

The Endangered Species Act and Climate Change

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Editors' Summary

Climate change is already affecting ecosystems around the globe. In the United States, we are seeing forced species relocations due to temperature changes, reductions in habitat due to rising sea levels, and increasing adverse impacts of invasive species. These problems present challenges to implementation of the Endangered Species Act, particularly with regard to listing decisions and critical habitat designations. To address these issues, the U.S. Fish and Wildlife Service and the National Marine Fisheries Service will need to take climate change and the "best available science" standard into account when examining effects on species.

Climate change is of increasing concern in the context of the Endangered Species Act (ESA).¹ The annual global emission of carbon dioxide (CO₂) grew by approximately 80% between 1970 and 2004,² which has led to rising global surface temperatures and rising sea levels.³ Those effects led one preeminent ecologist to conclude in 2005 that climate change is "a major threat to the survival of species and integrity of ecosystems worldwide."⁴ In 2007, the Intergovernmental Panel on Climate Change (IPCC) concluded that pressures from climate change and associated disturbances will likely overcome the natural resilience of many ecosystems, and as a result, 20 to 30% of plant and animal species will be subject to an increased chance of extinction in this century.⁵

On June 16, 2009, the Barack Obama Administration released its first climate change report, *Global Climate Change Impacts in the United States*,⁶ which assesses the current and future impacts of climate change on the nation. The report, which uses stronger language than any prior presidential assessment, breaks down the effects of global warming in the United States by region and sector; it describes how urban infrastructure will be placed in danger by hurricanes and storm surges; how heat waves, poor air quality, and insects will increase; and how it will be difficult for society and natural resources to adapt to rapid climate change. The report lists the following recommendations for dealing with climate change: expand our understanding of climate change impacts; refine our ability to project climate change; expand our capacity to provide decisionmakers and the public with relevant information on climate change and its impacts; improve our understanding of thresholds likely to lead to abrupt changes in climate or ecosystems; improve our understanding of the most effective ways to reduce the rate and magnitude of climate change, as well as unintended consequences of such activities; and enhance our understanding of how society can adapt to climate change. The Obama

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1. 16 U.S.C. §§1531-1544, ELR STAT. ESA §§2-18.
2. Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report, Climate Change 2007: Synthesis Report Summary for Policymakers at 5 (Nov. 2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.
3. See Stefan Rahmstorf et al., *Recent Climate Observations Compared to Projections*, 316 SCI. 709 (2007).
4. Philip E. Hulme, *Adapting to Climate Change: Is There Scope for Ecological Management in the Face of a Global Threat?*, 42 J. APPLIED ECOLOGY 784 (2005).
5. IPCC, Working Group II Contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report, Climate Change 2007: Climate Change Impacts, Adaptations, and Vulnerability Summary for Policymakers (2007), available at <http://www.ipcc.ch> (last visited Oct. 30, 2009).
6. GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES (Thomas R. Karl et al. eds., Cambridge Univ. Press 2009).

Administration hopes that the report will generate public and political support for strong climate change legislation.

These recent reports are the latest examples of the increase in awareness of climate change evolving over the last several decades. In 1978, the U.S. Congress passed the National Climate Program Act (NCPA), which required the president to establish a program to “assist the Nation and the world to understand and respond to natural and man-induced climate processes and their implications.”⁷ In response to President Jimmy Carter’s directive under the NCPA, the National Research Council concluded that continued increases in CO₂ levels would lead to climate change and that a “wait-and-see policy may mean waiting until it is too late.”⁸ In 1987, Congress enacted the Global Climate Protection Act,⁹ finding that man-made pollution “may be producing a long-term and substantial increase in the average temperature on Earth.”¹⁰ During the 1990s, the United Nations took a series of steps to respond to climate change, culminating in the adoption of the Kyoto Protocol, which assigned mandatory targets for industrialized nations to reduce greenhouse gas (GHG) emissions. While the United States declined to ratify the Kyoto Protocol,¹¹ evidence of climate change has steadily increased,¹² as has the pressure on the U.S. government to respond.

This pressure increased further following the landmark 2007 *Massachusetts v. EPA*¹³ decision, in which the U.S. Supreme Court acknowledged that the “harms [already] associated with climate change are serious and well recognized” and stated unequivocally that “global warming threatens . . . a precipitate rise in sea levels, severe and irreversible changes to natural ecosystems, a significant reduction in winter snowpack with direct and important economic consequences, and increases in the spread of disease and the ferocity of weather events.”¹⁴ Addressing the challenges for agencies to implement regulations taking into account climate change, the Court noted that “agencies, like legislatures, do not generally resolve massive problems in one fell swoop, but instead whittle away over time, refining their approach as circumstances change and they develop a more nuanced understanding of how best to proceed.”¹⁵ However, proceed they must, as the Supreme Court made it clear that simply because Congress did not have climate change in mind when it drafted a law does not mean that agencies can ignore the effects of climate change.¹⁶

With the ESA’s primary goal being to “provide a means whereby the ecosystems upon which endangered and threat-

ened species depend may be conserved,”¹⁷ and with a growing scientific consensus regarding ecosystem-level impacts related to climate change, the ESA will be a focal point of climate change discussion. Indeed, many conservation groups are already utilizing the ESA in an effort to force regulation of GHG emissions,¹⁸ and federal courts have begun to require consideration of climate change in conjunction with the application of the ESA.¹⁹

This Article examines the implications of the findings on climate change and its effects on ecosystems for ESA application and implementation. The initial discussion describes the impacts that climate change is having or is predicted to have on wildlife and plant species. Then, using the 2008 polar bear listing and cases considering climate change in the context of §7 consultation as examples, the analysis examines the current and potential use of climate change impacts in application of the ESA.

I. The Impact of Climate Change on Species and Their Habitat

Climate change has numerous adverse implications for a variety of wildlife and ecosystems. Some scientists have predicted that within the next 50 years, up to one-third of species in certain areas will be extinct as a result of global warming.²⁰ The consequences of climate change for wildlife species and habitats appear in a variety of forms, as discussed below.

A. Forced Relocation Due to Rising Temperatures

Rising temperatures have already forced some species to relocate. Since the mid-20th century, wildlife has moved toward the poles an average of four miles per decade and upslope an average of 20 feet per decade.²¹ For example, researchers in Yosemite National Park have found that in the past 90 years, the altitude of pika (*Ochotona pinceps*) population locations has risen from 7,800 feet to 9,500 feet.²² Additionally, there are currently almost no native bird species below 4,500 feet in Hawaii due to migration to higher elevations.²³

Such relocation can be hindered by obstacles such as lack of food supply and other ecological conditions necessary to support the displaced species.²⁴ In addition, migration to

7. 92 Stat. 601.

8. Climate Research Board, *Carbon Dioxide and Climate: A Scientific Assessment*, at vii (1979).

9. Title XI of Pub. L. No. 100-204, 101 Stat. 1407, note following 15 U.S.C. §2901.

10. §1102(1), 101 Stat. 1408.

11. See S. Res. 98, 105th Cong. (July 25, 1997) (as passed).

12. See, e.g., *Climate Change Science: An Analysis of Some Key Questions 1* (NRC Report).

13. 127 S. Ct. 1438, 1455, 37 ELR 20075 (2007).

14. *Id.*

15. *Id.* at 1442.

16. *Id.* at 1462-63.

17. 16 U.S.C. §1531(b), ELR STAT. ESA §2(b).

18. See, e.g., *ENDANGERED SPECIES: Petition to Protect Seals From Melting Ice*, GREENWIRE, Dec. 21, 2007, stating: “Attorney Brendan Cummings, ocean program director for the Center for Biological Diversity, said that without a national legal mechanism regulating greenhouse gases, his organization has turned to the Endangered Species Act.”

19. See *Natural Res. Def. Council v. Kempthorne*, 506 F. Supp. 2d 322, 37 ELR 20305 (E.D. Cal. 2007).

20. Brief for Wildlife Conservation Interests as Amici Curiae Supporting Petitioners, *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007) (No. 05-1120), 2006 WL 2563382, at *3.

21. Camille Parmesan & Gary Yohe, *A Globally Coherent Fingerprint of Climate Change Impacts Across Natural Systems*, 421 NATURE 37, 42 (2003).

22. Donald Grayson, *A Brief History of Great Basin Pikas*, 32 J. BIOGEOGRAPHY 2103 (2006).

23. See *Global Warming May Spread Diseases*, <http://www.cbsnews.com/stories/2002/06/20/tech/main512920.shtml> (last visited Nov 6, 2009).

24. See *Pew Center on Global Climate Change, Executive Summary*, available at http://www.pewclimate.org/global-warming-in-depth/all_reports/observed-

suitable new habitats may be impeded or blocked by “natural obstacles to movement, such as large water bodies (which create barriers for terrestrial species) and coastlines (for marine and estuarine species).”²⁵

Rising temperatures may also cause spring to arrive earlier than in previous years,²⁶ resulting in ripple effects throughout ecosystems. For example, migratory patterns may be disrupted, along with the patterns of the plant and prey species upon which migratory species rely for food. As a result, some migratory species may arrive at their destinations at a time that is mismatched with the plants or prey that would ordinarily be present at the location.²⁷ Because “the timing of arrival on breeding territories and over-wintering grounds is a key determinant of reproductive success, survivorship, and fitness,” any variation in the timing of these events can have drastic consequences for the survival of those species.²⁸

B. *Reduced Habitat Due to Rising Sea Levels, Melting Sea Ice and Snowpack, and Increased Frequency and Intensity of Hurricanes and Typhoons*

The dramatic effect of climate change on sea ice and snow pack is a significant concern. There has been a downward trend in the extent of sea ice since 1978 with the past few years exceeding previous low records.²⁹ Between 2000-2005, there was a 21% reduction of sea ice for the Arctic Ocean.³⁰ Significant warming has been occurring in the Arctic as evidenced by earlier onset of spring melt and the increase in the duration of the melt season.³¹ With the exception of 1996, the years 1995-2006 were the warmest on record since 1850.³² The effect of this warming has been greatest at higher northern latitudes where polar bear habitats are found.³³ In the last three decades of the 20th century, “sea-ice thickness has declined by about 40% in the late summer and early autumn,”³⁴ and the polar ice cap is now melting at a rate of 9% per decade,³⁵ which may be a conservative estimate.³⁶

These drastic changes have led to increased concern for the species that rely on sea-ice habitat, most notably evident in the listing of the polar bear as a threatened species under the ESA.³⁷

More generally, in the past 40 years, the average snow cover in the Northern Hemisphere has decreased by 10%.³⁸ The lack of snow cover is impacting the flow levels and temperatures of trout- and salmon-bearing rivers and streams and could ultimately render some of those rivers uninhabitable.³⁹

Rising sea levels have similarly dramatic habitat impacts. In the past century, the average global sea level rose between 4 and 8 inches, and sea levels are expected to rise between 4 and 35 inches by 2100.⁴⁰ This will disrupt many species that rely on areas of shallow water for habitat, such as dolphins and manatees. In combination with the more frequent and intense hurricanes predicted to result from higher water temperatures, rising sea levels will lead to diminished beach habitats due to the flooding and erosion of coastal areas.⁴¹ This could lead to drastic consequences for those species that rely on those coastal areas for habitat, such as seals and sea turtles. Rising sea levels will also impact freshwater species in coastal areas where the ocean water will increase the salinity of rivers and irrigation water in those regions.⁴²

C. *Invasive Species Adapting to Ecosystems Altered by Climate Change*

The adverse impacts of invasive species on native species are expected to be exacerbated due to invasive colonization of vegetation communities. These communities have suffered dieback as a result of new temperature and precipitation conditions and poleward and upslope expansion in the wake of climate change.⁴³

Research has also indicated that due to increased moisture and warmth in higher latitudes and higher elevation habitats, “tropical and subtropical diseases are projected to move

impacts/execsumm.cfm; see also Terry L. Root & Stephen H. Schneider, *Climate Change: Overview and Implications for Wildlife*, in WILDLIFE RESPONSES TO CLIMATE CHANGE: NORTH AMERICAN CASE STUDIES 59 (Stephen H. Schneider & Terry L. Root eds., 2002).

25. Camille Parmesan, *Biotic Response: Range and Abundance Changes*, in CLIMATE CHANGE AND BIODIVERSITY 52 (Lovejoy & Hannah eds., 2005).

26. Gian-Reto Walther et al., *Ecological Responses to Recent Climate Change*, NATURE, Mar. 28, 2002, 389-95.

27. See Climate Change and Migratory Species, http://www.bto.org/notices/climate_change.htm (last visited Nov. 6, 2009).

28. See Peter A. Cotton, Avian Migration Phenology and Global Climate Change, 100 Proceedings of the Nat'l Acad. 12219, 12219-22 (2003), available at <http://www.pnas.org/cgi/reprint/100/21/12219.pdf>.

29. Determination of Threatened Status of the Polar Bear Throughout Its Range, 73 Fed. Reg. 28212, 28220 (May 15, 2008) (to be codified at 50 C.F.R. pt. 17).

30. *Id.*

31. *Id.* at 28224.

32. *Id.*

33. *Id.*

34. Habiba Gitay, *Climate Change and Biodiversity*, IPCC TECHNICAL PAPER V, Apr. 2002, at 6, available at <http://www.ipcc.ch/pdf/technical-papers/climate-changes-biodiversity-en.pdf>.

35. Natural Resources Defense Council, *Melting Glaciers, Early Ice Thaw*, <http://www.nrdc.org/globalWarming/fcons/fcons4.asp> (last visited Nov. 8, 2009).

36. Press Release, U.S. Department of the Interior, Secretary Kempthorne Announces Decision to Protect Polar Bears Under Endangered Species Act (May

14, 2008), available at http://www.doi.gov/news/08_News_Releases/080514a.html.

37. See Part II.A.1.

38. Gitay, *supra* note 34, at 6.

39. See Kirkman O'Neal, *Effects of Global Warming on Trout and Salmon in U.S. Streams*, Defenders of Wildlife & Natural Res. Def. Council (2002), available at http://www.defenders.org/resources/publications/programs_and_policy/science_and_economics/global_warming/effects_of_global_warming_on_trout_and_salmon.pdf; see also N. LeRoy Poff et al., *Aquatic Ecosystem and Global Climate Change*, Pew Ctr. on Global Climate Change, 9-10 (2002), available at <http://www.pewclimate.org/docUploads/aquatic.pdf> (describing how increases in atmospheric temperatures will impact aquatic ecology, specifically the habitats of trout and salmon).

40. IPCC, *Climate Change 2001: Synthesis Report*, 6 (2001).

41. IPCC, *Fourth Assessment Report, Climate Change 2007: Synthesis Report Summary for Policymakers* at 10 (Nov. 2007), available at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

42. U.S. Dept. of the Interior, Bureau of Reclamation, Mid-Pacific Region, *Central Valley Project and State Water Project Operations Criteria and Plan—Biological Assessment*, at 7-20 (May 2008).

43. Erika Zavaleta & Jennifer L. Royval, *Climate Change and the Susceptibility of U.S. Ecosystems to Biological Invasions: Two Cases of Expected Range Expansion in Wildlife Responses to Climate Change*, in WILDLIFE RESPONSES TO CLIMATE CHANGE: U.S. CASE STUDIES 277 (Stephen H. Schneider & Terry L. Root eds., 2002).

poleward or upslope.⁴⁴ Not only will new pathogens creep into new areas that are unsuited to accommodate those species, but climate zones that generally experience seasons with average cold temperatures are predicted to experience longer annual periods of warmer temperatures that will facilitate increased pathogen growth and reproduction.⁴⁵ For example, increased temperatures have been cited as the cause of avian malaria in several thousand birds in Hawaii, distemper in African lions due to an insect-borne pathogen in Tanzania, and diseases that cause deadly bleaching in coral reefs.⁴⁶

II. Potential Implications for ESA Application

In light of the growing evidence of climate change impact on species and their habitats, as described above, Congress has urged the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) to take climate change into consideration with regard to effects on species.⁴⁷ However, considering climate change in the context of the ESA will be challenging, due to the global nature of sources contributing to the problem and the difficulty of addressing these causes and impacts for individual species and small-scale ecosystems. Given the statutory framework of the ESA, the impacts of climate change will have to be assessed in regard to the core issues the ESA addresses: what species to protect, and where and which threats to regulate and how. The following discussion examines these questions, focusing on the role of climate change in the listing process under §4, the take prohibition under §9, and the incidental take permitting processes (no jeopardy standard) under §7 and §10.

A. Section 4: Listing Decisions, Critical Habitat Designation, and Recovery Plans

I. Listing of Endangered and Threatened Species

The listing of species as threatened or endangered under §4 is based on the following criteria: “(a) the present or threatened destruction, modification, or curtailment of its habitat or range; (b) overutilization for commercial, recreational, scientific, or education purposes; (c) disease or predation; (d) the inadequacy of existing regulatory mechanisms; or (e) other natural or manmade factors affecting its continued existence.”⁴⁸ The 2008 listing of the polar bear is prob-

ably the most prominent listing primarily based on climate change-induced impacts.⁴⁹

In its listing of the polar bear as a threatened species, the FWS found that sea ice, the polar bear’s primary habitat, was declining throughout its range and that this decline was expected to continue.⁵⁰ The FWS concluded that arctic sea ice would “continue to be affected by climate change” and more dramatically, that “catastrophic mortality events that have yet to be realized on a large scale are expected to occur.”⁵¹ In light of the five statutory criteria listed above, the FWS issued its listing determination primarily because “[c]hanges in sea ice negatively impact polar bears by increasing the energetic demands of movement in seeking prey, causing seasonal distribution of substantial portions of populations into marginal ice or terrestrial habitats with limited values for feeding, and increasing the susceptibility of bears to other stressors. . . .”⁵² The FWS concluded that these adverse impacts on the polar bear’s habitat threatened the species throughout its range.

The FWS’ findings on the impacts of climate change on the polar bear are considered likely to lead to additional listings of polar species subject to the same stressors. Petitions to list 10 penguin species⁵³ and three seal species⁵⁴ have been filed, as well as petitions for species in the lower 48 states, like the American pika,⁵⁵ that may be impacted by decreasing snow pack and rising temperatures. Such listings will continue to be at the center of ESA-based climate change litigation.

44. Brief for Wildlife Conservation Interests as Amici Curiae Supporting Petitioners, *Massachusetts v. EPA*, 127 S. Ct. 1438 (2007) (No. 05-1120), 2006 WL 2563382, at *19.

45. See Curtis Petzoldt & Abby Seaman, *Climate Change Effects on Insects and Pathogens*, available at <http://www.climateandfarming.org/pdfs/FactSheets/III.2Insects.Pathogens.pdf>.

46. See Global Warming May Spread Diseases, <http://www.cbsnews.com/stories/2002/06/20/tech/main512920.shtml> (last visited Nov. 6, 2009). See also 65 Fed. Reg. 20760 (Apr. 18, 2000) (finding in the final rule to list the O’ahu ‘Elepaio from the Hawaiian Islands as endangered that avian malaria and avian pox were the primary contributor to the decline in those Hawaiian bird populations).

47. See *Appropriators Urge Interior to Deepen Review of How Global Warming Is Affecting Species*, 38 ENV’T REP. (BNA) 1015 (2007).

48. 16 U.S.C. §1533(a)(1), ELR STAT. §4(a)(1).

49. See 73 Fed. Reg. 28212 (May 15, 2008) (listing the polar bear as threatened); 71 Fed. Reg. 26852 (May 9, 2006) (listing the elkhorn coral and staghorn coral as threatened). The FWS had also considered climate change in earlier listing decisions. See 69 Fed. Reg. 76428, 76429 (Dec. 21, 2004) (withdrawn) (stating “we recognized in the proposal that the butterfly [Karner blue] may be vulnerable to changes in climate”); 56 Fed. Reg. 28712 (June 24, 1991) (“because of global warming and the [Uncompahgre Fritillary] butterfly’s susceptibility to drought its chances for long-term survival were nil”); 68 Fed. Reg. 7580, 7607 (Feb. 14, 2003) (stating that although the FWS ultimately decided that listing the California spotted owl was unwarranted at the time, it thoroughly discussed the implications of greenhouse gases and climate change on spotted owl populations).

50. Determination of Threatened Status of the Polar Bear Throughout Its Range, 73 Fed. Reg. at 28212.

51. *Id.* at 28275.

52. *Id.* Such other stressors include the reduced availability of prey seal species, whose populations are also expected to decline. Indeed, the NMFS initiated a status review in September 2008 of three ice seal species in response to a listing petition based in large part on climate change-induced impacts similar to those described in the polar bear listing. See 73 Fed. Reg. 51615 (Sept. 4, 2008).

53. See Press Release, Center for Biological Diversity, *Penguins Marching Toward Endangered Species Act Protection*; Court Deadline Set for 10 Penguin Species Threatened by Global Warming (Sept. 8, 2008), available at http://www.biologicaldiversity.org/news/press_releases/2008/penguins-09-08-2008.html.

54. See Press Release, Center for Biological Diversity, *Three Arctic Seal Species Advance Toward Endangered Species Act Protection*; Ringed, Bearded, and Spotted Seals Threatened by Global Warming (Sept. 4, 2008), available at http://www.biologicaldiversity.org/news/press_releases/2008/seals-09-04-2008.html.

55. See Press Release, Center for Biological Diversity, *Lawsuit to Be Filed to Protect American Pika*; Bush Administration Ignores Endangered Species Act Deadline for Small Mammal Threatened by Global Warming (Jan. 3, 2008), available at http://www.biologicaldiversity.org/news/press_releases/2008/pika-01-03-2008.html.

2. Protective Regulations Under §4(d)

The polar bear listing also indicates that the distinction between listing a species as “threatened” and “endangered” will be critical. The take prohibitions of §9 do not apply automatically to threatened species. Section 4(d) allows the FWS and the NMFS to adopt regulations deemed “necessary and advisable for the conservation of” threatened species.⁵⁶ The NMFS has issued such regulations for a number of species,⁵⁷ but the FWS has typically extended the same protections to threatened species as endangered species.⁵⁸ In conjunction with its listing of the polar bear as threatened, the FWS issued a Special Rule under §4(d) that essentially incorporated by reference the protective provisions of the Marine Mammal Protection Act that already applied to activities affecting the polar bear.⁵⁹ Notably, the Special Rule explicitly exempted any taking of polar bears incidental to “an otherwise lawful activity within any area subject to the jurisdiction of the United States except Alaska,” complementing its guidance concerning §7 and consultations that could theoretically be triggered by GHG emissions in the lower 48 states with attenuated climate change effects in polar regions. Thus, listing species as “threatened” provides the Services with a great deal more flexibility in formulating protective measures than the “endangered” status and the strict prohibitions of §9. On May 8, 2009, U.S. Department of the Interior (DOI) Secretary Ken Salazar announced that the DOI will retain the §4(d) Special Rule for Polar Bears.⁶⁰

3. Critical Habitat Designation

The polar bear listing provides a fairly straightforward model for future climate change-based species listings, but the inherently dynamic effects of climate change make the designation of critical habitat for these species substantially more complicated. As discussed above, climate change is expected to force species and their prey to relocate, and rising sea levels and decreasing snow pack will result in substantial physical changes to certain habitats. Critical habitat designations in the context of climate change thus pose another new challenge for the Services.

Section 4 of the ESA provides the FWS and the NMFS with considerable flexibility in designating critical habitat. First, critical habitat may include “specific areas outside the geographical area occupied by the species” upon a determination that such areas are “essential for conservation of the

species.”⁶¹ This provision provides the opportunity to potentially address the habitat-shifting effects of climate change described above by, for example, using predictive modeling to determine those areas to which species affected by climate change may be migrating and to concentrate conservation efforts on those areas. The FWS applied this kind of approach when considering critical habitat designation for the Preble’s meadow-jumping mouse. The FWS included small streams in the species’ critical habitat, even though larger streams are more important to the species, on the ground that “Preble’s populations along mountain streams may be less subject to certain threats including . . . long-term climate change.”⁶²

On the other hand, the ESA and its regulations also provide the flexibility to decline to designate critical habitat if it would not be “prudent,” based on a determination that it would not be beneficial to the species. The Services may also conclude that critical habitat is “indeterminable” in the face of the uncertainty posed by climate change. This was the position adopted by the FWS with respect to the polar bear. The FWS concluded that there was too much uncertainty as to which specific areas within the United States “might be essential to the conservation of the polar bear” and consequently found that critical habitat was indeterminable.⁶³

4. Recovery Plans

ESA §4(f) requires the FWS and the NMFS to develop recovery plans “for the conservation and survival of endangered species and threatened species listed pursuant to this section, unless [they find] that such a plan will not promote the conservation of the species.”⁶⁴ This caveat gives the FWS and the NMFS the discretion not to prepare recovery plans, which may be more likely in climate change-based listings where there may be few practical domestic mechanisms to promote recovery in the face of a globalized problem. But in at least one case, the FWS has suggested that integration of climate change in the recovery plan can “support recovery actions to protect and restore local habitat and restore local habitat conditions as a buffer against larger-scale changes.”⁶⁵ Thus, climate change can inform the development of localized recovery plans. Recovery plans, in general, can also provide extensive information about a species and can guide and inform complementary local, state, and private conservation and recovery efforts, in addition to informing incidental take authorizations under §§7 and 10 of the ESA.

B. Section 9: The Take Prohibition

Section 9 prohibits acts that “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” listed species.⁶⁶

56. 16 U.S.C. §1533(d), ELR STAT. ESA §4(d).

57. See generally 50 C.F.R. Part 223.

58. See 50 C.F.R. §§17.21, 17.31.

59. Special Rule for the Polar Bear, 73 Fed. Reg. 28306, 28318 (May 15, 2008) (to be codified at 50 C.F.R. pt. 17).

60. Release, Salazar Retains Conservation Rule for Polar Bears, U.S. Department of the Interior, May 8, 2009, available at http://www.doi.gov/news/09_News_Releases/050809b.html (News Release). Under the Omnibus Appropriations Act of 2009, Congress granted Secretary Salazar authority until May 10, 2009, to revoke the 4(d) Rule. Secretary Salazar declined to exercise this authority, explaining that “the best course of action for protecting the polar bear under the Endangered Species Act is to wisely implement the current rule, monitor its effectiveness, and evaluate our options for improving the recovery of the species.”

61. 16 U.S.C. §1532(5)(A), ELR STAT. §3(5)(A).

62. U.S. Fish & Wildlife Serv., Designation of Critical Habitat for the Preble’s Meadow Jumping Mouse, 68 Fed. Reg. 37267, 37285 (June 23, 2003).

63. 73 Fed. Reg. at 28298.

64. 16 U.S.C. §1533(f)(1), ELR STAT. ESA §4(f)(1).

65. Nat’l Marine Fisheries Serv., Proposed Recovery Plan for the Evolutionarily Significant Unit (ESU) of the Puget Sound Chinook Salmon, 70 Fed. Reg. 76445, 76447 (Dec. 27, 2005).

66. 16 U.S.C. §1532(19), ELR STAT. ESA §3(19).

In *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, the Supreme Court upheld the FWS' definition of "harm" to include any modification of the species' habitat that results in "actual death or injury" to a species "by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."⁶⁷ This raises the question in the climate change context of whether GHG emissions contributing to climate change can proximately cause "harm" for ESA purposes.⁶⁸ In *Sweet Home*, the Court emphasized the importance of "proximate causation and foreseeability"⁶⁹ when defining harmful activities, but these elements can be rather attenuated when dealing with climate change. On the other hand, the Supreme Court in *Massachusetts* allowed a less proximate causal chain in order to establish the "injury-in-fact" element to determine that the plaintiffs had standing in that case.⁷⁰ There, the Court first noted that there is indeed "a causal connection between man-made greenhouse gas emissions and global warming" and concluded that the Court may require EPA to regulate automobile emissions in order to reduce domestic production of those GHGs, even if doing so would merely be a "tentative step" toward combating global climate change.⁷¹ This illustrates that, in the context of takings caused by climate change, causation may take many forms, so agency discretion will have an especially important role in implementing the regulatory scheme.

C. Section 7: Jeopardy Consultations

Consideration of climate change in §7 consultations presents two issues: (1) whether federal actions that cause, fund, or authorize GHG emissions are "likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of [critical] habitat,"⁷² and (2) how the FWS and the NMFS should consider the effects of other federal actions in the context of climate change. The direct and indirect effects requiring consideration under the §9 jeopardy standard include those effects "that are caused by the proposed action and are later in time, but still are reasonably certain to occur," and "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation."⁷³ Based on these definitions, a causal connection can be drawn between GHG emissions and climate change-induced effects on species, such that federal authorizations resulting in GHG emissions could theoretically trigger §7 consultation.

In anticipation of such arguments, the FWS issued guidance in the wake of the polar bear listing. The guidance explicitly stated that the FWS did not anticipate that such

federal authorizations of projects involving GHG emissions would present a sufficient causal connection between, for example, emissions at an individual facility and individualized impacts on a species like the polar bear that is affected by climate change in general.⁷⁴ The U.S. Geological Survey concluded in concurrent guidance that "current science and models cannot link individual actions that contribute to atmospheric carbon levels to specific responses of species, including polar bears."⁷⁵ Similarly, the FWS concluded:

The best scientific data available today do not allow us to draw a causal connection between GHG emissions from a given facility and effects posed to listed species or their habitat, nor are there sufficient data to establish that such impacts are reasonably certain to occur. Without sufficient data to establish the required causal connection—to the level of reasonable certainty—between a new facility's GHG emissions and impacts to listed species or critical habitat, Section 7 consultation would not be required to address impacts of a facility's GHG emissions.⁷⁶

The FWS and the NMFS subsequently promulgated a major update to the consultation regulations to reflect this guidance on the scope of consultation, specifically focusing on requiring a clear causal connection between a federal project and impacts to listed species.⁷⁷ Consultation is not triggered where the

effects of [the] action are manifested through global processes and: (i) Cannot be reliably predicted or measured at the scale of a listed species' current range, or (ii) Would result at most in an extremely small, insignificant impact on a listed species or critical habitat, or (iii) Are such that the potential risk of harm to a listed species or critical habitat is remote; or (3) The effects of such action on a listed species or critical habitat: (i) Are not capable of being measured or detected in a manner that permits meaningful evaluation; or (ii) Are wholly beneficial.⁷⁸

In the update to the §7 consultation regulations, the FWS and the NMFS clarified the phrase "manifested through global processes" as covering "those effects that are the result of a specific source but become well mixed and diffused at the global scale such that they lose their individual identity."⁷⁹ They recognized that these combined effects become a "potential contributor to a separate phenomenon with possible global impacts," but that the contribution of any particular source to the global process that then affects a global environment is typically "very, very small."⁸⁰ However,

67. 515 U.S. 687, 691, 25 ELR 21194 (1995) (citing 50 C.F.R. pt. 17.3 and 50 C.F.R. pt. 217).

68. See J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-Analog Future*, 88 B.U. L. REV. 1, 39-40 (2008) (discussing the causal issues involved in the *Babbitt v. Sweet Home* decision).

69. 515 U.S. at 696-97 n.9.

70. 127 S. Ct. 1438, 1457, 37 ELR 20075 (2007).

71. *Id.*

72. 16 U.S.C. §1536(a)(2), ELR STAT. ESA §7(a)(2).

73. 50 C.F.R. §402.02.

74. See Memorandum from Dale Hall, Director, FWS, to Regional Directors, Regions 1-8, Expectations for Consultations on Actions That Would Emit Greenhouse Gases (May 14, 2008) [hereinafter Hall Memorandum].

75. Memorandum from Mark Myers, Director, U.S. Geological Survey, to Director, FWS, The Challenges of Linking Carbon Emissions, Atmospheric Greenhouse Gas Concentrations, Global Warming, and Consequential Impacts (May 14, 2008).

76. Hall Memorandum, *supra* note 74.

77. 73 Fed. Reg. 47868 (Aug. 15, 2008).

78. 73 Fed. Reg. 76272, 76287 (codified at 50 C.F.R. §402.03(b)(2)).

79. 73 Fed. Reg. 76272, 76282.

80. *Id.*

the FWS and the NMFS also explained that the term “manifested through global processes” does not refer to effects “that can be evaluated for the immediate effects on the surrounding area caused by their primary physical and chemical characteristics [because] they would be traced and measured to the extent possible”⁸¹ and that the term does not “preclude the appropriate consideration of climate change, generally, for purposes of establishing the environmental baseline and the status of the species in the action area [for example, information on different precipitation patterns than experienced in the past].”⁸²

In explaining the intent behind this revision and behind the rule more generally, the FWS and the NMFS stated unequivocally that they “believe that section 7(a)(2) simply was not intended to deal with global processes at individual project level consultations.”⁸³ The FWS and the NMFS captured the practical problem of using the ESA to regulate climate change by observing that “to attempt to regulate effects at a global scale would have the untenable consequence of transforming the ‘action area’ for consultation into the globe itself.”⁸⁴ Directly addressing the intent of the ESA, the FWS and the NMFS stated further that they do not believe “that Congress designed or intended the ESA to be utilized as a tool to regulate global processes.”⁸⁵ This discussion concluded with the following statement, which goes to one of the essential policy debates in climate change regulation and clearly indicates on which side of the policy debate the prior George W. Bush Administration landed: it is not “appropriate to hold an agency responsible for global processes.”⁸⁶ In retaining the Polar Bear Conservation Rule, Secretary of Interior Salazar clarified the Obama Administration’s position that the ESA is not the proper regulatory mechanism for addressing climate change.

The substance of this rulemaking reflects a balancing act by the FWS and the NMFS between, on the one hand, acknowledging and responding to climate change in its listing process, and on the other hand, reining in a potentially far-reaching ESA interpretation that could require federal agencies to consult on the attenuated GHG-related effects of a project on species ranging from the polar bear to tropical corals.

The revised regulatory language makes the policy position of the FWS and the NMFS on the appropriateness of regulating climate change through the ESA even clearer, but the language itself appears to present ripe opportunities for confusion and litigation. Phrases like “global processes,” “extremely” or “very, very” small, and “well mixed” are vague and ill-defined and have not been used in past ESA practice.⁸⁷ In fact, Secretary Salazar and Commerce Secretary Gary Locke requested public comments on numerous

ESA causation issues, including the issue of effects related to global climate change.⁸⁸

Recently, there have been several cases that raise the issue of global climate change as a necessary “effect” to be considered in the formal consultation between the agency and the FWS or the NMFS. Two companion cases in California (the Delta Cases) involved challenges to biological opinions issued for the federally managed Central Valley Project and the state of California’s State Water Project authorizing incidental take of the Delta smelt and several listed salmonids.⁸⁹ Among other issues, the court held that the FWS acted arbitrarily and capriciously by failing to address the issue of climate change, which the court described as a failure to analyze a potentially “important aspect of the problem” of water supply in California.⁹⁰ Citing the statutory requirement to use the “best scientific and commercial data available,” the court found that the FWS’ conclusions were impermissibly “based in part on the assumption that the hydrology of the water bodies affected by [the projects] will follow historical patterns for the next 20 years”⁹¹ and that there was “readily available scientific data . . . regarding the potential effects of global climate change”⁹² on the project area. The Delta Cases thus provide an example of how climate change may enter into the consultation process more indirectly.

D. Section 10: Incidental Take Permits and Experimental Populations

I. Incidental Take Permits

The assessment of climate change-induced impacts to listed species in the context of §10 presents the same challenges described above with respect to §7 of the ESA. The same questions that could be raised about the need to consult on attenuated GHG-related impacts to species in the consultation context could also be raised in the context of incidental take permit applications under §10. Two related elements unique to the habitat conservation planning under §10, however, raise additional issues relevant to climate change: adaptive management and the No Surprises Policy. Under the No Surprises Policy, habitat conservation plans (HCPs) typically provide assurances that the FWS and the NMFS will not impose additional mitigation requirements to address future impacts by “unforeseen circumstances,” while prescribing certain additional mitigation requirements in the event of identified “changed circumstances.”⁹³ The court’s analysis in the Delta Cases suggests that climate change-induced impacts would be reasonably foreseeable changed circumstances for which additional mitigation measures could be required. Adaptive management principles that have been long incor-

81. 73 Fed. Reg. 76272, 76282-83.

82. 73 Fed. Reg. 76283.

83. 73 Fed. Reg. 76272, 76280.

84. 73 Fed. Reg. 76272, 76283.

85. *Id.*

86. *Id.*

87. 50 C.F.R. §402.03.

88. 74 Fed. Reg. 20422 (May 4, 2009).

89. *See* *Natural Res. Def. Council v. Kempthorne*, 506 F. Supp. 2d 322 (E.D. Cal. 2007); *Pac. Coast Fed’n of Fishermen’s Ass’n/Inst. for Fisheries Res. v. Gutierrez*, 2008 WL 2223070 (E.D. Cal. 2008).

90. *Kempthorne*, 506 F. Supp. 2d at 364, 369.

91. *Kempthorne*, 506 F. Supp. 2d at 367.

92. *Gutierrez*, 2008 WL 2223070 at *60.

93. 50 C.F.R. §17.22(b)(5)(iii).

porated into HCPs to address changed circumstances can be used to address those reasonably foreseeable effects of climate change, such as rising sea levels and changes in precipitation, and provide flexibility in the HCP process.

2. Experimental Populations

Section 10(j) of the ESA authorizes the FWS to transport and release members of a listed species into new areas as “experimental populations,” upon the determination that “such release will further the conservation of such species.”⁹⁴ The areas available for release include the species’ “probable historic range” or other suitable natural habitat that may not have been previously occupied by the species.⁹⁵ This option for release and reintroduction of listed species to new habitats creates potential opportunities for climate change application with regard to necessity for relocation and impacts on prior and current habitats available for assisted migration. The process would potentially allow facilitation of the migrations that are already occurring as a result of displacement caused by climate change.⁹⁶

E. The “Best Science” Standard

Overarching the ESA provisions discussed above is the “best scientific and commercial data available” standard, which applies to loss of habitat considerations for listing decisions,⁹⁷ critical habitat designation,⁹⁸ and no jeopardy/no adverse modification standards.⁹⁹ The court in the Delta Cases made clear that a defense of “scientific uncertainty” with respect to climate change and its effects is unlikely to prevail in the ESA context. The level of certainty will likely vary with each case, but it is clear that climate change is a factor to be included in the scientific analysis throughout the ESA.

III. Conclusion

Given the substantial evidence that climate change is causing and is likely to continue to cause ecosystem disruptions, the various regulatory programs and determinations under the ESA can be expected to provide an increasingly contentious venue for climate change-related litigation. While the FWS and the NMFS under both the Bush and Obama Administrations have recently been more willing to acknowledge and address climate change in the context of the ESA, with the listing of the polar bear and additional listings likely to follow, the FWS and the NMFS have, so far, taken a hard line on attempting to actually regulate GHG emissions through the lens of the ESA. But recent decisions like the Delta Cases make clear that climate change will need to be taken into account in the application of the “best science available” standard, whether in the listing, consultation, or HCP processes.

94. 16 U.S.C. §1539(j)(2)(A), ELR STAT. ESA §10(j)(2)(A).

95. See 50 C.F.R. §17.81(a).

96. See Pew Center on Global Climate Change, Executive Summary, *available at* http://www.pewclimate.org/global-warming-in-depth/all_reports/observed-impacts/execsumm.cfm (stating “promoting dynamic design and management plans for nature reserves may enable managers to facilitate the adjustment of wild species to changing climate conditions (e.g. through active relocation programs.”)).

97. See 16 U.S.C. §1533(b)(1)(A), ELR STAT. ESA §4(b)(1)(A).

98. See 16 U.S.C. §1533(b)(2), ELR STAT. ESA §4(b)(2).

99. See 16 U.S.C. §1536(c), ELR STAT. ESA §7(c); 50 C.F.R. §402.14(g)(8).