



## Headwaters Streams Study

*Precis: A new study of headwaters streams refutes fundamental assumptions that underpin EPA's policies and standards for controlling coal mining's impact on water quality in Appalachia.*

Surface coal mining operations in steep sloped terrain must place excess spoil material, i.e. the earth, left over after the mined area is restored, in valley fills located in headwater stream channels. Headwater stream channels are those extreme upper reaches of streams and flow intermittently after rainfall or snowmelt. Discharges of spoil material to headwater streams are allowed under the Clean Water Act (CWA), so long as the activity takes place under permits authorized by the U.S. Army Corps of Engineers.

The U.S. Environmental Protection Agency (EPA) maintains that these headwater streams represent a wide variety of habitats that host diverse aquatic "bug" communities, particularly mayflies, and concludes they constitute "a unique and irreplaceable resource." Consequently, EPA claims impacts to these headwater streams cannot be mitigated and discharges to such streams should be prohibited under the CWA.

In order for EPA's assertions to be true, each of these streams' specific habitat and water quality characteristics would necessarily and directly determine what specific mixture of invertebrates ("aquatic bugs"), or "invertebrate community," can reside in each stream that correspond to each of those specific conditions.

The National Mining Association (NMA) Headwaters Streams Study, conducted in 12 headwater streams in the coal mining region of southern West Virginia by GEI Consultants, Inc., Denver, CO, was designed to test these assumptions.

Contrary to EPA's assertions, the study concludes that while headwater streams exhibit less than 50 percent similarity in the composition of their invertebrate communities, they are likely assembled opportunistically from commonly encountered species with broad habitat requirements. Instream habitat and water chemistry characteristics showed weak relationships to

invertebrate populations. And, contrary to EPA suggestions that 25-50 percent of the total invertebrate abundance in central Appalachian headwater streams should be comprised of mayflies, mayflies were not dominant and sometimes not even present in these headwaters streams. Therefore, EPA's proposed "core community" of mayfly populations does not exist in these streams as EPA suggests is to be expected.

These findings have important implications. First, they undermine one of the key foundations for EPA's objection to the issuance of CWA Section 404 and 402 permits for coal mining operations in steep sloped terrain. This objection is that loss of even a small number of headwaters communities would be detrimental to regional biodiversity; the results of the GEI report contradict this assertion. Second, they cast doubt on the validity of EPA's newly developed benchmark limit for conductivity that is almost exclusively justified on the basis of protection of mayfly populations in Appalachian headwater streams. These conclusions call into question the need for such a limit and suggest that a singular focus on mayflies is not necessarily the best way to evaluate the ecological health of Central Appalachian watersheds.

#### Key Points:

1. The Study demonstrates that diverse benthic invertebrate communities exist in extreme headwater streams. Furthermore, while individual communities differed from each other to some extent, these streams are not unique in the levels of diversity and variability among macroinvertebrate communities.
2. Mayflies are not as dominant in these headwaters streams as has been postulated by EPA studies conducted in the region.
3. The study finds that mayflies comprised less than 10 percent of the community at most study sites and were completely absent from one-fourth of the streams studied. Therefore, the EPA proposed core mayfly community does not occur in the headwater communities studied and the expectation of high proportions of the community being mayflies is an erroneous assumption.
4. The Study concludes that instead of being related to site-specific habitat or water chemistry differences, headwater streams communities appear to colonize streams opportunistically, and not deterministically as EPA asserts. In other words, headwaters streams are being colonized from a broad range of organisms with broad habitat requirements that are commonly encountered in this region.
5. The Study concludes that since the macroinvertebrates from a larger regional pool of species appear to colonize these stream reaches

opportunistically, loss of a limited number of individual streams should not jeopardize the overall biodiversity in the extreme headwaters streams of the region.

For a copy of the report by GEI consultants, [click here](#).