than reductions along the short axis. Reductions in length may therefore overstate the total change in protected area.

5. Rules Designating Habitat for Multiple Species

Our comparison of Hawaiian and non-Hawaiian species highlights an important difference between rulemaking efforts that involved single species as opposed to multiple species. Differences in the change in area of critical habitat (square miles) between proposed and final rules covering single and multiple species were virtually identical on a percentage basis, but mean change in habitat area for single-species rules was much larger on an absolute basis. This change was statistically significant ($p < 0.001$), but when we controlled for the skewed distribution by sorting acreage change into six equally sized bins, the difference was no longer statistically significant ($p = 0.540$). It is possible that combining numerous species into a single rulemaking effort would reduce the public attention paid to each species, which could lead to fewer revisions to species subject to a combined rulemaking effort. But this did not appear to be the case.

Mean change in linear habitat between the proposed and final rules for single-species rules versus multi-species rules was not statistically significant ($p = 0.127$), but when we controlled for the skewed distribution by sorting mileage change into six equally sized bins, the results became statistically significant ($p < 0.001$).[112]

112. *See infra* Table 11.

Table 11.
Mean Extent of Critical Habitat by Rules Involving Single or Multiple Species

	Proposed Mi^2	Final Mi^2	Change Mi^2	Proposed Miles	Final Miles	Change Miles
Single Species	4,368.1 (n = 94) (sd = 1,422,566)	3,329.9 (n = 94) (sd = 19,867)	-970.8 (-22.2%) (n = 94) (sd = 4,611)	5,637 (n = 29) (sd = 23,641)	1,458 (n = 29) (sd = 4,178)	-4,179 (-74.1%) (n = 29) (sd = 21,220)
Multiple Species	50.4 (n = 341) (sd = 139.6)	39.0 (n = 341) (sd = 130.3)	-11.4 (-22.6%) (n = 341) (sd = 22.5)	825 (n = 62) (sd = 980)	776 (n = 62) (sd = 749)	-48 (-5.8%) (n = 62) (sd = 368)
All Rules	983.4 (n = 435) (sd = 10,597)	762.0 (n = 437) (sd = 9,374)	-218.7 (-22.2%) (n = 435) (sd = 2,171)	2,358 (n = 91) (sd = 13,402)	993 (n = 90) (sd = 2,431)	-1,365 (-57.9%) (n = 91) (sd = 11,997)

6. Difference Between Service Region

Finally, we analyzed how NOAA Fisheries and the eight regional offices of the Fish and Wildlife Service compared in terms of the amount of habitat contained in proposed and final critical habitat rules. Some regions were involved in more rulemaking efforts than others. Region 1, the Pacific Region,[113] was the most active. It was involved in promulgation of 260 rules that were measured in terms of area. Final rules within Region 1 averaged 152.6 square miles. Conversely, Region 7, the Alaska Region, promulgated just 4 critical habitat rules, and those final rules averaged over 375,596 square miles, or 531 times the size of the average rule in Region 1. Much of this difference is attributable to Alaska's size and unique character, and the expansive range of species like the polar bear (*Ursus maritimus*) whose sea ice habitat is threatened by climate change.[114]

Critical habitat designations that were measured in terms of square miles were reduced by an average of 22.2 percent between the proposed and final rules. Differences in the change in critical habitat area between regions were statistically significant ($p < 0.001$) when measured in terms of both mean acreage

113. *See* Regional Contacts, *supra* note 99.

114. *See* Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Polar Bear (*Ursus maritimus*) in the United States, 75 Fed. Reg. 76,086, 76,093 (Dec. 7, 2010) (discussing how a changing climate and loss of sea ice negatively impact the polar bear).

and binned acreage. Rules promulgated by Region 2, the Southwest Region,[115] changed the most, with an average reduction of 34.1 percent between the proposed and final rules. Conversely, rules promulgated by Region 5, the Northeast Region,[116] changed the least, just -4.8 percent between the proposed and final rule. But with a total sample of just two rules, Region 5 may be an anomaly.

Linear habitat was reduced by an average of -57.9 percent between the proposed and final critical habitat rule, more than twice as much as area habitat. Differences in the change in linear critical habitat between regions were statistically significant (p = 0.001) when measured in terms of both mean and binned mileage. Rules promulgated within Region 5, the Northeast Region, changed the most, an average of -58.5 percent, but with only five rules that were quantified in terms of linear habitat features, this rate of change may be heavily influenced by a small sample size. Conversely, Region 4, the Southeast Region,[117] which promulgated the most linear critical habitat rules, experienced a reduction of just 3.5 percent between the proposed and final rules. As already noted, changes to linear habitat occur along the known long axis of a habitat area (river length) rather than the unknown and variable shorter axis (river width). Reductions to the long axis would reduce the size of the protected area at a lower rate than reductions along the short axis. Reductions in length may therefore overstate the total change in protected area.

NOAA Fisheries, which promulgated twenty critical habitat rules, was less likely than its sister agency to significantly reduce the size of the critical habitat areas between the proposed and final rules, regardless of whether the habitat was linear, like a river, or measured in terms of square miles, like terrestrial lands. This difference was statistically significant when compared to Region 4 (p = 0.041) and Region 7 (p = 0.002) for binned linear habitat. This difference was also statistically significant when compared to Region 2 (p = 0.035) and Region 6 (p = 0.045) based on binned linear habitat, but it was not statistically significant in comparison to other regions.

Table 12.
Mean Extent of Critical Habitat by ESA Service Region

	Proposed Mi²	**Final Mi²**	**Change Mi²**	**Proposed Miles**	**Final Miles**	**Change Miles**
FWS Region 1	152.6 (n = 260) (sd = 1,396)	110.6 (n = 260) (sd = 992.6)	-42.1 (-27.6%) (n = 260) (sd = 425.6)	5,684 (n = 4) (sd = 11,330)	4,945 (n = 4) (sd = 9,856)	-740 (-13.0%) (n = 4) (sd = 1,474)

115. *See* Regional Contacts, *supra* note 99.
116. *Id.*
117. *Id.*

FWS Region 2	585.0 (*n* = 39) (*sd* = 3,377)	372.3 (*n* = 41) (*sd* = 2,100)	-202.2 (-34.1%) (*n* = 39) (*sd* = 1,225)	572 (*n* = 12) (*sd* = 599)	403 (*n* = 12) (*sd* = 365)	-169 (-29.5%) (*n* = 12) (*sd* = 293)
FWS Region 3	32.8 (*n* = 5) (*sd* = 18.5)	22.6 (*n* = 5) (*sd* = 21.0)	-10.2 (-31.0%) (*n* = 5) (*sd* = 15.4)	104 (*n* = 2) (*sd* = 120)	101 (*n* = 2) (*sd* = 142)	-4 (-3.8%) (*n* = 2) (*sd* = 22)
FWS Region 4	13.5 (*n* = 29) (*sd* = 45.0)	10.4 (*n* = 29) (*sd* = 24.7)	-3.1 (-23.1%) (*n* = 29) (*sd* = 21.0)	517 (*n* = 50) (*sd* = 428)	536 (*n* = 50) (*sd* = 456)	-18 (-3.5%) (*n* = 50) (*sd* = 113)
FWS Region 5	276.1 (*n* = 2) (*sd* = 83.5)	262.9 (*n* = 2) (*sd* = 64.5)	-13.2 (-4.8%) (*n* = 2) (*sd* = 19.0)	31,829 (*n* = 4) (*sd* = 63,197)	3,213 (*n* = 4) (*sd* = 5,965)	-18,616 (-58.5%) (*n* = 4) (*sd* = 57,232)
FWS Region 6	4,023.2 (*n* = 11) (*sd* = 12,468)	3,758.4 (*n* = 11) (*sd* = 11,692)	-264.8 (-6.6%) (*n* = 11) (*sd* = 777.3)	612 (*n* = 5) (*sd* = 976)	295 (*n* = 5) (*sd* = 336)	-317 (-51.8%) (*n* = 5) (*sd* = 664)
FWS Region 7	76,596.6 (*n* = 4) (*sd* = 87,532)	58,708.7 (*n* = 4) (*sd* = 87,184)	-17,887.9 (-23.4%) (*n* = 4) (*sd* = 14,982)	-- (*n* = 0) --	-- (*n* = 0) --	-- -- (*n* = 0) --
FWS Region 8	140.7 (*n* = 77) (*sd* = 417.0)	123.1 (*n* = 77) (*sd* = 384.2)	-17.6 (-12.5%) (*n* = 77) (*sd* = 66.4)	137 (*n* = 2) (*sd* = 13)	141 (*n* = 2) (*sd* = 7)	-4 (-2.9%) (*n* = 2) (*sd* = 6)
NOAA Fisheries	338.3 (*n* = 8) (*sd* = 396.0)	295.7 (*n* = 8) (*sd* = 329.6)	-42.6 (-12.6%) (*n* = 8) (*sd* = 79.1)	2,355 (*n* = 12) (*sd* = 1,358)	2,017 (*n* = 12) (*sd* = 792)	-339 (-14.4%) (*n* = 12) (*sd* = 767)
All Rules	983.4 (*n* = 435) (*sd* = 10,597)	762.0 (*n* = 437) (*sd* = 9,374)	-218.7 (-22.2%) (*n* = 435) (*sd* = 2,171)	258 (*n* = 91) (*sd* = 13,402)	993 (*n* = 90) (*sd* = 2,431)	-1,365 (-57.9%) (*n* = 91) (*sd* = 11,997)

III. OBSERVATIONS AND RECOMMENDATIONS

After reviewing eighteen years of critical habitat designation rules, we found that requiring NEPA analysis, which almost always was conducted in an EA, does not appear to delay agency rulemaking. To the contrary, decisions that underwent NEPA review were completed an average of three months faster than decisions that did not. We also found that the size of the critical habitat area changes less between the proposed and final rules for rules that undergo NEPA review than for rules that do not. But most of these changes were not statistically significant, and the causal factors for change could not be established clearly.

A. NEPA Analysis Does Not Delay Critical Habitat Rule Development

Based on our analysis, critical habitat rules took an average of 22.5 months (683 days) to complete. Completion times, however, varied dramatically. While we did not review rulemaking files to determine the cause of project-specific variation, others have noted that delays associated with NEPA compliance are often attributable to factors outside the agency control,[118] and many of the factors contributing to NEPA delays could similarly affect critical habitat designation, even if those rules are not subject to NEPA review.

While there are numerous examples of lengthy critical habitat rule promulgation periods, several facts are notable: First, mean completion time is heavily skewed by a small number of lengthy rules. The Fish and Wildlife Service frequently promulgates rules that include multiple species, and these multi-species rules take longer to complete than single-species rules. We suspect, however, that promulgating multi-species rules is more efficient than promulgating a greater number of single-species rules, and that the total length of time required to complete multi-species rules may both skew the average and overlook multi-species rules' efficiencies.

Second, rules that underwent NEPA analysis *in addition* to APA rulemaking requirements were completed, on average, three months *faster* than those that did not undergo NEPA analysis. While these differences were not statistically significant (at the 0.05 level) because of the high level of variability between the time required to complete each rule, our results call into question the conventional wisdom that NEPA unduly delays agency rulemaking. Contrary to these claims, NEPA may actually allow rulemaking to proceed more rapidly.

Third, it is important to remember that the time required to complete a NEPA analysis—or any other rulemaking or decision-making process—is but

118. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 3, at 15 (noting that for nonfederal projects requiring a federal permit, delays in obtaining project funding, changes to the proposal that occur during the NEPA process, and nonfederal approvals may all delay a project). The Congressional Research Service also notes that NEPA may run concurrently with other permitting efforts and delays obtaining other permits may indirectly delay the NEPA process. LINDA LUTHER, CONG. RES. SERV., RL33267, THE NATIONAL ENVIRONMENTAL POLICY ACT: STREAMLINING NEPA 8–9 (2007).

one factor to consider when evaluating efficacy. Just as one should not conduct a benefit-cost analysis that considers costs while ignoring benefits, policymakers should not ignore the benefits associated with NEPA compliance. NEPA's twin goals include ensuring that agencies carefully consider the environmental effects of proposed projects before committing to a course of action, and providing the public with information and an opportunity to engage with federal agencies about these tradeoffs before decisions are final. "Streamlining" NEPA could compromise both of these goals.

There are also substantive benefits that derive from NEPA analysis. As the Government Accountability Office notes, NEPA's qualitative benefits include "discovering and addressing the potential effects of a proposal in the early design stages to avoid problems that could end up taking more time and being more costly in the long run."[119] Early research also indicates that NEPA can reduce environmental impacts without imposing unreasonable social or economic costs.[120] Policymakers should not lose sight of these benefits as they seek to reduce the burden of NEPA compliance.

In sum, NEPA appears to do little to delay agency rulemaking for critical habitat designations while providing potentially important benefits to agencies and the public. While there is room to improve NEPA efficacy, the most beneficial improvements may not involve arbitrary page limits, rigid timelines, or other means of "streamlining" the analysis. Rather, ensuring that agencies have sufficient staff and adequate resources to conduct their reviews in a timely and accurate manner may be more valuable than procedural reforms.[121]

B. Critical Habitat Designations that Undergo NEPA Change Slightly Less than Rules that Forego NEPA Analysis

After reviewing 526 critical habitat decisions for which we had data on the size of the proposed and final critical habitat areas, we found that the size of the designated area was generally reduced between the proposed and final iterations of the rule. Many reductions appear to reflect improvements in mapping and new information obtained between issuance of the proposed and final rules. Overall, we found that critical habitat designations that did not undergo NEPA

119. *See* U.S. GOV'T ACCOUNTABILITY OFFICE, *supra* note 3, at 16.

120. Mark K. Capone & John C. Ruple, *NEPA and the Energy Policy Act of 2005 Statutory Categorical Exclusions What are the Environmental Costs of Expedited Oil and Gas Development?*, 18 VT. J. ENVTL. L. 371, 399 (2017); John C. Ruple & Mark K. Capone, *NEPA, FLPMA, and Impact Reduction An Empirical Assessment of BLM Resource Management Planning in the Mountain West*, 46 ENVTL. L. 954, 964–972 (2016); John C. Ruple & Mark K. Capone, *NEPA—Substantive Effectiveness Under a Procedural Mandate Assessment of Oil and Gas EISs in the Mountain West*, 7 GEO. WASH. J. ENERGY & ENVTL. L. 39, 46–48 (2016).

121. Preliminary results from our forthcoming research also indicate that rushing a NEPA review increases the likelihood of a legal challenge, and that the benefits of expedited NEPA review can be vastly overshadowed by delays associated with litigation. *See* John C. Ruple & Kayla M. Race, *Measuring the NEPA Litigation Burden A Review of 1,499 Federal Court Cases*, 50 ENVTL. L. (forthcoming 2019).

generally—but not always—experienced larger downward reductions in size than rules that underwent NEPA. We also identified complex interactions between a number of other factors, involving species group, whether the species was listed as threatened or endangered, and where the species is located, that make it difficult to isolate causal variables. We are unable to say why rules promulgated with and without NEPA vary in the revisions they underwent between the proposed and final rules. More information is needed on this front if amendments to NEPA's implementing regulations are to expedite decision making without compromising NEPA's twin goals of meaningful public involvement and environmentally informed federal decision making.

The extent of public comment received on rules that undergo NEPA analysis compared to those that do not may also partially explain the difference in acreage change. Unfortunately, information on either the volume or quality of comments submitted on each critical habitat rule is unavailable and therefore cannot indicate whether rules that underwent NEPA analysis generated a higher level of attention and comment. NEPA does, however, appear to provide opportunities for the public to influence federal decisions that differ from the public comment process for critical habitat rules. It may be that NEPA analysis facilitates broader stakeholder participation. Decisions that undergo NEPA review may also receive more rigorous analysis before issuance of a proposed rule and therefore change less through the rulemaking process. NEPA may also help agencies more fully consider indirect and cumulative effects prior to rendering a decision, but these are suppositions rather than data-driven observations.

CONCLUSION

Based on a review of the time required to promulgate critical habitat rules for over 600 federally protected species, we found that critical habitat rules took an average of 22.5 months (683 days) to complete. Rules that underwent NEPA analysis *in addition* to APA rulemaking requirements were completed, on average, three months *faster* than those that did not undergo NEPA analysis. While this difference was not statistically significant at the 0.05 level, our findings contradict claims that NEPA delays federal decisions. Rather than slow the rulemaking process, NEPA, if anything, appears to produce more timely decisions, at least for critical habitat designations. While further research is needed, it appears that "streamlining" efforts that call for exempting rulemaking efforts from NEPA analysis may not result in faster decisions.

The size of the habitat area covered by a critical habitat rule also invariably changes between the proposed and final rule, and these changes generally involve a reduction in designated habitat area. While we identified statistically significant differences in the change between proposed and final rules, we do not believe that these differences, absent a better understanding of the causes of these changes, should be drivers for policy change. Much of the change appears

attributable to improved information obtained during the public comment period on the proposed rule, but we cannot tell how much of this new information or change is attributable to NEPA. It may be that NEPA analysis facilitates broader stakeholder participation. NEPA may also help agencies more fully consider indirect and cumulative effects when formulating the original proposal or prior to rendering a decision. If NEPA helps in gathering important information about habitat, and that information is included in the critical habitat designation rule, then this more inclusive approach could improve the likelihood that the rule being promulgated will lead to the recovery of a listed species—and that, after all, is the purpose behind the ESA.

Good information serves as the foundation for good decisions; and anchoring regulatory amendments in fact and data minimizes the chance that new regulations will have significant unintended consequences. Overall, NEPA appears to be working more efficiently than its critics contend, and while reforms are needed, aggressive "streamlining" does not appear warranted at this time.