

# SPECIES FACT SHEET

**Common Name:** Johnson's Waterfall Carabid Beetle

**Scientific Name:** *Pterostichus johnsoni* (Ulke 1889)

Phylum: Mandibulata

Class: Insecta

Order: Coleoptera

Family: Carabidae

Subfamily: Harpalinae

Subgenus: Orsonjohnsonus

## **Conservation Status:**

Global Status: GNR

Rounded Global Status: GNR - Not Yet Ranked

National Status (United States): NNR

State Statuses: Oregon (S2?), Washington (not ranked)  
(NatureServe 2008)

## **Technical Description:**

Adult: *Pterostichus* is a large genus in the Carabidae (ground beetle) family. This species was originally described by Ulke (1889), as follows:

Elongate, depressed, parallel, shining black with a feeble purplish luster; prothorax quadrate, longer than wide, feebly narrowed behind, sides margined in their entire length and feebly sinuate, front angles rounded at tip, base sinuate, hind angles rectangular, basal impressions long, deep and linear, outer ones very small. Elytra shining in the male, nearly opaque in the female, feebly rounded on the sides, sinuate near the tip and separately rounded; humeri rounded, striae very deep, impunctured, interstices rather costiform, 1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>, and 8<sup>th</sup> equal straight, 3<sup>rd</sup> and 5<sup>th</sup> broader and seven or eight times interrupted; the space between the 8<sup>th</sup> and the margin is still a little broader and the interrupted 9<sup>th</sup> costa forms about 15 or 16 tubercles.

Prosternum narrowly margined between the coxae; posterior tarsi slender with the first and second joints grooved in their entire length. Abdomen smooth, shining, last ventral segment with a semicircular impression in both sexes, somewhat deeper in the male. Length: 16.5 to 17 mm (.65 to .67 in.). This species is distinguished by its peculiar sculpture of the elytra, which recalls somewhat that of *P. punctatissimus* Randall (Ulke 1889).

Immature: A description of the larvae of this species is not available.

## **Life History:**

This flightless species is presumably predatory on other small invertebrates in both the larval and adult stages (Johnson 2006, *pers. comm.*), probably feeding

in moss when the weather is overcast, and retreating under gravel during bright parts of the day (Piper 1911). The phenology of this species is unknown, but the available records of adults are from May through August (Johnson 2008, *pers. comm.*). Congeneric *Pterostichus aterrimus* has an annual life cycle, breeding in spring and passing through the summer months as larvae (UK Biodiversity Group 1999), with adults available during the cooler months of the year. Similarly, the adults of congeneric *Pterostichus rothi* are most active during cooler months (October through March or April); adult activity in this species appears to gradually decline during the hot season when the soils become dry and the adults seek refugia (Brenner 2005, LaBonte 1993).

### **Range, Distribution, and Abundance:**

The range of this species stretches from northern Washington to central Oregon, with reportedly greater than 200 localities known (Bergdahl 2008, *pers. comm.*). It has been recorded between 1976 and 1980 from several sites in the Columbia River Gorge National Scenic Area, Oregon, including Multnomah Falls, Horsetail Falls, and Latourelle Falls (Johnson 2008, *pers. comm.*). Additionally, it occurs on the Washington side of the Gorge, although there are very few records close to the Columbia River and the species' distribution in this area remains poorly known (Bergdahl 2009, *pers. comm.*). Historical records include two creeks near Mehama, Marion Co., Oregon (the type series, 1878 and 1888), and Green River Gorge, King Co., Washington (Hatch 1933). Extensive survey work by James Bergdahl has established that the Skagit River in Washington is a terminal barrier to the species' dispersal north (Bergdahl 2008, *pers. comm.*). The southern range of this species extends to the central Oregon Cascades, apparently ending near the foothills and mountains east of Lebanon, although there appears to be no obvious reason why the species range would end there except possibly as an artifact of its natural history during the Pliocene and Pleistocene (Bergdahl 2009, *pers. comm.*). The Piper's Rock Creek record seems to be one of very few records of the species south of the North Fork Santiam River, and this species, typically found only along small and mid-sized forest streams in shaded positions, is not expected to occur along the lower reaches or the main stem of this river, although it is probably not uncommon in the mountains between the North Fork Santiam River and the MacKenzie River (Bergdahl 2009, *pers. comm.*). At present, the southern-most record of this species is from Falls Creek, Linn Co. (2000), but extensive survey work to further document the southern most extent of this species' range in Oregon is needed (Bergdahl 2008, *pers. comm.*). Apparently it has never been collected in the H. J. Andrews Experimental Forest in Oregon, or in the Oregon Coast Range. Likewise, it has not been recorded from the Olympic Mountains in Washington, or from east of the crest of the Washington Cascades (Bergdahl 2008, *pers. comm.*). The present geographic distribution of this species appears to be a legacy of poor power-of-dispersal out of the Pleistocene-age 'refugia' (Bergdahl 2008, *pers. comm.*).

BLM/Forest Service Lands: Documented occurrences are from the Columbia River Gorge National Scenic Area, Oregon. Note that there are many records and specimens of this species (held by James Bergdahl) with undisclosed localities (Bergdahl 2008, *pers. comm.*). Personal communication with James Bergdahl (2008) suggests that the species likely occurs on additional federal lands.

### **Habitat:**

This flightless species is found along the gravelly margins of small-to-mid-sized, densely shaded, coldwater streams coming down from the mountains (Bergdahl 2008, *pers. comm.*). In subalpine habitats, stream gradients appear to be too flat for the survival of this species (Bergdahl 2008, *pers. comm.*). Adults have been collected from wet moss on boulders and in gravel in the spray of waterfalls. In Washington, it has been reported from the gravel of talus slopes constantly wetted by the spray of falls, as well as under rocks near streams fed by these falls (Hatch 1933). Johnson (2006, *pers. comm.*) states that it requires cold running water and well-shaded gravel banks; the species appears unable to establish populations on open, sun exposed, higher-order mainstem creek and river reaches (Bergdahl 2009, *pers. comm.*). Piper (1911) ascertained that little patches of gravel between large mossy boulders are the natural microhabitat of this species. It is presumably predatory on other small invertebrates in both the larval and adult stages (Johnson 2006, *pers. comm.*), probably feeding in moss when the weather is overcast, and retreating under gravel on bright days (Piper 1911).

### **Threats:**

Populations are at risk of local extirpation if (1) small and mid-sized forest streams are not adequately buffered from logging operations, and (2) stand- or watershed-level clear cuts and road-building activities are so large or so extensive that stream hygrographs and streamside habitats are significantly disrupted, even with buffers (Bergdahl 2008, *pers. comm.*). Additionally, over-collecting may threaten some populations of this species, particularly along small creeks in the Oregon side of the Columbia River Gorge, where published sites are easy for collectors to access, and populations are undoubtedly already fairly vulnerable (Bergdahl 2009, *pers. comm.*).

### **Conservation Considerations:**

Inventory: Re-evaluation of this species' status at the known sites is critical in identifying both its current distribution and its conservation needs. Abundance estimates for this species at new and known sites would also assist future conservation efforts, since population size is important in evaluating the stability of a species at a given locality. Waterfalls in cool, densely forested streams in old-growth or mature forest watersheds are good candidates for new population sites.

Management: Protect all new and known sites and their associated watersheds from timber harvest and other practices that would adversely affect this species' habitat and survival. Riparian habitat protection, including maintenance of water quality, substrate conditions, and canopy cover, would likely benefit and help maintain this species.

**Version 2:**

Prepared by: Sarah Foltz  
Xerces Society for Invertebrate Conservation  
Date: May 2009

Edited by: Sarina Jepsen  
Xerces Society for Invertebrate Conservation  
Date: June 2009

**Version 1:**

Prepared by: Eric Scheuering  
Date: January 2006

**ATTACHMENTS:**

- (1) **References**
- (2) **List of pertinent or knowledgeable contacts**
- (3) **Survey Protocol**

**ATTACHMENT 1: References:**

Bergdahl, J. 2008. Personal communication with Sarah Foltz, Xerces Society for Invertebrate Conservation.

Bergdahl, J. 2009. Personal communication with Sarah Foltz, Xerces Society for Invertebrate Conservation.

Brenner, G. 2005. ISSSSP Species Fact Sheet: *Pterostichus rothi*. Available at: <http://www.fs.fed.us/r6/sfpnw/issssp/species-index/fauna-invertebrates.shtml> (Last accessed 23 Dec. 2008).

Hatch, M.H. 1933. Notes on Carabidae. Pan-Pacific Entomologist 9: 117-121.

LaBonte, J.R. 1993. Roth's Blind Beetle (*Pterostichus rothi* Hatch: Coleoptera: Carabidae): Habitat, Survey, Threatened and Endangered Status. A Challenge Cost-Share Project funded through the Bureau of Land management and the Nature Conservancy's Oregon Natural Heritage Program, 49pp.

Johnson, Paul. 2006. Personal communication with Eric Scheuering.

Johnson, Paul. 2008. Personal communication with Sarah Foltz, Xerces Society for Invertebrate Conservation.

NatureServe. 2008. "*Pterostichus johnsoni*." *NatureServe Explorer: An online encyclopedia of life [web application]*. Feb. 2008. Version 7.0. NatureServe, Arlington, Virginia. 7 Jan. 2009 <<http://www.natureserve.org/explorer/>>

Piper, C. V. 1911. Notes on *Pterostichus johnsoni* Ulke. Proceedings of the Entomological Society of Washington XIII: 62-64. Available at: [http://www.archive.org/stream/proceedingsofent13ento/proceedingsofent13ento\\_djvu.txt](http://www.archive.org/stream/proceedingsofent13ento/proceedingsofent13ento_djvu.txt) (Last accessed 7 January 2009).

Ulke, H. 1889. A new species of *Pterostichus*. Entomologica Americana V: 59. Available at: <http://ia310815.us.archive.org/0/items/entomologicaamer46188890broo/entomologicaamer46188890broo.pdf> (page 257 of pdf file, last accessed 7 January 2009).

UK Biodiversity Group. 1999. Species Action Plan: a Ground Beetle (*Pterostichus aterrimus*). Tranche 2 Action Plans - Volume IV: Invertebrates. Tranche 2 (4): 127. Available at <http://www.ukbap.org.uk/UKPlans.aspx?ID=540#8> (Last accessed 23 Dec. 2008).

## **ATTACHMENT 2: List of pertinent, knowledgeable contacts:**

- Paul Johnson, Professor of Entomology, Insect Research Collection, South Dakota State University.  
Phone: 605.688.4438 Email: [paul.johnson@sdstate.edu](mailto:paul.johnson@sdstate.edu)
- James LaBonte, Plant Division, Oregon Department of Agriculture
- James Bergdahl, Conservation Biology Center

## **ATTACHMENT 3: Survey Protocol**

### ***Pterostichus johnsoni***

#### **Where:**

This Pacific Northwest species is found near waterfalls of small-to-mid-sized, coldwater, montane streams (Bergdahl 2008, *pers. comm.*). Adults have been collected from wet moss on boulders and in gravel in the spray of waterfalls. At the Washington site, it was found in the gravel of talus slopes constantly wetted by the spray of falls, as well as under rocks near streams fed by these falls (Hatch 1933). Johnson (2006, *pers. comm.*) states that it requires cold

running water and well-shaded gravel banks. Piper (1911) ascertained that little patches of gravel between large mossy boulders are the natural microhabitat of this species. It is presumably predatory on other small invertebrates in both the larval and adult stages (Johnson 2006, *pers. comm.*), probably feeding in moss when the weather is overcast, and retreating under gravel on bright days (Piper 1911).

**When:**

The phenology of this species is unknown, but adults have been collected May through August (Johnson 2008, *pers. comm.*). Congeneric *Pterostichus aterrimus* has an annual life cycle, breeding in spring and passing through the summer months as larvae (UK Biodiversity Group 1999), with adults available during the cooler months of the year. Similarly, the best time to survey for congeneric *Pterostichus rothi* is during cooler months (October through March or April) when the adults are most active; adult activity in this species appears to gradually decline during the hot season when the soils become dry and the adults seek refugia (Brenner 2005, LaBonte 1993).

**How:**

Searching is the only established method of finding this species. Although there are no established survey methods for larvae of this species, adults are easy to survey for and may often be found in quantity (Bergdahl 2008, *pers. comm.*). Adults are found by turning over stones and digging through gravel near waterfalls, with particular focus given to small gravel patches between mossy rocks (Piper 1911). Like other species in the genus, these beetles may rapidly burrow into the soil when disturbed, and the collector must have a good search image of the species and be prepared to act quickly when searching under a newly turned stone or disturbed area (LaBonte 1993). Although photographs of this species are not available, images of congeneric adults and larvae can be found in the ISSSSP Fact Sheet for *P. rothi* (Brenner 2005). When surveying for this species, avoid disruption of stream bank habitat and immediately return overturned rocks to their original position.

Collected adult specimens should be pinned (through the right elytron) or preserved in 70% ethyl alcohol. Collection labels should include the following information: date, time of day, collector, detailed locality (including stream, waterfall, geographical coordinates, mileage from named location, elevation, etc.), and detailed habitat data (including soil type, moisture content, temperature, weather, forest composition, and understory vegetation). Since the biology of this species is poorly known, behavioral notes, such as “several individuals burrowing under small stone in splash zone” would also be useful. Complete determination labels include the species name, sex (if known), determiner name, and date determined. Expert determination is suggested to confirm field identifications.

## **References (survey protocol only):**

Bergdahl, J. 2008. Personal communication with Sarah Foltz.

Brenner, G. 2005. ISSSSP Species Fact Sheet: *Pterostichus rothi*. Available at: <http://www.fs.fed.us/r6/sfpnw/issssp/species-index/fauna-invertebrates.shtml> (Last accessed 23 Dec. 2008).

Hatch, M.H. 1933. Notes on Carabidae. Pan-Pacific Entomologist 9: 117-121.

Johnson, Paul. 2006. Personal communication with Eric Scheuering.

Johnson, Paul. 2008. Personal communication with Sarah Foltz.

LaBonte, J.R. 1993. Roth's Blind Beetle (*Pterostichus rothi* Hatch: Coleoptera: Carabidae): Habitat, Survey, Threatened and Endangered Status. A Challenge Cost-Share Project funded through the Bureau of Land management and the Nature Conservancy's Oregon Natural Heritage Program, 49pp.

Piper, C. V. 1911. Notes on *Pterostichus johnsoni* Ulke. Proceedings of the Entomological Society of Washington XIII: 62-64. Available at: [http://www.archive.org/stream/proceedingsofent13ento/proceedingsofent13ento\\_djvu.txt](http://www.archive.org/stream/proceedingsofent13ento/proceedingsofent13ento_djvu.txt) (Last accessed 7 January 2009).

Ulke, H. 1889. A new species of *Pterostichus*. Entomologica Americana V: 59. Available at: <http://ia310815.us.archive.org/0/items/entomologicaamer46188890broo/entomologicaamer46188890broo.pdf> (page 257 of pdf file, last accessed 7 January 2009).

UK Biodiversity Group. 1999. Species Action Plan: a Ground Beetle (*Pterostichus aterrimus*). Tranche 2 Action Plans - Volume IV: Invertebrates. Tranche 2 (4): 127. Available at <http://www.ukbap.org.uk/UKPlans.aspx?ID=540#8> (Last accessed 23 Dec. 2008).