

When Does Critical Habitat Designation Benefit Species Recovery?



The Center for
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at Utah State University

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Abstract

Because habitat loss is the primary threat to most species listed under the US Endangered Species Act (ESA), the requirement to designate critical habitat under the ESA intuitively appeals to many conservationists. As the ESA approaches 50 years of implementation, however, it has become clear to many people that species recovery does not always require or even benefit from critical habitat. In some situations, critical habitat may even undercut incentives for private landowners to help recover species. In other situations, however, critical habitat offers indirect or direct benefits to conservation. What are the situations when designation benefits recovery, has no effect on recovery, and undercuts recovery? And how should the US Fish and Wildlife Service and National Marine Fisheries Service decide whether and how to designate critical habitat in each of those situations, especially on private lands, after considering the benefits and costs of designation for recovery? This paper offers perspectives on these questions and a worksheet that the agencies can use to methodically evaluate the advantages and disadvantages of designating an area as critical habitat.

Introduction

Critical habitat under the US Endangered Species Act (ESA) is one of the most controversial aspects of the law, leading to very polarized views about the utility of the tool for conservation and its socioeconomic effects on landowners. On the one hand, proposals to eliminate or severely curtail critical habitat designations usually ignore the fact that the tool offers some direct and indirect benefits for conservation. For example, the National Marine Fisheries Service (NMFS) has been able to negotiate additional protections for endangered salmon based solely on the impacts of certain federal actions on critical habitat.¹ Without critical habitat, those actions would likely have resulted in more harm to the species.

On the other hand, the blanket view that critical habitat always benefits conservation seems improbable. Among the 60 species delisted because of recovery as of July 2020, 51 never had critical habitat designated.² Although the absence of critical habitat may have delayed the recovery of some of these species, it may also have facilitated the recovery of other species by lowering private landowner opposition to conservation. Further, for some recovered species, there is no clear mechanism for critical habitat to have made a meaningful difference to their recovery. For example, the three Channel Island fox species that the US Fish and Wildlife Service (FWS) delisted in 2016 were threatened by nonnative golden eagle predation.³ Addressing this threat through golden eagle control was sufficient to achieve recovery. It is difficult to imagine how critical habitat would have helped the situation.

On both ends of the debate, the absolutist perspectives on the conservation value of critical habitat overlook important nuances and context about this tool. Understanding those finer points is crucial if stakeholders seek a meaningful dialogue about how critical habitat can help species recover while minimizing socioeconomic impacts. With the goal of encouraging this type of dialogue, this paper strives to offer an honest assessment of when critical habitat benefits conservation and when it does not.

The paper briefly describes the critical habitat designation process and how critical habitat is supposed to be protected through the “destruction or adverse modification” prohibition in section 7 of the ESA. Debates about the economic impacts of critical habitat are often confounded with other issues, such as whether regulatory approaches are a preferable method of achieving conservation and whether the government should compensate private landowners when they incur a cost for conserving a species. When a person clearly articulates his or her assumptions and understands how they shape that person’s perspectives about critical habitat, the debate about critical habitat is less likely to morph into debates about other issues and ideologies. As such, I have included a section that describes five main assumptions and observations I make about critical habitat. They offer important context to understand the second half of the paper, which describes the situations where critical habitat is and is not likely to benefit conservation. These situations are not mutually exclusive; often, a critical habitat designation can present both benefits and drawbacks for conservation. How best to balance these trade-offs can be a challenging and controversial exercise. Lastly, I present a simple worksheet that the FWS and NMFS (the Services) can use to consider these trade-offs, one that can help inform when to exclude areas from critical habitat under section 4(b)(2) of the ESA. This section of the statute allows the agencies to exclude an area if the benefits of exclusion outweigh the benefits of inclusion. As part of this discretionary exclusion, the agencies may consider a variety of benefits, including the avoided costs to private landowners of ESA protections for

1 See, for example, National Marine Fisheries Service, *Biological Opinion on the Environmental Protection Agency Registration of Pesticides 2,4-D, Triclopyr BEE, Diuron, Linuron, Captan, and Chlorothalonil*, 2011. The report documents destruction or adverse modification for 9 of 26 species without finding jeopardy for any of them.

2 The only ones that have are American peregrine falcon, Robbins’ cinquefoil, Concho water snake, Steller sea lion, Oregon chub, Modoc sucker, Louisiana black bear, Colorado butterfly plant, and Borax Lake chub. US Fish & Wildlife Service, “Delisted Species,” ECOS Environmental Conservation Online System, last modified July 13, 2020, <https://ecos.fws.gov/ecp/report/species-delisted>.

3 US Fish & Wildlife Service, Final Rule Removing the San Miguel Island Fox, Santa Rosa Island Fox, and Santa Cruz Island Fox from the Federal List of Endangered and Threatened Wildlife, and Reclassifying the Santa Catalina Island Fox from Endangered to Threatened, 81 Fed. Reg. 53,315 (2016). According to the Service, “The decline of island foxes in the northern Channel Islands (San Miguel, Santa Rosa, and Santa Cruz Islands) is considered a consequence of hyperpredation by nonnative golden eagles (Roemer et al. 2001, entire).”

critical habitat. The analysis in this paper, however, focuses only on the benefits and drawbacks of critical habitat designation from a conservation perspective. It does not address the non-conservation factors that the Services may consider. The main reason for this omission is that it is beyond the limited scope of this paper to consider how non-conservation factors should interact with conservation factors. Another reason is that the Services have not issued policy on how much they will weigh one over the other. For example, if conservation factors take precedence, then a decision framework for section 4(b)(2) exclusions might look different from one where conservation and non-conservation factors are equally important.

Brief Background on Critical Habitat Designations and the Adverse Modification Prohibition

There are many excellent resources on how critical habitat is designated and protected through the section 7 prohibition on “destruction or adverse modification” of critical habitat.⁴ This part of the paper provides readers with a basic overview to enable them to understand the rest of the paper.

The ESA recognizes two types of critical habitat: occupied and unoccupied. The former refers to the “specific areas within the geographical area occupied by the species, at the time it is listed..., on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection.” The latter refers to the “specific areas outside the geographical area occupied by the species at the time it is listed..., upon a determination by the Secretary that such areas are essential for the conservation of the species.”⁵ Further, the ESA explains that “[e]xcept in those circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species.”⁶ Thus, critical habitat generally encompasses the areas needed to “conserv[e]” a listed species, which means to recover the species to the point where it can be delisted under the ESA.

In practice, the Services rarely designate unoccupied critical habitat. According to the agencies’ internal analysis, among all designations from 2008 to 2017, only 0.6 percent of all FWS terrestrial critical habitat, 3.1 percent of all FWS aquatic critical habitat, and 0 percent of all NMFS critical habitat was unoccupied.⁷ In a 2019 rulemaking, the Services adopted even more stringent limits on when they will designate unoccupied habitat.⁸ For example, the agencies “will only consider unoccupied areas to be essential where a critical habitat designation limited to geographical areas occupied would be inadequate to ensure the conservation of the species.”

In general, the ESA requires the Services, to the “maximum extent prudent and determinable,” to designate critical habitat concurrent with the decision to list a species as threatened or endangered.⁹ Further, the Services “may, from time-to-time thereafter as appropriate,” revise critical habitat. Thus, the initial designation is mandatory and usually occurs before a recovery plan for the species has been finalized, even though critical habitat is supposed to reflect the areas needed to recover a species.

In the 1980s and 1990s, the FWS had relied on the “maximum extent prudent” exception to avoid critical habitat designation for most listed species, arguing that designation was not prudent because it would increase the threats to a species (e.g., by facilitating poaching) or would not benefit a species. The courts generally struck down the FWS’s use of this exception, so the agency has stopped relying on it over the

4 See, for example, Federico Cheever, “Critical Habitat,” in *The Endangered Species Act: Law, Policy, and Perspectives*, ed. Donald C. Baur and Wm. Robert Irvin (Chicago: American Bar Association, 2009), 40.

5 16 U.S.C. § 1532(5)(A).

6 Ibid.

7 US Fish & Wildlife Service and National Marine Fisheries Service, Draft Effects Data for the Revision of the Regulations for Listing Species and Designating Critical Habitat, 1018–BC88, 0648–BH42 (June 26, 2018).

8 50 C.F.R. § 424.12(b)(2).

9 16 U.S.C. § 1533(a)(3).

past two decades.¹⁰ My own research reveals only 19 instances from 2000 to 2018 in which the FWS found that critical habitat would be not prudent. In 2019, however, the Services revised their regulations to identify five situations when they may use the exception:

- i. The species is threatened by taking or other human activity and identification of critical habitat can be expected to increase the degree of such threat to the species;
- ii. The present or threatened destruction, modification, or curtailment of a species' habitat or range is not a threat to the species, or threats to the species' habitat stem solely from causes that cannot be addressed through management actions resulting from consultations under section 7(a)(2) of the Act;
- iii. Areas within the jurisdiction of the United States provide no more than negligible conservation value, if any, for a species occurring primarily outside the jurisdiction of the United States;
- iv. No areas meet the definition of critical habitat; or
- v. The Secretary otherwise determines that designation of critical habitat would not be prudent based on the best scientific data available.¹¹

This list identifies more situations than under the prior regulations, suggesting that the Services may seek to use the not-prudent exception more in the future.

The ESA also requires the Services to designate critical habitat only “after taking into consideration the economic impact, the impact on national security, and any other relevant impact, of specifying any particular area as critical habitat.”¹² Based on this impact analysis, the Services may (but are not required to) exclude an area from critical habitat under section 4(b)(2) if the benefits of exclusion outweigh the benefits of inclusion.¹³ Thus, a critical habitat designation may reflect a host of non-biological factors and should not be presumed to depict all the areas a species needs for recovery or where it is likely to occur.

In 2016, the Obama administration issued a policy identifying a non-exclusive list of factors the Services will consider as part of their exclusion analysis.¹⁴ For example, the agencies will always consider areas covered by a candidate conservation agreement with assurances (CCAA), safe harbor agreement (SHA), or habitat conservation plan (HCP), and “anticipate consistently excluding such areas from a designation....” CCAs, SHAs, and HCPs are voluntary agreements that non-federal landowners can develop to help conserve a species, sometimes in exchange for ESA authorization to impact the species through land use activities described in the agreement.¹⁵ The Trump administration has signaled its intent to revise the policy, but has yet to do so as of August 2020.

Under the ESA, critical habitat is automatically protected only through the section 7(a)(2) prohibition on “destruction or adverse modification” of critical habitat (hereafter “adverse modification” as shorthand). The

10 Amy Sinden, “The Economics of Endangered Species: Why Less Is More in the Economic Analysis of Critical Habitat Designations,” *Harvard Environmental Law Review* 28, no. 1 (Winter 2003/2004): 157–59. Sinden summarizes the history of challenges to not-prudent determinations in the 1980s and 1990s.

11 50 C.F.R. § 424.12(a).

12 16 U.S.C. § 1533(b)(2).

13 *Ibid.*

14 US Fish & Wildlife Service and National Marine Fisheries Service, Policy Regarding Implementation of Section 4(b)(2) of the Endangered Species Act, 81 Fed. Reg. 7226 (2016).

15 Specifically, CCAs are intended to help conserve a species that is a candidate for ESA listing. In exchange for a commitment to help conserve the species, the participating landowner receives an assurance that he or she faces no additional ESA obligations if the species is listed, assuming the agreement is being properly implemented. SHAs are intended to eliminate a disincentive to helping recover a listed species. Participating property owners receive formal assurances from the Service that if they fulfill the conditions of the SHA, the Service will not require any additional or different management activities by the participants without their consent. In addition, at the end of the agreement period, participants may return the enrolled property to the baseline conditions that existed at the beginning of the SHA. HCPs authorize landowners to impact a listed species but require landowners to minimize and mitigate the impacts to the “maximum extent practicable.” All three tools are described in detail on the Service’s private landowner website: US Fish & Wildlife Service, “For Landowners,” *Endangered Species*, last updated January 30, 2020, <https://www.fws.gov/endangered/landowners/>.

phrase means “a direct or indirect alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.”¹⁶

The prohibition applies only to actions that federal agencies fund, permit, or carry out, including whenever a federal agency authorizes a private company to carry out activities on federal land (e.g., oil and gas drilling on Bureau of Land Management lands). The prohibition does not apply to purely private actions with no connection to a federal agency. Section 7(a)(2) requires all federal agencies to ensure they do not violate the prohibition by requiring them to consult with the Services on their proposed activities. The same consultation requirement applies to the “jeopardy” prohibition, which prohibits federal agencies from “reduc[ing] appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.”¹⁷ Thus, the jeopardy prohibition, as defined by the Services, focuses on a listed species rather than its habitat and works in tandem with the adverse modification prohibition.

Assumptions and Background Observations

To have a meaningful dialogue about the role of critical habitat, I first need to state five of my main assumptions and make several observations about this tool. This section will provide context for the subsequent sections of the paper.

1. Recovery for most species is impossible without controlling the primary threat of habitat loss.

Regardless of a person’s views on critical habitat, the scientific literature indisputably identifies habitat loss as the primary threat for most ESA-listed species. In the most recent assessment of threats to those species, scientists “found that habitat loss continues to be a top threat through time causing species to require federal protection” and that “habitat modification was the most common threat included in listing decisions since 1975.”¹⁸ Thus, any discussion about the future of critical habitat must recognize that controlling or eliminating habitat loss is the most important strategy for conserving most listed species. From that premise, the next important question is what are the most effective strategies to protect, maintain, and restore habitat?

2. Controlling the threat of habitat loss requires considering both regulatory prohibitions and incentives.

The last four decades of ESA implementation strongly suggest that both regulatory prohibitions and incentives must be considered when designing strategies to address habitat loss. Strategies that rely solely on prohibitions or on incentives unnecessarily hem conservation by precluding consideration of the full range of conservation tools. In any particular scenario, the exact balance of sticks and carrots to optimize conservation likely depends on a suite of factors.

In general, prohibitions are needed in situations where little to no incentive exists to protect habitat, especially if protection creates a significant opportunity cost for competing uses of the land. For example, conserving the habitat of a poorly known species may provide little to no economic benefit for the landowner because it generates no ecotourism, mitigation crediting, or other financial value to the landowner. If that habitat happens to be in a prime area for residential development, then the opportunity costs of not developing the land may be in the hundreds of millions of dollars, which far exceeds any direct economic

¹⁶ 50 C.F.R. § 402.02.

¹⁷ *Ibid.*

¹⁸ Matthias Leu, Aaron M. Haines, Courtney E. Check, Delaney M. Costante, Jessica C. Evans, Margaret A. Hollingsworth, Isabel T. Ritrovato, Ann Marie Rydberg, Alexander M. Sandercock, Kayli L. Thomas, and Tyler C. Treakle, “Temporal Analysis of Threats Causing Species Endangerment in the United States,” *Conservation Science and Practice* 1, no. 8 (August 2019): e78, 1–11.

benefit to the landowner for conserving the habitat. In these situations, financial incentives alone seem extremely unlikely to protect the habitat from development. Some form of regulatory prohibition is needed.

Prohibitions also play an important role in encouraging landowners to seek incentive-based tools. How many landowners and businesses would spend their own money, often in the tens or hundreds of thousands of dollars, to develop and implement CCAAs or HCPs, or to buy species mitigation credits, if no regulatory prohibition compelled them to do so? Or as one mitigation banker has told me, “I’ve never sold a mitigation credit without a gun to someone’s head.”¹⁹ A similar theme is evident from ESA listings. Many species that were candidates for listing received little to no conservation during the many years that they were awaiting a listing decision. But when the FWS set listing deadlines in 2011 for over 250 species, the agency triggered a wave of conservation investments by states and other landowners who hoped to avoid the ESA restrictions that accompany a listing. Examples include the massive conservation efforts for the greater sage grouse, lesser prairie chicken, and dunes sagebrush lizard, each of which spent over a decade on the candidate list before the FWS set a listing deadline. If there were no actual or perceived fear of the ESA’s prohibitions arising from a listing, these species would not have seen anywhere near the level of prelisting conservation that they did.

Although prohibitions play a unique and irreplaceable role in conservation, incentives are also vital to conserving most listed species. Many habitats require active management to maintain their suitability for species, but ESA prohibitions are generally unable to compel landowners to carry out those proactive measures. As a result, incentives are needed to encourage landowners to voluntarily conserve habitat. This is especially true for the many habitats in which natural ecological processes are no longer able to fully occur. Examples of this abound in the conservation literature, including for long-leaf pine forests, xeric scrub communities, and grasslands that require periodic natural fires. The fact that over 80 percent of listed species rely on some form of ongoing conservation management underscores the extent to which active habitat management is key to species recovery.²⁰

Incentives are also vital because regulatory prohibitions are often not easily enforceable in practice. For example, the ability to enforce the ESA’s section 9 “take” prohibition as applied to habitat degradation is notoriously difficult and exceedingly rare.²¹ Not only does successful enforcement require showing “actual” death or injury of an animal species (plants are not protected from take), but the Court of Appeals for the Fifth Circuit has solidified a requirement that plaintiffs establish proximate cause and foreseeability of the harm caused to species.²² With such a demanding legal requirement, the FWS could secure more conservation in many situations through cooperation with landowners rather than enforcing legal prohibitions. This dynamic is particularly applicable on private lands, where compliance monitoring and enforcement under the ESA are often very difficult if not impossible. Put differently, an incentive-based approach could bring private landowners under the ESA’s umbrella rather than discourage them from engaging in conservation altogether.

For any species, the optimal mix of regulatory prohibitions and incentives likely depends on a suite of factors, including the types of threats the species faces and how best to address them. On the one extreme, some species require little to no voluntary habitat restoration. Gray wolves are an example. Their path to recovery was largely driven by regulating direct take of the species and reintroducing wolves onto federal lands. On the other extreme, certain species depend entirely on active management and receive little to no direct benefit from regulatory prohibitions. Take, for example, the many Hawaiian species that occur on

19 A mitigation banker is someone who owns or operates one or more mitigation banks, which are protected lands or waters that contain natural resources that generate “credits” used to offset harmful impacts to those resources. To learn more about banks for ESA species, see US Fish & Wildlife Service, *Conservation Banking: Incentives for Stewardship*, August 2012.

20 J. Michael Scott, Aaron M. Haines, John Wiens, and Dale D. Goble, “Conservation-Reliant Species and the Future of Conservation,” *Conservation Letters* 3, no. 2 (April 2010): 91–97. They find that 84 percent of the species listed under the Act are conservation reliant.

21 “Take” means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” 16 U.S.C. § 1532(19).

22 *Aransas Project v. Shaw*, 775 F.3d 641 (5th Cir. 2014).

protected lands and are threatened primarily by invasive species introduced decades ago. Between these two extremes, the optimal mix of prohibitions and incentives is far less obvious and often requires careful consideration.

3. Regulatory prohibitions can discourage some landowners from engaging in voluntary conservation or result in preemptive habitat destruction.

In assessing the role of prohibitions and incentives in any particular situation, an important factor is the interplay between the two. As discussed earlier, the threat of prohibitions is often the strongest motivator for carrying out voluntary conservation. At the same time, prohibitions can turn landowners away from conservation entirely and have even resulted in some landowners eliminating habitat in advance of an ESA listing. One situation is when prohibitions create real or perceived inflexibility in how landowners can manage their land, imposing on them a cost for which the ESA provides no financial compensation. To be sure, landowners can enter into ESA agreements that provide predictability about the ESA restrictions that apply to the enrolled lands. Examples include HCPs, CCAAs, and safe harbor agreements, with the latter having been credited for reducing the rate at which private landowners preemptively destroyed habitat for the red-cockaded woodpecker.²³ But none of these agreements provides carte blanche authority to do whatever a landowner wishes to do with the lands. Thus, the landowner is not compensated for the opportunity cost of maintaining the property in a condition that supports conservation.

Further, my experience is that the time and cost of developing ESA agreements are often significant and unappealing to many landowners, especially when a local FWS office is considerably understaffed.²⁴ In years past, the FWS has told me that the wait to process HCPs in certain offices is several years. I have also heard directly from landowners who have declined to introduce a listed species on their lands because of the time and cost of drafting a safe harbor agreement and securing the associated ESA permit to authorize the introduction. Whether these instances are widespread remains unclear. Although several studies have evaluated the effects of the ESA's prohibitions on incentives, our understanding of this issue remains mostly limited to anecdotes, case studies, and theoretical analyses.²⁵ Despite the lack of any systematic evaluation of real-world situations, it is reasonable to conclude that critical habitat designation can sometimes present drawbacks for conservation and that those drawbacks may outweigh the benefits of designation in certain situations.

4. When evaluating the role of critical habitat, it is vital to differentiate how the tool has been administered from how it could be administered.

Any analysis of the value of critical habitat must be mindful of the distinction between how the Services have *actually* implemented critical habitat and the adverse modification prohibition, and how these tools *could* be implemented if the agencies were to exercise their full discretion with these tools. All evidence strongly suggests that the Services have deliberately constrained the reach of critical habitat and the adverse modification prohibition in both Democratic and Republican administrations. For example, the Clinton administration viewed critical habitat as providing limited protections beyond those provided by listing and the section 7 prohibition on jeopardizing a species, and underscored the “costly consequence (both in terms of staff time and funding)” of the designation process, thus suggesting that it does not offer a good return on investment for conservation.²⁶ The George W. Bush administration similarly stated in a

23 Jacob P. Byl, “Perverse Incentives and Safe Harbors in the Endangered Species Act: Evidence from Timber Harvests Near Woodpeckers,” *Ecological Economics* 157 (March 2019): 100–08.

24 Federal funding under section 6 of the ESA, however, does help offset the cost of developing many ESA habitat conservation plans.

25 Christian Langpap, Joe Kerkvliet, and Jason F. Shogren, “The Economics of The U.S. Endangered Species Act: A Review of Recent Developments,” *Review of Environmental Economics and Policy* 12, no. 1 (Winter 2018): 69–91.

26 US Fish & Wildlife Service, Notice of Intent to Clarify the Role of Habitat in Endangered Species Conservation, 64 Fed. Reg. 31,871 (June 14, 1999). Hereafter, FWS 1999 Critical Habitat Notice.

2003 press release that “spending more than two-thirds of our listing budget on critical habitat for already listed species flies in the face of logic and the intent of the Endangered Species Act.”²⁷

The Obama administration was not as blunt about the cost of designating critical habitat, but it did formally constrain the adverse modification definition, which provides the only legal protection for critical habitat under the ESA. Specifically, when the Services redefined this term in 2016, they explained in the preamble to the rule “that determinations on destruction or adverse modification are based on critical habitat as a whole, not just on the areas where the action takes place or has direct impacts.”²⁸ This “as a whole” interpretation is problematic because the FWS has yet to adopt an agency-wide system to track the cumulative amount of incidental take and habitat modification it authorizes (much less the amount of habitat modification that occurs outside the scope of ESA authorizations).²⁹ Put differently, the agency often does not have updated information on the total amount of critical habitat remaining or the condition of the habitat. Without this information, it is very difficult or impossible to assess a species’ critical habitat “as a whole” and thus to properly determine whether a proposed project will result in adverse modification. In 2019, the Trump administration took this preamble language and codified it into the regulatory definition of “destruction or adverse modification.”³⁰

The results of this cabined interpretation of critical habitat and adverse modification are unsurprising. From January 2008 through April 2015, only one FWS section 7 consultation out of 88,290 resulted in a finding of adverse modification (and only two consultations resulted in jeopardy).³¹ This is a remarkably low number, considering that a federal action results in adverse modification whenever it alters critical habitat in a way that “appreciably diminishes” the value of critical habitat for recovering a species. Many projects authorized under section 7 have resulted in hundreds to thousands of acres of disturbance or destruction of critical habitat, yet adverse modification was never triggered.

Another example of the Services-imposed restrictions on critical habitat comes from the paucity of unoccupied critical habitat: from 2008 to 2017, only 0.6 percent of all FWS terrestrial critical habitat, 3.1 percent of all FWS aquatic critical habitat, and 0 percent of all NMFS critical habitat was unoccupied.³² This is so despite the FWS’s acknowledgement that section 7 consultations on unoccupied critical habitat offer value beyond the jeopardy prohibition.³³ As previously explained, the Trump administration further constrained the Services’ ability to designate unoccupied critical habitat by adopting a general requirement that the agencies must designate all occupied habitat before it can designate any unoccupied habitat.³⁴

The Services’ past implementation of critical habitat and adverse modification is thus a poor indicator of the role that these tools *could* play in species recovery. For example, if the agencies were to aggressively designate unoccupied habitat and apply the adverse modification prohibition based primarily on the geographic footprint of each proposed federal project rather than a species’ critical habitat “as a whole,” then the value of critical habitat designation during section 7 consultations could increase. There is no insur-

27 US Department of the Interior, “Endangered Species Act ‘Broken.’ Flood of Litigation over Critical Habitat Hinders Species Conservation,” news release, May 28, 2003.

28 US Fish & Wildlife Service and National Marine Fisheries Service, Final Rule, Definition of Destruction or Adverse Modification of Critical Habitat, 81 Fed. Reg. 7214, 7221 (2016).

29 US Government Accountability Office, *The U.S. Fish and Wildlife Service Has Incomplete Information about Effects on Listed Species from Section 7 Consultations*, May 21, 2009.

30 US Fish & Wildlife Service and National Marine Fisheries Service, Final Rule, Regulations for Interagency Cooperation, 84 Fed. Reg. 44,976 (2019).

31 Jacob W. Malcom and Ya-Wei Li, “Data Contradict Common Perceptions about a Controversial Provision of the US Endangered Species Act,” *Proceedings of the National Academy of Sciences* 112, no. 52 (December 2015): 15844.

32 US Fish and Wildlife Service, Draft Effects Data for the Revision of the Regulations for Listing Species and Designating Critical Habitat, 1018-BC88, 0648-BH42, 83 Fed. Reg. 35,193 (proposed June 26, 2018).

33 FWS 1999 Critical Habitat Notice. “When unoccupied habitat is designated as critical habitat, the duplication ceases because consultation under section 7 of the Act must then be completed on an area not previously included in the analysis.”

34 US Fish & Wildlife Service and National Marine Fisheries Service, Final Rule, Regulations for Listing and Designating Critical Habitat, 84 Fed. Reg. 45,020 (2019).

mountable legal barrier to pursuing this and other similar avenues for conservation—the ESA offers the Services broad discretion to administer critical habitat and the adverse modification provisions.

This is not to suggest that the Services *should* implement critical habitat and adverse modification to the full extent of the ESA in all cases. Despite the strong public support for the ESA, there are likely limits to the public’s tolerance for the amount of legal restrictions and inconvenience it is willing to tolerate to conserve certain listed species.³⁵ Avoiding these limits is one reason that many conservation-minded managers at the Services make decisions that seem to constrain the reach of the ESA, especially when they perceive a risk that Congress will roll back those decisions.³⁶ Whether those perceived risks are accurate or overstated is a different question, but they undoubtedly help explain why the Services have not exercised their full authorities under the ESA and might never do so. As Professor Steven Yaffee has observed about the ESA, “the character of implementation is influenced as much by the personalities of the participants as it is by the original statute.”³⁷ This gap between the statute and implementation is especially vital to understanding whether critical habitat will ever reach its full potential as a conservation tool.

5. Many species have multiple paths to recovery, which is not apparent from critical habitat designations alone.

Critical habitat identifies the areas needed to recover a species and is supposed to be designated concurrent with listing. At the time of designation, however, the Service usually has yet to develop a recovery plan for the species. As a result, some designations may be overinclusive of the areas actually needed to recover a species, especially because designations are rarely revised. If overinclusion occurs, then not all areas of critical habitat are equally important for conserving a species, and there is likely more flexibility in how the Services can protect critical habitat than is apparent from the text of the designation. The Services almost certainly already exercise this flexibility when they determine whether a proposed action will result in adverse modification, but those determinations generally lack transparency and consistency. A more rigorous, transparent framework for determining how much to protect each area of critical habitat could create opportunities to incentivize conservation in the important areas in exchange for greater regulatory flexibility in any areas deemed less important through the recovery planning process.

The assumptions and observations above offer important background for understanding critical habitat and highlight the complexities of this issue. They convey why the conservation value of critical habitat depends on the context of each situation and on a proper understanding of how critical habitat has actually been implemented.

Benefits and Drawbacks of Critical Habitat Designation

This section describes the benefits and drawbacks of designating critical habitat from a species recovery standpoint. The purpose of this analysis is to better understand when the time, resources, and political capital expended to designate critical habitat generate a meaningful return for conservation.

35 Jeremy T. Bruskotter, John A. Vucetich, Kristina M. Slagle, Ramiro Berardo, Ajay S. Singh, and Robyn S. Wilson, “Support for the US Endangered Species Act over Time and Space: Controversial Species Do Not Weaken Public Support for Protective Legislation,” *Conservation Letters* 11, no. 6 (July 2018): e12595. But see Charles C. Mann and Mark L. Plummer, *Noah’s Choice: The Future of Endangered Species* (New York: Knopf, 1995), 82–114.

36 Sara M. Kerosky, “Relaxing Federal Rules: Political Determinants of Targeted Leniency,” (PhD diss., U.C. San Diego, 2018). Kerosky describes how Democratic administrations “use leniency mechanisms more when there is pressure to roll back the ESA in Congress.”

37 Steven Yaffee, *Prohibitive Policy: Implementing the Federal Endangered Species Act* (Cambridge, MA: MIT Press, 1982), 103.

Benefits of Critical Habitat Designation for Recovery

Changes to habitat are often easier to detect and measure than changes to demographic parameters or number of individuals.

Adverse modification of critical habitat should, in theory, be easier to quantify and assess than jeopardy. In fact, the relative ease with which habitat changes can be measured is the very reason the Services often rely on a habitat surrogate to estimate the amount of incidental take authorized. As the Services explained in a 2016 rulemaking:

Over the last 25 years of developing incidental take statements, the Services have found that, in many cases, the biology of the listed species or the nature of the proposed action makes it impractical to detect or monitor take of individuals of the listed species. In those situations, evaluating impacts to a surrogate such as habitat, ecological conditions, or similar affected species may be the most reasonable and meaningful measure of assessing take of listed species.³⁸

The National Academy of Sciences similarly stated in a 1995 study that “designated habitat is protected by a more objective standard (‘no adverse modification’) than that provided for threats to species (‘no likelihood of jeopardy’) in that adverse modifications are more amenable to objective measurement and quantification than are the many factors that might contribute to jeopardizing the survival of a species.”³⁹ Species that are poorly studied or difficult to detect could benefit disproportionately from the adverse modification standard, because the population and life history information needed to assess jeopardy for those species is often limited and difficult to obtain.

Despite these statements identifying the unique benefits of the adverse modification standard, the FWS appears not to have taken full advantage of the relative ease with which it can assess adverse modification relative to jeopardy. A 2011 study by Professor Dave Owen is especially revealing, finding that the biological opinions analyzed in the study “never mentioned protecting critical habitat as an independent justification for imposing [conservation] conditions” and that critical habitat usually had only “subtle” effects on the outcome of consultations.⁴⁰ Further, the section 7 study identified earlier reveals that adverse modification findings are almost nonexistent in FWS consultations from the past decade and never present without an accompanying jeopardy finding.⁴¹

Protecting unoccupied habitat is needed for recovery.

Even under the Services’ narrow views of critical habitat, the agencies have long acknowledged that critical habitat and adverse modification are the only regulatory tools to protect unoccupied habitat needed for recovery. This is because the Services have chosen to interpret the jeopardy and take prohibitions to require the presence of a listed species.⁴² As climate change affects an increasing percentage of current and future listed species and forces those species to shift their range, the importance of protecting presently unoccupied habitat will also increase.⁴³ Although the Services have historically emphasized designating occupied habitat over unoccupied habitat, the agencies may need to think more about the latter for species whose current habitat will become unsuitable in the coming decades because of climate change. For example,

38 US Fish & Wildlife Service and National Oceanic and Atmospheric Administration, Final Rule on Incidental Take Statements, 80 Fed. Reg. 26,832 (2016).

39 National Research Council, *Science and the Endangered Species Act* (Washington, DC: National Academies Press, 1995), 76.

40 Dave Owen, “Critical Habitat and the Challenge of Regulating Small Harms,” *Florida Law Review* 64, no. 1 (October 2012): 173.

41 Malcom and Li, “Data Contradict.”

42 Although beyond the scope of this paper, one could argue that the Services should expand their interpretation of the jeopardy prohibition to explicitly consider impacts to unoccupied habitat. For example, a different interpretation could find jeopardy if impacts to unoccupied habitat are so significant that recovery is precluded. If the Services were to adopt this broader interpretation, then the benefits of the adverse modification prohibition for protecting unoccupied habitat would diminish.

43 Leu et al., “Temporal Analysis.” “By 2017... environmental stochasticity [had] emerg[ed] as a top threat [in listing decisions], mainly in the form of climate change (e.g., rising sea levels, more severe storms, increased drought events etc.).”

in the FWS's recent decision to reclassify the American burying beetle as threatened, the agency found that all populations in the southern part of the range will likely be extirpated by mid-century because of increasing maximum summer temperatures.⁴⁴ Currently unoccupied habitat for the species might be vital to allowing the species to shift its range into areas that will have suitable temperatures by mid-century. An updated recovery plan for the species could identify those areas in light of the best available science about how climate change is likely to affect the species.

Although only a small percentage of designated critical habitat is unoccupied, interviews with Services biologists indicate that those designations have probably offered some conservation value. Professor Owen found that several biologists perceived an increase in the frequency of consultations for unoccupied habitat.⁴⁵ More generally, he also reported that some biologists thought that critical habitat designations make federal agencies more sensitive to the effects of their activities on habitat, and this leads to more informal section 7 consultations.⁴⁶

There is benefit to default avoidance of critical habitat during project planning.

An unknown number of projects are designed to avoid all impacts to critical habitat so that no section 7 consultation is needed or so that streamlined consultation is possible. For example, when the Bureau of Land Management (BLM) finalized its solar energy zones for solar energy development in western states, it automatically excluded from the Solar Energy Development Program all areas of designated critical habitat.⁴⁷ By adopting voluntary restrictions on solar development in these areas, the BLM applied a more protective standard for critical habitat than what the FWS could have required through the adverse modification prohibition. Without critical habitat, those protections would not have been available (there is no automatic exclusion for all areas within the range of listed species). In my experience, other private industries whose activities trigger section 7 consultation have similarly strived to avoid critical habitat and the areas depicted by FWS range maps for listed species in order to reach “no effect” or “not likely to adversely affect” findings during section 7 consultations.⁴⁸ Thus, the role of critical habitat in protecting habitat extends beyond the sparse number of adverse modification determinations, but the effect remains extremely difficult to document across all consultations. To my knowledge, no one has tried to answer this central question about the effects of critical habitat.

Critical habitat provides the Services with a tool to negotiate better conservation outcomes during permitting and consultations.

Interviews with Services staff indicate that they sometimes use critical habitat to negotiate better conservation outcomes during section 7 consultations and permitting for activities on private lands under section 10(a)(1)(B) of the ESA. Professor Owen found that although almost no Services biologists he interviewed thought that critical habitat had major benefits, most thought that it offered subtle advantages:

44 US Fish & Wildlife Service, Proposed Rule Reclassifying the American Burying Beetle from Endangered to Threatened on the Federal List of Endangered and Threatened Wildlife with a 4(d) Rule, 84 Fed. Reg. 19,013 (2019). “Within the mid-century time period, all Southern Plains analysis areas are expected to exceed threshold temperatures under both the RCP 4.5 and 8.5 emissions scenarios, likely resulting in extirpation of the American burying beetle from these areas.”

45 Owen, “Critical Habitat,” 174. Professor Owen specifically reports an increase in “informal” consultations, which are consultations that assess whether a proposed project is likely to “adversely affect” a species or its critical habitat. If so, then the consultation becomes “formal” to assess whether the project will likely result in jeopardy or adverse modification.

46 Ibid.

47 US Bureau of Land Management and the Department of Energy, “Chapter 2: Description of Alternatives and Reasonably Foreseeable Development Scenario,” in *Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States* (December 2010), 6. Available at: http://solareis.anl.gov/documents/dpeis/Solar_DPEIS_Chapter_2.pdf#page=6. Additional examples of default avoidance of critical habitat are described in US Department of the Interior, M-Opinion 37016, Memorandum: The Secretary's Authority to Exclude Areas from a Critical Habitat Designation under Section 4(b)(2) of the Endangered Species Act (October 3, 2008).

48 If an agency concludes “no effect,” then no consultation is necessary. If an agency concludes “not likely to adversely affect” and the Service concurs with that finding, then no formal consultation is necessary.

Some, though again not all, of the biologists thought that the process of designating critical habitat spurred the services to think more carefully about species' habitat needs and that the resulting additional knowledge could help them develop more protective conditions. Many of the biologists thought that a critical habitat designation gave the services more leverage to negotiate habitat conditions. With one exception, none of the biologists thought the changes were large, and any assertion of major across-the-board effects would be difficult to reconcile with the biological opinions. But all of the biologists thought that subtle effects do exist.⁴⁹

One reason critical habitat can offer this subtle effect is that section 7 consultations are more of a negotiation than a prescription. Thus, any factor the Services can use to their advantage to avoid, minimize, and offset project impacts could benefit recovery.

Another consideration during negotiations is that the adverse modification standard, on paper, adopts a more protective "recovery" threshold than the jeopardy standard, which effectively uses a "survival" threshold. In other words, adverse modification is triggered when a project appreciably diminishes the value of critical habitat for recovery, whereas jeopardy is triggered when a project diminishes the "survival and recovery" of the species, a phrase that courts have interpreted as allowing greater impacts because the survival threshold is harder to reach than the recovery threshold.⁵⁰ In practice, however, there is little evidence that the FWS makes use of this distinction.

Critical habitat provides information for conservation planning and other purposes.

Outside of ESA regulatory actions, critical habitat can also help with conservation planning decisions for listed species, especially those with low-resolution range maps. For example, the identification of "physical and biological features" of critical habitat can help conservationists, landowners, and project proponents think specifically about what aspects of habitat to acquire, protect, or improve. Although this benefit has not been systematically documented and is unlikely to be prevalent, I have seen it firsthand in my work, including on section 7 consultations for the registration of pesticides. Likewise, the identification of areas that need "special management and protection" can provide landowners with guidance about how best to plan their activities to avoid and minimize effects on species, outside the context of any consultation or ESA permitting action.⁵¹ And the designation process can also provide scientific knowledge to inform the development of recovery plans.⁵²

Drawbacks of Critical Habitat Designation for Recovery

Critical habitat designation can create disincentives to engage in conservation because of concerns about regulatory prohibitions, especially on private property.

As discussed previously, critical habitat designations in some situations can create a net loss for conservation by discouraging voluntary conservation, while also failing to provide any meaningful regulatory protections. A notable example is if designation on a parcel of private land will discourage the landowner from voluntarily conducting conservation actions or allowing surveys on the property. In this situation, the drawbacks of designation may outweigh the benefits. If the FWS, however, were to exclude an area based

⁴⁹ Owen, "Critical Habitat," 173.

⁵⁰ See, for example, *Sierra Club v. US Fish and Wildlife Service*, 245 F.3d 434 (5th Cir. 2001), holding that in the context of destruction or adverse modification, "Conservation" is a much broader concept than mere survival. The ESA's definition of 'conservation' speaks to the recovery of a threatened or endangered species. Indeed, in a different section of the ESA, the statute distinguishes between 'conservation' and 'survival.' Requiring consultation only where an action affects the value of critical habitat to both the recovery and survival of a species imposes a higher threshold than the statutory language permits."

⁵¹ Congressional Research Service, *Designation of Critical Habitat under the Endangered Species Act (ESA)* (April 11, 2005).

⁵² *Ibid.*

on a landowner's statements about the consequences of designation, then many savvy landowners will likely game the system by exaggerating their hostility to a designation and then seeking an exclusion.

One way to address this problem is by conditioning an exclusion on a landowner's commitment to allow or participate in some minimum amount of conservation on his or her property such that the conservation benefits of exclusion outweigh its drawbacks. For example, allowing the property to be surveyed and monitored for a listed species might qualify certain properties for an exclusion, especially for species for which survey efforts have been sparse. Although the Services finalized a critical habitat exclusion policy in 2016, the policy focuses mostly on exclusions arising from participation in ESA voluntary conservation agreements (e.g., habitat conservation plans, candidate conservation agreements, and safe harbor agreements) and was largely silent on lesser commitments that might also benefit conservation.⁵³ Given the time and expense of developing ESA agreements, these lesser commitments may represent an underappreciated opportunity to engage private landowners in modest forms of conservation.

This disincentive applies primarily to non-federal landowners because federal agencies are legally required under section 7(a)(1) of the ESA to use their authorities to help conserve listed species. Thus, federal agencies are obligated to carry out recovery actions when they are able to do so. The ESA imposes no such obligation on nonfederal entities. As a result, the FWS is rightfully cautious about creating disincentives for private landowners and states to engage in voluntary conservation. Throughout the rest of this paper, private landowners and states will be the main focus of my analysis on disincentives arising from critical habitat designations.

Designation can create ambiguity about what a critical habitat map is supposed to depict.

Whenever critical habitat is designated, the Service produces an official map depicting the areas where critical habitat may occur. A map can be confusing to interpret because of what it does and does not show. For instance, areas that are important to conserving a species might be eliminated from a map for non-biological reasons, as part of the section 4(b)(2) exclusion discussed above (i.e., because the Service determined that the benefits of excluding the area outweigh the benefits of including it). A common example is the exclusion of areas covered by a voluntary ESA agreement or by a tribal management plan. Even though those areas are often important to conserving the species, FWS's assessment is that the benefits of excluding the areas (e.g., promoting collaborative conservation and partnerships with the landowner) outweigh the benefits of including the areas.⁵⁴ Thus, even though the exclusion analysis is often well justified, the final critical habitat map does not depict all the areas needed to recover the species. Further, the low percentage of unoccupied critical habitat suggests that many areas needed to recover species in the future are excluded from current critical habitat maps. Professor Owen noted this drawback in his interviews, as one biologist cautioned that designations "create the inaccurate impression that nondesignated areas are unimportant."⁵⁵

On the other hand, some critical habitat designations are overinclusive for two reasons. First, not all areas shown on a critical habitat map are actual critical habitat. Recall that any occupied critical habitat requires the presence of "physical or biological features" essential to conserving the species and that may require special management. The areas with those specific features are generally not shown on a critical habitat map because of the difficulty of mapping the features, most of which likely do not have corresponding GIS layers. For example, in the recent critical habitat designation for the elfin-woods warbler in Puerto Rico, one feature is "dwarf forest at elevations above 900 m (2,952 ft) with a single story of trees

53 US Fish & Wildlife Service and National Oceanic and Atmospheric Administration, Policy Regarding Implementation of Section 4(b)(2) of the Endangered Species Act, 81 Fed. Reg. 7226 (2016).

54 See, for example, US Fish & Wildlife Service, Designation of Critical Habitat for Taylor's Checkerspot Butterfly and Streaked Horned Lark, 78 Fed. Reg. 61,506 (2013). This excludes tribal and HCP lands from the designation.

55 Owen, "Critical Habitat," 173.

between 1 and 6 m (3 and 19 ft) in height, with an understory of mosses, epiphytes, and liverworts.”⁵⁶ To my knowledge, this specific feature has never been mapped. In situations like these, some ESA permittees have resorted to conducting their own surveys to determine whether a specific area within a critical habitat map actually contains the necessary physical or biological features.

A second source of overinclusiveness occurs when a critical habitat map depicts areas not needed to recover a species. This problem can arise because critical habitat is supposed to be designated concurrent with listing, at which point the Service has yet to draft a recovery plan for the species. Thus, the designation reflects the agency’s best estimate of the areas needed for recovery but may not depict *only* the areas that a subsequent recovery plan identifies as necessary for recovery. To compound the problem, most critical habitat designations are rarely revised after a recovery plan has been finalized. More frequent revisions would address this problem, as would delaying critical habitat until after a recovery plan has been finalized. In the latter scenario, the National Research Council has recommended that the Services designate habitat needed for species to survive (i.e., “survival habitat”) until the agencies have time to designate critical habitat based on a final recovery plan.⁵⁷

In my experience, most laypeople and ESA novices do not realize that critical habitat can be simultaneously overinclusive and underinclusive, much less understand what to do about that problem when planning their land use activities. Without properly understanding how to interpret a critical map, a person may be misled about what the map does and does not depict. They may even make misguided decisions about which areas to avoid impacting species and which areas to deploy conservation actions.

The funds to designate critical habitat are sometimes better spent on other conservation actions.

Although the Services are generally required to designate critical habitat for all listed species in the United States, a reimagined standard for designation could, in certain instances, result in the Services using the funding they would have spent on a designation for other conservation actions that provide greater benefits for a species. Currently, funding from the FWS’s listing and critical habitat budget is not directly transferrable to the recovery budget. But a different budgeting process could allow the funds to transfer, creating an opportunity to make direct trade-offs between spending funds on critical habitat designation for a species and other conservation actions for the species. For species that gain little to nothing from critical habitat, this budget reallocation could greatly accelerate its recovery. In particular, consider that each designation costs the FWS about \$150,000 to \$300,000, with about \$30,000 of that amount paying for the economic impact analysis.⁵⁸ Now consider the large number of listed species that receive only several thousand dollars of federal and state funding annually. For example, in the most recent FWS annual expenditures report, 563 species were reported as having received \$10,000 or fewer dollars during fiscal year 2017 (excluding land acquisition costs).⁵⁹ Further, one study reported that among the 1,125 listed species between 1980 and 2014 with recovery plans, 271 of those species (24 percent) are in a state of “injurious neglect,” defined as species that are “both in decline and for which recovery efforts are underfunded.”⁶⁰ For many underfunded species, even \$150,000 for on-the-ground conservation actions could contribute considerably to their recovery progress and may even exceed the total amount of recovery funding a species has received since listing. The question then becomes whether \$150,000 for a critical habitat designation offers the best use of that funding if a species receives little to no benefit from critical habitat. In an ideal world, conservationists wouldn’t need to make this type of trade-off. But in the real

56 US Fish & Wildlife Service, Designation of Critical Habitat for Elfin-Woods Warbler, 85 Fed. Reg. 39,077 (2020).

57 National Research Council, *Science*, 91–2.

58 Author’s personal communication with an FWS regional director, July 16, 2018.

59 US Fish & Wildlife Service, *Federal and State Endangered and Threatened Species Expenditures, Fiscal Year 2017* (2017).

60 Leah R. Gerber, “Conservation Triage or Injurious Neglect in Endangered Species Recovery,” *Proceedings of the National Academy of Sciences* 113, no. 13 (March 2016): 3563.

world, where funding for the ESA has always been vastly inadequate, determining the optimal trade-off is an important strategy for maximizing conservation outcomes.⁶¹

Another example to illustrate the possible trade-off between funding for critical habitat and other conservation actions comes from the recovery and 2018 delisting of the Hidden Lake bluecurls plant.⁶² The species is found only on the margins of Hidden Lake, a two-acre montane vernal pool in Riverside County, California. The lake is owned and managed by Mount San Jacinto State Park, is located within a California state park nature preserve, and is surrounded by the Mount San Jacinto State Wilderness Area. The FWS did not designate critical habitat for the species. But if it did, I would be hard pressed to understand how the price of designation would have improved the species' status. The species occurs in protected land that is surrounded by other protected lands. There was no threat to the species that could be meaningfully addressed through the ESA's regulatory provisions; the species' recovery was based entirely on management actions, monitoring, and establishment of a seed bank for the species. Many other recovered and currently listed species fall into a similar situation where the use of Services resources to designate critical habitat seems to offer a limited return on investment relative to other uses of that funding that more directly contribute to a species' recovery.

As mentioned earlier, the Services' critical habitat budget for species is not currently interchangeable with their recovery budget for the same species. As a result, the agencies cannot shift their funding from the former to the latter in support of a not-prudent determination for critical habitat. But if the Services were to have this budget flexibility and were to update their critical habitat regulations to include this situation as a trigger for such a determination, then the agencies could create a legally defensible basis for making those determinations in appropriate circumstances. The feasibility of this approach requires further analysis that is beyond the scope of this paper. Notably, the FWS has lost many legal challenges to its determinations that designation is not prudent because it would not benefit a species.⁶³ Any future efforts to expand the basis of not-prudent determinations must overcome this major legal barrier and include safeguards to ensure the agency does not abuse this discretion. None of the past determinations, of course, were based on the FWS's commitment to shift funding from critical habitat designation to recovery actions. If the agency were to make such a commitment and clearly show that it benefits a species, the agency could spend its funding more effectively to advance recovery.

A Worksheet for Informing Critical Habitat Exclusion Analyses

Given the advantages and drawbacks of critical habitat, both of which can occur simultaneously, how should the Services determine when and where to designate critical habitat if they were given maximum latitude to make those determinations? This section offers a worksheet that the Services can use to more methodically describe the advantages and disadvantages from a conservation perspective of designating an area as critical habitat. The worksheet also includes a section to assess situations in which critical habitat offers neither advantages nor disadvantages for conservation. In these conservation-neutral situations, the Services need to decide as matter of agency policy whether they favor inclusion or exclusion. The text of the ESA provides no explicit guidance on this question, so the decision is left to the agency's reasonable judgment.

The worksheet does not replace the economic impacts analysis the Services carry out. Rather, it can augment that analysis with a structured but simple approach that helps ensure the full suite of advantages and disadvantages are always considered and clearly communicated to the public. The results of the worksheet

61 Leah R. Gerber, Michael C. Runge, Richard F. Maloney, Gwenllian D. Iacona, Ashton Drew, Stephanie Avery-Gomm, James Brazill-Boast, Deborah Crouse, Rebecca S. Epanchin-Niell, Sarah B. Hall, Lynn A. Maguire, Tim Male, Don Morgan, Jeff Newman, Hugh P. Possingham, Libby Rumpff, Katherine B. C. Weiss, Robyn S. Wilson, and Marilet A. Zablan, "Endangered Species Recovery: A Resource Allocation Problem," *Science* 362, no. 6412 (October 2018): 284.

62 US Fish & Wildlife Service, Removing *Trichostema austrorontanum* ssp. *Compactum* (Hidden Lake Bluecurls) from the Federal List of Endangered and Threatened Plants, 83 Fed. Reg. 25,392 (2018).

63 Sinden, "Economics of Endangered Species," 157–59.

can inform the section 4(b)(2) exclusion analysis. They may also inform a decision on whether designation is prudent, although those decisions must overcome the legal restrictions described earlier and thus are not the focus of this worksheet.

Compared to the agencies' current approach of describing the impacts of a designation using a narrative format, the worksheet offers several simple but important benefits. First is that it encourages the agencies to methodically consider and articulate each possible advantage and disadvantage associated with designating an area as critical habitat. In other words, it serves as a checklist for the agencies. As presented, the worksheet is unlikely to contain every advantage and disadvantage from a conservation perspective; additional considerations would surely follow if the agencies were to pursue this approach. Further, the worksheet does not contain non-conservation factors, such as regulatory burden on landowners and reductions in property value resulting from a designation. These factors can also be incorporated into the worksheet, but doing so is beyond the scope of this article.

A second advantage of the worksheet is that it encourages the Services to specify whether a particular factor is major, moderate, minor, or negligible. This information is often absent, incomplete, or unclear in the Services' impact analysis, even though the information is crucial to understanding why an area was included in or excluded from a designation. By indicating the magnitude of each factor, the Services can help the public better understand the basis for a section 4(b)(2) exclusion.

The worksheet is deliberately simple because the Services are unlikely to use a complicated worksheet in light of their resource and time constraints. The worksheet thus creates little additional work for the agencies but offers a meaningful improvement in the rigor of the section 4(b)(2) balancing analysis.

Finally, I want to restate that the worksheet does not capture the non-conservation reasons (e.g., national security interest or changes in property values) to exclude an area from critical habitat under section 4(b)(2). I focus on the conservation objectives of critical habitat to keep this article short and because recovery is the goal of the ESA. From the ESA's standpoint, other social objectives are arguably secondary to the recovery objective, although the Services have not explained how they rank the importance of conservation relative to other values as part of their exclusion analysis. If the agencies were to provide that clarity, the worksheet could be expanded to allow conservation and non-conservation values to be properly weighed based on each one's level of importance.

In determining whether a species' recovery goals will benefit from designating an area as critical habitat, the Services should review each of the factors below and indicate its significance from a recovery standpoint.

The non-exhaustive list of conservation factors that favor inclusion:

Potential benefits of designating the area as critical habitat	How significant is this factor that favors inclusion?			
	Major	Moderate	Minor	Negligible / none / not applicable
1. The area is covered by a future section 7 consultation and:				
a. The adverse modification prohibition may offer unique benefits to the species in the form of avoidance, minimization, and/or offset measures that are unlikely to result from the jeopardy prohibition alone.				
b. The adverse modification prohibition may support the ability to detect and measure project impacts in a manner that is unlikely with the jeopardy prohibition alone.				
c. The designation may support monitoring or enforcement under the ESA or other conservation laws.				
2. Because the area is designated, it benefits from conservation measures adopted through other conservation laws or through voluntary conservation activities.				
3. The species does not presently occupy the area but will likely use the area in the future to meet its ESA recovery criteria.				
4. Designation provides informational, educational, research, scientific, financial, or other similar benefits that help with recovery.				
5. Other factors (describe)				

The non-exhaustive list of conservation factors that favor exclusion:

Potential disadvantages of designating the area as critical habitat	How significant is this factor that favors exclusion?			
	Major	Moderate	Minor	Negligible / none / not applicable
1. The designation is likely to result in the non-federal landowner forgoing meaningful voluntary conservation activities for the species in the area.				
2. The designation is likely to significantly undermine future conservation opportunities with the non-federal landowner.				
3. The designation will result in significant confusion about the areas needed to conserve the species.				
4. Other factors (describe)				

The non-exhaustive list of conservation factors that indicate that designation of some or all of critical habitat offers marginal or no conservation value:

Situations in which designation of some or all critical habitat offers marginal or no conservation value	How significant is this factor that indicates no benefit?			
	Major	Moderate	Minor	Negligible / none / not applicable
1. The landowner has committed to conservation measures that offer equal or greater conservation benefits to the species, than all of the direct and indirect benefits resulting from designation (factors 1–5 above).				
2. The area is already adequately protected through ESA restrictions besides the adverse modification standard.				
3. The area is already adequately protected through legal mechanisms other than the ESA.				
4. The area is affected by threats that cannot be directly or indirectly addressed through the adverse modification prohibition or other protections resulting from designation.				
5. Other factors (describe)				

Conclusion

In closing, critical habitat is clearly an imperfect tool and has likely served a lesser role for conservation than what the drafter of the ESA anticipated or assumed. After nearly 50 years of ESA implementation, there remains no panacea for protecting the habitats needed for recovery. From this perspective, we should view critical habitat as one of many tools to help with recovery. This paper has tried to provide a nuanced understanding of the benefits and drawbacks of critical habitat designation from a conservation perspective, with the goal of encouraging the Services to enhance the conservation potential of critical habitat.