

EFFECTS OF LONGWALL MINING ON AQUATIC RESOURCES AT THE BAILEY MINE IN SOUTHWESTERN PENNSYLVANIA

J.M. Silvis, M.L. Shema*, and M.R. Haibach

Abstract: Since 2005, longwall coal mine operators in Pennsylvania (US) have been required to collect extensive hydrologic and biological data to document pre- and post-mining conditions of streams and wetlands overlying the subsidence control plan areas. This study analyzed biological data collected during the time period of 2005 through 2016 from 40 km of streams and 3.3 hectares of wetland that traverse the 19.3 km² study area. Hydrologic analysis suggested that there are variable degrees of change to headwater stream flows immediately following mining; however, the majority of the effects are reversible through stream flow intervention (i.e., mitigation). Biological assessments showed that greater than 95% of assessed stream length has maintained its ability to support benthic macroinvertebrate communities following mining and subsequent intervention. Comparisons of the benthic macroinvertebrate community metrics showed that the biological community in 48 of the 50 sample sites is being maintained or restored. The effectiveness of intervention was further substantiated by the similarity in recovery times between streams having no intervention (median = 2.1 years, 95th percentile = 4.9 years) and streams with intervention, when recovery times were measured from the date of the intervention (median = 1.7 years, 95th percentile = 4.7 years). Changes to individual wetlands were observed between the pre- and post-mining assessments, but cumulatively a net gain of 7% in wetland acreage was realized. Hydrologic assessments were used to infer whether there was a potential that streams had been affected by mining; however, the ultimate test of stream recovery is based on biological metrics that establish the relative quality of the biological communities following mining. Overall, the aquatic life use of streams is being maintained within the Bailey Mine's subsidence control plan areas.

Additional Key Words: Stream, Recovery, Benthic Macroinvertebrate, Wetland

Joshua M. Silvis, Manager Hydrogeology, CONSOL Energy, Inc., Canonsburg, PA 15317;
Michael L. Shema, Ecologist, Civil & Environmental Consultants, Inc., Pittsburgh, PA 15205;
Mark R. Haibach, Ecologist, Civil & Environmental Consultants, Inc., Pittsburgh, PA 15205.