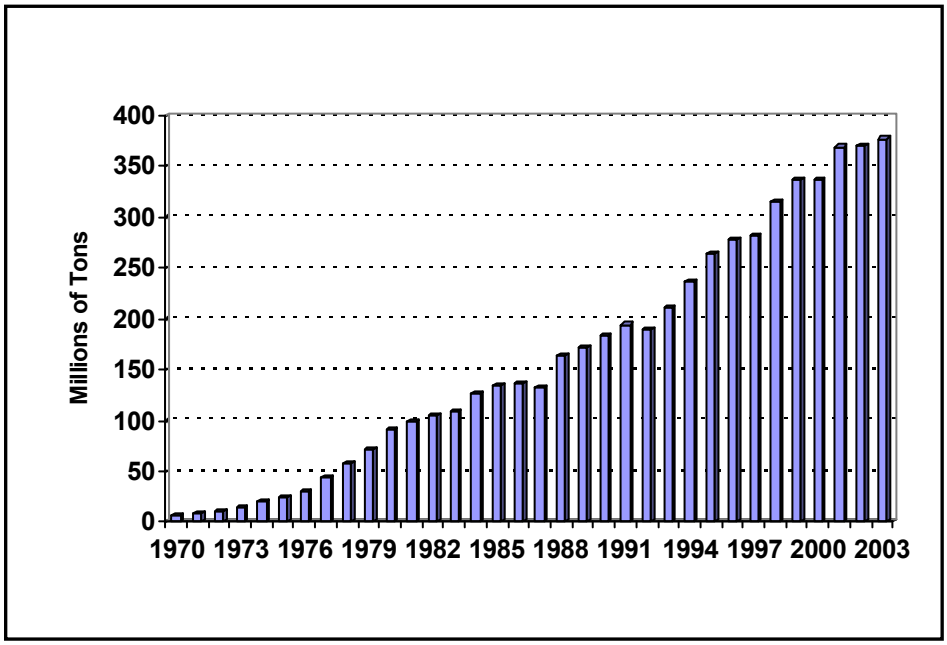
3.0 DESCRIPTION OF CURRENT SOCIAL AND ECONOMIC CONDITIONS

3.1 PRB Coal Production and Productivity Trends

In 1974, as the BLM was conducting a series of regional coal leasing efforts in Wyoming, Utah, and other states, 20.7 million tons of coal was produced in Wyoming. By 1981, the total annual output exceeded 100 million tons. Statewide production was 184 million tons in 1990, with the 200 million-ton threshold topped in 1993. Just 5 years later, the total annual tonnage had expanded by 50 percent, as 315 million tons of coal was produced in 1998. Total statewide coal output in 2003, produced by 18 operating mines, was 376.6 million tons (**Figure 3-1**). The PRB produces over 95 percent of all coal mined in Wyoming. As a result, the state leads the nation in coal production, accounting for approximately one third of all coal produced nationwide in 2003 (U.S. Department of Energy, Energy Information Administration [USDOE-EIA 2004a]).



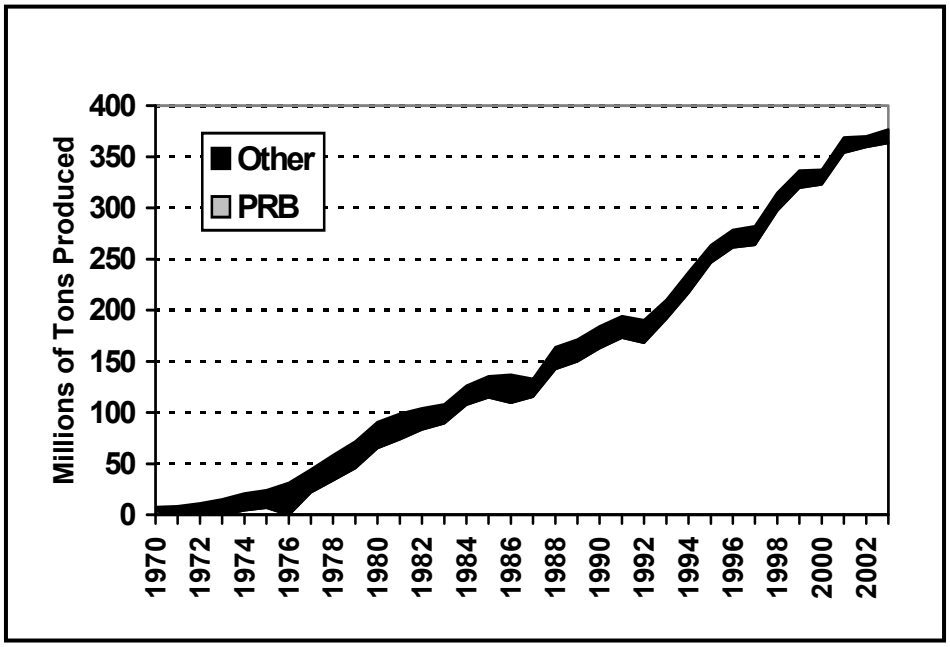
Source: Wyoming State Inspector of Mines 1975 - 2003.

Figure 3-1 Statewide Coal Production (1970 - 2003)

To some extent, the increase in production was anticipated. The Eastern Powder River Basin Final EIS (BLM 1979) projected production of 174 million tons of coal by 1990. At the same time, the Southcentral Wyoming regional coal EIS projected an annual output of 17.8 million tons, while the Southwestern Wyoming regional coal EIS projected an annual output of 31.2 million tons. However, while the aggregate annual production of up to 223 million tons in 1990 was ambitious when compared to actual production, the potential for Wyoming coal to become a major source of the domestic supply was clearly foreseen.

3.1 PRB Coal Production and Productivity Trends

What was not fully foreseen was the extent to which economic, market, and regulatory forces would alter the economic landscape of Wyoming's coal mining industry, the result of which was industrial concentration in the PRB. In 1977, a gross coal production of 22.0 million tons in the PRB represented 50 percent of the total statewide production (**Figure 3-2**).



Source: Wyoming State Inspector of Mines 1975 - 2003.

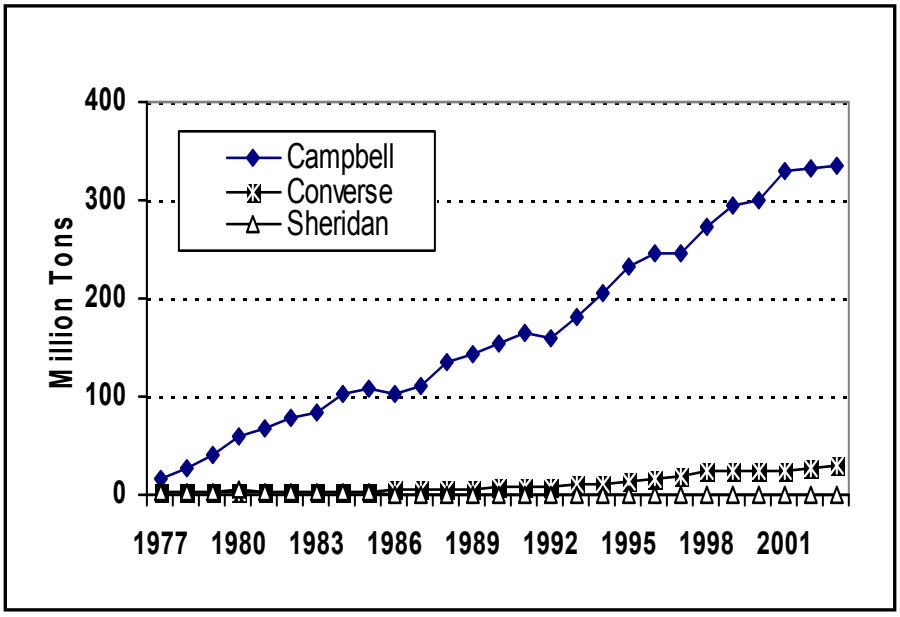
Figure 3-2 Annual Coal Production, PRB and the Rest of Wyoming (1970 – 2003)

By 1981, production in the PRB had increased by 52 million tons, raising its share of the statewide total to 75 percent as the remainder of the state added only about 2.5 million tons. Annual production in the remainder of the state peaked at about 26 million tons per year in 1979. Since that time, coal production in the remainder of the state has declined steadily. In 2003, the total output of Wyoming coal from outside the PRB was 12.9 million tons, just 3.4 percent of the statewide total. Production from the PRB totaled 363.7 million tons, of which 334.1 million tons came from Campbell County. (Also see **Table S-1** in the Appendix of this report.)

As shown in **Figure 3-3**, Campbell and Converse are the coal-producing counties in the PRB, with Campbell producing the majority of the coal. Following the cessation of production at the Dave Johnston Mine near Glenrock, the Antelope Mine is currently the only producing mine in Converse County. The Big Horn Mine in Sheridan County ceased production in 2000 and entered the reclamation phase.

Reviewing the implications of three decades of changes in Wyoming's coal industry on regional population and employment quickly highlights several important and interrelated factors. These include the abundant quantity, desired quality, and accessibility of coal reserves in the PRB, which provided the prospect of long-term economic viability necessary to support the capital investment and ongoing mining operations. They also include improved rail transportation of coal from Wyoming to national markets and enhancements in coal production technology that yielded

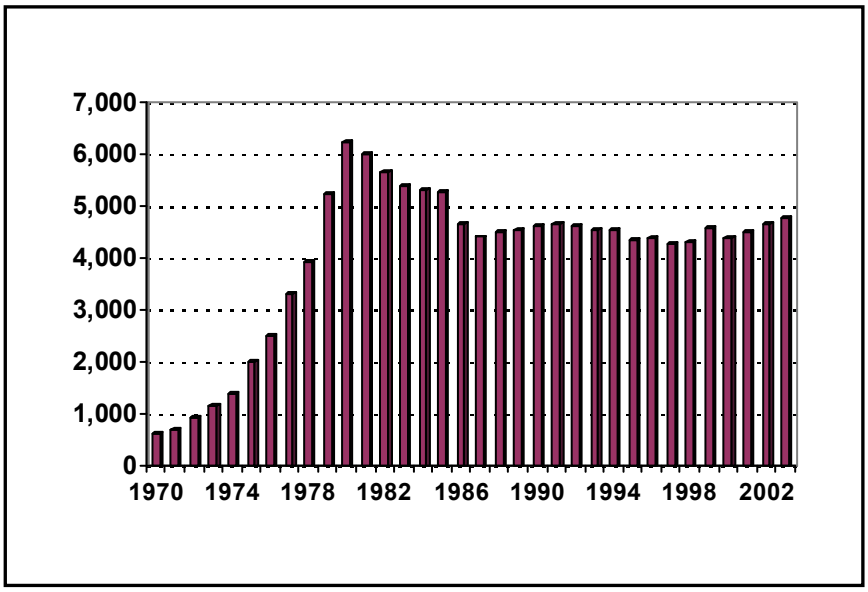
substantial productivity increases in mining. Other contributing factors include constraints limiting expansion of the electrical transmission system access and the increased reliance on electrical energy to meet industrial and residential consumer demands. Collectively, these factors not only increased the demands, but also positioned Wyoming coal, and especially PRB coal, to meet an increasing share of market demand.



Source: Wyoming Taxpayers Association (WTA) 1977 – 2004.

Figure 3-3 Annual Coal Production in the PRB by County (1970 – 2003)

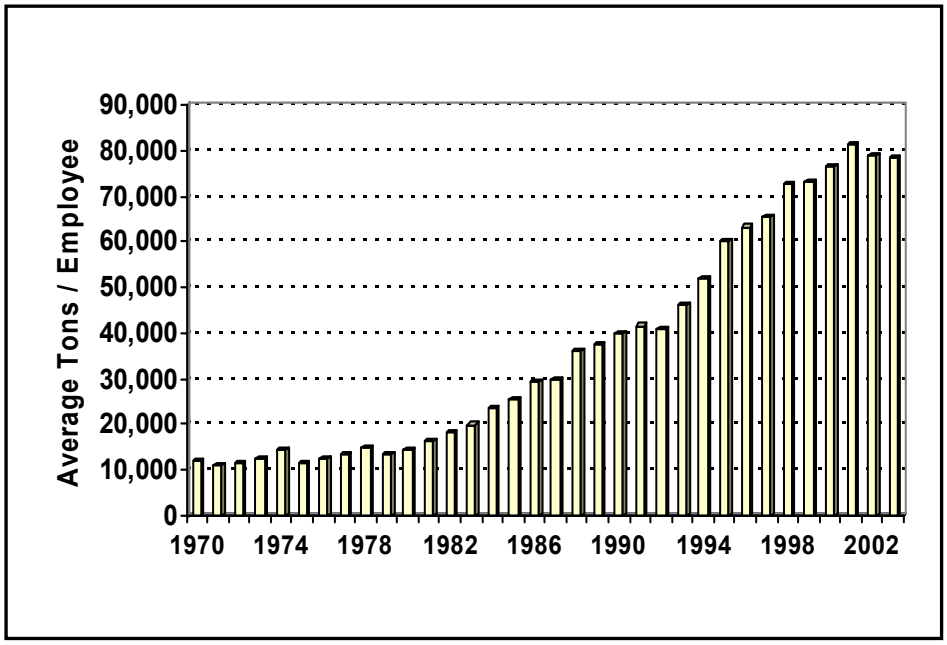
The increase in average labor productivity in the PRB mines is important to an understanding of the cumulative economic, demographic, and social effects in the region. Initially, expansion of the state's coal output was mirrored by increases in mining employment (**Figure 3-4**).



Source: Wyoming State Inspector of Mines 1975 - 2003.

Figure 3-4 Direct Employment in Wyoming's Coal Mining Industry

Between 1970 and 1980, statewide coal mining employment increased ten-fold, from 621 to 6,231 employees, paralleling the increase in output from 7.4 to 95 million tons. In part, this reflected the lags between startup and full production linked to activities such as facility construction and overburden stripping. During that period, average annual output was relatively steady between 11,000 and 15,000 tons per employee (**Figure 3-5**).



Source: Wyoming State Inspector of Mines 1975 – 2003.

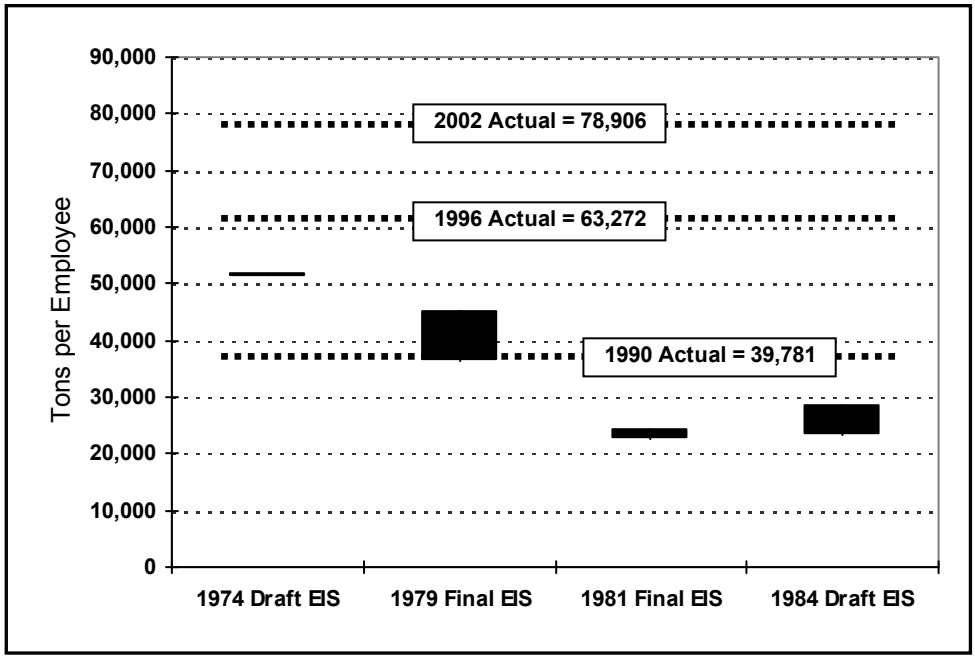
Figure 3-5 Average Productivity in Wyoming's Coal Industry (1970 - 2003)

Thereafter, productivity started increasing dramatically. The increases were such that total employment declined, even as total output climbed. By 1985, average productivity reached 25,612 tons per year, with subsequent gains raising the average to 39,781 tons per year by 1990 as 4,623 employees produced a total of 184 million tons. The trends in productivity gains continued through the 1990s and into the new decade. Average annual productivity peaked at 81,363 tons per employee in 2001, before declining below 79,000 tons per year in 2002 and 2003.

Total annual projected coal output is the critical variable driving the projections of future coal mining employment, which in turn underlie the overall economic and population projections associated with coal development. The assumptions regarding future productivity are what link these two factors together and are consequently critical to the overall analysis. As shown above, average productivity has increased dramatically in the PRB.

Comparing actual productivity to the productivity assumptions in the previous cumulative analyses reveals variances that have important implications for the long-term cumulative projections contained in the various regional coal EISs for the PRB. During the preparation of the early regional impact analyses, the assumed average annual productivity per mining employee ranged from about 22,700 (BLM 1979) to 51,250 tons of coal per miner (BLM 1974). Generally, the productivity assumption held constant over the entire projection horizon. The major exception to that protocol being the "High Development Scenario" in the Eastern Powder River Coal Final EIS (BLM 1979),

which assumed nearly a 20 percent decline in average productivity associated with bringing new mines on line to achieve a much higher production target. The Powder River Coal Draft EIS (BLM and U.S. Forest Service [USFS] 1984), the most recent regional analysis, assumed an average annual productivity of about 25,300 tons of coal per employee (**Figure 3-6**). Actual productivity through the early 1990s generally was consistent with the productivity assumptions contained in the regional EISs. Thereafter, productivity climbed dramatically, nearly doubling between 1990 and 2002 and quickly outpacing the most optimistic assumptions in the Draft EIS Development of Coal Resources in the Eastern Powder River Coal Basin of Wyoming (BLM 1974). The increasing productivity has direct implications for the size of work force required for any given level of production.



Sources: BLM 1974, 1996; Wyoming State Inspector of Mines 1991, 1997, and 2003.

Figure 3-6 Projected and Actual Productivity of Coal Mining in the PRB

The decline in direct mining employment and increasing productivity obscures a countervailing trend that also factors into productivity, that being the increased use of contractors to perform equipment repair, maintenance, stripping, blasting, and other activities historically performed by mine employees. The full extent of such contracting is not known, but the Wyoming State Inspector of Mines reports the number of contract employees tallied in a survey of mining contractors more than doubled from 576 in 1998 to 1,288 in 2003 (an increase of 712 employees or 124 percent). Taking subcontracting into account would reduce the overall average productivity; however, it still would reflect a dramatic increase compared to productivity in the late 1970s.

Development of the PRB coal resource resulted in substantial ancillary development. Since the 1970s, rail lines into the PRB have been expanded and improved to keep pace with coal production, resulting in a substantial rail construction, operation, and maintenance industry in the PRB. Transporting PRB coal to utilities and manufactures across the nation is now a vital source of traffic for the railroads.

3.1 PRB Coal Production and Productivity Trends

Five coal–fired electric power plants (several with multiple units) have been constructed in the PRB to take advantage of the relatively low cost/low sulfur coal resource and to avoid coal transportation costs (USDOE-EIA 1004b). A number of coal beneficiation and coal gasification plants have been proposed over the last 30 years in an effort to add value to the coal resource, but these technologies have yet to be implemented on a commercial scale. A coal slurry pipeline was proposed during the 1980s to provide an alternative for transporting coal to markets, but was abandoned because of environmental hurdles and opposition from the railroads.