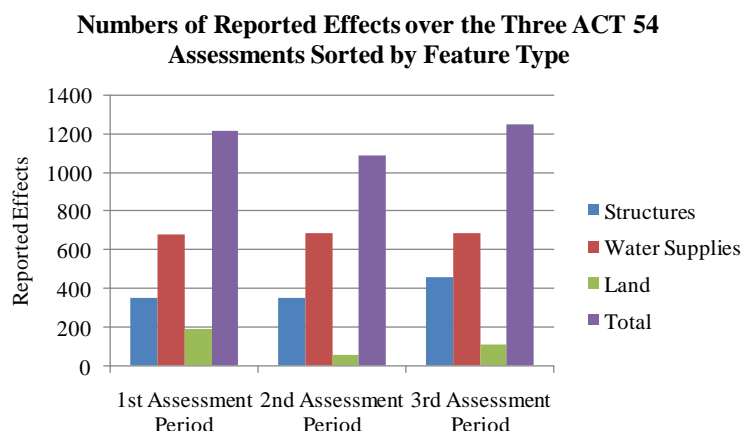


# **EXECUTIVE SUMMARY**

Laws, governing how environmental impacts from underground bituminous coal mining are anticipated and mitigated, have been evolving within the Commonwealth of Pennsylvania over the last four decades. Initially, with the passage of the Bituminous Mine Subsidence and Land Conservation Act (BMSLCA) of 1966 and the Surface Mining Control and Reclamation Act (SMCRA) of 1977, structures, land, and highways were the focus of action.

As time passed, mine operators learned how to mitigate damage to key structures, i.e. homes, garages, barns, silos, etc., and developed methods to fairly compensate property owners. During the 3<sup>rd</sup> assessment period, spanning August 21, 2003 to August 20, 2008, 456 structures and 108 lands with reported effects occurred from a total 3,735 inventoried structures and 3,587 properties. That is just 12-pct of the total structures and 3-pct of the total properties undermined.

*A reported effect refers to an incident reported to the Pennsylvania Department of Environmental Protection (PA DEP) by its staff, representatives of the coal companies, or land owners. A total of 1,247 reported effects occurred during the 3<sup>rd</sup> assessment period. That represents a 14-pct increase over the 2<sup>nd</sup> ACT 54 assessment period.*



The eight longwall mines operating in Greene and Washington Counties account for almost 94-pct of the structure and 89-pct of land reported effects. The average number of days to resolved structure reported effects was 207 days and for land 246. Compared with other feature types, i.e. water supplies, streams, and wetlands, this is a relative low time frame.

In the early 1980s, interstate highways were first subjected to longwall mining subsidence impacts. During the timeframe of this study, nine longwall panels undermined Interstate 79. The commonwealth spent over 19 million dollars monitoring, maintaining, and repairing the highway. It is estimated that this was a fraction of the cost necessary for the state to condemn the coal and compensate the owners of the mineral rights to prevent longwall mining. Most importantly, no accidents were attributed to longwall mining subsidence and restrictions were limited to reduced speeds and single lane traffic during times of active mining or repairs.

In the mid 1980's new environmental concerns were raised about the BMSLCA. In 1994, the state legislator passed the ACT 54 amendments to the BMSLCA. This law gave coal companies the capability to subside the ground using the longwall mining method as long as the potential impacts were identified and planned for during the permitting process and compensation to land owners was provided.

*Fifty underground coal mines were active during the 3<sup>rd</sup> assessment period undermining 38,256 acres of land. Thirty-six of the mines are room-and-pillar, eight are longwall, and six are room-and-pillar mines with pillar recovery. Overburden varies from less than 100-ft at several room-and-pillar mines to over 1,100-ft at the Blacksville No.2 Longwall Mine. Overburdens for room-and-pillar mines averaged 276-ft and for longwall mines 687-ft. The High Quality Mine was classified as the only shallow longwall mine with an average overburden of 338-ft. This mine was involved in a highly publicized case where a permit for mining their 6-East longwall panel was denied in a court decision. In general, impacts from longwall subsidence are more significant at shallow overburdens.*

Water supplies became a major focus after the passage of ACT 54. During the 3<sup>rd</sup> assessment period, 2,789 wells, spring, and ponds were undermined with 683 reported effects accounting for 24.5-pct of the total water supplies undermined. Water supplies have proven a challenge but they are being resolved. At the end of the 3<sup>rd</sup> assessment period, 234 reported effects or 34-pct of the cases were still awaiting a final resolution. The average number of days to resolve water supplies reported effects was 321, a considerable increase compared to structures and land reported effects. Resolution strategies for recovering water supplies are often multi-step, especially when wells and springs are being replaced. For example, longwall mining subsidence takes approximately 7 months to stabilize before meaningful repair can begin. In addition, operation and maintenance costs must often be calculated and agreed upon.

In late 1990's, the quality and quantity of water flowing in streams undermined by longwall mines became a major focus. The diminution and contamination of streams have been the traditional measures for determining impacts. While the number of stream investigations has varied over the three assessment periods, the amount of technical information collected and kinds of analysis required have changed dramatically. In the early 2000's data became available on the biologic health of streams, largely through the assessment of diversity of the benthic macroinvertebrates (a source of food for fish). In 2005, Technical Guidance Document 563-2000-655 established protocols for assessing biological health and for determining when a stream was impaired and when it attained a resolution of repaired to this reported impact, be it low flow or degraded macroinvertebrate diversity.

*Fifty-five stream investigation reports occurred in the 3<sup>rd</sup> assessment period and 20 have been resolved. The average number of days to resolve stream impacts was 688, nearly double the time required to resolve water supply reported effects. The other 35 cases are in some state of an interim resolution such as:*

- *Monitoring flow,*
- *Measuring biological diversity,*
- *Grouting open fractures,*
- *Altering stream gradients,*
- *Re-vegetating stream banks,*
- *Augmenting stream flow,*
- *Promoting aquatic diversity and health, or*
- *Repairing obstacles within the streams that impair flow.*

Because these protocols were first implemented in October of 2005, many of the questions concerning what streams have been impaired by longwall mining and, after mitigation actions, which have attained pre-mining stream flow and biological diversity standards are yet to be answered. There is one statement that can be made - stream remediation activities have increased dramatically through the three assessment periods.

The impact to wetlands by undermining continues to elude measurement. The 1<sup>st</sup> assessment didn't make an attempt to investigate wetlands. The 2<sup>nd</sup> assessment, relying on the NWI database and site visits by PA DEP biologist, found 78 acres of wetlands undermined. The 3<sup>rd</sup> assessment, again relying on the Nation Wetlands Inventory database and company documented wetlands from their permit file and from 6-month mining maps, found 93.9 acres undermined. Similar to streams, a new protocol for measuring and characterizing wetlands was introduced in 2005 (Technical Guidance Document 563-2000-655) and implemented in 2007. Recently submitted permit revisions have shown a more significant effort is currently underway by the companies to report accurate wetlands data.

In summary, the historical focus was on structures, water supplies, and land features undermined by bituminous coal mines. Currently, capabilities and resources are in-place, both at the coal company level, through their in-house staff and consultants, and the PA DEP, through their district mining offices, to monitor these impacts and work towards an amiable solution as outlined in ACT 54.

The more recent focus of standards and protocols for dealing with stream and wetlands impacted by underground longwall mines has been developing over the last decade. Presently the coal companies, under the guidance of the PA DEP, are collecting necessary information on the pre- and post-mining conditions of streams and wetlands. Some period of time will be required to fully understand these impacts and to measure how effectively they return to their previous states. In some cases mitigation actions have been required and in others, natural processes have been successful since no impacts were observed in more than half of the streams undermined by longwall panels.

ACT 54 has set standards for the coal mining industry so that environmental impacts are lessened. These standards and the associated protocols are changing and developing as more information and understanding about the impacts is gained and mitigation efforts become more commonplace at coal operations. The 3<sup>rd</sup> assessment period saw the collection of much more data to more rigorously analyze these impacts. Structures, water supplies, and land features were the early focus of legislation and enforcement. Streams have become a major focus in the last decade, and will likely continue to be, while authorities and industry complete their understanding of the impacts and resolutions. Wetlands are expected to become a major focus going forward.