# 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:

05/13/2011

## 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

___ Taxon not subject to the degree of threats sufficient to warrant issuance of

___ Range is no longer a U.S. territory

___ Insufficient information exists on biological vulnerability and threats to s

___ 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

## 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?

Explanation of why precluded:

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, the majority our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements; meeting statutory deadlines for petition findings or listing determinations; emergency listing evaluations and determinations; and essential litigation-related administrative and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of Progress on Revising the Lists, in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).

## Historical States/Territories/Countries of Occurrence:

- **States/US Territories**: District of Columbia, Virginia
- **US Counties**: Fairfax, VA
- **Countries**:Country information not available

## Current States/Counties/Territories/Countries of Occurrence:

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

## Land Ownership:

60 percent Federal [National Park Service-Rock Creek Park], 20 percent County [Montgomery County, Maryland], and 20 percent private. The sites known to support the species consist of five small seeps/springs and their outflows; the five 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 is certainly much greater.

## Lead Region Contact:

ARD - Ecological Services, Krishna Gifford, 413-253-8619, krishna_gifford@fws.gov

## Lead Field Office Contact:

Chesapeake Bay ESFO, Andy Moser, 410-573-4537, andy_moser@fws.gov

# 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 Parks headquarters in Washington, D.C. It was formally described by J.R. Holsinger (1978, pp.39-42). This is a moderately small groundwater species, with largest male specimens reaching 3.7mm (0.15 inches (in)) and largest females 5.5mm (0.22 in).

## Taxonomy:

This amphipod is a member of the Spinosus Group of *Stygobromus* which includes two other closely related species, *S. spinosus* and *S. pseudospinosus*, which are found only in Virginia and primarily in Shenandoah National Park. It 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). We have carefully reviewed the available taxonomic information to reach the conclusion that *S. kenki* is a valid species.

## Habitat/Life History:

Amphipods of the genus *Stygobromus* occur in groundwater or groundwater-related habitats (e.g. caves, seeps, small springs, wells, interstices, and rarely deep lakes) and have modified morphology for survival in these subterranean habitats. 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. *Stygobromus kenki* occurs in seeps and springs, in wooded areas (Holsinger 1978, p.39). The shading, hydrologic conditions, and organic matter found in these woodlands are probably factors in maintaining suitable habitat for the species. It can be found in dead leaves or fine sediment submerged in the waters of its spring/seep outflows (Holsinger 1978, p.130).

## Historical Range/Distribution:

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

## Current Range Distribution:

The species is currently known only from five spring/seep sites in Washington D.C. and Montgomery County, Maryland (Feller 2005). These are the only known sites for the species despite extensive surveys for

the species in the District of Columbia and Montgomery County, Maryland (Feller 1997 and 2005, Culver and Sereg 2004). Groundwater amphipod surveys on National Park Service properties in Arlington and Fairfax Counties, Virginia, also failed to detect this species (Hutchins and Culver 2008).

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 line. The fifth known site (Burnt Mill Spring #6) is within the Northwest Branch drainage in Montgomery County, Maryland, approximately three miles from the District line. Thus, the current range of this species is limited to Federal land and private property (one site) adjacent to approximately four linear miles of Rock Creek, and a single site to the east, on county parkland adjacent to Northwest Branch.

Rock Creek Park is a long, linear (approximately 6.5 miles long and a maximum of 1.3 miles wide) park within a heavily urbanized area.

Kenk's amphipod co-occurs with the federally listed Hay's Spring amphipod at one site, Kennedy Spring.

### Population Estimates/Status:

There is evidence of survival of the species at each of the five sites referred to under "Current Range/Distribution" (Feller 2005, pp. 5-7, and Culver and Sereg 2004, p.18). However, there are no reliable population numbers for these sites because of the difficulty of sampling them and the uncertainty concerning what portion of the population remains out of reach in the groundwater supplying the seep/springs at these sites (Feller 2005, p.10). The species is typically found in small numbers and then only when groundwater 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 groundwater 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).

## 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 seep/spring habitat "large enough to support this species" has been significantly impacted or completely destroyed by urban and suburban development (Feller 2005, p.11) through both direct destruction of spring/seep locations and indirect impacts on 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 run-off, etc.), all groundwater species within the District of Columbia are potentially threatened (Feller 1997, p.1).

Fragmentation of habitat, as a result of groundwater pollution and loss of groundwater 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 National Zoo (which is located within Rock Creek Park) maintenance activities have resulted in piled tree cuttings and other debris in the spring area occupied by the Hays Spring amphipod

(Moser 2011, pers. com.), which negatively impacted the site. While this is an example impacting 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 groundwater and related habitats (Culver and Sereg 2004, p.13). Similar threats are present at the two Montgomery County, Maryland, sites known to support this species, which were found since the completion of Culver and Sereg's 2004 report. These two sites are within the Rock Creek and Northwest Branch watersheds (subunits of the Potomac watershed). Green space in the Rock Creek and Northwest Branch watersheds in Montgomery County is limited largely to county parks. These parks are subjected to 13 million annual visitors (Feller 2005, p.2). The habitat impacts associated with the intense recreational use from that many visitors can be severe.

Water Quality Degradation: 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 16thStreet 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 real threats to the water quality and stability of this spring. The nearby sanitary sewer line is structurally unsound and is subject to leakage (Feller 1997, p.37, Yeaman 2011). This threat is present at many locations within Rock Creek Park and the Montgomery County park supporting this species, because these are linear parks established along stream valley corridors which also function as conduits for buried sewer and water lines (Feller 2005, p.2, Feller 2011). Adverse effects of groundwater pollution, including sewage contamination, on amphipods and other invertebrates were documented by Simon and Buikema (1977), Sket (1977), and Culver et al.(1992).

Culver and Sereg (2004) indicate that Kenk's amphipod is barely surviving in Sherrill Drive Spring and is absent from the other three springs [studied by Culver and Sereg]. Given the springs' geographic proximity to each other, the increases in heavy metal concentration and other water quality concerns in the springs' habitat likely explains the absence of this amphipod from the other three springs (Culver and Sereg 2004, p.73). The surveys conducted by Culver and Sereg (2004) are the most recent survey efforts for the species. Surveys are currently undertaken only when Service or National Park Service funding is available. In addition, 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 a leg from the specimen for microscopic identification. This identification method is currently the best scientific method available, but it is not one that the Service and scientific community wants to use very often due to the mortality.

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 heavy metal concentrations, Culver and Sereg 2004 (p.69) also 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 with extant, high numbers of Stygobromus species (Culver and Sereg 2004, p.69).

Water Quantity and Hydrology: 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 (Feller 1997, p.25). The amount of impervious cover from residential and commercial development (buildings, parking lots, etc,) changes the hydrology of the watershed by preventing groundwater recharge, resulting in decreased flows in the springs and seeps supporting this species. In addition, the run-off that does come from those areas and drains into the aquifers and seep/spring habitat of Kenk's amphipod is often contaminated. Such adverse effects on subterranean aquatic invertebrates from changes in hydrology have been documented in the literature (Datry et al. 2005, Culver et al. 1992).

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 spring/seep 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 or range, particularly from water quality and quantity degradation, is the principal threat to this species. It 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 spring/seeps it inhabits.

## B. Overutilization for commercial, recreational, scientific, or educational purposes:

This is not known to be a factor threatening Kenk's amphipod. The last scientific collections of this species were made during National Park Service or Service funded surveys as documented by Feller (1997 and 2005) and Culver and Sereg (2004). These surveys were conducted to evaluate the distribution of the species and involved the collection of very small numbers of Kenk's amphipod. Since the occurrence of subterranean invertebrates at spring emergences 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:

This is not known to be a factor threatening Kenk's amphipod.

## D. The inadequacy of existing regulatory mechanisms:

District of Columbia laws currently provide no protection for this invertebrate species. However, Maryland has listed *S. kenki* as a state endangered species. Therefore, state regulations will provide the species some protection at Maryland sites but unlike Federal law and regulation, do not provide for the designation of critical habitat.

Some protection for the habitat at the three spring/seep sites supporting this species in Rock Creek Park is provided by the National Park Service (NPS). This conservation of park resources is mandated by the National Park Service Organic Act of 1916 and the Rock Creek Park enabling legislation of 1890. In addition, Park Service policy requires that management of candidate species should, to the greatest extent possible, parallel the management of federally listed species (Pavek 2011). NPS has made a concerted effort to protect the habitat of this species (see Conservation Measures Planned or Implemented section below for specifics); however, the NPS cannot provide protection of any seep recharge areas which extend outside Park boundaries.

Therefore, we conclude that the protections from existing regulatory mechanisms are not adequate to alleviate the threats to Kenk's amphipod.

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

Because all known occurrences of this species are in wooded areas, widespread use of Dimilin to control gypsy moth outbreaks on public land in Maryland is a potential 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, three of the

five sites supporting this amphipod are not subject to this threat because the National Park Service does not permit the spraying of Dimilin in Rock Creek Park.

Climate change has the potential to adversely affect the species, particularly if it results in a significant change in the amount of precipitation in the Washington, D.C. metropolitan area. Decreases in precipitation within the species' range may result in the drying up of springs/seeps while increases in precipitation may result in washing away of important surface features or excessive erosion at spring/seep sites. However, based on the limited available information, there is considerable uncertainty regarding whether climate change may be a threat to this species.

## 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 Department of Transportation so that design of their 16th Street road reconstruction and storm drainage project incorporated the construction of a storm sewer under Sherrill Drive, resulting in the elimination of a major outfall at the Kenk's amphipod Sherrill Drive spring site. However, the Park must still continually deal with water quality threats from outside the Park, as well as the demand for additional recreational features within this heavily used park. For the two spring/seep sites outside Rock Creek Park, we are not aware of any conservation measures that have been planned or implemented.

## Summary of Threats :

The primary threats to this species are modification of hydrology and degradation of water quality at the springs/seeps and spring runs of its aquatic habitat. 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 extend well beyond the boundaries of the parks. In addition, some of the recreational activities and past and future developments within the park lands have the potential to threaten the species. 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 spring/seep habitats. Therefore, we find that Kenk's amphipod should be listed throughout its entire range and that further analysis is unnecessary to determine whether it is threatened or endangered in a significant portion of its 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 maintain the water quality and quantity at the springs and seeps supporting this species. These include:
1) Maintain a buffer around each of the springs/seeps and associated spring runs where recreational activities, construction activities including new trails, and other activities that impact water quality are prohibited or discouraged.
2) Avoid any increase in impervious surfaces, loss of forested areas, road salting, and pesticide spraying in the catchment basins of each of the springs/seeps.
3) Carry out studies to delineate recharge zones of each of the 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 parks 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 educate them in regard to minimizing groundwater pollution and flow alterations.

# Priority Table

| Magnitude | Immediacy | Taxonmomy | 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 are already occurring 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 Kenk’s 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. Furthermore, because these threats are, for the most part, not amenable to law enforcement action or under the control of Federal agencies, listing would not afford immediate protection from these threats.

## Description of Monitoring:

Regular monitoring of spring/seep flows and population numbers has not been implemented for this species. Methods/procedures to monitor flows and population numbers should be explored. However, meaningful 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. In March 2005, flow rates in the two Montgomery County sites supporting the species were estimated at 1 gallon per minute (gpm) (Feller 2005, pp.5-6). Springs in Rock Creek Park had an average flow of 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:

The State of Maryland's Wildlife and Heritage Program provided comments on this candidate assessment. National Park Service biologists provided comments relating to the District of Columbia portion of Kenk's amphipod range, since all known District of Columbia sites are found within Rock Creek Park.

## Literature Cited:

**LIterature Cited**

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Simon, K.S and A.L.Buikema,jr. 1997. Effects of Organic Pollution on an Appalachian Cave: Changes in macroinvertebrate populations and food supplies. Am. Midl. Nat. 138:387-401.

Sket, B. 1977. Gegenseitige Beeinflussung der Wasserpollution und des Hohlenmilieus. Proceedings of the 6th International Congress of Speleology, Olomouc, CSSR, 1973: 4, 253-62.

Terwilliger, K. 1991. Virginia's Endangered Species, Proceedings of a Symposium. McDonald and Woodward, Blacksburg, VA. 672 pp.

Yeaman, B. Telephone conversation record of 5/12/2011. Rock Creek Park, National Park Service, Washington, DC.

## 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:  06/03/2011
Date

Concur: _____ _____
Date

Did not concur: _____ _____
Date

Director's Remarks: