

Can the Precautionary Principle Save the Endangered Species Act from an Uncertain Climate Future?

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Beginning in the 1980s, conservation groups began campaigning for the federal government to list the fluvial Arctic grayling—a relative of the salmon that lives only in the cold waters of North America—as threatened or endangered under the Endangered Species Act. In 2014, the U.S. Fish and Wildlife Service declined to list the grayling under the Act, citing, among other things, the uncertainty associated with how the grayling would respond to climate change.

The Endangered Species Act has long been heralded as one of the United States’ most protective environmental statutes, due in part to its precautionary mandate that the government take action to help species before they face extinction. But agency implementation and judicial interpretation of the Endangered Species Act has only recently begun to grapple with the crisis of climate change, which threatens global biodiversity and promises to test the strength of the Endangered Species Act.

One factor complicating traditional enforcement of the Endangered Species Act in the face of climate change is the uncertainty that can cloud species-specific climate science. This uncertainty makes it difficult for agencies to know how climate change will impact a particular species. In the face of this uncertainty, this Note argues that agencies should embrace the precautionary principle to help guide listing decisions and critical habitat designations under the Endangered Species Act.

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INTRODUCTION

The Arctic grayling has a problem. It is a freshwater fish—a silvery-white relative of the trout with a sail-like dorsal fin—that prefers the cold streams, rivers, and lakes of North America.¹ In the continental United States, Arctic grayling used to be abundant in Michigan and Montana.² Due to overfishing, competition from introduced species, and habitat loss, Arctic grayling are no longer so abundant.³ The population that lived in Michigan is now extinct;⁴ the only two remaining river-dwelling populations of Arctic grayling in the continental United States are now confined to the upper Missouri River in southwestern Montana.⁵

Unfortunately for the Arctic grayling, southwestern Montana is already starting to see adverse impacts associated with climate change.⁶ Montana has

1. U.S. FISH & WILDLIFE SERV.: ARCTIC GRAYLING, <https://www.fws.gov/mountain-prairie/es/arcticGrayling.php> (last updated July 8, 2015) [hereinafter *Arctic grayling*].

2. *See id.*

3. ALASKA DEP'T OF FISH & GAME: ARCTIC GRAYLING (*THYMALLUS ARCTICUS*) SPECIES PROFILE, <https://www.adfg.alaska.gov/index.cfm?adfg=arcticgrayling.main> (last visited May 21, 2020).

4. *Arctic grayling*, *supra* note 1.

5. *Id.*

6. Meera Subramanian, *Fly-Fishing on Montana's Big Hole River, Signs of Climate Change Are All Around*, INSIDECLIMATE NEWS (June 7, 2018), <https://insideclimatenews.org/news/07062018/montana-flyfishing-global-warming-science-temperature-trout-at-risk-big-hole-river>.

warmed by about two degrees Fahrenheit in the last century.⁷ Montana's snowpack is also decreasing, which decreases the amount of melted snow available to feed Montana's mountain streams and rivers.⁸ Snow is also melting earlier in the season, meaning that there is less snow left to feed mountain streams and rivers by the time the late summer months roll around.⁹ And it is not just the snow: Due to increased temperatures, some of Montana's glaciers could be gone in a little over ten years.¹⁰ All of this is bad news for a fish that finds water temperatures of seventy degrees Fahrenheit "stressful" and temperatures above seventy-seven degrees Fahrenheit "lethal."¹¹ If climate change continues to alter Montana's ecosystems, there might come a time when there are simply no more rivers in which the Arctic grayling can survive.¹²

In the United States, the Endangered Species Act (ESA) is the primary legal mechanism for dealing with threats to biodiversity. Since its passage in 1973, scholars have heralded the ESA as one of the country's strongest environmental statutes.¹³ But agency implementation and judicial interpretation of the ESA are only just beginning to run up against the most consequential human-caused change ever witnessed in our global environment—climate change.¹⁴ Crucially, implementing agencies have struggled with how best to apply the ESA to species like the Arctic grayling, which survive in dwindling numbers in a changing climate but are not immediately faced with extinction.

The uncertainty associated with climate change—how bad it will be, how soon it will be that bad, and what we will do to mitigate those harms—complicates traditional enforcement of the ESA, which one scholar colorfully described as "emergency room care."¹⁵ In this vision of the ESA, the statute "intervenes, if at all, only after a species has been pushed to the brink of extinction."¹⁶ But climate change threatens species on a slower timescale than more discrete threats like development or habitat destruction: A species may face climate threats today but would not necessarily face climate extinction, if at all,

7. EPA, WHAT CLIMATE CHANGE MEANS FOR MONTANA, EPA 430-F-16-028 (Aug. 2016).

8. Subramanian, *supra* note 6.

9. Cathy Whitlock et al., *2017 Montana Climate Assessment*, MONT. INST. ON ECOSYSTEMS 91–98 (2017).

10. EPA, *supra* note 7.

11. *Big Hole River Drought Management Plan Version 2019*, BIG HOLE WATERSHED COMM. 1 (2019), https://bhwc.org/wp-content/uploads/BHWC-DMP-2019-with-Cover_FINAL-1.pdf. "Thermally-induced stress" means an increased incidence of mortality and disease. *Id.* at 2. "Lethal" means that the environment is at a temperature sufficient to cause death. *See id.*

12. *See* Subramanian, *supra* note 6 (observing that "in Montana [Arctic grayling] can only retreat so far to higher cooler elevations if temperature is a pressure on them").

13. *See* Bradley C. Karkkainen, *Biodiversity and Land*, 83 CORNELL L. REV. 1, 16 (1997) (describing the ESA as "a powerful measure aimed explicitly at preventing the extinction of species").

14. The first species to be listed under the ESA based substantially on climate-related threats was the polar bear, which the U.S. Fish and Wildlife Service (FWS) listed as threatened in 2007. For a deeper discussion of the litigation surrounding FWS's polar bear listing determination, see *infra* Part II.

15. Karkkainen, *supra* note 13, at 20.

16. *Id.*

for decades to come.¹⁷ Moreover, the extent to which a species faces climate threats—or climate extinction—might vary greatly depending on a number of factors, from the rate of global greenhouse gas emissions to the existence of various climate change feedback mechanisms.¹⁸ Thus, if greenhouse gas emissions continue to drive climate change, implementing agencies¹⁹ will almost certainly run up against more cases like the Arctic grayling, where the climate is clearly changing around a species but the species itself is not necessarily in terminal decline—yet.²⁰

When it comes to the threshold determination of whether or not to list a vulnerable species as threatened or endangered under the ESA, implementing agencies should not feel paralyzed by this uncertainty. Instead, in the face of possible but uncertain climate threats, the precautionary principle should guide implementation of the ESA at its threshold stages.²¹ Using a definition of the precautionary principle that advises that lack of certainty is not a justification for inaction in the face of possible risks,²² agencies should not treat lack of certainty as a barrier to listing under the ESA. Instead, agencies should be empowered to apply the ESA as a preventative measure for species that face probable, though uncertain, risks due to climate change.²³ Indeed, as this Note argues, following the recent Ninth Circuit decision in *Center for Biological Diversity v. Zinke*,

17. Rhett Butler, *Global Warming May Cause Biodiversity Extinction*, MONGABAY (Mar. 21, 2007), <https://news.mongabay.com/2007/03/global-warming-may-cause-biodiversity-extinction/>.

18. Justin Gillis, *Short Answers to Hard Questions About Climate Change*, N.Y. TIMES (July 6, 2017), <https://www.nytimes.com/interactive/2015/11/28/science/what-is-climate-change.html> (explaining that one of climate science's biggest uncertainties is "the degree to which global warming sets off feedback loops, such as a melting of sea ice that will darken the surface and cause more heat to be absorbed, melting more ice, and so forth").

19. In this Note, I will use "implementing agencies" to refer to the government agencies charged with carrying out the ESA. There are two implementing agencies: FWS, which administers the ESA for terrestrial and freshwater species, and the National Marine Fisheries Service (NMFS), which is a part of the National Oceanic and Atmospheric Administration (NOAA) and which administers the Act for marine species. U.S. FISH & WILDLIFE SERV.: ENDANGERED SPECIES ACT OVERVIEW, <https://www.fws.gov/endangered/laws-policies/> (last updated Jan. 30, 2020); NOAA FISHERIES: ABOUT US, <https://www.fisheries.noaa.gov/about-us> (last visited May 21, 2020).

20. Compare the situation of the Arctic grayling to a more traditional listing of an endangered or threatened species, such as the bald eagle, which was listed in 1978 as endangered due in large part to the discrete threat of pesticides. At the time of its listing, there were only seven hundred nesting pairs in the lower forty-eight states. *Symbol and Victim of U.S., Bald Eagle Found in Peril*, N.Y. TIMES, July 15, 1976, at 22; Michael Casey, *Bald Eagles Soaring Back From Brink of Extinction*, CBS NEWS (Feb. 12, 2015), <https://www.cbsnews.com/news/bald-eagles-soaring-back-to-recovery-after-almost-going-extinct-in-the-1960s/>.

21. In this Note, I will at times, refer to listing decisions and critical habitat designations as "threshold" determinations under the ESA, because they are necessary to trigger any number of its more protective measures, such as section 7 or section 9. For a deeper discussion of the requirements for listing a species under the ESA, see *infra* Part I.C.

22. See Daniel A. Farber, *Coping with Uncertainty Cost-Benefit Analysis, the Precautionary Principle, and Climate Change*, 90 WASH. L. REV. 1659, 1671 (2015).

23. "Though there is no shortage of books and articles on the legal status of the [precautionary principle], legal scholarship is thin with regard to its relationship with climate change (CC)." Nicolas de Sadeleer, *The Precautionary Principle and Climate Change*, in ELGAR ENCYCLOPEDIA OF ENVIRONMENTAL LAW: CLIMATE CHANGE LAW 20 (Michael Faure ed., 2018).

agencies must implement the ESA in a preventative way, since courts now consistently read a weak version of the precautionary principle into the ESA's statutory mandate to agencies.

This Note proceeds in three parts. Part I provides background on the precautionary principle as well as the ESA and explores how they intersect with climate change. It will illustrate that the precautionary principle has long been the foundation for judicial interpretation of the ESA, culminating in the decision in *Center for Biological Diversity v. Zinke*, where the Ninth Circuit held that the U.S. Fish and Wildlife Service (FWS) erred when it refused to consider climate impacts to the Arctic grayling because the effects were uncertain.²⁴ Part II situates *Center for Biological Diversity v. Zinke* within the wider context of judicial interpretations of the ESA that rely on the precautionary principle.²⁵ Part II also contrasts the strong judicial tradition of applying the precautionary principle to the ESA with agency implementation practices and modern political visions of the ESA. Finally, Part III suggests a roadmap for listing decisions and critical habitat designations guided by the precautionary principle and argues that such implementation would allow agencies to most faithfully carry out the ESA's statutory purpose in a climate-changed future.

I. BACKGROUND: THE PRECAUTIONARY PRINCIPLE, THE ENDANGERED SPECIES ACT, AND CLIMATE CHANGE

Scholars often characterize U.S. environmental law as reactive, rather than precautionary, in the sense that many U.S. environmental laws were passed in response to ongoing environmental degradation rather than to prevent uncertain, but possible, environmental disasters.²⁶ Thus, uncertainty is necessarily in tension with the reactive nature of much of U.S. environmental law, which often requires proof of a substantial harm in order to warrant regulatory measures.²⁷ Climate change, on the other hand, does not lend itself to certainty. Rather, due to a confluence of factors—from the limitations of climate models to the incertitude of mitigation measures—considerable uncertainty exists about the extent to which climate change will adversely impact ecosystems and

24. *Ctr. for Biological Diversity v. Zinke*, 900 F.3d 1053, 1073 (9th Cir. 2018).

25. *Id.*

26. *See, e.g.*, Robert V. Percival, *Regulatory Evolution and the Future of Environmental Policy*, 1997 U. CHI. LEGAL F. 159, 173–74 (1997) (connecting the passage of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 to the Love Canal pollution disaster, or the passage of the Oil Pollution Act of 1990 to the Exxon Valdez oil spill). Although U.S. environmental statutes were enacted in response to environmental harms, courts almost immediately began relying on the precautionary principle to interpret what measures were required under these new statutes. *See infra* Subpart I.B.

27. *See, e.g.*, *Indust. Union Dep't v. Am. Petroleum Inst.*, 448 U.S. 607, 608 (1980) (holding that the Occupational Health and Safety Act requires “a threshold finding that . . . significant risks are present and can be eliminated or lessened by a change in practices” before a permanent safety standard can be implemented).

biodiversity.²⁸ The precautionary principle, which is embraced more fully in international treaties and European law than in U.S. federal law, offers a roadmap for agencies grappling with the threshold question of whether to take preventative action in the face of scientific uncertainty. Indeed, although they rarely mention the principle by name, U.S. courts often interpret the ESA's statutory purpose and requirements through a precautionary lens.²⁹

A. Climate Change and Wildlife

Uncertainty about the future extent of climatic changes makes predicting the exact impacts of climate change on individual species difficult. Nevertheless, climate change is already having a measurable and profound effect on global biodiversity. According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, climate change has already had a negative effect on the distribution of 47 percent of terrestrial flightless mammals.³⁰ Other studies have documented range shifts in some species of birds and insects, suggesting that climate change is already driving species from their traditional habitats and into new, uncharted regions.³¹ Other studies have looked at climate change-driven changes in the seasonal timing of life events for certain species, which could pose survival threats if those changes do not correlate with the behavior of other species upon which they are dependent.³² Trees might bloom earlier, for instance, and if pollinators do not likewise hatch earlier to match a tree bloom, this phenological change could result in under-pollination of the particular tree species.³³ Climate change could also drive population loss as habitat changes continue to occur. Declines in sea ice, for instance, have been linked to declines in Antarctic krill, which has implications for the larger Antarctic food chain.³⁴

As scientific evidence continues to support the broad notion that the climate is changing, a great deal of scientific uncertainty remains with respect to climate

28. For an exploration of uncertainty in climate science, see *infra* Subpart I.A.

29. For a deeper survey of the ways in which U.S. courts have applied the precautionary principle to the ESA, see *infra* Part II.

30. *Climate Change Is a Key Driver for Species Extinction*, UNFCCC (May 6, 2019), <https://unfccc.int/news/ipbes-climate-change-is-a-key-driver-for-species-extinction>. “Threatened” is based on the International Union for Conservation of Nature’s Red List of Threatened Species. ENCYCLOPÆDIA BRITANNICA: INTERNATIONAL UNION FOR CONSERVATION OF NATURE, <https://www.britannica.com/topic/International-Union-for-Conservation-of-Nature> (last visited May 22, 2020).

31. PERVAZE A. SHEIKH ET AL., CONG. RSCH. SERV. REP., NO. RS22597, GLOBAL CLIMATE CHANGE AND WILDLIFE 3 (2008).

32. *Id.* at 3.

33. *Id.* at 4; This phenomenon has already been observed in California, where a mismatch between precipitation and the timing of a plant bloom caused the extinction of two populations of checkerspot butterflies, because in very wet or very dry years, checkerspot butterfly larvae did not get a chance to feed on their host plants before the plants died. *Id.*

34. *Id.* Penguins, albatrosses, seals and whales are particularly at risk when there are shortages of krill. *Id.*

change's impact on individual species.³⁵ While species have generally "demonstrated that they can adapt in a variety of ways to some degree of climate change," the climatic changes experienced this century are "uncharacteristically rapid" and thus pose unique challenges for species adaptation.³⁶ Compounding this uncertainty is the lack of studies that effectively capture how climate change impacts species, due in large part to the difficulty in gathering data over a species' entire range.³⁷ Researchers also face the general issue of having to adapt global climate models to fit local contexts, which often results in missing unique features of local environments or ecosystems.³⁸

Ultimately, the true extent to which climate change will adversely impact global biodiversity depends on how much humans succeed in mitigating climate change. If global average temperatures rise two degrees Celsius above preindustrial levels, roughly 5 percent of species worldwide would be threatened with climate-related extinction. If temperatures increase more or less than that, then more or fewer species will go extinct.³⁹ Such uncertainty does more than bedevil scientists who seek to study species, or conservationists who seek to protect them—it threatens to undercut the reach of the ESA by presenting a barrier to listing decisions and critical habitat designations. Uncertainty about the extent of future climate impacts forces implementing agencies to make decisions about potentially irreversible harms that depend, in large part, on uncertain present-day actions. Thus, to maximize the strength of the ESA in the face of climate change, agencies should look to the precautionary principle, which, at its most basic level, counsels that lack of certainty should not preclude preventative action, particularly in circumstances where the consequences of inaction are irreversible, as is the case with the extinction of a species.

B. *The Precautionary Principle*

To combat the barrier that uncertainty poses to ESA listing decisions, agencies should implement the ESA in keeping the precautionary principle. Indeed, in the wake of the Ninth Circuit's decision in *Center for Biological*

35. See Katherine Scranton & Priyanga Amarasekare, *Predicting Phenological Shifts in a Changing Climate* 114 PNAS 13212, 13212 (2017) (noting "[c]hanges in species' phenology, the seasonal timing of life history events, constitute one of the most unambiguous consequences of climate warming and one of the least understood").

36. SHEIKH ET AL., *supra* note 31, at 5.

37. *Id.* at 2.

38. *Id.* Typically, global climate models are created by using grid cells—each of which contain various data points about temperature, precipitation, ocean temperature, etc.—that encompass 10,000 square kilometers. This, in turn, makes it difficult to generalize about regional climatic changes using global climate models; researchers must instead "downscale" the global models to look at regional or local changes, a process that takes both time and considerable computing power. See also Catherine M. Cooney, *Downscaling Climate Models: Sharpening the Focus on Local-Level Changes*, 120 ENVTL. HEALTH PERSPECTIVES A22, A24 (2012).

39. UNFCCC, *supra* note 30.

Diversity v. Zinke, agencies must implement the ESA in keeping with a definition of the principle which states that uncertainty cannot be a barrier to action.

Broadly, the precautionary principle is a risk-management theory which counsels that uncertainty should not be seen as a barrier to action.⁴⁰ Since its introduction into the academic and political lexicon in the early 1970s, however, the precautionary principle has eluded a singular interpretation.⁴¹ Academics have offered myriad definitions of the precautionary principle, sometimes in an attempt to “rescue” the precautionary principle from its critics, and sometimes to offer criticism of the principle itself.⁴² Some have called it “the expression of a philosophy of anticipated action, not requiring that the entire corpus of scientific proof be collated in order for a public authority to be able to adopt a preventive measure.”⁴³ Others have argued that the precautionary principle counsels that “if a new product or technology carries even the hint of a health or environmental risk, it should be banned.”⁴⁴ Critics of the precautionary principle’s application to U.S. environmental law often cast the principle as kind of regulatory *carte blanche* weaponized by radical environmentalists whose ultimate goal is complete government regulation of all activity.⁴⁵ Still others note the principle’s vast and untapped potential for shaping environmental law and policy.⁴⁶

Despite the sometimes-controversial position that the principle occupies in academic scholarship, the precautionary principle has been used for decades in both European and international law as a powerful tool for enacting protective regulations or policies in the face of scientific uncertainty. International treaties on environmental law widely embrace the precautionary principle with varying

40. See Farber, *supra* note 22, at 1671.

41. See Phillip M. Kannan, *The Precautionary Principle More Than a Cameo Appearance in United States Environmental Law?*, 31 WM. & MARY ENVTL. L. & POL’Y REV. 409, 416 (2007) (providing “[t]here is no one precautionary principle”); see also GARY E. MARCHANT & KENNETH L. MOSSMAN, *ARBITRARY AND CAPRICIOUS: THE PRECAUTIONARY PRINCIPLE IN THE EUROPEAN UNION COURTS 1* (2004) (stating “[t]he precautionary principle may well be the most innovative, pervasive, and significant new concept in environmental policy over the past quarter century. It may also be the most reckless, arbitrary, and ill-advised.”).

42. See Jonathan Aldred, *Climate Change Uncertainty, Irreversibility and the Precautionary Principle*, 36 CAM. J. ECON. 1051, 1052 (2012) (noting “[i]t is not a straightforward matter to define the PP [precautionary principle], because innumerable distinct statements of it have been made, partly reflecting the different academic disciplines involved”); see also Noah M. Sachs, *Rescuing the Strong Precautionary Principle from Its Critics*, 2011 U. ILL. L. REV. 1285, 1313–14 (2011) (highlighting the significant benefits of the precautionary principle for risk decision making); Fred L. Smith, Jr., *Prometheus Bound Caution Precautionary Principle Ahead*, 20 REGULATION 56, 56 (1997) (arguing against the application of the precautionary principle).

43. Nicolas de Sadeleer, *The Precautionary Principle in EC Health and Environmental Law*, 12 EUR. L.J. 139, 139 (2006).

44. Smith, *supra* note 42, at 56.

45. *Precautionary Principle*, U.S. CHAMBER OF COMMERCE (Aug. 4, 2010, 8:00 PM), <https://www.uschamber.com/precautionary-principle>.

46. See Ellen Hey, *The Precautionary Concept in Environmental Policy and Law Institutionalizing Caution*, 4 GEO. INT’L ENVTL. L. REV. 303, 303 (1992) (noting that “the precautionary principle/approach is likely to play a prominent role in the development of international environmental policy and law”).

degrees of stringency. The Ministerial Declaration from the 1990 Bergen Conference on Sustainable Development, for instance, states that “in order to achieve sustainable development, policies must be based on the precautionary principle.”⁴⁷ Building off of the Bergen Declaration, the Rio Declaration, which was created in 1992 during the United Nations Conference on Environment and Development, states that “in order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities.”⁴⁸ That same year, the parties to the United Nations Framework Convention on Climate Change embraced the precautionary principle, finding that “Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects.”⁴⁹ However, like the Rio Declaration, the United Nations Framework Convention on Climate Change softened the bite of the precautionary principle by holding that any preventative measures taken in the face of scientific uncertainty “should be cost-effective so as to ensure global benefits at the lowest possible cost.”⁵⁰

European nations have also embraced the precautionary principle. Typically, European environmental and public health laws are seen as more reflective of the precautionary principle than U.S. environmental and public health laws.⁵¹ While this comparison is necessarily simplified,⁵² the European Union has embraced the precautionary principle more fully than the United States in at least two distinct areas: regulation of human growth hormones in industrial animal agriculture and the regulation of genetically modified crops. In dairy producing cows, Europe banned the use of rBST, a form of a naturally occurring hormone that controls lactation in cows that has been synthesized by bacteria and commercially produced.⁵³ The European Union banned rBST as a “precautionary measure” for a period of ten years beginning in 1990,⁵⁴ and made

47. Regional Conference at Ministerial Level to Follow-up the Report of the World Comm’n on Env’t and Dev., *Economic Comm’n for Europe on the Bergen Conference*, ¶ 7 A/CONF.151/PC/10 (May 16, 1990). The Declaration goes on to note that “environmental measures must anticipate, prevent and attack the causes of environmental degradation” and holds that “where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing measures to prevent environmental degradation.” *Id.*

48. Conference on Environment and Development, *Rio Declaration on Environment and Development*, Principle 15, A/CONF.151/26 (Jun. 13, 1992). The Rio Declaration also states that “lack of full scientific certainty” should not be a reason for inaction in the face of serious or irreversible damage but adds that preventative measures should be cost effective. *Id.*

49. U.N. Framework Convention on Climate Change, art. 3(3), May 9, 1992, S. Treaty Doc No. 102-38, 1771 U.N.T.S. 107.

50. *Id.*

51. See Jonathan B. Wiener & Michael D. Rogers, *Comparing Precaution in the United States and Europe*, 5 J. RISK RES. 317, 318 (2002) (noting that “the conventional wisdom is that Europe endorses the precautionary principle and seeks proactively to regulate risks, while the US opposes the precautionary principle and waits more circumspectly for evidence of actual harm before regulating”).

52. See *id.* at 319 (stating “[s]ometimes Europe does take a more precautionary stance than the US, but sometimes the US is the more precautionary regulator”).

53. *Id.* at 323.

54. *Id.* at 324.

the ban permanent in 1999, citing animal welfare concerns as well as potential human health concerns.⁵⁵ Europe has also employed a cautious approach to the regulation of genetically modified organisms.⁵⁶ In the European Union, all genetically-modified food products must go through a centralized process for premarket approval and follow strict labeling guidelines, a process that is reflective of the European Union's "tradition of risk-averse regulation."⁵⁷

In the United States, by contrast, environmental and public health law is only sporadically rooted in the precautionary principle.⁵⁸ Many of the principle's most notable appearances in U.S. environmental law came in the 1970s, as courts began interpreting landmark environmental statutes such as the ESA or the Clean Air Act for the first time.⁵⁹ By requiring agencies to take action before a species is extinct, for instance, courts have often interpreted the ESA as a precautionary statute.⁶⁰ Likewise, in 1976, the U.S. Court of Appeals for the D.C. Circuit held in *Ethyl Corp. v. EPA* that the Clean Air Act does not require scientific certainty in order for an agency to act, placing the statute in direct dialogue with the precautionary principle.⁶¹ These instances, however, are far from the norm. Instead, perhaps spurred by industry, agencies and some scholars often view environmental laws and regulations through a purely "neoclassical economic efficiency" lens, wherein all regulations must prove themselves a fair trade for some loss of industry control.⁶² Indeed, Executive Order 12291, issued by President Reagan in 1981, required government agencies to conduct a cost-benefit analysis for any regulation that was thought to have a major impact on the economy.⁶³ Industry often opposes the application of the precautionary principle to U.S. environmental law, casting the policy as one pushed by "radical

55. *Id.*; see also Roni Caryn Rabin, *What Foods Are Banned in Europe but Not Banned in the U.S.?*, N.Y. TIMES (Dec. 28, 2018), <https://www.nytimes.com/2018/12/28/well/eat/food-additives-banned-europe-united-states.html?searchResultPosition=4> (providing "[t]he European Union also bans some drugs that are used on farm animals in the United States, citing health concerns. These drugs include bovine growth hormone, which the United States dairy industry uses to increase milk production.").

56. See Wiener & Rogers, *supra* note 51 at 324.

57. Jessica Lau, *Same Science, Different Policies: Regulating Genetically Modified Foods in the U.S. and Europe*, SCIENCE IN THE NEWS (Aug. 9, 2015), <http://sitn.hms.harvard.edu/flash/2015/same-science-different-policies/>.

58. There are a few notable exceptions to this, particularly in the area of nuclear energy, where the United States has proceeded with much more precaution than its European counterparts. See Wiener & Rogers, *supra* note 51, at 338.

59. See Kannan, *supra* note 41, at 435, 444.

60. See *infra* Part II.

61. See Kannan, *supra* note 41, at 444.

62. David M. Driesen, *The Economic Dynamics of Environmental Law: Cost-Benefit Analysis, Emissions Trading, and Priority-Setting*, 31 B.C. ENVTL. AFF. L. REV. 501, 502 (2004); see also Michael Pollan, *The Precautionary Principle*, N.Y. TIMES MAGAZINE (Dec. 9, 2001), <https://michaelpollan.com/articles-archive/the-year-in-ideas-a-to-z-precautionary-principle/>.

63. Exec. Order No. 12291, 46 Fed. Reg. 13,193 (Feb. 17, 1981) (stating "[r]egulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society.").

environmentalists” who seek total government control of all industrial activities.⁶⁴

Because of its close relationship with the precautionary principle, the ESA offers implementing agencies a unique opportunity to use the principle as a decision-making guide in the face of climate change. Given the myriad definitions that scholars have offered to describe the precautionary principle, this Note builds off the definition offered by Professor Daniel Farber, which states that “in its most general sense, the precautionary principle advises that lack of certainty is not a justification for inaction in the face of possible risks.”⁶⁵

This definition captures what Professor Richard Stewart defines as the “Nonpreclusion Precautionary Principle”—the idea that regulation (in this case, the making of a threshold determination under the ESA) should not be precluded by uncertainty.⁶⁶ Because the nonpreclusion precautionary principle does not mandate action in the face of uncertainty, and merely mandates that uncertainty not be a barrier to action, critics have cast this as the “weakest” version of the precautionary principle.⁶⁷ In his article arguing that strong versions of the precautionary principle are inherently unworkable, Professor Cass Sunstein refers to the weak precautionary principle as an “uncontroversial” “truism.”⁶⁸ The weak precautionary principle, he adds, is necessary only to combat “self-interested claims of private groups demanding unambiguous evidence of harm, which no rational society requires.”⁶⁹ However, as this Note endeavors to show, a nonpreclusion precautionary principle allows agencies a kind of regulatory flexibility that is crucial for a binary statute such as the ESA.⁷⁰

C. *The Endangered Species Act*

The text of the ESA does not explicitly mention the precautionary principle; nevertheless, the ESA’s focus on saving species before their extinction infuses the law with a precautionary hue and places the ESA in direct dialogue with the precautionary principle.⁷¹ Widely viewed as one of the most protective statutes against biodiversity loss passed by any country,⁷² the ESA has been used as a

64. See *Precautionary Principle*, *supra* note 45.

65. Farber, *supra* note 22, at 1671.

66. Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1014 (2003) (quoting Richard B. Stewart, *Environmental Regulatory Decision Making Under Uncertainty*, in 20 RESEARCH IN LAW AND ECONOMICS 71, 76 (Timothy Swanson ed., 2002)).

67. See *id.*

68. *Id.* at 1016.

69. *Id.*

70. By “binary statute,” I mean that the ESA allows for two outcomes: either a species is listed, in which case it receives the protections of the ESA, or it is not listed, in which case it receives no protections. For a deeper discussion of the ESA’s listing mechanisms and protections, see *infra* Subpart I.C.

71. Kannan, *supra* note 41 at 437; Nat’l Wildlife Fed’n v. Nat’l Marine Fisheries Serv., 184 F. Supp. 3d 861, 873 n.26 (D. Or. 2016) (comparing the requirement that “the consulting agency must give the ‘benefit of the doubt’ to the endangered species” to the precautionary principle).

72. Tenn. Valley Auth. v. Hill, 437 U.S. 153, 180 (1978) (describing the 1973 ESA as “the most comprehensive legislation for the preservation of endangered species ever enacted by any nation”).

shield against development-fueled species loss. But the ESA has also elicited controversy, particularly from industry interests concerned with the Act's sheer force and breadth.⁷³ Since its passage in 1973, the ESA has halted construction of multimillion-dollar dams and suspended logging operations across thousands of acres of old growth forests in the Pacific Northwest.⁷⁴ To fully understand how the precautionary principle necessarily must inform implementation of the ESA, it is important to understand how the ESA functions. This Subpart will introduce the ESA, as well as delve into the details of the ESA's listing process.

The first line of the ESA states that "various species of fish, wildlife, and plants in the United States" had, at the time of the Act's passage, been "rendered extinct as a consequence of economic growth and development untempered by adequate concern and conservation."⁷⁵ The ESA, then, sought to respond to this pattern of extinction by providing a means through which species threatened with extinction could be identified and through which subsequent programs could be put in place to ensure the species' continued survival.⁷⁶ Two agencies are responsible for implementing the ESA: FWS, which administers the ESA for terrestrial and freshwater species, and the National Marine Fisheries Service (NMFS), which is a part of the National Oceanic and Atmospheric Administration (NOAA) and administers the ESA as it applies to marine species. Because the ESA's protections only extend to species and habitat listed under the Act, it is important to understand the statutory framework that guides implementing agencies in making these threshold determinations before fully analyzing how agencies can utilize the precautionary principle to respond to uncertain climate threats.

1. Listing a Species under the Endangered Species Act

Because species do not receive the protection of the ESA unless they are listed as either threatened or endangered, the decision to list (or not to list) a species is a one of the most consequential decisions that an implementing agency can make.⁷⁷ The Secretary of the Interior ("the Secretary") can choose to review a species for listing of their own accord, or can respond to a petition to list a particular species.⁷⁸ A species is listed as "endangered" if it is "in danger of extinction throughout all or a significant portion of [its] range."⁷⁹ A species is listed as "threatened" if it is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."⁸⁰

73. Karkkainen, *supra* note 13 at 8.

74. *Id.* at 18.

75. 16 U.S.C. § 1531 (2012).

76. *Id.* §§ 1531–44.

77. ERIN WARD, CONG. RSCH. SERV., IF11241, THE LEGAL FRAMEWORK OF THE ENDANGERED SPECIES ACT (2019).

78. 16 U.S.C. § 1533(c)(1) (2012).

79. 16 U.S.C. § 1532(6) (2012).

80. *Id.* § 1532(20).

“Foreseeable future” does not imply a strictly defined time period—instead, foreseeable future is for FWS or other implementing agency to determine on a case-by-case basis.⁸¹

Pursuant to section 4 of the ESA, a species is “threatened” or “endangered” if it is threatened or endangered by any one of five enumerated factors.⁸² In addition to specifying the criteria against which species are judged, section 4(b) directs the Secretary to base their decision solely on the best scientific and commercial data available, after reviewing the status of the species and accounting for existing conservation efforts.⁸³ For nearly half a century, section 4(b) explicitly stated that the Secretary must make the listing determination “without reference to possible economic or other impacts of such determination.”⁸⁴

Because implementing agencies must assess present threats to the species before determining whether or not to list the species under the ESA, climate uncertainty can present a significant hurdle for deciding whether or not to list a species. Typically, species listed under the ESA are threatened by “discrete human-induced threats that have straightforward causal connections to a species.”⁸⁵ Climate change, however, is neither discrete nor straightforward.⁸⁶ In the case of the Arctic grayling, for instance, it is clear that climate change is currently having an adverse impact on southwestern Montana, particularly on snowpack and glacial melt, both of which feed the cold rivers and streams upon which the Arctic grayling depends.⁸⁷ But unlike a fish that is imminently threatened by the construction of a dam, or a bird that is imminently threatened by industrial development in a forested area, climate change will not necessarily threaten the Arctic grayling with extinction, if at all, for many years. However, if agencies wait to list climate-threatened species until the science becomes clear, it will likely be too late to respond.⁸⁸ Thus, climate uncertainty presents implementing agencies with a problem not contemplated by the language of

81. *In re Polar Bear v. Salazar*, 709 F.3d 1, 15–16 (D.C. Cir. 2013).

82. 16 U.S.C. § 1533(a)(1). The factors are: (A) the present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; (E) or other natural or manmade factors affecting its continued existence. *Id.*

83. *Id.* § 1533(b)(1)(a).

84. Brian Resnick, *The Endangered Species Act Is Incredibly Popular and Effective. Trump Is Weakening It Anyway*, VOX (Aug. 12, 2019, 2:20 PM), <https://www.vox.com/science-and-health/2019/8/12/20802132/endangered-species-act-trump-weakening>.

85. J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U.L. REV. 1, 6 (2008) [hereinafter Ruhl *Bridges*].

86. *Id.*

87. See Subramanian, *supra* note 6.

88. See Complaint at 20, *Ctr. for Biological Diversity v. Bernhardt*, No. 4:19-cv-05206 (2019) No. 28 (challenging the Trump administration’s changes to ESA implementation, including an increased certainty requirement for listing species, by noting that “the consequence of imposing this increased certainty requirement is that species facing extinction from the impacts of climate change or other future events involving prediction and uncertainty will improperly be deprived of protection until after it is too late to prevent their extinction.”).

section 4—namely, what happens when scientific and commercial data cannot fully account for the potential threats to a particular species? The precautionary principle seeks to answer this question by counseling that uncertainty should not be viewed as an obstruction to listing decisions where climate poses a likely, but uncertain, threat.

2. *Designating Critical Habitat under the Endangered Species Act*

When a species is listed under the ESA, the Secretary must also—“to the maximum extent prudent and determinable”—designate critical habitat for the species.⁸⁹ The ESA defines “critical habitat” as “the specific areas within the geographical area occupied by the species, at the time it is listed” which have “physical or biological features essential to the conservation of the species.”⁹⁰ Critical habitat can also include areas outside of the geographic area currently occupied by the species that, by the Secretary’s determination, “are essential for the conservation of the species.”⁹¹ Like listing determinations, critical habitat designations must be made on the basis of the best scientific data available.⁹² However, unlike listing determinations, critical habitat designations must also take into account “the economic impact, the impact on national security, and any other relevant impact, of specifying any particular area as critical habitat.”⁹³

Once a species is listed as threatened or endangered, and its critical habitat is concurrently determined, a number of protections immediately apply to the species. Section 7 of the ESA, for instance, requires federal agencies to consult with FWS or NMFS to ensure that “any action authorized, funded, or carried out . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification” of critical habitat.⁹⁴ Section 9 of the ESA prohibits the import, export, transport, or sale of endangered species of fish, wildlife, and plants in interstate or foreign commerce.⁹⁵ It also prohibits the “take” of any endangered species, which means individuals cannot “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” an endangered species, or “attempt to engage in any such conduct.”⁹⁶ However, because these protections occur only after a species is listed under section 4 of the Act, these provisions, though powerful, are applicable to the

89. 16 U.S.C. § 1533(a)(3)(A)(i) (2012).

90. § 1532(5)(A)(i).

91. § 1532(5)(A)(ii). Although critical habitat need not necessarily be land that the species *currently* occupies, the statute makes clear that, except in circumstances determined by the Secretary, critical habitat cannot be “the entire geographical area which can be occupied by the threatened or endangered species.” § 1532(5)(C).

92. § 1533(b).

93. *Id.*

94. § 1536(a)(2).

95. § 1538(a)(1)(A).

96. § 1532(19).

precautionary principle only in that they define the type of action to be taken once a threshold determination is made.⁹⁷

It is at the listing stage of the ESA that the precautionary principle offers the most promise for agencies confronted with climate uncertainty. Because listing decisions require implementing agencies to assess the present threats to a particular species and its habitat, it is at these stages that implementing agencies are most often confronted with both the impacts of climate change and the uncertainty surrounding the extent of those impacts.⁹⁸ Critics of the precautionary principle sometimes note that while the principle is useful at determining whether or not to act, it is ineffective at determining *how* to act.⁹⁹ But at the listing stage, the choice is between action or inaction: either the implementing agency moves forward with listing, in which case the species becomes eligible for the protections of the ESA, or it does not, in which case no protections are offered.¹⁰⁰ Thus, at the ESA's threshold stages, the weak precautionary principle stands for the proposition that climate uncertainty cannot unilaterally forestall a listing decision, but leaves agencies flexibility under other parts of the ESA to match proactive regulatory measures with the level of uncertainty about risks.¹⁰¹

II. THE ENDANGERED SPECIES ACT AND THE COURTS: FROM PRECAUTIONARY ROOTS TO A REEMBRACE OF CLIMATE-FUELED PRECAUTION

Although courts rarely mention the precautionary principle by name, they have historically applied a precautionary lens to their interpretations of the ESA. Indeed, from the very first Supreme Court case interpreting the meaning of the ESA to the Ninth Circuit's recent decision overturning FWS's determination not to list the Arctic grayling, the precautionary principle's mandate that uncertainty should not be a bar to preventative action underpins much judicial thinking about

97. For a deeper discussion of the power of section 7 and section 9 of the ESA, see generally Eric Erdheim, *The Wake of the Snail Darter: Insuring the Effectiveness of Section 7 of the Endangered Species Act*, 9 *ECOLOGY L.Q.* 629 (1981) (discussing the impacts of section 7 and the snail darter); Paul Boudreaux, *Understanding Take in the Endangered Species Act*, 34 *ARIZ. ST. L.J.* 733 (2002) (discussing the "take" provision of the ESA).

98. LINDA TSANG, CONG. RSCH. SERV., R44807, U.S. CLIMATE CHANGE REGULATION AND LITIGATION: SELECTED LEGAL ISSUES 23 (2017).

99. See Sunstein, *supra* note 66, at 1028 (arguing that some versions of the precautionary principle stand "as an obstacle to regulation and nonregulation, and to everything in between").

100. J.B. Ruhl, *Section 7(a)(1) of the New Endangered Species Act: Rediscovering and Redefining the Untapped Power of Federal Agencies' Duty to Conserve Species*, 25 *ENVTL. L.* 1107, 1114 (1995) (noting "although no regulatory consequences are prescribed directly within the section 4 programs, all ESA regulatory consequences flow from the decisions made pursuant to section 4 authorities") [hereinafter Ruhl *Section 7(a)(1)*].

101. See *id.* at 1107 (noting both the "breadth and flexibility" of section 7(a)(1) of the ESA, which imposes a duty on federal agencies to conserve endangered and threatened species).

the ESA.¹⁰² But while courts have consistently interpreted the ESA to be in dialogue with the precautionary principle, implementing agencies have been reluctant to use their considerable autonomy to apply the principle to listing decisions.¹⁰³ And recently, political winds have begun to actively steer agency practice away from applying even a weak version of the principle to threshold decisions.¹⁰⁴ However, as the Ninth Circuit has noted, agencies must embrace at least a weak version of the precautionary principle when implementing the ESA, because uncertainty alone cannot be a barrier to action.¹⁰⁵ Such implementation would ensure that the ESA remains a powerful tool for conservation in the face of climate change, because it would allow the ESA's protections to extend to species that face climate threats on a slower timescale than the ESA typically envisions.

*A. The Endangered Species Act and Courts'
Fundamental Embrace of Precaution*

Courts have remarked on the precautionary nature of the ESA since the law's passage. In *Tennessee Valley Authority v. Hill*, "the first major test of the courts' willingness to enforce the ESA,"¹⁰⁶ the Supreme Court emphasized that it was Congress's clear intent, in passing the ESA, to endorse preventative actions that stopped species loss before a species went extinct.¹⁰⁷ The controversy involved the Tellico Dam and Reservoir Project, a multimillion-dollar federal project weeks from completion.¹⁰⁸ Environmental groups sued to stop the project on the grounds that its operation would decimate the endangered snail darter, a small fish that made its home directly downstream from the dam.¹⁰⁹ The Court held that the ESA prohibited the dam from becoming operational, noting that Congress had written the ESA "to halt and reverse the trend toward species extinction, whatever the cost."¹¹⁰ To accomplish this goal, the Court found that Congress had adopted "a policy [of] 'institutionalized caution'" that directed agencies to preserve endangered species, even if the benefits of preservation were not readily apparent.¹¹¹ *Tennessee Valley Authority v. Hill* does not mention the precautionary principle, but its interpretation of the

102. See, e.g., *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 194 (1978) (holding that the ESA represents "a policy [of] 'institutionalized caution'"); *Zinke*, 900 F.3d at 1073 (holding that it is arbitrary and capricious for an implementing agency to ignore the potential impacts of climate change due to uncertainty when deciding whether to list a species under the ESA).

103. See *infra* Subpart II.C.

104. *Id.*

105. See *Zinke*, 900 F.3d at 1073.

106. U.S. DEP'T OF JUSTICE: TENNESSEE VALLEY AUTHORITY V. HILL, <https://www.justice.gov/enrd/tennessee-valley-authority-v-hill> (last updated May 15, 2015).

107. 437 U.S. at 180.

108. *Id.* at 153.

109. *Id.* at 158–59.

110. *Id.* at 184.

111. *Id.* at 194.

ESA suggests an act that is highly precautionary, in that it calls for preventative action “to halt and reverse the trend toward . . . extinction.”¹¹² Moreover, the removal of language from the ESA’s 1966 precursor that required protection “where practicable” suggested that it was the intention of Congress that preventative action be applied broadly—not just in situations where there is conclusive proof of the benefits of protection.¹¹³

Following the embrace of the ESA’s broad precautionary foundation in *Tennessee Valley Authority v. Hill*, subsequent jurisprudence strengthened the ESA’s relationship with the precautionary principle by holding that agencies could not require certainty before choosing to list a species. In *Defenders of Wildlife v. Babbitt*, for instance, which dealt with a 1997 challenge to FWS’s decision not to list the Canada lynx as threatened or endangered, the D.C. District Court held that agencies could not require “conclusive evidence” that a species “is headed for extinction” before listing.¹¹⁴ Noting that Congress intended that “preventive action to protect species be taken sooner rather than later,” the court held that “by requiring the listing of species based on the ‘best available data,’ Congress intended to give ‘the benefit of the doubt to the species.’”¹¹⁵ Nor did the court find that the ESA required “certainty” with respect to threats.¹¹⁶ “The ESA does not,” the court wrote, “require such ‘certainty’ to justify the listing of a species.”¹¹⁷ The court in *Babbitt* never explicitly mentions the precautionary principle in its opinion. Nonetheless, the opinion embraces the precautionary nature of the ESA by holding that the statute allows for implementing agencies to take preventative action—in this case, to list a species—without full certainty of all possible threats or outcomes.¹¹⁸

Soon after asserting that the ESA does not require certainty, many courts began to hold that species facing threats from climate change could be protected under the ESA. In the mid-to-late 2000s, implementing agencies, environmental groups, and courts saw a flurry of litigation surrounding the poster child of climate change’s impact on species: the polar bear.¹¹⁹ In 2005, the Center for Biological Diversity petitioned for the polar bear to be listed under the ESA,

112. *See id.* at 184.

113. *See id.* at 185. Note that while *Tennessee Valley Authority v. Hill* suggests a precautionary approach to section 7 of the ESA, courts have read the precautionary principle into other parts of the statute as well. John Buse, *A Different Perspective on the Endangered Species Act at 40 Responding to Damien M. Schiff*, 38 ENVIRONS: ENVTL. L. & POL’Y J. 145, 147 (2018) (stating “[c]ourts have applied the precautionary principle beyond the context of section 7 of the ESA, but these applications are straightforward interpretations of the ESA rather than radical extensions of *TVA v. Hill*”).

114. *Defs. of Wildlife v. Babbitt*, 958 F. Supp. 670, 679-80 (D.D.C. 1997).

115. *Id.* at 680 (citation omitted).

116. *Id.* at 681.

117. *Id.*

118. *See id.*

119. *See* Dorothea Born, *Bearing Witness? Polar Bears as Icons for Climate Change Communication in National Geographic*, 13 ENVTL. COMM. 649, 650 (2019) (arguing that “polar bears have gradually attained the status of climate change icons”).

citing threats to the polar bear related to climate change.¹²⁰ Specifically, the petition argued that the polar bear should be listed “due to observed and anticipated declines in the Arctic sea ice upon which the polar bear relies for survival.”¹²¹ FWS, for its part, agreed and released a decision in 2008 to list the polar bear as threatened.¹²² It was the first ESA listing based primarily on climate-related threats.¹²³

Industry immediately challenged the listing decision in court, essentially arguing that there was too much uncertainty with respect to the polar bear’s future to warrant listing under the ESA.¹²⁴ The D.C. Circuit, however, held that the agency had relied on the best available science—despite possible uncertainties regarding the extent of harm—and fairly determined that the polar bear was “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.”¹²⁵ In response to a later challenge to FWS’s designation of critical habitat for the polar bear, the Ninth Circuit held that FWS could designate critical habitat that the polar bear did not use, but could use in the future, in light of the ESA’s precautionary purpose.¹²⁶ “Since the point of the ESA is to ensure the species’ recovery,” the court wrote, “it makes little sense to limit its protections to the habitat that the existing, threatened population currently uses.”¹²⁷ The lower court’s requirement that critical habitat be habitat that the species currently occupies, the court held, “contravenes the ESA’s conservation purposes by excluding habitat necessary to species recovery.”¹²⁸ The polar bear listing is thus another example of courts reading the ESA to allow preventative measures, such as listing the polar bear due to future climate threats or listing uninhabited critical habitat, even in the face of scientific uncertainty.

A court most directly addressed the issue of listing decisions and climate uncertainty in 2011, when the Ninth Circuit held in *Greater Yellowstone Coalition v. Servheen* that FWS had not properly justified its decision to remove the Yellowstone grizzly from listing under the ESA.¹²⁹ In determining that the

120. Andrew C. Mergen, *Lessons from the Polar Bear Listing Litigation*, 29 NAT. RESOURCES & ENV’T 30, 30 (2015).

121. *Id.*

122. In a decision that took up more than ninety pages in the Federal Register, FWS noted that it relied on a “considerable body of scientific evidence” that, essentially, broke down into three component parts. *Id.* at 31. First, FWS noted that polar bears are dependent on sea ice for survival. *Id.* Second, FWS noted that sea ice is declining. *Id.* And third, FWS found that climate changes “have and will continue to dramatically reduce the extent of sea ice to a degree sufficiently grave to jeopardize polar bear populations.” *Id.*

123. Michael C. Blumm & Kya B. Marienfeld, *Endangered Species Act Listings and Climate Change Avoiding the Elephant in the Room*, 20 ANIMAL L. 277, 294 (2014).

124. *In re Polar Bear v. Salazar*, 709 F.3d at 7.

125. *Id.* at 15.

126. *See Alaska Oil & Gas Ass’n v. Jewell*, 815 F.3d 544, 556 (9th Cir. 2016).

127. *Id.*

128. *Id.*

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

Yellowstone grizzly warranted delisting, FWS concluded that any climate change-induced declines in prevalence of the whitebark pine, upon which the bears depend for food, were not likely to endanger the continued survival of the species.¹³⁰ The agency came to this conclusion, in part, by claiming that “it simply does not yet know what impact whitebark pine declines may have on the Yellowstone grizzly.”¹³¹ The Ninth Circuit held that while “scientific uncertainty generally calls for deference to agency expertise,” the court nonetheless had an independent responsibility under the Administrative Procedure Act (APA)¹³² to ensure that the agency’s decision was not “arbitrary.”¹³³ In the face of a potential, though uncertain, threat, the agency could not “take a full-speed ahead, damn-the-torpedoes approach to delisting.”¹³⁴ Instead, given the ESA’s “policy of institutionalized caution,” FWS was required to “rationally explain why the uncertainty . . . counsel[ed] in favor of delisting now, rather than, for example, more study.”¹³⁵ Thus, by holding that uncertainty should not be a barrier to preventative action, *Greater Yellowstone Coalition v. Servheen* shows a judicial embrace of the precautionary principle as applied to climate change listings under the ESA.

These cases provide courts with a strong judicial foundation against which to read the precautionary principle into enforcement of the ESA. Taken together, these cases suggest that agencies must use the precautionary principle when implementing the ESA in the face of uncertainty. Indeed, as the Ninth Circuit would show in 2018, the ESA does not allow agencies to claim uncertainty as a sole basis for failing to move forward with implementation of the ESA.

B. The Arctic Grayling’s Battle for Listing: Center for Biological Diversity v. Zinke

In *Center for Biological Diversity v. Zinke*, the precautionary principle came to the forefront of a decades-long controversy between conservation groups and FWS when the Center for Biological Diversity (CBD) challenged the agency’s decision not to list the Arctic grayling based at least in part on uncertainty

130. Endangered and Threatened Wildlife and Plants; Final Rule Designating the Greater Yellowstone Area Population of Grizzly Bears as a Distinct Population Segment; Removing the Yellowstone Distinct Population Segment of Grizzly Bears from the Federal List of Endangered and Threatened Wildlife; 90-Day Finding on a Petition to List as Endangered the Yellowstone Distinct Population Segment of Grizzly Bears, 72 Fed Reg. 14,866, 14,929 (Mar. 29, 2017) (codified at 50 C.F.R. pt. 17).

131. *Servheen*, 665 F.3d at 1028.

132. The Administrative Procedure Act (APA) articulates the process by which federal agencies develop and issue regulations. 5 U.S.C. § 551 *et seq.* (1946). 5 U.S.C. § 706(2)(a) compels a court to “hold unlawful and set aside agency action, findings, and conclusions found to be arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law.” For an overview of the APA, see TODD GARVEY, CONG. RSCH. SERV., R41546, A BRIEF OVERVIEW OF RULEMAKING AND JUDICIAL REVIEW 1 (2017).

133. *Servheen*, 665 F.3d at 1028.

134. *Id.* at 1030.

135. *Id.* at 1030, 1028.

surrounding climate threats.¹³⁶ Overturning a district court decision which found the agency's climate analysis to be "reasonable,"¹³⁷ the Ninth Circuit subsequently held that it is arbitrary and capricious for an implementing agency to ignore the potential impacts of climate change due to uncertainty when deciding whether to list a species under the ESA.¹³⁸ Taken together with prior judicial interpretations of the ESA, *Zinke* shows that some courts will not allow an implementing agency to broadly gesture to uncertainty as a reason against preventative action at the threshold stage of the ESA.¹³⁹

The controversy in *Zinke* arose out of FWS's 2014 decision not to list the Arctic grayling as threatened or endangered under the ESA but finds its roots in a decades-long battle between conservation groups and FWS. FWS initially considered whether to list the Arctic grayling in 1982 and determined that listing was "possibly appropriate"; FWS declined to list the species, however, due to lack of sufficient data.¹⁴⁰ In 1994, FWS determined that listing the Arctic grayling was "warranted but precluded" by other, more pressing matters.¹⁴¹ FWS also concluded that "ongoing cooperative conservation actions" meant that the threats the Arctic grayling faced were of "moderate-to-low" magnitude.¹⁴² In 2007, in response to litigation by conservation groups, FWS determined that the Montana population of fluvial Arctic grayling did not warrant protection because it was not a distinct population segment as defined under the ESA.¹⁴³ Then, in 2010, again in response to litigation from conservation groups, FWS determined that the Arctic grayling was a distinct population segment, and that listing was "warranted but precluded" by higher priority actions.¹⁴⁴ That position stood until 2014, when FWS reversed and determined that the Arctic grayling did not warrant listing under the ESA (the 2014 Finding).¹⁴⁵

Although southwestern Montana is already experiencing climate impacts, including reduced snowpack and glacial melt, FWS did not consider climate impacts when determining whether the Arctic grayling warranted listing under the Act.¹⁴⁶ Instead, FWS argued that "uncertainty about how different temperature and precipitation scenarios could affect water availability make projecting possible synergistic effects of climate change on the Arctic grayling

136. *Zinke*, 900 F.3d at 1062.

137. *Ctr. for Biological Diversity v. Jewell*, No. CV 15-4-BU-SEH, 2016 WL 4592199, at *11 (D. Mont. Sept. 2, 2016).

138. 900 F.3d at 1074–75.

139. *See id.*; *see also Servheen*, 665 F.3d at 1020; *Alaska Oil & Gas Assoc. v. Jewell*, 815 F.3d at 556; *In re Polar Bear v. Salazar*, 709 F.3d at 7.

140. *Zinke*, 900 F.3d at 1060.

141. *Id.*

142. *Id.*

143. *Id.*

144. *Id.*

145. *Id.*

146. Subramanian, *supra* note 6.

too speculative at this time.”¹⁴⁷ CBD subsequently challenged the decision not to list the Arctic grayling in the U.S. District Court for the District of Montana, arguing that the 2014 Finding arbitrarily relied on certain studies to find that the Arctic grayling is not threatened by small population size, failed to properly evaluate the threat the Arctic grayling faces due to climate change, and did not properly analyze whether a loss of the species “historical range” constituted a “significant portion of [the Arctic grayling’s] range.”¹⁴⁸ When the district court held that the agency had not violated the APA, CBD appealed the decision to the Ninth Circuit.¹⁴⁹

Citing to *Greater Yellowstone Coalition v. Servheen*, the Ninth Circuit held that FWS had acted in violation of the APA when it failed to articulate why uncertainty about climate change and water availability counseled not listing the species rather than some other course of action, such as listing the species or conducting further study.¹⁵⁰ The court held that the decision to “expressly disclaim[] making any projection as to the synergistic effects of climate change, simply because of the uncertainty” was “unacceptable.”¹⁵¹ The holding required the agency to “explain how uncertainty about water availability justifies not listing the Arctic grayling as opposed to taking another course of action.”¹⁵² Listing the Arctic grayling or producing more studies, the court reasoned, might have been “particularly prudent given the ESA’s policy of ‘institutionalized caution.’”¹⁵³

In support of its conclusion that FWS acted in an arbitrary and capricious manner by relying on “uncertainty” to ignore potential climate impacts to the grayling, the court also noted that the implementing agency had already acknowledged the potential threats of climate change in the 2014 Finding.¹⁵⁴ The 2014 Finding, the court noted, “expressly cites to evidence that climate change will increase water temperatures and threats of low water flow.”¹⁵⁵ But despite the fact that FWS knew that climate change was likely to impact the Arctic grayling’s habitat, it relied on uncertainty about the extent of those impacts to

147. Endangered and Threatened Wildlife and Plants; Revised 12-Month Finding on a Petition to List the Upper Missouri River Distinct Population Segment of Arctic Grayling as an Endangered or Threatened Species, 79 Fed. Reg. 49,384, 49,419 (Aug. 20, 2014) (codified at 50 C.F.R. pt. 17).

148. *Zinke*, 900 F.3d at 1068. The issues of population size and the definition of “range” are not germane to this Note, because these issues did not rely on problems related to uncertainty and climate change. For a deeper treatment of these issues, see Thuy Le, *Center for Biological Diversity v. Zinke: The Fight for the Arctic Grayling Forges a Sword in the Battle for the Dusky Gopher Frogs*, 32 TUL. ENVTL. L.J. 105, 106 (2018).

149. *Ctr. for Biological Diversity v. Jewell*, No. CV 15-4-BU-SEH, 2016 WL 4592199, at *11 (D. Mont. Sept. 2, 2016). The district court did not consider the FWS’s claim of “uncertainty” regarding climate data. Instead, the court held that the FWS had reasonably concluded that the Arctic grayling was likely to adapt to warming temperatures. *Id.*

150. *Zinke*, 900 F.3d at 1072.

151. *Id.*

152. *Id.* at 1073.

153. *Id.*

154. *Id.*

155. *Id.*

justify not taking preventative action.¹⁵⁶ This, the court held, was arbitrary and capricious—implementing agencies cannot point to uncertainty as a valid justification for the decision not to list a species under the ESA.¹⁵⁷ Put another way, the court in *Zinke* held that uncertainty of climate threat could not be used to preclude preventative action, a reflection of the nonpreclusion precautionary principle.

Center for Biological Diversity v. Zinke represents the most recent example in a line of cases illustrating judicial embrace of the precautionary principle as a foundational element of the ESA. Bare uncertainty, the courts have held, is an unacceptable reason not to move forward with a listing decision.¹⁵⁸ To be sure, the court in *Zinke* did not hold that uncertainty necessarily counsels preventative action¹⁵⁹— this would represent an embrace of an incredibly stringent version of the precautionary principle that courts have been unwilling to apply.¹⁶⁰ Nonetheless, courts have consistently embraced the nonpreclusion precautionary principle in threshold decisions under the ESA by holding that uncertainty cannot be the basis for failing to take preventative action.¹⁶¹ Within the Ninth Circuit, it appears clear that implementing agencies cannot use uncertainty to justify inaction and must implement the ESA in keeping with a weak version of the precautionary principle. Whether this holding will carry weight outside of the Ninth Circuit, however, remains an open question, particularly in light of the Supreme Court’s recent narrowing of other parts of the ESA.¹⁶²

C. *Implementation of the ESA: Current Agency Practices and an Uncertain Political Future*

Despite the consistent judicial tradition of reading the precautionary principle into the ESA, implementing agencies have been hesitant to embrace the precautionary principle in their threshold determinations. In written testimony as part of a hearing before the House Committee on Science, Space, and Technology’s Subcommittee on Investigations and Oversight, Gary Frazer, assistant director, Endangered Species, FWS, told Subcommittee Chairman Representative Paul Broun that FWS “never use[s] the precautionary principle

156. *Id.*

157. *See id.*

158. *See id.*

159. *Id.*

160. *See* Sachs, *supra* note 42 at 1295 (defining the “strong” precautionary principle as one that suggests that some precautionary regulation should be a default response to serious risks under conditions of scientific uncertainty or that preventative action should be the default response to any uncertainty).

161. *See, e.g., Servheen*, 665 F.3d at 1030 (holding that agencies are required to explain why uncertainty counsels a particular course of action under the ESA).

162. *See, e.g., Weyerhaeuser Co. v. U.S. Fish & Wildlife Serv.*, 139 S. Ct. 361, 368 (2018) (holding that “critical habitat” must be habitat in which a species can actually live, rather than being habitat in which a species might be able to survive in at some point in the future).

as the basis of a listing decision unless ordered to do so by a court.”¹⁶³ Frazer continued that it was the agency’s view that “the precautionary principle has no applicability on the preliminary question as to whether a species is in fact threatened or endangered.”¹⁶⁴ And FWS has only twice endorsed an explicitly precautionary implementation of the ESA that gives the “benefit of the doubt” to species—once in its preamble explanation of rules adopted in 1986 for conducting section 7 consultations, and once in its 1998 internal guidance on how to conduct consultations.¹⁶⁵ Neither of these endorsements dealt with whether or not to use the precautionary principle to guide threshold determinations.

Congress might have enacted the ESA to embody a policy of “institutionalized caution,”¹⁶⁶ but agency implementation has never favored one governing policy over another. Instead, implementing agencies have used their considerable discretion to respond to political signals, most notably “by seeking to calm or defuse controversy.”¹⁶⁷ Often, such actions translate to limiting rather than expanding species’ protection.¹⁶⁸ The saga of the Canada lynx, which the agency refused to list because its extinction was not certain, typifies the extent to which agency implementation can operate antithetically to the ESA’s policy of “institutionalized caution.”¹⁶⁹

Just because agencies have not fully embraced the precautionary principle in implementing the ESA in the past, however, does not mean that agencies should not consider such an implementation policy in the future. Indeed, courts have interpreted the ESA to allow for ample room for agencies to act proactively to protect endangered species, even in the face of uncertainty.¹⁷⁰ Implementing agencies are given considerable discretion in deciding how to implement the ESA’s statutory directives.¹⁷¹ If agencies have, to this point, used that discretion to respond to political signals from industry or activists, there is no reason why they could not now use that discretion to respond to vast threat of climate

163. *The Endangered Species Act: Reviewing the Nexus of Science and Policy* Hearing Before the H. Comm. on Science, Space, & Technology, Subcomm. on Investigations and Oversight, 112 Cong. 82 (2011).

164. *Id.*

165. J. B. Ruhl, *The Battle Over Endangered Species Act Methodology*, 34 ENVTL. L. 555, 594 (2004) [hereinafter Ruhl *Methodology*].

166. *Tenn. Valley Auth. v. Hill*, 437 U.S. at 194.

167. Holly Doremus, *Adaptive Management, the Endangered Species Act, and the Institutional Challenges of New Age Environmental Protection*, 41 WASHBURN L.J. 50, 56 (2001).

168. *Id.*; see also Kannan, *supra* note 41 at 437 (noting “[a]lthough the ESA itself is precautionary, its implementation is frequently not”).

169. See *Defs. of Wildlife v. Babbit*, 958 F. Supp. 670, 680 (D.D.C. 1997). The FWS decided not to list the Canadian lynx because petitioners could not point to “conclusive” evidence that the species was threatened with extinction.

170. See *supra* Subparts II.A.–B.

171. See Doremus, *supra* note 167 at 56.

change.¹⁷² Not only are they empowered to do so; courts have ruled that they must do so—as *Center for Biological Diversity v. Zinke* makes clear, agencies must implement the ESA in keeping with a weak version of the precautionary principle which counsels that uncertainty cannot be a barrier to action.

From a judicial perspective, the recommended implementation strategy for the ESA in the face of climate change seems guided by a weak precautionary principle—the idea that uncertainty does not mandate, but should not forestall, preventative action.¹⁷³ But recent executive changes to the ESA’s implementation suggest a very different future for the ESA in the face of climate change.¹⁷⁴ These changes include a definition of “foreseeable future” in section 4 that extends only so far into the future as to allow the agency to “reasonably determine that both the future threats and the species’ responses to those threats are likely.”¹⁷⁵ This language opens up the potential for implementing agencies to ignore climate threats due to uncertainty if the agency cannot “reasonably determine” that those threats are “likely.”¹⁷⁶ Long-term climate models, for instance, depend on uncertain inputs—will global greenhouse gas emissions rise, and if so, how much? Under the new implementation scheme, agencies could ignore these long-term models if they decide that they cannot “reasonably determine” that the threats are “likely.”¹⁷⁷

On their face, the new regulations seem to forestall any chance of the precautionary principle guiding ESA implementation in the face of climate change. They certainly have the potential to do so: If the agency chooses to use its discretion to discount climate uncertainties, it could claim that it cannot reasonably determine future threats and therefore cannot move forward with listing decisions due to climate change. The new regulations could thus undercut the potency of the Ninth Circuit’s decision in *Zinke* by giving agencies a strong basis for using their discretion to discount climate impacts without having to resort to claiming “uncertainty.”

The Trump administration’s new guidelines do not go so far as to explicitly require “unambiguous evidence of harm” to list a species threatened by climate

172. See, e.g., *Endangered Species Act Implementation: Science or Politics? Oversight Hearing Before the H. Comm. on Natural Resources*, 110 Cong. 110–24 (2007) (discussing the influence of the timber industry on agency implementation of the ESA during the George W. Bush administration).

173. See *supra* Part II.

174. Lisa Friedman, *U.S. Significantly Weakens Endangered Species Act*, N.Y. TIMES (Aug. 12, 2019), <https://www.nytimes.com/2019/08/12/climate/endangered-species-act-changes.html?smid=tw-nytimes&smtyp=cur>.

175. Endangered and Threatened Wildlife and Plants; Regulations for Listing Species and Designating Critical Habitat, 84 Fed. Reg. 45,020, 45,020 (Aug. 27, 2019) (codified at 50 C.F.R. pt. 424).

176. See Friedman, *supra* note 174.

177. A lawsuit filed by eighteen attorneys general in September 2019 challenged the Trump administration’s new regulations as being “manifestly contrary to the statute” and thus in violation of the APA. In their complaint, plaintiffs argue that the regulations “violate the plain language and purpose of the ESA, its legislative history, numerous binding judicial precedents interpreting the ESA, and its precautionary approach to protecting imperiled species and critical habitat.” Complaint at 2, *California v. Bernhardt*, No. 3:19-cv-06013 (N.D. Cal. 2019) [hereinafter *California v. Bernhardt* Complaint].

change.¹⁷⁸ But the changes do give implementing agencies—which already enjoy considerable discretion—an easy route to ignoring possible climate impacts merely by pointing to uncertainty as a basis for finding that the agency cannot “reasonably determine” “likely” threats.¹⁷⁹ As such, the regulations directly contrast with the precautionary principle, with each offering a dueling vision of how the ESA should respond to future climate change: either by ignoring the threats, in the Trump administration’s version, or by embracing the ESA’s precautionary foundation to tackle climate uncertainty head-on. The *Zinke* court’s vision of the ESA is one where uncertainty cannot undercut the ESA’s ultimate “policy of institutionalized caution.”¹⁸⁰ Such caution is particularly important in a climate-changing world, where threats to species are both less certain and less discrete than traditional threats like development.¹⁸¹ Thus, as this Note endeavors to show, a version of the ESA implementation that fully embraces the precautionary principle offers both agencies and species the strongest path forward for species protections in the face of climate change.

III. EMBRACING THE PRECAUTIONARY PRINCIPLE: A ROADMAP FOR THRESHOLD DETERMINATIONS IN A CLIMATE-CHANGING WORLD

While climate change poses certain challenges to implementation of the ESA—by threatening species on both a slower and wider scale than more discrete threats—a new paradigm focusing on the precautionary principle could help agencies adapt to these challenges. Because agencies have not used their considerable discretion to implement the ESA according to the precautionary principle, however, there is no existing framework for how such an implementation strategy might look, particularly in light of the *Zinke* decision, which mandates that agencies use a version of the weak precautionary principle when implementing the ESA at its threshold stages.¹⁸²

At the listing stage, an ideal strategy would be one that prioritizes the precautionary principle in cases where threats are credible but where the magnitude of the threat is uncertain—in cases like the Arctic grayling for instance, where the question is not so much *whether* climate change is affecting the species’ habitat, but *how much*. For critical habitat designations, for which agencies can include economic costs of preservation, the precautionary principle could also help agencies prioritize intangible costs and benefits that are often excluded from cost-benefit assessments.

178. See Sunstein, *supra* note 66, at 1016.

179. Listing Species and Designating Critical Habitat, 84 Fed. Reg., at 45,020.

180. See *Zinke*, 900 F.3d at 1073; see also *Tenn. Valley Auth. v. Hill*, 437 U.S. at 194.

181. See *supra* Subpart I.A.

182. See *Zinke*, 900 F.3d at 1073.

A. Precautionary Listing Decisions

Under an ESA implementation strategy based on the precautionary principle, listing decisions with respect to climate change would never view uncertainty as a barrier to listing a species as threatened or endangered. Instead, the precautionary principle would force agencies to explain why uncertainty counsels taking a particular path over another (listing the species or not listing the species). In this way, it would force agencies to consider the extent of the uncertainty, as well as the potential consequences associated with each path of action. Such a strategy would essentially prevent agency decisions like the one challenged in *Center for Biological Diversity v. Zinke*, because agencies would be forced to reasonably explain the existing uncertainty rather than use that uncertainty as a shield against considering climate impacts.¹⁸³

Because of the considerable time and cost that goes into producing a listing decision, it is likely that any species for which the process has begun faces *some* level of credible threat.¹⁸⁴ As such, the precautionary principle would not give agencies carte blanche to consider a species for which there is no credible climate threat and appeal broadly to uncertainty as a reason to list. Moreover, implementation of the ESA in keeping with the precautionary principle would require actual uncertainty before the principle was triggered; a conservation group could not merely petition to list a species that faces no threats, because there would be no attendant uncertainty. Instead, the precautionary principle would be most useful in cases where there is some threat but an agency seems unlikely to take preventative action because the magnitude of the threat is difficult to assess with full confidence. In those instances, the precautionary principle advises that the prudent decision is likely to list the species rather than ignore the potential for climate-fueled extinction.

Because the decision to list a species as endangered or threatened necessarily triggers a number of protections, the precautionary principle should never mandate listing as a response to uncertainty.¹⁸⁵ Instead, the principle should trigger a review of the science while considering two outcomes: listing species that are not really endangered and failing to list those that really are.¹⁸⁶ In this way, the precautionary principle would shift the traditional listing paradigm by counseling implementing agencies to consider the potential of a catastrophic error in failing to list a species that needed protection against the

183. *See id.*

184. *See* NATIONAL RESEARCH COUNCIL STAFF: COMMITTEE ON SCIENTIFIC ISSUES IN THE ENDANGERED SPECIES ACT, SCIENCE AND THE ENDANGERED SPECIES ACT 169 (National Academies Press, 1995).

185. This would keep the ESA from embracing what Professor J.B. Ruhl describes as the “catastrophe principle,” which imposes a precautionary remedy regardless of cost on any activity shown to have a “catastrophic environmental effect,” regardless of the likelihood of that effect coming to fruition. J. B. Ruhl, *Is the Endangered Species Act Eco-pragmatic?*, 87 MINN. L. REV. 885, 898 (2003).

186. *Id.*

potential error in listing a species that did not need protection.¹⁸⁷ Application of the precautionary principle to listing decisions would be particularly important where the data suggests that a species could face total extinction due to climate change. In these situations, agencies would need to look at both the level of potential threat and the level of uncertainty, in order to understand whether the prudent action is to move forward with a preventative measure (listing the species) or to reject preventative measures, because one course of action could potentially lead to the total extinction of a species.

Because listing decisions guided by the precautionary principle could lead to charges that the implementing agency is basing its decisions on weak science to achieve a particular, predetermined outcome, successful implementation of the ESA guided by the precautionary principle might need to include an independent basis for agency review: that is, an independent review of the agency's decision that the risk of catastrophic error in not listing is so great as to warrant preventative measures.¹⁸⁸ Such review could be done by an outside body, such as the National Academy of Sciences' National Research Council, which in the past has conducted independent reviews of ESA implementation policies.¹⁸⁹ Such independent review could potentially slow listing decisions. However, because the time horizon for climate-related threats tends to be greater than discrete, human-caused developments, this time delay might be acceptable in the face of alternative measures, such as choosing to treat uncertainty as a bar to listing or, on the other hand, basing listing on uncertainty in such a way that undermines public trust in the statute.¹⁹⁰

As Professor J.B. Ruhl notes, such review is hardly unheard of in traditional ESA listing procedure. FWS and NMFS can list a species on an "emergency" basis, which requires only that the agency find that the species faces an "emergency posing a significant risk to the wellbeing of any species."¹⁹¹ The agencies must then complete the listing process under "normal standards of proof" if the species is to be listed on a permanent basis.¹⁹² Such a framework could also work in situations where there is considerable uncertainty about the extent of the threat, but little uncertainty that climate change does pose an existent and potentially catastrophic risk. In such situations, a species could be

187. NATIONAL RESEARCH COUNCIL STAFF, *supra* note 184, at 169.

188. See, e.g., Ruhl *Methodology*, *supra* note 165, at 562 (suggesting a framework for the application of the precautionary principle to ESA listings where "[a]ny interested person could then require the agency to obtain a rigorous scientific peer review of the basis for the agency's decision as means of checking against irrational precaution").

189. See generally NATIONAL RESEARCH COUNCIL STAFF, *supra* note 184 (publishing a review of the ESA and its scientific implementation).

190. See, e.g., Ruhl *Bridges*, *supra* note 85, at 29 (stating "[i]dentifying climate change as a basis for listing a species is likely to invite charges from industry that the agency is using weak models and sparse data, whereas declining to list a species for which a plausible case of climate threat can be made is likely to invite claims from environmental groups that the agency is ignoring the science").

191. Ruhl *Methodology*, *supra* note 165 at 602; 16 U.S.C. § 1533(b)(7) (allowing emergency listing based on finding of an "emergency posing a significant risk to the well-being of any species").

192. § 1533(b)(7).

listed pursuant to the precautionary principle; the agency would then be expected to produce a more thorough accounting of the uncertainties, including independent review, if the species were to be listed on a permanent basis. In this way, the precautionary principle can help agencies move forward in situations where climate change is “a serious enough problem to justify some response.”¹⁹³

B. *Precautionary Habitat Designations*

Beyond listing decisions, the designation of critical habitat presents an opportunity for agencies to efficiently implement the ESA by using the precautionary principle tempered by a cost-benefit analysis that takes into account the magnitude of potential risk alongside the associated uncertainties of that risk coming to fruition.

Critical habitat can provide a useful tool for biodiversity conservation in the face of climate change because critical habitat need not be limited to habitat that the species currently occupies; instead, as discussed in Part I, critical habitat can include habitat that the species does not currently occupy, but might rely on for continued survival.¹⁹⁴ This, in turn, allows for greater species protection because listing a species and any attendant critical habitat designation triggers a number of protections for species, including interagency consultation.¹⁹⁵

Unlike the initial listing decision, agencies are statutorily required to consider economic impacts in their critical habitat designations.¹⁹⁶ Thus, for an unoccupied area of habitat to be listed as critical habitat, it would need to be likely that the species would someday need to use the habitat in order for the benefit to the species to outweigh any economic losses associated with development.¹⁹⁷ The precautionary principle, however, would ensure that a critical habitat designation could not be derailed simply because it is uncertain as to whether the species would need the unoccupied habitat for survival. Instead, it would force the implementing agency to look at the data and conclude *why* uncertainty counsels designating or not designating habitat as critical. This process would lead to more efficient outcomes in the long run by forcing agencies to consider how various habitats, species, and ecosystems might interact in a climate-changed future.

The Supreme Court’s recent decision in *Weyerhaeuser Co. v. U.S. Fish and Wildlife Service* complicates the precautionary principle’s ability to guide critical

193. Farber *supra* note 22, at 1721.

194. *Supra* Part I.

195. See Kalyani Robbins, *The Biodiversity Paradigm Shift: Adapting the Endangered Species Act to Climate Change*, 27 *FORDHAM ENVTL. L. REV.* 57, 95 (2015) (discussing interagency consultation for agency actions impacting critical habitat).

196. 16 U.S.C. § 1533(b)(2).

197. See Robbins, *supra* note 195, at 92.

habitat designation.¹⁹⁸ The Court ruled that “critical habitat” must, in essence, actually be habitat—it cannot be a place that does not exhibit the “physical or biological features essential to the conservation of the species.”¹⁹⁹ One can imagine that, in the face of climate change, this directive will necessarily limit potentially important habitat; a present-day seasonal wetland could come to exhibit essential features critical for a certain species due to climate-fueled precipitation changes, for instance. In this sense, *Weyerhaeuser* seems to greatly limit an implementing agency’s ability to preventatively designate critical habitat for a climate-threatened species.

But *Weyerhaeuser Co.* need not fatally limit the designation of critical habitat, particularly in situations of climate-fueled uncertainty. The decision limits preventative designation of critical habitat where the habitat lacks “physical or biological features essential to the conservation of the species.”²⁰⁰ If the habitat does have these features, however, it could be still be designated as critical habitat.²⁰¹ The precautionary principle would counsel that, if the habitat has those features, implementing agencies should not view uncertainty as to the habitat’s eventual use by the species as a bar to designation; instead, it should factor uncertainty into its cost-benefit analysis.

An agency could do this by using an economic model of costs and benefits that places a premium on the incorporation of both scientific models and economic models, to better account for the level of risk associated with various uncertainties. This is similar to the approach advocated for by Professor David Driesen, who suggests creating a “precautionary” cost-benefit analysis by ensuring that science, as well as economics, is included in the modeling, and by giving special attention to “nonquantifiable benefits” of a particular action.²⁰² In determining nonquantifiable benefits, agencies should focus on what is “important” rather than what is necessarily “quantifiable.”²⁰³ In critical habitat designation, what is “important” could represent a combination of the agency’s assessment of the potential risks of a worst-case climate scenario compared with the uncertainty that such a scenario will come to fruition. The more likely a scenario, or the more catastrophic the potential consequence, the more an agency might want to consider “unquantifiable” components in its cost-benefit assessment of critical habitat.

A precautionary approach to cost-benefit analysis and critical habitat designations could be particularly useful in situations where taking preventative

198. For a general discussion of *Weyerhaeuser*, see LINDA TSANG, CONG. RSCH. SERV., LSB10234, HOME IS WHERE THE HABITAT IS: SUPREME COURT ADDRESSES CRITICAL HABITAT UNDER THE ENDANGERED SPECIES ACT (2018).

199. *Weyerhaeuser Co. v. U.S. Fish & Wildlife Serv.*, 139 S. Ct. 361, 368–69 (2018).

200. *Id.*

201. *See id.*

202. David M. Driesen, *Cost-Benefit Analysis and the Precautionary Principle Can They Be Reconciled?*, 2013 MICH. ST. L. REV. 771, 815 (2013) [hereinafter *Driesen Cost-Benefit Analysis*].

203. *Id.* at 816; *see also id.* at 820 (providing “precautionary [cost benefit analysis] can only exist if government officials give weight to soft but important variables”).

action to designate critical habitat could run into direct conflict with climate mitigation strategies, such as the deployment of renewable energy. Typically, these conflicts occur after a species has been listed under the ESA and critical habitat has been designated; oftentimes, renewable energy development will be proposed that would “destroy or adversely modify designated critical habitat,” or would “take” a listed species, in violation of the ESA.²⁰⁴ In these instances, developers can apply for an “incidental take permit,” which allows for the “take” of a listed species when “such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.”²⁰⁵ Without an incidental take permit, courts are reluctant to let renewable energy projects proceed if they are likely to harm a listed species.²⁰⁶

Applying the precautionary principle at the critical habitat designation stage could help agencies grapple with the potential conflict between species protection and renewable energy development before these conflicts arise. By using a precautionary cost-benefit analysis, implementing agencies would give special attention to the “unquantifiable benefits” of both critical habitat designation and the area’s potential for use in renewable energy development.²⁰⁷ This analysis would look at things like the potential benefit of the climate-mitigation project on climate change, as well as the likelihood that the area would be used for renewable development, and compare those benefits with the likelihood that a future project would harm critical habitat. Moreover, a precautionary approach would take into account how the mitigation measures might ultimately benefit the species in the long run, by lessening the overall consequences of climate change. Following the precautionary principle would require agencies to consider climate change more thoroughly in their cost-benefit analysis for critical habitat designations, as well as force implementing agencies to directly grapple with trade-offs between climate mitigation-inspired development and preservation of existing ecosystems, because “uncertainty” could not serve as a sufficient justification for inaction.

As with listing decisions, the precautionary principle should not dictate affirmative action in the face of uncertainty. Instead, the principle should encourage agencies to more deeply grapple with uncertainties related to climate change before pursuing a particular course of action.

204. Gregg Badichuk, *Resolving Conflicts Between Endangered Species Conservation and Renewable Energy Siting: Wiggle Room for Renewables?*, 28 ENVTL. CL. J. 163, 176 (2016). An example of this kind of conflict between renewable energy development and the ESA is illustrated by the battle over solar development in the Mojave Desert and the endangered desert tortoise; see, e.g., Todd Woody, *Fight over Solar Power in the Mojave Desert*, N.Y. TIMES (Dec. 22, 2009), <https://green.blogs.nytimes.com/2009/12/22/fight-over-solar-power-in-the-mojave-desert/>.

205. 16 U.S.C. § 1539(a)(1)(B) (2018).

206. See, e.g., *Animal Welfare Inst. v. Beech Ridge Energy*, 675 F. Supp. 2d 540, 542 (D. Md. 2009) (granting injunctive relief to plaintiffs challenging a wind farm that would have harmed the endangered Indiana bat, despite noting the federal policy “encouraging development of renewable energy resources”).

207. See Driesen, *supra* note 202, at 816.

C. *The Possibilities—and Limits—of Precaution*

The courts' consistent endorsement of the ESA's precautionary nature gives agencies ample room to experiment with creating an implementation framework guided by the precautionary principle. But there are also a number of practical, policy-driven reasons why agencies might ultimately prefer a model of the ESA that is driven by the precautionary principle.

Above all else, applying the precautionary principle to listing decisions would result in more species—particularly species that are threatened by climate change—receiving protection under the ESA. Thus, an implementation policy guided by the precautionary principle could bolster the ESA against criticism that it functions as “emergency room care,” inefficiently stepping in only to save a species when “available remedies are limited and populations of the listed species may be so diminished, and habitats so degraded, that recovery is either impossible or extremely costly.”²⁰⁸ This criticism is particularly apt in the face of climate change, where the tipping point from likely-at-risk to imminently-imperiled is both uncertain and dependent on a number of factors, making it particularly difficult for agencies to judge future risk.²⁰⁹ Because uncertainty could not unilaterally stop the listing process, the precautionary principle would result in more climate-threatened species receiving the “benefit of the doubt” under the statute, even if it was not entirely clear at the time of listing how climate change would ultimately affect the species.²¹⁰ This would help the ESA better address the broad but diffuse threats to biodiversity posed by climate change.

Moreover, application of the precautionary principle to listing decisions might have the added co-benefit of encouraging implementing agencies to become more familiar with existing climate science and uncertainties, which, in turn, would lead to better and more efficient decision making in future cases. Currently, implementing agencies struggle with limited resources for evaluating information about a candidate species and for gathering additional information about a species.²¹¹ Under the precautionary principle, uncertainty cannot forestall a listing decision—and so the application of the precautionary principle would incentivize the creation of institutional infrastructure to help agencies more deeply account for uncertainties and gaps in information. By forcing agencies to at least grapple with uncertain but potentially catastrophic threats to species from climate change, agencies would ultimately move forward with a more nuanced understanding of the climate risks that a species faces. In this way, the precautionary principle helps agencies confront climate change in a manner

208. Karkkainen, *supra* note 13, at 20.

209. *See infra* Subpart I.A.

210. *Defs. of Wildlife v. Babbitt*, 958 F.Supp. at 680. Again, it is important to emphasize that under the weak precautionary principle that this Note supports, precautionary regulation would never be mandated in the face of uncertainty. Instead, uncertainty simply could not be used by agencies as an excuse for suspending the listing process.

211. NATIONAL RESEARCH COUNCIL STAFF, *supra* note 184, at 168.

consistent with the ESA's original purpose: the idea that government agencies cannot plead ignorance in the face of species extinction.²¹²

Finally, the precautionary principle offers a chance for early intervention with respect to climate-threatened species, which can allow for greater flexibility for various stakeholders.²¹³ By forcing implementing agencies to contend with, rather than dismiss, uncertainties due to climate change, the precautionary principle allows agencies and interested stakeholders to more fully consider uncertain but potentially catastrophic threats to species and habitat. Stakeholders, as a consequence, become better acquainted with the risks associated with a particular course of action, as well as potential risks from the extinction of a climate-threatened species. In a model driven by cost-benefit analysis, by contrast, risks that are unquantifiable are largely ignored, meaning that stakeholders are ultimately presented with a picture of overall risks that discounts possible but uncertain costs and benefits.²¹⁴ As discussed above, this is particularly troublesome in the face of climate change, where uncertain risks are potentially quite grave.

Even with the precautionary principle guiding threshold determinations of the ESA, however, there are limits to the statute's ability to meet the challenge of climate-fueled biodiversity loss. In its polar bear listing, for instance, FWS made clear that section 9, the ESA's takings section, and section 7, the ESA's consultation section, do not apply to greenhouse gas emissions.²¹⁵ Thus, any potential for the ESA to be used as a mitigation tool to encourage a decrease in fossil fuel emissions faces difficult legal and political barriers.²¹⁶ As one scholar noted, this leaves implementing agencies with the "Sisyphean" task of species protection: They can acknowledge climate-fueled threats but are powerless to stop the root cause of these threats in greenhouse gas emissions.²¹⁷

The reality is that while the ESA is a powerful endorsement of species preservation, it cannot unilaterally address the root causes of climate change and, as such, cannot unilaterally stop species extinction due to climate change. But application of the precautionary principle could have benefits outside of the conservation of biodiversity, particularly if the embrace of the precautionary principle in the ESA context led to a wider embrace of the precautionary

212. See 119 Cong. Rec. H. 11837 (daily ed. Dec. 20, 1973) (statement of Rep. Dingell) (stating "[i]t is a pity that we must wait until a species is faced with extermination before we begin to do those things that we should have done much earlier, but at least when and if that unfortunate stage is reached, the agencies of Government can no longer plead that they can do nothing about it. They can, and they must. The law is clear.").

213. See William K. Stevens, *Battle Looms over U.S. Policy on Species*, N.Y. TIMES (Nov. 16, 1993), <https://www.nytimes.com/1993/11/16/science/battle-looms-over-us-policy-on-species.html>.

214. See Driesen, *supra* note 202, at 816 (noting that "soft variables . . . lacking in hard numbers" are often discounted or not considered in traditional cost-benefit analyses).

215. Endangered and Threatened Wildlife and Plants; Special Rule for the Polar Bear, 73 Fed. Reg. 76,249, 76,265 (Dec. 16, 2008) (codified at 50 C.F.R. pt. 17).

216. See Blumm & Marienfeld, *supra* note 123, at 289–93.

217. *Id.* at 279.

principle in U.S. environmental law. In the context of climate change, uncertainty plagues more than just biodiversity: Uncertainties abound in every corner, from the amount of greenhouse gas emission reductions required to maintain a livable climate to the extent of probable climate-fueled damages.²¹⁸ At the same time, scientists have cautioned that the planet is running out of time to act.²¹⁹ This necessarily means that we will need to make decisions about whether or not to take preventative measures regarding climate change before we have resolved all lingering uncertainties about the issue. The sooner we can become comfortable with the thorny issues of uncertainty—rather treating uncertainty as an automatic barrier to preventative action—the easier it will be to make decisions that adequately balance both the potential risks of action and the potential risks of inaction.

CONCLUSION: THE ENDANGERED SPECIES ACT CHARTS AN UNCERTAIN PATH FORWARD

In 1973, when Congress passed the ESA, the global concentration of carbon dioxide hovered around 330 parts per million.²²⁰ When the U.S. government first considered listing the Arctic grayling as threatened or endangered in 1982, the global concentration measured just over 341 parts per million.²²¹ In 2014, when FWS determined that the Arctic grayling did not warrant listing, it had risen to just over 398 parts per million.²²² Today, the global concentration of carbon dioxide is well over 400 parts per million—the highest concentration of atmospheric carbon dioxide in three million years.²²³

The ESA, for all its strength, will have little to say about how high those concentrations eventually climb. The ESA will not be able to stop industry from emitting greenhouse gas emissions nor will it encourage a paradigm shift from fossil fuels to renewable energy. For better or for worse, the ESA's greatest strength lies in identifying discrete threats to discrete species—an endeavor that, in the face of climate change, feels woefully inadequate.

But the ESA's requirements necessarily force implementing agencies to confront a universal issue in climate policy—the uncertainty that comes with predicting how complex systems respond to complex problems. Given its

218. Stephen H. Schneider & Kristin Kuntz-Duriseti, *Uncertainty and Climate Change Policy*, in *CLIMATE CHANGE POLICY: A SURVEY 54* (eds. Schneider et al., 2002).

219. Bob Berwyn, *What Does '12 Years to Act on Climate Change' (Now 11 Years) Really Mean?*, INSIDECLIMATE NEWS (Aug. 27, 2019), <https://insideclimatenews.org/news/27082019/12-years-climate-change-explained-ipcc-science-solutions>.

220. NAT'L AERONAUTICS & SPACE ADMIN.: GLOBAL MEAN CO₂ MIXING RATIOS (PPM): OBSERVATIONS, <https://data.giss.nasa.gov/modelforce/ghgases/fig1a.ext.txt> (last visited May 21, 2020).

221. Berwyn, *supra* note 219.

222. NOAA: TRENDS IN ATMOSPHERIC CARBON DIOXIDE, <https://www.esrl.noaa.gov/gmd/ccgg/trends/global.html> (last visited May 21, 2020).

223. Isabelle Gerretsen, *CO₂ Levels at Highest for 3 Million Years—When Seas Were 20 Meters Higher*, CNN (Apr. 4, 2019), <https://www.cnn.com/2019/04/04/health/co2-levels-global-warming-climate-intl/index.html>.

precautionary purpose of halting and reversing the trend of species extinction, the ESA offers implementing agencies the opportunity to confront these uncertainties head on. Indeed, as the Ninth Circuit made exceedingly clear in *Zinke*, the precautionary principle is an inextricable part of the ESA's statutory mandate: Agencies confronted with uncertainty cannot throw their hands up in defeat.²²⁴ Instead, they must continue to move forward with the ESA's mandate of species protection.²²⁵

Today, the ESA sits at a crossroads between an uncertain climate future and a tempestuous political present. Recent changes to the implementation of the ESA threaten to undercut its precautionary nature, allowing for agencies to disregard climate-related uncertainty under the guise of economic benefits or time-constrained analyses.²²⁶ There will come a time in the near future when preventative action may need to be taken in the face of considerable climate uncertainty; we should take advantage of the strong structure of the ESA to grapple with how best to approach these problems now, before we run out of time.

224. *Ctr. for Biological Diversity v. Zinke*, 900 F.3d at 1072–73.

225. *Id.*

226. *See California v. Bernhardt Complaint*, *supra* note 177, at 2.

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