cloud, or other file sharing system). For additional submission methods, the full EPA public comment policy, information about CBI or multimedia submissions, and general guidance on making effective comments, please visit *https://www2.epa.gov/dockets/commenting-epa-dockets.*

FOR FURTHER INFORMATION CONTACT: Heather Hamilton, Air Planning and Development Branch, U.S. Environmental Protection Agency, Region 7, 11201 Renner Boulevard, Lenexa, KS 66219 at (913) 551–7039, or by email at *hamilton.heather@epa.gov.*

SUPPLEMENTARY INFORMATION: This document proposes to take direct final action on Iowa's infrastructure SIP submissions for the 2010 SO_2 NAAQS. We have published a direct final rule approving the State's SIP revision (s) in the ''Rules and Regulations'' section of this issue of the **Federal Register**, because we view this as a noncontroversial action and anticipate no relevant adverse comment. We have explained our reasons for this action in the preamble to the direct final rule. A detailed Technical Support Document (TSD) is included in this rulemaking docket to address the following: A description of Clean Air Act section 110(a)(1) and (2) infrastructure SIPs; the applicable elements under sections 110(a)(1) and (2); EPA's approach to the review of infrastructure SIP submissions, and EPA's evaluation of how Iowa addressed the relevant elements of sections 110(a)(1) and (2). If we receive no adverse comment, we will not take further action on this proposed rule. If we receive adverse comment, we will withdraw the direct final rule and it will not take effect. We would address all public comments in any subsequent final rule based on this proposed rule. We do not intend to institute a second comment period on this action. Any parties interested in commenting must do so at this time. For further information, please see the information provided in the **ADDRESSES** section of this document.

List of Subjects in 40 CFR Part 52

Environmental protection, Air pollution control, Incorporation by reference, Intergovernmental relations, Sulfur dioxide, Reporting and recordkeeping requirements.

Dated: September 20, 2017.

Cathy Stepp,

Acting Regional Administrator, Region 7.

[FR Doc. 2017–20965 Filed 9–28–17; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2016–0030; 4500030113]

RIN 1018–BB50

Endangered and Threatened Wildlife and Plants; Withdrawal of the Proposed Rule to List Kenk's Amphipod

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule; withdrawal.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), withdraw the proposed rule to list the Kenk's amphipod (*Stygobromus kenki*), an invertebrate from the District of Columbia, Maryland, and Virginia as an endangered species under the Endangered Species Act (Act) as amended. This withdrawal is based on our conclusion that the threats to the species as identified in the proposed rule are not as significant as we previously determined and the proposed listing is not warranted. We base this conclusion on our analysis of new information concerning the results of new surveys, current and future threats, and conservation efforts. We find the best scientific and commercial data available indicate that the Kenk's amphipod does not meet the statutory definitions of an endangered or threatened species. Therefore, we are withdrawing our proposed rule to list the Kenk's amphipod as an endangered species.

DATES: The proposed rule that published on September 30, 2016 (81 FR 67270), is withdrawn on September 29, 2017.

ADDRESSES: The withdrawal of our proposed rule and supplementary documents are available on the Internet at *http://www.regulations.gov* at Docket No. FWS–R5–ES–2016–0030, and at *https://www.fws.gov/chesapeakebay/.* Comments and materials we received, as well as supporting documentation we used in the preparation of this withdrawal, are available for public inspection by appointment, during normal business hours at: U.S. Fish and Wildlife Service, Chesapeake Bay Field Office, 177 Admiral Cochrane Drive, Annapolis, MD 21401, by telephone 410–573–4577 or by facsimile 410–269–0832.

FOR FURTHER INFORMATION CONTACT: Genevieve LaRouche, Field Supervisor, U.S. Fish and Wildlife Service, Chesapeake Bay Field Office, 177 Admiral Cochrane Drive, Annapolis, MD 21401, by telephone 410–573–4577 or by facsimile 410–269–0832. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Relay Service at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Executive Summary

Why we need to publish this document. Under the Endangered Species Act (Act), if a species is determined to be an endangered or threatened species throughout all or a significant portion of its range, we are required to promptly publish a proposal in the **Federal Register** and make a determination on our proposal within 1 year. On September 30, 2016, we issued a proposed rule to add the Kenk's amphipod as an endangered species to the List of Endangered and Threatened Wildlife in title 50 of the Code of Federal Regulations (50 CFR 17.11(h)). Our proposal was based on threats due to poor water quality, erosion, and sedimentation resulting from urban runoff at the Maryland and the District of Columbia locations and the effects of small population size and climate change at all known locations (81 FR 67270). This document withdraws our proposed rule to list the Kenk's amphipod as an endangered species under the Act because we have now determined that the threats to the species are not as significant as we previously determined and additional populations have been discovered in Virginia with threats that will be reduced or eliminated through conservation measures; therefore, listing is not warranted.

The basis for our action. Under section 4(a)(1) of the Act, we can determine that a species is an endangered or threatened species based on any of five factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. We have determined that the threats to the Kenk's amphipod are not as significant and the species is more widely distributed than we previously determined and that listing is not warranted. Therefore, this document withdraws our proposed rule to list the Kenk's amphipod as an endangered species under the Act.

Peer review and public comment. We sought comments from five independent specialists to ensure that our designation is based on scientifically sound data, assumptions, and analyses. We invited these peer reviewers to comment on our listing proposal and received comments from all five. We also considered all comments and information received during the comment period.

Background

Previous Federal Actions

Please refer to the proposed listing rule for the Kenk's amphipod (81 FR 67270; September 30, 2016) for a detailed description of previous Federal actions concerning this species.

On June 7, 2017, the Department of Defense, U.S. Army Garrison, Fort A.P. Hill, finalized their revised Integrated Natural Resources Management Plan (INRMP) to include conservation measures for the Kenk's amphipod (Fort A.P. Hill 2017, pp. 5, 8, 8–56, 9–1–9–4, 9–31–9–34; Andersen 2017a, pers. comm.; Andersen 2017b pers. comm.).

Species Description

Please refer to the proposed listing rule for the Kenk's amphipod (81 FR 67270; September 30, 2016) for a detailed summary of species' information; however, we note key pieces of updated information below.

The Kenk's amphipod (*Stygobromus kenki*) is a moderately small subterranean crustacean, growing to a maximum length of approximately 0.22 inches (in) (5.5 millimeters (mm)), that can co-occur with other amphipods, such as the Potomac ground water amphipod (*S. tenuis potomacus*), Hay's spring amphipod (*S. hayi),* Tidewater amphipod (*S. indentatus*), and Rappahannock spring amphipod (*S. foliatus*). Subterranean species like the Kenk's amphipod may live for 4 to 6 years, or even longer (Foltz and Jepson 2009, p. 2; Culver 2016, pers. comm.).

Accurate identification of the Kenk's amphipod can occur only when a specimen is removed from the seepage spring site (hereafter referred interchangeably as seepage spring, seep, spring, or site depending upon the reference), and preserved in alcohol or other fixing agent for identification by a species expert who removes legs and other appendages from the specimen for microscopic examination. This identification method is the best scientific method available. Because the laboratory identification results in mortality, and the species co-occurs in at least one site with the federally listed Hay's spring amphipod, the Service has been judicious in limiting the frequency and number of specimens removed from known sites.

Habitat

Amphipods of the genus *Stygobromus* occur in ground water and ground water-related habitats (*e.g.,* caves, seeps, small springs, wells, interstices, and, rarely, deep ground water lakes). The Kenk's amphipod is found in wooded areas where ground water emerges to form seepage springs (Holsinger 1978, p. 39). More specifically, Culver and Pipan (2014, pp. 22–23) refer to this habitat as the hypotelminorheic. Hypotelminorheic is described as habitats: (1) With a perched aquifer fed by subsurface water that creates a persistent wet spot; (2) underlain by a clay or other impermeable layer typically 5 to 50 centimeters (cm) (2 to 20 in) below the surface; and (3) rich in organic matter compared with other aquatic subterranean habitats. The water supplying the springs infiltrates to the ground water from precipitation and runoff into the catchment (*e.g.,* recharge or drainage) areas. The water exits these habitats at seepage springs. The shading, hydrology, and organic matter found in these woodlands are considered important factors in maintaining suitable habitat (*i.e.,* for feeding, breeding, and sheltering) for the species.

Springs known to currently support the Kenk's amphipod are found in forested areas with moderate to steep slopes, adjacent to streams, and overlying the Wissahickon geologic formation in the Piedmont of Maryland and the District of Columbia and in the Calvert formation just above the Nanjemoy formation in the upper Coastal Plain of Virginia. The Kenk's amphipod has been found in the dead leaves or fine sediment submerged in the waters of its seepage spring outflows (Holsinger 1978, p. 130). The species will move between the surface and subterranean portions of the spring habitat, but it is unknown when or how often that movement occurs (Kavanaugh 2009, p. 3).

Our previous understanding of seepage springs drainage areas was that these springs typically drain an area of less than 10,000 square meters (2.5 acres (ac); 1 hectare (ha)). The Service contracted with the Maryland Geological Survey to delineate the recharge areas of the six Kenk's amphipod's seepage spring sites in Maryland and the District of Columbia (Burnt Mill Spring #6, East Spring, Kennedy Street Spring, Sherrill Drive Spring, Coquelin Run Spring, and Holsinger Spring) (Staley 2016, pp. 1–46; Staley 2017, pers. comm.). In addition, the Maryland Geological Survey conducted electrical resistivity surveying to determine elevations of bedrock or clay that may be perching the water table, and to detect elevation of the water table of three of the Washington metropolitan area seepage springs (Burnt Mill Spring #6, East Spring, and Kennedy Street Spring) (Staley 2016, pp. 1–46). The surface watershed area of the springs ranged from the largest area of 22,055 square meters (m^2) (237,402 square feet (ft^2) (Holsinger Spring) to the smallest of 2,345 m^2 (25,241 ft^2) (East Spring) (Staley 2016, pp. 1–46; Staley 2017, pers. comm.).

However, these watershed boundary calculations do not accurately reflect the extent and magnitude of the subsurface ground water flow to the springs, since fracture zones in the bedrock underlying the saturated zones may extend a spring's ground water source beyond the surface watershed boundaries. The saturated zones supplying water to these springs appear to extend to a depth of 10 meters (m) (32.8 ft) or more at locations near each of these springs (Staley 2016, pp. 1–46); they are underlain by bedrock or dense saprolite (material derived from weathered bedrock). This finding suggests that at some locations the ground water source for these seepage springs may not be as shallow as described by Culver and Chestnut (2006, p. 2), and could be influenced by a larger area than the surface catchment area. This finding may also mean that the Kenk's amphipod could be present at times in deeper subsurface water or in fractured portions of bedrock.

Distribution and Relative Abundance

Current Known Range and Distribution

The Kenk's amphipod has been documented from a total of 13 seepage spring sites: East Spring, Holsinger Spring, Sherrill Drive Spring and Kennedy Street Spring in Rock Creek Park, managed by the National Park Service (NPS), in the District of Columbia; Coquelin Run Spring (privately owned) and Burnt Mill Spring #6 (county owned) in Montgomery County, MD; Upper Mill #2, Mill #4, Mill #5, Mill Creek #56, Mill Creek #58, and Mount Creek #2 on the U.S. Army Garrison's Fort A.P. Hill, in Caroline County, VA; and Voorhees Nature Preserve (owned by The Nature Conservancy (TNC)) in Westmoreland County, VA (see figure 1). While we focus our analysis on the Kenk's amphipod's known sites, we consider it likely that additional springs supporting the species could be found in Virginia because a survey of only a small portion of the potential suitable habitat outside of Fort A.P. Hill resulted in the discovery of the Voorhees Nature Preserve site. Surveyors had access to only publicly owned lands; potential suitable habitat also occurs on private land. In Virginia, 77 springs inside Fort A.P. Hill and 22 springs outside of Fort A.P. Hill in 3 counties (Caroline, King George, and Westmoreland) were surveyed. Two new sites were found on Fort A.P. Hill in 2017 (Mill Creek #56 and #58) with more intensive surveys. In Maryland, no new Kenk's amphipod sites were located during more widespread surveys of suitable habitat on publicly owned lands (129 springs in 5 counties (Anne Arundel, Prince George's, Charles, Calvert, and St. Mary's) in 2017.

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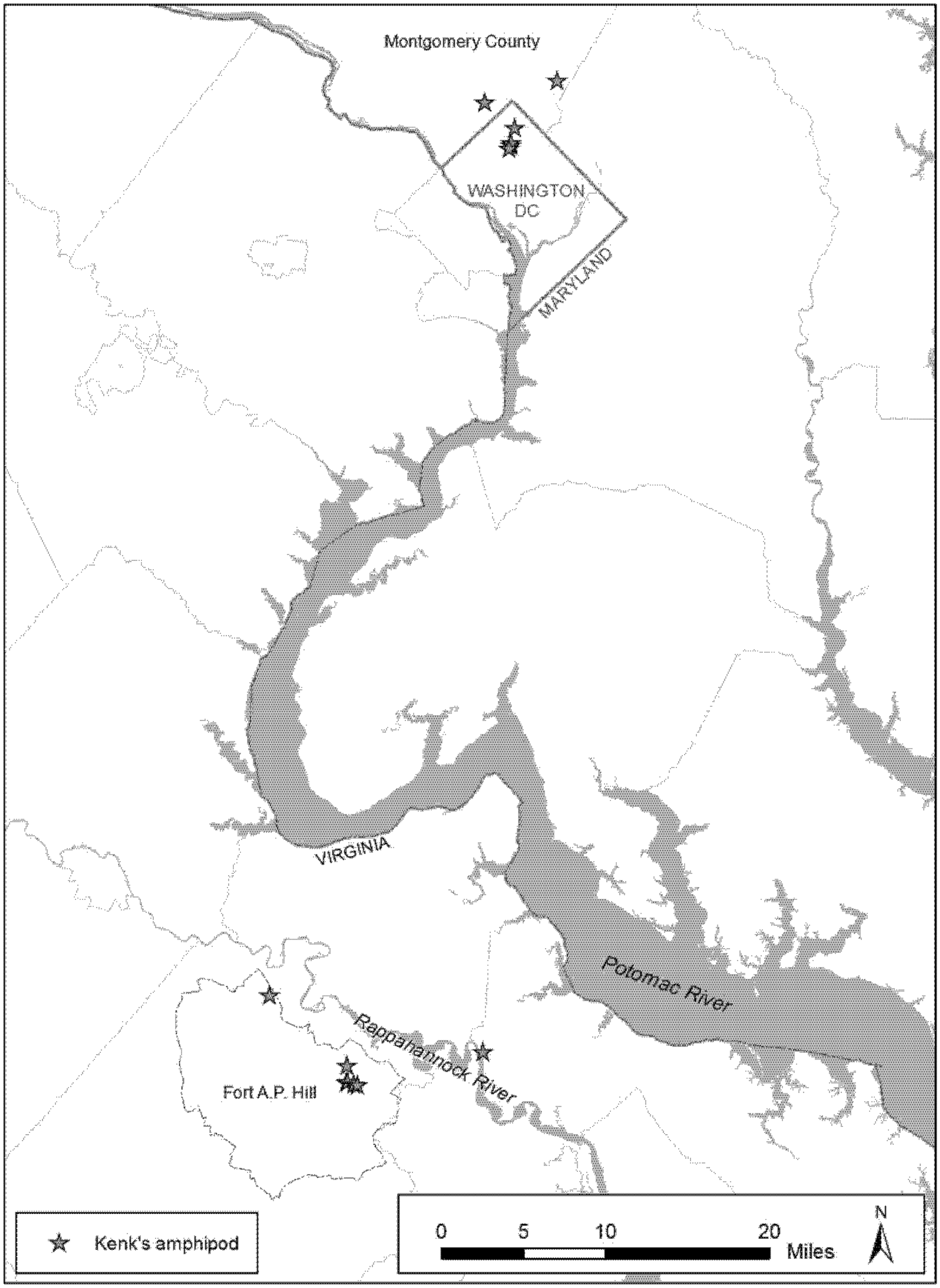

Figure 1. Distribution of the 13 known Kenk's amphipod seep sites in 2017. Due to scale, some sites are obscured by the symbols of others.

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Relative Abundance

There are no reliable total population numbers for Kenk's amphipod sites due to sampling difficulties (*e.g.,* flow conditions) and the lack of information on the portion of the population that may remain in the springs' ground water supply (Feller 2005, p. 10). However, because surveying in the Washington metropolitan area has been conducted using systematic and consistent methodology over many years, often by the same individuals, the numbers of Kenk's amphipod individuals observed and the number of conducted surveys required to find the species are considered to be the best available data and provide a reliable indication of the species' relative abundance.

The species is typically found in small numbers and then only when ground water levels are high and springs are flowing freely, conditions that cause the Kenk's amphipod to be transported to the surface. These conditions typically occur during the spring season, except during especially dry years. Given the small size of the shallow ground water aquifers supporting the sites occupied by this species, and the known characteristics of subterranean invertebrates, it is probable that each of the Kenk's amphipod populations has always been small (Hutchins and Culver 2008, pp. 3–6).

Although specimens were not collected and identified to the species level, *Stygobromus sp.,* including some in the right size range for the Kenk's amphipod, were observed during site reconnaissance visits between 2004 and 2012 in several of the known Kenk's amphipod Washington metropolitan area spring habitats (Yeaman 2012, pers. comm.). In addition, visual inspections during this same time period indicated that most of the sites continued to appear to be suitable habitat, leading us to conclude that the Kenk's amphipod was extant at least at Burnt Mill Spring #6, Kennedy Street Spring, and East Spring (Feller 2015, pers. comm.). However, actual identifications of specimens collected during surveys conducted in 2015 and 2016 (Feller 2016b, pers. comm.) did not result in Kenk's amphipod being found (see below).

Prior to 2015, all Kenk's amphipod specimens were discovered on the first or second survey conducted at all known sites. In 2015 and 2016, the Kenk's amphipod was confirmed at only one of the Washington metropolitan area spring sites, Coquelin Run Spring, despite all of the sites being sampled multiple times during these 2 years (see table 1 below) (Feller 2016b, pers. comm.; Feller 2016c, pers. comm.). Additionally, an environmental DNA (eDNA) study was conducted in 2016 (Niemiller *et al.* 2016, pp. 1–7) for several amphipod species, including the Kenk's amphipod, to determine potential presence of the species in springs in the Rock Creek watershed.

Individual Kenk's amphipods were collected from Fort A.P. Hill for DNA sequencing since no individuals could be found in the Washington metropolitan area at the time (spring/summer 2016) comparative samples were required for the study (Niemiller *et al.* 2016, p. 2). Water tested in the Washington metropolitan area did not detect the Kenk's amphipod eDNA (Niemiller *et al.* 2016, p. 6). However, we cannot conclude that Kenk's amphipods were absent at those sites. The abundance of the Kenk's amphipod may not be high enough in the springs to amplify DNA in the water samples, or the DNA from the Fort A.P. Hill animals may be different enough from the Washington metropolitan area animals to not be detected in the Rock Creek water samples. Therefore, it is unclear without additional survey effort whether the species may be extirpated at Burnt Mill Spring #6, Kennedy Street Spring, and East Spring, although the best available data show a decrease in observed individuals at these sites (see table 1).

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Table 1. Survey results for the Kenk's amphipod.

Site Name (owner)	1960s			1990s		2000 to 2006						Current			
	1966	1967	1968	1994	1995	2000	2001	2003	2004	2005	2006	2014	2015	2016	2017
East Spring (NPS)	1 of 1 (3)	5 of 5 (3 to 21)	1 of 1 (1)	0 of 2*	0 of 1*	0 of 1	2 of 3 (1 and 2)	N/A	N/A	N/A	N/A	N/A	0 of 3	0 of 4	N/A
Holsinger Spring (NPS)	N/A	1 of 1 (24)	N/A	N/A	N/A	N/A	N/A	0 of 1	N/A	N/A	N/A	N/A	0 of 3	N/A	N/A
Sherrill Drive Spring (NPS)	N/A	N/A	N/A	0 of 1	1 of 2 (3)	0 of 1	1 of 2 (1)	0 of 1	N/A	N/A	N/A	N/A	0 of 3	0 of 4	N/A
Kennedy Street Spring (NPS)	N/A	N/A	N/A	N/A	N/A	N/A	1 of 2 (1)	0 of 1	N/A	N/A	N/A	N/A	N/A	0 of 4	N/A
Coquelin Run Spring (Private)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 of 1 (2)	1 of 1 (2)	N/A	N/A	N/A	1 of 4 (1)	N/A
Burnt Mill Spring #6 (County Park)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 of 1 (5)	0 of 1	N/A	0 of 3	0 of 6	0 of 2
Upper Mill Creek #2 (DoD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 of 4 (1)	N/A	N/A	1 of 1 (6)
Mill Creek #4 (DoD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 of 6 (1)	N/A	N/A	1 of 1 (1)
Mill Creek #5 (DoD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2 of 7 (4)	N/A	N/A	N/A
Mill Creek #56 (DoD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 of 1 (16)
Mill Creek #59 (DoD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 of 1 (8)
Mount Creek #2 (DoD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2 of 6 (1)	N/A	N/A	1 of 1 (4)
Voorhees Nature Preserve (TNC)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1 of 1 (1)

*Individuals in the size range of the Kenk's amphipod were observed but not collected for verification (Feller 1997). The first pair of numbers (e.g., "1 of 2") indicates the number of site visits where the species was detected compared to the total number of site visits that year. The numbers in parenthesis "()" are the total number of Kenk's amphipods collected. The N/A indicates no surveys were conducted at the site in that year.

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Summary of Comments and Recommendations

In the proposed rule published on September 30, 2016 (81 FR 67270), we requested that all interested parties submit written comments on the proposal by November 29, 2016. We also contacted appropriate Federal and State agencies, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. A newspaper notice inviting general public comment was published in USA Today on October 5, 2016. We did not receive any requests for a public hearing.

During the 60-day public comment period (September 30, 2016, to November 29, 2016), we received public comments from 10 individuals or organizations. Of these, seven were from individuals, including five peer reviewers, one was from a Federal agency, and two were from nongovernmental organizations (NGOs). All the commenters were generally supportive of the proposed listing, but only 8 of the 10 provided substantive information. All substantive information provided during the comment period is summarized below and has either been incorporated directly into this final determination or is addressed in the response to comments below.

Comments From Peer Reviewers

(1) *Comment:* Two peer reviewers agree with us that few if any studies exist that specifically examine critical thresholds for flow, water permanence, nutrient or contaminant loading, or the tolerance of close relatives of the Kenk's amphipod to pollutants and toxicants. One of the reviewers suggests that additional studies conducted on the basic biology and population size of the Kenk's amphipod would be helpful, noting that the more common and widespread Potomac ground water amphipod could be used as a surrogate species.

Our Response: The Act requires that the Service make listing determinations based solely on the best scientific and commercial data available. When we published the proposed rule on September 30, 2016 (81 FR 67270), we relied on the best quantitative and qualitative data available at that time to assess the Kenk's amphipod's status.

(2) *Comment:* One peer reviewer states that the proposed listing underestimates the potential effect due to urbanization stress for the Washington metropolitan area populations, given the species' isolated populations. More specifically, this reviewer indicates that our analysis contained insufficient discussion of increased conductivity (salinity) and that the risk from potential sewage leakage may have been underestimated, in part because we did not consider that, in addition to increasing conductivity and nutrient loading, sewage leaks include ''pharmaceuticals, personal care products, and home-use chemicals that even at very low levels can disrupt endocrine and immune systems.'' Another peer reviewer provided additional references on several studies in the Rock Creek watershed showing the occurrence of pesticides, organic wastewater compounds, and metals in surface water and bed sediment that may be related to the degradation of habitat (Anderson *et al.* 2002; Miller *et al.* 2006; Koterba *et al.* 2010; Phelan and Miller 2010).

Our Response: See the Factor A section below addressing *Water Quality/Quantity Degradation Due to Chronic Pollution of Urban/Suburban Runoff* for added discussion regarding the effects of conductivity and the presence of pharmaceuticals, personal care products, and home-use chemicals from sewer leaks. Additional references on several studies in the Rock Creek watershed showing the occurrence of pesticides, organic wastewater compounds, and metals in surface water and bed sediment that may be related to the degradation of habitat were also added to the final determination.

(3) *Comment:* One peer reviewer states that existing regulatory mechanisms are inadequate to address issues related to Factor A and that this is largely because many of the recharge areas for the seepage springs in the Washington metropolitan area extend outside the jurisdiction of Federal agencies.

Our Response: Many of these seepage springs have recharge areas extending into private lands where Federal agencies have little jurisdiction. While the existing regulatory mechanisms do not fully ameliorate the stressors affecting the species' sites in the Washington metropolitan area, we have concluded that those stressors do not rise to the level of the species being warranted for listing as an endangered or threatened species (See the *Summary of Factor A* and *Kenk's Amphipod Determination of Status Throughout All of Its Range* sections below).

(4) *Comment:* One peer reviewer states that the proposed rule underestimates the potential threat of warming of the shallow ground water habitats supporting this amphipod ''because the impacts of pollutants on Kenk's amphipod may likely be compounded by even a slight increase in water temperature due to a potential increase of uptake of pollutants in concert with increased metabolic activities.''

Our Response: We have included additional language in the final determination indicating the effects of increased water temperature on the uptake and metabolism of pollutants—see Factor E, *Effects of Climate Change.*

(5) *Comment:* Two peer reviewers comment on the threat of small population dynamics and indicate that the proposed rule was missing a discussion about metapopulation structure. One reviewer states that the assumption of small population size and genetic isolation among Kenk's amphipod populations is untested and that some analyses of DNA sequence information will shed light on the species' metapopulation structure and the potential for migration of individuals among sites. The second reviewer states that many animal and plant species exist in low population numbers, but possess adequate levels of genetic diversity to maintain their populations. This reviewer also states that because the species' ability to move between sites is considered low or perhaps nonexistent in the opinion of species experts, as discussed in the proposed rule, the Kenk's amphipod may represent isolated populations with little potential for either recolonization or colonization of suitable habitat.

Our Response: While we agree that the assumption of small population size and genetic isolation among Kenk's amphipod populations is untested, the best available data indicate that the effect of small population dynamics may be contributing to the species' viability, particularly in the Washington metropolitan area. Additionally, it is difficult to study the DNA sequences of Kenk's amphipods at any sites other than Fort A.P. Hill sites, given the paucity of individuals collected and the preservation method used to store the collected individuals.

Comments From the Public

(6) *Comment:* One commenter considers the discussion of stressors incomplete because it does not include the ''mounting circumstantial evidence that seep-inhabiting *Stygobromus* are susceptible to changes in the forest canopy and understory.'' This commenter also suggests that the species' very shallow ground water sites are in some ways more connected to the forest floor than to base-level streams.

Our Response: We have added an assessment of potential activities that could change the forest canopy and understory in Factor A under *Other*

Habitat Considerations. This issue was not mentioned in the proposed rule because it had not been identified as occurring at any of the known Kenk's amphipod sites.

(7) *Comment:* One commenter, familiar with the management of Fort A.P. Hill, provided additional information about the identity of two springs, the level of stressors/threats to the Kenk's amphipod at the installation, and how the species would be addressed under the Sikes Act.

Our Response: We have revised the final determination, as appropriate, to reflect these comments. The Service appreciates the cooperation of the Army and looks forward to working with them to protect this species and its habitat on Fort A.P. Hill.

(8) *Comment:* One commenter indicates that a number of projects pose threats to the species such that the species warrants listing and that reinitiation of conferencing under section 7(a)(4) of the Act is appropriate. This commenter provides multiple documents supporting their position; however, only one document was new information—the final report on the *Stygobromus* eDNA study.

Our Response: Section 7 consultations under the Act are outside the scope of this final listing determination. However, to the extent that it is relevant here, we note that we completed the appropriate level of consultation on the projects and concluded that there would be no effect to the Kenk's amphipod or its habitat. All of the commenter's supporting information, with the exception of their proposed rule comment letter and the new eDNA report referenced above, were included in our earlier consultations. Our subsequent review of the eDNA report, as part of the analysis for this final listing determination, finds that the report provides no evidence to support the commenter's position because no Kenk's amphipod DNA was detected in any of the action areas related to the consultations.

(9) *Comment:* One commenter states that susceptibility of Kenk's amphipod sites to destruction by hikers on social trails near the seeps should be more fully discussed. The commenter also indicated that the NPS has taken no affirmative, proactive steps to divert hikers and other recreational traffic away from these seeps.

Our Response: There is no evidence that the occasional use of social trails has had any effect on the Kenk's amphipod or caused any disturbance to the seep habitat. While the NPS has not found a practical way to close most social trails, they have taken steps to prevent designated trails from being built in areas that could affect the Hay's Spring or Kenk's amphipods.

(10) *Comment:* One commenter raises concerns with the Service's and NPS's compliance with section 7 of the Act and with NPS's implementation of Rock Creek Enabling Legislation.

Our Response: The Service and NPS have met our respective section 7 regulatory obligations for the Hay's Spring and Kenk's amphipods (see the *Water Quality/Quantity Degradation Due to Chronic Pollution of Urban/Suburban Runoff* section of the proposed rule (81 FR 67270, September 30, 2016) and the Candidate Notices of Review (75 FR 69222, November 10, 2010; 76 FR 66370, October 26, 2011; 77 FR 69994, November 21, 2012; 78 FR 70104, November 22, 2013; 79 FR 72450, December 5, 2014; 80 FR 80584, December 24, 2015).

(11) *Comment:* One commenter indicates that the proposed rule should more fully discuss agencies' failure to clean up water pollution in the Rock Creek watershed, specifically citing NPS's use of pesticides and the District of Columbia government's and NPS's use of road salt in the watershed.

Our Response: We analyzed the use of pesticides in Rock Creek Park and determined that dimilin, which can be toxic to crustaceans, is not being used in the park. Other pesticides that may be toxic to amphipods are used on the Rock Creek Park Golf Course, but because the golf course is not within the recharge areas for the seepage springs known to support the Kenk's amphipod, this activity is not considered a stressor for the species. The NPS has limited or discontinued the use of road salts at some locations, including Sherrill Drive, Ross Drive, Morrow Drive, and Ridge Road, where this practice might be a problem for the Hay's Spring or Kenk's amphipods (Bartolomeo 2017, pers. comm.). The use of road salts may affect one or more locations and we have added additional discussion on this topic in the final listing determination (see Factor A, *Water Quality/Quantity Degradation Due to Chronic Pollution of Urban/Suburban Runoff*).

(12) *Comment:* One commenter questioned the rationale behind being able to collect up to 10 specimens for scientific collection.

Our Response: The majority of amphipods collected at sites are the more common species, *S. tenuis.* However, the Service has allowed larger numbers to be collected during 2016 surveys in the Washington metropolitan area because none of the specimens of appropriate size collected in the 2015 surveys have been identified to be the Kenk's amphipod. These protocols are followed to minimize effects to the species. Because the occurrence of subterranean invertebrates at spring emergence sites likely represents only a portion of the actual underground population, the Service has considered the collecting procedures (Feller 1997, p. 2) to be nondetrimental to the populations.

Summary of Changes From the Proposed Rule

Based upon our review of the public comments, comments from other Federal and State agencies, peer review comments, and new relevant information that has become available since the publication of the proposal, we have reevaluated our proposed listing rule and made changes as appropriate. This document differs from the proposal in the following ways:

(1) Based on our analyses of the potential threats to the Kenk's amphipod and additional survey data obtained in 2017, we have determined that the species no longer meets the definition of a threatened or an endangered species. This document withdraws our proposed rule as published on September 30, 2016 (81 FR 67270).

(2) We have added a discussion of Ongoing and Future Conservation Efforts below. Fort A.P. Hill's INRMP (Fort A.P. Hill 2017, entire) is discussed in this section.

(3) We have incorporated: (a) A more detailed impervious cover analysis using the Watershed Boundary Dataset (U.S. Geological Survey (USGS) 2014a, entire) and the 2011 National Land Cover Dataset (USGS 2014b, entire); (b) reference to an eDNA study conducted in 2016 (Niemiller *et al.* 2016, pp. 1–7); (c) reference to a hydrogeology electrical resistivity study conducted in 2016 that improves our understanding of the surface catchment area and the subsurface area surrounding the Kenk's amphipod sites (Staley 2016, pp. 1–46); (d) water quality sampling results conducted in 2016 and 2017 by the Service; and (e) results from suitable habitat surveys conducted in 2017.

Ongoing and Future Conservation Efforts

Below we review conservation efforts for the Kenk's amphipod, including those in Fort A.P. Hill's recently revised INRMP. In our proposed rule, we described the conservation efforts that are already occurring or were planned to occur in the Washington metropolitan area; and there are no changes to this information based on peer review and public comments. We have also completed an analysis of the newly initiated conservation efforts at Fort A.P. Hill pursuant to our Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE) (68 FR 15100, March 28, 2003).

Based on information provided in our proposed rule, Fort A.P. Hill revised its existing INRMP in 2017 to include the Kenk's amphipod and established conservation measures (*i.e.,* expanded buffer areas) to address the identified threats (Fort A.P. Hill 2017, p. 9–32). The INRMP includes the most recent Kenk's amphipod survey information and establishes conservation areas that will be managed with limited surface disturbance and avoidance buffers (Fort A.P. Hill 2017, pp. 9–32 to 9–34), as further described below. In addition, Fort A.P. Hill has agreed to include expanded buffer areas around any future new locations of the species. The INRMP will be revised as part of the next annual review process to reflect that continued implementation of buffers would be subject to mission requirements (Andersen 2017b, pers. comm.). The INRMP is comprehensively updated every 5 years, with review and minor amendments occurring annually. More significant updates will occur if and when new biological information becomes available or if Fort A.P. Hill's mission requirements change. The expanded buffer areas for the Kenk's amphipod designated in the INRMP are designed to maintain the species' redundancy, resiliency, and representation on Fort A.P. Hill, thus significantly contributing to the species' viability (see table 3 and the Cumulative Effects section below).

Fort A.P. Hill consists of 76,000 acres (30,756 ha) of land with 65,000 acres (26,304 ha) of forest (Fort A.P. Hill 2017, p. 2–1). The mission of the base is to ensure soldiers are fully prepared to fight and win the Nation's wars (Fort A.P. Hill 2017, p. 12–2). Currently, 98 percent of the base is undeveloped operational training lands. Training occurs year round for both active and reserve troops of the different branches of the military (Fort A.P. Hill 2017, pp. 2–2 to 2–3).

Management buffers are established around Kenk's amphipod seeps to ensure the integrity of surficial habitats and water quality from potential impacts associated with land disturbance activities. Buffers are site specific and are determined based on the size of the seep area, surrounding terrain, hydrology, and contiguity of surrounding habitats. The buffer areas for each seep generally exceed 200 ft (0.06 kilometers (km)) all around, ranging in size from 1 to 6 acres (0.40 to 2.43 ha) (average buffer area is approximately 2.3 acres (0.93 ha)). These buffers are also complemented by protections afforded to each site by adjacent wetlands and the undulating terrain of the surrounding landscape that provide additional habitat protections from disturbance activities. Within the buffers, land-disturbing activities (*e.g.,* construction, land management (including pesticide application)) and ground-water-disturbing activities (*e.g.,* drilling wells) are prohibited unless Fort A.P. Hill coordinates with the Service to determine ways to minimize impacts to the Kenk's amphipod (Fort A.P. Hill 2017, pp. 9–32 to 9–33).

All mounted military training maneuvers (*i.e.,* those using tracked and wheeled vehicles) are restricted to established roads and designated open areas throughout the installation, and all tactical and nontactical vehicles must also use established stream crossings. Dismounted military maneuvers (*i.e.,* those on foot) occur throughout the installation, including the training areas where Kenk's amphipod seeps occur. Kenk's amphipod seeps occur in the most undeveloped portion of the installation surrounded by an abundance of natural habitats characterized by rolling and often steep terrain. The seeps themselves where the Kenk's amphipod has been found represent an exceptionally small fraction (0.00005 percent) of the training lands and are typically less often used for military training than other areas due to their isolated nature. Soldiers are precluded from bivouacking (*i.e.,* camping) or digging within the buffer areas. Maps denoting the location of Kenk's amphipod buffer areas are provided to Range Operations for the scheduling and coordination of training activities in these areas. No military training operations occur in Kenk's amphipod seep areas or buffers that use petroleum operations (*e.g.,* transport, storage, and handling) or chemical training (Fort A.P. Hill 2017, p. 9–33).

Dirt and gravel trails are the primary transportation routes throughout the training areas where Kenk's amphipod seeps can be found. Tactical and nontactical vehicle traffic on these trails is intermittent and is typically of low duration and intensity. The trails do not get chemically treated in the winter months nor are these trails designated for or used as transportation routes for industrial hazardous materials (*i.e.,* tanker trucks). Routine recurring maintenance activities regularly conducted on installation trails include tree limbing, surface grading, application of surface material and surface and ditch stabilization. These types of maintenance activities occur as needed on these already established trails within the buffers to ensure safe access to military lands. Stabilization activities are the only type of maintenance activity that requires the application of erosion and sediment control procedures. Where stabilization of trails is required within Kenk's amphipod buffers, stabilization efforts shall be in compliance with Virginia Erosion and Sediment Control procedures (VDEQ 1992). Of the six known Kenk's amphipod sites, only two have trails within them, and these trails constitute only 1.8 mi (2.89 km) (0.3 percent of total trail miles), half of which is closed to through traffic. Trail maintenance activities are anticipated to occur on trails within Kenk's amphipod buffers less than once every 5 years. Large-scale trail improvements (*e.g.,* culvert installation/replacement, trail widening) within Kenk's amphipod buffers would require discussion with the Service to minimize impacts to the species and its habitat (Fort A.P. Hill 2017, pp. 9–32 to–9–33).

At Fort A.P. Hill, forest management activities, including timber harvest and controlled burns, occur throughout much of the facility, including areas along Mill Creek and Mount Creek supporting Kenk's amphipod sites. No land-disturbance activities such as forest management or vegetation/habitat management will be conducted within established buffers without discussion with the Service. The seeps also occur in the non-live-fire portion of the base, meaning that wildfires are significantly less of a threat to the species or its habitat because no live rounds are used in those areas that can serve as ignition sources (Applegate 2016, pers. comm.). Additionally, when prescribed burns are used in areas adjacent to the seeps, Fort A.P. Hill will keep fire out of the buffers to the extent practicable. If a fire entered a buffer, Fort A.P. Hill would document any impacts to the buffers and the seeps (Andersen 2017c, pers. comm.).

Recreational activities are allowed within Kenk's amphipod buffer areas because installation regulations provide sufficient protections to ensure the conservation of the species. Hunting is the only recreational activity authorized in areas where three of the known Kenk's amphipod sites occur. However, strict hunting regulations severely limit the numbers of hunters allowed in an area at any given time and restrict the timing and duration for hunting. Consequently, Fort A.P. Hill is only available for hunting less than 16 percent of the year. The Kenk's amphipod sites are unlikely to experience adverse effects from hunting given: The limited availability of the Fort A.P. Hill landscape to hunting by the public in general; regulations prohibiting hunters from camping, digging, or using any motorized transportation (*e.g.,* all-terrain vehicles, utility-terrain vehicles); that the Kenk's amphipod buffers and seep areas represent an exceptionally small amount (0.014 percent and 0.00005 percent) of the huntable areas of Fort A.P. Hill, respectively; and seeps and streams are typically avoided by hunters due to the difficulty in traversing them and the adjacent slopes. Fort A.P. Hill has offered public hunting opportunities for decades, and there has not been any evidence of adverse impacts observed at any stream, seep, or wetland to date, including the known Kenk's amphipod sites (Fort A.P. Hill 2017, p. 9–34).

Fort A.P. Hill has agreed to continued commitment to the conservation measures (buffers) identified in the 2017 INRMP regardless of the Kenk's amphipod Federal listing status, pending any currently unknown change in mission requirements (Andersen 2017a, pers. comm.). However, should the species not warrant listing under the Act, some monitoring efforts for the species could be reduced (Andersen 2017a, pers. comm.; Andersen 2017b pers. comm.).

Based on past and current primary uses of the base (forest management, recreational use, and military maneuvers), the acreage of the base, the limited area occupied by the species, including the buffers, and the habitat characteristics (mature forest on steep or rolling topography, and often adjacent to wetland areas), and the location of the seep sites (*e.g.,* on isolated areas of the base), the Service concludes that there is a low risk of sites being adversely affected even if mission requirements changed.

The INRMP would result in the protection of 6 out of the 13 (46 percent) known Kenk's amphipod locations.

PECE Analysis

The purpose of PECE is to ensure consistent and adequate evaluation of recently formalized conservation efforts when making listing decisions. The policy provides guidance on how to evaluate conservation efforts that have not yet been implemented or have not yet demonstrated effectiveness. The evaluation focuses on the certainty that the conservation efforts will be implemented and the certainty that the conservation efforts will be effective. The policy presents nine criteria for evaluating the certainty of implementation and six criteria for evaluating the certainty of effectiveness for conservation efforts. The certainty of implementation and the effectiveness of a formalized conservation effort may also depend on species-specific, habitat-specific, location-specific, and effort-specific factors. These criteria are not considered comprehensive evaluation criteria; we consider all appropriate factors in evaluating formalized conservation efforts. The specific circumstances will also determine the amount of information necessary to satisfy these criteria.

To consider that a formalized conservation effort contributes to forming a basis for not listing a species, or listing a species as threatened rather than endangered, we must find that the conservation effort is sufficiently certain to be (1) implemented, and (2) effective, so as to have contributed to the elimination or adequate reduction of one or more threats to the species identified through the section 4(a)(1) analysis. The elimination or adequate reduction of section 4(a)(1) threats may lead to a determination that the species does not meet the definition of threatened or endangered, or is threatened rather than endangered. An agreement or plan may contain numerous conservation efforts, not all of which are sufficiently certain to be implemented and effective. Those conservation efforts that are not sufficiently certain to be implemented and effective cannot contribute to a determination that listing is unnecessary, or a determination to list as threatened rather than endangered. Regardless of the adoption of a conservation agreement or plan, however, if the best available scientific and commercial data indicate that the species meets the definition of an ''endangered species'' or a ''threatened species'' on the day of the listing decision, then we must proceed with appropriate rulemaking activity under section 4 of the Act. Further, it is important to note that a conservation plan is not required to have absolute certainty of implementation and effectiveness in order to contribute to a listing determination. Rather, we need to be certain that the conservation efforts will be implemented and effective such that the threats to the species are reduced or eliminated.

Using the criteria in PECE (68 FR 15100, March 28, 2003), we evaluated the certainty of implementation (for those measures not already implemented) and effectiveness of conservation measures in the 2017 Fort A.P. Hill INRMP pertaining to the Kenk's amphipod. We determined that the measures will be effective at eliminating or reducing threats to the species because they protect currently occupied, and any future occupied, seeps and their catchment areas from removal of forest canopy and the effects of poor water quality, erosion, and sedimentation, by instituting on-the-ground protections to better manage and regulate disturbance in the species' occupied habitat. For example, two of the sites are in an area where timber harvest and prescribed burns were scheduled to occur within the next 5 years, but will not be subjected to those management actions, pending any currently unknown change in mission requirements, due to the expanded buffer areas implemented around the Kenk's amphipod sites (see below).

We have a high degree of certainty that the measures will be implemented because Fort A.P. Hill has a track record of being good environmental stewards for the past 76 years since the base was established, and, more specifically, a track record of implementing conservation measures for federally listed species and species of concern since 1997 through their INRMPs. For example, Fort A.P. Hill has effectively implemented conservation measures specified in their INRMP for the Rappahannock spring amphipod (*Stygobromus foliatus*), a Department of Defense species at risk, including surveying its population and implementing avoidance buffers from ground-disturbing activities on the installation. In addition, during the spring of 2017, Fort A.P. Hill allowed access to its facility for amphipod surveys in potential suitable habitat.

New conservation measures are prescribed by the 2017 INRMP for the Kenk's amphipod and are already being implemented, including expanded buffer areas. The 2017 INRMP has sufficient monitoring and reporting requirements to ensure that the conservation measures we deem necessary are implemented as planned, and are effective at removing threats to the Kenk's amphipod and its habitat. As specified above, the INRMP may be modified to reflect changes in mission requirements. Despite this provision, we believe that the site conditions at Fort A.P. Hill will continue to be adequate to conserve the Kenk's amphipod, and Fort A.P. Hill will discuss with the Service any changes in mission requirements that would affect the Kenk's amphipod and its habitat.

Collaboration between the Service, Fort A.P. Hill, and Virginia Department of Game & Inland Fisheries previously occurred during development of the INRMP and continues to occur via discussions pertaining to implementation throughout the year that are documented through electronic mail correspondence and telephone calls (Hoskin 2017, pers. comm.). This ongoing coordination and collaboration ensures that the conservation measures identified in the INRMP for all Federal and State listed species and species of concern are implemented. Based on Fort A.P. Hill's implementation of previous conservation efforts as specified in its INRMP, we have a high level of certainty that the conservation measures in the 2017 INRMP will be implemented and effective, and thus they can be considered as part of the basis for our final listing determination for the Kenk's amphipod. Our detailed PECE analysis is available for review at *http://www.regulations.gov* and *https://www.fws.gov/chesapeakebay/.*

Summary of Biological Status and Threats

Please refer to the proposed listing rule for the Kenk's amphipod (81 FR 67270; September 30, 2016) for a detailed description of the factors affecting the species, which are summarized and updated as appropriate below.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Water Quality/Quantity Degradation Due to Chronic Pollution of Urban/Suburban Runoff

Habitat modification, in the form of degraded water quality and quantity, is one of the primary drivers of Kenk's amphipod viability. While the species' specific tolerances to parameters affecting water quality and quantity is not yet known, we do know that the Kenk's amphipod is at increased risk to parameters that negatively affect water quality and quantity because these freshwater amphipods spend their entire life cycle in water and are, therefore, continually exposed to changes in the aquatic habitat. Water quality degradation of ground water at spring sites located in the Washington metropolitan area has been previously cited as a top concern in several studies and reports (Feller 1997, pp. 12–13; Culver and Sereg 2004, p. 13; Feller 2005, p. 9; Hutchins and Culver 2008, p. 6; Kavanaugh 2009, p. 60; Culver *et al.* 2012, p. 37; Culver and Pipan 2014, p. 219).

The amount of forested buffer surrounding the seep influences the species' vulnerability and exposure to negative effects, and the smaller the buffer, the greater the risk of exposure. Buffer distance is important because the buffer helps filter sediment and other contaminants from the surface water entering the catchment areas and, therefore, the ground water that supports the Kenk's amphipod. The Washington metropolitan area amphipod sites have narrow riparian buffers (94 ft to 1,000 ft) (29 m to 305 m) separating them from the surrounding urban landscape. This urban land is characterized by impervious surface cover, which includes paved roads, sidewalks, parking lots, and buildings (Sexton *et al.* 2013, p. 42).

An impervious cover analysis was conducted by the Service within the watersheds occupied by the Kenk's amphipod.

We calculated the overall average value (percentage) for each watershed identified. We also identified three categories of impervious cover: (1) 0 percent impervious cover, (2) 1 to 15 percent impervious cover, and (3) greater than (>) 15 percent impervious cover. For each watershed, we then calculated the percentage of area that fell into each of these three categories. These percentages are presented in Table 2.

TABLE 2—IMPERVIOUS COVER ESTIMATES

Amphipod species (total number of sites)	Watershed	Number of amphipod sites	Categories of impervious cover (IC) percentage			Average impervious cover (IC) percentage
			0% IC	1–15% IC	>15% IC	
Stygobromus kenki (12)	Lower Rock Creek	5	17	24	59	83
	Northwest Branch	1	28	27	45	72
	Mount Creek	1	92	6	2	8
	Mill Creek	3	93	5	2	7

* Vorhees Nature Preserve was not evaluated.

The four watersheds within the Kenk's amphipod's range have overall impervious cover estimates ranging from approximately 7 percent (Mill Creek in Virginia) to 83 percent (Lower Rock Creek in the District of Columbia and Montgomery County, MD). Although the data for this level of the impervious cover analysis were derived using the finest scale hydrologic units available in the National Land Cover dataset, they do not reference the exact location of the Kenk's amphipod spring sites in relation to the location of impervious cover within the watersheds because the spring sites and their catchment areas are at a smaller scale. Additionally, because the data are from 2011, there could be more impervious cover present than indicated in our analysis. However, by looking at aerial photographs from 1988 and 2014 of the areas surrounding the spring sites in the Washington metropolitan area, there has been little change in the amount of development; therefore, we determined that the estimates of impervious cover derived from the 2011 dataset are sufficiently accurate for our analysis.

To provide a general indication of how much impervious cover may be influencing surface water quality at individual sites, we created maps with the individual sites included within the impervious cover data layers (see Supplemental Document—*Maps of Impervious cover in relation to spring sites in the Washington metropolitan areas* and *Impervious cover in relation to spring sites in Virginia*).

Urban impervious surfaces can result in increased surface water flow after storm events due to decreased opportunity for immediate or proximal infiltration. The surface flow waters have higher temperatures, higher sediment loads, and higher levels of heavy metals (zinc, cadmium), nitrogen, phosphorus, and fecal coliform bacteria (Walsh *et al.* 2005, pp. 706–723). In addition to affecting water quality, urban impervious surfaces can affect water quantity; decreased infiltration can result in depletion of ground water reserves and ultimately cause springs to dry up over time (Frazer 2005, p. 3).

When the average impervious cover is between 10 and 15 percent within a watershed, sharp declines in aquatic habitat quality and aquatic insect diversity are likely to occur, while the number of pollution-tolerant species increase (Schueler 1994, pp. 100–102; Boward *et al.* 1999, p. 45; Center for Watershed Protection 2003, pp. 101–102 (synthesis of 30 studies)). More recently, declines of 110 of 238 macroinvertebrate taxa were found in streams receiving runoff water from areas that contained between 0.5 to 2 percent of impervious cover (King *et al.* 2011, pp. 1659–1675). These results were consistent among the three physiographic regions evaluated (Mountain, Piedmont, and Coastal Plain); the Piedmont region includes the Washington metropolitan area amphipod sites. Further, higher gradient, smaller catchments such as those supporting sites occupied by the Kenk's amphipod required less impervious cover than lower gradient, larger catchments to elicit a macroinvertebrate community response (*i.e.,* the macroinvertebrate taxa from steeper sloped, smaller catchment areas showed a decline in response to relatively small amounts of impervious cover) (King *et al.* 2011, pp. 1659–1676). This finding is relevant, given that the results of our impervious cover analysis indicate that Kenk's amphipod sites are located within areas containing 7 to 83 percent impervious cover (see table 2).

The hypotelminorheic zone, the main habitat required by the Kenk's amphipod, may be more vulnerable to the effects of urban runoff than streams with respect to pollutants, erosion, and sedimentation because of the small size and shallow nature of the habitat. In addition, the aforementioned narrow buffer zones around the hypotelminorheic sites increase the habitat's and species' exposure to urban runoff.

Poor water quality parameters have been documented by the USGS through chemical analyses of ground water, surface water, and sediments in the Rock Creek watershed (Anderson *et al.,* 2002, pp. 1–99; Miller *et al.* 2006, pp. 1–48; Koterba *et al.* 2010, pp. 1–102; Phelan and Miller 2010, pp. 1–80). For example, five pesticides (carbaryl, chlorpyrifos, diazinon, dieldrin, and malathion) were detected in Rock Creek Park water samples at concentrations that exceed aquatic life water quality criteria (Anderson *et al.* 2002, p. 44). Furthermore, Rock Creek sediments contained polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), organochlorine pesticides, and toxic metals at concentrations that approached and exceeded guidelines for the protection of aquatic life (Miller *et al.* 2006, p. 21). In a 2008 study at five stream locations in Rock Creek Park, pharmaceuticals, pesticides, fragrances, flame retardants, detergents, and sterols were detected and attributed to low-level sources of wastewater entering the streams (Phelan and Miller 2010, pp. 37, 40–41).

In the Washington metropolitan area, water quality degradation from urban runoff is the greatest concern for the Kenk's amphipod at the Sherrill Drive Spring location (Culver and Sereg 2004, p. 69). Sherrill Drive Spring is close (approximately 115 ft (35 m)) to the edge of Rock Creek Park where there is an abrupt change from forested habitat to an urban landscape along 16th Street Northwest, which parallels the park boundary. A significant amount of impervious cover routes runoff into the catchment area surrounding the Sherrill Drive Spring.

While there have been no laboratory studies conducted to evaluate the effects and tolerance of the Kenk's amphipod or *Stygobromus tenuis* to chemical, nutrient, pesticide, or metal pollution, we know from published studies that amphipods may be one of the most vulnerable groups of organisms to chemical pollution due to their high sensitivity to toxicants and contaminant accumulation (Borgmann *et al.* 1989, p. 756; Brumec-Turc 1989, p. 40). Sediment samples surrounding the springs were collected in September 2001 at East Spring and Sherrill Drive Spring to analyze metal and organic contaminants.

Toxic metals were found in the sediment samples. Values were similar for the two sites, although East Spring had the highest values for all toxic metals, with the exception of zinc (Culver and Sereg 2004, p. 65). However, because it was the springs' sediments instead of water samples that were analyzed, it is difficult to know whether the value of the metals measured in the sediments exceed aquatic life standards in water or any published values for freshwater amphipod species. Furthermore, water samples taken from the springs in Rock Creek Park and at Burnt Mill Spring #6 in June 2016 did not detect toxic metals (Pinkney 2017b, pers. comm.). Sources of trace metals in an urban environment may include vehicles, streets, parking lots, snowpacks, and rooftops (Center for Watershed Protection 2003, p. 73). However, although the Washington metropolitan area spring sites are exposed to these sources, there is no quantitative evidence that toxic metals are affecting the springs or the Kenk's amphipod.

Water samples collected from 2000 to 2003 found nitrate levels as high as 30.8 milligrams per liter (mg/L) at Sherrill Drive Spring (Culver and Sereg 2004, p. 109). In 2016, nitrate concentrations at Sherrill Drive Spring were 3.9 mg/L and 4.2 mg/L at Burnt Mill Spring #6 (Pinkney 2017, pers. comm.). Statistical analysis of Maryland Biological Stream Survey (MBSS) data indicated that detrimental effects were present in fish and benthic communities at critical nitrate-N threshold values of 0.83 mg/L and 0.86 mg/L, respectively (Morgan *et al.* 2007, pp. 160–161). These threshold values are significantly lower than the values reported at Sherrill Drive Spring and Burnt Mills Spring #6.

We do not know how typical the Sherrill Drive Spring or Burnt Mill Spring #6 nitrate concentrations are and if chronic exposure is occurring, but we know that *Stygobromus* specimens have not been detected at Sherrill Drive Spring since 2001 or at Burnt Mill Spring #6 since 2005 (see table 1). We also do not know the potential source of the nitrate since it could come from runoff containing fertilizers or animal waste or from sanitary sewer leaks. However, a sanitary sewer line runs adjacent to the Sherrill Drive Spring, and this sewer line has leaked in the past (Feller 1997, p. 37; Yeaman, 2014, pers. comm.).

Other high levels of nutrients were also evident in the June 2016 sampling conducted by the Service's Chesapeake Bay Field Office (Pinkney 2017b, pers. comm.). The EPA (2000) ecoregional proposed criterion for stream total nitrogen of 0.69 mg/L was exceeded at the following seepage spring locations: Kennedy Street Spring (1.9 mg/L), Sherrill Drive Spring (6.5 mg/L), East Spring (9.7 mg/L), Holsinger Spring (20.9 mg/L), and Burnt Mill Spring #6 (24.2 mg/L). The EPA stream total phosphorus criterion of 0.036 mg/L was exceeded at all five seepage springs with a maximum concentration of 1.3 mg/L at Kennedy Street Spring. The MBSS thresholds were 1.3 mg/L total nitrogen and 0.043 mg/L total phosphorus for benthic communities (no thresholds were determined for fish communities) (Morgan *et al.* 2007, pp. 160–161).

Chloride levels as high as 227 mg/L were detected at Sherrill Drive Spring. The EPA chronic ambient water quality criterion for chloride is 230 mg/L (EPA 2016, entire). Although we do not know the exact source of the elevated chloride levels at Sherrill Drive Spring, one potential source could be road salt. The Washington metropolitan area receives, on average based on 69 years of data taken at Washington National Airport, approximately 19.5 inches of snow annually *(*Southeast Regional Climate Center 2017, entire; Current Results 2017, entire). The District of Columbia Department of Public Works uses road salt and other salt products to pre- and post-treat road surfaces before and after ice and snowfall events (District of Columbia Department of Public Works 2017, entire). However, the NPS has discontinued the use of road salts at some locations within Rock Creek Park (Bartolomeo 2017, pers. comm.). The widespread use of salt to deice roadways has led to regionally elevated chloride concentrations equivalent to 25 percent of the chloride concentration in seawater during winter. The concentrations can remain high throughout the summer even in less urbanized watersheds due to long-term (*e.g.,* decades) accumulation of chloride in ground water (Kaushal *et al.* 2005, pp. 13518–13519). This phenomenon was documented by the Service's June 2016 detection of a chloride concentration of 227 mg/L at Sherrill Drive Spring (Pinkney 2017a, pers. comm.). Analyses of MBSS data on fish and benthic communities yielded critical chloride values of 17 mg/L for fish and 50 mg/L, respectively, as thresholds above which there would be detrimental effects on biotic communities (Morgan *et al.* 2007; pp. 160–161). Thus, the concentrations measured in June 2016 (Pinkney 2017a, pers. comm.) at Kennedy Street Spring (56.3 mg/L), Holsinger Spring (70.7 mg/L), Burnt Mill Spring #6 (115 mg/L), and Sherrill Drive Spring (237 mg/L) all exceed thresholds for benthic communities. Furthermore, chloride concentrations in ground water may move slower (*e.g.,* dilute slower) than in surface waters and thus the effects from winter road salt application may be more persistent in the surrounding environment (Findlay and Kelly 2011, p. 66).

At Coquelin Run Spring, ground water pollution from yard chemicals and road runoff (*e.g.,* road salts, oil) could be a concern for the Kenk's amphipod's long-term viability. The USGS research on water quality degradation in other urban areas indicates that chemicals enter waterways and ground water primarily through runoff from rain events, and these chemicals have commonly been detected in streams and shallow ground water (USGS 1998, entire; USGS 1999a, pp. 1–3; USGS 1999b, p. 1; USGS 2001, p. 2). Although no water samples have been taken at the Coquelin Run Spring site, it is separated from backyards in this neighborhood by a narrow, wooded riparian strip (less than 100 ft) (30 m) that slopes steeply down to the site. Therefore, the Coquelin Run Spring may be at increased risk of exposure to chemical pollutants from the surrounding urban development.

The other four Washington metropolitan area sites (Burnt Mill Spring #6, Holsinger Spring, East Spring, and Kennedy Spring) have wider buffers than Sherrill Drive Spring and Coquelin Run Spring, with buffer distances ranging from approximately 272 ft (83 m) to 1,000 ft (305 m). East Spring and Kennedy Spring had much lower conductivity and nitrate levels than Sherrill Drive Spring in the 2000, 2001, and 2003 sampling (Culver and Sereg 2004, pp. 55–58), but were still above criteria suggested by Morgan *et al.* (2007, p. 161). Surveys conducted in 2015 and 2016 did not re-confirm the Kenk's amphipod at any of these sites but consistently found *Stygobromus tenuis* at all the sites in higher numbers (*e.g.,* greater than 40 observed at Burnt Mill Spring #6 during 1 sampling event). Urban runoff can decrease biotic richness and favor more pollution-tolerant species in urban streams (Center for Watershed Protection 2003, pp. 101–102). If *S. tenuis* has a higher tolerance than the Kenk's amphipod to poor water quality parameters, the change in species' composition discussed in the proposed rule's (81 FR 67270; September 30, 2016) *Relative Abundance* section and Factor E—*Changes in Species Composition* could indicate that urban runoff is negatively affecting the Kenk's amphipod populations at these spring sites.

The NPS manages the surrounding habitat at the four seepage spring sites supporting the Kenk's amphipod in Rock Creek Park. While the NPS uses its regulatory authority to manage water quality concerns for the species within Rock Creek Park, the agency has little influence over the protection of or effects to any seep recharge areas occurring outside park boundaries, and over maintenance or repair of city-owned infrastructure such as storm water and sewer systems located near the spring sites. See the proposed rule (81 FR 67270; September 30, 2016) for a list of laws and policies influencing NPS management.

In Virginia, poor water quality is not likely affecting the species at the Fort A.P. Hill and Voorhees Nature Park because the sites are located in watersheds that are primarily forested with little impervious surface (see table 2).

Summary of Water Quality—In total, poor water quality is believed to be a contributing stressor at all six of the Washington metropolitan area sites (*i.e.,* 46 percent of the total known sites). Water quality in this area is expected to worsen due to significant runoff events from anticipated increases in both winter and spring precipitation and the frequency of high-intensity storms. (See Factor A—*Excessive Storm Water Flows* and Factor E—*Effects of Climate Change* sections for more details.) However, we find that poor water quality is not impacting the Virginia spring sites because the sites are located in forested areas with low levels of impervious cover, and we do not anticipate those conditions to change into the future. In addition, the measures in Fort A.P Hill's INRMP and the location of one site on conservation land provides protections to the species.

Excessive Storm Water Flows

Runoff from impervious surfaces after heavy rain events can result in flooding (Frazer 2005, p. 4; NBC News 2016, entire). Flash flooding can also result in erosion and sedimentation (Center for Watershed Protection 2003, pp. 30–33), which, if it occurs in the catchment area, can subsequently degrade a spring site's value as habitat for the Kenk's amphipod.

In the Washington metropolitan area, excessive storm water flows are causing significant habitat degradation at two sites—Sherrill Drive Spring and Coquelin Run Spring. A washout at Sherrill Drive Spring from 16th Street was observed in 2016 making it difficult to find a seep to survey (Feller 2016f, pers. comm.). Coquelin Run Spring is severely degraded by runoff from the surrounding Chevy Chase Lake Subdivision, where severe erosion was first observed at this site in 2006 (Feller 2016h, pers. comm.). Subsequent surveys of the site found evidence of plastic underground pipe and sheeting, which may have been an attempt to address water flow and erosion at the site, in close proximity to the original seep and further erosion of the site (Feller 2016a, pers. comm.; Feller 2016e, pers. comm.). A small flow was observed in May 2016 but was located several feet above the original seep documented in 2006. It is unknown what affect the pipe or plastic may have on the long-term hydrology of the site.

Erosion from storm water flows has also been observed at the other three springs in Rock Creek Park, but not to the extent that it has been observed at Sherrill Drive and Coquelin Run Springs. It is unknown how much chronic or acute erosion and sedimentation causes a site to become unsuitable for the Kenk's amphipod; however, Culver and Sereg (2004, p. 69) found that sediment transported by storm runoff results in the degradation of ground water animals' habitat by clogging the interstices of gravels in the spring seep, thereby preventing the species from using those interstitial spaces for shelter. It is uncertain to what extent the Kenk's amphipod uses those interstitial spaces, but if they do, then it is plausible that this type of sedimentation would cause the habitat to become unsuitable for the species.

At the Virginia sites, Mill Creek #2 experiences sheet flow into the seep area off of a lateral slope during rainfall events due to the degree of slopes and close proximity to a stormwater culvert outlet (Applegate 2016, pers. comm.). However, erosion and sediment control repairs to the culvert and the surface of the associated unimproved trail conducted prior to the proposed rule has dramatically improved current conditions. Consequently, sheetflow is not considered a threat to the conservation of the Kenk's amphipod at this location (Applegate 2017, pers. comm.). Sheet flow is not considered to be a problem at Voorhees Nature Preserve (Hobson 2017a, pers. comm.).

Summary of Excessive Storm Water Flows—Excessive storm water flows are a contributing stressor at 38 percent (5 of 13) of the species' sites (Sherrill Drive Spring, Coquelin Run Spring, East Spring, Kennedy Street Spring, and Holsinger Spring).

Sewer Line Breaks and Spills

The same riparian areas that contain the habitats of the Kenk's amphipod are among the principal areas where sewer lines are located in the Washington metropolitan area (Feller 2005, p. 2). Most of these sewer lines are old (most installed between 1900 and 1930 in the District of Columbia and between 1941 and 1971 in Montgomery County, MD) and subject to periodic breakage and leakage (Shaver 2011, entire; Kiely 2013, entire). While there have been no laboratory or field studies evaluating the effect of sewage leaks or spills on the Kenk's amphipod or the *Stygobromus tenuis,* adverse effects of sewage contamination on amphipods and other invertebrates have been documented (Simon and Buikema 1997, entire; de laOssa-Carretero *et al.* 2012, p. 137).

Releases of large volumes of sewage (up to 2 million gallons (gal)) from sanitary sewer leaks have occurred in the District of Columbia and Montgomery County, MD. Coquelin Run Spring, Burnt Mill Spring #6, and Sherrill Drive Spring are most vulnerable to sewage spills because they are located downhill from several sewer lines (see table 2 in the proposed rule (81 FR 67270; September 30, 2016) for details). The Washington Suburban Sanitary Commission (WSSC) has documented numerous large (more than 1,000 gallons) and small (more than 100 gallons) leaks in both the Rock Creek and Northwest Brach drainages (WSSC 2015). The District of Columbia does not have such detailed records, but half the District of Columbia's 1,800 mi (2,896 km) of sewer lines are at least 84 years old and faulty pipes result in two dozen sewer spills every year (Olivio 2015). The frequency of spills is likely to increase in the future as the sewer lines continue to age.

At the Virginia sites, we have no information indicating sewer pipelines may affect the species.

Summary of Sewer Line Spills—In total, sewer line breaks and spills are a potential concern at 23 percent (3 of 13) of the species' sites.

Water Pipe Breaks

Bursting of large-diameter water pipes can cause significant erosion of surrounding areas as a result of the large volume of fast-moving water that exits the pipe at the break point. Bursting water pipes and the resulting erosion has been documented within the Washington metropolitan area, including areas near but not directly at a specific Kenk's amphipod seep site (Dudley *et al.* 2013, entire). The exposure risk of bursting water pipes at locations that could affect Kenk's amphipod sites is increasing given the age of the water pipe infrastructure (see table 2 in the proposed rule (81 FR 67270; September 30, 2016) for more details).

At the Virginia sites, we have no information indicating water pipeline breaks may affect the species.

Summary of Water Pipe Breaks—In total, large water pipeline breaks have a potential to occur at 8 percent (1 of 13) of the species' sites (Sherrill Drive Spring), while smaller water pipeline breaks could occur at 23 percent (3 of 13) of the sites (Sherrill Drive Spring, Coquelin Run Spring, and Burnt Mills #6 Spring).

Other Habitat Considerations

The Kenk's amphipod is likely susceptible to changes to the forest canopy and understory; this theory is supported by the fact that they can be found in leaf litter. The more common species *Stygobromus tenuis* has been found to actively exit the hypotelminorheic under appropriate conditions, presumably to forage (Kavanaugh 2009, p. 3), and they are found only in forested areas (Culver 2016, pers. comm.).

In the Washington metropolitan area, there have been no land-disturbance activities such as forest management or vegetation/habitat management activities conducted at Rock Creek Park or at the Montgomery County park in the vicinity of the seeps. At Rock Creek Park, the NPS has taken steps to prevent designated trails from being built in areas that could affect the Kenk's amphipod, and there are no trails in close vicinity to the seep found at the county park. At the privately owned site, an underground pipe previously installed on the hillside where the seep is located was observed in 2016, and, despite the steep topography, there is the potential for foot traffic in the seepage area by the landowners. The Service is unaware of any tree removal ever occurring at this site.

In general, stressors to the Kenk's amphipod habitat at the Virginia sites are less significant than those in the Washington metropolitan area because land use is primarily agriculture and forest with little impervious surface. See the description of Fort A.P. Hill under the Ongoing and Future Conservation Measures section above. With the possible exception of the effects of climate change and the potential effects of small population dynamics (see Factor E below), we are unaware of any stressors at Voorhees Nature Preserve (Hobson 2017a, pers. comm.). The preserve is located 8.5 mi (13.7 km) east across the Rappahannock River from Fort A.P. Hill in Westmoreland County, Virginia. The 729-acre (295-hectare) parcel has been owned by The Nature Conservancy (TNC) since 1994. The goal of the preserve is to protect the mature coastal plain forest and freshwater tidal marsh (Truslow 2017a, pers. comm.).

As of July 2017, human activity at the preserve is limited to maintenance of approximately 3 mi (4.8 km) of hiking trails, white-tailed deer management through a hunt lease with a local hunt club, and annual monitoring to ensure the protection goals of the property are being met. There is light recreational use from the 3 mi (4.8 km) of hiking trails located on the property. The trails are open only for foot travel (approximately several hundred visitors a year based on trail logs); no ATVs or bikes are allowed on the trails (Truslow 2017b, pers. comm.). Dogs are also not allowed at the preserve (TNC 2017, entire).

The seep where the Kenk's amphipod was found is not impacted by the trail because it is located approximately 30 to 40 ft (9.1 to 12.2 m) down slope of the trail, at the head of a ravine, and it is surrounded by dense vegetation, which makes access to the site difficult (Hobson 2017a, pers. comm.). There is also no visible erosion from the trail (C. Hobson 2017a, pers. comm.).

The TNC developed a site-management plan upon assuming ownership. Timber harvesting will not occur where there is mature forest, and uplands will be kept in a forested condition to protect the property's marsh from sedimentation runoff. In addition, TNC will not use pesticides (*e.g.,* dimilin) to control future gypsy moth infestations (TNC 1994).

In terms of the property's protection status, TNC preserves are considered to be permanently protected. The deed does not contain restrictions on TNC selling or transferring the property; however, TNC policy would require that the property be transferred to an entity that would manage for similar conservation goals (*e.g.,* a State natural resource agency or Federal agency), or that it be restricted by a conservation easement that would ensure permanent protection of the property (Truslow 2017a, pers. comm.).

The preserve is surrounded primarily by forest, and there is Service-owned National Wildlife Refuge land and State-owned land west of the site. A soil enhancement facility was proposed in 2014 at a parcel approximately 1 mile (1.6 km) northeast of the seep. The purpose of the facility would be to compost biosolids from sewage and sell the compost as fertilizer. If the site was approved and constructed, it would not impact the Kenk's amphipod because the seep is at a higher elevation and in a different surface catchment area than the proposed soil enhancement facility.

Summary of Factor A—Habitat modification, in the form of degraded water quality and quantity, is one of the primary drivers affecting Kenk's amphipod viability at the Washington metropolitan area sites, despite ongoing conservation measures. Reductions in water quality continue to occur at those sites primarily as a result of urbanization, which increases the amount of impervious cover in the watersheds surrounding six of the Kenk's amphipod sites. Impervious cover increases storm water flow velocities, decreases ground water filtration, and increases erosion and sedimentation. Impervious cover can also increase the transport of contaminants and nutrients common in urban environments, such as metals (zinc, cadmium), nitrogen, phosphorus, and fecal coliform bacteria. The Washington metropolitan area sites have narrow riparian buffers separating them from the surrounding development, increasing the sites' exposure to poor water quality from runoff. While poor water quality has been documented at Sherrill Drive Spring and is likely affecting all six sites in the Washington metropolitan area, the seven Virginia sites are not thought to be affected by poor water quality because of the large forested buffers on Fort A.P. Hill and Voorhees Nature Preserve.

Excessive storm water runoff from heavy rain events can result in flooding, which can cause erosion and sedimentation. Habitat degradation due to excessive storm water flows is having effects at two sites—Sherrill Drive Spring and Coquelin Run Spring—but has also been observed at the other four springs in Rock Creek Park, and may increase in the future. At the Virginia sites, we have no information indicating excessive storm water flows affect the species.

Sewer and water line breaks and leaks are a concern at the Washington metropolitan area sites because most of them are located in the same riparian areas that contain the habitats of the Kenk's amphipod. While leaks and breaks of these pipelines have not yet been known to directly affect the species or its habitat, the pipeline systems are subjected to chronic leaks and breaks, the frequency of which is likely to increase given the age of the infrastructure, and thus the exposure risk of the species to this stressor will continue to increase. Coquelin Run Spring, Burnt Mill Spring #6, and Sherrill Drive Spring are most vulnerable to sewage spills and water pipe breaks due to the pipe's proximity to each site and the age of the pipes. At the Virginia sites, we have no information indicating sewer or water pipeline breaks will affect the species.

Stressors to Kenk's amphipod habitat are significantly less in scope and severity at Fort A.P. Hill and Voorhees Nature Preserve than at the Washington metropolitan area habitats, due to the location of the sites, the current and foreseeable mission of the managing entities, and the conservation measures described in the INRMP and TNC Management Plan. The risk is low that any disturbance to the surface habitat on those properties would result in adverse effects to the species. We acknowledge that the Washington metropolitan sites face a number of stressors that will continue into the future. Of the six Washington sites, only one site has a recent record of Kenk's amphipod. We cannot confirm without additional consecutive negative survey results, but it is possible that this species is functionally extinct in the Washington metropolitan area given the stressors it faces and the lack of specimens found in recent survey results. Conversely, the seven Virginia sites do not face the same stressors as the Washington metropolitan area sites. Habitat quality at the Virginia sites is good and the sites all have some form of protection, either from the measures in the Fort A.P. Hill INRMP or the TNC nature preserve's site-management plan.

TABLE 3—RELATIVE VULNERABILITY OF KENK'S AMPHIPOD SEEP HABITAT SITES

Site name	Location	Current seep status	Current biological status of the Kenk's amphipod
Sherrill Drive Spring	Rock Creek Park, Washington, DC.	Approximately 50' to road, documented decrease in water quality (chemical and sedimentation), within 10' of 1924 sewer pipe and 130' of 1955 30'' water pipe.	Extirpated? Not found in recent surveys. No other *Stygobromus* present. Last detected 2001 (8 surveys since and none found). Niemiller *et al.* (2017) eDNA study also supports extirpation of all *Stygobromus* here.
East Spring	Rock Creek Park, Washington, DC.	Approximately 300–500' buffer of protected forest, within 560' of 6–8'' 1921 water pipe.	Unknown. Not found in recent surveys but other *Stygobromus* present. Last detected 2001 (7 surveys in 2015–2016 and none found).
Kennedy Street Spring	Rock Creek Park, Washington, DC.	Approximately 500' buffer of protected forest, within 860' of 6–8'' 1911 water pipe.	Unknown. Not found in recent surveys but other *Stygobromus* present. Last detected 2001 (5 surveys since and none found).

TABLE 3—RELATIVE VULNERABILITY OF KENK'S AMPHIPOD SEEP HABITAT SITES—Continued

Site name	Location	Current seep status	Current biological status of the Kenk's amphipod
Holsinger Spring	Rock Creek Park, Washington, DC.	Approximately 700–1,000' buffer of protected forest.	Historical? Not documented since 1967. One survey in 2003 and 3 surveys in 2015 and none found; other *Stygobromus* species present.
Burnt Mill Spring #6	Northwest Branch Park, Montgomery County, MD.	In county park protected from further development, within 186' of unknown age sewer pipe and 394' of 6–8'' 1959 water pipe.	Unknown. Not found in recent surveys but other *Stygobromus* species present. Last detected in 2005 (10 surveys since and none found).
Coquelin Run Spring	Private land, Montgomery County, MD.	Erosion problems are already apparent, site has been modified with a plastic pipe and plastic material, and riparian forest is very narrow. Within 220' of 1952 sewer pipe and 250' of 6–8'' 1954 water pipe.	Present in upslope portion of seep (1 individual found in 2016); lower section has some erosion and species absent in that section (3 surveys conducted in 2016 and none found). No other *Stygobromus* species were found in upper or lower portion of seep in 2016.
Fort A.P. Hill (6 seeps)	Department of Defense, Caroline County, VA.	Good habitat quality, sites unaffected by urbanization. Military exercises, forest management, and construction activities are at low risk to affect surface habitat due to the revised INRMP.	Present and recently discovered. One individual each found at Upper Mill 2, Mill 4, and Mount 2 in 2014 but not identified as the Kenk's amphipod until 2016; 4 individuals found at Mill 5 in 2014. In 2017, there were 6 individuals found at Upper Mill 2, 1 individual at Upper Mill 4, and 4 individuals at Mount 2. Two new sites were found in 2017: Mill Creek 56 (16 individuals) and Mill Creek 59 (8 individuals found).
Voorhees Nature Preserve (1 seep).	Westmoreland County, VA.	Good habitat quality, owned by TNC. Permanently protected as a nature preserve.	Recently discovered. One individual found in 2017.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

In the September 30, 2016, proposed rule (81 FR 67270), we found no information indicating that overutilization was a factor affecting the Kenk's amphipod. No new information from peer review or public comments indicates that overutilization is a concern for the species.

Factor C. Disease or Predation

In the September 30, 2016, proposed rule (81 FR 67270), we found no information indicating that disease or predation was affecting the Kenk's amphipod. No new information from peer review or public comments indicates that disease or predation is a concern for the species.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

The following existing regulatory mechanisms were specifically considered and discussed as they relate to the stressors, under the applicable Factors, affecting the Kenk's amphipod: the Clean Water Act's (CWA) National Pollutant Discharge Elimination System, Rock Creek Park Authorization Act of 1890, and National Park Service Organic Act of 1916 (Factor A; summarized above in this final determination, but discussed in full in the proposed rule (81 FR 67270; September 30, 2016) and Nongame and Endangered Species Conservation Act (Factor B).

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Small Population Dynamics

The observed small size of each of the 13 Kenk's amphipod populations may make each one vulnerable to natural environmental stochasticity and human-caused habitat disturbance, including relatively minor impacts in their spring recharge areas. However, there is significant uncertainty regarding the extent to which the number of Kenk's amphipods observed at the seep surface accurately reflects the actual population at each site given the species' known ability to move between the surface and subsurface habitat. We are unaware of any reliable method to accurately estimate the actual population size of the Kenk's amphipod at each of its historical and current sites. In addition, the multiple sites (six in the Washington metropolitan area and seven in Virginia) provide some protection against stochastic and catastrophic events affecting all sites simultaneously (see the Cumulative Effects section below).

An eDNA (Niemiller *et al.* 2016, pp. 1–7) and a hydrogeology study (Staley 2016, pp. 1–46) were conducted in 2016. However, neither study resulted in any information that helped us better understand the Kenk's amphipod's genetics, distribution, or potential for dispersal (*e.g.,* metapopulation structure). Therefore, unless the populations are larger than we know or are hydrologically connected such that individuals can move between sites, we maintain that these small populations are vulnerable to the effects of small population dynamics.

Species that are restricted in range and population size are more likely to suffer loss of genetic diversity due to genetic drift, potentially increasing their susceptibility to inbreeding depression, and reducing the fitness of individuals (Soule 1980, pp. 157–158; Hunter 2002, pp. 162–163; Allendorf and Luikart 2007, pp. 117–146). Small population sizes and inhibited gene flow between populations may increase the likelihood of local extirpation (Gilpin and Soulé 1986, pp. 32–34). With the exceptions for the Fort A.P. Hill populations of Mill Creek #2 and Mill Creek #4, which are separated by only approximately 360 ft (110 m), and Mill Creek #56 and #59, which are approximately 2,640 ft (805 m) from the other two Mill Creek sites and 1,056 ft (322 m) apart from each other, all the other populations of the Kenk's amphipod are isolated from other existing populations and known habitats by long distances, inhospitable upland habitat, and terrain that create barriers to amphipod movement. The level of isolation and the restricted range seen in this species, based on our current knowledge of known habitat, make natural repopulation of known habitats (*e.g.,* the District of Columbia sites and Burnt Mill Spring #6 where the species' presence has not been recently confirmed) virtually impossible without human intervention.

Effects of Climate Change

Climate change may result in changes in the amount and timing of precipitation, the frequency and intensity of storms, and air temperatures. All of these changes could affect the Kenk's amphipod and its habitat. The amount and timing of precipitation influence spring flow, which is an important feature of the habitat of this ground water species. Also, the frequency and intensity of storms affects the frequency, duration, and intensity of runoff events, and runoff transport of sediment and contaminants into catchment areas of Kenk's amphipod sites, especially in the Washington metropolitan area, where there is a substantial amount of impervious cover in close proximity to the habitat (see Factor A summarized above and in detail in the proposed rule (81 FR 67270; September 30, 2016)). Below we discuss the best available climate predictions for the areas supporting the Kenk's amphipod.

The 2014 National Climate Assessment (Melillo *et al.* 2014, entire) predicts increasing ambient temperatures, increasing winter and spring precipitation, increasing frequency of heavy downpours, and increasing summer and fall drought risk as higher temperatures lead to greater evaporation and earlier winter and spring snowmelt (Horton *et al.* 2014, p. 374 *In* Melillo *et al.* 2014). Without more specific information about how seeps are connected underground, as well as the ability of the amphipods to migrate within the soil column in response to drying from drought conditions, it is unclear to what degree the temporary drying of these habitats will affect the Kenk's amphipod (Carter 2016, pers. comm.). Alternatively, an increase in heavy downpours will likely result in increased runoff and resulting erosion of surface features at spring sites, based on previously documented events. The 2014 National Climate Assessment further indicates that overall warming in the Northeast, including Maryland and the District of Columbia, will be from 3 to 10 degrees Fahrenheit (°F) (1.7 to 5.6 degrees Celsius (°C)) by the 2080s (Horton *et al.* 2014, p. 374 *In* Melillo *et al.* 2014). The Southeast region, which includes Virginia, is projected to see a regional average temperature increase of 4 to 8 °F (2.2 to 4.4 °C) (Carter *et al.* 2014, p. 399 *In* Melillo *et al.* 2014).

Data specific to the District of Columbia from NOAA's National Climate Data Center (NOAA 2017, entire) shows that the average annual air temperature in the District of Columbia has already increased by approximately 2 °F (1.1°C) from 1960, the decade corresponding to the first Kenk's amphipod surveys, to 2016. This higher rate of change in the District of Columbia may be due to the urban heat island effect (Oke 1995, p. 187), which is an increase in ambient temperature due to heating of impervious surfaces. This activity also results in an increase in temperature of rainwater that falls on heat-absorbing roads and parking lots. A sudden thunderstorm striking a parking lot that has been sitting in hot sunshine can easily result in a 10 °F (5.6 °C) increase in the rainfall temperature. Menke *et al.* (2010, pp. 147–148) showed that these temporary increases in temperature of storm water can still result in a shift in the biotic community composition and even accelerate changes in species distributions. Based on the work of Menberg *et al.* (2014, entire), we expect these changes in air temperature to be reflected in the temperature of the shallow ground water at all sites within a few years, but at a lower magnitude.

Increased temperature is stressful to aquatic life through several mechanisms. First, at higher temperatures, the metabolic rate of invertebrates and fish is higher and more rapid ventilation is needed by the animal to obtain oxygen, which is less soluble (*i.e.,* less available) in warmer versus cooler water (Schiedek *et al.* 2007, p. 1846). Second, the rates that cold-blooded animals metabolize certain chemicals into more toxic forms increase at higher temperatures. This characteristic can either cause sublethal effects that inhibit the animal's ability to feed, breed, or escape from predators, or can be lethal due to increased toxicity at higher temperatures. For example, organophosphate insecticides are metabolically transformed into the more toxic oxon form. This oxon form is lethal to animals because it inhibits the enzyme acetylcholinesterase (Hooper *et al.* 2013, p. 36). Illustrating this toxicity, laboratory experiments exposed the *Gammarus pseudolimnaeus* amphipod to the organophosphates terbufos and trichlorofon (Howe *et al.* 1994, p. 58). In one set of experiments, terbufos was demonstrated to be seven times more toxic at 62 °F (17 °C) than at 45 °F (7 °C). And third, ammonia, derived from wastewater, fertilizers, and runoff from animal wastes, is more toxic to all aquatic life at higher temperatures because a greater fraction exists in the more toxic un-ionized form (EPA 2013, p. 7). Thus, the EPA aquatic life criteria are temperature (and pH) dependent with lower limits at higher temperatures for a given pH. It is important to note we do not have specific temperature tolerance information for the Kenk's amphipod; however, there are studies of other amphipod species that indicate these animals have a sensitivity to elevated temperatures, as exhibited by reduced or eliminated egg survival at water temperatures above 75 °F (24 °C) to 79 °F (26 °C) (Pockl and Humpesch 1990, pp. 445–449).

In summary, if current climate change predictions become reality, by the 2080s some increase in ground water temperatures will occur at sites occupied by the Kenk's amphipod, yet the magnitude and significance of these changes is difficult to predict.

Change in Species Composition

At most of the Washington metropolitan area sites supporting the Kenk's amphipod, numbers of the Potomac ground water amphipod, which is the most widely distributed and abundant *Stygobromus* species in the lower Potomac drainage (Kavanaugh 2009, p. 6), have increased as numbers of observed Kenk's amphipods have declined (Feller 2016b, pers. comm.; Feller 2016c, pers. comm.). The exact cause of this change is not known, but it may be an indication that some stressor has led to a competitive advantage for the Potomac ground water amphipod (Culver *et al.* 2012, p. 29). Other than at Coquelin Run Spring, there are no obvious physical changes at these sites indicating a cause for the decline. However, as described in Factor A, impaired water quality could favor a more common species over a rare species. Culver and Sereg (2004, pp. 72–73) indicated that there is a possibility that the Kenk's amphipod is a poor competitor with other *Stygobromus* species, which may be a factor promoting the Kenk's amphipod's natural rarity, and that in cave locations *Stygobromus* species strongly compete with each other. Only one site in the Washington metropolitan area was surveyed in 2017, Burnt Mills Spring #6. That site continues to have a large number of *S. tenuis* and no Kenk's amphipod (Feller 2016g, pers. comm.). The more common species *S. tenuis* and *S. foliatus* are found at the Virginia sites, but they are less abundant than what has been observed in the Washington metropolitan area sites (Hobson 2017b, pers. comm.). While the Kenk's amphipod may have always been naturally rare, we conclude that the species may be getting rarer at the Washington metropolitan area sites due to the stressors discussed above.

Summary of Factor E—The believed small population size at all of the sites makes each one of them vulnerable to natural environmental stochasticity and human-caused habitat disturbance, including relatively minor impacts in their spring recharge areas. The believed small size and isolation of sites also make each population vulnerable to demographic stochasticity, including loss of genetic variability and adaptive capacity.

The best available climate data indicate that the areas supporting the Kenk's amphipod will see increasing ambient temperatures, increasing winter and spring precipitation, increasing frequency of heavy downpours, and increasing summer and fall drought risk as higher temperatures lead to greater evaporation and earlier winter and spring snowmelt. Droughts could result in drying up of spring sites, while the increase in heavy downpours could result in erosion and sedimentation of sites. Ambient air temperature has increased by 3 °F (1.7 °C) since 1960, and is expected to increase by 8 to 10 °F (4.4 to 5.6 °C) by the 2080s. If current climate change predictions become a reality, by the 2080s some increase in ground water temperatures will occur at sites occupied by the Kenk's amphipod, but the magnitude and significance of these changes is difficult to predict.

Cumulative Effects

Many of the factors previously discussed are cumulatively and synergistically affecting the Kenk's amphipod primarily in the Washington metropolitan area. For example, Kenk's amphipod habitat can be degraded by storm water runoff when there is not adequate forest buffer, which is likely to increase with more frequent and intense storms and precipitation levels in the future. Species with larger populations are naturally more resilient to the stressors affecting individuals or local occurrences, while smaller populations or individuals are more susceptible to demographic or stochastic events. Below we discuss the Kenk's amphipod's viability as expressed through the conservation biology principles of representation, redundancy, and resiliency, which illustrate how the cumulative and synergistic effects are affecting the species as a whole.

Redundancy—The species has some redundancy given its known historical distribution of 13 sites across 4 municipal jurisdictions and multiple streams. Currently, the species is known to be extant at one of the Washington metropolitan area sites and seven of the Virginia sites. We assume that the Sherrill Drive Spring site is extirpated. Although we cannot confirm without additional consecutive negative survey results, given the lack of recent positive surveys and the existing stressors at the five other Washington metropolitan area sites, it is possible that these sites are functionally extinct, which means that the population at each site is so reduced that the site population is no longer viable.

The isolation of the two Montgomery County, MD, populations from other Washington metropolitan area populations and their occurrence along different tributary streams make it unlikely that a single catastrophic adverse event (*e.g.,* a spill) will eliminate more than one occurrence at a time. In addition, the Virginia sites on Fort A.P. Hill occur in two stream areas, Mill Creek and Mount Creek, making it unlikely that a single military training event or other catastrophic event will eliminate more than one occurrence at a time. In addition, subsequent to the species' proposal for endangered status, it was found in the spring of 2017 approximately 8.5 mi (13.7 km) away and across the Rappahannock River from the known Fort A.P. Hill sites. This finding, together with the discovery of two new sites on Fort A.P. Hill, contributes to additional redundancy for the species.

Representation—Based on the information about historical changes to the landscape across the Washington metropolitan area, we conclude it is likely that the species' historical distribution was larger than the current distribution; therefore, the species may have previously experienced a loss in representation. Also, because we do not yet have sufficient information on the genetics of these populations, we cannot determine whether the species possesses a single genetic identity or has genetic variability across populations. However, the species is now known to occur within habitat supported by two different geological formations, the Wissahickon and Nanjemoy. While we conclude that the species' representation has likely been reduced from historical levels, it may not be as limited as we thought at the time of the proposed rule given our expanded understanding of suitable habitat and the three new locations found during the spring 2017 surveys on public land.

Resiliency—Based on the relatively small number of individuals found at the 13 known seeps, and the variability of stressors across the species' range, the resiliency of each of the Kenk's amphipod's populations may be low to moderate. The small size of each of the 13 habitat areas makes each population vulnerable to natural environmental stochasticity and human-caused habitat disturbance, including relatively minor effects in the spring recharge area. As a result of habitat fragmentation/isolation there is a lack of connectivity and genetic exchange between populations and, we assume, a lack of ability to recolonize extirpated sites. However, the larger number of Kenk's amphipods found at two of the newly discovered sites, together with the expectation that seven of the sites will be adequately protected from habitat quality stressors, leads us to believe that the resiliency of the Kenk's amphipod at a majority of its sites is higher than we thought at the time of the proposed listing rule.

Determination

Section 4 of the Act (16 U.S.C. 1533), and its implementing regulations at 50 CFR part 424, set forth the procedures for determining whether a species is an endangered species or threatened species and should be included on the Federal Lists of Endangered and Threatened Wildlife and Plants (listed). The Act defines an endangered species as any species that is ''in danger of extinction throughout all or a significant portion of its range'' and a threatened species as any species ''that is likely to become endangered throughout all or a significant portion of its range within the foreseeable future.'' The phrase ''significant portion of its range'' (SPR) is not defined by the Act, and, since the Service's policy interpreting the phrase was vacated by the court in *Center for Biological Diversity* v. *Jewell,* No. 14–cv–02506–RM (D. Ariz. Mar. 29, 2017), we currently do not have a binding interpretation that addresses: (1) The outcome of a determination that a species is either in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range; or (2) what qualifies a portion of a range as ''significant.'' We have examined the plain language of the Act and court decisions addressing the Service's application of the SPR phrase in various listing decisions, and for purposes of this rulemaking we are applying the following interpretation for the phrase ''significant portion of its range'' and its context in determining whether or not a species is an endangered species or a threatened species.

Two district court decisions have evaluated whether the outcomes of the Service's determinations that a species is in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range were reasonable. *Defenders of Wildlife* v. *Salazar,* 729 F. Supp. 2d 1207 (D. Mont. 2010) (appeal dismissed as moot because of public law vacating the listing, 2012 U.S. App. LEXIS 26769 (9th Cir. Nov. 7, 2012)); *WildEarth Guardians* v. *Salazar,* No. 09–00574–PHX–FJM, 2010 U.S. Dist. LEXIS 105253 (D. Ariz. Sept. 30, 2010). Both courts found that, once the Service determines that a ''species''—which can include a species, subspecies, or Distinct Population Segment of a vertebrate species (DPS) under section 3(16) of the Act—meets the definition of ''endangered species'' or ''threatened species,'' the species must be listed in its entirety and the Act's protections applied consistently to all members of that species (subject to modification of protections through special rules under sections 4(d) and 10(j) of the Act). See *Defenders,* 729 F. Supp. 2d at 1222 (delisting the Northern Rocky Mountain DPS of gray wolf except in the Wyoming portion of its range (74 FR 15123 (Apr. 2, 2009)) was unreasonable because the Act unambiguously prohibits listing or protecting part of a DPS); *WildEarth Guardians,* 2010 U.S. Dist. LEXIS 105253, at 15–16 (the Service's finding that listing the Gunnison's prairie dog in the ''montane portion'' of its range was warranted (73 FR 6660 (Feb. 5, 2008)) was unreasonable because the Service ''cannot determine that anything other than a species, as defined by the Act, is an endangered or threatened species''). The issue has not been addressed by a Federal Court of Appeals.

For the purposes of this rule, we interpret the SPR phrase in the Act's definitions of ''endangered species'' and ''threatened species'' to provide an independent basis for listing a species in its entirety; thus there are two situations (or factual bases) under which a species would qualify for listing: A species may be in danger of extinction or likely to become so in the foreseeable future throughout all of its range; or a species may be in danger of extinction or likely to become so throughout a significant portion of its range. If a species is in danger of extinction throughout an SPR, it, the species, is an ''endangered species.'' The same analysis applies to ''threatened species.'' Therefore, the consequence of finding that a species is in danger of extinction or likely to become so throughout a significant portion of its range is that the entire species will be listed as an endangered species or threatened species, respectively, and the Act's protections will be applied to all individuals of the species wherever found.

Although there are potentially many ways to determine whether a portion of a species' range is ''significant,'' we conclude, for the purposes of this rule, that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for ''significant'' in terms of an increase in the risk of extinction for the species. We conclude that such a biologically based definition of ''significant'' best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation.

For the purposes of this rule, we determine if a portion's biological contribution is so important that the portion qualifies as ''significant'' by asking whether, *without that portion,* the species in the remainder of its range warrants listing (*i.e.,* is in danger of extinction or likely to become so in the foreseeable future). Conversely, we would not consider the portion of the range at issue to be ''significant'' if the species would not warrant listing in the remainder of its range even if the population in that portion of the range in question became extirpated (extinct locally).

We interpret the term ''range'' to be the general geographical area within which the species is currently found, including those areas used throughout all or part of the species' life cycle, even if not used on a regular basis. We consider the ''current'' range of the species to be the range occupied by the species at the time the Service makes a determination under section 4 of the Act. The phrase ''is in danger'' in the definition of ''endangered species'' denotes a present-tense condition of being at risk of a current or future undesired event. Hence, to say a species ''is in danger'' in an area where it no longer exists—*i.e.,* in its historical range where it has been extirpated—is inconsistent with common usage. Thus, ''range'' must mean ''current range,'' not ''historical range.'' A corollary of this logic is that lost historical range cannot constitute a significant portion of a species' range where a species is in danger of extinction or likely to become so within the foreseeable future (*i.e.,* it cannot be currently in danger of extinction in a portion of its range where it is already extirpated). While we conclude that a species cannot be in danger of extinction in its lost historical range, taking into account the effects of loss of historical range on a species is an important component of determining a species' current and future status.

In implementing these independent bases for listing a species, as discussed above, we list any species in its entirety either because it is in danger of extinction now or likely to become so in the foreseeable future throughout all of its range or because it is in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range. With regard to the text of the Act, we note that Congress placed the ''all'' language before the SPR phrase in the definitions of ''endangered species'' and ''threatened species.'' This placement suggests that Congress intended that an analysis based on consideration of the entire range should receive primary focus. Thus, the first step in our assessment of the status of a species is to determine its status throughout all of its range. Depending on the status throughout all of its range, we will subsequently examine whether it is necessary to determine its status throughout a significant portion of its range.

Under section 4(a)(1) of the Act, we determine whether a species is an endangered species or threatened species because of any of the following: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence. These five factors apply whether we are analyzing the species' status throughout all of its range or throughout a significant portion of its range.

Kenk's Amphipod Determination of Status Throughout All of Its Range

Our review of the best available information indicates that the Kenk's amphipod is known to be extant at one of the Washington metropolitan area sites and seven of the Virginia sites. We assume that the Sherrill Drive Spring site is extirpated. Although we cannot confirm without additional consecutive negative survey results, given the lack of recent positive surveys and the existing stressors at the other Washington metropolitan area sites, it is possible that these sites are functionally extinct. Three of the Virginia sites were recently discovered during the 2017 surveys of suitable habitat on publicly owned lands. While there appears to be evidence of extirpation at one site (Sherrill Drive Spring) and decline of the species at four Washington metropolitan area sites (East Spring, Kennedy Spring, Holsinger Spring, and Burnt Mill Spring #6), and one individual was collected at Coquelin Run Spring, the number of Kenk's amphipods found during the 2017 surveys was slightly higher at two of the previously known Fort A.P. Hill sites (Mount Creek #2 and Upper Mill Creek #2), the same at one previously known Fort A.P. Hill site (Mill Creek #4), and higher at two new sites on Fort A.P. Hill (Mill Creek #56 and Mill Creek #59); one of the previously known Fort A.P. Hill sites was not surveyed (Mill Creek #5) due to lack of spring flow. In addition, the species was newly discovered at the Voorhees Nature Preserve. It is possible that the species could be found at additional locations in Virginia based on the amount of yet-to-be-surveyed suitable habitat.

The habitat loss and degradation (Factor A) from poor water quality parameters associated with urban runoff affecting the Kenk's amphipod at the six Washington metropolitan area sites, despite existing regulatory mechanisms (Factor D), are likely to be exacerbated in the future by the increasing risk of exposure to breaks and leaks from the aging sewer and water pipe infrastructure (Factor A), as well as the predicted more frequent and intense rainfall events, resulting in sheet flow events, due to the effects of climate change (Factor E). However, poor water quality associated with urban runoff is not affecting the species at the seven sites in Virginia. Interspecific competition (Factor E) from larger amphipod species may also be affecting the Kenk's amphipod at some of the Washington metropolitan area sites, but the available information is inconclusive, and those larger amphipod species, while found at some of the Virginia sites, have not been found in large numbers (Hobson 2017b, pers. comm.). Overutilization (Factor B), disease (Factor C), and predation (Factor C) are not known to be factors affecting the Kenk's amphipod at any site. It is possible that the effects of small population dynamics (Factor E) may be having an effect at some, if not all, of the species' locations, but there is some uncertainty associated with that hypothesis given the species' known ability to move back and forth between the ground water and surface areas of the seeps and given the survey data indicating the species can reappear, sometimes in higher numbers of individuals, after several years of absence. It is also possible that increasing air temperatures as a result of climate change (Factor E) will cause ground water temperatures to eventually increase, that the ground water will become too warm by the end of the century for the Kenk's amphipod to successfully reproduce, and that higher ground water temperatures will increase the species' exposure, and sublethal and lethal response, to contaminants. However, there is some uncertainty associated with that hypothesis given the long timeframes (*e.g.,* more than 50 years) associated with the climate modelling and the unknown water temperature tolerance of the Kenk's amphipod.

Although there are some stressors that are expected to continue to result in the degradation and loss of some habitat sites for the Kenk's amphipod, the risk of the species significantly declining across its range in the near term is very low given that it has persisted, albeit at decreased levels, despite historical levels of habitat loss in the Washington metropolitan area. Factors in favor include the species' presence in relatively higher numbers at the Virginia sites. Furthermore, the existing stressors are not likely to cause species-level effects in the near term. The documented persistence of the species at one location in the Washington metropolitan area and seven locations in Virginia provides redundancy, resiliency, and representation to sustain the species beyond the near term. Therefore, we conclude that the risk of extinction of the Kenk's amphipod in the near term is sufficiently low that it does not meet the definition of an endangered species under the Act.

The Act defines a threatened species as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' A key statutory difference between an endangered species and a threatened species is the timing of when the relevant threats would begin acting upon a species such that it is in danger of extinction *now* (endangered species) or likely to become so in the *foreseeable future* (threatened species).

The foreseeable future refers to the extent to which we can reasonably rely on predictions about the future in making determinations about the future conservation status of the species (U.S. Department of the Interior, Solicitor's Memorandum, M–37021, January 16, 2009). We must look not only at the foreseeability of threats, but also at the foreseeability of the impact of the threats on the species (U.S. Department of the Interior's Solicitor's Memorandum, M–37021, January 16, 2009).

In considering the foreseeable future as it relates to the status of the Kenk's amphipod, we considered the extent to which we could reliably predict the species' risk of extinction over time. Our ability to make reliable predictions into the future for the Kenk's amphipod is informed by the species' survey data; the potential effects to the species from ongoing and predicted stressors, as well as the uncertainty surrounding the species' response to those stressors; and ongoing and future conservation measures to address the known stressors. The future timeframe for this analysis is 30 years, which is a reasonably long time to consider as the foreseeable future given the Kenk's amphipod's life history and the temporal scale associated with the patterns of survey data and the past and current stressors outlined in the best available data. The timeframe for foreseeable future is based, in part, on projecting forward. A similar timeframe encompassed by the historical survey results shows decades in which the species was present, absent, and then present again at some seep sites. This timeframe also captures our best professional judgment of the projected potential range of future conditions related to the effects of climate change (*i.e.,* the period in which the species' response to the potential effects of climate change are reliably predictable) and cumulative effects.

Since the analysis of potential effects from climate change was an important consideration in our analysis, it was necessary to consider a long enough timeframe to adequately evaluate those potential effects. However, we did not extend our risk assessment forecasting used in the listing determination process out as far as the existing climate change models (*e.g.,* models that forecast effects over 80 years) discussed in the proposed listing rule (81 FR 67270) due to (1) the increased uncertainty in the model results (*i.e.,* the confidence intervals associated with temperature and precipitation projections); (2) the higher level of uncertainty of how the species may respond to any potential changes in its habitat that may result from changes in temperature and precipitation patterns; and (3) uncertainty associated with how society will respond to the predicted change in climate (*e.g.,* take actions that will mediate or accelerate global emissions) that far into the future. As an example of biological uncertainty, there are significant questions regarding the extent to which the number of Kenk's amphipods observed at the seep surface accurately reflects the actual population at each site given the species' known ability to move between the surface and subsurface habitat.

These uncertainties are additive and undermine the Service's confidence in making a risk assessment projection beyond 30 years. Therefore, as further described below, a projection of the threats and the effects to the species of 30 years represents the timeframe over which the Service considers a reliable prediction to be possible.

As we concluded above, the stressors likely to have the greatest influence on the Kenk's amphipod's viability over time include: Changes in habitat quality and quantity resulting from urbanization in the Washington metropolitan areas and the potential for the effects of small population dynamics and increased ground water temperatures due to climate change at all sites. Given the risk factors affecting the species currently and/or potentially in the future, we determined the following:

- The best available information indicates that the risk is low that changes in habitat quality resulting from changes in temperature will result in aggregate or species-level effects in the foreseeable future.
- There is significant uncertainty regarding the timeframe in which the predicted climate-induced changes to air temperature will manifest in ground water (*i.e.,* whether those changes will occur within the foreseeable future).
- There is significant uncertainty regarding the extent to which the number of Kenk's amphipods observed at the seep surface accurately reflects the actual population at each site given the species' known ability to move between the surface and subsurface habitat. The best available data indicate that the risk of the dynamics of small population size affecting the species is low because even if the species may exist in low numbers at most or all of the 13 known sites, it is very unlikely that all of the sites would be exposed to catastrophic or stochastic events at the same time. Therefore, the species is not likely to be extirpated at most or all of the sites within the foreseeable future.

Taking into account the effects of the most likely stressors and the potential for cumulative effects to the species, our projections for foreseeable future conditions are that the risk is low that the Kenk's amphipod will not continue to be distributed across multiple seep sites within the species' current range. These multiple areas will help the Kenk's amphipod withstand catastrophic events; meaning the risk is low that a significant weather or other event will cause extirpation of the species at most or all sites. Also, we project that the risk is low that the species will not continue to be present in multiple areas, especially in Virginia, in adequate abundance to withstand stochastic events. For example, the risk is low that a training or hunting event at Fort A.P. Hill causing damage to a seep site will cause extirpation of the species at that site.

Based on our analysis of the species' redundancy, resiliency, and representation, and our consideration of the species' future stressors and conservation measures to address those stressors, we conclude that the Kenk's amphipod is likely to remain at a sufficiently low risk of extinction such that it is not likely to become in danger of extinction in the foreseeable future and thus does not meet the definition of a threatened species under the Act.

Determination of Status Throughout a Significant Portion of Its Range

Consistent with our interpretation that there are two independent bases for listing species as described above, after examining the species' status throughout all of its range, we now examine whether it is necessary to determine its status throughout a significant portion of its range. We must give operational effect to both the ''throughout all'' of its range language and the SPR phrase in the definitions of ''endangered species'' and ''threatened species.'' The Act, however, does not specify the relationship between the two bases for listing. As discussed above, to give operational effect to the ''throughout all'' language that is referenced first in the definition, consideration of the species' status throughout the entire range should receive primary focus and we should undertake that analysis first. In order to give operational effect to the SPR language, the Service should undertake an SPR analysis if the species is neither in danger of extinction nor likely to become so in the foreseeable future throughout all of its range, to determine if the species should nonetheless be listed because of its status in an SPR. Thus, we conclude that to give operational effect to both the ''throughout all'' language and the SPR phrase, the Service should conduct an SPR analysis if (and only if) a species does not warrant listing according to the ''throughout all'' language.

Because we determined that the Kenk's amphipod is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we will consider whether there are any significant portions of its range in which the Kenk's amphipod is in danger of extinction or likely to become so.

Although there are potentially many ways to determine whether a portion of a species' range is ''significant,'' we conclude, as noted above, for the purposes of this rule, that the significance of the portion of the range should be determined based on its biological contribution to the conservation of the species. For this reason, we describe the threshold for ''significant'' in terms of an increase in the risk of extinction for the species. We conclude that such a biologically based definition of ''significant'' best conforms to the purposes of the Act, is consistent with judicial interpretations, and best ensures species' conservation.

We evaluate biological significance based on the principles of conservation biology using the concepts of redundancy, resiliency, and representation because decreases in the redundancy, resiliency, and representation of a species lead to increases in the risk of extinction for the species. *Redundancy* (having multiple resilient populations considering genetic and environmental diversity) may be needed to provide a margin of safety for the species to withstand catastrophic events. *Resiliency* describes the characteristics of a species that allow it to recover from stochastic events or periodic disturbance. *Representation* (the range of variation found in a species) ensures that the species' ability to adapt to changing environments is conserved. Redundancy, resiliency, and representation are not independent of each other, and some characteristics of a species or area may contribute to all three. For example, distribution across a wide variety of habitats is an indicator of representation, but it may also indicate a broad geographic distribution contributing to redundancy (decreasing the chance that any one event affects the entire species), and the likelihood that some habitat types are less susceptible to certain threats, contributing to resiliency (the ability of the species to recover from disturbance). None of these concepts is intended to be mutually exclusive, and a portion of a species' range may be determined to be ''significant'' due to its contributions under any one of these concepts.

For the purposes of this rule, we determine if a portion's biological contribution is so important that the portion qualifies as ''significant'' by asking whether, *without that portion,* the representation, redundancy, or resiliency of the species would be so impaired that the species would be in danger of extinction or likely to become so in the foreseeable future (*i.e.,* would be an ''endangered species'' or a ''threatened species''). Conversely, we would not consider the portion of the range at issue to be ''significant'' if there is sufficient resiliency, redundancy, and representation elsewhere in the species' range that the species would not be in danger of extinction or likely to become so throughout its range even if the population in that portion of the range in question became extirpated (extinct locally).

We recognize that this definition of ''significant'' establishes a threshold that is relatively high. Given that the outcome of finding a species to be in danger of extinction or likely to become so in an SPR would be to list the species and apply protections of the Act to all individuals of the species wherever found, it is important to use a threshold for ''significant'' that is robust. It would not be meaningful or appropriate to establish a very low threshold whereby a portion of the range can be considered ''significant'' even if only a negligible increase in extinction risk would result from its loss. Because nearly any portion of a species' range can be said to contribute some increment to a species' viability, use of such a low threshold would require us to impose restrictions and expend conservation resources disproportionately to conservation benefit: Listing would be rangewide, even if only a portion of the range with minor conservation importance to the species is imperiled. On the other hand, it would be inappropriate to establish a threshold for ''significant'' that is too high. This would be the case if the standard were, for example, that a portion of the range can be considered ''significant'' only if threats in that portion result in the entire species' being currently in danger of extinction or likely to become so. Such a high bar would not give the SPR phrase independent meaning, as the Ninth Circuit held in *Defenders of Wildlife* v. *Norton,* 258 F.3d 1136 (9th Cir. 2001).

The definition of ''significant'' used in this rule carefully balances these concerns. By setting a relatively high threshold, we minimize the degree to which restrictions would be imposed or resources expended that do not contribute substantially to species conservation. But we have not set the threshold so high that the phrase ''throughout a significant portion of its range'' loses independent meaning. Specifically, we have not set the threshold as high as it was under the interpretation presented by the Service in the *Defenders* litigation. Under that interpretation, the portion of the range would have to be so important that the species' current level of imperilment in the portion results in the species currently being in danger of extinction or likely to become so throughout all of its range.

Under the definition of ''significant'' used in this rule, the portion of the range need not rise to such an exceptionally high level of biological significance. (We recognize that, if the portion rises to the higher level of biological significance and the species is in danger of extinction or likely to become so in the foreseeable future in that portion, then the species would already be in danger of extinction or likely to become so in the foreseeable future throughout all of its range. We would accordingly list the species as threatened or endangered throughout all of its range by virtue of the species' rangewide status so we would not need to rely on the SPR language for such a listing.) Rather, under this interpretation we ask whether the species would be in danger of extinction or likely to become so everywhere without that portion, *i.e.,* if the species were hypothetically completely extirpated from that portion. In other words, the portion of the range need not be so important that its current status in that portion of its range—being merely in danger of extinction, or likely to become so in the foreseeable future— is sufficient to cause the species to be in danger of extinction or likely to become so in the foreseeable future throughout all of its range. Instead, we evaluate whether the *complete extirpation* (in a hypothetical future) of the species in that portion would at that point cause the species throughout its remaining range to be in danger of extinction or likely to become so in the foreseeable future.

We are aware that the court in *Center for Biological Diversity* v. *Jewell* found that this definition of ''significant'' does not give sufficient independent meaning to the SPR phrase. However, that decision was based on two misunderstandings about the interpretation of ''significant.'' First, the court's decision was based on its finding that, as with the interpretation that the court rejected in *Defenders*, the definition of ''significant'' does not allow for an independent basis for listing. However, this definition of ''significant'' is not the same as the definition applied in *Defenders,* which looked at the current status within the portion and asked what the current effect on the entire range of the species is. By contrast, this definition of ''significant'' looks at a future hypothetical loss of all members within the portion and asks what the effect on the remainder of the species would be; the current status of the species in that portion is relevant *only* for determining the listing status if the portion has been determined to be significant. This definition of ''significant'' establishes a lower threshold than requiring that the species' current status in that portion of its range is already causing the species to be in danger of extinction throughout all of its range or likely to become so in the foreseeable future. In other words, this definition of ''significant'' captures circumstances that would not be captured by the definition used in *Defenders,* or by analyzing whether a species is in danger of extinction or likely to become so throughout all of its range: A species that is *not* currently likely to become an endangered species in the foreseeable future, but would be if a particular important portion of its range is completely lost, can nonetheless be listed now if the species in that portion is threatened or endangered (as opposed to only after the portion is in fact lost, as would be the case if the SPR language did not exist).

The second misunderstanding was the court's characterization of the listing determination for the African coelacanth as an indication that the Service and National Marine Fisheries Service (NMFS) have had difficulty accurately applying this definition of ''significant.'' However, in that listing determination, the conclusion was that the species was not in danger of extinction throughout all of its range or likely to become so in the foreseeable future but it did warrant listing because of its status in a significant portion of its range. The only reason for not listing the entire species was that the population in that portion of the range met the definition of a DPS, and therefore the agency listed the DPS instead of the entire species. The population in an SPR is not automatically a DPS so, contrary to the court's reasoning, the definition of ''significant'' can be applied and result in listing a species that would not otherwise be listed. (We also note another instance, in addition to the one cited in this case, in which this definition has been effectively applied. In the proposed rule to list the giant manta ray as a threatened species (82 FR 3694; January 12, 2017), NMFS found that the giant manta ray was not currently in danger of extinction or likely to become so in the foreseeable future throughout all of its range because the Atlantic populations were not experiencing the same risks as the Pacific populations. However, they did find that the Pacific populations constituted an SPR, because, without that portion, the smaller and more sparsely distributed populations in the Atlantic would become vulnerable to demographic risks and would be likely to become in danger of extinction in the foreseeable future. Accordingly, the giant manta ray is proposed to be listed as a threatened species.) In light of these flaws, we are currently seeking reconsideration of the district court's decision.

To undertake this analysis, we first identify any portions of the species' range that warrant further consideration. The range of a species can theoretically be divided into portions in an infinite number of ways. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that there are any portions of the species' range: (1) That may be ''significant,'' and (2) where the species may be in danger of extinction or likely to become so in the foreseeable future. We emphasize that answering these questions in the affirmative is not a determination that the species is in danger of extinction or likely to become so in the foreseeable future throughout a significant portion of its range—rather, it is a step in determining whether a more-detailed analysis of the issue is required.

In practice, one key part of identifying portions for further analysis may be whether the threats or effects of threats are geographically concentrated in some way. If a species is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range and the threats to the species are essentially uniform throughout its range, then the species is not likely to be in danger of extinction or likely to become so in the foreseeable future in any portion of its range. Moreover, if any concentration of threats applies only to portions of the species' range that are not ''significant,'' such portions will not warrant further consideration.

If we identify any portions (1) that may be significant and (2) where the species may be in danger of extinction or likely to become so in the foreseeable future, we engage in a more-detailed analysis to determine whether these standards are indeed met. The identification of an SPR does not create a presumption, prejudgment, or other determination as to whether the species is in danger of extinction or likely to become so in the foreseeable future in that identified SPR. We must go through a separate analysis to determine whether the species is in danger of extinction or likely to become so in the SPR. To make that determination, we will use the same standards and methodology that we use to determine if a species is in danger of extinction or likely to become so in the foreseeable future throughout all of its range.

Once we have identified portions of the species' range for further analysis, we conduct a detailed analysis of the significance of the portion and the status of the species in that portion. Depending on the biology of the species, its range, and the threats it faces, it might be more efficient for us to address the significance question first or the status question first. If we address significance first and determine that a portion of the range is not ''significant,'' we do not need to determine whether the species is in danger of extinction or likely to become so in the foreseeable future there; if we address the status of the species in portions of its range first and determine that the species is not in danger of extinction or likely to become so in a portion of its range, we do not need to determine if that portion is ''significant.''

Kenk's Amphipod Determination of Significant Portion of Its Range

Applying the process described above, to identify whether any portions warrant further consideration, we determine whether there is substantial information indicating that (1) particular portions may be significant and (2) the species may be in danger of extinction in those portions or likely to become so within the foreseeable future.

To identify portions where the species may be in danger of extinction or likely to become so in the foreseeable future, we consider whether there is substantial information to indicate that any threats or effects of threats are geographically concentrated in any portion of the species' range.

We evaluated the current range of the Kenk's amphipod to determine if there are any apparent geographic concentrations of potential threats to the species. The risk factors that occur throughout the Kenk's amphipod's range include the potential for the effects of small population dynamics and the potential for increased ground water temperature resulting from the effects of climate change. Habitat loss and degradation from poor water quality parameters associated with urban runoff, however, is occurring both currently and in the foreseeable future solely at the six Washington metropolitan area sites. Thus, this one area of the species' range is subject to a type of habitat loss and degradation that is *not* affecting the species uniformly throughout its range. We identify the Washington metropolitan area sites as a portion where the species may be in danger of extinction or likely to become so in the foreseeable future. We next consider whether this portion may be significant. We can accomplish this by considering the biological or conservation importance of the portion.

While the six Washington metropolitan area sites represent 46 percent of the Kenk's amphipod's known populations and represent a diversity of sites because they occur on one of the two known geological formations, the risk is low that, should the species become extirpated in all of those locations, that loss would be sufficient to cause the remainder of the species to be in danger of extinction or likely to become so within the foreseeable future, given the Kenk's amphipod would still be present in 54 percent of its range (*e.g.,* the seven Virginia sites). The Virginia sites are protected against the effects of poor water quality parameters.

We have identified the Washington metropolitan area sites as a portion where the species may be in danger of extinction or likely to become so in the foreseeable future. However, there is not substantial information to indicate that this portion is significant. Therefore, this portion does not warrant further consideration to determine whether the species may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range.

To identify portions that may be significant, we consider whether there is substantial information to indicate that there are any natural divisions within the range or other areas that might be of biological or conservation importance. We identified the Virginia sites (spring seeps on Fort A.P. Hill and the Voorhees Nature Preserve) as a portion that may be significant. These sites are separated from the Washington metropolitan area sites by 60 mi (97 km). The spring sites in these areas occur in the Calvert geologic formation, whereas the Washington metropolitan area sites occur in the Wissahickon geologic formation. Given the separation between the Washington metropolitan sites and the Virginia sites and the inability of the Kenk's amphipod to travel long distances, we conclude that there is no genetic exchange between these two areas. Therefore, we find that there is substantial information that there are natural divisions between the Virginia and Washington metropolitan sites and that the Virginia site may be significant. We did not find substantial evidence that the Washington metropolitan sites are a significant portion because, without that portion, there is no reasonable likelihood that the remainder of the species (*i.e.,* those at the Virginia sites) would be in danger of extinction or likely to become so in the foreseeable future, due to the paucity of threats affecting the Virginia sites.

We have identified the Virginia sites as a portion that may be significant. We next consider whether the species may be in danger of extinction or likely to become so in the foreseeable future in this portion. We can accomplish this task by considering whether there is substantial information indicating that there are any threats to or effects of threats on the species that are concentrated in that portion. The Virginia sites are not affected by the same threats we identified for the Washington metropolitan area sites (*e.g.,* water quality impacts and habitat degradation), because the Virginia sites occur in areas where land use is primarily agriculture and forest with little impervious surface and spring sites are surrounded by large forest buffers that would filter out any potential effects of runoff from the agricultural areas. We do not find there is substantial information indicating there is a concentration of threats in the Virginia portion.

We have identified that the Virginia portion may be significant. However, there is not substantial information to indicate that the species may be in danger of extinction or likely to become so in the foreseeable future in this portion. Therefore, this portion does not warrant further consideration to determine whether the species may be in danger of extinction or likely to become so in the foreseeable future in a significant portion of its range.

Our review of the best available scientific and commercial information indicates that the Kenk's amphipod is not in danger of extinction (endangered) or likely to become endangered within the foreseeable future (threatened) throughout all or a significant portion of its range. Therefore, we find that listing the Kenk's amphipod as an endangered or threatened species under the Act is not warranted at this time.

We request that you submit any new information concerning the status of, or threats to, the Kenk's amphipod to our Chesapeake Bay Field Office (see **ADDRESSES**) whenever it becomes available. New information will help us monitor the Kenk's amphipod and encourage its conservation. If an emergency situation develops for the Kenk's amphipod, we will act to provide immediate protection.

References Cited

A complete list of references cited in this rulemaking is available on the Internet at *http://www.regulations.gov* and upon request from the Chesapeake Bay Field Office (see **FOR FURTHER INFORMATION CONTACT**).

Authors

The primary authors of this proposed rule are the staff members of the Chesapeake Bay Field Office and the Northeast Regional Office.

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James W. Kurth,

Acting Director, U.S. Fish and Wildlife Service.

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