

Summer 2018

## Ecotypes and Killer Whales: A Scientific Concept to Guide the Endangered Species Act's "Distinct Population Segment"

Christopher Michael Johnson

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# ECOTYPES AND KILLER WHALES: A SCIENTIFIC CONCEPT TO GUIDE THE ENDANGERED SPECIES ACT’S “DISTINCT POPULATION SEGMENT”

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*The Endangered Species Act protects threatened and endangered species, subspecies, and distinct population segments, with species listings guided by the best scientific information available. “Distinct population segment,” however, is not a biological term. To date, there is still not a test based on evolutionary theory used to determine distinct population segments. This Comment attempts to change that by introducing the ecotype concept—a scientific theory that has existed for over one hundred years—into jurisprudence. This Comment begins by recounting how the distinct population segment terminology came to be. Next, it argues that the Endangered Species Act has been implemented contrary to its purpose of protecting the evolutionary process. It then modifies the test for determining distinct population segments with the aim of protecting populations in the early stages of ecological speciation and suggests using the ecotype concept as a guide to future listings. Lastly, this Comment follows the legal history of the Southern Resident killer whale and discusses how the ecotype concept would have applied to each twist and turn along its legal journey.*

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## INTRODUCTION

The Endangered Species Act (ESA) intends for science to mold the law—for science to inform the government which species are in peril, and for the agencies responsible for carrying out the ESA to list and protect those species.<sup>1</sup> But many contend that the opposite occurs—that the law influences scientists.<sup>2</sup> For example, since the ESA is currently read to limit conservation efforts to populations that have attained specific taxonomic levels, it encourages elevating populations to meet covered ranks when science may not support this status.<sup>3</sup> Moreover, the ESA is filled with non-scientific language that makes it difficult, if not impossible, to adhere to the ESA's direction to make species listings based on the best scientific information available.<sup>4</sup> The result is an ESA that fails to properly protect biodiversity, undermining the purpose of the ESA “to halt and reverse the trend toward species extinction.”<sup>5</sup> These shortcomings can be lessened by re-evaluating the ESA's definition of species, a definition that is broken due to its use of non-scientific language and ignorance of the evolutionary process.<sup>6</sup> Utilizing a species definition that is rooted in science and protects evolution as a whole is imperative because demarcating the boundaries of potentially protectable populations is the first step, and thus the keystone, in ESA listings.<sup>7</sup>

This Comment suggests a new lens through which to view the ESA. This lens reveals that the ESA has become convoluted due to the statute's use of non-scientific terms. The legal history of the ESA illustrates how the agencies responsible for listing species procrastinated defining these terms, and how when attempts were finally made to clarify the non-scientific terms, the clarifications were comprised of even more non-

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1. Thomas Wheeler, *The Concept of Species with Constant Reference to Killer Whales*, 4 WASH. J. ENVTL. L. & POL'Y 250, 278 (2014).

2. *Id.*

3. See Nick J.B. Isaac et al., *Taxonomic Inflation: Its Influence on Macroecology and Conservation*, 19 TRENDS IN ECOLOGY & EVOLUTION 464, 466 (2004).

4. See Holly Doremus, *Listing Decisions Under the Endangered Species Act: Why Better Science Isn't Always Better Policy*, 75 WASH. U.L.Q. 1029, 1035 (1997).

5. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 184 (1978).

6. Doremus, *supra* note 4, at 1101.

7. *Id.* at 1103.

scientific terms. This process led to the further distortion of already confusing language. The result of this practice is that the ESA offers the listing agencies both vast discretion in making species determinations and shelter from the political ramifications.<sup>8</sup>

This Comment proceeds in five parts. Part I begins with a background of the ESA. Part II then discusses the adoption and development of the “distinct population segment” terminology. Next, Part III advocates for a new way to interpret the ESA in the context of ecological speciation. Part IV then suggests, based on the principles of ecological speciation, that distinct population segment should be interpreted to mean ecotype. Finally, Part V follows the legal history of the Southern Resident killer whale and explains how each phase in the legal history would have been decided under an ecotype analysis. Interpreting distinct population segment to mean ecotype will accomplish the goal of the ESA by providing protection to populations in the early stages of ecological speciation. Furthermore, adopting the ecotype concept will enhance the ability of the National Marine Fisheries Service (NMFS) and the Fish and Wildlife Service (FWS) to make species listing determinations under the ESA that are based on “the best scientific and commercial data available.”<sup>9</sup>

## I. BACKGROUND OF THE ENDANGERED SPECIES ACT

Congress enacted the ESA in response to the dramatic rise in manmade extinctions<sup>10</sup> and viewed the benefits of biodiversity as “incalculable.”<sup>11</sup> Thus, the overall goal of the ESA is to halt the trend towards species extinction no matter the cost.<sup>12</sup> Section I.A will discuss the importance of maintaining species diversity, and Section I.B will outline the structure of the ESA.

### A. *Why We Should Care About Species Diversity*

Organisms and species diversity are immensely important

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8. *Id.* at 1104.

9. 16 U.S.C. § 1533(b)(1)(A) (2012).

10. *See* 16 U.S.C. § 1531(b) (2012).

11. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 187 (1978).

12. *Id.* at 184.

to humans. For example, species diversity contributes to healthy ecosystems, which provide clean air and water, recreation, and habitats for other organisms.<sup>13</sup> Furthermore, non-human organisms have an aesthetic value to humans, as we derive pleasure from observing animals in their natural environment.<sup>14</sup> Additionally, the value of plant-derived pharmaceuticals exceeds tens of billions of dollars annually,<sup>15</sup> and non-human organisms can improve our understanding of health problems and aid in the development of treatments for human diseases.<sup>16</sup> Full appreciation of the value of species to people requires foresight, because even if there is no known use for a particular species, extinction forecloses all future opportunities for its potential use.<sup>17</sup>

Species extinctions are a natural part of life, but human activities are causing the loss of biological diversity at a rate that many scientists consider crisis proportions.<sup>18</sup> In response to the shocking magnitude of manmade extinctions, Congress enacted the ESA.<sup>19</sup> The ESA is “the most comprehensive legislation for the preservation of endangered species ever enacted by any nation”<sup>20</sup> and protects the “esthetic, ecological, educational, historical, recreational, and scientific value” of endangered species “to the Nation and its people.”<sup>21</sup> Understanding the combined benefits of biodiversity to be “incalculable,” the ESA does not make the courts conduct a cost-benefit analysis when considering the protection of endangered species.<sup>22</sup> Despite Congress’s recognition of the importance of species diversity, the ESA lacks a fundamental understanding of the processes that generate and maintain

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13. Kevin W. Grierson, *The Concept of Species and the Endangered Species Act*, 11 VA. ENVTL. L.J. 463, 468 (1992).

14. *Id.* at 469.

15. Allison L. Westfahl Kong, *Improving the Protection of Species Endangered in the United States by Revising the Distinct Population Segment Policy*, 85 N.Y.U. L. REV. 358, 361–62 (2010).

16. *Id.* at 362.

17. Grierson, *supra* note 13, at 467.

18. *The Extinction Crisis*, CTR. FOR BIOLOGICAL DIVERSITY, [http://www.biologicaldiversity.org/programs/biodiversity/elements\\_of\\_biodiversity/extinction\\_crisis/](http://www.biologicaldiversity.org/programs/biodiversity/elements_of_biodiversity/extinction_crisis/) [<http://perma.cc/U3SJ-JC42>] (estimating that human activities have increased the extinction rate by 1,000 to 10,000 times that of the background extinction rate).

19. See 16 U.S.C. § 1531(b) (2012).

20. *Tenn. Valley Auth. v. Hill*, 437 U.S. 153, 180 (1978).

21. 16 U.S.C. § 1531(a)(3).

22. *Tenn. Valley Auth.*, 437 U.S. at 187–88.

species diversity. To understand the full effect of this shortcoming, one must first understand the ESA's basic structure.

*B. The Endangered Species Act in a Nutshell*

The ESA, as written, vests the Secretary of the Interior and the Secretary of Commerce with the authority to list species as endangered or threatened.<sup>23</sup> The Secretary of the Interior delegated these ESA responsibilities to the FWS, and the Secretary of Commerce delegated its responsibilities to the NMFS (hereinafter collectively "the Services").<sup>24</sup> Therefore, the FWS, which is responsible for terrestrial animals and plants, and the NMFS, which is responsible for marine animals and plants, implement the majority of the ESA provisions.<sup>25</sup>

The ESA requires that two elements be satisfied for a population to qualify for ESA protection. The population must be (1) a species as defined by the ESA, and (2) must be considered endangered or threatened.<sup>26</sup> A species is considered endangered when it is in danger of extinction throughout all or a significant portion of its range.<sup>27</sup> A species is considered threatened if it is likely in the near future to become endangered throughout all or a significant portion of the species' range.<sup>28</sup> It is important to note that no population is granted any protection under the ESA unless it is officially listed by the government, no matter how close to extinction the species may be.<sup>29</sup> The ESA provides five non-exclusive factors for establishing endangered or threatened status: "(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>30</sup>

Once the Services list a species as endangered or

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23. Westfahl Kong, *supra* note 15, at 367 & n.33.

24. *Id.*

25. *Id.*

26. 16 U.S.C. § 1533(a)(1) (2012).

27. 16 U.S.C. § 1532(6) (2012).

28. § 1532(20).

29. § 1533(b)(1)(A).

30. § 1533(a)(1).

threatened, they are obligated to respond appropriately to assure the persistence of the species. The Services are obligated to designate a “critical habitat”<sup>31</sup> and develop a recovery plan for the species.<sup>32</sup> Critical habitats are specific areas that exhibit the biological features essential to the conservation of the species which may require special management considerations or protection, as well as areas outside of that geographic area that are nonetheless essential for the conservation of the species.<sup>33</sup> Furthermore, the listing of a species places significant obligations on both the Services and private actors, such as requiring federal agencies to ensure that their actions do not jeopardize the continued existence of the listed species and prohibiting “all persons” from “taking” a listed species.<sup>34</sup> Although classifying species as endangered or threatened is a contentious process in its own right, determining if a population qualifies as a species under the ESA is a more challenging and abstract question that first requires explaining how the ESA’s definition of species evolved.

## II. THE GREAT DISTINCT POPULATION SEGMENT DEBATE

The term “distinct population segment” was born from an ESA amendment<sup>35</sup> and has been problematic since its inception. Section II.A will discuss the origin of distinct population segment. Section II.B will discuss the first definition of distinct population segment, which was short-lived, and Section II.C will discuss the contemporary definition of distinct population segment.

### A. *Out of Thin Air: Congress Births “Distinct Population Segment”*

The current ESA definition of species is not the original definition, and the subtle change from the original version has immense importance. The original version of the ESA provided that the term “species” included “any subspecies of fish or

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31. § 1533(b)(2).

32. § 1533(f)(1).

33. 16 U.S.C. § 1532(5)(A)(i)–(ii).

34. Westfahl Kong, *supra* note 15, at 368–69 & nn.44, 45 (citing 16 U.S.C §§ 1536(a)(2), 1532(13), 1538(a)(1)(B)).

35. 16 U.S.C. § 1532(16).



wildlife or plants and any other group of fish or wildlife of the same species or smaller taxa in common spatial arrangement that interbreed when mature.”<sup>36</sup> This species description survived only five years. In 1978, Congress amended the ESA to redefine what the term “species” covered.<sup>37</sup> Congress altered the terminology so that “the term ‘species’ includes any subspecies of fish or wildlife or plants, and any *distinct population segment* of any species of vertebrate fish or wildlife which interbreeds when mature.”<sup>38</sup> From an evolutionary and taxonomic standpoint, the addition of “distinct population segment” appears to throw a wrench into the species definition. There are a multitude of species concepts, and evolutionary biologists have been engaged in a constant debate as to which concept is superior.<sup>39</sup> Regardless of which species concept one prefers, the terms species and subspecies at least have definitive meaning within the scientific community—whereas distinct population segment is not a biological term.<sup>40</sup> Likely due to its lack of scientific support, adding “distinct population segment” to the ESA species definition drew concern almost immediately.

In 1979, the Government Accountability Office (GAO) expressed concern over the distinct population segment terminology, arguing that its inclusion would lead to the listing of tiny populations of species that were insignificant to the species as a whole.<sup>41</sup> In response to this concern, the Senate Committee on Environment and Public Works suggested that distinct population segments be listed “sparingly,” meaning “only when the biological evidence indicates that such action is warranted.”<sup>42</sup> Congress provided no official guideline for interpreting what constitutes a distinct population segment, leaving the Services to determine the appropriate scope.<sup>43</sup>

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36. Endangered Species Act of 1973, Pub. L. No. 93-205, 87 Stat. 884.

37. Endangered Species Act Amendments of 1978, Pub. L. No. 95-632, 92 Stat. 3751.

38. 16 U.S.C. § 1532(16) (emphasis added).

39. See Kevin D. Hill, *The Endangered Species Act: What Do We Mean by Species?* 20 B.C. ENVTL. AFF. L. REV. 239, 249–50 (1993).

40. Doremus, *supra* note 4, at 1100–01.

41. S. Rep. No. 96-151, at 6–7 (1979).

42. *Id.* at 7.

43. Draft Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act; Request for Public Comment, 59 Fed. Reg. 65,884 (Dec. 21, 1994).

*B. Thirteen Years Later: A First Attempt at Defining  
"Distinct Population Segment"*

Congress's failure to provide an official guideline for interpreting "distinct population segment" in the ESA species definition,<sup>44</sup> along with the term not being common in scientific discourse,<sup>45</sup> led to considerable controversy surrounding the distinct population segment terminology in the years following the ESA amendment.<sup>46</sup> Despite the absence of congressional and scientific guidance, the Services made listing determinations for populations of species under the added language of distinct population segment before finally establishing criteria for determining what qualifies as a distinct population segment.<sup>47</sup> This first attempt at defining distinct population segment occurred in 1991, when the NMFS published a report explaining that a stock of Pacific salmon would be considered a distinct population segment under the ESA if it was considered an "evolutionarily significant unit" (ESU) of the biological species.<sup>48</sup> The report explained that an ESU is a population (or group of populations) that (1) is substantially reproductively isolated from other conspecific population units, and (2) represents an important component in the evolutionary legacy of the species.<sup>49</sup>

The aim of the Pacific salmon report was to conserve the genetic diversity of a species while at the same time allowing discretion in the listing of a population by requiring the population to represent a unit of evolutionary significance to the species as a whole.<sup>50</sup> In the report, the NMFS attributes its emphasis on genetic diversity to the legislative history of the ESA.<sup>51</sup> Under the Pacific salmon report, the first step for determining if a population is an ESU is to quantify the degree

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44. *Id.*

45. *Id.*

46. Westfahl Kong, *supra* note 15, at 370.

47. *Maine v. Norton*, 257 F. Supp. 2d 357, 379 (D. Me. 2003).

48. Robin S. Waples, *Pacific Salmon, Oncorhynchus spp., and the Definition of "Species" Under the Endangered Species Act*, 53 U.S. NATL. MARINE FISHERIES SERV., MARINE FISHERIES REV. 11, 12 (1991).

49. *Id.*

50. *Id.* at 13.

51. *Id.* at 12 (for example, one House Report stated that it was in the interest of mankind to preserve genetic diversity because genetic variations are a resource to solve puzzles and questions we have not yet begun asking).

of reproductive isolation.<sup>52</sup> If a population exhibits sufficient reproductive isolation from the rest of the species' range, the next step is to examine whether the population is of substantial ecological or genetic importance. Ecological or genetic importance under an ESU analysis requires three considerations:

(1) Is the population genetically distinct from other conspecific populations?

(2) Does the population occupy unusual or distinctive habitat?

(3) Does the population show evidence of unusual or distinctive adaptation to its environment?<sup>53</sup>

The Pacific salmon report exhibited a small step in the right direction in that it used some legitimate evolutionary concepts, such as environmental adaptations, in an attempt to clarify the distinct population segment language. The report, however, was short-lived, and the joint policy that replaced it proved to be two steps backwards.

### C. *The Joint Policy: The Current Distinct Population Segment Test*

Twenty years after the distinct population segment terminology first appeared in jurisprudence, the Services finally adopted a joint policy to "clarify their interpretation of the phrase."<sup>54</sup> The Services believed that adopting a joint policy was necessary to ensure that the term "distinct population segment" would be "interpreted in a clear and consistent fashion," especially since "scientific information provides little . . . enlightenment in interpreting the phrase."<sup>55</sup> The joint policy does not adopt an ESU analysis, but it does point out that the NMFS bases its Pacific salmon policy on ESUs and that it is consistent with the ESA.<sup>56</sup> Under the joint policy, a

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52. *Id.* at 11 ("Insights into the extent of reproductive isolation can be provided by movements of [individuals] . . . , natural recolonization rates observed in other populations, measurements of genetic differences between populations, and evaluations of the efficacy of natural barriers.").

53. *Id.* at 14.

54. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722 (Feb. 7, 1996).

55. *Id.*

56. Robin S. Waples, *Evolutionarily Significant Units, Distinct Population Segments, and the Endangered Species Act: A Reply to Pennock and Dimmock*, 12

population must meet three elements to be considered an endangered or threatened distinct population segment:

- (1) The population segment must be discrete in relation to the remainder of the species to which it belongs;
- (2) The population segment must be significant to the species to which it belongs; and
- (3) The population segment must have the appropriate conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).<sup>57</sup>

This definition of distinct population segment exhibits a flaw common to the ESA in general in that each of the dispositive elements are vague and lack any scientific terminology.<sup>58</sup> Since the motivation behind adopting the joint policy was to resolve the difficulty in using scientific concepts to define the non-scientific "distinct population segment,"<sup>59</sup> it is bizarre that the joint policy did not adequately clarify the distinct population segment terminology by including only scientific language. By failing to abandon or adequately clarify "distinct population segment" in the ESA species definition, the joint policy journeys deeper down the rabbit hole in order to define the crucial words "discrete" and "significant."

### 1. How the Joint Policy Determines "Discrete"

The motivation behind the "discreteness" prong is to ensure that the population can "be adequately defined and described."<sup>60</sup> According to the joint policy, one may consider a population segment of a species "discrete" if it satisfies either of the following conditions: (1) it is markedly separated from other populations of the same taxon<sup>61</sup> because of physical,

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CONSERVATION BIOLOGY 718, 721 (June 1998).

57. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4725.

58. Teresa Woods & Steve Morey, *Uncertainty and the Endangered Species Act*, 83 IND. L. J. 529, 530-31 (2008).

59. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4722.

60. *Id.* at 4724.

61. Taxon is a general term used by taxonomists to refer to a collection of populations that form a single unit, and the plural of taxon is taxa. *Taxon*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/taxon> (last

physiological, ecological, or behavioral factors; or (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of the inadequacies of existing regulatory mechanisms.<sup>62</sup>

The first basis for discreteness is of importance to this Comment. The second basis for discreteness—delineation by international boundaries—is outside the scope of this Comment, since its inclusion is based on non-scientific considerations.<sup>63</sup> To be a distinct population segment, the population needs to not only be “discrete” but also be “significant.”<sup>64</sup>

## 2. How the Joint Policy Determines “Significant”

To satisfy the Senate Committee on Environment and Public Works’ assurance to the GAO that the listing of distinct population segments is done sparingly,<sup>65</sup> a population that is deemed “discrete” must also be of “significant’ importance to the taxon to which it belongs.”<sup>66</sup> The joint policy lists non-exclusive factors that may be used to determine the “significance” of a discrete population.<sup>67</sup> These factors include:

- (1) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon;
- (2) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon;
- (3) Evidence that the discrete population segment

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visited Mar. 19, 2017) [<https://perma.cc/Q3JR-TDXV>].

62. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4725.

63. *Id.* (“The Services recognize that the use of international boundaries as a measure of discreteness may introduce an artificial and non-biological element to the recognition of DPS’s. Nevertheless, it appears to be reasonable for national legislation, which has its principal effects on a national scale, to recognize units delimited by international boundaries when these coincide with differences in the management, status, or exploitation of a species.”)

64. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4725.

65. S. Rep. No. 96–151, at 7 (1979).

66. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4724.

67. *Id.* at 4725.

represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or

(4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.<sup>68</sup>

When the Services decide if a population is “distinct” and “significant” to its taxon, their determination must be based strictly on biological evidence.<sup>69</sup> This condition, however, creates a paradox. The Services are to consider only biological evidence when classifying a population as a distinct population segment, but many of the factors used to determine “distinct population segment” have no relation to biology.<sup>70</sup> As a result, ESA species listings are unpredictable<sup>71</sup> and do not follow an evolutionary blueprint.<sup>72</sup> To remedy this paradox, the distinct population segment language should be grounded in purely scientific concepts that emphasize ecological speciation.

### III. ENDANGERED SPECIES ACT LISTINGS OF DISTINCT POPULATION SEGMENTS MUST BE ALIGNED WITH SCIENTIFIC CONCEPTS

As previously discussed, the ESA defines species as “any subspecies of fish or wildlife or plants, and any *distinct population segment* of any species of vertebrate fish or wildlife which interbreeds when mature.”<sup>73</sup> This Part proposes that the Services should revise the current understanding of what constitutes a distinct population segment under the ESA. Section III.A begins with the argument that distinct population segment was added to the ESA to protect the evolutionary

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68. *Id.*

69. *See* S. Rep. No. 96-151, at 7 (noting that the FWS is expected to list distinct population segments “sparingly and only when the biological evidence indicates that such action is warranted”); *see also* 16 U.S.C. § 1533(b)(1)(A) (2012) (listing species under the ESA is to be done “solely on the basis of the best scientific and commercial data available”).

70. ENV’T L. INST., 3 L. OF ENV’T PROT. § 21:11 (updated Oct. 2016). The agencies have even been accused of acting out a “science charade” when listing species. Doremus, *supra* note 4.

71. Doremus, *supra* note 4.

72. *Id.* at 1110.

73. 16 U.S.C. § 1532(16) (2012) (emphasis added).

process. Accepting this understanding eliminates the frequent debates surrounding the taxonomic implications of the ESA and modifies the lens through which the ESA should be viewed. Next, Section III.B argues that viewing the ESA as intending to protect the evolutionary process requires modifying the joint policy factors used for determining if a population qualifies as a distinct population segment. Lastly, Section III.C discusses how the Services should use the modified factors for determining if a population is a distinct population segment along with scientific principles that adhere to these factors.

A. *The Endangered Species Act Protects the Evolutionary Process*

As mentioned throughout this Comment, “distinct population segment” is not a biological term,<sup>74</sup> and half of the factors used to determine distinct population segments are not related to evolution.<sup>75</sup> Yet, both the FWS and the NMFS agree that “species” should be defined “according to the best current biological knowledge and understanding of evolution, specialization, and genetics.”<sup>76</sup> Furthermore, the ESA does not attempt to define “species” in biological terms,<sup>77</sup> that is, taxonomically. Despite this, many critics of the ESA are lost in the debate that the ESA bases its definition of species on taxonomic classifications that create uncertainty regarding the coverage of the ESA.<sup>78</sup> The intent of the Services and an analysis of the ESA’s history reveal that this concern is superfluous.

The ESA does not attempt to define what a species is, nor could it.<sup>79</sup> There has never been a single accepted method among evolutionary biologists for defining species.<sup>80</sup> Speciation

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74. *Id.*

75. *See infra* Section III.B.

76. Proposed Policy on the Treatment of Intercrosses and Intercross Progeny (the Issue of “Hybridization”), 61 Fed. Reg. 4709, 4710 (Feb. 7, 1996).

77. *Id.*

78. Hill, *supra* note 39, at 239; Wheeler, *supra* note 1; Anna L. George & Richard L. Mayden, *Species Concepts and the Endangered Species Act: How a Valid Biological Definition of Species Enhances the Legal Protection of Biodiversity*, 45 NAT. RESOURCES J. 369, 369 (2005).

79. George & Mayden, *supra* note 78.

80. *Id.* at 375 (citing John J. Wiens & Maria R. Servedio, *Species Delimitation in Systematics: Inferring Diagnostic Differences Between Species*, 267 PROC. ROYAL SOC’Y LONDON SERIES B 631, 632 (2000); Jack W. Sites, Jr. & Jonathon C.

is composed of “a long series of stages of increasing evolutionary distinctness, starting with the local populations, continuing through ecological races, ecospecies, and groups of species of higher and higher order.”<sup>81</sup> While most evolutionary biologists agree that speciation occurs across a continuum over time, there is much debate as to when the process of speciation is complete.<sup>82</sup> The ESA does not attempt to do what biologists have been unable to do and make a one-size-fits-all determination about when speciation is complete. It instead grants protection to populations below the species level,<sup>83</sup> and allows for the listing of populations where the process of speciation is in effect but incomplete.<sup>84</sup> By doing so, the ESA is consistent with the scientific belief that “the most important aspect of speciation is that it is a process involving populations.”<sup>85</sup>

The distinct population terminology did not appear in early drafts of the ESA but was suggested by Dr. John Grandy of the National Parks and Conservation Association and Stephen R. Seater of the Defenders of Wildlife.<sup>86</sup> It was during committee hearings on early versions of the ESA where Mr. Seater suggested a more inclusive definition of species and Dr. Grandy proposed language identical to the distinct population segment terminology included in the Act.<sup>87</sup> As Dr. Grandy explained: “Taxonomy is a science—splitters and lumpers come and go and classifications vary accordingly. What all concerned people want, I believe, is to *protect populations* of animals or plants, *regardless of varying classification systems developed by*

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Marshall, *Delimiting Species: A Renaissance Issue in Systematic Biology*, 18 TRENDS IN ECOLOGY & EVOLUTION 462, 462 (2003)).

81. David B. Lowry, *Ecotypes and the Controversy Over Stages in the Formation of New Species*, 106 BIOLOGICAL J. OF THE LINNEAN SOCIETY 241, 241 (2012).

82. *Id.*

83. Wheeler, *supra* note 1, at 270; ENV'T L. INST., *supra* note 69, § 21:11, § 21:10, n.30–32; Doremus, *supra* note 4 at 1089.

84. Wheeler, *supra* note 1, at 282.

85. Ernst Mayr, *Ecological Factors in Speciation*, 1 EVOLUTION 263, 263 (1947).

86. Grierson, *supra* note 13, at 482 (citing Endangered Species: Hearings Before the House Subcomm. on Fisheries and Wildlife Conservation and the Environment of the House Comm. on Merch. Marine and Fisheries, 93d Cong., 1st Sess. 87–185 (1973)).

87. See Endangered Species: Hearings Before the House Subcomm. on Fisheries and Wildlife Conservation and the Env't of the House Comm. on Merch. Marine and Fisheries, 93d Cong., 1st Sess. 286, 307 (1973).



*taxonomists.*"<sup>88</sup>

It is clear that the aim of including "distinct population segment" within the definition of species is to extend ESA eligibility to populations below the species and subspecies level,<sup>89</sup> and to protect populations in the early stages of ecological speciation. While the ESA's species definition has the potential to provide the foundation for a workable guideline for listing species under the ESA, a number of factors likely played a role in the current confusion surrounding the ESA terminology.

First, Congress elected to include a nonscientific term despite the fact that there was scientific terminology available that they could have adopted in place of the distinct population segment terminology.<sup>90</sup> Second, along with essentially inventing the term "distinct population segment," Congress failed to provide any guidance to explain what this term meant.<sup>91</sup> Lastly, the NMFS took thirteen years to provide guidance for determining if a population is a distinct population segment,<sup>92</sup> and the Services took twenty years to propose the current universal test.<sup>93</sup> One can even argue that the sluggish development of the joint policy was an abuse of agency discretion.<sup>94</sup> In sum, the distinct population segment language was born and left to fester for two decades, leaving the courts and the Services to determine retroactively what the invented term covers. As a result of this practice, the joint policy contains factors used to determine distinct population segments that are misplaced and unrelated to the evolutionary process.

*B. Refining the Joint Policy's Significance Factors to Include Only Factors Related to Evolution*

Despite the effort to create a consistent method for

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88. *Id.* at 286 (emphasis added).

89. ENV'T L. INST., *supra* note 70, § 21:11.

90. *See infra* Part IV.

91. ENV'T L. INST., *supra* note 70, § 21:10.

92. *See* Waples, *supra* note 48.

93. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722, 4722 (Feb. 7, 1996).

94. *Sw. Ctr. for Biological Diversity v. Babbitt*, 926 F.Supp. 920, 927 (D. Ariz. 1996).

determining if a population is a distinct population segment under the ESA, the joint policy exhibits several fundamental misunderstandings about the evolutionary process and the aims of the ESA to provide protection to populations that are in the early stages of speciation. In order to align the ESA species listings with scientific discourse, the factors used to determine distinct population segments must be reexamined and modified. Of the four significance factors listed in the joint policy, only the first and fourth factors should be retained in future determinations, whereas the second and third factors are best suited in other provisions of the ESA.<sup>95</sup> Recognizing and correcting these errors will open the doors of the ESA to evolutionary biology and evolutionary ecology, thereby liberating a wealth of scientific information that can be used in the ESA species classification stage.

1. The Second Significance Factor Confuses the Scope of Distinct Population Segment Protection

The second significance factor listed in the joint policy focuses on whether the loss of the discrete population segment would result in a significant gap in the range of a taxon.<sup>96</sup> This factor does nothing to help discern if a population is at the early stages of speciation (i.e., is a distinct population segment). Under the ESA, a “species” includes any species, subspecies, or distinct population segment.<sup>97</sup> If a population is found to be a distinct population segment, then it should be considered its own “species” under the ESA that is independent of the larger taxon to which it may belong.<sup>98</sup> Therefore, this factor conflates two populations that should be viewed as distinct taxa for the purposes of the ESA.

The following example provides an illustration of the flaw contained in the second joint policy significance factor. There

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95. See *infra* Sections III.B.1–2.

96. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4725.

97. 16 U.S.C. § 1532(16) (2012).

98. See Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4725 (When viewing the conservation status of a distinct population segment, one must ask “is the population segment, when treated as if it were a species, endangered or threatened?” Therefore, distinct population segments are to be reviewed independent of the larger taxon to which they belong.).

exists Species *A*, and within that Species *A* there is a discrete population that is potentially a distinct population segment. If, using the appropriate remaining significance factors, it can be established that the discrete population is a distinct population segment, then it is its own species under the ESA—Species *B*.<sup>99</sup> The ESA would then require studying Species *B*'s conservation status to see if Species *B* is endangered or threatened.<sup>100</sup> In this scenario, Species *B*'s conservation status should be analyzed irrespective of its effect on Species *A* (which may or may not be endangered or threatened in its own right). Thus, it is irrelevant whether the loss of Species *B* would result in a significant gap in the range of Species *A*, because the loss of Species *B* is the complete extinction of Species *B*.

Conversely, if one can establish that the discrete population is not a distinct population segment, then there only exists Species *A*, to which the discrete population in question belongs. In this scenario, the second significance factor belongs in the analysis of whether Species *A* is threatened or endangered. If the loss of the discrete population (which is part of Species *A*) would cause a significant gap in the range of Species *A*, then Species *A* is either threatened or endangered.<sup>101</sup>

This hypothetical illustrates that the second significance factor stated in the joint policy should be removed from a distinct population segment analysis. This oversight has infected jurisprudence, and this Comment will revisit this oversight in the NMFS's handling of the Southern Resident killer whale.

## 2. The Third Significance Factor Is Unrelated to Evolution

The third significance factor listed in the joint policy focuses on "evidence that the discrete population segment represents the only surviving natural occurrence of a taxon

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99. 16 U.S.C. § 1532(16).

100. See *supra* text accompanying note 98.

101. See 16 U.S.C. § 1533(a)(1). The first factor in determining if a species is threatened or endangered is to look at "the present or threatened destruction, modification, or curtailment of its habitat or range." Therefore, if there is a population within a taxon whose loss is at risk, and the loss of that population would lead to a significant gap in the taxon's range, then that taxon is a threatened species. *Id.*

that may be more abundant elsewhere as an introduced population outside its historic range.”<sup>102</sup> Like the second joint policy significance factor, the third factor does nothing to help discern if a population is in the early stages of speciation (i.e. is a distinct population segment). Rather, this factor should stand for the assertion that introduced populations should not be considered when determining if a species is threatened or endangered.

The first step in qualifying a population for ESA protection is to determine if a population is a species.<sup>103</sup> If a population is determined to be a species under the ESA, the next step is to determine if the species is threatened or endangered.<sup>104</sup> As mentioned, the ESA considers a species endangered if it is in danger of extinction throughout all or a significant portion of its range,<sup>105</sup> and threatened if it is likely in the near future to become endangered throughout all or a significant portion of its range.<sup>106</sup> Thus, it is only after a species is delineated that the ESA directs the Services to look at its distribution. The third significance factor listed in the joint policy, however, directs the Services to do the opposite.

By directing the Services to distinguish between a taxon’s native versus introduced populations during the species classification stage, the third significance factor is putting the cart before the horse. It would be more intuitive and true to the ESA to account for a taxon’s native versus introduced populations when determining if a species is endangered or threatened. Under this framework, the Services would determine the conservation status of a distinct population segment by focusing only on the individuals of the populations occurring in its native range.

Under the ESA, the Services are obligated to designate a “critical habitat”<sup>107</sup> and develop a recovery plan for listed species.<sup>108</sup> While the third significance factor has no business in species demarcation, its ideology neatly fits within this ESA

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102. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4725.

103. 16 U.S.C. § 1533 (outlining that you must first demarcate a species, and then determine if it is threatened or endangered).

104. *Id.*

105. § 1532(6).

106. § 1532(20).

107. § 1533(b)(2).

108. § 1533(f)(1).

obligation. The third significance factor, as it relates to drafting a recovery plan for a species, should be interpreted as meaning that introduced populations are not part of a “critical habitat” and should not be considered in the recovery plan for the species. Therefore, it may at times be important to protect a species in its local range, because it is endangered or threatened, and ignore or even eradicate it in introduced areas.<sup>109</sup> Lastly, omission of introduced species from a recovery plan would also mean that *ex situ* conservation is not a permissive strategy for protecting species under the ESA.<sup>110</sup>

### 3. The Proposed Distinct Population Segment Test

As explained in the preceding sections, the second and third significance factors under the joint policy do not relate to evolutionary principles and, therefore, the Services should not consider them when making species listings. After eliminating these factors from the joint policy, the proposed test for determining if a discrete population is significant requires considering: (1) persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; and (2) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

While “distinct population segment” is not a biological term,<sup>111</sup> what remains after removing the two unwarranted significance factors describes an ecotype, a 100-year-old concept regarding populations in the early stages of speciation.<sup>112</sup> Therefore, the following Part argues that using this concept to classify distinct population segments will lead to more clear and consistent applications of the ESA that are strongly rooted

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109. This can be justified on the grounds that many introduced species become invasive, meaning they are non-native to a region and their presence has a negative effect on the ecosystem. See *generally Invasive Species*, NAT'L WILDLIFE FED'N, <https://www.nwf.org/Wildlife/Threats-to-Wildlife/Invasive-Species.aspx> (last visited Mar. 19, 2017) [<https://perma.cc/2BDE-D4RK>].

110. *Ex situ*, or “off-site conservation,” is the process of protecting a taxon outside of its natural habitat. IUCN Species Survival Commission Guidelines on the Use of *Ex situ* Management for Species Conservation 1, 2 (2014), <http://www.eaza.net/assets/Uploads/Position-statements/IUCN-Guidelines-on-the-Use-of-ex-situ-management-for-species.pdf> [<https://perma.cc/2EJG-DU8F>].

111. ENV'T L. INST., *supra* note 70, § 21:11.

112. Lowry, *supra* note 81, at 243.

in science.

#### IV. DISTINCT POPULATION SEGMENT SHOULD BE RECOGNIZED AS ECOTYPE

After combining the “discrete” and the modified “significance” components of the proposed distinct population segment test, a distinct population segment becomes a population that is: (1) markedly separated from other populations of the same taxon because of physical, physiological, ecological, or behavioral factors, and; (2) shows evidence of either (a) persistence in an ecological setting unusual or unique for the taxon, or (b) differs markedly from other populations of the species in its genetic characteristics.

Critics of the joint policy suggest the goals of the ESA would be better served by merging the “discrete” and “significance” factors into a single standard.<sup>113</sup> With this argument in mind, merging these factors together describes the ecotype concept, a concept that has existed in the scientific literature for nearly a century.<sup>114</sup> This Part will discuss ecotypes and how they satisfy the proposed distinct population segment test.

##### A. *The Definition of an Ecotype*

If the [Endangered Species] Act is meant to do more than just protect charismatic megafauna who are valued for their sentimental appeal, the definition of species . . . should include a requirement that the organism *fill a specific ecological niche*.<sup>115</sup>

The above quote highlights what I believe is the most substantial oversight in ESA jurisprudence—that the ESA added distinct population segment to its species definition in order to protect populations in the early stages of ecological

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113. Katherine M. Hausrath, *The Designation of “Distinct Population Segments” Under the Endangered Species Act in Light of Nat’l Ass’n of Homebuilders v. Norton*, 80 CHI.-KENT L. REV. 449, 472 (2005).

114. Lowry, *supra* note 81, at 243. In 1922, Göte Turesson’s coined the term “ecotype” as a way to refer to a set of ecologically distinct populations. *Id.*

115. Hill, *supra* note 39, at 263 (emphasis added).

speciation.<sup>116</sup> While there are other theories as to how speciation occurs,<sup>117</sup> focusing on ecological speciation makes sense given the goal of the ESA “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.”<sup>118</sup> Since local adaptation is the first step in ecological speciation,<sup>119</sup> determining if a population is a distinct population segment should be done with a test that focuses on local adaptation. This Section argues that the best course of action for the Services to correct this oversight is to adopt the ecotype concept. Oddly enough, the ecotype concept has already been lurking in the shadows of ESA jurisprudence,<sup>120</sup> but the players are unaware of its significance or how to utilize it.

An ecotype is a genetically distinct population of a taxon whose differentiation is the result of adaptation to the selective action of ecological factors.<sup>121</sup> Put simply, if a population within a taxon exhibits traits that are unique to the rest of the taxon,

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116. Ecological speciation is “the evolution of reproductive isolation between populations as a result of ecologically-based divergent natural selection.” Schluter & Conte, *Genetics and Ecological Speciation*, 106 PNAS 9955, 9955 (2009), [http://www.pnas.org/content/106/Supplement\\_1/9955.full.pdf](http://www.pnas.org/content/106/Supplement_1/9955.full.pdf) [<https://perma.cc/MN5S-XWT2>].

117. Speciation may occur by other means such as genetic drift. Genetic drift is the result of certain genes being in higher abundance in a generation of offspring simply by chance. Norman C. Ellstrand & Diane R. Elam, *Population Genetic Consequences of Small Population Size: Implications for Plant Conservation*, 24 ANN. REV. OF ECOLOGY & SYSTEMATICS 217, 218–19 (1993). Genetic drift, therefore, differs from natural selection because it is the result of chance, whereas natural selection is the result of differences in reproductive success. Thus, although genetic drift is a mechanism of speciation, it does not result in adaptations. S. J. Gould & R. C. Lewontin, *The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme*, 205 PROC. OF THE ROYAL SOC’Y OF LONDON, SERIES B, BIOLOGICAL SCI. 581, 585–86 (1979). By including genetic differentiation of a population as an accepted measure of “significance,” it could be argued that the proposed distinct population segment test would allow populations that exhibit either natural selection or genetic drift to qualify for ESA protection. However, the purpose of the ESA suggests otherwise. The purpose of the ESA is “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved.” 16 U.S.C.A. § 1531(b) (2012). A population experiencing genetic drift does not depend on its ecosystem, and instead simply depends on isolation and random gene flow. Therefore, protecting these populations does not further the goal of the ESA.

118. 16 U.S.C.A. § 1531(b).

119. Thomas Lenormand, *From Local Adaptation to Speciation: Specialization and Reinforcement*, INT’L J. OF ECOLOGY 1 (Apr. 2012).

120. See *infra* Part V.

121. Mayr, *supra* note 85, at 279.

and those traits are the result of a unique adaptation to the environment instead of by chance, then the population is an ecotype.<sup>122</sup> As a result, the adaptive traits of ecotype populations vary across the natural landscape.<sup>123</sup> As this Comment previously elucidated, the purpose of adding “distinct population segment” to the ESA species definition was to extend ESA protection to populations that are below the species and subspecies levels and are in the early stages of speciation. Ecotypes, therefore, align perfectly with this ideology, because the term “can be used to describe populations or groups of populations that will likely be designated formal species or subspecies sometime in the future.”<sup>124</sup> As explained in the following sections, the ecotype concept also satisfies what this Comment has proposed as a new distinct population segment test.

*B. Ecotypes Satisfy the Discreteness Requirement Under the Proposed Distinct Population Segment Test*

The discreteness requirement of the proposed distinct population segment test, which is identical to the discreteness requirement of the joint policy, requires that a distinct population segment be “discrete” by being “markedly separated from other populations of the same taxon because of physical, physiological, ecological, or behavioral factors.”<sup>125</sup> Ecotypes fulfill this requirement because they “do not live in an indiscriminate mixture,” but rather, “are spatially segregated from each other.”<sup>126</sup> Ecotypes may intergrade marginally with other populations of the taxon,<sup>127</sup> but this does not violate the joint policy, which does not require that distinct population segments exhibit complete reproductive isolation from the rest

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122. Lowry, *supra* note 81, at 243.

123. *Id.* at 253.

124. MARGARET M. KRAHN ET AL., NOAA TECHNICAL MEMORANDUM NMFS-NWFSC-54, STATUS REVIEW OF SOUTHERN RESIDENT KILLER WHALES (*ORCINUS ORCA*) UNDER THE ENDANGERED SPECIES ACT 72 (2002), [https://www.nwfsc.noaa.gov/assets/25/5590\\_06162004\\_130449\\_tm54.pdf](https://www.nwfsc.noaa.gov/assets/25/5590_06162004_130449_tm54.pdf) [<https://perma.cc/5Y47-9MEA>].

125. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722, 4725 (Feb. 7, 1996).

126. Mayr, *supra* note 85, at 280.

127. *Id.*



of the taxon.<sup>128</sup>

C. *Ecotypes Satisfy the Significance Requirement Under the Proposed Distinct Population Segment Test*

The first significance factor of the proposed distinct population segment test looks to persistence in an ecological setting unusual or unique for the taxon.<sup>129</sup> Unfortunately, this factor suffers from a common flaw found in ESA jurisprudence—the factor assigns non-scientific verbiage to describe a scientific principle. How does one define “persistence” in this context?

Merriam-Webster Dictionary defines persistence as “the quality or state of being persistent; especially: perseverance”<sup>130</sup> and perseverance as the “continued effort to do or achieve something despite difficulties, failure, or opposition.”<sup>131</sup> In the context of populations and evolution, “difficulties, failure, or opposition” should be read to mean natural selection. Natural selection is the process in which organisms that adapt to changes in the environment survive and reproduce more, and those who do not die or reproduce less.<sup>132</sup> This process is the driving force behind the evolution of locally adapted populations.<sup>133</sup> Therefore, a more logical interpretation of persistence, and one that would further the “significance” requirement under the joint policy, would be to interpret “persistence” to mean that a population thrives in a unique environment due to adaptations to the unique characteristics of that environment.<sup>134</sup> Ecotypes form through trait adaptations

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128. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4724.

129. *Id.* at 4725.

130. *Persistence*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/persistence?src=search-dict-hed> (last visited Mar. 19, 2017) [<https://perma.cc/TT38-E8VR>].

131. *Perseverance*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/perseverance> (last visited Mar. 19, 2017) [<https://perma.cc/6J6F-JHXJ>].

132. *Natural Selection*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/natural%20selection> (last visited Mar. 19, 2017) [<https://perma.cc/K85L-GEK7>].

133. Mayr, *supra* note 85, at 286.

134. Hausrath, *supra* note 113, at 473 (“The first significance factor, persistence of the species in an ‘ecological setting unusual or unique for the taxon,’ appears to be trying to identify populations that have adapted to a different habitat.”).

to environmental variables.<sup>135</sup> Therefore, ecotypes satisfy the first significance factor because they maintain a viable population across many generations in a unique environment due to adaptation to the unique characteristics of that environment.

The second significance factor in the proposed distinct population segment test focuses on whether a discrete population segment differs markedly from other populations of the species in its genetic characteristics.<sup>136</sup> Ecotypes satisfy this factor, although it is somewhat irrelevant. First, ecotypes already fulfill the significance requirement because they exhibit local adaptation to a unique environment.<sup>137</sup> Second, showing genetic differentiation would be redundant because there is no ecological speciation that is not at the same time genetic speciation.<sup>138</sup> This is true because an ecotype's phenotypic variation within the taxon is always linked to genotypic variation.<sup>139</sup> However, evidence of genetic differentiation can be used to help reinforce an ecotype argument where local adaptation is evident, or could be used on its own to argue the existence of an ecotype. For these reasons, this factor still has value and should remain part of the proposed distinct population segment test.

Up to this point, this Comment has argued that Congress added distinct population segment to the ESA species definition for the purpose of making locally adapted populations (i.e., ecotypes) eligible for ESA protection. By overlooking Congress's intention, ESA jurisprudence dealing with species listings has been confusing, inconsistent, and at times even wasteful. To highlight this assertion, the following Part takes the ecotype concept and applies it to the legal history of the Southern Resident killer whale. Thus, this Part uses the Southern Resident killer whale to highlight how adopting the ecotype concept would make petitions for species

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135. Lowry, *supra* note 81, at 242.

136. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722, 4725 (Feb. 7, 1996).

137. Lowry, *supra* note 81, at 243.

138. Mayr, *supra* note 85, at 285.

139. Orgogozo et al., *The Differential View of Genotype-Phenotype Relationships*, 6 FRONTIERS IN GENETICS 179, at 1 (2015), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4437230/pdf/fgene-06-00179.pdf> [<https://perma.cc/WT4X-5FGX>].

listings and judicial challenges to listing decisions more consistent, efficient, and rooted in science.

## V. APPLYING THE ECOTYPE CONCEPT TO THE SOUTHERN RESIDENT KILLER WHALE

The complicated legal history of the Southern Resident killer whale, which fortunately ends with the population being listed as an endangered distinct population segment, provides the perfect platform to discuss the value of adopting the ecotype concept for ESA listing and highlights how the ecotype concept is working its way into ESA listing proceedings. This Part traces the legal history of the Southern Resident killer whale and discusses how the history would have changed under an ecotype analysis.

### A. *The NMFS Finds that the Southern Resident Killer Whale Is Not a Distinct Population Segment*

The journey began in May 2001, when the Center for Biological Diversity (CBD) petitioned the NMFS to list the Southern Resident killer whale as an endangered species under the joint policy.<sup>140</sup> In their petition, the CBD explained that all killer whales were considered to belong to one species but that killer whales in the Pacific Northwest were classified into three distinct forms: Resident, Transient, and Offshore.<sup>141</sup> Furthermore, the CBD provided data that the three forms “exhibit differences in morphology, ecology, behavior, and genetic composition.”<sup>142</sup> Rather than stop there, the CBD then broke down the Resident killer whale population further, and argued that the Southern Resident killer whale was a distinct population segment within the larger North Pacific Resident killer whale population.<sup>143</sup> One argument that the CBD

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140. Petition from Ctr. for Biological Diversity et al., to the Nat'l Marine Fisheries Services, Petition to List the Southern Resident Killer Whale (*Orcinus orca*) as an Endangered Species Under the Endangered Species Act 14, (May 1, 2001) [http://www.biologicaldiversity.org/species/mammals/Puget\\_Sound\\_killer\\_whale/pdfs/petition.pdf](http://www.biologicaldiversity.org/species/mammals/Puget_Sound_killer_whale/pdfs/petition.pdf) [<https://perma.cc/E2KE-TDHR>] (arguing that the Southern Resident Killer Whale is a distinct population segment because it “occupies” a unique ecological setting) [hereinafter 2001 Petition].

141. *Id.* at 3–4.

142. *Id.* at 4.

143. *Id.* at 7–16.

promulgated to the NMFS was that the Southern Resident killer whale satisfies the joint policy's significance prong because the Southern Resident killer whale occupies a uniquely "urbanized habitat" that is a "unique ecological setting" compared to the Resident killer whales.<sup>144</sup>

The NMFS suspected that the Southern Resident killer whale might warrant an ESA listing and, in August 2001, assembled a Biological Review Team to assist with the status review.<sup>145</sup> Ultimately, the Biological Review Team found that genetic and behavioral differences suggested that there existed unrecognized species and subspecies within the global killer whale population,<sup>146</sup> but they declined to determine to which taxon the Southern Resident killer whale belonged.<sup>147</sup> Based largely on the biological review, the NMFS denied listing the Southern Resident killer whale in 2002.<sup>148</sup> The NMFS determined that the Southern Resident killer whale was not a distinct population segment and that the habitat differences between the Southern Resident killer whale and global killer whale populations were "not relevant to the ESA discussion, because there [was] no evidence that Southern Residents have adapted (in the evolutionary sense) to urbanization."<sup>149</sup>

Under an ecotype analysis, the NMFS's failure to list the Southern Resident killer whale as an ecotype was correct—the CBD had failed to show that the Southern Resident killer whale exhibited local adaptation unique from the global killer whale population. However, the CBD could have successfully saved the Southern Resident killer whale under an ecotype analysis by arguing that the *North Pacific Resident* killer whale was an ecotype.

Under an ecotype analysis, the scope of the CBD's argument was flawed because its petition was too narrow—it argued for listing the *Southern* Resident killer whale as a

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144. *Id.* at 14.

145. Listing Endangered and Threatened Species and Designating Critical Habitat: Petition to List Southern Resident Killer Whales, 66 Fed. Reg. 42499 (Aug. 13, 2001).

146. KRAHN ET AL., *supra* note 124, at 71–72.

147. Wheeler, *supra* note 1, at 275–76.

148. Endangered and Threatened Wildlife and Plants: 12-Month Finding for a Petition To List Southern Resident Killer Whales as Threatened or Endangered Under the Endangered Species Act (ESA), 67 Fed. Reg. 44133, 44138 (July 1, 2002).

149. KRAHN ET AL., *supra* note 124, at 79.

distinct population segment instead of petitioning to list the *North Pacific Resident* killer whale as a distinct population segment. Had the CBD argued that the North Pacific Resident killer whale was an ecotype, and thereby a distinct population segment, the NMFS may have granted the listing. The 2002 NMFS status review frequently mentions that the North Pacific Resident killer whale is an ecotype within the larger killer whale taxon (thereby a distinct population segment). The NMFS status review concedes that the North Pacific Resident killer whale is an ecotype because of its distinct genetic characteristics,<sup>150</sup> and because they are uniquely specialized to feed on coastal salmon.<sup>151</sup> Since the NMFS believed that the North Pacific Resident killer whale is a distinct population segment (as an ecotype), the NMFS would have had to examine if the North Pacific Resident killer whale was threatened or endangered.<sup>152</sup> There is strong evidence in the status review that the NMFS believed that the North Pacific Resident killer whale was at least threatened, if not endangered. In the status review, the NMFS states, "Southern Residents represent[] a significant portion of the range of [North Pacific] resident killer whales" and "the continued existence of [North Pacific] residents in this area may be dependent upon the persistence of the current Southern Resident population."<sup>153</sup> Therefore, since the NMFS appeared to believe that the Southern Residents were at risk of extinction,<sup>154</sup> it follows that they may have found the North Pacific residents to be either threatened or endangered. Thus, had the CBD petitioned for the listing of the North Pacific Resident killer whale population instead of just the Southern Resident killer whale population on the grounds that the North Pacific Resident killer whale was an ecotype, it appears that the NMFS would have been required to grant protection to the North Pacific Resident killer whale as either an endangered or threatened distinct population segment.

The treatment of the Southern Resident killer whale

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150. *Id.* at 71.

151. *Id.* at 81.

152. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722, 4725 (Feb. 7, 1996).

153. KRAHN ET AL., *supra* note 124, at 81.

154. *Id.* at 111-12.

highlights the value of adopting the ecotype concept as the standard for determining distinct population segments, and demonstrates how the parties involved in ESA species listing disputes fail to properly apply evolutionary principles to their species classification arguments. Had the CBD argued that the North Pacific Resident killer whale was a distinct population segment as an ecotype, the story would likely have ended in 2002 with the protection of the Southern Residents via the North Pacific residents being listed as either threatened or endangered. Instead, controversy surrounded the NMFS's decision causing litigation and administrative proceedings that lasted over a decade.<sup>155</sup>

*B. The NMFS Decides That the Southern Resident Killer Whale Is a Distinct Population Segment After All*

Two years after the NMFS denied listing the Southern Resident killer whale, a district court held that the NMFS decision was flawed and ordered the NMFS to conduct a new twelve-month review to determine the status of the Southern Resident killer whale.<sup>156</sup> The district court's holding pointed to the NMFS's reliance on recognizing killer whales as a global species, stating that "[w]hen the best available science indicates that the 'standard taxonomic distinctions' are wrong . . . NMFS must apply that best available science."<sup>157</sup>

Following the orders of the district court, the NMFS assembled a new Biological Review Team, and the NMFS published another status review, this time listing the Southern Resident killer whale as an endangered species.<sup>158</sup> The NMFS relied heavily on the new biological review, which concluded that Southern Residents likely belong to a currently unnamed subspecies within the resident killer whales in the North Pacific.<sup>159</sup> The NMFS concluded that the Southern Residents

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155. Wheeler, *supra* note 1, at 278.

156. See *Ctr. for Biological Diversity v. Lohn*, 296 F. Supp. 2d 1223,1243 (W.D. Wash. 2003) *vacated and remanded*, 511 F.3d 960 (9th Cir. 2007).

157. *Id.* at 1238.

158. *Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales*, 70 Fed Reg. 69903 (Nov. 18, 2005).

159. MARGARET M. KRAHN ET AL., U.S. DEP'T OF COM., NOAA TECH. MEMO., NMFS-NWFSC-62, 2004 STATUS REVIEW OF SOUTHERN RESIDENT KILLER WHALES (ORCINUS ORCA) UNDER THE ENDANGERED SPECIES ACT, at 41 (2004) [https://www.nwfsc.noaa.gov/assets/25/6377\\_02102005\\_172234\\_krahnstatusrevtm](https://www.nwfsc.noaa.gov/assets/25/6377_02102005_172234_krahnstatusrevtm)

were a distinct population segment of this unnamed subspecies because the loss of the Southern Residents would result in a gap in the range of the North Pacific Residents.<sup>160</sup>

The NMFS was correct to protect the Southern Resident killer whale, but their rationale was left open to criticism because it relied on classifying the North Pacific Residents as a subspecies, an assertion which had no support in the scientific literature.<sup>161</sup> Under an ecotype analysis, this seeming need to identify the North Pacific Residents as a subspecies is unwarranted. Both the CBD and the NMFS had already identified the North Pacific Residents as an ecotype, and the NMFS expressed that the fate of the North Pacific Residents likely rested in the health of the Southern Residents.<sup>162</sup>

Furthermore, the NMFS erred by relying on the second significance factor in the joint policy—evidence that the loss of the population segment would result in a significant gap in the range of a taxon.<sup>163</sup> This Comment has previously explained why this factor does not belong in a distinct population segment analysis and instead is just a determination of whether a species is threatened or endangered.<sup>164</sup> Under an ecotype analysis, the NMFS would have identified the North Pacific Residents as a distinct population segment, been required to consider its conservation status as if it was a species,<sup>165</sup> and found that the likely extinction of the Southern Resident population rendered the North Pacific Residents

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62final.pdf [<https://perma.cc/PTQ6-NFFL>].

160. Endangered and Threatened Wildlife and Plants: Endangered Status for Southern Resident Killer Whales, 70 Fed. Reg. at 69907.

161. Petition from Ctr. for Env'tl. Sci., Accuracy & Reliability, Empresas Del Bosque, & Coburn Ranch, to the Nat'l Marine Fisheries Services, Petition to Delist the Southern Resident Killer Whale Distinct Population Segment Under the Endangered Species Act, 26–27 (Aug. 1, 2012), [http://www.westcoast.fisheries.noaa.gov/publications/protected\\_species/marine\\_mammals/killer\\_whales/2012\\_kw\\_petition\\_to\\_delist.pdf](http://www.westcoast.fisheries.noaa.gov/publications/protected_species/marine_mammals/killer_whales/2012_kw_petition_to_delist.pdf) [<https://perma.cc/WP9P-DRUU>] [hereinafter Petition to Delist].

162. See *supra* Section V.A.

163. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722, 4725 (Feb. 7, 1996).

164. See *supra* Section III.B.1.

165. See Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. at 4725. When viewing the conservation status of a distinct population segment, one must ask “Is the population segment, when treated as if it were a species, endangered or threatened?” Therefore, distinct population segments are to be reviewed independent of the larger taxon to which they belong. *Id.*

either threatened or endangered.<sup>166</sup>

Furthermore, had the NMFS protected the Southern Resident killer whales via listing the North Pacific killer whale as an endangered or threatened distinct population segment, the Pacific Legal Foundation (PLF) could not have made the arguments contained in its petition to delist the Southern Resident killer whale.

C. *The Petition to Delist the Southern Resident Killer Whale*

In 2012, the PLF petitioned to delist the Southern Resident killer whale, promulgating two arguments that the NMFS had improperly listed the Southern Resident killer whale. The PLF's first argument was textual—that the ESA only allowed for the listing of distinct population segments of species, not subspecies.<sup>167</sup> The plain language of the ESA reads: “The term ‘species’ includes any subspecies of fish or wildlife or plants, and any *distinct population segment of any species* of vertebrate fish or wildlife which interbreeds when mature.”<sup>168</sup>

The PLF's second argument was that listing the Southern Resident as an endangered distinct population segment was based on a faulty taxonomy.<sup>169</sup> There is clear merit to this argument, given that the subspecies discussed by the NMFS is based on a nebulous subspecies demarcated somewhere within the North Pacific Resident killer whale population, rather than on a subspecies defined in the scientific literature.<sup>170</sup> Furthermore, it is debatable whether the evidence even supported the existence of a subspecies within the North Pacific Resident population.<sup>171</sup> Despite these contentions, the PLF did not challenge the notion that there “are clearly different ecotypes” within the North Pacific populations<sup>172</sup> (i.e. Resident, Transient, Offshore), nor did they challenge the number of whales in the population or their threats or risk of

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166. See *supra* Section V.A.

167. Petition to Delist, *supra* note 161, at 19.

168. *Id.*

169. *Id.* at 1.

170. *Id.*

171. *Id.* at 28–36.

172. *Id.* at 15.



extinction.<sup>173</sup>

Because of the PLF's petition to delist the Southern Resident killer whale, the NMFS conducted another twelve-month review of the Southern Resident killer whale listing, ultimately denying the petition to delist.<sup>174</sup> The NMFS denied the PLF's first challenge, finding that since the definition of species includes "subspecies," it was reasonable to interpret the phrase "distinct population segment of any species" to include subspecies.<sup>175</sup> The NMFS also denied the PLF's second claim, finding that, despite the uncertainty, "the best available scientific information indicates that the [unnamed] North Pacific resident subspecies is the appropriate reference taxon . . . despite the fact that the taxonomic community has not yet formally named the subspecies."<sup>176</sup> According to the NMFS, the best available scientific information to support granting the North Pacific Residents subspecies status was the "evidence supporting differentiation between the *ecotypes* of North Pacific whales,"<sup>177</sup> that is, the Resident, Transient, and Offshore ecotypes.

The NMFS and the PLF were fixated on the existence of subspecies within the North Pacific killer whale population even though the ESA is not restrained by taxonomic classifications.<sup>178</sup> Under an ecotype analysis, proving the existence of a subspecies, or making one up as the NMFS did, is unnecessary. Under an ecotype analysis, an ecotype is a distinct population segment, period. Therefore, the Services must look at the conservation status of that ecotype, and in the case of the North Pacific Resident killer whale, that meant finding that it was either threatened or endangered.<sup>179</sup> Regardless of the assignment, the Southern Residents, which comprise a critical part of the North Pacific Residents,<sup>180</sup> would be protected. It is difficult to rationalize the NMFS's fixation with assigning subspecies status within the North Pacific

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173. Listing Endangered or Threatened Species: 12-Month Finding on a Petition to Delist the Southern Resident Killer Whale, 78 Fed. Reg. 47277, 47282 (Aug. 5, 2013).

174. *Id.*

175. *Id.* at 47281.

176. *Id.* at 47280.

177. *Id.* (emphasis added).

178. *See supra* Section III.A.

179. *See supra* Section V.A.

180. *Id.*

Residents when they themselves point to its status as an ecotype as the primary justification for a subspecies assignment.<sup>181</sup> Perhaps it can be best explained by chalking it up to missing the big picture, that distinct population segments grant protection to populations in the early stages of ecological speciation.

## CONCLUSION

Long before the Services decide whether a species deserves ESA protection, they must first carve out the boundaries of the species in question from a continuum of genetically related individuals. Therefore, all ESA listing decisions must rely on an accurate species demarcation. Given that demarcating species is the keystone of ESA listings, one would assume that this step closely tracks the ESA's mission of making listings based on the best scientific information available. It is axiomatic, as this Comment has hopefully illustrated, that this is not the case. Instead, the ESA's species definition is infected with language that means nothing to science. This infection, however, can be cured by scrapping the meaningless jargon and replacing it with well-known principles of evolutionary ecology. The result of scrapping the meaningless jargon is this Comment's proposed distinct population segment test. As a big-picture takeaway, "species," as described in the ESA, should be read as protecting the evolutionary process. Under this view, "distinct population segment" refers to populations that are in the early stages of ecological speciation, that is, are ecotypes. By adopting this viewpoint, the Services can finally fulfill the ESA's mission "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved."<sup>182</sup>

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181. Listing Endangered or Threatened Species: 12-Month Finding on a Petition to Delist the Southern Resident Killer Whale, 78 Fed. Reg. 47277, 47280 (Aug. 5, 2013).

182. 16 U.S.C. § 1531(b) (2012).

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