Species: Refton Cave Planarian (*Sphalloplana pricei*)
Global Rank: G2G3
State Rank: S1
State Wildlife Action Plan: Immediate Concern Species - Responsibility Species
Climate Change Vulnerability: Not Vulnerable/Presumed Stable
Confidence: Very High

Habitat:

The Refton cave planarian is a freshwater free-living Turbellaria in the "higher" taxonomic order Tricladida. Triclads are typically restricted geographically and have adaptations which allow them to utilize habitats with unusual conditions when compared to a typical stream or pond. Triclads are predators, hunting other invertebrates for food and scavenging upon injured or recently dead organisms. Turbellarian abundance will fluctuate according to seasonal succession (Thorp and Covich 1999).

Refton cave planarian inhabits the dark zone of caves, in drip or stream fed pools, or on the flat surfaces of rocks in small streams (Holsinger 1988). They may also be found underwater on rotting wood. Limited survey information has documented the Refton cave planarian at three cave sites in Pennsylvania, though it has not been seen since the 1930s at two of the three sites (NatureServe 2008). The extent of this flatworm's distribution within occupied aquifers is unknown, though the species is not expected have a much expanded range.

Current Threats (adapted from NatureServe 2008):

This species is stygobitic and is restricted to caves within a small region of southcentral Pennsylvania. It is unlikely that many new sites will be discovered. The region surrounding the only known extant population of Refton cave planarian has experienced rapid agricultural, urban, and industrial growth. Protecting the groundwater is the key ingredient to long term viability of any extant population. Potential threats to groundwater quality and quantity include pollution by agricultural fertilizers and pesticides, siltation, pumping of water from the aquifer for domestic and industrial uses, and industrial chemical spills. Upslope of the aquifers some potential exists for pollution from forestry practices and capture of surface run-off which might limit water reaching subterranean habitats. Limestone mining near occupied caves and/or aquifers would also be a serious threat.

Main factors Contributing to Vulnerability:

The key factors found to increase the vulnerability of the Refton cave planarian to climate change are minimal ability to disperse outside of occupied cave systems, highly restricted range, specialized cave habitat, increased groundwater demand and surface water capture expected due to increased frequency and duration of summer droughts. This cold-water planarian is likely sensitive to changes in the seasonal hydrology and temperatures of the

aquifer. However, a groundwater system should be able to moderate climatic changes to some degree.

In the CCVI version 2.0, obligate cave species were automatically given a higher resistance rating to climate change impacts. According to the CCVI guidelines (NatureServe 2010) and the West Virginia Climate Change Vulnerability Assessment Report (Byers and Norris 2011), cave species are expected to better survive climate changes in their buffered underground habitats.

Protecting water quality and quantity in occupied watersheds by increasing forest cover, prohibiting mining activities, implementing best management practices for agriculture, and limiting the addition of impervious surfaces and further water withdrawal or storage can provide important protection against current and future threats.

References:

Byers, E. and S. Norris. 2011. Climate Change Vulnerability Assessment of Species of Concern in West Virginia. West Virginia Division of Natural Resources, Elkins, WV.

Holsinger, J.R. and D.C. Culver. 1988. The invertebrate cave fauna of Virginia and a part of eastern Tennessee: zoogeography and ecology. Brimleyana, 14:1-162.

NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: July 17, 2008)

NatureServe. 2010. Guidelines for Using the Climate Change Vulnerability Index, release 2.0, 27April2010. NatureServe, Arlington, Virginia.

Thorp, J.H. and A.P. Covich (eds). 1991. Ecology and classification of North American freshwater invertebrates. Academic Press, Inc., Boston, MA. 911pp.