

# NOTES

## RULES FOR PLAYING GOD: THE NEED FOR ASSISTED MIGRATION & NEW REGULATION

By  
Jessica Kabaz-Gomez\*

*Climate change is quickly transforming habitats. Species in affected regions are facing extinction as they are unable to migrate to suitable environments. This Note discusses assisted migration, the intentional human-assisted movement of imperiled species to suitable habitats outside of their historic range, as an important—though controversial—conservation tool. There are, however, no comprehensive assisted migration regulations in the United States (U.S.). This Note argues that the U.S. Fish & Wildlife Service (FWS) should be the agency to issue regulations regarding assisted migration because FWS already has broad authority under the Endangered Species Act to conserve wildlife. This Note proposes that new regulations should be based upon existing FWS frameworks.*

- I. INTRODUCTION ..... 113
  - A. *Many Species Will Face Extinction as Climate Change Transforms Their Habitats and They Are Unable to Migrate to New Locations* ..... 114
  - B. *Species’ Extinction Will Have Many Negative Implications for Society* ..... 116
  - C. *Assisted Migration Will Be a Valuable Conservation Solution for Species That Are Unable to Migrate to New Locations* ..... 117
- II. ASSISTED MIGRATION BACKGROUND ..... 119
  - A. *Assisted Migration Is a Controversial Conservation Solution with Three Major Criticisms* ..... 120

---

\* © Jessica Kabaz-Gomez 2012. Jessica Kabaz-Gomez is a *magna cum laude* graduate of the College of William & Mary, holding a B.A. in public policy and economics. She is a 2013 J.D. candidate at the George Washington University Law School with a focus in environmental law, and is the Managing Editor for the *Journal of Energy and Environmental Law* and the American Bar Association *Animal Law Committee Newsletter*. She expresses gratitude to her family and dedicates this Note to those species that have vanished in the past decade—like the Baiji River Dolphin and the Caribbean Monk Seal—with hope that that we may prevent others from suffering similar fates.

- 1. *Assisted Migration Is Criticized for Its Ecological Risks* ..... 120
- 2. *Assisted Migration Is Criticized for Its Purported Infeasibility Due to High Costs and Political Pressure* ..... 122
- 3. *Assisted Migration Is Criticized for Detracting from Other Conservation Measures and for Its Interventionist Approach* ..... 123
- B. *Assisted Migration Is Gradually Becoming More Accepted* ..... 125
- C. *FWS Should Issue Assisted Migration Regulations for Species Listed under the ESA* ..... 127
- III. THE EXISTING FOUNDATION FOR ASSISTED MIGRATION REGULATION ..... 129
  - A. *The ESA Supports Assisted Migration as a Conservation Tool* ..... 129
    - 1. *The ESA Gives FWS Broad Authority to Conserve Species* ..... 129
    - 2. *The ESA Listing Provision, 16 U.S.C. § 1533(a), Allows FWS to Bring Species in Need of Assisted Migration under the Scope of the Act* ..... 130
    - 3. *The ESA Experimental Population Provision, 16 U.S.C. § 1539(j), Allows FWS to Conserve Species through Introductions* ..... 131
  - B. *The ESA Experimental Population Regulations Provide a Framework That Supports Assisted Migration as a Conservation Tool* ..... 134
  - C. *FWS’s Strategic Plan for Responding to Accelerating Climate Change Creates Tools That Support Assisted Migration* ..... 136
    - 1. *FWS Can Leverage the Climate Science Partnerships Created under the Climate Change Plan* ..... 136
    - 2. *FWS Can Leverage the Landscape Conservation Cooperatives Created under the Climate Change Plan* ..... 138
    - 3. *FWS Can Leverage the Strategic Habitat Conservation Framework Created under the Climate Change Plan* ..... 139
- IV. NEW COMPREHENSIVE ASSISTED MIGRATION REGULATION ..... 140
  - A. *Assisted Migration Regulation Should Expand on the Definitions in C.F.R. § 17.80* ..... 140
  - B. *Assisted Migration Regulation Should Expand and Modify the Experimental Population Listing Process Laid out in C.F.R. § 17.81* ..... 143
    - 1. *The “Unsuitably” Altered or Destroyed Requirement of the Habitat Standard Is Too Restrictive and Should Be Excluded from Assisted Migration Regulation* ..... 143

- 2. *The “Irreversibly” Altered or Destroyed Requirement of the Habitat Standard Is Too Restrictive and Should Be Excluded from Assisted Migration Regulation* ..... 144
- 3. *The Listing Requirements Should Be Expanded to Require a Risk-Benefit Analysis before an Experimental Population Is Approved* ..... 146
- C. *Assisted Migration Should Expand on the Experimental Population Special Rule Requirements Laid out in C.F.R. § 17.81(c)*..... 146
  - 1. *Congress Should Expand the ID Requirement to Specifically Address Assisted Migration Concerns*..... 147
  - 2. *FWS Should Expand the Essential Designation Requirement to Specifically Address Assisted Migration Concerns* ..... 148
  - 3. *FWS Should Expand the Management Requirement to Specifically Address Assisted Migration Concerns* . 149
  - 4. *FWS Should Expand the Review Requirement to Specifically Address Assisted Migration Concerns*..... 149
- V. CONCLUSION ..... 149

I. INTRODUCTION

*[C]limate change is forcing us to rethink what it means to save a species in the 21st century. If climate change continues unabated and as rapidly as a few models predict, saving at least some species will require solutions more radical than creating parks and shielding endangered species from bullets, bulldozers, and oil spills: It will require moving them.<sup>1</sup>*

There is worldwide scientific consensus that climate change is occurring.<sup>2</sup> Heat-trapping gases, known as greenhouse gases, in the Earth’s atmosphere are causing global temperatures to rise, and temperatures will continue to rise over this century.<sup>3</sup> Alarminglly, climate change is occurring much faster than scientists originally anticipated.<sup>4</sup> If the current climate change impacts continue at today’s rate, one in ten species could face extinction by the year 2100.<sup>5</sup> This is not just a prediction; global warming has already caused hundreds of documented cases of species decline in marine, terrestrial, and freshwater

<sup>1</sup> Ben A. Minter & James P. Collins, *Move It or Lose It? The Ecological Ethics of Relocating Species under Climate Change*, 20 *Ecological Applications* 1801, 1801 (2010).

<sup>2</sup> U.S. Fish & Wildlife Serv., *Climate Change Is Real*, <http://www.fws.gov/home/climatechange/climate101.html> (updated Apr. 14, 2011) (accessed Nov. 18, 2012).

<sup>3</sup> *Id.*

<sup>4</sup> Julie Lurman Joly & Nell Fuller, *Advising Noah: A Legal Analysis of Assisted Migration*, 39 *Envtl. L. Rptr.* 10413, 10413 (2009).

<sup>5</sup> ScienceDaily, *One in 10 Species Could Face Extinction: Decline in Species Shows Climate Change Warnings Not Exaggerated, Research Finds*, <http://www.sciencedaily.com/releases/2011/07/1107111151457.htm> (July 12, 2011) (accessed Nov. 18, 2012).

ecosystems.<sup>6</sup> Climate change will be one of the major driving forces of species extinctions in the twenty-first century.<sup>7</sup>

A. *Many Species Will Face Extinction as Climate Change Transforms Their Habitats and They Are Unable to Migrate to New Locations*

Climate change will cause “rapid, dramatic transformations of habitats critical to many species.”<sup>8</sup> These habitat transformations will make it necessary for an estimated 22% to 52% of the world’s species to relocate in order to survive.<sup>9</sup> This is not just something that might affect future generations; species migration due to climate change is already well under way.<sup>10</sup> A study published in 2011, drawing on earlier studies of more than 1,500 species of birds, mammals, reptiles, insects, and plants that were observed over the past forty years, shows that animals are on the move.<sup>11</sup> Species are climbing to higher elevations or migrating towards the poles to cooler climates as their original habitats become too warm.<sup>12</sup> Species that are able to migrate have climbed an average of forty feet higher in elevation and 10.3 miles closer to the poles per decade.<sup>13</sup> Climate change has moved species up to three times faster than scientists expected.<sup>14</sup>

Some species’ ability to adapt quickly to climate change is a very positive finding.<sup>15</sup> The harsh reality, though, is that at least 10% of all species will not be able to migrate to new locations.<sup>16</sup> As early as 2054, up to 35% of species worldwide will face extinction as a result of cli-

<sup>6</sup> Intl. Union for Conserv. of Nat. (IUCN), *Addressing Climate Change* 33 (IUCN 2010) (available at <http://www.iucn.org/dbtw-wpd/edocs/2010-033.pdf> (accessed Nov. 18, 2012)).

<sup>7</sup> *Id.*; see also Nicole E. Heller & Erika S. Zavaleta, *Biodiversity Management in the Face of Climate Change: A Review of 22 Years of Recommendations*, 142 *Biological Conserv.* 14, 15 (2009) (noting that CO<sub>2</sub> increases are predicted “to become the first or second greatest driver of global biodiversity loss”).

<sup>8</sup> Joly & Fuller, *supra* n. 4, at 10413; see also Heller & Zavaleta, *supra* n. 7, at 15 (“Global average temperatures have increased 0.2° C per decade since the 1970s, and global average precipitation increased 2% in the last 100 years. Moreover, climate changes are spatially heterogeneous. Some locations, such as the Arctic, experience much larger changes than global means, while others are exposed to secondary effects like sea level rise.”).

<sup>9</sup> Joly & Fuller, *supra* n. 4, at 10414.

<sup>10</sup> Lauren Morello, *Species Are Moving Away from Rising Heat Much Faster than in 2003*, *ClimateWire* (Aug. 19, 2011) (available at <http://www.eenews.net/climatewire/2011/08/19/3> (accessed Nov. 18, 2012)).

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> *Id.*

<sup>15</sup> Jennifer Carpenter, *Species Flee Warming Faster than Previously Thought*, *BBC* (Aug. 20, 2011) (available at <http://www.bbc.co.uk/news/science-environment-14576664> (accessed Nov. 18, 2012)) (“[T]he British comma butterfly, for example, has moved 220km northward from central England to southern Scotland in the last two decades.”).

<sup>16</sup> Joly & Fuller, *supra* n. 4, at 10414. The loss will be tremendous, considering that there are an estimated 8.7 million species on earth, 6.5 million of which are terrestrial

mate change.<sup>17</sup> There is a wide range of reasons for species' inability to migrate.<sup>18</sup> For example, species that are not "vagile" (able to change their location or distribution over time) or highly "philopatric" (meaning that they return annually to breeding or wintering grounds) may be unable to migrate.<sup>19</sup> Similarly, species with fragmented habitats that lack suitable migration paths may also be unable to migrate.<sup>20</sup> While traditional conservation techniques, such as landscape corridors that connect fragmented habitats, may assist some species in adjusting their range, this approach may not be sufficient to help all species.<sup>21</sup> Left alone, many species will go extinct.<sup>22</sup> Mass extinction will have a negative cyclical effect.<sup>23</sup> As more species die, genetic diversity, which provides the "raw material for species adaptation and evolutionary flexibility in response to environmental changes," will decline.<sup>24</sup> With less genetic diversity, it is more difficult for species to adapt, and the risk of extinction increases.<sup>25</sup>

---

and 2.2 million of which are marine. Camilo Mora et al., *How Many Species Are There on Earth and in the Ocean?* 9 PLOS Biology 1, 1–8 (2011).

<sup>17</sup> Chris D. Thomas & Alison Cameron, *Extinction Risk from Climate Change*, 427 Nat. 145, 145–48 (2004); see also Devin Powell, Live Science, *Should Species be Relocated to Prevent Extinction?*, <http://www.livescience.com/10575-species-relocated-prevent-extinction.html> (updated Aug. 24, 2009) (accessed Nov. 18, 2012) (discussing the Nature study).

<sup>18</sup> Joly & Fuller, *supra* n. 4, at 10413–14.

<sup>19</sup> *Id.*

<sup>20</sup> *Id.* (explaining that habitat destruction and fragmentation cause a great deal of biodiversity loss, and that this may impede population recovery, migration, and range extension in the wake of climate change); see also Nina Hewitt et al., *Taking Stock of the Assisted Migration Debate*, 144 Biological Conserv. 2560, 2561 (2011) (explaining that habitat destruction and fragmentation are the current and historical leading causes of biodiversity loss).

<sup>21</sup> Hewitt et al., *supra* n. 20, at 2561.

<sup>22</sup> Carpenter, *supra* n. 15, at ¶ 15; see also Patrick D. Shirey & Gary A. Lamberti, *Assisted Colonization under the U.S. Endangered Species Act*, 3 Conserv. Ltrs. 45, 50 (2010) ("The harsh reality for endangered species is that interactions between habitat loss and climate change will likely cause extinctions and range contractions within this century.").

<sup>23</sup> U.S. Fish & Wildlife Serv., *Rising to the Urgent Challenge: Strategic Plan for Responding to Accelerating Climate Change* 7, 25 (Sept. 2010) (available at <http://www.fws.gov/home/climatechange/strategy.html> (accessed Nov. 18, 2012)) [hereinafter FWS, *Strategic Plan*].

<sup>24</sup> *Id.*

<sup>25</sup> *Id.* Genetic diversity is gaining increased attention among conservationists as a means to monitor species affected by climate change. Virginia Gewin, *Climate Change Will Hit Genetic Diversity*, Nature News, <http://www.nature.com/news/2011/110821/full/news.2011.490.html#B1> (updated Aug. 21, 2011) (accessed Nov. 18, 2012). As a result, countries are starting to invest more in documenting genetic diversity among species in their national jurisdictions. *Id.* One example of this increased focus on genetic diversity was the creation of the Nagoya Protocol in 2010, a treaty created to manage and share the economic benefits of the world's genetic resources with developing nations. *Id.* As of March 2012, ninety-two countries have signed the Protocol. See Convention on Biological Diversity, Nagoya Protocol, *Status of Signature, and Ratification, Acceptance, Approval or Accession*, <http://www.cbd.int/abs/nagoya-protocol/signatories/> (Mar. 18, 2012)

*B. Species' Extinction Will Have Many Negative Implications for Society*

Why does species' extinction concern us? There are many reasons why we should value biodiversity.<sup>26</sup> From a utilitarian perspective, every species has potential to provide us with direct benefits.<sup>27</sup> When society began to develop, we domesticated wild plants and animals to create our food crops.<sup>28</sup> To this day, we continue harvesting useful genetic traits found in the wild, and this will likely increase as breeding and genetic engineering improve.<sup>29</sup> Additionally, biodiversity is the source of many useful chemicals.<sup>30</sup> More than a quarter of all United States (U.S.) prescriptions contain major chemical ingredients derived from plants, and many species' medicinal value remain unknown.<sup>31</sup>

Most importantly, species are a critical part of this earth, providing numerous, complex "ecosystem services" that benefit humans.<sup>32</sup> These services include "climate control, oxygen production, removal of carbon dioxide from the atmosphere, soil generation, nutrient cycling, and purification of freshwater."<sup>33</sup> Many of these processes are beyond our technological capabilities and are not fully understood, but they are necessary for our survival, so we rely on species to fill this role.<sup>34</sup> A frequently cited estimate of just seventeen ecosystems values these services between \$16 trillion and \$54 trillion each year, with an average of \$33 trillion a year.<sup>35</sup>

Beyond utilitarian rationales for valuing biodiversity, there are esthetic and ethical reasons to preserve diversity.<sup>36</sup> Millions of Americans visit national parks and wildlife refuges every year, and around

---

(accessed Nov. 18, 2012) (indicating that ninety-two countries are signatories to the protocol and eight countries have ratified).

<sup>26</sup> See e.g. U.S. Fish & Wildlife Serv., *Why Save Endangered Species?* (July 2005) (available at [http://www.fws.gov/endangered/esa-library/pdf/Why\\_Save\\_Endangered\\_Species\\_Brochure.pdf](http://www.fws.gov/endangered/esa-library/pdf/Why_Save_Endangered_Species_Brochure.pdf) (accessed Nov. 18, 2012)) (noting that species are valuable for various reasons, including agricultural, pharmaceutical, and industrial support).

<sup>27</sup> Holly Doremus, *Patching the Ark: Improving Legal Protection of Biological Diversity*, 18 *Ecol. L.Q.* 265, 269–73 (1991) (excerpted in Robert L. Glicksman et al., *Environmental Protection: Law and Policy* 335, 335 (Vicki Been et al. eds., 6th ed., Wolters Kluwer 2011)).

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*; see e.g. Blaine P. Friedlander, Jr., *Researchers Harvest Wild Plant Genes to Boost World Food Production*, *Cornell Chronicle* (Aug. 28, 1997) (available at [http://www.news.cornell.edu/Chronicle/97/8.28.97/plant\\_genes.html](http://www.news.cornell.edu/Chronicle/97/8.28.97/plant_genes.html) (accessed Nov. 18, 2012)) (describing an experiment conducted at Cornell University whereby scientists inserted high-production genes from wild plants into domesticated crop plants to boost food production worldwide).

<sup>30</sup> Doremus, *supra* n. 27, at 270–71.

<sup>31</sup> *Id.*

<sup>32</sup> *Id.*

<sup>33</sup> *Id.*

<sup>34</sup> *Id.*

<sup>35</sup> Robert Constanza et al., *The Value of the World's Ecosystem Services and Natural Capital*, 387 *Nat.* 253, 253 (May 15, 1997).

<sup>36</sup> Doremus, *supra* n. 27, at 271–75.

60 million Americans participate in bird watching or other forms of recreation involving wildlife.<sup>37</sup> Our society views nature as having special value, as embodied by our choice of symbols, such as our national emblem—the bald eagle—and our political parties—elephants and donkeys.<sup>38</sup> As members and beneficiaries of the biotic community, we have an ethical obligation to nature—to preserve its integrity and stability.<sup>39</sup> For all these reasons, it is not surprising that 84% of the American public overwhelmingly supports protection for imperiled species.<sup>40</sup>

*C. Assisted Migration Will Be a Valuable Conservation Solution for Species That Are Unable to Migrate to New Locations*

Fortunately, the U.S. Fish and Wildlife Service (FWS) has recognized that climate change poses a threat to many species and has characterized climate change as “the greatest threat to [its] mission.”<sup>41</sup> FWS has noted that it “must mobilize efforts to help fish and wildlife adapt to changes that have already occurred in their habitats as a result of climate change” and FWS “cannot afford a failure of imagination [in finding solutions].”<sup>42</sup> To this end, FWS has embraced adaptive responses designed to “facilitate the transition of ecosystems . . . to new conditions brought about by a changing climate.”<sup>43</sup> One such response for those species with poor dispersal abilities is assisted migration, the “intentional . . . movement of species outside of their *historic ranges* . . . to mitigate . . . biodiversity losses caused by . . . climatic change.”<sup>44</sup> Species would be moved to areas they could occupy under new climate conditions.<sup>45</sup> Equivalent terms for assisted migration include: facilitated migration, assisted colonization, managed relocation, assisted range expansion, and species translocation.<sup>46</sup> While moving

---

<sup>37</sup> *Id.*

<sup>38</sup> *Id.*

<sup>39</sup> See *id.* at 273 (explaining humanity’s ethical obligation to protect and preserve nature, as articulated by Aldo Leopold and subsequent commentators); see also Glicksman et al., *supra* n. 27, at 24–25 (quoting Aldo Leopold, *A Sand County Almanac and Sketches Here and There* 202–04 (Oxford U. Press 1968)) (describing a “land ethic [that] simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land”).

<sup>40</sup> Mark Cheater, *Assault on Wildlife: The Endangered Species Act under Attack*, *Defenders of Wildlife* 11 (Sept. 2011) (available at [http://www.defenders.org/publications/assault\\_on\\_wildlife\\_the\\_endangered\\_species\\_act\\_under\\_attack.pdf](http://www.defenders.org/publications/assault_on_wildlife_the_endangered_species_act_under_attack.pdf) (accessed Nov. 18, 2012)).

<sup>41</sup> FWS, *Strategic Plan*, *supra* n. 23, at 31.

<sup>42</sup> *Id.*

<sup>43</sup> *Id.* at 16.

<sup>44</sup> Hewitt et al., *supra* n. 20, at 2561 (emphasis added). See also 50 C.F.R. § 17.11(e) (2011) (defining “historic range”—in the context of endangered and threatened wildlife—as “indicat[ing] the known general distribution of the species or subspecies as reported in the current scientific literature”).

<sup>45</sup> Shirey & Lamberti, *supra* n. 22, at 45.

<sup>46</sup> Hewitt et al., *supra* n. 20, at 2561; see also Shirey & Lamberti, *supra* n. 22, at 45 (“The human-assisted movement of a species inside a historic range is translocation,

species to save them from extinction may seem a bit like playing God, FWS already wields enormous influence under the Endangered Species Act (ESA).<sup>47</sup>

The clear benefit of assisted migration is the conservation of species that would otherwise go extinct in a habitat altered by climate change.<sup>48</sup> A growing number of researchers argue that “the future for many species and ecosystems is so bleak that assisted [migration] might be their best chance.”<sup>49</sup> However, assisted migration is controversial among scientists and policymakers alike.<sup>50</sup> It raises big questions and concerns: which species to relocate; where to move them; how effective it is to move species; and how to minimize the risks inherent in relocation.<sup>51</sup> Despite these issues and the increased dialogue around assisted migration as a conservation tool,<sup>52</sup> no federal agency has yet developed any regulation around assisted migration.<sup>53</sup>

This Note will argue that assisted migration is quickly becoming more necessary and accepted in the face of climate change. Consequently, FWS should use its broad authority under the ESA to issue comprehensive assisted migration regulation. Particularly, FWS should modify and expand its experimental population regulation and leverage provisions from its Strategic Plan for Responding to Accelerating Climate Change. Part II of this Note provides background on assisted migration and explains that assisted migration is becoming accepted in the face of climate change. Part II also explains that of all

---

whereas movement to a site outside of the historic range is often termed assisted colonization, assisted migration, or managed relocation.”)

<sup>47</sup> Congress passed the ESA to protect imperiled species and help them recover. U.S. Fish & Wildlife Serv., *ESA Basics: More Than 30 Years of Conserving Endangered Species* 1 (June 2011) (available at [http://www.fws.gov/endangered/esa-library/pdf/ESA\\_basics.pdf](http://www.fws.gov/endangered/esa-library/pdf/ESA_basics.pdf) (accessed Nov. 18, 2012)) [hereinafter FWS, *ESA Basics*]. Under the ESA, FWS is responsible for protecting imperiled species and helping them recover by listing species as “endangered” or “threatened” under the Act and managing their populations. *Id.* The ESA imposes an affirmative obligation on FWS to use “all methods and procedures which are necessary to bring any [listed] species to the point at which the measures provided in [this Act] are no longer necessary.” Joly & Fuller, *supra* n. 4, at 10423.

<sup>48</sup> Yee Huang, Center for Progressive Reform Blog, *Location, Location, Location: Assisted Migration May Be Coming Closer to a Reality as a Response to Climate Change*, <http://www.progressivereform.org/CPRBlog.cfm?idBlog=DE3F1579-F7C6-4EBA-421D06AAEE842530> (Feb. 1, 2011) (accessed Nov. 18, 2012).

<sup>49</sup> Richard Stone, *Home, Home Outside the Range?*, 329 *Sci.* 1592, 1592 (2010).

<sup>50</sup> Huang, *supra* n. 48.

<sup>51</sup> *Id.*

<sup>52</sup> See generally Intl. Union for the Conserv. of Nature (IUCN), *IUCN/SSC Guidelines for Re-Introductions*, Re-introduction Specialist Group (1995) (available at <http://www.iucnsscrg.org/download/English.pdf> (accessed Nov. 18, 2012)) (setting policy guidelines and principles for assisted migration). Existing literature around assisted migration discusses the following: the feasibility of assisted migration for plant and animal species; selected positions on the assisted migration debate; species valuation; assisted migration planning tools; integration with other adaptations; and reviews of the scholarly literature on assisted migration. Hewitt et al., *supra* n. 20, at 2561.

<sup>53</sup> Joly & Fuller, *supra* n. 4, at 10413.

U.S. agencies, FWS is the appropriate agency to issue assisted migration regulation. Part III discusses the ESA, FWS experimental population regulations, and FWS's Climate Change Plan, and argues that these form a foundation that FWS can leverage in creating assisted migration regulation. Part IV examines how this existing foundation can be expanded and modified to create truly comprehensive assisted migration regulation. Part V concludes by stressing the necessity for assisted migration in the face of climate change and summarizing how FWS can issue comprehensive assisted migration regulation.

## II. ASSISTED MIGRATION BACKGROUND

In 1985, Robert L. Peters and Joan S. Darling first proposed assisted migration.<sup>54</sup> The idea was not completely novel; humans have been moving wild species for millennia.<sup>55</sup> The intentional movement of a species from one area to another is known as “translocation.”<sup>56</sup> There are two main classes of translocation for species conservation.<sup>57</sup> The first is “population restoration,” which moves species to habitats that are within their historically known native range, either to “reintroduce” a species because it has disappeared from its historic range, or to “reinforce” a species by introducing additional individuals to build up an existing population.<sup>58</sup> The second class of translocation is “conservation introduction,” which moves species to new habitats that are outside their historical range.<sup>59</sup> Assisted migration falls under the um-

---

<sup>54</sup> Hewitt et al., *supra* n. 20, at 2561. Peters and Darling foresaw the need for assisted migration in the climate change context. See Jessica J. Hellmann, *Butterflies as Model Systems for Understanding and Predicting Climate Change*, in *Wildlife Responses to Climate Change: North American Case Studies* 93, 94 (Stephen H. Schneider & Terry L. Root eds., Island Press 2002) (stating that “[s]ensitive species found only in reserves or small areas of relict habitat [would be] especially likely to suffer negative effects of global warming because they [would not be able to] escape climate impacts by dispersal”).

<sup>55</sup> Philip J. Seddon, *From Reintroduction to Assisted Colonization: Moving along the Conservation Translocation Spectrum*, 18 *Restoration Ecology* 796, 796 (2010).

<sup>56</sup> *Id.* (citing IUCN, *The IUCN Position Statement on Translocation of Living Organisms*, Species Survival Commission 3 (Sept. 4, 1987) (available at <http://www.iucnss-crsg.org/download/IUCNPositionStatement.pdf> (accessed Nov. 18, 2012)) [hereinafter IUCN, *Position Statement*].

<sup>57</sup> See Sarah E. Dalrymple & Mark Stanley Price, Presentation, *Moving Plants and Animals for Conservation When the Historic Range Loses Legitimacy: Adaptation of Translocations to Cope with Climate Change* (British Ecological Socy., Natural England Meeting, London, Eng. Jan. 10, 2011) (available at [http://www.britishecologicalsociety.org/documents/policy\\_documents/policy\\_meetings/BES\\_NE\\_Conference/Sarah\\_Dalrymple.pdf](http://www.britishecologicalsociety.org/documents/policy_documents/policy_meetings/BES_NE_Conference/Sarah_Dalrymple.pdf) (accessed Nov. 18, 2012)) (outlining the two approaches to translocation: the reintroduction of species to endemic habitats and the relocation of species to new ranges); see also IUCN, *Position Statement*, *supra* n. 56, at 3 (listing “re-stocking” as a third main category in addition to “introduction” and “re-introduction.” Since re-stocking is the fortification of existing species in their historic ranges, it is appropriate to treat it as a subset of re-introduction.).

<sup>58</sup> Seddon, *supra* n. 55, at 797–98.

<sup>59</sup> *Id.* at 798–99.

brella of conservation introductions<sup>60</sup> and is defined as “translocation of a species to favorable habitat beyond their native range to protect them from human-induced threats, such as climate change.”<sup>61</sup>

A. *Assisted Migration Is a Controversial Conservation Solution with Three Major Criticisms*

Since Peters and Darling first proposed assisted migration, the conversation around assisted migration has become a highly charged topic of debate among conservationists in the search for solutions to address the impacts of climate change.<sup>62</sup> The arguments against assisted migration fall into three categories of criticism. The first critique focuses on the ecological risks associated with assisted migration. The second critique warns that high costs and political pressures may make assisted migration unfeasible. The final critique focuses on the scope of assisted migration, its relation to other conservation measures, and its interventionist approach.

1. *Assisted Migration Is Criticized for Its Ecological Risks*

The first group of critics warns about the ecological risks associated with assisted migration, focusing on the uncertainty and information gaps associated with this conservation tool.<sup>63</sup> One source of uncertainty is assisted migration’s potential to create invasive species. Invasive species are “organisms that are introduced into a non-native ecosystem and which cause, or are likely to cause, harm to the economy, environment or human health.”<sup>64</sup> Invasive species are associated with negative impacts on resident species and uncontrolled population growth.<sup>65</sup> An example of an extremely invasive species is the South American fire ant.<sup>66</sup> Introduced to the U.S. in 1930, the fire ant is now

---

<sup>60</sup> Dalrymple & Price, *supra* n. 57, at 10.

<sup>61</sup> Seddon, *supra* n. 55, at 799. This Note uses the term “assisted migration.” Although Seddon believes that “colonization” better describes the concept of moving species outside their historic range to establish new populations, the term “migration” has the benefit of contextualizing the movement as a response to changes in temperature.

<sup>62</sup> See Hewitt et al., *supra* n. 20, at 2565 (discussing the broad range of views on assisted migration). Even among proponents of assisted migration there is division; some scientists argue that assisted migration is a necessary alternative for biodiversity protection, while others only suggest that it should be considered in light of traditional strategies, after careful assessment of risks and benefits, or only in a few exceptional circumstances. *Id.*

<sup>63</sup> Hewitt et al., *supra* n. 20, at 2566; see also Shirey & Lamberti, *supra* n. 22, at 45 (suggesting that assisted migration could be a useful management tool but must be conducted carefully with adequate risk management).

<sup>64</sup> U.S. Fish & Wildlife Serv., *Invasive Species*, <http://www.fws.gov/invasives/> (updated Jan. 19, 2012) (accessed Nov. 18, 2012) [hereinafter FWS, *Invasive Species*].

<sup>65</sup> Hewitt et al., *supra* n. 20, at 2561.

<sup>66</sup> Doug Inkley et al., Natl. Wildlife Fedn., *They Came from Climate Change* (Apr. 2010) (available at <http://www.nwf.org/~media/PDFs/Global-Warming/Reports/They-Came-From-Climate-Change-WEB.ashx> (accessed Nov. 18, 2012)).

five times more abundant in this country than in its native habitat, South America.<sup>67</sup>

The risk of invasiveness is by far the most commonly identified risk associated with assisted migration.<sup>68</sup> The risk is present because of the nature of assisted migration, which involves moving species to novel environments that are outside of their historic ranges.<sup>69</sup> The fear is that the invasive nature of a species will not be clear until it arrives in the novel habitat and that the impacts on the environment and the ecological community will be irreversible.<sup>70</sup> This perceived risk creates conflicting conservation objectives, with the preservation of a focal species that is on the brink of extinction as one objective and the protection of healthy ecological communities as another objective.<sup>71</sup>

While the fear of invasiveness is well-founded, this risk should not be the death knell of assisted migration. Recently, the International Union for Conservation of Nature (IUCN)<sup>72</sup> found that assisted migration may not be more risky than reintroductions, which are similar to assisted migration except that species are moved to areas within their historic range.<sup>73</sup> The U.S. Fish & Wildlife Service (FWS) commonly engages in reintroductions and has promulgated reintroduction regulation.<sup>74</sup> In addition, there are a variety of ways to mitigate the risk that a species may become invasive. The major risk of invasiveness is a result of information gaps around assisted migration.<sup>75</sup> These gaps can be addressed by building on reintroduction case histories, invasive species literature, and simulation studies.<sup>76</sup> In addition, a great deal of careful planning would go into assessing each assisted migration effort before FWS approved it.<sup>77</sup>

<sup>67</sup> *Id.*

<sup>68</sup> Hewitt et al., *supra* n. 20, at 2566. Even if introduced species do not become invasive, they may pose other ecological risks. *Id.* They have the potential to disrupt receiving ecosystems and erode biodiversity. *Id.* Their precise effect, however, is difficult to predict, as they were not traditionally part of the receiving ecosystem. *Id.*

<sup>69</sup> *Id.* at 2561; *see also* Shirey & Lamberti, *supra* n. 22, at 45 (discussing the distinctions between translocation and assisted colonization).

<sup>70</sup> Hewitt et al., *supra* n. 20, at 2566.

<sup>71</sup> *Id.*

<sup>72</sup> IUCN is the world's oldest and largest global environmental organization. IUCN, *About IUCN*, <http://www.iucn.org/about/> (updated Sept. 21, 2012) (accessed Nov. 18, 2012). It comprises more than 1,200 member organizations including over 200 government organizations, over 900 non-governmental organizations, and almost 11,000 voluntary scientists and experts, grouped in six Commissions in some 160 countries. *Id.* IUCN serves as a neutral forum for governments, non-governmental organizations, scientists, business, and local communities to find pragmatic solutions to conservation and development challenges. *Id.* IUCN's central mission is conserving biodiversity. *Id.*

<sup>73</sup> Dalrymple & Price, *supra* n. 57, at 7.

<sup>74</sup> 50 C.F.R. § 17 (2009).

<sup>75</sup> Hewitt et al., *supra* n. 20, at 2566.

<sup>76</sup> *Id.*

<sup>77</sup> *Id.*

## 2. *Assisted Migration Is Criticized for Its Purported Infeasibility Due to High Costs and Political Pressure*

The second category of assisted migration critics argue that assisted migration is infeasible due to high costs and political pressures.<sup>78</sup> While assisted migration will certainly require funding, the Obama administration has demonstrated that it is possible to build consensus and fund species conservation.<sup>79</sup> In 2010, the administration provided \$25 million for Landscape Conservation Cooperatives<sup>80</sup> and \$15 million for Climate Science Centers, increasing conservation funding from zero to \$40 million in one year.<sup>81</sup> Political pressure will likely arise when groups object to the choice of focal species for assisted migration,<sup>82</sup> but under the Endangered Species Act (ESA), FWS already engages in the scientific and politically challenging task of selecting species to list as threatened and endangered.<sup>83</sup> Selecting a subgroup of species for assisted migration would be an authority quite similar to those that that FWS already employs.

An additional source of political pressure is resistance from landowners and local governments that oppose introducing threatened and endangered species onto their lands.<sup>84</sup> A recent example of such pressures is the case of the gray wolf reintroductions in Idaho, Montana, and Wyoming,<sup>85</sup> where there was a great deal of political pressure against the experimental population release from local ranchers who feared that wolves would kill their livestock.<sup>86</sup> FWS was able to ease the political resistance by designating the wolf experimental populations as nonessential<sup>87</sup> and permitting the “taking” of wolves that were caught in the act of “killing, wounding, or biting livestock”<sup>88</sup> or creating “unacceptable impact on wild ungulate populations.”<sup>89</sup> In addition to such regulatory measures, FWS might alleviate resistance to as-

<sup>78</sup> *Id.*

<sup>79</sup> Janet Fang, *Wildlife Service Plans for a Warmer World: US Interior Department Seeks Ways to Save Species Threatened by Climate Change*, 464 Nat. 332, 333 (Mar. 17, 2010) (available at <http://www.nature.com/news/2010/100317/full/464332a.html> (accessed Nov. 18, 2012)).

<sup>80</sup> LCCs are formal partnerships between federal agencies, state agencies, tribes, and non-governmental organizations, which focus on assessing climate change impacts on defined geographic areas. FWS, *Strategic Plan*, *supra* n. 23, at 20.

<sup>81</sup> Fang, *supra* n. 79, at 464.

<sup>82</sup> See Shirey & Lamberti, *supra* n. 22, at 47 (noting that Congress added the “experimental population” provision to the ESA in response to politically unpopular restrictions that came with the presence of endangered species).

<sup>83</sup> 16 U.S.C. § 1533(a) (2006).

<sup>84</sup> Shirey & Lamberti, *supra* n. 22, at 47.

<sup>85</sup> 50 C.F.R. § 17.84(i)–(iii) (2011).

<sup>86</sup> See e.g. Jack Hamann, *Wolves’ Return to Yellowstone Sparks Controversy*, CNN, <http://www.cnn.com/EARTH/9711/12/yellowstone.wolves/> (Nov. 12, 1997) (accessed Nov. 18, 2012).

<sup>87</sup> 50 C.F.R. § 17.84(i)(1).

<sup>88</sup> *Id.* at § 17.84(i)(3)(ii).

<sup>89</sup> *Id.* at § 17.84(n)(4)(v).

sisted migration efforts by restricting assisted migration to federal lands or by using existing ESA mechanisms, like safe harbor agreements, for non-federal landowners.<sup>90</sup>

### 3. *Assisted Migration Is Criticized for Detracting from Other Conservation Measures and for Its Interventionist Approach*

The final group of assisted migration criticism focuses on assisted migration in relation to other conservation measures and its interventionist approach. Critics argue that assisted migration detracts funds from other important conservation measures, such as reserve planning<sup>91</sup> and landscape connectivity.<sup>92</sup> They also argue against assisted migration because it is an interventionist approach that cuts against more traditional conservationist and preservationist goals.<sup>93</sup> Traditional conservation goals tend to favor maintaining the status quo of species' ranges, while assisted migration intentionally changes species' habitat ranges to adapt to changing climates.<sup>94</sup> Traditional preservation measures also attempt to mitigate climate change by advancing measures that address the underlying causes of climate change, whereas assisted migration only alleviates the symptoms of climate change.<sup>95</sup>

This Note does not argue that assisted migration should supplant other conservation measures. Assisted migration is not a climate change panacea. It is a conservation measure that addresses a specific crisis caused by climate change—the innate inability of many species to migrate as climate change alters their existing habitats. Other conservation measures, such as reserve planning and landscape connectivity efforts, are not sufficient to address this problem.<sup>96</sup> They only help species that are able to migrate to suitable locations on their own.

---

<sup>90</sup> See e.g. U.S. Fish & Wildlife Serv., *Endangered Species: Safe Harbor Agreements*, <http://www.fws.gov/midwest/endangered/permits/enhancement/sha/index.html> (updated Mar. 6, 2012) (accessed Nov. 18, 2012) (“To date, nearly three million acres of land have been enrolled in Safe Harbor Agreements.”). These agreements between FWS and non-federal landowners relieve landowners of liability under the ESA if conservation practices they undertake on their land help conserve federally listed species. *Id.*

<sup>91</sup> Reserve planning focuses on predicting future biodiversity hotspots based on climate change species distribution modeling and basing reserve acquisition priorities on these future biome predictions. Heller & Zavaleta, *supra* n. 7, at 22.

<sup>92</sup> Landscape connectivity is the most frequently recommended climate change adaptation measure. It focuses on reversing habitat fragmentation by connecting habitat corridors through designating new parks, protecting riparian habitat, and planting trees and shrubs to create shelterbelts and hedgerows in farmland. *Id.* at 24.

<sup>93</sup> Minter & Collins, *supra* n. 1, at 1802; see also Alejandro E. Camacho, *Assisted Migration: Redefining Nature and Natural Resource Law under Climate Change*, 27 Yale J. on Reg. 171, 176–78 (2010) (positing that assisted migration is controversial because it challenges the foundational tenets of conservation law).

<sup>94</sup> Hewitt et al., *supra* n. 20, at 2561; Minter & Collins, *supra* n. 1, at 1802.

<sup>95</sup> Hewitt et al., *supra* n. 20, at 2570.

<sup>96</sup> *Id.*

There are many species that will not be able to migrate even in relatively continuous, uninterrupted landscapes.<sup>97</sup> The bog turtle, for example, which is the smallest turtle in the U.S. and lives in very delicate habitats (open canopy wetlands with little standing water), has a very limited ability to migrate on its own to more suitable locations as its habitat disappears.<sup>98</sup> The American pika, a small rabbit-like mammal, is in a similar situation.<sup>99</sup> In its southern range, it can only live on mountain peaks, at elevations of at least 8,200 feet in areas referred to as “sky islands”—remote, high-elevation habitats that are separated from other similar habitats by intervening warmer, lower ecosystems.<sup>100</sup> Climate change is causing heat to creep up mountainsides, driving pikas into extinction, as they are unable to scurry any farther up the mountain, or down the mountains through hot valley bottoms to find neighboring mountains with higher elevations and cooler temperatures.<sup>101</sup> For many sensitive species such as the bog turtle and the pika, assisted migration may be the only suitable conservation response.<sup>102</sup>

This Note, therefore, does not argue that assisted migration addresses the underlying causes of climate change. Rather, assisted migration is merely a means of coping with climate change impacts. Assisted migration is a targeted conservation solution that, due to the far-reaching impacts of climate change, cannot help all species, and should not supplant other conservation measures. Instead, assisted migration should be exercised as part of a complex, context-dependent, and multi-faceted approach to climate change.<sup>103</sup>

Critics are correct that assisted migration is an interventionist approach in tension with traditional conservationist and preservationist goals,<sup>104</sup> but this intervention is necessary. Since climate change is occurring much faster than originally anticipated,<sup>105</sup> a more active and direct form of species conservation is becoming essential.<sup>106</sup> We should not, however, abandon our traditional, long-term, risk-averse conservation measures. Instead, we will need to create a complete species conservation strategy that implements “a range of measures, from

<sup>97</sup> *Id.* at 2566.

<sup>98</sup> Endangered Species Coalition, *America’s Hottest Species: Ten Endangered Wildlife, Fish & Plants Impacted by Climate Change* 11 (Dec. 2009) (available at <http://www.stopextinction.org/images/hottestspecies.pdf> (accessed Nov. 18, 2012)).

<sup>99</sup> Susan Cosier, *Feeling the Heat*, *Audubon Magazine* (June 2010) (available at <http://archive.audubonmagazine.org/features1005/photogallery.html> (accessed Nov. 18, 2012)).

<sup>100</sup> *Id.*

<sup>101</sup> *Id.* Biologists believe that the pika population is shrinking. *Id.* Pikas are very sensitive to heat because of their thick coat. *Id.* It is difficult for pikas to survive more than several hours when exposed to temperatures that exceed 77° F. *Id.*

<sup>102</sup> Hewitt et al., *supra* n. 20, at 2566.

<sup>103</sup> *Id.* at 2570.

<sup>104</sup> Minter & Collins, *supra* n. 1, at 1802.

<sup>105</sup> Joly & Fuller, *supra* n. 4, at 10413.

<sup>106</sup> Minter & Collins, *supra* n. 1, at 1802.

short to long-term and from precautionary and robust to more risky or deterministic.”<sup>107</sup> Assisted migration should be part of our new holistic approach.

*B. Assisted Migration Is Gradually Becoming More Accepted*

Despite these criticisms, scientists have begun to accept assisted migration as a conservation tool in the face of climate change.<sup>108</sup> The urgency and scale of the climate change problem is becoming a point of agreement,<sup>109</sup> with many including FWS recognizing that “climate change is ushering in a new era of conservation . . . that involves novel ways of thinking and bold innovations.”<sup>110</sup> A sustained debate has emerged over the use of assisted migration as a climate change adaptation strategy, with a flood of commentary and reviews beginning in 2007.<sup>111</sup> A study that assessed 112 scholarly articles on climate change adaptation strategies for biodiversity management found that species translocation ranked as the fourth most frequently cited adaptation strategy.<sup>112</sup> Another assessment of scholarly articles also showed that a majority of the articles generally support assisted migration as a climate change adaptation strategy.<sup>113</sup>

Assisted migration has gained sufficient acceptance to be implemented in a few situations in the U.S. and abroad. In the U.S., a coalition of botanists and environmentalists known as the “Torreya Guardians” transported members of a Florida species of conifer tree with a shrinking range in Florida’s panhandle to North Carolina.<sup>114</sup> In New Zealand, a variety of endemic bird, reptile, and invertebrate species that faced extinction threats from mammalian predators were translocated to predator-free, offshore islands that were not part of the species’ historical habitat ranges, resulting in new viable populations of the species.<sup>115</sup> In British Columbia, scientists are moving more than a dozen species of trees to locations beyond their native ranges.<sup>116</sup> Two English butterfly species have been introduced to more hospitable regions in the northern part of the country.<sup>117</sup>

Most importantly, international organizations and U.S. government agencies that are involved in species conservation are increasingly recommending assisted migration as a climate change

---

<sup>107</sup> Heller & Zavaleta, *supra* n. 7, at 27 (describing a range of adaptation measures classified along a risk continuum, from risk-averse to risk-tolerant).

<sup>108</sup> Camacho, *supra* n. 93, at 183.

<sup>109</sup> Hewitt et al., *supra* n. 20, at 2569.

<sup>110</sup> FWS, *Strategic Plan*, *supra* n. 23, at 29.

<sup>111</sup> Hewitt et al., *supra* n. 20, at 2564.

<sup>112</sup> Heller & Zavaleta, *supra* n. 7, at 18 tbl. 1.

<sup>113</sup> Hewitt et al., *supra* n. 20, at 2570.

<sup>114</sup> Minter & Collins, *supra* n. 1, at 1802.

<sup>115</sup> Seddon, *supra* n. 55, at 799.

<sup>116</sup> Minter & Collins, *supra* n. 1, at 1802.

<sup>117</sup> *Id.*

adaptation strategy.<sup>118</sup> Most prominently, the Re-introduction Specialist Group (RSG) within the IUCN had originally published Re-introduction Guidelines in 1995 that promoted translocation “only when there is no remaining area left within a species’ historic range.”<sup>119</sup> Recently, however, IUCN recognized that the guidelines are in need of revision<sup>120</sup> because “historic range cannot be used as . . . shorthand for suitable habitat, [and] out of range introductions may not carry any more risk than ‘true’ reintroductions.”<sup>121</sup> As a result of this finding, IUCN has created a task force, comprised of the RSG, the Species Survival Commission, and the Invasive Species Specialist Group to move ahead with assisted migration models and guideline revisions on translocation for species conservation.<sup>122</sup>

FWS has also recognized that climate change is increasingly threatening species, with Ken Salazar, the Secretary of the Interior Department, stating that “[f]or too long . . . we have stood idle as the climate-change crisis has grown.”<sup>123</sup> FWS recognizes that climate change challenges basic conservation assumptions.<sup>124</sup> One assumption that underlies virtually all conservation is “that by controlling threats in a species’ historical range, the species will recover and persist” in its historic range.<sup>125</sup> Climate change, however, will make species’ historic ranges lose relevance, which FWS recognizes will shift the traditional conservation paradigm.<sup>126</sup> In response to this shift, FWS is considering a broad range of conservation solutions, including assisted migration.<sup>127</sup> FWS recognizes that assisted migration may be necessary because the rate of climate change will be too fast for many species to keep up, and the changing climate will favor species that are generalists, such as weeds, over species with sensitive habitat needs.<sup>128</sup> FWS initially assessed and formally addressed assisted migration as a conservation measure in its first workshop on assisted migration in August 2008.<sup>129</sup>

---

<sup>118</sup> Hewitt et al., *supra* n. 20, at 2561.

<sup>119</sup> Dalrymple & Price, *supra* n. 57, at 8.

<sup>120</sup> *Id.*

<sup>121</sup> *Id.* at 7.

<sup>122</sup> *Id.* at 9.

<sup>123</sup> Fang, *supra* n. 79, at 332.

<sup>124</sup> Jeff Burgett, PowerPoint, *Climate Change and Its Implications for Conservation and Policy* slides 25–26 (FWS Workshop, June 24–25, 2008) (available at <http://www.fws.gov/pacific/Climatechange/pdf/boise/Burgett/PDF%20of%20Powerpoint/1%20Burgett.pdf> (accessed Nov. 18, 2012)).

<sup>125</sup> *Id.* at 26.

<sup>126</sup> *Id.* at 25–26.

<sup>127</sup> Joly & Fuller, *supra* n. 4, at 10419; see also FWS, *Climate Change in the Pacific Region: Fish and Wildlife Challenges*, <http://www.fws.gov/pacific/Climatechange/challenges.html> (updated Nov. 2, 2011) (accessed Nov. 18, 2012) (discussing some of the climate-related challenges faced by fish and wildlife managers and some possible solutions, including assisted migration).

<sup>128</sup> Burgett, *supra* n. 124, at 34.

<sup>129</sup> Joly & Fuller, *supra* n. 4, at 10419. The workshop took place on August 20, 2008 in Tucson, Arizona as part of FWS’s Climate Change Workshop (Effects of Climate

C. *FWS Should Issue Assisted Migration Regulations  
for Species Listed under the ESA*

While assisted migration has become more accepted as a climate change conservation tool, there is still no comprehensive federal assisted migration regulation.<sup>130</sup> As a starting point, it is necessary to determine who should be responsible for issuing assisted migration regulation and which species are eligible for it. There are several federal agencies that manage federal lands that could be used for assisted migration, including FWS, the National Park Service (NPS),<sup>131</sup> the U.S. Forest Service (USFS),<sup>132</sup> the Bureau of Land Management (BLM),<sup>133</sup> and even the Department of Defense (DOD), through its compatible use land buffer program.<sup>134</sup> Of all these agencies, FWS is the best suited to issue assisted migration regulation.

FWS is best suited to issue assisted migration regulation because of its clear mission and its obligations under the ESA. FWS's mission is to "conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people."<sup>135</sup> This

---

Change on Fish, Wildlife and Habitats in the Arid and Semiarid Southwestern United States). See generally Daniel Ferguson et al., *Putting Knowledge into Action: Tapping the Institutional Knowledge of U.S. Fish and Wildlife Service Regions 2 and 8 to Address Climate Change* 1, 4 (available at [http://www.climas.arizona.edu/files/climas/project-documents/public/knowledge\\_into\\_action.pdf](http://www.climas.arizona.edu/files/climas/project-documents/public/knowledge_into_action.pdf) (accessed Nov. 18, 2012)) (providing an overview of the workshop and the resulting recommendations).

<sup>130</sup> Joly & Fuller, *supra* n. 4, at 10413.

<sup>131</sup> NPS has the statutory duty to conserve "the scenery and the natural and historic objects and the wild life therein." National Park Service Organic Act of 1916, 16 U.S.C. §§ 1 *et seq.* (2006). Currently, NPS is responsible for 397 national parks containing 400 endangered species. Natl. Park Serv., *About Us*, <http://www.nps.gov/aboutus/index.htm> (updated Apr. 11, 2012) (accessed Nov. 18, 2012).

<sup>132</sup> USFS manages public lands in national forests and grasslands, which encompass 193 million acres of land, an area roughly equivalent to the size of Texas. U.S. Forest Serv., *About Us*, <http://www.fs.fed.us/aboutus/> (updated Jan. 12, 2012) (accessed Nov. 18, 2012). USFS's mission is to sustain the health, diversity, and productivity of these lands to meet the needs of present and future generations. U.S. Forest Serv., *About Us—Mission*, <http://www.fs.fed.us/aboutus/mission/shtml> (updated Mar. 7, 2008) (accessed Nov. 18, 2012).

<sup>133</sup> BLM administers over 245 million surface acres of land. Bureau of Land Mgt., *The Bureau of Land Management: Who We Are, What We Do*, [http://www.blm.gov/wo/st/en/info/About\\_BLM.html](http://www.blm.gov/wo/st/en/info/About_BLM.html) (updated Jan. 26, 2012) (accessed Nov. 18, 2012). BLM must manage the land according to its multiple-use mission, which mandates uses such as energy development, livestock grazing, recreation, and timber harvesting, while protecting natural resources. *Id.* BLM's land conservation system includes 221 Wilderness Areas totaling 8.7 million acres. *Id.*

<sup>134</sup> The U.S. Army, under the DOD, has created the Army Compatible Use Buffer (ACUB) program, which protects natural habitats, open lands, and working lands near military installations. U.S. Army, *Stand-To!*, <http://www.army.mil/standto/archive/2007/09/26/> (Sept. 26, 2007) (accessed Nov. 18, 2012). Through ACUB, the Army has permanently preserved more than 65,000 acres of buffer lands. *Id.*

<sup>135</sup> U.S. Fish & Wildlife Serv., *Employee Pocket Guide, FWS Fundamentals*, <http://www.fws.gov/info/pocketguide/fundamentals.html> (updated Dec. 17, 2010) (accessed Nov. 18, 2012).

mission is compatible with assisted migration's goal of conserving species that cannot migrate and that face extinction as a result of climate change. FWS is also responsible for implementing the ESA, which Congress passed in 1973 to protect imperiled species and to help them recover.<sup>136</sup> Congress passed the ESA in recognition of America's natural heritage and its "esthetic, ecological, educational, recreational, and scientific value . . . ."<sup>137</sup>

Under the ESA, FWS is responsible for protecting terrestrial and freshwater organisms by listing species as "[e]ndangered"<sup>138</sup> or "[t]hreatened"<sup>139</sup> and managing their populations.<sup>140</sup> ESA listed species are ideal candidates for assisted migration, as climate change may be the final push towards their extinction.<sup>141</sup> The ESA also imposes an affirmative obligation on the FWS to use "all methods and procedures which are necessary to bring any [listed] species to the point at which the measures provided in [the Act] are no longer necessary."<sup>142</sup> FWS, therefore, should issue assisted migration regulation under its ESA authority.<sup>143</sup>

FWS is also best suited to issue assisted migration regulation because it has acknowledged the need to shift the traditional conservation paradigm as a result of climate change.<sup>144</sup> As part of this shift, FWS is already engaging in proactive species conservation tools, such as reintroductions (through the use of experimental populations), and has committed itself to reviewing its regulations and policies to determine if changes are necessary to support effective adaptation responses to climate change.<sup>145</sup> FWS has stated that it will "focus particularly on determining the need to develop new policies (e.g., for managed relocation) and necessary revisions of existing policies (e.g., what constitutes native, invasive, or exotic species)" all of which are especially pertinent to assisted migration.<sup>146</sup> This commitment makes FWS uniquely poised to issue assisted migration regulation.

---

<sup>136</sup> FWS, *ESA Basics*, *supra* n. 47.

<sup>137</sup> *Id.*

<sup>138</sup> "Endangered' means a species is in danger of extinction throughout all or a significant portion of its range." *Id.*

<sup>139</sup> "Threatened' means a species is likely to become endangered within the foreseeable future." *Id.*

<sup>140</sup> *Id.*

<sup>141</sup> Shirey & Lamberti, *supra* n. 22, at 46.

<sup>142</sup> Joly & Fuller, *supra* n. 4, at 10423 (alteration in original).

<sup>143</sup> FWS is required to follow notice and comment procedure in issuing or revising regulations. See Administrative Procedure Act, 5 U.S.C. § 553 (2006) (setting forth requirements for agency rulemaking).

<sup>144</sup> Burgett, *supra* n. 124, at 25.

<sup>145</sup> FWS, *Strategic Plan*, *supra* n. 23, at 22.

<sup>146</sup> *Id.*

### III. THE EXISTING FOUNDATION FOR ASSISTED MIGRATION REGULATION

The U.S. Fish & Wildlife Service (FWS) will not have to begin from scratch when issuing assisted migration regulation. The Endangered Species Act (ESA) already provides a framework that supports assisted migration as a conservation tool. FWS can issue assisted migration regulations as a revision of its existing experimental population regulation, under which FWS already implements reintroductions that resemble assisted migration. The revised experimental population regulations should include a provision that creates a subgroup of experimental populations called assisted migration experimental populations. The revised regulation should leverage existing portions of the experimental population requirements and portions of FWS's Strategic Plan for Responding to Accelerating Climate Change.<sup>147</sup>

#### A. *The ESA Supports Assisted Migration as a Conservation Tool*

The ESA is a powerful statute with teeth. It gives FWS expansive authority to conserve imperiled species by helping them recover.<sup>148</sup> The purpose of the ESA is therefore consistent with use of assisted migration. The listing provision of the ESA, 16 U.S.C. § 1533(a), allows FWS to bring species in need of assisted migration under the scope of the Act. In addition, the ESA experimental population provision, 16 U.S.C. § 1539(j), specifically allows FWS to conserve species through introductions. Together, these provisions demonstrate that the ESA supports assisted migration as a conservation tool.

#### 1. *The ESA Gives FWS Broad Authority to Conserve Species*

The U.S. Supreme Court has acknowledged the ESA's strength and extensive reach. In *Tenn. Valley Auth. v. Hill*, the Court upheld an injunction against the completion of the \$100 million Tellico Dam on the Little Tennessee River because of the threat it posed to the endangered snail darter fish.<sup>149</sup> The Supreme Court described the ESA as "the most comprehensive legislation for the preservation of endangered species ever enacted by any nation."<sup>150</sup> Chief Justice Burger stated that "Congress has spoken in the plainest of words, making it abundantly clear that the balance has been struck in favor of affording endangered species the highest of priorities."<sup>151</sup> In analyzing the

---

<sup>147</sup> *Id.*

<sup>148</sup> See 16 U.S.C. § 1532(3) (defining FWS's power to "conserve" as "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary"); FWS, *ESA Basics*, *supra* n. 47; Taiga Takahashi, *Left Out at Sea: Highly Migratory Fish and the Endangered Species Act*, 99 Cal. L. Rev. 179, 187 (2011).

<sup>149</sup> *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 172–73 (1978).

<sup>150</sup> *Id.* at 180.

<sup>151</sup> *Id.* at 194.

framework of the ESA, the Court concluded that “[t]he plain intent of Congress in enacting this statute was to halt and reverse the trend toward species extinction, whatever the cost. This is reflected not only in the stated policies of the Act, but in literally every section of the statute.”<sup>152</sup>

ESA § 1532(3) emphasizes the importance of saving species from extinction by imposing an affirmative obligation on FWS to use “all methods and procedures which are necessary to bring any [listed] species to the point at which the measures provided in this Act are no longer necessary.”<sup>153</sup> The ESA provides a non-exhaustive list of such conservation methods and procedures, which include maintenance, propagation, live trapping, and transplantation.<sup>154</sup> While the ESA does not define transplantation, the plain meaning is “to remove from one location and introduce in another.”<sup>155</sup> On its face, the ESA appears to contemplate assisted migration.

## 2. *The ESA Listing Provision, 16 U.S.C. § 1533(a), Allows FWS to Bring Species in Need of Assisted Migration under the Scope of the Act*

The listing provision of the ESA, 16 U.S.C. § 1533(a), provides additional foundation for assisted migration regulation.<sup>156</sup> It requires FWS to list a species as threatened or endangered based on any of the following factors:

(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; or (E) other natural or manmade factors affecting its continued existence.<sup>157</sup>

---

<sup>152</sup> *Id.* at 184.

<sup>153</sup> Joly & Fuller, *supra* n. 4, at 10423 (alteration in original); *see also* 16 U.S.C. § 1532(3) (2006) (stating that the term “conserve . . . mean[s] to use . . . all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary”).

<sup>154</sup> 16 U.S.C. § 1532(3).

<sup>155</sup> *Webster's Third New International Dictionary* 2430 (Philip Babcock Gove ed., 3d ed., Merriam-Webster, Inc. 2002).

<sup>156</sup> 16 U.S.C. § 1533 (a).

<sup>157</sup> 16 U.S.C. § 1533(a)(1)(A)–(E). FWS must list species as threatened or endangered solely on the basis of biological status and threats to their existence, which FWS determines in accordance with the five factors described above, using the best scientific information available. FWS, *ESA Basics*, *supra* n. 47. When one or more of these factors imperils a species' survival, FWS may list the species under the ESA. *Id.* FWS also maintains a list of “candidate” species, which are species for which listing is warranted but precluded by higher listing priorities. *Id.* FWS works with partner actors, such as states, tribes, private landowners, private partners, and other federal agencies, to carry out conservation efforts for candidate species to prevent further decline of the species and possibly to eliminate the need for listing. *Id.* There are 1,998 species listed under the ESA. U.S. Fish & Wildlife Serv., *Species Report*, [http://ecos.fws.gov/tess\\_public/pub/boxScore.jsp](http://ecos.fws.gov/tess_public/pub/boxScore.jsp) (updated Oct. 5, 2012) (accessed Nov. 18, 2012) [hereinafter FWS, *Species*

The effects of climate change could theoretically trigger all of the factors except for factor (B), overutilization. The ESA listing provision, therefore, already allows FWS to bring species in need of assisted migration under the scope of the Act. The provision also demonstrates that while choosing which species to save from extinction may seem like a difficult decision, and a bit like playing God,<sup>158</sup> it is a role that FWS already fills.<sup>159</sup>

3. *The ESA Experimental Population Provision, 16 U.S.C. § 1539(j), Allows FWS to Conserve Species through Introductions*

The ESA experimental population provision, 16 U.S.C. § 1539(j), also gives FWS a broad grant of authority to conserve species through introductions. The provision allows the FWS Secretary to authorize the release (and the related transportation) of any population (including eggs, propagules, or individuals) of an endangered species or a threatened species *outside the current range* of such species if the Secretary determines that such release will further the conservation of such species.<sup>160</sup>

Congress added this provision to the ESA in 1982 to broaden FWS's discretion to reintroduce species because there had been a great deal of political opposition to FWS reintroduction efforts that conflicted with human activity.<sup>161</sup> In interpreting FWS reintroduction decisions under the experimental population provision, courts have agreed that FWS has a great deal of flexibility and discretion.<sup>162</sup> Although reintroductions occur inside of species' historical habitat, FWS arguably has the same discretion to manage assisted migrations outside of species' historical habitat.

---

*Report*]. Of the 1,391 U.S. species listed, 1,072 are endangered and 319 are threatened. *Id.* On July 12, 2011, FWS reached an agreement with the Center for Biological Diversity (CBD) to make petition findings and final listing decisions on more than 700 species by 2018. Steve Davies, Endangered Species & Wetlands Report, *CBD, FWS Reach Separate Agreement on Listing Deadlines*, <http://www.eswr.com/2011/07/cbd-fws-reach-separate-agreement-on-listing-deadlines/> (July 13, 2011) (accessed Nov. 18, 2012).

<sup>158</sup> See generally Camacho, *supra* n. 93, at 215 (noting that "assisted migration raises concerns regarding the hubris of playing God").

<sup>159</sup> *Id.* at 203–04 (explaining that FWS has already moved thirty-six endangered species).

<sup>160</sup> 16 U.S.C. § 1539(j)(2)(A).

<sup>161</sup> See *Wyo. Farm Bureau Fedn. v. Babbitt*, 199 F.3d 1224, 1231–32 (10th Cir. 2000) (finding that "Congress added section 10(j) to the Endangered Species Act in 1982 to address the Fish and Wildlife Service and other affected agencies' frustration over political opposition to reintroduction efforts perceived to conflict with human activity"); see also *Forest Guardians v. U.S. Fish and Wildlife Serv.*, 611 F.3d 692, 705 (10th Cir. 2010) (noting the same).

<sup>162</sup> See *Babbitt*, 199 F.3d at 1233 (stating that "Congress purposely designed section 10(j) to provide the Secretary flexibility and discretion in managing the reintroduction of endangered species"); see also *Forest Guardians*, 611 F.3d at 705 (noting that "Congress amended the ESA in 1982 to broaden the FWS's discretion to reintroduce endangered and threatened species" which authorized "the FWS to designate certain populations of endangered and threatened species as 'experimental populations'").

While the ESA gives FWS discretion in managing experimental populations, it also provides guidance. Prior to the release of an experimental population, FWS must determine whether a population is “essential to the continued existence of an endangered species or a threatened species.”<sup>163</sup> FWS considers a population “essential” if its “loss would be likely to appreciably reduce the likelihood of the survival of the species in the wild.”<sup>164</sup> A determination that an experimental population is essential imposes a different set of management requirements than those that apply to nonessential experimental populations.<sup>165</sup>

The ESA requires FWS to treat essential populations as threatened species,<sup>166</sup> which places two significant protections on the population: a prohibition on “taking” individuals of the population,<sup>167</sup> and a requirement that federal agencies acting within the population’s designated critical habitat consult with FWS about the resultant impacts of that action.<sup>168</sup> These protections are the core of the ESA. The ESA protects individual members of essential populations from “takes,” which the statute defines as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.”<sup>169</sup> Essential species also receive protection through FWS consultation, which requires that each federal agency, in consultation with FWS, must “insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat.”<sup>170</sup> FWS does not, however, have to treat nonessential experimental populations as endangered for purposes of consultation.<sup>171</sup> Instead, FWS treats them as species that are proposed for listing (candidate species), which means that they do not receive either of the two core protections of the ESA.<sup>172</sup> The ESA experimental population provision, therefore, gives FWS the ability to extend or remove core ESA protections for experimental populations.

---

<sup>163</sup> 16 U.S.C. § 1539(j)(2)(B).

<sup>164</sup> 50 C.F.R. § 17.80(b) (2011).

<sup>165</sup> 16 U.S.C. § 1539(j)(2)(B)–(C) (explaining that regulatory restrictions are considerably reduced under the nonessential population designation).

<sup>166</sup> 16 U.S.C. § 1539(j)(2)(C).

<sup>167</sup> See 50 C.F.R. § 17.31 (2011) (showing that FWS regulations generally extend the prohibition of take to threatened wildlife).

<sup>168</sup> Shirey & Lamberti, *supra* n. 22, at 48.

<sup>169</sup> *Id.*; 16 U.S.C. at § 1532(19).

<sup>170</sup> *Id.* at § 1536(a)(2).

<sup>171</sup> *Id.* at § 1539(j)(2)(C)(i).

<sup>172</sup> *Id.* at § 1539(a)(1)(A), (j)(2)(C)(i); see also Shirey & Lamberti, *supra* n. 22, at 48 (noting that a species proposed to be listed “is released without a critical habitat designation, without the taking prohibitions and without the USFWS consultation requirement for government action”).

Despite this discretion, FWS has not yet designated any reintroduced experimental population as essential.<sup>173</sup> Even the Guam rail, the only experimental population introduced outside its historic range,<sup>174</sup> was designated as nonessential—and it was extinct in the wild at the time of reintroduction.<sup>175</sup> This precedent suggests that FWS will likely designate assisted migration experimental populations as nonessential.<sup>176</sup> A nonessential designation has the obvious downside of leaving a vulnerable experimental population without core ESA protections. Assisted migration regulations can mitigate these dangers, however, and this Note suggests mitigation measures in Part IV. Moreover, nonessential designations also have benefits.

The nonessential designations facilitate assisted migration by giving FWS more flexibility in managing an experimental population. This flexibility allows FWS and authorized officials to “take” individuals that need special care or “problem” individuals that are causing land-use or resource interference.<sup>177</sup> It also gives FWS a means of managing experimental populations should they become invasive.<sup>178</sup> This management flexibility in turn helps to gain and maintain public support for the experimental population.<sup>179</sup> Experience with gray wolf experimental populations in Idaho, Montana, and Wyoming demonstrates the importance of this flexibility.<sup>180</sup> Local ranchers and tribes lobbied against the experimental population release due to fears that the wolves would kill their livestock and diminish the numbers of wild ungulates (deer, elk, moose, bighorn sheep, mountain goats, antelope, or bison).<sup>181</sup> FWS’s ability to designate the wolf experimental populations as nonessential allowed FWS to ease the political resistance by

---

<sup>173</sup> Shirey & Lamberti, *supra* n. 22, at 48. Of the sixty-three animals listed as experimental populations, none are listed as essential. U.S. Fish & Wildlife Serv., *Species Reports: Experimental Populations*, [http://www.fws.gov/ecos/ajax/tess\\_public/pub/experimentalPopulations.jsp](http://www.fws.gov/ecos/ajax/tess_public/pub/experimentalPopulations.jsp) (updated Oct. 22, 2012) (accessed Nov. 18, 2012).

<sup>174</sup> 50 C.F.R. § 17.84(f)(7).

<sup>175</sup> Robert E. Beck, Jr. & Julie A. Savidge, *Native Forest Birds of Guam and Rota of the Commonwealth of the Northern Mariana Islands Recovery Plan* 31 (U.S. Fish and Wildlife Serv. 1990).

<sup>176</sup> See Shirey & Lamberti, *supra* n. 22, at 48 (“FWS has avoided designating experimental populations as essential because of the restrictions that are placed on management and land use along with political resistance to introducing an endangered species to unoccupied habitat. Therefore, any release of a species inside or outside of its historic range under Section 10(j) is likely to be designated a nonessential experimental population by the FWS.”).

<sup>177</sup> Proposed Determination of Experimental Population Status for an Introduced Population of Guam Rails on Rota in the Commonwealth of the Northern Mariana Islands, 54 Fed. Reg. 25744, 25745 (June 19, 1989).

<sup>178</sup> Joly & Fuller, *supra* n. 4, at 10423. Invasive species have been a problem for over a century and the U.S. has developed a large network of laws and policies to address the issue. *Id.* The risk that assisted migration experimental populations will become invasive is a source of political resistance to assisted migration projects. *Id.*

<sup>179</sup> *Id.*

<sup>180</sup> 77 Fed. Reg. 55530, 55531 (Sept. 10, 2012).

<sup>181</sup> See Jesse H. Alderman, *Crying Wolf: The Unlawful Delisting of Northern Rocky Mountain Gray Wolves from Endangered Species Act Protections*, 50 B.C. L. Rev. 1195,

permitting the “taking” of wolves that were caught in the act of “killing, wounding, or biting livestock”<sup>182</sup> or creating an “unacceptable impact on wild ungulate populations.”<sup>183</sup> Without this ability to ease political resistance or manage the experimental population, assisted migration would be politically and practically difficult. Therefore, despite being controversial, FWS’s ability to designate species as nonessential currently seems to be the best option to handle the uncertainty and resistance around assisted migration.<sup>184</sup>

*B. The ESA Experimental Population Regulations Provide a Framework That Supports Assisted Migration as a Conservation Tool*

The ESA experimental population provision gives FWS the broad authority to engage in introductions without providing very many guidelines for experimental populations. On August 27, 1984, therefore, FWS expanded on the ESA experimental population provision by publishing experimental population regulations.<sup>185</sup> While these regulations provide more detailed management requirements for experimental populations, they are general guidelines for introductions regardless of whether FWS introduces a species inside or outside of its historic range, and regardless of the reason for introduction.<sup>186</sup> The only reference to the concept of assisted migration is a small phrase that prohibits assisted migration unless there has been “a finding by the Director in the extreme case that the primary habitat of the species has been unsuitably and irreversibly altered or destroyed.”<sup>187</sup> Part IV of this Note argues that this requirement functions as a ban on assisted migration and that FWS should not include it in future assisted migration regulation. There is no additional provision that restricts assisted migration. Assisted migration experimental populations, however, should still comply with general experimental population provisions.

FWS must authorize an experimental population by issuing regulations for each specific experimental population with a finding that the designation will “further the conservation of the species.”<sup>188</sup> FWS must consider the following in making such a finding: (1) possible adverse effects of removing individuals from an existing population of a species for the experimental population; (2) the likelihood that the experimental population will be successful and survive; (3) the impact the experimental population will have on the recovery of the species;

---

1212–13 (2009) (discussing some of the political challenges created by the release of gray wolf populations).

<sup>182</sup> 50 C.F.R. § 17.84(d)(3)(ii).

<sup>183</sup> *Id.* at § 17.84(n)(4)(v).

<sup>184</sup> Joly & Fuller, *supra* n. 4, at 10423.

<sup>185</sup> 49 Fed. Reg. 33845, 33893 (Aug. 27, 1984).

<sup>186</sup> *Id.*

<sup>187</sup> 50 C.F.R. § 17.81(a) (2011); *see also* Joly & Fuller, *supra* n. 4, at 10423 (discussing the necessity of a Director’s “finding”).

<sup>188</sup> *Id.* at § 17.81(b).

and (4) how much the experimental population will be affected by current or future activities in or around the release area.<sup>189</sup> These factors are also important considerations for assisted migration experimental populations because they ensure that assisted migration is in the best interest of the species. In addition, species in need of assisted migration should not have any difficulty meeting this requirement because introduction into a new, suitable habitat is likely to be their only means of survival in the face of climate change.<sup>190</sup> Comprehensive assisted migration regulation, therefore, should include these provisions.

Once FWS determines that an experimental population will “further the conservation of the species,”<sup>191</sup> FWS must list the population as either wildlife or plant and must identify the population by issuing a special rule.<sup>192</sup> The special rule for each experimental population must include certain core information.<sup>193</sup> First, the rule must identify the experimental population (the ID requirement) by providing the following minimum information: “[A]ctual or proposed location, actual or anticipated migration, number of specimens released or to be released, and other criteria appropriate to identify the experimental population(s).”<sup>194</sup> Second, the rule must identify the experimental population as essential or nonessential (the essential designation requirement), with each designation imposing different management requirements.<sup>195</sup> Third, the rule must lay out “management restrictions, protective measures, or other special management concerns of that population, which may include but are not limited to measures that isolate and/or contain the experimental population . . . from natural populations” (the management requirement).<sup>196</sup> Finally, the rule must establish a review and evaluation process (the review requirement) to measure the success or failure of the experimental population and its effect on the recovery of the species.<sup>197</sup> These fundamental requirements are a solid foundation for assisted migration regulations. The requirements establish necessary processes and require the basic information that is necessary for any introduction initiative, and should be part of assisted migration regulation.

---

<sup>189</sup> *Id.* at § 17.81(b)(1)–(4).

<sup>190</sup> Thomas T. Moore, *Climate Change and Animal Migration*, 41 *Envtl. L.* 393, 394–97 (2011).

<sup>191</sup> 50 C.F.R. § 17.81(b).

<sup>192</sup> *Id.* at § 17.81(e).

<sup>193</sup> *Id.* at § 17.81(c).

<sup>194</sup> *Id.* at § 17.81(c)(1).

<sup>195</sup> *Id.* at § 17.81(c)(2).

<sup>196</sup> *Id.* at § 17.81(c)(3).

<sup>197</sup> 50 C.F.R. § 17.81(c)(4).

C. *FWS's Strategic Plan for Responding to Accelerating Climate Change Creates Tools That Support Assisted Migration.*

In September of 2010, FWS published its Strategic Plan for Responding to Accelerating Climate Change (Climate Change Plan).<sup>198</sup> FWS created the Climate Change Plan in response to changing climate conditions, which the agency recognizes as “the greatest challenge to fish and wildlife conservation in the history of the Service.”<sup>199</sup> The Climate Change Plan calls for action now, “as if the future of fish and wildlife and people hangs in the balance—for indeed, all indications are that it does.” Climate change is occurring at an accelerating rate and has the potential to cause abrupt changes in ecosystems and to increase the risk of species extinctions.<sup>200</sup> The Climate Change Plan shows that FWS is committed to saving species that face extinction because of climate change.

To further FWS's commitment, the Climate Change Plan strives to establish new organizational and managerial processes and procedures that enable FWS to share and collect scientific knowledge to better predict, understand, and address the effects of climate change on species and their habitats at all spatial scales.<sup>201</sup> The Climate Change Plan lays out measures to help FWS achieve this goal. The first measure is the creation of climate science partnerships that will help FWS develop a long-term capacity for biological planning and conservation design.<sup>202</sup> The second measure is the creation of Landscape Conservation Cooperatives (LCCs) that will develop research and monitoring capability for landscape conservation.<sup>203</sup> Finally, the Plan also creates a strategic habitat conservation (SHC) framework that can help further the goals of assisted migration. These three tools will prove invaluable for assisted migration implementation efforts, and they should be part of assisted migration regulation.

1. *FWS Can Leverage the Climate Science Partnerships Created under the Climate Change Plan*

The climate science partnerships created under the Climate Change Plan will be with organizations such as the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, and even universities and non-governmental organizations.<sup>204</sup> These partnerships will provide FWS with experts in climate science modeling who can transfer global climate change projections into downscaled

---

<sup>198</sup> U.S. Fish & Wildlife Serv., *An Overview: Climate Change Strategic Plan* (Sept. 2010) (available at <http://www.fws.gov/home/climatechange/pdf/ClimatePlanOverview.pdf> (accessed Nov. 18, 2012)).

<sup>199</sup> FWS, *Strategic Plan*, *supra* n. 23, at 2.

<sup>200</sup> *Id.* at 3.

<sup>201</sup> *Id.* at 13.

<sup>202</sup> *Id.* at 19.

<sup>203</sup> *Id.* at 20.

<sup>204</sup> *Id.*

models<sup>205</sup> in order to identify climate change thresholds for key species and habitats.<sup>206</sup> Climate change thresholds are environmental tolerance levels that are important to understand because the physiology and ecology of many species depend on specific ranges of climatic variables (such as temperature, precipitation, pH, and carbon dioxide levels).<sup>207</sup> Those species with narrow climate change thresholds, which can survive in only a small range of climatic variables, are particularly vulnerable to climate change.<sup>208</sup> These climate change thresholds will help FWS predict future changes in the distribution of wildlife as a result of climate change.<sup>209</sup>

These partnerships will also allow FWS to leverage partners' climate change assessment processes, such as the U.S. Department of Agriculture's System for Assessing Vulnerability of Species (SAVS), which identifies how and to what extent vertebrate species may be vulnerable to climate change.<sup>210</sup> The data and processes derived from these climate science partnerships are valuable ways to identify assisted migration candidates and to prioritize conservation needs. Assisted migration regulations should therefore require that all

---

<sup>205</sup> Downscaling climate data is a strategy for generating locally relevant data from Global Circulation Models. Climate-Decisions, *Adaptation: Downscaling Climate Data*, [http://www.climate-decisions.org/2\\_Downscaling%20Climate%20Data.htm](http://www.climate-decisions.org/2_Downscaling%20Climate%20Data.htm) (2008) (accessed Nov. 18, 2012). There are three major downscaling strategies, and they can be statistically driven or dynamic. *Id.* (describing the three downscaling methods and the necessary data to create regional climate change models).

<sup>206</sup> FWS, *Strategic Plan*, *supra* n. 23, at 20. The feasibility of downscaling climate change models to assess local ecological conditions and to evaluate effects on individual species has been questioned because of the complexity of climate variables. J.B. Ruhl, *Climate Change and the Endangered Species Act: Building Bridges to the No-analog Future*, 88 B.U. L. Rev. 1, 22 (2008). However, FWS's Climate Change Plan emphasizes FWS's commitment to working with the U.S. Geological Survey Climate Change and Wildlife Science Center and the Departmental Climate Science Centers (established pursuant to Secretarial Order 3289) to further develop climate science and modeling expertise that will: "(1) make global climate model outputs usable at multiple planning scales through downscaling approaches (either dynamical or statistical); (2) integrate global or downscaled climate model outputs with ecological and land-use change models to project future changes in the distribution and abundance of fish and wildlife resulting from climate and land-use changes; (3) identify and predict climate change thresholds for key species and habitats; (4) facilitate research to address key uncertainties in applying climate change science to fish and wildlife conservation; and (5) support regional or local climate monitoring programs." FWS, *Strategic Plan*, *supra* n. 23, at 20.

<sup>207</sup> Wendy B. Foden et al., *Species Susceptibility to Climate Change Impacts*, IUCN 3 (2008) (available at <http://data.iucn.org/dbtw-wpd/html/RL-2009-001/section9.html> (accessed Nov. 18, 2012)).

<sup>208</sup> *Id.*

<sup>209</sup> FWS, *Strategic Plan*, *supra* n. 23, at 20.

<sup>210</sup> SAVS is designed to assess species' relative risks of population declines in response to projected changes in climate and related phenomena through a questionnaire based on predictive criteria, which translates into a score that indicates a species' vulnerability or resilience to climate change. Karen E. Bagne et al., *A System for Assessing Vulnerability of Species (SAVS) to Climate Change 2* (U.S. Forest Serv. 2011) (available at [http://docs.lib.noaa.gov/noaa\\_documents/NOAA\\_related\\_docs/USDA/RMRS-GTR\\_257.pdf](http://docs.lib.noaa.gov/noaa_documents/NOAA_related_docs/USDA/RMRS-GTR_257.pdf) (accessed Nov. 18, 2012)).

proposals for experimental populations include a climate change threshold for a species and its habitat, as well as a vulnerability assessment. This should not pose a significant additional burden on FWS, because climate science partnerships and the development of climate change thresholds for key species and habitats are already a part of FWS's Climate Change Plan.<sup>211</sup>

## 2. *FWS Can Leverage the Landscape Conservation Cooperatives Created under the Climate Change Plan*

FWS will also develop LCCs to meet its goal of acquiring biological planning and conservation design expertise.<sup>212</sup> LCCs are formal partnerships between federal agencies, state agencies, tribes, and non-governmental organizations that are focused on assessing climate change impacts on defined geographic areas.<sup>213</sup> LCCs will identify best practices, identify gaps, and avoid duplication through improved conservation planning and design.<sup>214</sup> Altogether, there will be twenty-one LCCs that collectively form a national network of conservation design experts.<sup>215</sup>

Each of the twenty-one LCCs will focus on a definite geographic area that will allow FWS to gather important information for assisted migration about the state of species' current habitats and the conditions of habitats outside species' historic ranges.<sup>216</sup> LCCs will assess landscapes for the following: (1) projected climate conditions at the potential receiving site and its likely compatibility with an assisted migration candidate species; (2) the site's biotic environment and its likely compatibility with an assisted migration candidate species; (3) the uniqueness of the site and its biota; (4) the level of human presence at the site; and (5) the ecological stability of the ecosystem.<sup>217</sup> These factors can provide a framework for FWS to determine when and where assisted migration would be a viable option.<sup>218</sup> Assisted migration regulation should therefore require that all proposals for assisted migration experimental populations include such a landscape assessment of the assisted migration candidate's current habitat and proposed new habitat.

---

<sup>211</sup> FWS, *Strategic Plan*, *supra* n. 23, at 20.

<sup>212</sup> *Id.*

<sup>213</sup> *Id.* at 21.

<sup>214</sup> *Id.* at 21–22.

<sup>215</sup> *Id.* at 21.

<sup>216</sup> *Id.* at 21–22.

<sup>217</sup> Camacho, *supra* n. 93, at 237.

<sup>218</sup> *Id.* at 238.

### 3. *FWS Can Leverage the Strategic Habitat Conservation Framework Created under the Climate Change Plan*

Assisted migration regulation can also leverage the SHC framework that LCCs will employ.<sup>219</sup> The SHC framework involves the strategic conservation of species' habitats within sustainable landscapes<sup>220</sup> through an adaptive research process<sup>221</sup> that involves five steps: (1) biological planning, which sets targets and goals; (2) conservation design, which develops a plan to meet the targets; (3) conservation delivery, which implements the conservation plan; (4) outcome-based monitoring and adaptive management, which allows a measurement of success and improvement of results; and (5) assumption-based research, which repeats all five steps in order to improve understanding.<sup>222</sup> This process is intended to help FWS learn from both success and failure, increasing the probability of success in future conservation actions.<sup>223</sup>

This SHC framework is a critical foundation for assisted migration implementation for two reasons. First, the SHC adaptive management approach is the same flexible management approach that will be necessary during assisted migration implementation, so that the agency can respond to contingencies such as the failure of an introduced population, or can craft remedial action to combat emerging negative impacts of introduced species.<sup>224</sup> Second, the SHC framework's focus on continuous monitoring and research of strategic habitats will help FWS determine when assisted migration is appropriate. This focus will ensure that FWS is continuously aware of habitat conditions, providing the agency with the necessary information to determine if a habitat has become unsuitable for certain species that have been unable to migrate. Assisted migration regulation should adopt this process as a mandatory adaptive management requirement for assisted migration experimental populations.

In summary, FWS already has a strong foundation for assisted migration regulation. The ESA gives FWS authority to issue comprehensive assisted migration regulation. In addition, FWS can revise the experimental population regulation to provide a framework for assisted migration regulation. The revised regulations should include a provision that creates a subgroup of experimental populations, called assisted migration experimental populations. This subgroup would utilize existing portions of the experimental population requirements

---

<sup>219</sup> FWS, *Strategic Plan*, *supra* n. 23, at 26 (describing how LCCs will develop appropriate research and monitoring capabilities).

<sup>220</sup> *Id.* at 14 (stating that the SHC's principal approach is the conservation of various habitats).

<sup>221</sup> *Id.* at 26 (noting that targeted research evaluates adaptation efforts).

<sup>222</sup> *Id.* at 15.

<sup>223</sup> *Id.* at 26 (addressing the benefits of measuring effects of conservation efforts).

<sup>224</sup> Hewitt et al., *supra* n. 20, at 2569 (noting the importance of a flexible management approach that can respond to assisted migration's possible adverse effects).

and portions of FWS's Climate Change Plan. This foundation will need further expansion and modification to create truly comprehensive assisted migration regulation.

#### IV. NEW COMPREHENSIVE ASSISTED MIGRATION REGULATION

While the Endangered Species Act (ESA), experimental population regulations, and U.S. Fish and Wildlife Service's (FWS) Strategic Plan for Responding to Accelerating Climate Change (Climate Change Plan) provide a broad foundation for assisted migration regulation, there need to be more specific rules for playing God if assisted migration efforts are to be implemented effectively. The need for specificity, however, must be balanced against the complexities and idiosyncrasies that make assisted migration a case-specific effort dependent on such factors as which species to move, where to move them, and who will fund and perform the introduction.<sup>225</sup> FWS can promulgate balanced and comprehensive assisted migration regulation by adopting the framework laid out in Part IV of this Note and by making several additions and modifications to the following: (1) the definitions laid out in 50 C.F.R. § 17.80; (2) the experimental population listing process laid out in 50 C.F.R. § 17.81; and (3) the experimental population special rule requirements in 50 C.F.R. § 17.81(c).

##### A. *Assisted Migration Regulation Should Expand on the Definitions in C.F.R. § 17.80*

The definitions section of C.F.R. § 17.80 defines only "experimental population" and "essential experimental population."<sup>226</sup> If assisted migration regulations are to be incorporated with the experimental population regulations, this definition section will need to include terms relevant to assisted migration efforts. Table 1 below provides a non-exclusive list of terms that should be part of comprehensive assisted migration regulations. FWS does not need to adopt these exact terms or definitions. Instead, the importance lies in creating some consistency and shared understanding of concepts that are critical for assisted migration efforts. The concept of assisted migration alone is recognized under six different terms: facilitated migration, assisted colonization, managed relocation, assisted range expansion, species translocation, and assisted migration.<sup>227</sup> Table 1 below proposes streamlined terminology and definitions of key terms that future assisted migration regulation should include.

---

<sup>225</sup> Joly & Fuller, *supra* n. 4, at 10414 (noting the complexities of federal land management).

<sup>226</sup> 50 C.F.R. § 17.80.

<sup>227</sup> Hewitt et al., *supra* n. 20, at 2561; *see also* Shirey & Lamberti, *supra* n. 22, at 45 (discussing the use of the terms "translocation," "assisted colonization," "assisted migration," and "managed relocation").

**Table 1.**

| <b>Concepts</b>                            | <b>Definition</b>   |
|--|---|
| Translocation                              | The intentional movement of a species by humans from one area to another, inside or outside a species' historical range, for a conservation purpose. <sup>228</sup>                                       |
| Population Restoration                     | The intentional movement of a species by humans to a habitat within its historic range <sup>229</sup> either to "re-introduce" <sup>230</sup> a species or to "re-enforce" <sup>231</sup> the population. |
| Reintroduction                             | The intentional introduction of a species by humans to a habitat within its historic range because it has disappeared from its historic range. <sup>232</sup>   |
| Re-enforcement                             | The intentional introduction by humans of additional individuals of a species to habitats within its historic range to build up an existing population. <sup>233</sup>                                    |
| Conservation Introduction                  | The intentional movement of a species by humans to new habitats outside of its historic range for a conservation purpose. <sup>234</sup>  |
| Assisted Migration                         | The intentional movement of a species by humans to favorable habitat beyond its historic range to protect the species from threats, such as climate change. <sup>235</sup>                                |
| Assisted Migration Experimental Population | An experimental population that is introduced by humans to habitat outside its historic range through assisted migration.   |
| Native Species                             | A species that has historically been a part of a particular environment, if its presence in that region is the result of only natural processes with no human intervention. <sup>236</sup>                |

<sup>228</sup> See Seddon, *supra* n. 55, at 796 (relying on the IUCN definition of the term); see also IUCN, *Position Statement*, *supra* n. 56, at 3 (stating that "translocation is the movement of living organisms from one area to another").

<sup>229</sup> See Seddon, *supra* n. 55, at 798 (defining "population restoration" as "encompass[ing] translocations that seek to reestablish viable populations within the known distribution range of a species").

<sup>230</sup> *Id.* at 797.

<sup>231</sup> *Id.*

<sup>232</sup> *Id.*

<sup>233</sup> *Id.*

<sup>234</sup> Seddon, *supra* n. 55, at 798–99 (defining "conservation introduction" as a "mediated movement of organisms outside their native range" performed with the intention of establishing a new population "explicitly for conservation").

<sup>235</sup> See Joly & Fuller, *supra* n. 4, at 10413–14 (defining "assisted migration" as the "action of picking up and moving certain individuals or populations of species that either cannot or will not be able to migrate on their own in response to the rapidly changing climatic conditions expected over the next several decades").

<sup>236</sup> See U.S. Fish & Wildlife Serv., *Native Species Conservation*, <http://www.fws.gov/midwest/Fisheries/native.html> (updated Aug. 2, 2012) (accessed Nov. 18, 2012).

|                          |   |
|--------------------------|---|
| Invasive Species         | A species that is intentionally or unintentionally introduced into a non-native ecosystem, by any means, and which causes, or is reasonably certain to cause, harm to the environment or human health. <sup>237</sup> |
| Alien/non-native Species | A species that is intentionally or unintentionally introduced outside its native distributional range, by any means, and that was not present in that region at the time of European settlement. <sup>238</sup>       |
| Neo-native Species       | A species that is not historically part of an ecosystem but, because of shifting climate patterns, may come to be considered native to the ecosystem. <sup>239</sup>  |
| Historic range           | The known general distribution of a species or subspecies as reported in the current scientific literature. <sup>240</sup>  |

*B. Assisted Migration Regulation Should Expand and Modify the Experimental Population Listing Process Laid out in C.F.R. § 17.81*

The current experimental population listing process in C.F.R. § 17.81 imposes two requirements before FWS can approve assisted migration: (1) the Director of FWS must find that a species' primary habitat has been "unsuitably and irreversibly altered or destroyed" (the "habitat standard");<sup>241</sup> and (2) FWS must find that assisted migration will "further the conservation of the species."<sup>242</sup> This second requirement, as explained in Part IV of this Note, is an important consideration and should be incorporated as part of assisted migration regulations. In contrast, the first requirement—that a habitat must be "unsuitably and irreversibly altered or destroyed" for experimental population approval—is problematic and should not be part of assisted migration regulation. The standard is undefined, making it difficult to apply consistently. In addition, it has only been met once, suggesting that is too difficult of a standard to meet.<sup>243</sup> The Guam rail has been the only beneficiary of this standard.<sup>244</sup> FWS's application of the standard to the Guam rail provides insight into both the "unsuitable" and the "irreversible" prongs of the standard, making it clear that the standard should be modified.

<sup>237</sup> FWS, *Invasive Species*, *supra* n. 64, at ¶ 1.

<sup>238</sup> See U.S. Fish & Wildlife Serv., *Non-Native, Invasive and Nuisance Species Management*, <http://www.fws.gov/birds/uctmbga/non-native.html> (accessed Nov. 18, 2012).

<sup>239</sup> Joly & Fuller, *supra* n. 4, at 10425.

<sup>240</sup> 50 C.F.R. 17.11(e).

<sup>241</sup> 50 C.F.R. § 17.81(a).

<sup>242</sup> *Id.* at § 17.81(b).

<sup>243</sup> Joly & Fuller, *supra* n. 4, at 10423–24.

<sup>244</sup> *Id.*

1. *The “Unsuitably” Altered or Destroyed Requirement of the Habitat Standard Is Too Restrictive and Should Be Excluded from Assisted Migration Regulation*

FWS’s application of the habitat standard to the Guam rail suggests that the “unsuitable” prong of the standard is too restrictive. In the case of the Guam rail, FWS did not find that the rail’s habitat was unsuitable until almost three decades had passed since the introduction of the invasive brown tree snake which preyed the Guam rail out of existence in the wild.<sup>245</sup> The brown tree snake was accidentally introduced into Guam in the early 1950s.<sup>246</sup> By 1970, it was found throughout southern Guam, preying on the Guam rail, and by the 1980s it had moved into northern Guam, driving the rail into extinction.<sup>247</sup> In short, FWS did not deem the Guam rail’s habitat unsuitable until there was not a single wild Guam rail left in its primary habitat.<sup>248</sup> In fact, several years passed between the extinction of the rail in the wild and FWS’s determination that its primary habitat had become unsuitable.<sup>249</sup> The Guam rail’s saga suggests that the “unsuitable” prong of the habitat standard is impossible to meet unless a species is already extinct in the wild.

The Guam rail, fortunately, was part of a successful captive breeding program that saved it from extinction.<sup>250</sup> Luckily, rails breed readily in captivity, making possible the release of experimental populations of rails into the wild.<sup>251</sup> Captive breeding, however, is not always successful, because animals can become tame and lose their ability to survive in the wild.<sup>252</sup> Analysis of experimental releases indicates that the most successful populations are those with individuals that were caught in the wild and relocated, rather than animals bred in captivity for release.<sup>253</sup> The “unsuitable” habitat prong of the standard, therefore, is too restrictive and risks species extinction—it should not be part of assisted migration regulation.

---

<sup>245</sup> Beck & Savidge, *supra* n. 175, at 27–28.

<sup>246</sup> *Id.* at 27.

<sup>247</sup> *Id.* at 27–28.

<sup>248</sup> 54 Fed. Reg. 43966, 43967 (Oct. 30, 1989) (stating that by May of 1985 wild Guam rails were not locatable).

<sup>249</sup> The Guam rail was virtually extinct in the wild by 1985. Beck & Savidge, *supra* n. 175, at 27–31. It was not until 1989 that FWS found that the habitat had become unsuitable and therefore approved an experimental population of rails. 54 Fed. Reg. 43966, 43967.

<sup>250</sup> Beck & Savidge, *supra* n. 175, at 30.

<sup>251</sup> 54 Fed. Reg. 43966, 43968.

<sup>252</sup> *Id.* at 43966.

<sup>253</sup> *Id.*

2. *The “Irreversibly” Altered or Destroyed Requirement of the Habitat Standard Is Too Restrictive and Should Be Excluded from Assisted Migration Regulation*

The Guam rail experimental population also suggests that the “irreversible” prong of the habitat standard is too restrictive. FWS based its approval for the rail experimental population on the facts that no effective control method for the brown snake existed and that no effective control methods were “anticipated in the foreseeable future.”<sup>254</sup> FWS, therefore, interpreted “irreversible” alteration or destruction to mean “indefinitely” altered or destroyed habitat.<sup>255</sup> The practical application of this restrictive standard had devastating effects on the Guam rail’s habitat. The standard functioned as a wait-and-see restriction that allowed the invasive brown snake to spread from south to north throughout the island of Guam, allowing the Guam rails to disappear as the snake’s territory expanded.<sup>256</sup> After decades of finding decimated bird populations correlated with high snake populations, FWS concluded that the rail’s habitat would be indefinitely altered and that the rail would need to be introduced outside its historic range.<sup>257</sup>

Stringent application of the requirement that habitat be “irreversibly” altered or destroyed in order for a species to have a designated experimental population will function as an impediment to a successful assisted migration program. FWS will not approve an assisted migration experimental population until it is absolutely clear that a species’ habitat has been rendered unsuitable for an indefinite amount of time, at which point all wild individuals of the species will have disappeared. This will necessitate assisted migration experimental populations that are based off of captive-bred individuals with lower chances of survival in the wild. The “unsuitably and irreversibly altered” standard, therefore, should not be part of assisted migration regulation.

Comprehensive assisted migration regulation should not include a new standard that imposes another hurdle on when assisted migration may occur. Instead, the existing experimental population provisions and the suggested provisions in Part IV will appropriately limit assisted migration efforts. Specifically, three proposed requirements would put appropriate limits on assisted migration efforts. The first provision would require that all candidate experimental populations must include a climate change threshold<sup>258</sup> for a species and its

---

<sup>254</sup> *Id.*

<sup>255</sup> *Id.*

<sup>256</sup> 54 Fed. Reg. 25744, 25745 (June 19, 1989).

<sup>257</sup> Beck & Savidge, *supra* n. 175, at 27–28.

<sup>258</sup> Climate change thresholds would be a specific range of climatic variables (temperature, precipitation, pH, and carbon dioxide levels) that a particular species depends on for survival. Foden et al., *supra* n. 207.

habitat, as well as a vulnerability assessment<sup>259</sup> score. The second provision would require that all proposals for experimental populations must include a landscape assessment of a species' current habitat, as well as a landscape assessment of the next best habitat that is suited for the species, both inside and outside a species' historic range. The final provision that would appropriately limit assisted migration would require that FWS find that assisted migration will "further the conservation of the species." These three provisions would adequately replace the "unsuitably and irreversibly altered" standard.

### 3. *The Listing Requirements Should Be Expanded to Require a Risk-Benefit Analysis before an Experimental Population Is Approved*

In addition to modifying the experimental population listing requirements in C.F.R. § 17.81, FWS should also expand them. Currently, the requirements do not require a risk-benefit analysis before an experimental population is approved.<sup>260</sup> This is a large gap in the existing experimental population regulation because the risk of species invasion and land use/resource interference is a serious concern with assisted migration.<sup>261</sup> Scientists have suggested a variety of risk-benefit decision-making frameworks.<sup>262</sup> Assisted migration regulation, however, does not need to adopt a specific model. It can simply require that a risk-benefit analysis be completed, as long as the framework is reputable and scientifically based. Comprehensive assisted migration regulation should include this core requirement because it will ensure that FWS seriously considers all risks and weighs them against the benefits of assisted migration.<sup>263</sup>

---

<sup>259</sup> A vulnerability assessment score, which represents a species' vulnerability or resilience to climate change, could be developed using the U.S. Department of Agriculture's SAVS tool. SAVS generates a vulnerability assessment score through the use of a questionnaire that incorporates predictive criteria for climate change response. Bagne, *supra* n. 210, at 2.

<sup>260</sup> See 50 C.F.R. § 17.81(b) (only requiring the Secretary to consider whether the release will further the conservation of the species).

<sup>261</sup> See Hewitt et al., *supra* n. 20, at 2566 (observing that the most commonly identified risk of assisted migration is that introduced species will become invasive); Shirey & Lamberti, *supra* n. 22, at 45–47 (suggesting that assisted migration could be a useful management tool but must be conducted carefully with adequate risk management).

<sup>262</sup> See Mark C. Andersen et al., *Risk Assessment for Invasive Species*, 24 *Risk Analysis* 787, 792 (2004).

<sup>263</sup> The National Environmental Policy Act imposes a similar stop-and-think requirement by requiring all federal agencies to "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on . . . the environmental impact of the proposed action . . ." 42 U.S.C. § 4332(2)(C)(i) (2000).

*C. Assisted Migration Should Expand on the Experimental Population Special Rule Requirements Laid out in C.F.R. § 17.81(c)*

The current experimental population regulations require that FWS issue special rules containing certain core information for all experimental populations.<sup>264</sup> The special rules must include four requirements that Part III(B) described as the identification (ID) requirement, the essential designation requirement, the management requirement, and the review requirement.<sup>265</sup> While all four of these requirements should be incorporated into assisted migration regulation, each requirement needs to be expanded so it addresses specific assisted migration concerns.

*1. Congress Should Expand the ID Requirement to Specifically Address Assisted Migration Concerns*

The experimental population ID requirement should be expanded to mitigate the ESA's geographical restriction on assisted migration. The ESA states that a population qualifies as experimental only when "the population is wholly separate geographically from non-experimental populations of the same species."<sup>266</sup> This limitation might impede assisted migration efforts because it conflicts with FWS's important ongoing efforts to facilitate species' migration by promoting habitat connectivity.<sup>267</sup> With increased habitat connectivity, non-experimental populations are more likely to commingle with experimental populations of the same species.

This problem, however, appears to be a bigger concern for reintroduced experimental populations than for assisted migration experimental populations. Reintroduced experimental populations are released within their historic range, as opposed to outside their historic range, and are therefore more likely to commingle with non-experimental populations once fragmented habitat is connected. In addition, FWS chooses species for reintroduction for a wide range of reasons, while assisted migration candidates are necessarily selected

---

<sup>264</sup> 50 C.F.R. § 17.81(c).

<sup>265</sup> *Supra* pt. III(B) (discussing the special rule requirement).

<sup>266</sup> 16 U.S.C. § 1539(j)(1). This phrase is not defined in the ESA, and courts have found that Congress deliberately left its meaning for FWS to interpret, as long as its interpretation does not conflict with the plain language of the ESA. *Babbitt*, 199 F.3d at 1234; see also *Rainson Co. v. Fed. Energy Reg. Commn.*, 106 F.3d 269, 272 (9th Cir. 1997) (holding that FWS's interpretation of the ESA, which it is charged with administering, is entitled to great deference). FWS has elaborated on the meaning of the phrase in its experimental population regulations, explaining that it will recognize an experimental population's status only when there is no overlap in populations and only if "the times of geographic separation are reasonably predictable; e.g., fixed migration patterns, natural or man-made barriers." 50 C.F.R. § 17.80.

<sup>267</sup> FWS's Climate Change Plan contains habitat connectivity initiatives that create linkages and corridors between fragmented habitats to enhance habitat connectivity and facilitate the movement of species that are able to migrate on their own. FWS, *Strategic Plan*, *supra* n. 23, at 23.

for assisted migration because of their limited dispersal ability and the judgment that without assisted migration they are doomed to extinction. It is less likely, therefore, that assisted migration experimental populations will commingle with non-experimental populations of the same species. Comprehensive assisted migration regulation, however, should still address this issue.

Assisted migration regulations should mitigate ESA's geographical restriction by permitting FWS to define "population" for each species with approved assisted migration experimental populations. The definition of "population" informs whether FWS will find that a species' non-experimental population is in the same geographic area as the experimental population. FWS can redefine a "population" in the context of different species, as demonstrated by FWS's experimental population regulations for gray wolves.<sup>268</sup> When FWS approved the gray wolf experimental populations, it defined a gray wolf population as "at least two breeding pairs of gray wolves that each successfully raise at least two young . . . for two consecutive years."<sup>269</sup> The ability to redefine "population" for each species can help mitigate the geographic limitations while also allowing FWS to pursue habitat connectivity efforts.

## 2. *FWS Should Expand the Essential Designation Requirement to Specifically Address Assisted Migration Concerns*

The current essential designation requirement in experimental population regulation requires a finding that supports a population's designation as essential or nonessential.<sup>270</sup> All approved experimental populations to date have, however, been nonessential. While nonessential populations are not protected from take under the ESA, FWS has issued special rules for almost all nonessential experimental populations, which do generally prohibit take.<sup>271</sup> FWS has usually paired these special rules prohibiting takes with only a few exceptions allowing narrowly defined takes in specific circumstances.<sup>272</sup> Some of the exceptions that allow takes have included humane requirements. For instance, the Guam rail's special rules permit takes that are humane and allow killing only if there are no other viable alternatives.<sup>273</sup> In addition, FWS has paired these special take rules with enforcement provisions warning that violations of the special rules will be considered violations pursuant to the ESA.<sup>274</sup>

---

<sup>268</sup> Establishment of a Nonessential Experimental Population of Gray Wolves in Yellowstone National Park in Wyoming, Idaho and Montana. 59 Fed. Reg. 60252, 60256 (Nov. 22, 1994).

<sup>269</sup> *Id.*

<sup>270</sup> 50 C.F.R. § 17.81(c)(2).

<sup>271</sup> *Id.* at §§ 17.84, 17.85.

<sup>272</sup> *Id.*

<sup>273</sup> *Id.* at § 17.84(f)(3).

<sup>274</sup> *Id.* at § 17.84(f)(4).

Assisted migration regulations, therefore, should capture FWS's general practice of issuing special take prohibition rules for nonessential experimental populations. To do so, FWS should add language to the essential designation requirement that makes it necessary for FWS to issue general take prohibitions with narrowly tailored exceptions via special rules for nonessential populations. Assisted migration regulations should also impose a humane take requirement on all special rules that permit takes of nonessential population species.<sup>275</sup> These additions sufficiently expand the essential designation requirement to specifically address assisted migration concerns.

3. *FWS Should Expand the Management Requirement to Specifically Address Assisted Migration Concerns*

The current regulatory management requirement prescribes that experimental populations' special rules include "[m]anagement restrictions, protective measures, or other special management concerns of that population."<sup>276</sup> FWS should expand this requirement to include language that reflects concerns specific to assisted migration. A significant scientific source of concern is that assisted migration experimental populations will become invasive.<sup>277</sup> A significant source of political resistance comes from landowners who fear that experimental populations will cause land-use and resource interference.<sup>278</sup> FWS should expand the management requirement to address these concerns by requiring that all assisted migration experimental populations have special rules that mitigate species invasiveness and land-use/resource interference.

4. *FWS Should Expand the Review Requirement to Specifically Address Assisted Migration Concerns*

Finally, FWS should expand the review requirement in the experimental population regulation to include an adaptive management review strategy. The framework for this strategy should come from the strategic habitat conservation (SHC) framework in FWS's Climate Change Plan, which involves a cyclical five-step process.<sup>279</sup> This framework will enable FWS to learn from assisted migration successes

---

<sup>275</sup> Humane takes are not a novel idea in wildlife conservation. The Marine Mammal Protection Act defines "humane" in the context of taking an animal as "that method of taking which involves the least possible degree of pain and suffering practicable" to the animal involved. 16 U.S.C. 1362(4).

<sup>276</sup> *Id.* at § 17.84(c)(3).

<sup>277</sup> Hewitt et al., *supra* n. 20, at 2566.

<sup>278</sup> Shirey & Lamberti, *supra* n. 22, at 47–48.

<sup>279</sup> FWS's Climate Change Plan describes the following five-step SHC adaptive management framework: (1) biological planning to set targets and goals; (2) conservation design to develop a plan to meet targets; (3) conservation delivery to implement the conservation plan; (4) outcome-based monitoring and adaptive management to measure success and improve results; and (5) assumption-based research, which repeats all five steps to improve understanding. FWS, *Strategic Plan*, *supra* n. 23, at 15.

and failures, increasing the probability of success in future assisted migration efforts.<sup>280</sup> These proposed additions and modifications to the broad assisted migration foundation laid out in this Part IV will all form part of comprehensive assisted migration regulation.

## V. CONCLUSION

Climate change will be one of the major drivers of species extinctions in the twenty-first century.<sup>281</sup> “A quarter of animals and plants living on the land could be forced into oblivion,” and some species “may be unable to migrate far enough to reach hospitable surroundings.”<sup>282</sup> Assisted migration is a solution for these species, but there is currently no comprehensive assisted migration regulation. The U.S. Fish and Wildlife Service (FWS) has the authority under the Endangered Species Act to issue comprehensive assisted migration regulation, and it should do so. The agency can create assisted migration regulation through experimental population regulation revisions by modifying and expanding experimental population provisions and by adopting tools from FWS’s Strategic Plan for Responding to Accelerating Climate Change. This Note has explained what revisions are necessary and has laid out new provisions that are essential for comprehensive assisted migration regulation. This proposed regulation will enable FWS to carry out assisted migration efforts in the monumental task of saving biodiversity from the impacts of climate change.

---

<sup>280</sup> *Id.* at 26.

<sup>281</sup> IUCN, *Addressing Climate Change*, *supra* n. 6, at 33.

<sup>282</sup> Alex Kirby, BBC News, *Climate Risk ‘To Million Species’*, <http://news.bbc.co.uk/2/hi/science/nature/3375447.stm> (Jan. 7, 2004) (accessed Nov. 18, 2012); *see also* Joly & Fuller, *supra* n. 4, at 10413–14 (describing the need to move “certain individuals or populations of species that either cannot or will not be able to migrate on their own in response to the rapidly changing climatic conditions expected over the next several decades”).

