U.S. FISH AND WILDLIFE SERVICE SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

Scientific Name:

Stygobromus kenki

Common Name:

Kenk's amphipod

Lead region:

Region 5 (Northeast Region)

Information current as of:

06/23/2015

Status/Action

___ Funding provided for a proposed rule. Assessment not updated.

___ Species Assessment - determined species did not meet the definition of the endangered or threatened under the Act and, therefore, was not elevated to the Candidate status.

___ New Candidate

_X_ Continuing Candidate

___ Candidate Removal

> ___ Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status
>
> ___ Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species
>
> ___ Range is no longer a U.S. territory
>
> ___ Insufficient information exists on biological vulnerability and threats to support listing

___ Taxon mistakenly included in past notice of review

___ Taxon does not meet the definition of "species"

___ Taxon believed to be extinct

___ Conservation efforts have removed or reduced threats

___ More abundant than believed, diminished threats, or threats eliminated.

Petition Information

_X_ Non-Petitioned

___ Petitioned

90-Day Positive:

12 Month Positive:

Did the Petition request a reclassification?

For Petitioned Candidate species:

Is the listing warranted(if yes, see summary threats below)

To Date, has publication of the proposal to list been precluded by other higher priority listing?

Historical States/Territories/Countries of Occurrence:

- **States/US Territories**: District of Columbia, Maryland
- **US Counties**: Montgomery, MD
- **Countries**:Country information not available

Current States/Counties/Territories/Countries of Occurrence:

- **States/US Territories**: District of Columbia, Maryland
- **US Counties**: District of Columbia, DC, Montgomery, MD
- **Countries**:Country information not available

Land Ownership:

Sixty percent Federal (National Park Service (NPS)-Rock Creek Park), 20 percent County (Montgomery County, Maryland), and 20 percent private. The sites known to support the species consist of 5 small seeps/springs and their outflows; the 5 sites together have a total surface water

area of less than 1 acre. The acreage needed to protect the recharge areas of these springs is not known but, based on recharge area information from other sites, is likely much greater.

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Biological Information

Species Description:

Kenk's amphipod (*Stygobromus kenki*) was first collected in 1967 by Roman Kenk from a spring in Rock Creek Park, southeast of North National Capitol Parks' headquarters in Washington, D.C. It was formally described by J.R. Holsinger (1978, pp. 39-42). This is a moderately small ground water species, with largest male specimens reaching 3.7 millimeters (mm) (0.15 inches (in)) and largest females 5.5 mm (0.22 in).

Taxonomy:

This amphipod is a member of the Spinosus Group of *Stygobromus* that includes two other closely related species, *S. spinosus* and *S. pseudospinosus*, which are found only in Virginia and primarily in Shenandoah National Park. Kenk's amphipod is distinguished from those two species on the basis of various morphological features (Holsinger 1978, p. 39). These include the palmar (of or pertaining to the hand) margin of gnathopod 1 (pincer-like appendage), which is nearly straight, and the rudimentary ramus (branch) of uropod 3 (posterior (at or towards the rear) appendage), which is only about 1/8 length of the peduncle (a stalk supporting an animal organ, such as the eyestalk of a lobster). It is further distinguished from *S. spinosus* by less spinose (spiny) uropods of the male and shorter telson (posterior projection of the last body section) spines of both sexes. It is further distinguished from *S. pseudospinosus* by the telson, which is proportionately shorter and more spinose (Holsinger 1978, p. 39).

Accurate identification of Kenk's amphipod can occur only when a specimen is removed from the spring site, preserved in a pickling agent for shipping, and sent to the species expert who removes legs and other appendages from the specimen for microscopic identification. This identification method is the best scientific method available. However, the U.S. Fish and Wildlife Service (Service) and scientific community prefer not to use this method very often due to the resulting mortality.

We have carefully reviewed the available taxonomic information to reach the conclusion that Kenk's amphipod is a valid species.

Habitat/Life History:

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) and have modified morphology for survival in the subterranean ground water that is their primary habitat. They are generally eyeless and unpigmented (without color), and frequently have attenuated (reduced in length and width) bodies (Holsinger 1978, pp. 1-2). Members of this genus occur only in freshwater and belong to the family Crangonyctidae, the largest family of freshwater amphipods in North America. Kenk's amphipod is found in wooded areas where ground water emerges to form seepage springs (Holsinger 1978, p. 39). Seepage springs typically have a diffuse discharge of water where the flow cannot be immediately observed but the land surface is wet compared to the surrounding area (Culver *et al*. 2012, p. 2). The shading, hydrologic conditions, and organic matter found in these woodlands are probably factors in maintaining suitable habitat for the species. Kenk's amphipod can be found in dead leaves or fine sediment submerged in the waters of its seepage spring outflows (Holsinger 1978, p. 130). Seepage springs typically have a drainage area of less than 1 hectare (2.5 acres) and differ from small surface waters in having higher conductivity and dissolved oxygen and lower pH and temperature (Culver *et al*.2012, pp. 5-6).

Historical Range/Distribution:

All current and historical occurrences of Kenk's amphipod are from the Potomac River watershed in or near Washington, D.C. At the time of its description, this amphipod was known from two seepage springs in Rock Creek Park in Washington, D.C. and was tentatively identified from one shallow well in Fairfax County in northern Virginia (Holsinger 1978, p. 39, Terwilliger 1991, p.184). However, the single immature male specimen from this well was reexamined by a taxonomic expert and determined not to be Stygobromus kenki (Holsinger 2009, p. 266).

Current Range Distribution:

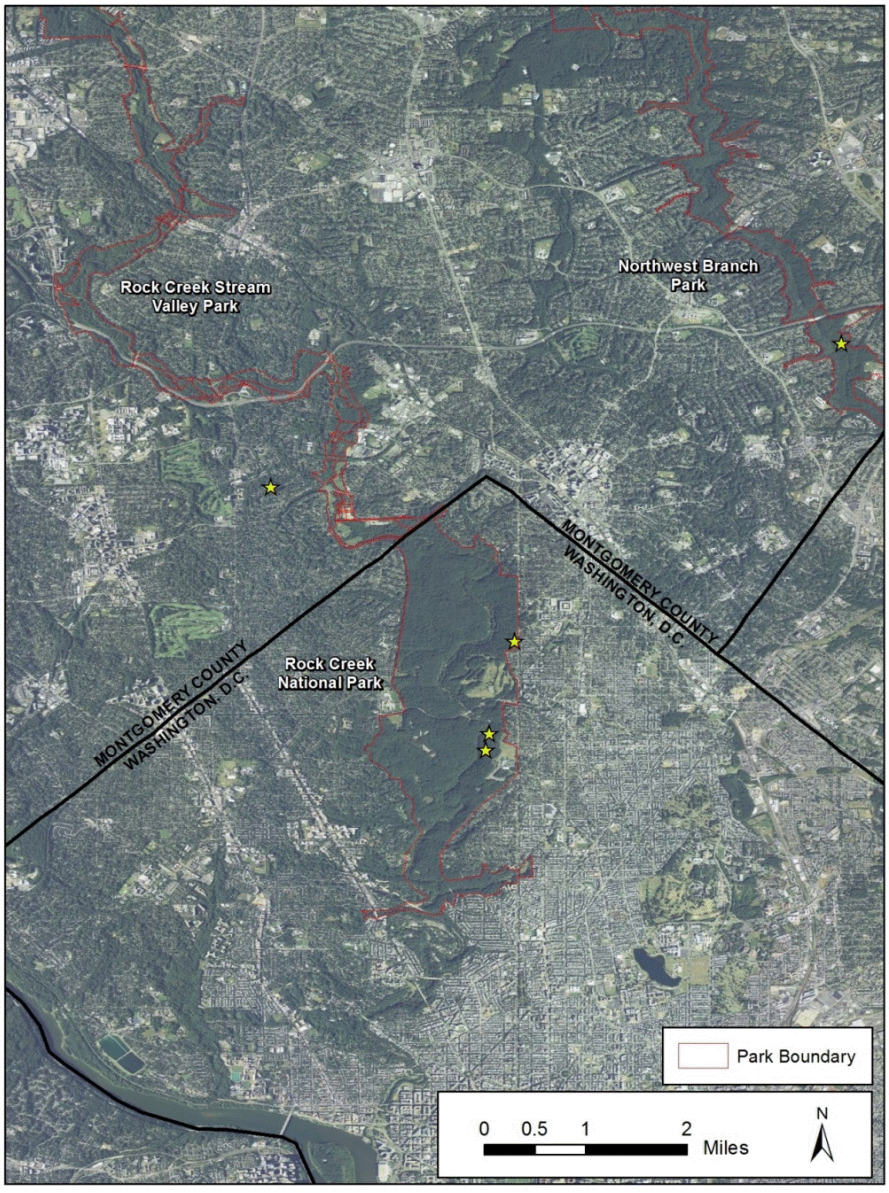
The species is currently known from only five seepage spring sites in the District of Columbia and Montgomery County, Maryland (Culver and Sereg 2004; Feller 2005) (see figure 1). These are the only known sites for the Kenk's amphipod despite extensive surveys for the species in the District of Columbia and Montgomery County, Maryland (Feller 1997; Culver and Sereg 2004; Feller 2005). Ground water amphipod surveys on NPS properties in Arlington and Fairfax Counties, Virginia, failed to detect this species (Hutchins and Culver 2008). Surveys in 2014 in the vicinity of the proposed Purple Line light rail project in Montgomery County, Maryland also failed to detect the species (Culver 2015).

Four of the known occupied sites are within the Rock Creek drainage; three within Rock Creek Park in Washington, D.C. (Kennedy Street Spring, East Spring, and Sherrill Drive Spring); and the fourth (Coquelin Run Spring) in Montgomery County, Maryland, not far from the District of Columbia line. The fifth known site (Burnt Mill Spring #6) is within the Northwest Branch Park in the Northwest Branch drainage in Montgomery County, Maryland, approximately 3 miles from the District of Columbia line. Thus, the current range of this species is limited to Federal land (three

sites) and private property (one site) adjacent to approximately 4 linear miles of Rock Creek, and a single site to the east, on county parkland adjacent to the Northwest Branch. Both Rock Creek Park and the Northwest Branch Park are long, linear parks within heavily urbanized areas.

Kenk's amphipod co-occurs with the federally listed (endangered) Hay's Spring amphipod (*Stygobromus hayi*) at one site, Kennedy Street Spring.

Figure 1 Kenk's Amphipod Distribution



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Population Estimates/Status:

There are no reliable total population numbers for Kenk's amphipod sites due to sampling difficulties (e.g., flow conditions) and the uncertainty concerning what portion of the population may

remain out of reach in the seep/springs ground water supply (Feller 2005, p. 10). The species is typically found in small numbers and then only when ground water levels are high and springs are flowing freely. These conditions typically occur during the spring season, except during especially dry years. Given the small size of the shallow ground water aquifers occupied by this species, and the known characteristics of subterranean invertebrates, it is probable that each of the five populations is small (Hutchins and Culver 2008, pp. 3-6).

There is evidence of survival of the species at each of the five current sites (Feller 2005, pp. 5-7; Culver and Sereg 2004, p. 18). More recent observations made at Burnt Mill Spring #6 in Montgomery County, Maryland, in 2011 and 2015 indicate the presence of *Stygobromus* amphipods. Several of these animals appeared to be Kenk's amphipods based on their physical sizes in visual comparison to the other present amphipods (Feller 2011, pers. comm.; Feller 2015, pers. comm.). Observations at Kennedy Street Spring and East Spring in Rock Creek Park in 2012 and 2015 have also confirmed the continued presence of *Stygobromus* amphipods at these locations. *Stygobromus* amphipods have not been observed more recently at Coquelin Run Spring because we do not have permission to access it. We assume that Kenk's amphipod is still present at all five sites because we have no information to suggest that the site conditions have changed since they were last confirmed there and observations at three of the five known sites indicate that *Stygobromus* amphipods are still found there. Additional information on the status of known populations will be available following a survey conducted in spring 2015 in the District of Columbia and Montgomery County, Maryland.

Threats

A. The present or threatened destruction, modification, or curtailment of its habitat or range:

General

Within the limited area encompassing the current range of this species, the vast majority of potential expanses of seepage spring habitat "large enough to support this species" (and maintain ground water recharge to its springs) has been significantly affected or completely destroyed by urban and suburban development (Feller 2005, p. 11) through both direct destruction of seepage spring locations and indirect impacts to hydrology resulting from the marked increase in impervious surfaces. Kenk's amphipod is vulnerable to threats because of its limited geographic distribution and the infringement of urban development both outside and within Rock Creek Park (Feller 2005, p. 1). Due to large-scale hydrologic changes associated with intensive urban development (increase in impervious cover, contaminated surface area runoff, etc.), all ground water species within the District of Columbia are potentially threatened (Feller 1997, p. 1).

Fragmentation of habitat, as a result of ground water pollution and loss of ground water recharge, is also a factor affecting the species.

New construction surrounding Rock Creek Park, increased land use outside the park, internal park

maintenance operations, and intensive recreational use all pose threats to the seep/spring habitats of this species. For example, prior maintenance activities at the National Zoo (which is located within Rock Creek Park) have resulted in piled tree cuttings and other debris in the spring area occupied by the Hays Spring amphipod (Moser 2011, pers. comm.), which negatively affected the site. While this is an example of effects to another species, similar challenges exist for the Kenk's amphipod. Other threats to the park habitats are toxic spills (e.g., oil, gas), non-point source inputs (e.g., fertilizer and pesticides), additional land disturbance, sanitary sewer leaks, and excessive storm water flows that may affect ground water and related habitats (Culver and Sereg 2004, p. 13). Most of these threats to the Kenk's amphipod have some sources outside of Rock Creek Park and the NPS's jurisdictional authority.

Similar threats are present at the two Montgomery County, Maryland, sites known to support this species; these two sites, which are within the Rock Creek and Northwest Branch watersheds (subunits of the Potomac watershed) were found since the completion of Culver and Sereg's 2004 report. Green space in the Rock Creek and Northwest Branch watersheds in Montgomery County is limited largely to county parks that receive 13 million visitors annually (Feller 2005, p. 2). The habitat impacts associated with the intense recreational use from that many visitors can be severe.

Water Quality Degradation

Studies of water quality by Culver and Sereg (2004) included all three springs in Rock Creek Park supporting Kenk's amphipod, but only the Sherill Drive spring showed clear evidence of water quality degradation. However, water quality degradation is an ongoing threat and may have been a factor increasing the rarity of Kenk's amphipod in Rock Creek Park. This is especially likely to the north of Military Road, in the four springs extending from Sherrill Drive Spring to Holly Street Spring. Sherrill Drive Spring is highly vulnerable to degradation because it is located at the base of the 16th Street embankment near the edge of the park (Feller 1997, p. 37). Threats include those associated with immediate proximity to heavily used roads and urban residential development. Urban runoff (containing high levels of cadmium, zinc, and nitrates) and erosion in the vicinity of this spring are significant threats to the water quality and stability of this spring. In addition, the nearby sanitary sewer line is structurally unsound and is subject to leakage (Feller 1997, p. 37; Yeaman 2011). The potential for sanitary sewer line leakage is present at many locations within Rock Creek Park and the Northwest Branch Park in Montgomery County because these are linear parks established along stream valley corridors that also function as corridors for buried sewer and water lines (Feller 2005, p. 2; Feller 2011). Authorization to access Washington Suburban Sanitary Commission (WSSC) Geographic Information System (GIS) maps of sewer and water lines (*https://www.wsscwater.com/home.html*) was recently received and should facilitate more site-specific evaluation of existing or potential impacts related to sewer and water line leakage. Adverse effects of ground water pollution, including sewage contamination, on amphipods and other invertebrates were documented by Simon and Buikema (1977), Sket (1977), and Culver et al. (1992). For instance, Simon and Buikema's (1977) study of a karst ground water system found that amphipods were absent from ground water pools polluted by septic system effluent.

In 2004, Culver and Sereg had indicated that Kenk's amphipod was barely surviving in Sherrill

Drive Spring and was absent from the other three springs north of Military Road (Alaska, Holly, and Walter Reed Springs). Given the four springs' geographic proximity to each other, the increases in heavy metal concentration and other water quality concerns in the springs' habitat likely explain the absence of this amphipod from the other three springs (Culver and Sereg 2004, p. 73). The surveys conducted by Culver and Sereg (2004) remain the best available information because they are the most recent comprehensive survey efforts for the species in Rock Creek Park. Surveys are undertaken only when Service or NPS funding is available.

The toxicity of heavy metals, especially cadmium and zinc, to amphipods and other aquatic crustaceans has been well documented and has been shown to result in mortality and sublethal effects at low concentrations (Eisler 1985; Eisler 1993; Gossiaux *et al*. 1992; Brumec-Turk 1998). In addition to finding heavy metal concentrations, Culver and Sereg 2004 (p. 69) found that Sherrill Drive Spring consistently had the highest conductivity (a measure of salinity) and nitrate values. Therefore, Sherrill Drive Spring shows anthropogenic influence and, consequently, greater degradation in water quality than the other four springs in Rock Creek Park with extant, high numbers of *Stygobromus* species (Kennedy Street Spring, Carter Baron Spring, East Spring, and Park Police Spring) (Culver and Sereg 2004, p. 69).

Water Quantity and Hydrology

Impervious cover from residential and commercial development (buildings, parking lots, etc.) changes the hydrology of the watershed by preventing ground water recharge and results in decreased flows in the springs and seeps supporting Kenk's amphipod. Feller (1997, p. 25) indicates the hydrology of East Spring, in Rock Creek Park, is affected by the existing extensive parking area, tennis courts, and lawn areas in parklands above the spring. Adverse effects on subterranean aquatic invertebrates from changes in hydrology have been documented by Culver et al. (1992) and Datry *et al*. (2005). The Service will continue to evaluate potential changes in impervious cover over the last several decades utilizing new GIS data as they become available.

Coquelin Run Spring, in Montgomery County, is immediately adjacent to an unnamed intermittent tributary of Coquelin Run (a tributary of Rock Creek). This unnamed tributary drains a residential development and occasionally floods the seepage spring emergence (Feller 2005, pp. 5-6). This site is at high risk of ongoing and continual hydrologic changes and pollution because it is on private land closely situated to extensive impervious surfaces and periodically subjected to runoff from residential development (Feller 2005, p. 9).

In summary, the present and threatened destruction or modification of this species' habitat (including ground water, seepage springs, and spring runs), particularly from water quality and quantity degradation, is the principal threat to Kenk's amphipod. The species is especially vulnerable to this threat because of its small range and the small size of the surface water catchment areas supporting each of the inhabited ground water areas and the associated seepage springs.

B. Overutilization for commercial, recreational, scientific, or educational

purposes:

Overutilization is not known to be a factor threatening Kenk's amphipod. The last scientific collections of this species were made during NPS- or Service-funded surveys as documented by Feller (1997 and 2005) and Culver and Sereg (2004). These surveys were conducted to evaluate the species' distribution and involved the collection of very small numbers of Kenk's amphipod. Surveys planned in spring 2015 will follow specific protocols to minimize effects to the species. Because the occurrence of subterranean invertebrates at spring emergence sites likely represents only a small portion of the actual underground population, these collecting procedures are considered nondetrimental to the populations (Feller 1997).

C. Disease or predation:

Disease or predation is not known to be a factor threatening Kenk's amphipod.

D. The inadequacy of existing regulatory mechanisms:

Species-specific protections

The District of Columbia has no existing laws specifically intended to protect the Kenk's amphipod. Maryland has listed Kenk's amphipod as a State endangered species under its Nongame and Endangered Species Conservation Act. This designation makes "taking, possession, transportation, exportation, processing, sale, offer for sale, or shipment within the State" of a State-listed species unlawful. Because we have determined that these activities do not constitute threats to the species, we conclude that this existing State regulatory mechanism is adequately achieving its intended purpose.

NPS protections

The NPS provides some protection for the habitat at the three seepage spring sites supporting Kenk's amphipod in Rock Creek Park. Conservation of park resources is mandated by the National Park Service Organic Act of 1916 which requires the NPS "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."Â It is also mandated by section 7 of the Rock Creek Park enabling legislation of 1890, which states that "such regulations shall provide for the preservation from injury and spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as nearly as possible."Â These laws are implemented through the NPS's formal management policy, which requires that management of candidate species should, to the greatest extent possible, parallel the management of federally listed species (Pavek 2011). The NPS has made a concerted effort to protect the habitat of this species (see Conservation Measures Planned or Implemented section below for specifics), fully meeting the requirements of these laws and the NPS's management policy.

While the NPS is utilizing its regulatory authority to manage threats to the species within the Rock Creek Park, the NPS has little influence over the protection of any seep recharge areas outside Park boundaries.

Water quality protections

The Clean Water Act (CWA) has as its goal the restoration and maintenance of the chemical, physical, and biological integrity of the nation's waters. Waters of the United States include any surface water, including intermittent streams, and those underground sources that have a direct hydrologic connection to a surface stream (*http://www.inece.org/4thvol2/devlin.pdf*; last accessed June 23, 2015). Polluted stormwater runoff entering ground water and seepage spring sites is the main water quality threat facing the Kenk's amphipod. Stormwater runoff is commonly transported through Municipal Separate Storm Sewer Systems (MS4s), from which it is often discharged untreated into local waterbodies. To prevent harmful discharges of pollutants into an MS4, the CWA's National Pollutant Discharge Elimination System (NPDES) program requires permits for discharges into MS4s and development of stormwater management programs. Because some habitats of the Kenk's amphipod contain harmful levels of pollutants (see Factor A), we conclude that the CWA has not adequately protected the species from the threat of water quality degradation.

E. Other natural or manmade factors affecting its continued existence:

Because all known occurrences of this species are in wooded areas, use of Dimilin to control gypsy moth outbreaks on public land in Montgomery County, Maryland was considered a threat to the Kenk's amphipod, as small concentrations of this pesticide are known to cause crustacean mortality (Feller 2009). Dimilin has been shown to be especially toxic to freshwater amphipods (Fischer and Hall 1992, p. 45). However, because the NPS does not permit the spraying of Dimilin in Rock Creek Park and Montgomery County has discontinued its use in its gypsy moth spray program (Tatman 2015 pers. Comm.), use of Dimilin is no longer a threat to the Kenk's amphipod.

The small number of populations and their limited areal extent make this species more vulnerable to all threats. In addition, the isolation of the Montgomery County sites from each other and the Rock Creek Park sites makes natural recolonization, should the species be extirpated at these sites, unlikely.

Climate change has the potential to adversely affect the species, particularly if it results in significant changes in ground water temperatures or in the amount of precipitation in the Washington, D.C., metropolitan area. The 2014 National Climate Assessment indicates that overall warming in the Northeast, including Maryland and the District of Columbia will be from 3 to 10 degrees Fahrenheit (1.7 to 5.6 degrees Celsius) by the 2080s (Horton *et al*. 2014, p. 374 in Melillo *et al*. 2014). Based on the work of Menberg *et al*. (2014, entire), we expect this change in air temperature to be reflected in the temperature of the shallow ground water within a few years, but at a lower magnitude. Menberg *et al.'*s (2014) study demonstrated that the changes in ground water temperature were reflected from 1 to 4 years after the changes in surface air temperature and were

dampened in magnitude by 40 to 70 percent. Information on the effect of increased temperatures on the European stream amphipod *Gammarus fossarum* indicates that reproductive success was reduced to zero at temperatures above 24 degrees C and that eggs did not survive at 26 degrees C; for *Gammarus roeseli*, reproductive success was zero above 26 degrees C, and egg survival was zero at 26 degrees C (Pockl and Humpesch 1990). Since the maximum temperature measured in *Stygobromus kenki* springs was 19.2 degrees C, adverse effects of climate change on this species seem possible. However, the amphipods in the study are in different habitats (streams) that may not be comparable to the springs *S. kenki* inhabits. In summary, it is highly probable that by the 2080s some increase in ground water temperatures will occur at sites occupied by Kenk's amphipod, but the magnitude and significance of these changes are difficult to predict. However, given the wide ranges in the predicted air temperature changes, there is a potential for adverse effects to Kenk's amphipod.

The 2014 National Climate Assessment also indicates that there will be (1) an increase of 0 to 20 percent in winter and spring rainfall; (2) an increase of 0 to 10 percent in summer rainfall; (3) no change in fall rainfall in the Washington, D.C. area; and (4) an increased frequency of heavy downpours (Walsh *et al*. 2014, pp. 19, 30, 42-47 in Melillo *et al*. 2014)). These predictions may translate into a lower probability of springs drying up, and a higher probability of erosion of surface features in the vicinity of springs. While increased erosion of surface features is considered a stressor for Kenk's amphipod, we do not consider it a threat to the species' survival.

Conservation Measures Planned or Implemented :

As stated above, the NPS has made a concerted effort to protect the habitat of this species within Rock Creek Park. This has included working with the District of Columbia Department of Transportation to incorporate the construction of a storm sewer under Sherrill Drive into the design of the 16th Street road reconstruction and storm drainage project, resulting in the elimination of a major outfall at the Kenk's amphipod Sherrill Drive Spring site (Yeaman, pers. comm., 2015).

The Service, NPS, and District of Columbia Department of the Environment have worked cooperatively to obtain funding for best management practices (reducing erosion and increasing infiltration) on two tributaries flowing into the drainage of Kennedy Street Spring, which supports both Kenk's amphipod and the federally endangered Hay's Spring amphipod. Project funding was approved in January of 2015 and implementation, which includes construction of bioretention basins and infiltration berms, is to be completed by November 2017 (Saari 2015).

The Service has funded additional surveys for this species to be conducted in 2015 to confirm its continued survival at known sites and to look for new sites in Montgomery County, Maryland, and the District of Columbia. These surveys were initiated in late March 2015 and should be completed by the end of the 2015 calendar year.

In addition, the Service is seeking the expertise of a hydrogeologist to delineate the recharge areas of the seepage springs supporting Kenk's amphipod. These studies, to be initiated in 2016, are expected to assist in analyzing water quality and quantity threats to the species.

Summary of Threats :

The primary threats to this species are modification of hydrology (water quantity) and degradation of water quality at the seepage springs it inhabits (Factor A). Although all but one of the sites supporting this species are on Federal or county park land, significant water quality and quantity threats remain, in part because of the activities occurring on the private lands surrounding these narrow linear parks. Of particular concern are effects on the springs' recharge areas, which may, in some cases, extend well beyond the boundaries of the parks. With only five small sites in a relatively small geographic area known to support this species, it is highly vulnerable to the threats to the hydrology and water quality of its seepage spring habitat. Therefore, we find that Kenk's amphipod warrants listing throughout its entire range.

For species that are being removed from candidate status:

_____ Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions(PECE)?

Recommended Conservation Measures :

Measures are recommended to protect the water quality and hydrology at the springs and seeps supporting this species. These include:

1) Maintain a buffer around each of the seepage springs and associated spring runs where recreational activities, construction activities (including construction of new trails), erosion, and other activities that affect water quality are prohibited or discouraged.

2) Avoid any increase in impervious surfaces, loss of forested areas, road salting, erosion, and pesticide spraying in the catchment basins of each of the seepage springs.

3) Fund studies to delineate recharge zones of each of the seepage springs known to support this species; this might be combined with a similar study of the federally endangered Hay's Spring amphipod's spring sites in Rock Creek Park. Once this delineation is complete, designate areas within the park to protect and manage these recharge zones.

4) Redirect existing artificial surface flows away from springs and spring runs supporting the species.

5) Initiate an outreach program for surrounding landowners within the catchment basins to discuss minimizing ground water pollution and flow alterations.

6) Conduct nonlethal population monitoring of amphipods at least every other year at the springs where Kenk's amphipod has been documented. This would include recording presence/absence of amphipods of the genus *Stygobromus* at the springs and the presence/absence of amphipods of appropriate size (5 to 6 mm (0.22 in)) to be Kenk's amphipod. Although some of the amphipods in

this size range may be juveniles of other species, they would be an indication of active reproduction and evidence of a suitable habitat quality for the Kenk's amphipod, as well as the more common *Stygobromus* species.

7) Every 5 years, collect and preserve specimens of appropriate sized *Stygobromus* from the known Kenk's amphipod springs for definitive identification by the species expert.

8) Every other year collect water quality data from the known Kenk's amphipod springs; this could be done at the same time as amphipod monitoring.

9) If possible, develop a method to measure spring flow that does not damage the spring or spring run, and conduct measurements at the known Kenk's amphipod sites.

10) Where it will result in an overall benefit to the species, replace/repair or reline leaky sewer lines currently affecting four of the five seepage springs: Sherrill Drive, Kennedy Street, East Spring, and Burnt Mill Spring #6. The District of Columbia Department of the Environment is developing a project to protect and reinforce the sewer line that is exposed above the spring run at East Spring (Yeaman 2015).

11) Encourage Montgomery County to implement the above recommendations in Northwest Branch Park.

12) Obtain additional information on the condition of sewer and water lines adjacent to the four known Kenk's amphipod sites, and the lines' potential to affect the species' habitat. We have contacted the Washington Suburban Sanitary Commission to obtain GIS mapping of sewer and water lines to help us with this assessment.

13) Develop a Memorandum of Understanding with the NPS to address specific threats within its control and explore a similar agreement with the Montgomery County Parks Department.

Priority Table

Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/Population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/Population	6
Moderate to Low	**Imminent**	Monotypic genus	7
		Species	**8**
		Subspecies/Population	9
	Non-Imminent	Monotype genus	10
		Species	11
		Subspecies/Population	12

Rationale for Change in Listing Priority Number:

Magnitude:

All five known sites of occurrence face threats to the hydrology and water quality of their springs. However, these threats are chronic in nature and appear to be increasing only gradually.

Imminence :

Pollution and/or hydrologic changes continue to occur at the majority of springs supporting this species.

__Yes__ Have you promptly reviewed all of the information received regarding the species for the purpose of determination whether emergency listing is needed?

Emergency Listing Review

__No__ Is Emergency Listing Warranted?

Emergency listing of Kenkâs amphipod is not warranted at this time because the main threats to the species are chronic in nature and appear to be increasing only gradually. Extinction is not imminent because there are five extant sites and the intensity of threats at each of these sites varies considerably.

Description of Monitoring:

Annual monitoring of seepage spring flows (water quantity), water quality, and population numbers has not been implemented for this species (see Recommended Conservation Measures section, above, for the suggested monitoring schedule). However, population monitoring may not be possible since the majority of the population is likely to be underground at any given time and the number of individuals captured appears to depend more on flow levels than actual population levels. Current sampling is primarily aimed at determining presence/absence at individual springs when they are flowing. Flow rates at the two Montgomery County sites supporting the species were estimated at 1 gallon per minute (gpm) in March 2005 (Feller 2005, pp. 5â6). Flow rates at springs in Rock Creek Park averaged 2.4 gpm during March and April (generally the wettest time of year) (Feller 1997, p. 11).

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment:

District of Columbia,Maryland

Indicate which State(s) did not provide any information or comment:

none

State Coordination:

We have coordinated with the State of Maryland's Wildlife and Heritage Program and NPS biologists (all known District of Columbia sites are found within Rock Creek Park).

Literature Cited:

Literature Cited:

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Approval/Concurrence:

Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: 

07/28/2015
Date

Concur: _____

_____
Date

Did not concur: _____

_____
Date

Director's Remarks: