Recovery of a Mining-Damaged Stream Ecosystem

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The environmental science literature is replete with case studies of stream ecosystems damaged by pollution, but fewer case studies are available with long-term data on the recovery from effects of pollution. Panther Creek, a tributary to the Salmon River in central Idaho, is one such case with a 30-year period of record from about 1980 through 2010. Panther Creek suffered intensive damage from large-scale mining and milling operations in the Blackbird Mining District, primarily from the late 1940s to 1967. The mine drained to two tributaries of Panther Creek, Blackbird Creek and Big Deer Creek, contaminating the streams with copper, arsenic, and cobalt, as well as altering the physical channel.

From the 1960s through 1980s, no fish and few aquatic insects could be found in mine-affected sections of Panther Creek. By the early 1990s, copper concentrations had attenuated to the point that some natural production of rainbow trout occurred. However, Chinook salmon and resident fish other than rainbow trout remained rare. Species richness of aquatic insects was about half that of reference sites, and mayflies were absent or rare.

Concerted efforts to reduce mine contamination began in 1995, and by 2002 copper levels had been reduced by about 90%. As of 2010, resident fish populations appeared largely recovered. Rainbow trout were early colonizers, quickly expanding their range as areas became habitable. Sculpin appeared slower to disperse and colonize; but they appeared to recover about four years after their first detections. Macroinvertebrate richness in Panther Creek sites downstream of Blackbird and Big Deer Creeks appears to have plateaued at about 70 to 90% of reference. Total abundances of mayflies in locations downstream of mine influences are as high as or higher than at reference locations. However, mayfly diversity remains lower than reference, and Heptageniids and Ephemerellids remain rare. These patterns raise questions of what it means for an ecosystem to be “recovered.” For example, if benthic macroinvertebrates provide a sufficient food base for fish populations, is the ecosystem sufficiently recovered? Or would all major ecosystem components need to be similar to reference?