

**UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLUMBIA**

NATURAL RESOURCES DEFENSE
COUNCIL, INC., *et al.*,

Plaintiffs,

v.

Civil Action No. 15-198 (RDM)

SAMUEL D. RAUCH, III, Acting Assistant
Administrator for Fisheries, National Marine
Fisheries Service,¹ *et al.*,

Defendants.

MEMORANDUM OPINION

Blueback herring (*alosa aestivalis*) are silver-colored fish, roughly a foot in length, that inhabit much of North America's Atlantic coast. The species is "anadromous," meaning the fish are born in inland rivers, then spend most of their adult lives at sea, while still returning to their natal rivers for six to eight weeks each spring to spawn.

In 2011, the Natural Resources Defense Council ("NRDC") petitioned the National Marine Fisheries Service ("Service") to list blueback herring as "threatened" under the Endangered Species Act of 1973. The Service undertook a lengthy review in response, but ultimately found that listing the species "[wa]s not warranted." *See* Endangered Species Act Listing Determination for Alewife and Blueback Herring, 78 Fed. Reg. 48,944 (Aug. 12, 2013) ("Listing Decision"). The NRDC and others now challenge that determination. Because the Court agrees that the Service failed to offer a rational connection between the facts and two of its essential conclusions, and because the Service entirely failed to consider other important aspects

¹ The current officeholders are substituted as defendants. *See* Fed. R. Civ. P. 25(d).

of the problem, the Court will **VACATE** the Listing Decision and will **REMAND** the matter to the Service for further proceedings consistent with this opinion.

I. BACKGROUND

A. The Endangered Species Act

The Endangered Species Act exists to conserve endangered and threatened species and “the ecosystems upon which [they] depend.” 16 U.S.C. § 1531(b). As amended, the Act defines “species” to include not just “any subspecies of fish or wildlife,” but also any “distinct population segment” of any species of vertebrate fish or wildlife which interbreeds when mature. *Id.* § 1532(16). A species is “endangered” if it “is in danger of extinction” either throughout “all . . . of its range” or throughout “a significant portion of its range.” *Id.* § 1532(6). And a species is “threatened” if it “is likely to *become* . . . endangered . . . within the foreseeable future” throughout “all or a significant portion of its range.” *Id.* § 1532(20) (emphasis added).

The Act directs the Service, along with its counterpart in the Department of the Interior,² to “determine whether any species is . . . endangered . . . or . . . threatened,” *id.* § 1533(a), and to publish lists of species designated as such, *id.* § 1533(c)(1). Listed species then receive heightened protections under the Act. *See generally id.* §§ 1533–1538. Any “interested person” may petition the Service to change a species’s status, *see* 5 U.S.C. § 553(e); 16 U.S.C. § 1533(b)(3); 50 C.F.R. § 424.14, and, if the petition “presents substantial scientific or

² Two agencies—the National Marine Fisheries Service (in the Department of Commerce) and the U.S. Fish and Wildlife Service (in the Department of the Interior)—“share responsibilities for administering the Act.” 50 C.F.R. § 402.01(b); *see also* 16 U.S.C. § 1532(15). This case concerns only the National Marine Fisheries Service, which asserts jurisdiction over non-landlocked populations of blueback herring. *See Listing Decision*, 78 Fed. Reg. at 48,945–46 (citing U.S. Fish & Wildlife Serv. & Nat’l Marine Fisheries Serv., *Memorandum of Understanding Regarding Jurisdictional Responsibilities and Listing Procedures Under the Endangered Species Act of 1973*, at 2–3 (Aug. 28, 1974), available at http://www.nmfs.noaa.gov/pr/laws/esa/mou_usfws.pdf).

commercial information indicating that the petitioned action may be warranted,” the Service must “promptly” conduct a species status review, 16 U.S.C. § 1533(b)(3)(A). The Service must then publish its findings in a listing determination, *id.*, which must rest on any one or a combination of the following factors:

- (A) the present or threatened destruction, modification, or curtailment of [the species’s] 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 [the species’s] continued existence.

16 U.S.C. § 1533(a)(1); *see also* 50 C.F.R. § 424.11(c). In addition, the Service must make its listing determination “solely on the basis of the best scientific and commercial data available.”

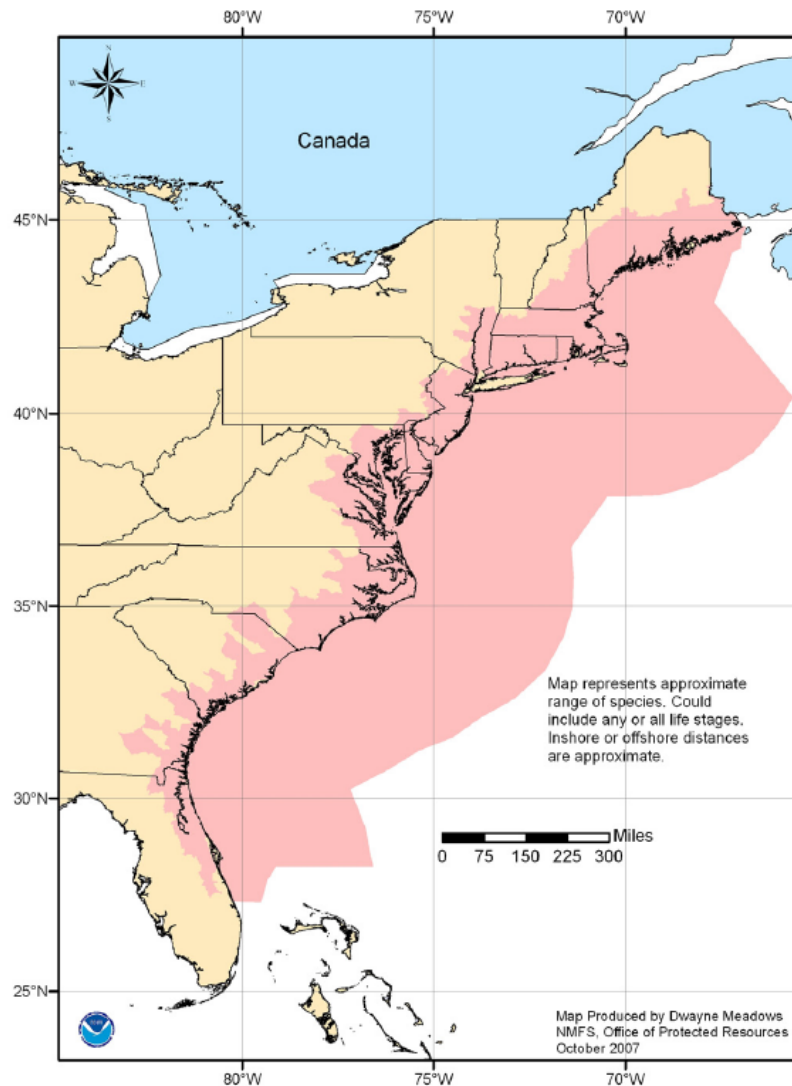
16 U.S.C. § 1533(b)(1)(A).

B. Factual Background

Blueback herring “use many different habits” throughout their life cycle, “including the ocean, estuaries, rivers, and freshwater lakes and ponds.” *Listing Decision*, 78 Fed. Reg. at 48,945. They spend the first few months of their life in freshwaters. They then migrate to the open sea, where they mature and spend most of their adult life (in what is called their “ocean phase”), before returning “to estuarine and freshwater rivers, ponds, and lake habitats to spawn.” *Id.*; *see also* Dkt. 40-1 at 104–06 (AR 2048–50) (describing blueback herring lifecycle). Adult blueback herring “frequently return[] to their natal rivers for spawning,” but may, on occasion, “stray[] . . . between rivers.” *Listing Decision*, 778 Fed. Reg. at 48,945. Evidence also suggests, but has not conclusively determined, that blueback herring migrate large distances even during

their ocean phase, moving *en masse* with the seasons up and down the Atlantic coast. *See, e.g., id.* at 48,949–50; Dkt. 40-5 at 146 (AR 66,934). The species's range reaches south to the St. John's River in Florida, north to the Miramichi River in New Brunswick, Canada, and east into oceanic waters along the continental shelf. *Listing Decision*, 78 Fed. Reg. at 48,945, 48,948.

*Figure 1: Approximate Blueback Herring Range in U.S. Waters (2007)*³



³ Nat'l Marine Fisheries Serv., *Species of Concern: River Herring 2* (2009), http://www.nmfs.noaa.gov/pr/pdfs/species/riverherring_detailed.pdf. This map does not appear to capture the extent of the Canadian blueback herring range as described in the Listing Decision.

In August 2011, the NRDC petitioned the Service to list blueback herring as “threatened.”⁴ *See* Dkt. 40-1 at 86–192 (AR 2030–136) (Petition). Citing numerous studies, the NRDC argued that blueback herring had “suffered dramatic population declines” from their nineteenth-century peak and that those declines had continued over the past four decades. *Id.* at 87, 110 (AR 2031, 2054). The causes, the NRDC argued, were primarily “fishing-related mortality, dams, dredging and blasting, water pollution, and global warming.” *Id.* at 88–89 (AR 2032–33). The Service deemed the petition supported by substantial scientific evidence, *see* 90-Day Finding on a Petition To List Alewife and Blueback Herring as Threatened Under the Endangered Species Act, 76 Fed. Reg. 67,652, 67,656 (Nov. 2, 2011), and, pursuant to its statutory mandate, embarked on a blueback herring status review.

As a launching point for its analysis, the Service relied on the May 2012 *River Herring Benchmark Stock Assessment* prepared by the Atlantic States Marine Fisheries Commission (“ASMFC”).⁵ *Listing Decision*, 78 Fed. Reg. at 48,944. The ASMFC study analyzed data from 52 in-river United States “stocks,” *i.e.*, discrete “part[s] of a fish population” with “particular migration pattern[s]” and “specific spawning grounds.” Dkt. 40-3 at 146, 151 (AR 52,745, 52,750). Of those 52 stocks, 22 displayed evidence of declining river herring populations, 1

⁴ The NRDC’s petition also sought “threatened” status for a related fish, the alewife. Dkt. 40-1 at 86 (AR 2030). The Service reviewed the alewife’s status concurrently with that of the blueback herring, using the same methods. *See generally Listing Decision*, 78 Fed. Reg. 48,944. The Service found that the alewife is not threatened, *id.* at 48,992, and Plaintiffs do not challenge that finding here, Dkt. 27-3 at 15 n.2.

⁵ The ASMFC is an interstate commission composed of representatives from the fourteen Atlantic coast states. *See* Atlantic States Marine Fisheries Compact, Pub. L. No. 77-539, 56 Stat. 267 (1942), *amended by* Pub. L. No. 81-721, 64 Stat. 467 (1950). Its duties include periodic “inquir[ies] . . . [into] such methods, practices, circumstances and conditions as may . . . bring[] about the conservation . . . of the fisheries . . . of the Atlantic seaboard.” 56 Stat. at 268.

displayed evidence of an increasing population, and the remaining 28 lacked data to support definitive quantitative conclusions about population trends. *Id.* at 151 (AR 52,750). On the whole, the ASMFC determined that “[t]he coastwide meta-complex of river herring stocks on the US Atlantic coast is depleted to near historic lows.”⁶ *Id.*

The Service also “worked cooperatively with [the] ASMFC” to “identify information not in the stock assessment that [would be] needed for [the] listing determination.” *Listing Decision*, 78 Fed. Reg. at 48,944. At the outset of the status review, they convened three sets of workshops and working groups with experts in the field. *Listing Decision*, 78 Fed. Reg. at 48,944; *see* Dkt. 40-1 at 11 (AR 1). Two of those working group reports received peer review from the Center for Independent Experts. *Listing Decision*, 78 Fed. Reg. at 48,944.

C. The Listing Decision

On August 12, 2013, the Service published its fifty-page Listing Decision “determin[ing] that listing blueback herring as threatened or endangered” was “not warranted at th[at] time.” *Listing Decision*, 78 Fed. Reg. at 48,944. The decision turned on three central conclusions. First, the Service found that it lacked sufficient data to deem any subset of blueback herring a “distinct population segment.” *Id.* at 48,950, 48,993. Second, “as a result of [its] extinction risk analysis,” the Service determined that the blueback herring “[was] not in danger of extinction [throughout all of its range] or likely to become so in the foreseeable future.” *Id.* at 48,993. And, third, without addressing whether the blueback herring was threatened or endangered

⁶ These ASMFC conclusions refer generally to “river herring,” a category that includes both blueback herring and alewife.

throughout the “Mid-Atlantic” region, the Service concluded that the Mid-Atlantic region was “not . . . a significant portion of the blueback herring’s range.”⁷ *Id.*

The grounds for those conclusions appear to have been as follows.

1. *The Service’s “Distinct Population Segment” (“DPS”) Analysis*

The Service first sought to identify any “distinct population segments” of blueback herring. Because the Act’s definition of “species” includes “distinct population segment[s]” of any species of vertebrate fish, 16 U.S.C. § 1532(16), each “distinct population segment” of blueback herring requires its own status determination. The threshold issue for the Service, therefore, was delineating exactly which “species” were the subjects of its review. *See Listing Decision*, 78 Fed. Reg. at 48,948–50.

a. The 1996 DPS Policy

To make this threshold determination, the Service applied its Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722 (Feb. 7, 1996) (the “1996 DPS Policy”). Under the 1996 DPS Policy, a group of animals of the same taxon (*i.e.*, biological species) is a “distinct population segment” only if two conditions are met. First, the group must be “discrete[.]” *Id.* at 4725. A group is discrete under the 1996 DPS Policy if it is either (1) “markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavior factors” or (2) “delimited by international governmental boundaries” across which meaningfully different regulatory mechanisms exist. *Id.* Second, the group must be “significan[t] . . . to the [taxon] to

⁷ At the same time, however, the Service conceded that blueback herring are “at low abundance compared to historical levels,” that the Service’s status review suffered from “significant data deficiencies,” and that further “monitoring [of the] species is warranted.” *Id.* at 48,994. The Service also noted that the “positive benefit” from the “many ongoing restoration and conservation efforts” could not be “quantif[ied]” at that time. *Id.* “Given the[se] uncertainties and data deficiencies,” the Service “commit[ted] to revisiting [the] species in 3 to 5 years.” *Id.*

which it belongs.” *Id.* Under the 1996 DPS Policy, “significance” depends on factors that “may include”—but are “not limited to”—the following:

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 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.

Id. “Because precise circumstances are likely to vary considerably from case to case,” the policy adds, “it is not possible to describe prospectively all the classes of information that might bear on the biological and ecological importance of a discrete population segment.” *Id.*

b. The Five “Discrete” Population Segments

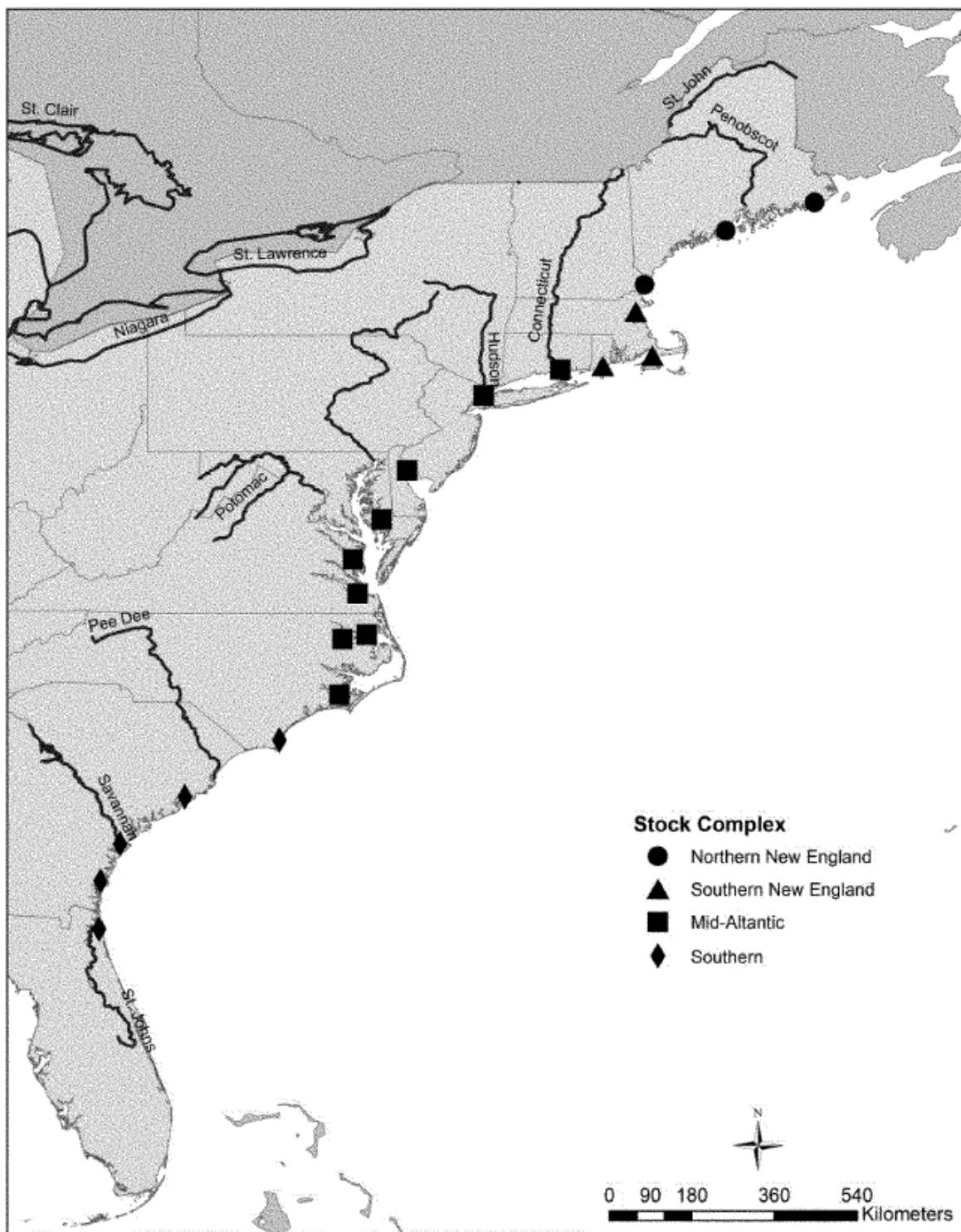
The Service’s “discreteness” finding turned largely on genetics research by Dr. Eric P. Palkovacs. *Listing Decision*, 78 Fed. Reg. at 48,948–49; *see also* Dkt. 40-6 at 233–47 (AR 73,485–99) (Palkovacs *et al.* report to the “stock structure” working group). Dr. Palkovacs collected DNA samples from 1,183 blueback herring across 20 rivers in the United States and performed statistical analyses to test them for genetic differentiation.⁸ *Listing Decision*, 78 Fed. Reg. at 48,948–49; Dkt. 40-6 at 234–35 (AR 73,486–87). He noted, however, that the “neutral genetic markers” he tracked (*i.e.*, the DNA sequences he compared across specimens)

⁸ The Palkovacs team’s initial presentation to the Service stated that they considered 1,201 blueback herring samples, Dkt. 40-3 at 88 (AR 52,337), and that number appears in the Listing Decision, *see* 78 Fed. Reg. at 48,948. The Palkovacs report itself, however, states the number as 1,183. *See* Dkt. 40-6 at 234 (AR 73,486). The difference is immaterial to this opinion.

“represent[ed] the effects of gene flow and historical population isolation, but [did] not [represent] the effects of adaptive processes.” *Listing Decision*, 78 Fed. Reg. at 48,949.

The Palkovacs analysis revealed a minimum of four geographic “clusters” of rivers in the United States, within which blueback herring populations were “genetically homogenous,” Dkt. 40-6 at 235 (AR 73,487), and between which blueback herring populations were “genetically distinguishable,” *id.* at 233 (AR 73,485). *See also Listing Decision*, 78 Fed. Reg. at 48,948–49. These clusters also corresponded to “larger-scale geographic boundaries,” across which “gene flow [was] extremely minimal.” Dkt. 40-6 at 237 (AR 73,489). Dr. Palkovacs therefore concluded that these geographic boundaries “define[d] the higher-level population structure” for blueback herring in the United States. *Id.* The four Palkovacs “stock complexes” were the “Northern New England,” “Southern New England,” “Mid-Atlantic,” and “Southern” stock complexes, *Listing Decision*, 78 Fed. Reg. at 48,949 (citing Dkt. 40-6 at 238 (AR 73,490)), as shown in the figure below.

Figure 2: Blueback Herring U.S. Stock Structure as Defined by Palkovacs et al.⁹



⁹ Listing Decision, 78 Fed. Reg. at 48,952 fig.2.

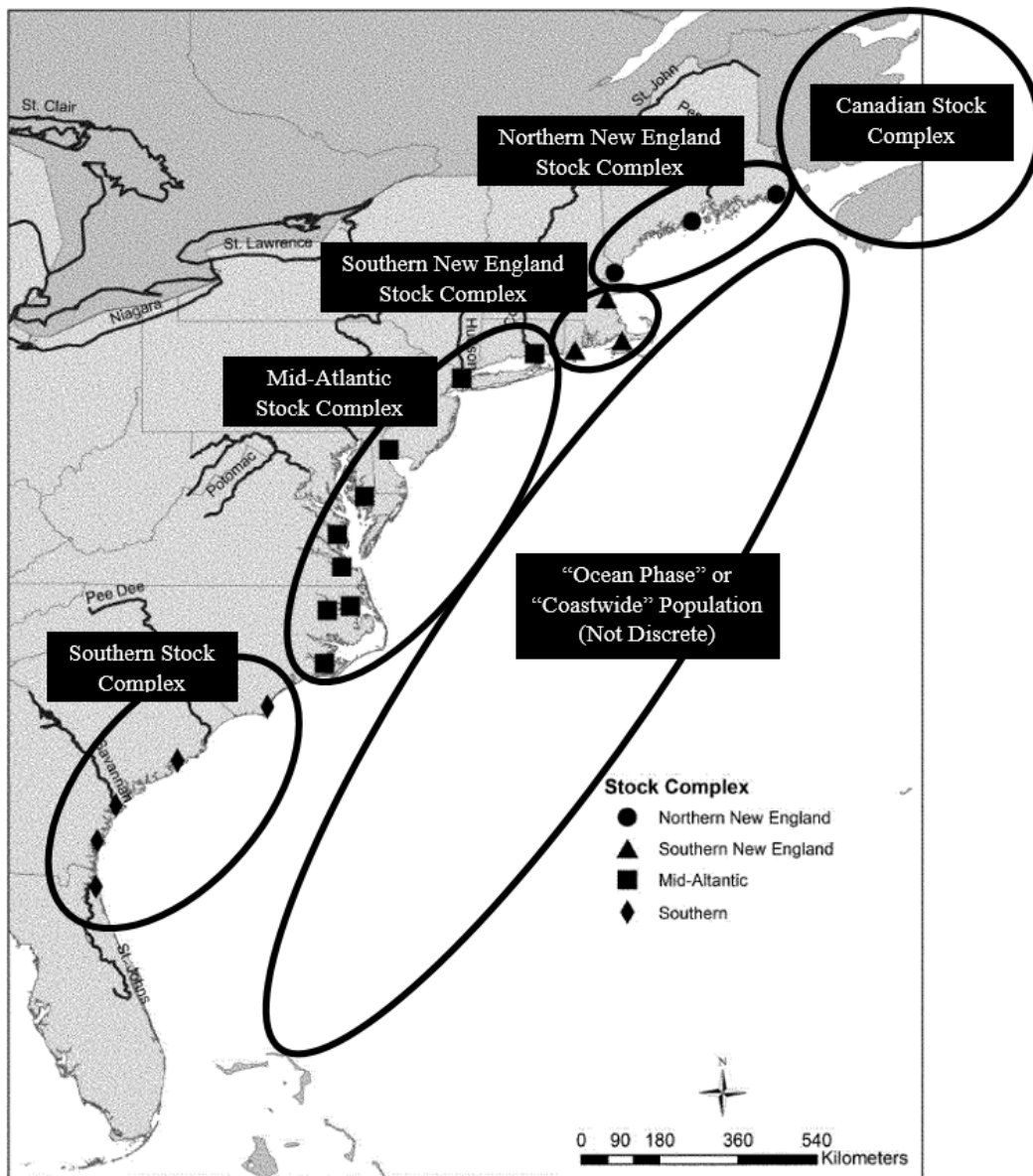
Applying the 1996 DPS Policy, the Service determined that the four stock complexes identified by Dr. Palkovacs represented “discrete” population segments. *Id.* at 48,950. This conclusion presumably relied on the policy’s first discreteness prong, which looks for populations “markedly separated from other[s] . . . as a consequence of physical, physiological, ecological, or behavior factors,” *1996 DPS Policy*, 61 Fed. Reg. at 4725—factors that include the genetic and geographic evidence that Dr. Palkovacs examined.

Notably, the Palkovacs analysis did not consider the entire blueback herring population: it omitted (1) blueback herring in Canadian rivers and (2) blueback herring in their “ocean phase,” where all blueback herring (regardless of stock) spend most of their adult lives. The Service resolved the issue regarding Canadian blueback herring by designating them as a fifth “discrete” population segment—not based on genetic differentiation, but based on the second prong of the “discreteness” test, which keys to “international governmental boundaries.” *Id.* at 48,950 (applying *1996 DPS Policy*, 61 Fed. Reg. at 4725). The oceanic population, however, proved more difficult. For that group, the Service found that “[m]igration and mixing patterns of . . . blueback herring in the ocean ha[d] not been determined,” *id.* at 48,949, but that experts suspected the oceanic population to be “comprised of mixed stocks,” *id.* at 48,950. Given the anticipated level of mixing, the Service decided that “the ocean phase” of blueback herring could not be treated as its own discrete population segment “until further tagging and genetic data become available.” *Id.* at 48,949.

The Service, accordingly, settled on five “discrete” blueback herring population segments, which the Listing Decision and this opinion refer to—from north to south—as the (1) Canadian, (2) Northern New England, (3) Southern New England, (4) Mid-Atlantic, and (5) Southern stock complexes. *Id.* at 48,949–50. Although blueback herring spend the majority of

their adult lives in the ocean, *see id.* at 48,945, the Service could not conclude that the oceanic population segment was “discrete,” *id.* at 48,949–50. All of these population segments corresponded to geographic areas, as depicted (roughly) in the map below.

*Figure 3: The Five “Discrete” In-River Stock Complexes and the “Mixed” (Non-Discrete) Oceanic Population*¹⁰



¹⁰ Adapted from Dkt. 40-5 at 148 (AR 66,936) (opinion of expert Kevin Sullivan). The Court has modified the original image by (1) updating it to reflect the final Palkovacs stock complexes,

c. No “Significant” Population Segments

Despite finding these five stock complexes to be “discrete,” the Service concluded that none of them met any of the 1996 DPS Policy’s four (non-exclusive) criteria for “significance.” *See Listing Decision*, 78 Fed. Reg. at 48,950. As an initial matter, the Listing Decision stated that the Service “considered all [four] of the [1996 DPS Policy’s] criteria” and observed that blueback herring “occupy many different ecological settings throughout their range.” *Id.* It then devoted several paragraphs to the second and fourth criteria for “significance” under the policy.

As to the second criterion—whether “the loss of [a] discrete population segment” would create a “significant gap” in the remaining population’s range, *id.* at 48,948—the Service acknowledged that “the loss of [any one] stock complex would mean the loss of [the corresponding] subpopulations” of herring that were born in and annually return to those rivers, *id.* at 48,950. But, because the oceanic population is “comprised of mixed stocks,” the Service reasoned, the oceanic territory “would most likely still be occupied by migratory river herring from other stock complexes.” *Id.* The Service thus concluded:

As it has been shown that gene flow is greater among neighboring runs than among distant runs, we might expect that river herring would re-colonize neighboring systems over a relatively short time frame. Thus, the loss of one stock complex in itself may not be significant; the loss of contiguous stock complexes may be. The goal then for river herring stock complexes is to maintain connectivity between genetic groups to support proper metapopulation function (spatially separated populations of the same species that interact, recolonize vacant habitats, and occupy new habitats through dispersal mechanisms).

Id.

As to the fourth criterion—whether any “discrete population segment differs markedly . . . in its genetic characteristics”—the Service sought to distinguish its earlier finding

as depicted in the Listing Decision, 78 Fed. Reg. at 48,952 fig.2, and (2) replacing the label on the “ocean phase” population, which originally read “Single At-Sea Mixing Stock.”

under the discreteness prong that the four Palkovacs stock complexes were “markedly separated from other population segments” as a result of their genetic characteristics. *See supra* Part I.C.1.b. To do so, the Service seized on Dr. Palkovacs’s “caveat” that the genetic markers his study looked for “represented the effects of gene flow and historical population isolation, but not the effects of adaptive processes.” *Id.* at 48,949. As the Service explained, “[n]eutral genetic markers . . . have a longstanding history of utilization in stock designation for many anadromous fish species.” *Id.* at 48,950. “[T]hese markers,” however, “represent the effects of gene flow and historic population isolation and not the effects of adaptive behavior.” *Id.* That information, the Service concluded, is “appropriately used in support of the discreteness criterion.” *Id.* But because “neutral markers” of the kind Dr. Palkovacs measured do not “capture[]” “[t]he effects of adaptive genetic and phenotypic diversity,” they have no bearing on the significance determination. *Id.*

Based on this analysis, the Service declined to designate any “distinct population segments” of blueback herring. *See id.* “The [four Palkovacs] stock complexes may be discrete,” the Service wrote, “but under the DPS policy, they are not significant.” *Id.* The Service further concluded that, “given the unknown level of intermixing between Canadian and U.S. river herring in coastal waters, the Canadian stock complex should also not be considered separately under the DPS policy.” *Id.*

2. *The Service’s Extinction Risk Analysis*

Having determined that the only “species” at issue was the entire taxon of blueback herring, the Service turned to its main inquiry: Are blueback herring “threatened”—*i.e.*, “likely to become [in danger of extinction] in the foreseeable future” throughout “all . . . of their range”? 16 U.S.C. §1532(20). This extinction risk analysis contained both a qualitative and a

quantitative component, although it is unclear whether and how the qualitative component impacted the decision not to list the species.

a. The Qualitative Rankings

In the qualitative component, the Service first surveyed the threats to blueback herring and categorized them under the five factors enumerated in 16 U.S.C. § 1533(a)(1). *See Listing Decision*, 78 Fed. Reg. at 48,953–70. This part of the Listing Decision merely catalogued potential threats to blueback herring, without analyzing the magnitudes of those threats or the likelihood that they would cause extinction. *See id.* Instead, the Service promised after each section that “the level of threat posed by these potential stressors [would be] evaluated further in the qualitative threats assessment below.” *Id.* at 48,958; *accord id.* at 48,961, 48,963, 48,968, 48,970.

In the “qualitative threats assessment” itself, the Service asked nine of its team members to rank each potential threat on a scale from zero to five, according to perceived severity. *Id.* at 48,970. For example, if a team member considered a threat to be of “low” severity, she would assign it a “one;” if she considered it to be of “high” severity, she would assign it a “five.” *Id.* After tabulating the results, the Service determined that its team believed “dams and other barriers” to be the most serious threats. *See id.* at 48,978. Although this “qualitative analysis” occupied thirty-two of the Listing Decision’s fifty pages, it nowhere discussed, analyzed, or drew conclusions regarding whether these or any other threats posed a risk of extinction to the blueback herring.

b. The Quantitative Models

The driver of the Service’s extinction risk conclusion—and, indeed, of the entire Listing Decision—appears to have been the Service’s quantitative “trend analysis modeling.” *See Listing Decision*, 78 Fed. Reg. at 48,985–92. This analysis began from the premise that, as of

1976, the blueback herring population had already undergone a significant decline. *See id.* at 48,987 (asserting that the risk analysis “assume[d] that there has already been a significant decline in abundance” due to overfishing); *id.* at 48,989 (stating that, “[p]rior to 1976, fishing intensity was much greater”); *id.* at 48,987 (explaining that the Service “use[d] data from 1976 through the present” to minimize the influence of the pre-1976 overfishing). “[G]iven the extensive declines from historical levels,” the Service wrote, the blueback herring “is [not] thought to be capable of withstanding continued high rates of decline.” *Id.* at 48,992. The Service thus sought to answer the following question: Since 1976, has the blueback herring population stabilized or has it continued to decline?

To explore this question, the Service retained Dr. Kiersten Curti of the Northeast Fisheries Science Center (“NEFSC”),¹¹ and asked her to create a number of statistical models to estimate the average annual change in the relative size of each blueback herring population segment—a metric the Service calls “relative abundance.” *Listing Decision*, 78 Fed. Reg. at 48,989; *see also* Dkt. 40-2 at 71–113 (AR 2477–519) (Dr. Curti’s report). The analysis involved the following steps.

i. The Models’ Design

Because Plaintiffs do not challenge the design of the models themselves, *see, e.g.*, Dkt. 53 at 16, most of the technical details underlying those models are not material to this opinion. For present purposes, the following simplified account will suffice.

As input, each model took some number of time series, *i.e.*, lists of values recorded for a given measurement each year. For example, some time series tracked the number of blueback

¹¹ The NEFSC is “the scientific research arm of [National Oceanic and Atmospheric Administration] Fisheries in the northeast.” Dkt. 29-1 at 42 n.23.

herring that passed by a given monitoring site during certain observational periods each year. *See* Dkt. 47-1 at 5 (Damon-Randall Decl. ¶ 6(b)) (describing “run counts”). Other time series tracked the total biomass of blueback herring caught in a given river each year, divided by the total number of nets used. *See id.* (Damon-Randall Decl. ¶ 6(c)) (describing “catch per unit effort”). Time series like these are valuable because they theoretically correlate with the size of the regional blueback herring population—in other words, they are “indices of relative abundance.” But, because they measured different types of data, often with units of different dimensions (*e.g.*, “fish per season” or “weight per net”), they were not always directly comparable. So, whenever a model took more than one time series as an input, Dr. Curti multiplied each subsequent time series by whatever number was necessary to “scale[]” it to the same size as the first. Dkt. 40-2 at 75 (AR 2481). In other words, the time series within each model were “normalized” to a common scale. Dkt. 53 at 53.

As output, each model then generated an estimate of the *average change per year* in the modeled population’s “relative abundance.”¹² Exactly what this number represents is unclear; neither the Service’s Listing Decision nor its submissions in this case have explained the units in which relative abundance was measured.¹³ As far as the Court can tell, relative abundance is

¹² Technically, the output appears to represent the difference between the *natural logarithm* of the modeled population’s estimated relative abundance in the most recent year modeled and the *natural logarithm* of the modeled population’s estimated relative abundance in the first year modeled, divided by the number of years modeled. *See* Dkt. 40-2 at 100 fig.9, 109–10 fig.16 (AR 2506, 2515–16); *see also* Dkt. 53 at 52 (Plaintiffs’ counsel’s explanation at oral argument). Given that the agency’s subsequent approach considered only whether the confidence interval for this number included zero, this distinction between relative abundance and the natural logarithm of relative abundance does not appear material for present purposes.

¹³ At oral argument, the Court provided the Service with the opportunity to address this question in a further filing. *See* Dkt. 53 at 8–9. The Service’s post-oral argument submission, however, simply noted that “[r]elative abundance is different for every survey” and that the units of

measured in arbitrary “relative abundance” units, which do not directly represent any tangible values (unlike, say, “fish per year” or “biomass per net per year”). Instead, the “relative abundance” metric relays information only about the modeled population’s *relative* change in size. *See, e.g.*, Dkt. 40-6 at 104 (AR 68,439) (explaining that “[the] modeling will give us percent decline over the time period modeled [but] not actual numbers”). So, for example, if the modeled population had 10 “relative abundance” units in 1980, and 15 “relative abundance” units in 1990, then the relative abundance grew by 5 units in 10 years, and the model’s output would be “0.5.” *See* Dkt. 53 at 51–54 (Oral Arg. Tr.). The models also paired each estimate with its 95% confidence interval and standard error. *See* Dkt. 40-2 at 77, 79 (AR 2483, 2485).

ii. The Models’ Inputs and Results

The Service originally intended that Dr. Curti would create a total of six models: one model for each of the five “discrete” stock complexes (*i.e.*, the Canadian, Northern New England, Southern New England, Mid-Atlantic, and Southern stock complexes), and one “coastwide” model that would incorporate data from the ocean near the Atlantic coast. *See, e.g.*, Dkt. 40-2 at 72 (AR 2,478); Dkt. 40-6 at 204–05 (AR 68,929–30). Although the Listing Decision sometimes referred to the “coastwide” model as the “rangewide” model, that is a misnomer. Because the data in that model came only from the ocean—and not the species’s entire range, which would include inland rivers—it is best thought of as a proxy for the blueback herring’s “ocean phase,” where herring from all stock complexes mix together.

The Service was unable to obtain data from the Canadian government for the Canadian stock complex model and, therefore, did not construct a model for the population in Canadian

measurement were “comparable between years *within a specific survey*.” Dkt. 47-1 at 4 (Damon Randall Decl. ¶ 5) (emphasis added).

rivers. *See Listing Decision*, 78 Fed. Reg. at 48,989 (“No blueback herring abundance indices were available for the Canadian stock.”); *id.* at 48,992 (“[W]e were unable to obtain data from Canada to determine the population growth rate for rivers in Canada.”). For the “coastwide” model, the Service used two sets of annual “trawl net” surveys from ships sailing along the coast. *Id.* at 48,988–89. And for the other four stock-specific models, the Service used data from the 2012 ASMFC stock assessment. *Id.* at 48,989. Each time series in that dataset was specific to a particular river or bay within a state or the District of Columbia. Most of the models used only one or two time series as inputs. The Mid-Atlantic region, however, used twelve. *See* Dkt. 40-2 at 84 (AR 2490) (list of stock-specific inputs). It is unsurprising, then, that the Mid-Atlantic model had the lowest margin of error of any of the models by an order of magnitude. *See Listing Decision*, 78 Fed. Reg. at 48,991.

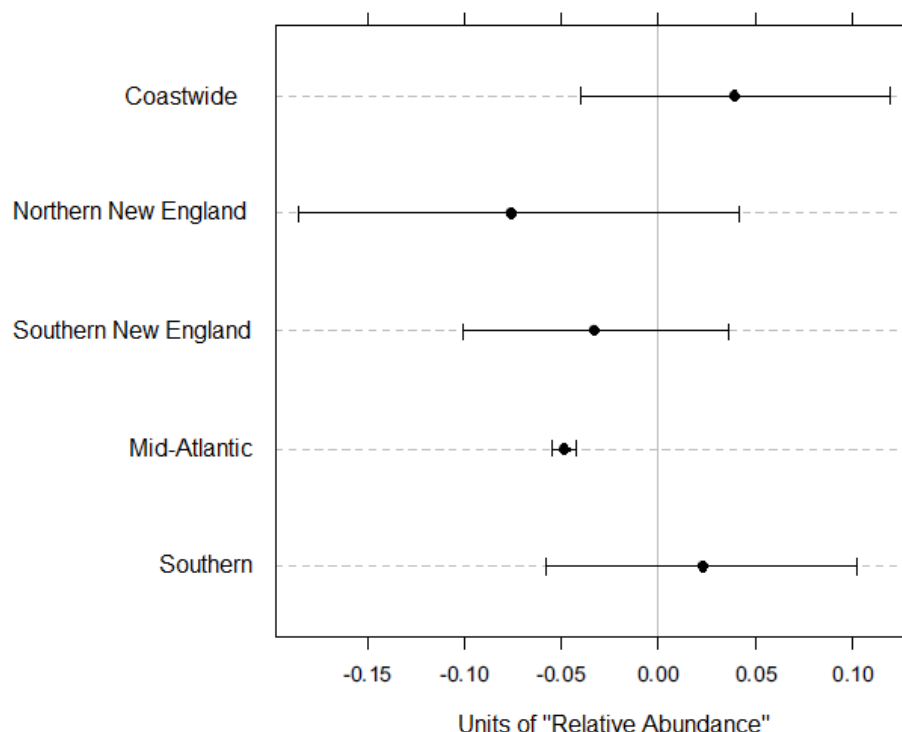
The figures below describe the models’ numerical results:

Table 1: The Models' Inputs and Outputs¹⁴

	Inputs (Time Series)			Outputs (Average Annual Change in Relative Abundance)			
					95% Confidence Interval		
Modeled Population	States in Region	# of Time Series	Years	Std. Error	Low End	Point Est.	High End
“Coastwide” (mixed stock)	N/A	2	1976–2012	0.040	−0.040	<u>0.039</u>	0.119
Canadian Stock Complex	NO DATA			N/A	N/A		
Northern New England Stock Complex	Maine	1	1995–2011	0.058	−0.185	<u>−0.076</u>	0.041
	New Hampshire	1					
	Total	2					
Southern New England Stock Complex	Massachusetts	1	1983–2012	0.035	−0.101	<u>−0.033</u>	0.036
	Rhode Island	0					
	Total	1					
Mid-Atlantic Stock Complex	Connecticut	2	1979–2011	0.003	−0.054	<u>−0.048</u>	−0.042
	New York	2					
	New Jersey	1					
	Delaware	0					
	Maryland	1					
	Washington, D.C.	1					
	Virginia	2					
	North Carolina (northern)	3					
	Total	12					
Southern Stock Complex	North Carolina (southern)	0	1979–2011	0.041	−0.058	<u>0.022</u>	0.102
	South Carolina ¹⁵	2					
	Georgia	0					
	Florida	0					
	Total	2					

¹⁴ The Court compiled this table from information in the Listing Decision, the Palkovacs report, and Dr. Curti's report. For the "coastwide" model, descriptions of the inputs are at *Listing Decision*, 78 Fed. Reg. at 48,988–89 and Dkt. 40-2 at 100 fig.9 (AR 2506), and the outputs are at *Listing Decision*, 78 Fed. Reg. at 48,990 tbl.15 (highlighted rows). For the stock-specific models, the states are at Dkt. 40-6 at 238 (AR 73,490), the time series are at Dkt. 40-2 at 84 tbl.3

*Figure 4: Estimates and 95% Confidence Intervals for Each Population's Average Annual Change in Relative Abundance*¹⁶



The Court notes, however, that while the time series were normalized *within* each model, the Court has not located an explicit statement in the record stating that the time series were also normalized *across* the five models. *See, e.g.*, Dkt. 40-2 at 75 (AR 2481). In other words, it is not obvious that a “0.05” decrease in one model is equivalent to a “0.05” decrease in another.

(AR 2490), the years are at *id.* at 78 (AR 2484), and the outputs are at *Listing Decision*, 78 Fed. Reg. at 48,991 tbl.16 (highlighted rows).

¹⁵ It appears that one of the two time series for the Southern stock complex—the “Santee-Cooper Min. Pop.” survey—may have been erroneously excluded from the model. The graph of estimated relative abundance over time for that stock complex suggests that the model ignored that time series, *see* Dkt. 40-2 at 109 (AR 2515), as do the graphs of the two time series’ residuals, *see id.* at 111 (AR 2517).

¹⁶ Adapted from Dkt. 40-2 at 108 (AR 2514). For clarity, the Court has replaced the “Coastwide” label, which originally read “Range-wide,” and replaced the *x*-axis label, which originally read “Growth rate \pm 95% confidence intervals.”

iii. The Service's Interpretation of the Models

In order to translate the models' results into a concrete determination of blueback herring extinction risk, the Service employed a three-step process of its own design, which does not appear to have been the subject of any expert peer review.¹⁷

In the first step, the Service assigned each modeled populations one of three possible labels: "significantly increasing," "significantly decreasing," or "stable." *Listing Decision*, 78 Fed. Reg. at 48,987. A modeled population was labeled "significantly increasing" if both ends of the confidence interval around the model's estimate were positive. *Id.* Conversely, a modeled population was deemed "significantly decreasing" if both ends of the confidence interval were negative. *Id.* And, if a confidence interval began at a negative number and ended at a positive number (*i.e.*, if it included zero), the Service considered that modeled population "stable." *Id.*

As the Service explained:

Relative abundance of a stock is considered to be significantly increasing or decreasing if the 95-percent confidence intervals of the population growth rate do not include zero. In contrast, if the 95-percent confidence intervals do contain zero, then the population is considered to be stable, as the increasing or decreasing trend in abundance is not statistically significant.

Id. The Service, accordingly, assigned labels to the modeled populations as follows:

¹⁷ The Extinction Risk Analysis Working Group Report from the Service's workshop and working group with experts in the field makes no mention of the three-step process the Service ultimately used to interpret Dr. Curti's models. *See generally* Dkt. 40-5 at 89–128 (AR 66,800–39).

Table 2: Trend Labels¹⁸

Modeled Population	95% Confidence Interval for Average Annual Change in Relative Abundance			Trend Label
	Low End	Point Est.	High End	
“Coastwide”	<u>-0.040</u>	0.039	<u>0.119</u>	“Stable”
Canadian Stock Complex	NO DATA			N/A
Northern New England Stock Complex	<u>-0.185</u>	-0.076	<u>0.041</u>	“Stable”
Southern New England Stock Complex	<u>-0.101</u>	-0.033	<u>0.036</u>	“Stable”
Mid-Atlantic Stock Complex	<u>-0.054</u>	-0.048	<u>-0.042</u>	“Significantly Decreasing”
Southern Stock Complex	<u>-0.058</u>	0.022	<u>0.102</u>	“Stable”

Because each trend label represented only a single blueback herring population segment, however, the Service needed a further mechanism to assess the risk of extinction rangewide. To do so, the Service created and applied two independent assessments, which it labeled “Tier A” and “Tier B.” *See id.* at 48,986–87. Although the Service designed each tier to assess different types of conservation metrics, *see id.*, given the “significant uncertainties associated with the available data” and the “significant number of data deficiencies,” the Service decided after reviewing the models’ results that “it was not necessary to have information under both tiers in order to make a risk determination.” *Id.* at 48,986.

“The goal of Tier A,” the Service wrote, “was to maintain three contiguous stock complexes that are stable or increasing.” *Id.* As the results described above show, however, just two adjacent stock complexes—the Northern and Southern New England stock complexes—

¹⁸ The Service described its labeling process for the modeled populations of blueback herring at *Listing Decision*, 78 Fed. Reg. at 48,989–90.

received the designation “stable.” The only other “stable” complex—the Southern stock complex—was separated from the others by the “significantly decreasing” Mid-Atlantic stock complex. And the last stock complex—Canada—received no label due to insufficient data. Thus, although the models failed to identify “three contiguous stock complexes” where the blueback herring population was “stable or increasing,” the Service concluded that it was unable to draw any results under Tier A because it lacked sufficient data regarding “the population growth rate for rivers in Canada.” *Listing Decision*, 78 Fed. Reg. at 48,992. Without that data, the Service wrote, “there [was] insufficient information available to make a conclusion under Tier A.” *Id.*

The Service’s decision whether to list blueback herring as threatened throughout its range, accordingly, came down to Tier B. The Service designed Tier B to “directly interpret the results” of its trend analysis models. *Listing Decision*, 78 Fed. Reg. at 48,986–87. Unlike “Tier A,” “Tier B” did not consider the stock complexes’ geographic arrangement; it looked only at how many of the modeled populations were “stable” or “significantly increasing.” *Id.* at 48,987. According to the Service:

[A] stable or significantly increasing trajectory suggests that [the blueback herring] may be within the margins of being self-sustainable [But] [a] significantly decreasing population growth rate for several stock complexes[, on the other hand,] would be an indicator that the current abundance may not be sustainable relative to current management measures and, therefore, may warrant further protections.

Id. The Service further stated that the level of extinction risk for blueback herring was a function of two criteria: (1) the number of stock-specific models that were “significantly decreasing;” and (2) whether or not the “coastwide” model was “significantly decreasing.” *See id.* The following matrix summarizes how the Service used these two criteria to determine the species-wide extinction risk:

Table 3: Tier B Outcome Matrix¹⁹

		Number of Discrete Stock Complexes Labeled “Significantly Decreasing”			
		<i>Zero</i>	<i>One</i>	<i>Two</i>	<i>Three or more</i>
Coastwide Model’s Label	“Significantly Increasing” or “Stable”	“Low risk” of extinction	“Moderate-Low risk” of extinction	“Moderate-High risk” of extinction	“High risk” of extinction
	“Significantly Decreasing”	“High risk” of extinction	“High risk” of extinction	“High risk” of extinction	“High risk” of extinction

Thus, because only one stock complex—the Mid-Atlantic—was “significantly decreasing,” and because the “coastwide trajectory” and three of the four stock complexes were “stable,” the Service concluded that the blueback herring was at a “moderate low” risk of extinction through all of its range. *See id.* at 48,992. The Service therefore “determined that, as a result of the extinction risk analysis,” the blueback herring was “not in danger of extinction or likely to become so in the foreseeable future,” and that “listing . . . blueback herring as either endangered or threatened throughout all of [its] range[] [wa]s not warranted at th[at] time.”²⁰ *Listing Decision*, 78 Fed. Reg. at 48,993.

¹⁹ This outcome matrix is described in text at *Listing Decision*, 78 Fed. Reg. at 48,987.

²⁰ Although the Service observed that “[t]he estimated population growth rates reflect[ed] the impacts from the various threats [identified in the qualitative analysis],” *id.* at 48,987, it otherwise appears that the Service derived its extinction-risk conclusion from the Tier B quantitative analysis alone.

3. *The Service's "Significant Portion of its Range" ("SPR") Analysis*

The Service then turned to the last of its three central questions: Is the blueback herring threatened throughout a “significant portion of its range”? *See* 16 U.S.C. § 1532(20). For this purpose, the Service took the candidate “portions of [the] range” to be the geographic boundaries of the five discrete stock complexes which the Service had previously identified (but not the ocean-phase population, which is comprised of mixed stock). *See Listing Decision*, 78 Fed. Reg. at 48,993; *see also supra* Figure 3 (map of discrete stock complexes). To decide whether any of these stock complexes were “significant,” the Service applied its Draft Policy on Interpretation of the Phrase “Significant Portion of Its Range” in the Endangered Species Act’s Definition of “Endangered Species” and “Threatened Species,” 76 Fed. Reg. 76,987 (Dec. 9, 2011) (the “2011 Draft SPR Policy”).

Under the 2011 Draft SPR Policy, “if a species is found to be endangered or threatened in only a significant portion of its range, the *entire species* is listed as endangered or threatened, respectively, and the Act’s protections applies across the species’s entire range.” *Id.* at 76,990 (emphasis added). The Service therefore adopted an interpretation of “significant” that used “the species itself as the reference point.” *Id.* at 76,993. That interpretation is as follows:

Significant: A portion of the range of a species is “significant” if its contribution to the viability of the species is so important that without that portion, the species would be in danger of extinction.

Id. at 77,002.²¹

²¹ After issuing the Listing Decision, the Service adopted a final SPR policy that differs substantively from the 2011 draft. *See* Final Policy on Interpretation of the Phrase “Significant Portion of Its Range” in the Endangered Species Act’s Definitions of “Endangered Species” and “Threatened Species,” 79 Fed. Reg. 37,578 (July 1, 2014) (the “2014 Final SPR Policy”). Under the old standard, “significance” existed only if, without the members of the species in the portion of the range in question, the remainder of the species would be endangered. The new definition

The Service’s subsequent application of the 2011 Draft SPR Policy to the blueback herring was brief. It concluded, in three sentences, that the risk of blueback herring extinction throughout the Mid-Atlantic region was immaterial because that portion of the range was not “significant.” It determined that the Mid-Atlantic region was not “significant” because, even assuming the hypothetical loss of that portion of the range, “the overall coastwide trend is stable.” *Id.* at 48,993. In other words, because “the relative abundance of the species throughout its range (as demonstrated through the coast-wide population growth rate) [wa]s stable,” the Service reasoned, “the [M]id-Atlantic stock complex does not contribute so much to the species that without it, the entire species would be in danger of extinction.” *Id.* at 48,992. The Service did not explicitly analyze the significance of any other regions. *See id.* at 48,992–93.

D. The Present Proceeding

Plaintiffs are five non-profit organizations with interests in the continued existence of blueback herring. They are the NRDC, the Anglers Conservation Network, the Delaware River Shad Fishermen’s Association, the Great Egg Harbor River Council, and the Great Egg Harbor Watershed Association.²² Dkt. 1 at 4–6 (Compl. ¶¶ 10–14). Invoking the Act’s “citizen suit” provision, *see* 16 U.S.C. § 1540(g), they ask the Court to declare the Listing Decision unlawful, vacate it, and remand it to the Service, *see* Dkt. 1 at 3–4 (Compl. ¶¶ 5, 7); Dkt. 27-3 at 54. Both sides have moved for summary judgment. Dkts. 26 & 29. The Court has also received an

allows for “significance” if the remainder would be merely threatened—an explicitly lower standard. *See id.* at 37,579.

²² Plaintiffs have also submitted declarations attesting to their organizations’ conservation-oriented missions, as well as their members’ concrete aesthetic and recreational interests in the continued existence of blueback herring. *See* Dkt. 27-1 at 2–32. These declarations are sufficient to establish Plaintiffs’ standing, *see, e.g., Friends of the Earth, Inc. v. Laidlaw Envtl. Servs. (TOC), Inc.*, 528 U.S. 167, 180–83 (2000), which the Service does not contest.

amicus brief, Dkt. 36, Plaintiffs' response to that brief, Dkt. 38, both parties' post-oral argument briefs, Dkts. 48 & 50, and various notices of supplemental authority, Dkts. 41–46, 51–52.

II. ANALYSIS

Plaintiffs challenge all three of the Listing Decision's central conclusions, which the Court will address in the following order: First, did the Service reasonably conclude that the Mid-Atlantic region is not a "significant portion" of the blueback herring's range? Second, did the Service reasonably conclude that blueback herring are not threatened throughout all their *entire* range? And, third, did the Service reasonably conclude that the Mid-Atlantic stock complex of blueback herring is not a "distinct population segment"?

In considering each of these contentions, the Court must be mindful of both the bounds and demands of judicial review of administrative action. On the one hand, it is not the Court's role to substitute its judgment for that of agency, and this rule applies with particular force in a case, like this one, involving scientific analysis and "technical expertise." *Marsh v. Or. Nat. Res. Council*, 490 U.S. 360, 377 (1989); *see also Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 103 (1983) ("When examining this kind of scientific determination, . . . a reviewing court must generally be at its most deferential."). "When specialists express conflicting views," for example, "an agency must have discretion to rely on the reasonable opinions of its own qualified experts even if, as an original matter, a court might find contrary views more persuasive." *Marsh*, 490 U.S. at 378; *see also, e.g., Defs. of Wildlife v. Zinke*, --- F.3d ----, 2017 WL 836089, at *9 (D.C. Cir. Mar. 3, 2017) ("[C]ompeting views about scientific data and policy choices . . . fail to show that the Service's conclusions were arbitrary and capricious or contrary to law."). Nor is an agency required to explain its conclusions with crystal clarity; rather, the Administrative Procedure Act ("APA") merely requires that the reviewing court be able

“reasonably [to] discern[]” the “agency’s path.” *Alaska Dep’t of Env’tl. Conservation v. EPA*, 540 U.S. 461, 497 (2004) (citation omitted).

On the other hand, it is the Court’s job to ensure that the agency has “examine[d] the relevant data and [has] articulate[d] a satisfactory explanation for its action.” *Motor Vehicle Mfrs. Ass’n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43 (1983). The APA “established a scheme of ‘reasoned decisionmaking,’” and thus the “the process by which [an agency] reaches [its decreed] result must be logical and rational.” *Allentown Mack Sales & Serv., Inc. v. NLRB*, 522 U.S. 359, 374 (1998) (quoting *State Farm*, 463 U.S. at 52); *see also*, *e.g.*, *Tripoli Rocketry Ass’n v. Bureau of Alcohol, Tobacco, Firearms, & Explosives*, 437 F.3d 75, 77 (D.C. Cir. 2006) (same); *Fisher v. Pension Benefit Guarantee Corp.*, 151 F. Supp. 3d 159, 165 (D.D.C. 2016) (same). As the Supreme Court explained in *State Farm*, “[t]he scope of review under the ‘arbitrary and capricious’ standard is narrow,” but the agency must “articulate a satisfactory explanation for its action including a ‘rational connection between the facts found and the choice made.’” 463 U.S. at 43 (quoting *Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168 (1962)); *see also Sw. Power Pool, Inc. v. FERC*, 736 F.3d 994, 997 (D.C. Cir. 2013) (same). Although review of the agency’s reasoned decision is deferential, where the agency “entirely fail[s] to consider an important aspect of the problem” at issue, the Court must set the agency’s action aside as “arbitrary and capricious.” *State Farm*, 463 U.S. at 43.

Applying these standards here, much of what the Service did is unobjectionable. In at least three key respects, however, the Listing Decision either failed to offer a rational connection between the facts and its conclusions or entirely failed to consider an important aspect of the problem. The Court, accordingly, will vacate the Listing Decision and remand to the Service for further consideration consistent with this opinion.

A. Challenges to the “Significant Portion of Its Range” Analysis

The most salient of these errors occurred in the Service’s determination that the species is not threatened in a “significant portion of its range.” As explained above, the Endangered Species Act requires that the Service list a species if it is threatened “throughout all or a *significant portion of its range*.” 16 U.S.C. § 1532(20) (emphasis added). The Service understood the relevant “portions of [the] range” to be the five geographic stock complexes it had previously identified. *See Listing Decision*, 78 Fed. Reg. at 48,950, 48,993. According to its 2011 Draft SPR Policy, the Service was then required to ask “whether there is substantial information suggesting that the hypothetical loss of any of the[se] individual stock complexes . . . would reasonably be expected to increase the demographic risks to the point that the [entire] species would then be in danger of extinction.” *Id.* at 48,993. Because the only stock complex for which the Service had statistically significant evidence of population decline was the Mid-Atlantic stock complex, the Service performed the analysis only for that region. *See id.* If the loss of the Mid-Atlantic region would not place the entire species in danger of extinction, the Service reasoned, it “need not address the question whether the portion of the species occupying” that region was threatened or endangered. *Id.*

Against this backdrop, the Service dispensed with the SPR inquiry in just a few sentences. Given the centrality of this analysis to the Court’s holding, it is worth quoting in full:

For blueback herring, 3 of the stock complexes and the coastwide trend are all stable, but the [M]id-Atlantic stock complex is decreasing. The [internal status review team] determined that the [M]id-Atlantic stock complex is not significant to the species, given that[,] even though it is decreasing, the overall coastwide trend is stable. Thus, the loss of this stock complex would not place the entire species at risk of extinction. We concur with this conclusion. Because the portion of the blueback herring stock complex residing in the [M]id-Atlantic is not so significant that its hypothetical loss would render the species endangered, we conclude that the [M]id-Atlantic stock complex does not constitute a significant portion of the blueback herring’s range.

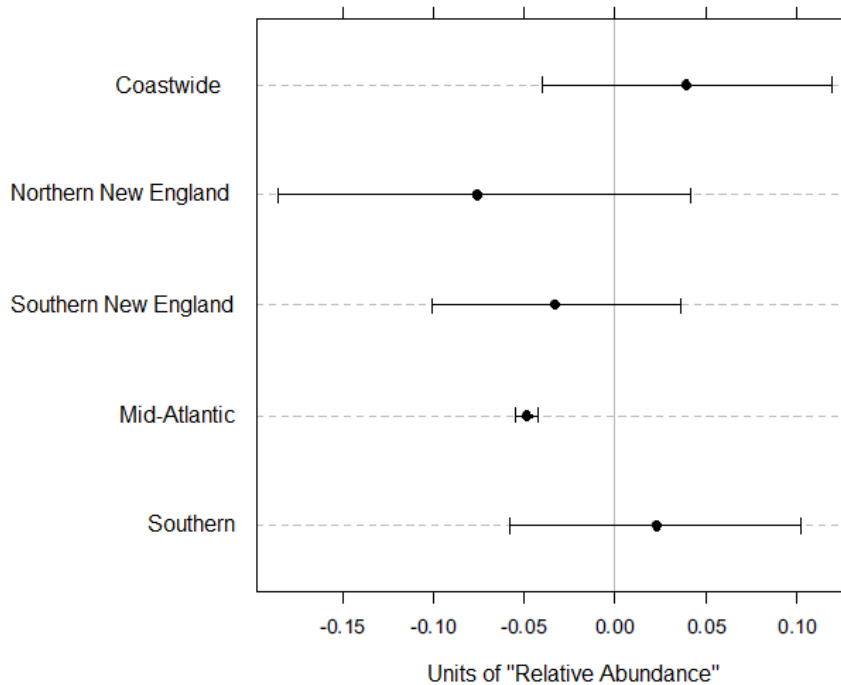
Id.; *accord id.* at 48,992 (explaining same rationale). This analysis, however, is based on a premise (that the coastwide trend was “stable”) and an assumption (that the Mid-Atlantic and coastwide complexes did not overlap) that are not supported by the Listing Decision. The Court will consider each of these propositions in turn.²³

1. *Inference That the Coastwide Trend Was “Stable”*

The Service’s determination that the Mid-Atlantic region does not constitute a significant portion of the blueback herring’s range depended on the factual premise that “the overall coastwide trend is stable.” *Id.* at 48,993. The Service’s only stated basis for that claim was the “coastwide” trend analysis model, which estimated the average annual change in relative abundance of ocean-phase blueback herring, and generated a 95% confidence interval for that result. *See supra* Part I.C.2.b. As explained above, that estimate and its confidence interval are reflected in the top line of the following chart:

²³ Plaintiffs also urge the Court to reject the 2011 Draft SPR Policy’s gloss on the statutory phrase “significant portion of its range” on the grounds that it is contrary to the Act and that draft policies deserve no deference. *See* Dkt. 27-3 at 33–40; Dkt. 34 at 18–23. The draft policy, however, is no longer in effect. *See 2014 Final SPR Policy*, 79 Fed. Reg. at 37,578; *see also supra* note 21. Plaintiffs agree that the new policy is more lenient, and that, if rationally applied, it might qualify the Mid-Atlantic region as “significant.” *See* Dkt. 53 at 31–32. They also agree that their arguments regarding deference do not apply to the new policy. *See id.* at 41. Thus, because other flaws already necessitate a remand, because the remand will not involve the 2011 Draft SPR Policy, and because the 2014 Final SPR Policy presents a materially different set of issues, the Court need not decide whether the 2011 Draft SPR Policy was lawful.

*Figure 4 (repeated): Estimates and 95% Confidence Intervals for Each Population's Average Annual Change in Relative Abundance*²⁴



In making its decision, however, the Service did not consider the value of the point estimate (*i.e.*, the midpoints identified above). Nor did it consider the length of the error bars. Instead, it considered only the fact that the 95% confidence interval “contain[ed] zero.” *Listing Decision*, 78 Fed. Reg. at 48,987. In other words, because the data did not show with 95% confidence that the population size had changed, the Service “considered [the population] to be stable.” *Id.*; *accord id.* at 48,989. Plaintiffs contend that this inference lacked the “rational connection between the facts found and the choice made” that the APA requires. *State Farm*, 463 U.S. at 43; *see* Dkt. 27-3 at 21–29; Dkt. 34 at 11–17. In short, they argue that the absence of statistically significant evidence that the coastwide population is declining (or increasing) does not—absent more—show that it is stable. As explained below, the Court agrees with this

²⁴ Adapted from Dkt. 40-2 at 108 (AR 2514). As stated above, for clarity, the Court has replaced the “Coastwide” label, which originally read “Range-wide,” and replaced the x-axis label, which originally read “Growth rate \pm 95% confidence intervals.”

undisputed tenet and, accordingly, concludes that the Service has committed one of two errors: It has either committed the logical error that Plaintiffs have identified or, at the very least, it has failed to explain why it has not done so. *See State Farm*, 463 U.S. at 43.

It is helpful to begin with some background, none of which is disputed for present purposes. In conducting a formal significance test, researchers start from the hypothesis they are seeking to disprove, called the “null hypothesis” or “null.” David H. Kaye & David A. Freedman, *Reference Guide on Statistics*, in REFERENCE MANUAL ON SCIENTIFIC EVIDENCE 211, 241 (Fed. Judicial Ctr. 3d ed. 2011) [hereinafter *Reference Guide*].²⁵ They then ask: Assuming the null hypothesis is true, what is the probability of observing data that conflict with the null hypothesis to at least as great an extent as do the data actually observed? *Id.* at 249–51. To take a simple example, suppose a study seeks to draw inferences about the color of apples in an orchard, and begins from a random sample of 10 apples, 3 of which are green. If the null hypothesis is “most apples in this orchard are green,” the question would be: “If most apples in this orchard are, in fact, green, then what is the probability of choosing 10 apples at random from the orchard and finding 3 or fewer green ones?” If the answer falls below a predetermined significance threshold (often 5%), then the null hypothesis is sufficiently inconsistent with the data that it is deemed “rejected,” and the result is deemed “statistically significant.” *Id.* at 251–

²⁵ Judicial review is, of course, typically confined to the administrative record, but that does not mean that courts cannot consult widely accepted and undisputed background materials for the purpose of elucidating the issues presented. Any question of the Court’s ability to do so here, moreover, is put soundly to rest by the D.C. Circuit’s decision in *American Petroleum Institute v. EPA*, 684 F.3d 1342 (D.C. Cir. 2012), where it relied on the Federal Judicial Center’s *Reference Guide on Statistics* to explain the concept of the null hypothesis in an APA case. *See id.* at 1350. Although the Service objects to any use by the Court of “extra-record evidence,” *see* Dkt. 29-1 at 40–41 (emphasis added), it “[does] not take issue” with the Court relying on documents like the *Reference Guide* (which the Service attaches to its brief) in order to “explain the [concept of] the null hypothesis,” Dkt. 53 at 66; *see* Dkt. 29-2.

52; accord, e.g., *Matrixx Initiatives, Inc. v. Siracusano*, 563 U.S. 27, 39 n.6 (2011) (explaining statistical significance). A “95% confidence interval,” then, is the interval containing all and only the null hypotheses that could not be rejected using a 5% significance threshold. Richard D. De Veaux *et al.*, *Stats: Data and Models* 510–11 (2d ed. 2008); see also *Reference Guide* at 247.

Plaintiffs’ argument turns on the established principle that, when a statistical test fails to reject the null hypothesis, that does not by itself constitute evidence that the null hypothesis is true. See, e.g., *Reference Guide* at 251–52, 253–54; De Veaux *et al.* at 485, 501, 508. This concept is familiar in law: A criminal verdict of “not guilty,” for example, does not establish that the defendant did not commit the alleged conduct; it simply means that the government failed to disprove the assumption of innocence beyond a reasonable doubt. *Helvering v. Mitchell*, 303 U.S. 391, 397 (1938). So too in significance testing. Failing to reject the null does not mean that the null hypothesis accurately describes the world; “it simply means that we don’t have enough evidence to reject our assumption [that it does].”²⁶ De Veaux *et al.* at 485 (drawing criminal law analogy). As the D.C. Circuit has explained, a “fail[ure] to reject the null hypothesis” *might* mean that no trend in fact exists, but it is equally consistent with proposition that a trend does exist and the test “merely lacked sufficient power to detect [it].” *Am. Petroleum Inst.*, 684 F.3d at 1350 (“[T]he study did not establish there was ‘no dose-response relationship’; it simply failed to reject the null hypothesis to that effect.”); see also, e.g., *Smith v. Wyeth-Ayerst*

²⁶ Professor De Veaux’s textbook admonishes students as follows:

When you have not found sufficient evidence to reject the null according to the standard you have established, you should say that “The data have failed to provide sufficient evidence to reject the null hypothesis.” Don’t say that you “accept the null hypothesis.” You certainly haven’t proven or established it; it was assumed to begin with.

De Veaux *et al.* at 508.

Labs. Co., 278 F. Supp. 2d 684, 693 n.14 (W.D.N.C. 2003) (“A study may fail to disprove the null hypothesis, but that alone does not justify a conclusion that the null hypothesis has been proved.”); *cf. Matrixx Initiatives, Inc.*, 563 U.S. at 40 (“A lack of statistically significant [evidence of an effect] does not mean that . . . experts have no reliable basis for [concluding that no effect exists].”). As a result, just as a court cannot conclude that a criminal defendant did not commit the underlying criminal conduct merely because the jury failed to find sufficient evidence of guilt, reasoned decisionmaking does not permit an agency to conclude, based on a failure to reject the null hypothesis and without further analysis, that the null hypothesis is true.

The Listing Decision, however, seems to have committed this very error. The Service defined the null hypothesis as the proposition that the relative abundance of ocean-phase blueback herring was the same in 2012 as it was in 1976 (*i.e.*, that the average change in relative abundance between those years was zero). The model, then, failed to reject the null. That is, zero was among the values in the confidence interval for the estimated change in abundance over the last 36 years—or, to put it in different terms, the data did not show with a 95% degree of confidence that the number of ocean-phase blueback herring had changed between 1976 and 2012. *Listing Decision*, 78 Fed. Reg. at 48,990; *see supra* Figure 4. And, based on the model’s failure to reject the hypothesis that the relative abundance of the ocean-phase blueback herring had not changed, the Service concluded (or at least seems to have concluded) that the ocean-phase population was “stable.” *Listing Decision*, 78 Fed. Reg. at 48,987; *see also* Dkt. 29-1 at 44–45 (Defs.’ Brief) (confirming this description of the Listing Decision).

Before concluding that the Listing Decision was therefore unreasonable, the Court must, of course, ensure that it is not substituting its judgment for that of the agency, *see State Farm*, 463 U.S. at 43, and that this not the type of technical issue that can reasonably lead to competing

expert perspectives, *see, e.g., Marsh*, 490 U.S. at 378. One could imagine, for example, that the technical details of the model somehow accounted for and nullified this putative error. Or perhaps Plaintiffs’ account of hypothesis testing—although “correct” enough to appear in college textbooks and the Federal Judicial Center’s statistics manual—is at odds with other, more complex statistical principles on which the Service relied. After three rounds of briefing and a lengthy oral argument, however, the Service has not even argued that such an explanation exists.

To start, the Service does not appear to dispute the mathematical premise of Plaintiffs’ argument, *i.e.*, that accepting an unrejected null hypothesis as true, absent further analysis, is error. *See* Dkt. 29-1 at 39–48; Dkt. 37 at 12–17. To the contrary, the Service’s citations confirm Plaintiffs’ description of the relevant principles. The Service directs the Court, for example, to a “commonly cited scholarly article,” Dkt. 29-1 at 45–46 & n.28, which characterizes Plaintiffs’ position as “well known among applied scientists,” John M. Hoenig & Dennis M. Heisey, *The Abuse of Power: The Pervasive Fallacy of Power Calculations for Data Analysis*, AMERICAN STATISTICIAN, Feb. 2001, at 1, 1. That article’s opening paragraph states:

It is well known among applied scientists that a lack of impact or effect is not sufficiently established by a failure to demonstrate statistical significance. A failure to reject the null hypothesis of no effect may be the result of low statistical power when an important effect actually exists and the null hypothesis of no effect is in fact false.

Id. The Service also cites the website of Dr. Martha Smith, a retired statistics professor. *See* Dkt. 29-1 at 46 n.30. Her website explains that “[a]ccepting a null hypothesis when a result is not statistically significant, without taking power into account” is a “common [statistical] mistake[.]” Martha K. Smith, *Common Mistakes Involving Power* (Aug. 28, 2012), <http://www.ma.utexas.edu/users/mks/statmistakes/PowerMistakes.html>. She continues:

Since smaller samples yield smaller power, a small sample size may not be able to detect an important difference. If there is strong evidence that the power of a procedure will indeed detect a difference of practical importance, then accepting the null hypothesis may be appropriate; *otherwise it is not—all we can legitimately say then is that we fail to reject the null hypothesis.*

Id. (footnote omitted) (emphasis added). Far from justifying the Listing Decision’s reasoning, these sources support the view that it was flawed.

Nor does the Service argue that it relied on the type of additional analysis that might have permitted it reasonably to draw affirmative conclusions from the rejection of the null. One such type of analysis would evaluate the model’s “power,” which “is the chance that a statistical test will declare an effect when there is an effect to be declared.” *Reference Guide* at 254; *accord* De Veaux *et al.* at 515. The amount of power depends on both the size of the effect to be detected and the amount of data considered. *Reference Guide* at 254. When a low-powered test fails to reject the null hypothesis, the results are “more fairly described as inconclusive than negative.” *Id.* But, when a high-powered test fails to reject the null hypothesis, that “can be persuasive evidence” that the null is close to being correct. *Id.* Thus, demonstrating that the Service’s significance test had high power would be one way to bridge the gap between failing to reject the null and accepting it as true.

The Service, however, concedes that it did not conduct a power analysis. Indeed, it argues that it would have been inappropriate to do so, because power analyses “are most useful when designing a study (before data is collected),” and the data the Service used were collected before the status review began. *See* Dkt. 29-1 at 45, 47 (citing Hoenig & Heisey at 5; Smith). The statistical utility of a “*post hoc* power analysis” is beyond the judicial ken, but it is also beside the point. Plaintiffs do not argue, nor do their views entail, that a power analysis was required. Instead, they contend only that the Service impermissibly accepted an unrejected null as true. *See* Dkt. 34 at 16–17. The fact that the Service considered a power analysis infeasible

does not cure that problem. A leaky ship is still leaky, even if it is not feasible to patch the leak after the ship has gone to sea. The Service, moreover, has not identified anything in the administrative record suggesting that it contemporaneously considered and rejected this—or any other—means of assessing whether the null hypothesis is true. *See* Dkt. 29-1 at 45, 47. All agree that the Court “must judge the propriety of [agency] action solely by the grounds invoked by the agency.” *SEC v. Chenery Corp.*, 332 U.S. 194, 196 (1947); *see* Dkt. 48 at 5. Because the Service points to nothing in the administrative record suggesting that it even considered whether or how it might be able to confirm the truth of the null hypothesis, the Court cannot credit the Service’s “post hoc rationalization[.]” now. *Gerber v. Norton*, 294 F.3d 173, 184 (D.C. Cir. 2002).

One could imagine the argument that the Service did not use the word “stable” to mean “stable,” but rather used it to mean that it lacked data demonstrating a statistically significant trend in population size. This line of reasoning, however, faces hurdles of its own. To the extent the Service indeed takes that position now, it has contradicted itself in its briefs. Nor did the Listing Decision itself state that it was employing such a counterintuitive definition. And, even if the Service did mean to use “stable” in this way, it has not explained how a finding of “stability”—understood to mean a lack of statistically significant evidence—would support the conclusions it reached.

As an initial matter, the Service does not advance in its briefs the argument that “stable” meant “unknown.” It writes, for example that “[t]he term ‘stable’ [in the Listing Decision] mean[t] that the stock[’s population] [wa]s neither increasing nor decreasing, because the estimated growth rate for the particular population [wa]s not statistically different from zero.” Dkt. 29-1 at 44. There is a substantial difference between asserting that the data did not show

whether the population was changing, and affirmatively concluding, as the Service appears to have done, that the population was, in fact, “neither increasing nor decreasing.” One assertion posits a lack of knowledge, while the other asserts a fact based on the absence of statistically significant evidence to the contrary.

The Service’s briefs go on to agree, moreover, that its inability to reject the null was consistent with at least two possibilities: (1) that the null hypothesis (that there was no trend) was actually true or (2) that there was a trend (*i.e.*, the null was false) but that the data lacked sufficient power to detect it. *See* Dkt. 37 at 13; Dkt. 53 at 69. The inability to distinguish those two possibilities, however, is precisely the problem. As the Service’s own sources explain, without some reason to favor the first possibility over the second, simply *assuming* the first to be true constitutes an unreasoned choice. *Cf., e.g., Allentown*, 522 U.S. at 374 (requiring “the process by which [an agency] reaches [its] result [to] be logical and rational). And, to the extent the Service intended to rely on the absence of evidence—that is, to rely on its inability to discern whether the coastwide population was increasing, decreasing, or stable—as a reason why it could not render a listing decision on the existing record, that effort fails because the Service never “articulate[d] [a] rational connection between” that lack of evidence and its listing decision. *See State Farm*, 463 U.S. at 43.

When viewed in the context of the Listing Decision itself, this difficulty is acute. The Service recognized that the population of blueback herring is, in fact, declining in the Mid-Atlantic region. The 2011 Draft SPR Policy required the Service then to ask, if the Mid-Atlantic stock complex went extinct, would the remainder of the species would become endangered? 76 Fed. Reg. at 77,002. But the Service asserted that it would not, *because* “the overall coastwide trend is stable.” *Listing Decision*, 78 Fed. Reg. at 48,993. That is, the Service concluded that the

abundance of blueback herring in the “coastwide” region (*i.e.*, the ocean) was sufficient to protect the species against the hypothetical loss of the Mid-Atlantic stock complex. Although the Court does not foreclose the possibility that the Service might conclude that its lack of knowledge about whether the coastwide population would be sufficient to protect against such a loss required further study before the Service could find that listing the species was warranted, that is not what the agency said. To the contrary, the Service concluded that the coastwide population “*is* stable,” that “the loss of [the Mid-Atlantic] stock complex *would not* place the entire species at risk of extinction,” and that “the [M]id-Atlantic stock complex *does not* constitute a significant portion of the blueback herring’s range.” *Id.* (emphases added). If the Service meant something else, it was required to say so *and* to offer a reasoned explanation for that alternative.

Ultimately, the Service’s main argument seems to be that the Court should defer to the Service’s statistical analysis because it involved complicated questions of statistics and ecology. *See* Dkt. 29-1 at 39–40; Dkt. 37 at 12–13; Dkt. 53 at 71–72. The Court is unpersuaded. It is of course true that “agency determinations receive ‘an extreme degree of deference [when] they involve complex judgments about sampling methodology and data analysis that are within the agency’s technical expertise.’” *Alaska Airlines, Inc. v. TSA*, 588 F.3d 1116, 1120 (D.C. Cir. 2009) (alteration in original) (quoting *Kennecott Greens Creek Min. Co. v. Mine Safety & Health Admin.*, 476 F.3d 946, 956 (D.C. Cir. 2007)). But Plaintiffs’ challenge here is not particularly technical. They dispute none of the choices the Service made in selecting its data. Nor do they dispute the design of the models themselves. *See* Dkt. 53 at 15–16. Rather, Plaintiffs challenge the Service’s interpretation of the models’ output—namely, the inference that, because the models failed to detect a trend, no trend in fact existed. *Id.* at 60. This was hardly a “complex

judgment about sampling methodology and data analysis;” it was a simple error of logic. And the law is clear that “the process by which [an agency] reaches [its] result must be logical and rational.” *Allentown*, 522 U.S. at 374. In any event, even in the most technical cases, the Service must still “provide[] a complete analytic defense” of its “assumptions and methodology.” *Nat’l Ass’n for Surface Finishing v. EPA*, 795 F.3d 1, 18 (D.C. Cir. 2015). The Service has not done so here. And not even the most deferential standard of review can save an agency action for which the agency can articulate no reasoned basis. *See ALLTEL Corp. v. FCC*, 838 F.2d 551, 562 (D.C. Cir. 1988).

Finally, the Service contends that this ruling will “undermine a fundamental statutory assumption of the [Endangered Species Act], i.e., the default that a species is not warranted for listing unless the best available science indicates otherwise.” Dkt. 37 at 14–15; *see also* Dkt. 29-1 at 46–47. It is not obvious why the Service believes that to be so. The Service’s concern appears to be that, on remand, if it cannot show with 95% certainty that blueback herring are not threatened, the Service will be required to list the species. Nothing in this opinion mandates that result. The Court merely holds that the Listing Decision failed to offer a “rational connection” between the agency’s inability to reject the null hypothesis that the trend had not changed, and its conclusion that the coastwide population was, in fact, stable. The Listing Decision’s conclusion that the Mid-Atlantic stock complex does not constitute a significant portion of the blueback herring range must, accordingly, be set aside.²⁷

²⁷ This same logic also fells the Service’s “threatened throughout all of its range” analysis. *See infra* Part II.B.

2. *Assumption That the Coastwide and Mid-Atlantic Stock Complexes Were Disjoint*

The Service’s “significant portion of its range” analysis also suffers from a second, critical lapse in reasoning. As explained above, the Service applied its 2011 Draft SPR Policy to determine whether the Mid-Atlantic complex constituted a *significant* portion of the overall range for blueback herring. Under that draft policy, the Service was required to hypothesize a scenario in which the members of Mid-Atlantic stock complex perish, and then to ask whether, without that stock complex, the rest of the species would become endangered. *2011 Draft SPR Policy*, 76 Fed. Reg. at 76,994, 77,002; *see Listing Decision*, 78 Fed. Reg. at 48,993. If so, the Mid-Atlantic complex constitutes a “significant” portion of the range. But, if the loss of the Mid-Atlantic complex would not pose a risk of extinction to the entire species, then that portion of the range does not qualify as “significant” for purposes of the SPR analysis. Applying this test, the Service concluded that the Mid-Atlantic complex was not “significant” because the “coastwide trend is stable” and, thus, “the loss of [the Mid-Atlantic] stock complex would not place the entire species at risk of extinction.” *Listing Decision*, 78 Fed. Reg. at 48,993.

Plaintiffs criticize this reasoning on a number of grounds, even apart from the use of the term “stable.” *See* Dkt. 27-3 at 40–44; Dkt. 34 at 23–25; Dkt. 38 at 18–22. Most significantly for present purposes, they contend that the Service “never actually examined what the effect would be of extirpation of the Mid-Atlantic stock,” Dkt. 38 at 19–20, and that it failed to “engag[e] in a meaningful analysis of what the loss of the Mid-Atlantic blueback population would mean for the entire species,” Dkt. 34 at 23. The Court inquired about this issue at oral argument, *see* Dkt. 53 at 34–37, 76–78, and the parties submitted supplemental briefs further addressing the issue, *see* Dkt. 48 at 7–10; Dkt. 50 at 7–8.

As crystalized at oral argument and in the post-argument briefing, one logical flaw in the Service’s reasoning stands out: The Service’s SPR analysis implicitly assumed that the Mid-

Atlantic stock complex and the coastwide population are disjoint—that is, that the two populations do not overlap. By doing so, however, the Service did not truly hypothesize the loss of the Mid-Atlantic stock complex, because Mid-Atlantic herring still contributed to the coastwide trend analysis. In other words, the Service posited that the coastwide population would compensate for the hypothetical total loss of the Mid-Atlantic stock complex, but it failed to consider the fact that the loss of the Mid-Atlantic complex would invariably also diminish the coastwide population, which is made up of a mix of fish that migrate from each of the stock-specific complexes. *E.g., Listing Decision*, 78 Fed. Reg. at 48,950.

In response, the Service argues that accounting for the overlap in population between the Mid-Atlantic stock specific-complex and the coastwide mixed-stock population was, as a practical matter, impossible. *See* Dkt. 48 at 6–10. It cites the Listing Decision for the proposition that “[t]he coastwide [population] undisputedly represents a mixed stock (comprising multiple stock complexes).” *Id.* at 8 (citing *Listing Decision*, 78 Fed. Reg. at 48,950). Thus, it explains, in order to “subtract” the Mid-Atlantic stock complex from the coastwide model, the Service would have needed to convert estimates of relative abundance into estimates of “absolute abundance,” *id.* at 7, or else obtain genetic data from the ocean-phase population extending all the way back to 1976, *id.* at 8. Neither option, the Service says, was viable. *Id.* at 10. According to the Service, then, the only way to disentangle the “Mid-Atlantic” and “coastwide” datasets would have been to “bas[e] its listing[] on speculation or surmise.” *Id.*

This leaves the Service in an untenable position. Faced with an unsupported assumption on which its decision necessarily relied, the Service cannot identify any portion of the administrative record in which it so much as acknowledged the gap in its reasoning. This omission alone warrants remand. *See, e.g., State Farm*, 463 U.S. at 43 (remand is appropriate

when the agency “entirely failed to consider an important aspect of the problem”). The Service’s assumption, however, was not merely unexplained; the Service now acknowledges that the record “undisputedly” showed its critical, unstated assumption to be false. Dkt. 48 at 8. Suffice it to say, it is arbitrary and capricious for an agency to base its decision on a factual premise that the record plainly showed to be wrong. *State Farm*, 463 U.S. at 43 (an agency cannot “offer[] an explanation for its decision that runs counter to the evidence before [it]”).

* * *

The Court, accordingly, will order the Service to conduct a new “signification portion of [the] range” analysis, in which the Service (1) may not, at least without rational explanation, accept the lack of statistically significant evidence of decline as proof that the population is “stable”; and (2) may not assume that the ocean-phase population would be unaffected by the loss of the Mid-Atlantic stock complex.

B. Challenges to the Throughout “All of Its Range” Analysis

The Service’s determination that the blueback herring is not endangered “throughout all of its range” shares at least one of the SPR determination’s fatal flaws. As described above, the Service’s “throughout all of its range” analysis relied, at least in principal part, on the Tier B interpretation of the quantitative models. *Listing Decision*, 78 Fed. Reg. at 48,992; *see supra* Part I.C.2.b.iii. Under the Tier B approach, the Service’s assessment of species-wide extinction-risk was a function of (1) the number of stock-specific models that showed a statistically significant decline and (2) whether the coastwide model also showed a statistically significant decline. *See supra* Table 3. Although the Service found statistically significant evidence that the Mid-Atlantic population was declining, it was unable to reject the null hypothesis (*i.e.*, the hypothesis that there was no trend) with respect to the three other stock-specific models and the “coastwide” model. The Service, accordingly, concluded that the coastwide population and

other stock-specific complexes were “stable,” and thus concluded that, overall, the blueback herring faces only a “moderate-low risk” of extinction. *Listing Decision*, 78 Fed. Reg. at 48,992. As with its SPR analysis, however, the Service appears to have committed one of two errors: Either it committed a logical error—that is, it treated the models’ failure to reject the null hypothesis as proof that the null hypothesis is true—or it failed adequately to explain the basis for its decision.

As with the Service’s SPR determination, it is possible that the Service did not use the word “stable” to mean “stable,” but rather meant to convey that it lacked sufficient information to conclude that these stock complexes were decreasing. But, as with the SPR determination, that is not what the Service said. To the contrary, the Service seems to have used the word “stable” in something like the ordinary-language sense; it concluded that “a stable or significantly increasing trajectory [in these complexes] suggests that the[] species may be within the margins of being self-sustainable and thus, if all of the growth rates for the[se] . . . stock complexes are stable or significantly increasing, the species is at low risk of extinction.” *Id.* at 48,987. And, of equal importance, the Service has failed to point to anything in the Listing Decision or the administrative record explaining how evidence of a statistically significant decline in the Mid-Atlantic population—combined with the lack of evidence regarding the coastwide complex and the remaining three stock-specific complexes—supports a finding of a “moderate-low” risk of extinction. Because the Service’s analysis, accordingly, either committed a logical misstep, *see Allentown*, 522 U.S. at 374, or failed adequately to explain the basis for the Service’s decision, *see State Farm*, 463 U.S. at 43, the agency’s finding with respect to the blueback herring’s risk of extinction rangewide cannot stand.

The Court, as above, will order the Service on remand to conduct a new “through all of its range” analysis in which it may not, at least without rational explanation, accept the lack of statistically significant evidence of decline as proof that the population is “stable.”²⁸

C. Challenges to the “Distinct Population Segment” Analysis

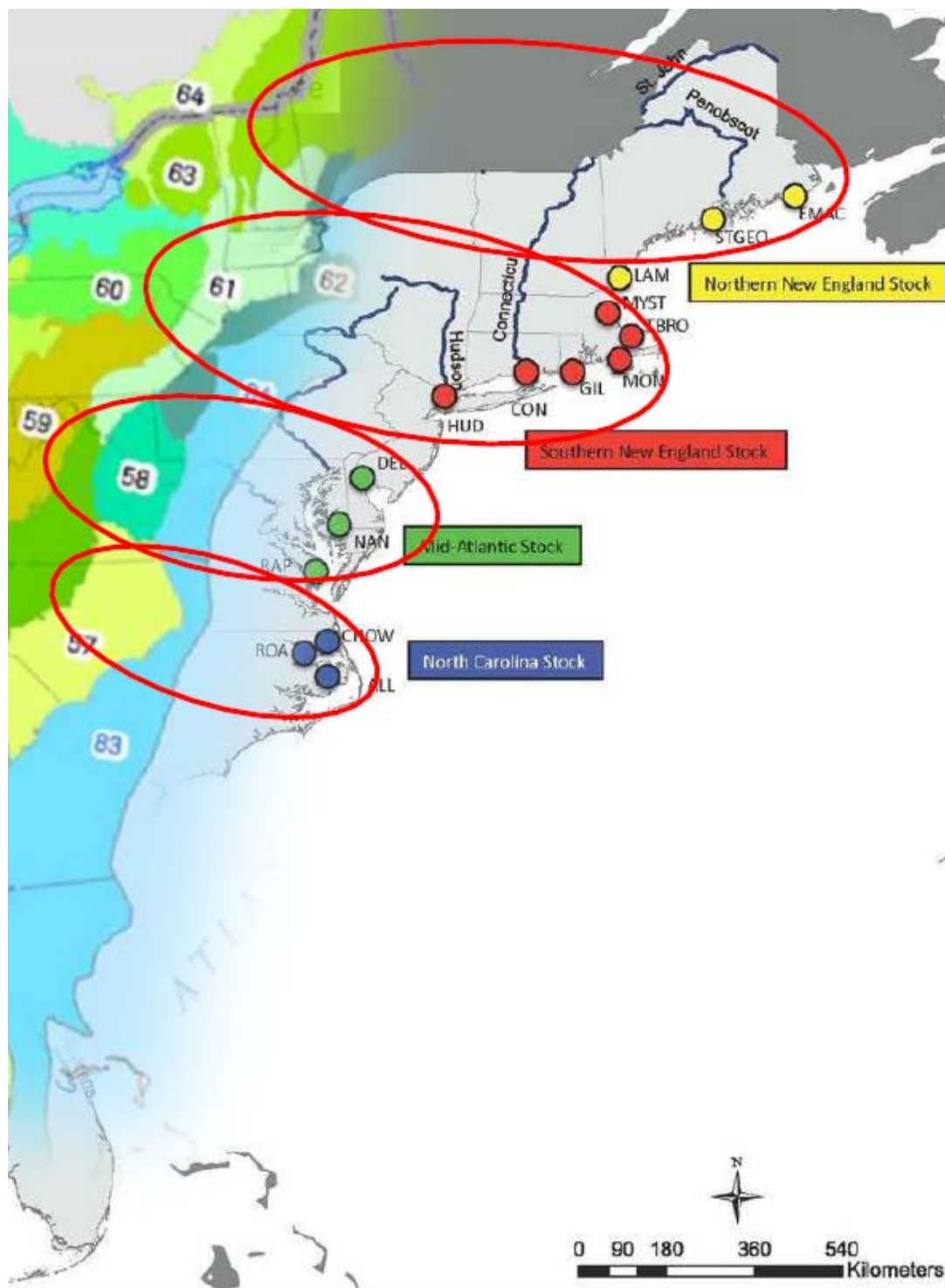
Finally, the Service’s “distinct population segment” (or “DPS”) analysis cannot withstand APA scrutiny because the agency failed entirely to consider an important aspect of problem. *See State Farm*, 463 U.S. at 43. Under the Service’s 1996 DPS Policy, any subset of blueback herring qualifies as a “distinct population segment” if it is both “discrete” and “significant.” 61 Fed. Reg. at 4725. The Policy then lists four criteria to guide consideration of the “significance” prong, “[a]ny one of [which] is sufficient” to establish “significance.” *Am. Forest Res. Council v. Ashe*, 601 F. App’x 1, 4 (D.C. Cir. 2015); *see also* Dkt. 53 at 95 (statement of agency counsel at oral argument) (“[A]ny of those four significance factors, if they’re positive, will result in passing the significance test.”). Although the Listing Decision contains the conclusory assertion that the agency “considered *all* of the [enumerated] criteria” for significance, 78 Fed. Reg. at 48,950 (emphasis added), Plaintiffs contend that the Service “provided no meaningful evaluation” of the first such criterion—namely, whether any blueback herring stock “[p]ersist[s] . . . in an ecological setting” that is “unusual or unique” among blueback herring. *1996 DPS Policy*, 61 Fed. Reg. at 4725; *see* Dkt. 27-3 at 45. The Court agrees. Indeed, the Service does not appear to have considered this criterion at all.

²⁸ Plaintiffs also argue that the Service acted arbitrarily and capriciously when it determined that “[t]here is insufficient information available to make a conclusion under Tier A as [it was] unable to obtain data from Canada.” *Listing Decision*, 78 Fed. Reg. at 48,992; *see* Dkt. 27-3 at 29–32. In light of the Court’s other conclusions, it need not reach that issue.

In the Listing Decision itself, the Service points only to its statement that blueback herring “occupy many different ecological settings throughout their range.” 78 Fed. Reg. at 48,950; *see* Dkt. 29-1 at 20–21. That statement, however, provides no support for the Service’s contention that no population segment persists in an ecological setting that is “unusual or unique”; to the contrary, if anything, it adds modest support for the proposition that one or more of the regional stock complexes *might* contain an ecological setting that is “different” from the settings in which other stocks reside. To the extent the Service considers this sentence in the Listing Statement to be a “reasonabl[e] assessment of the first significance factor,” Dkt. 29-1 at 22, the Service is incorrect. It is, therefore, not surprising that the Service looks for support for its conclusion in the broader administrative record.

There, however, the Service again fails to show that it considered the issue, much less that it reached a reasoned conclusion. It directs the Court to (1) the map displayed below and (2) an excerpt of an internal memorandum from the Service’s internal status review team. The map appears to be a map of “ecoregions” (as defined by a third party in 2004), with circles overlaid to represent the corresponding stock complexes for the alewife (a fish closely related to the blueback herring). At least in relevant respects, the Mid-Atlantic stock complex for blueback herring encompasses the Mid-Atlantic stock complex for alewife, so any “ecoregion” containing alewife Mid-Atlantic stock should also contain blueback herring Mid-Atlantic stock. *See* Dkt. 40-6 at 238 (AR 73,490) (describing extent of both stock complexes). *Compare Listing Decision*, 78 Fed. Reg. 48,951 fig.1 (alewife map) *with id.* at 48,952 fig.2 (blueback herring map).

Figure 5: Alewife Stock Complexes Overlaid on Map of “Terrestrial and Marine Ecoregions”²⁹



²⁹ Dkt. 40-6 at 102 (AR 68,435). For the complete ecoregions map, see Dkt. 40-2 at 247 (AR 49,964).

The Service apparently intends these documents as evidence that it “considered the possibility of [associating] ecoregions . . . with regional stock complexes.” Dkt. 29-1 at 21. It is difficult to understand what the Service means by this, or how it is relevant. In any event, it is safe to conclude that these material do not show that the Service considered whether the Mid-Atlantic stock includes an ecoregion that is “unique or unusual” for blueback herring.

As above, this map, if anything, works *against* the Service. It suggests that the Mid-Atlantic stock complex wholly encompasses “unique” ecoregion No. 58, which the legend identifies as the Chesapeake Bay Lowlands. *See* Dkt. 40-2 at 247 (AR 49,964). If so, then it indicates that the Mid-Atlantic stock of blueback herring is the only stock to “persist” in the Chesapeake Bay Lowlands—rendering it “significant” under the 1996 DPS Policy. *Cf.* Threatened and Endangered Status for Distinct Population Segments of Atlantic Sturgeon in the Northeast Region, 77 Fed. Reg. 5880, 5904–05 (Feb. 6, 2012) (concluding that, because only one discrete population segment of Atlantic sturgeon lives in the Chesapeake Bay Lowlands ecoregion, that population segment is “significant”).

Nor does the internal memorandum support the Service’s contention that it considered, and rejected, the possibility that any of the four stock-specific complexes might contain a unique ecoregion. The memorandum discusses what eventually became “Tier A” in the rangewide extinction risk analysis. In a single sentence, the author suggests that the requirement that there be three contiguous stock complexes that “are either stable or increasing” is a sensible one, because “[i]f you have three contiguous stocks, they should span at least [two] ecoregions.” Dkt. 40-6 at 191–92 (AR 68,679–80). It contains no evidence that the author actually researched or analyzed this question but, rather, notes: “Expand information with McElhany et al.” *Id.* at 192 (AR 68,680). If that reference was “expanded” elsewhere in the administrative record, the

Service has not directed the Court to it, and it is not the Court's role to comb through the voluminous joint appendix in search of it. As is, however, this single, incomplete sentence in an internal memorandum does not vindicate the Service's position that it did study the issue but simply neglected to set forth its findings in the Listing Decision.

At bottom, there is no evidence that the Service gave any consideration whatsoever to the first significance prong of its 1996 DPS Policy. It thereby "entirely failed to consider an important aspect of the problem," *State Farm*, 463 U.S. at 43, and the DPS finding must be set aside. On remand, the Service will need to address this criterion, as well.³⁰

CONCLUSION

The Court will grant Plaintiffs' motion for summary judgment and deny the Service's cross-motion for summary judgment. The Court will, accordingly, vacate the Listing Decision with respect to blueback herring and will remand this matter to the Service for further proceedings consistent with this opinion. A separate order will issue.

/s/ Randolph D. Moss
RANDOLPH D. MOSS
United States District Judge

Date: March 25, 2017

³⁰ Plaintiffs also raise a number of challenges to the Listing Decision's discussion of prongs two and four of the 1996 DPS Policy. *See* Dkt. 27-3 at 47-54; *see also Listing Decision*, 78 Fed. Reg. at 48,950. The Court need not consider those challenges at this time.