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# Conserving South Carolina's At-Risk Species:

## *Species facing threats to their survival*

### Smokies needlefly

(*Megaleuctra williamsae*)



Adult male Smokies needlefly/Photo credit: South Carolina Department of Natural Resources

### Description

The Smokies needlefly was first described in 1941 by John F. Hanson from a single adult male specimen collected in 1938. Adult needleflies are slender, brown to black stoneflies ranging from 4 to 15 mm (0.2 to 0.6 inches) in length. Adults have one-segmented cerci (paired appendages on the rear of many Arthropods) and typically, the wings are rolled around the body at rest. The genus *Megaleuctra* can be easily distinguished from all other needleflies by the large size, 12 to 15 mm (0.5 to 0.6 inches) in length, and the presence of six veins in the hindwing anal region.

### Range

This genus is among the rarest of all North American stoneflies. There are less than 20 known occurrences for the Smokies needlefly, known only from North Carolina, South Carolina, Tennessee and Virginia. The only other species within this genus in the eastern United States, the Shenandoah Needlefly (*Megaleuctra flinti*), is known from Pennsylvania, Virginia and West Virginia. Likewise, there are less than 20 known occurrences for that species.

### Habitat

Stoneflies, more than any other order of insects, are typical inhabitants of running waters. Nearly all species occur exclusively in streams, and most are restricted to running water habitats of mountainous regions of the world. Usually, water temperatures of these streams are below 25°C with high dissolved oxygen levels. The nymphs of the Smokies needlefly are restricted to high elevation springs and seeps in relatively undisturbed forested areas. Nymphs sprawl in accumulations of decaying leaves and other debris that are covered with a thin film of flowing water. Most stoneflies transform to adults in spring or early summer.

### Status

The Smokies needlefly is globally ranked as imperiled (G2). This species is currently not ranked in South Carolina, but is under review. It is considered critically imperiled (S1) in North Carolina, imperiled to critically imperiled (S1/S2) in Tennessee and imperiled (S2) in Virginia. Infrequently recorded from the higher elevations of western North Carolina and South Carolina, eastern Tennessee and southwestern Virginia, several records are available from Oconee County, South Carolina. Population size has not been determined, but this species occurs as small populations, usually less than 20 nymphs per site. The U.S. Fish and Wildlife Service was petitioned to list the species in April 2010 and published a substantial 90-day finding in September 2011 indicating listing may be warranted.

### Threats

The springs and seeps where Smokies needlefly have been documented have the potential to be impacted by logging, acid deposition and development. The major

challenge is deforestation, which would result in opening of the canopy of seeps and springs, increasing water temperature and likely reducing food inputs. Acid deposition, primarily from precipitation, may alter pH conditions of the habitats, potentially eliminating populations. Diversions of surface waters or removal of ground water may alter below ground hydrological patterns of the seeps and springs.

### Management/Protection Needs

Incentive programs to help farmers implement best-management practices could improve instream habitat by decreasing sedimentation and runoff and increasing riparian forest cover. Forestry operations should follow best-management practices for water quality. Outreach and education to developers and local governments will assist with sharing information about minimizing the impacts from new home construction and commercial developments. There is also a need for additional surveys to document new populations and for periodic monitoring of known populations.

### References

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