Citizens Advisory Council
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Dear Citizens Advisory Council,

I have over 30 years of experience in teaching and conducting research on ecology and environmental disturbances, especially streams.

I am concerned with several components of the findings of the most recent Act 54 Report on the impacts of underground mining. The report does not sufficiently document the causes of mining and water resources, nor does it adequately recommend ways to better monitor and protect water. Flowing water is the rarest of all water on earth and such waters are a major resource for humans and our food supply. Lowering the risk of harm to streams must be a higher priority than maintaining any industry. We have many alternatives to obtain energy and jobs, but when a water supply is impaired, citizens have few or no options to keep their homes, and other industries literally dry up. I have three areas of comment I wish to see included in Act 54 and subsequent actions by state agencies.

A. Recognition of difficulty to restore streams when mining impacts occur.

I have published in an international journal on the difficulty of restoring streams after contamination from ground water from coal mining. The figure below illustrates a case of spending over $1 million in public and private funds to build wetlands to intercept alkaline coal mine drainage to improve a tiny 1 km section of a stream. Despite our success at capturing 700 kg of iron/day for almost 20 years, and exceptional engineering by the DEP, Carnegie Mellon University scientists and other private professionals, we were unable to restore the stream. We simply cannot manage the complex hydrological interactions induced by coal mining. Numerous conferences and publications show that our situation is common throughout Pennsylvania.

Act 54 documents and subsequent agency policies must reflect the facts that when mining disturbs the complex geology of PA, impacts are difficult to predict. When damage occurs, it is extremely hard if not impossible to mitigate. Furthermore, the causes of stream impairment are too easily dispersed into legal debates with mining companies that leave home owners, and those who need surfaces waters with the responsibility to clean up the problem.

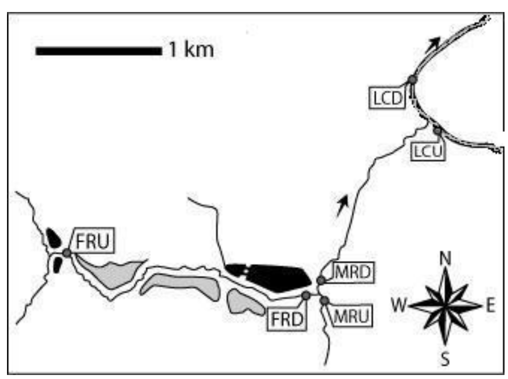


Fig. 1 Stream study sites, Fourmile Run Upstream and downstream (FRU, FRD) from abandoned mine drainage treatment wetlands (gray ponds), Monastery Run upstream and downstream (MRU, MRD) from Fourmile Run, and Loyalhanna Creek upstream and downstream (LCU, LCD) from Monastery Run. A freshwater lake and ponds are noted in black.

Walter, Cynthia, Dean Nelson, and Jane I. Earle. 2012. Assessment of stream restoration: Sources of variation in macroinvertebrate recovery throughout an 11 year study of coal mine drainage treatment. Ecological Restoration. 20:431-440

B. **Past regulations and current policies have not fully caught up to the current science of stream ecology.**

In years past, DEP regulations appear to be based on limited understanding of the integrated nature of stream functions. For example, people assumed impairment in one section of a stream will cause harm only for a known distance downstream where simple equations can predict chemical concentration and dilution, with no further effects. Now, science shows a much wider range of impacts from harm to only a small stream section.

1. For example, impacts occur even upstream of the damage, because stream invertebrates that are important as juveniles in stream functions fly upstream to lay eggs, and fish certainly travel upstream in different seasons.
2. Substances that are at toxic concentrations in one part of a stream alter essential processes such as leaf decomposition, for the entire length of the stream, and thus impair 2. the stream far beyond where the chemical discharge. Further, chemicals can be low in toxicity, but their physical impacts such as causing precipitation can block algae attachment, insect feeding and fish food sources.

I include the following as illustrations of the integrated nature of stream function.

Illustration of how a stream is part of a progressive shift in food processing.

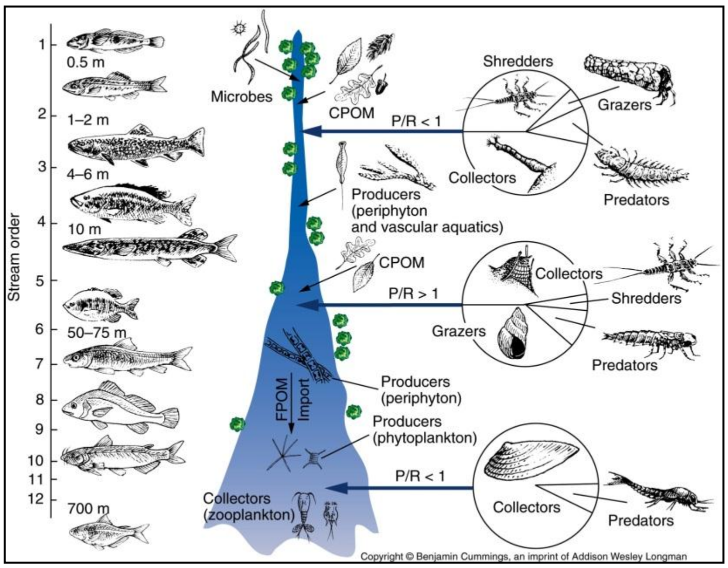
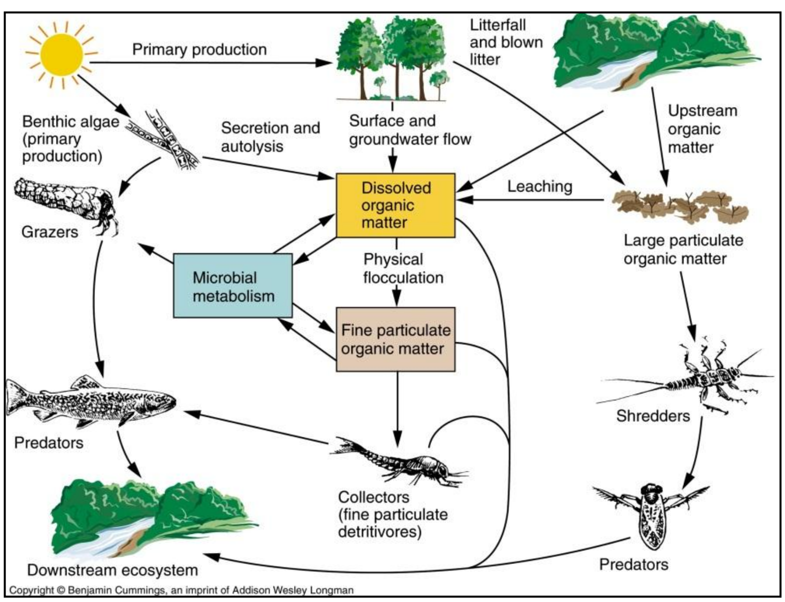


Illustration of the integrated interactions of food webs from both upstream to downstream. Thus,

Impairment of any section of a stream impairs all of the stream.



C. I fully support the following concerns written below that were compiled by organizations using public documents including the Act 54 Report.

I am writing to express my concerns about the findings of the fourth Act 54 Report assessing the impacts of underground coal mining, including damage to surface structures and impacts to aquatic life, streams, wetlands, and the loss of domestic water supplies from mining.

- The effects of underground mining in the Commonwealth are staggering: the 46 mines operating between 2008 and 2013 undermined a total of 31,343 surface acres.
  - Approximately 40% of the acreage undermined by bituminous coal mining in Pennsylvania is within Greene County, and 19% in Washington County. The mining in Washington and Greene Counties is performed with both longwall and room-and pillar-methods. About 41% of the acreage undermined in the combined counties of Armstrong, Beaver, Cambria, Clearfield, Elk, Indiana, Jefferson, and Somerset.
- Disturbances in stream flow and chemistry result in a variety of adverse effects on the entire stream ecosystem, including excessive stream vegetation growth, increases in undesirable insect species, reduced aquatic insect diversity, reductions in fish populations, habitat space reduction, higher water temperatures, and lower oxygen. (I-15-16).
- The ability to repair damage to streams that have been undermined and have experienced subsidence impacts remains largely unknown. (I-7)
- There were a total of 389 reported surface effects during the assessment period with 19 occurring at non-active mining operations. (IV-2).
  - 96.6% of the "Company Liable" effects (230 effects) occurred in association with longwall mining. (IV-6).
- Despite a reduction in the amount of surface acres undermined by longwall mining, which causes highest numbers of subsidence related impacts, over the last 5 years; the number of reported effects did not decrease. (III-29).
- The lack of uniformity requirements for data submissions by the mine operators to fulfill permit requirements and DEP's rampant disorganization of its data severely hampers both enforcement and required Act 54 reporting. (X-2).
- Out of the total of 201 water supply reported effects at the end of 2013, DEP's records showed that only three of them were actually in the process of having liability for the effect assessed. (V-6).
  - Many of the water supply effects which take the longest to resolve are Permanent Supplies, for which the average times to resolution can exceed two years. (V-7).
- 176 of the 230 company liable structure effects, some with multiple problems, were located within either the tops of the hills, along the hillside slopes, or within the valley bottoms. And 69% of all company liable structure effects were located along hillsides. (IV-11).

- 283 of the 367 company liable water supply effects, some with multiple problems, were located within the tops of the hills, along the hillside slopes, or within the valley bottoms. (V-12).
  - The hillslope springs of southwestern Pennsylvania are numerous and support ecosystem components that are considered globally rare and threatened, as they provide a specific type of habitat for a diversity of organisms. Damaging these springs can result in reduced water availability to the surrounding forest, affecting forest health and potentially magnifying potential climate change impacts to forest ecosystems. (VI-42).
- A total of 96.05 miles of streams were undermined between 2008-2013. Of these, 50.59 miles of streams were undermined by longwall mining methods, while 45.04 miles were undermined by room-and-pillar methods. (VII-15).

- About 77% of the total miles of streams undermined by longwall techniques, 39.2 of the 50.59 miles, experienced flow loss, pooling or both. Thus, only 23% of the total miles of streams undermined by longwall techniques did not experience mining-induced flow-loss or pooling. (VII-20).
- Maximum post-mining flow loss lengths in the dry season ranged from 936-ft to 10,883-ft and 96-ft to 8,106-ft in the wet season. Maximum flow losses across all streams totaled 52.2 miles of undermined streams in the dry season and 23.7 miles in the wet season. (VII-22).
- Two of the five stream investigations conducted by DEP during the assessment period were found to have relied on inadequate data and observations before reaching determinations that impacts were “Not due to underground mining.” For two more investigations currently underway, the flow data available to DEP is inadequate. (VII-28).
- In the area above and near the Bailey Mine in Washington and Greene Counties, 24 stream bio-monitoring stations experienced mining-induced flow loss impacts (i.e. received augmentation and/or grouting). It is the only mine that has been placed under a compliance schedule by DEP. (VII-30).
- Mining-induced flow loss to streams has a significant adverse effect on stream biological communities. (VII-31).
- Streams over longwall mining have been observed to have elevated conductivity and alkalinity levels. Streams that are grouted could also experience increases in conductivity and pH due to weathering of the grout material over time. Ultimately, “longwall mining clearly pushes stream conductivity levels over the U.S. EPA benchmark for aquatic life.” (VII-36-37).
- “Augmentation discharge points were installed on 95 streams during the 4th assessment period (Table VII-13). Augmentation discharges were active at 74 of these streams (Table VII-13).” (VII-46).
    - “Bailey Mine had the greatest number of streams with installed and active augmentation discharge points (Figure VII-17).” (VII-51).
- To mitigate pooling impacts, 28 gate cuts were performed across 4.21 miles of streams to lower the stream bed elevation and promote flow across the gate area. (VII-39).
    - The single longest gate cut mitigation project occurred on Dyers Fork in Cumberland Mine where nearly 4,000-ft of stream were mitigated. Prior to the gate cut, pooling along this stretch of Dyers Fork was severe with increases in natural stream depth of up to 6.1 feet. (VII-39).
- 57 streams received grouting during the assessment period, 40% received grouting in multiple panels. Because PADEP does not currently require mine operators to report the length of stream grouted, it is not possible to evaluate the actual extent of grouting after mining. (VII-52). However, the data available on the Bailey mine indicates that, “~5,941-ft and ~2,758-ft of streams were grouted in the 3rd and 4th quarters of 2008” and if that is extrapolated out to keep pace with mining progress at Bailey, “then ~50% of the stream length undermined in Bailey Mine was likely grouted. The University suspects that this estimate of grouting in Bailey is highly conservative.” (VII-52).
- Following up on stream investigations that were still pending during the last assessment period, the University found that an investigation of reported flow loss in a tributary to North Fork of Dunkard Fork, a stream that was the focus of three other stream investigations during the last assessment period, had been withdrawn from consideration by DEP. The investigation was withdrawn without explanation the day after the mining company requested an extension for development of a mitigation plan. (VIII-3).
- Seven stream investigations had a final resolution status of “Not recoverable: compensatory mitigation required” meaning that all other mitigation efforts have failed and the company will have to compensate the state monetarily for the loss of these streams. In total, eight cases represent stream impacts that have not recovered from mining-induced flow loss. (VIII-5).

- Four stream investigations from the 3rd Act 54 assessment remain unresolved and have been open for 7-8 years.
- The University also re-sampled the biological communities for five streams that were impacted and studied during the 3rd Act 54 assessment. Of these five streams, two showed improvements in TBS from the 3rd assessment while three experienced declines.

- Of the four longwall mines with available post-mining data, three reported net gains in wetland acreage following mining. Despite these net gains, 33-41% of the original wetland acreage was lost after subsidence. The losses of original wetland acreage were offset by the creation of new wetland acreage. Currently, the new wetlands do not functionally replace the complexity and resources that were provided by the original wetlands and it could take decades for them to develop the types of vegetation necessary to provide those functions. (IX-16).

Conclusion

The impacts described in Act 54 are extreme and unacceptable.

As a resident of the Commonwealth, I expect the Citizen Advisory Council to do the following:

a. take action to better manage mining practices
b. lead other agencies to make clear changes in policy, practices, and documentation of mining impacts in order to prioritize water resource values
c. provide better opportunities for citizens to participate in monitoring and protecting our streams

Sincerely,

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