



The Economic Impact of Fire Damage on Wyoming's Economy from a Business Perspective

A Regional Economic Models, Inc. (REMI) Policy Insight Analysis

Prepared by Amy Bittner and Justin Ballard

August 18, 2005

Staff:

Buck McVeigh, Administrator
Justin Ballard, Senior Economist
Wenlin Liu, Senior Economist
Jim Robinson, Senior Economist
Amy Bittner, Economist
Jamie Rinehart, Financial/Statistical Technician

Department of Administration and Information
Economic Analysis Division
1807 Capitol Ave., Suite 206
Cheyenne, WY 82002-0060
Phone: (307) 777-7504
Fax: (307) 632-1819
E-mail: ead@state.wy.us
Website: <http://eadiv.state.wy.us>

The U.S. faces one of the worst fire problems on a per capita basis in the industrial world. According to the U.S. Fire Administration, the losses from hurricanes, tornadoes, floods, earthquakes, and other natural disasters average only a fraction of damage from fires, annually. Smaller, sparsely populated states such as Wyoming are not immune to fire devastation; recently, the state experienced some well publicized and destructive fires. Last year, in Powell, a fire broke out in a dormitory at Northwest College that left several students temporarily homeless and caused severe damage to the building. This dormitory fire has initiated the installation and appropriation for enhanced fire safety in all the community college and University of Wyoming dormitories. Approximately \$5 million was approved by the State Legislature to retrofit a sprinkler system in these housing facilities. The cost of rebuilding the dormitory is estimated to be as high as \$5.8 million. In December 2004, a vicious fire wiped out a section of historical downtown Cheyenne, and damaged several businesses. Overall, the damage incurred from this fire is estimated to be around \$3 million. Direct costs associated with fire are often well-known and apparent, but fires also induce indirect costs, which may be 8-10 times higher than the direct impacts. Often times, the general public, local government, and the media may be unaware of the complete impact fires may have on individuals and communities.

Utilizing Regional Economic Models, Inc. (REMI) Policy Insight, the economic impact of a fire to Wyoming's economy can be estimated. REMI is a regional economic forecasting and policy analysis model that includes cause and effect relationships. For this analysis, a 169 economic sector, single region REMI model for Wyoming was exercised. REMI maintains a baseline forecast and when a shock is introduced into the economy it is able to estimate the changes that occur in that forecast for each year that shock is inputted. The economic model provides an opportunity to see the direct as well as indirect changes that occur to Wyoming's economy due to this shock. REMI allows the flexibility of running different simulations to view various perspectives and scenarios. For this analysis, two different types of business scenarios were examined using the REMI model to show how Wyoming's economy may be affected by fire damage. The basis behind each simulation is that employment in a firm and an industry would be reduced due to a fire outbreak.

Scenario 1: Reduced retail trade firm employment

Businesses may feel the impact of fire damage in many different areas. If a business is severely damaged due to a fire, not only is the actual physical structure impaired, but output or sales decline. In addition, a business may incur new production costs stemming from the fire damage; a business may have to temporarily relocate, purchase new equipment and supplies, or perhaps it would close permanently. All of these effects may force a reduction in employment.

The retail trade sector is one of the larger employment sectors in Wyoming. According to the U.S. Census Bureau's County Business Patterns: 2002, Wyoming's retail trade sector is comprised of 2,850 establishments that employ 29,180. The average employee size for each of these establishments is approximately ten persons. For this analysis, a shock was induced in a retail trade firm's employment. Initially, a decrease of 10 employees in retail trade firm employment was modeled and then in another simulation a reduction of 60 workers was initiated. The assumption was made that a fire could destroy a retail trade establishment, causing a decrease in that firm's employment. The employment shock was induced for one year only, 2005, and the economic impacts are reported for that single year. Table 1 on page 2 shows some of the effects that occur when employment is reduced in a retail trade firm.

Table 1 – Impacts to Wyoming’s economy from a fire to a retail trade establishment

Variable	Retail Trade	
	-10 employees	-60 employees
Total Employment	-2	-14
Output (sales)	\$ -133,522	\$ -809,063
Gross State Product (GSP)	\$ -77,852	\$ -472,179
Personal Income	\$ -42,657	\$ -266,905
Population Change	0	-3

Scenario 1: Impact Summary

1. In the smaller retail trade firm, Wyoming’s total employment decreases by approximately two, while the larger reduction of 60 persons causes a loss of 14 in total employment. The overall employment impact is smaller than the inputted shock, which is due to the nature of the retail sector. Some of these unemployed persons may find work in other retail trade establishments; other retail trade firms will absorb a portion of the unemployed retail trade workers.
2. Output can be viewed as the dollar value of production, including intermediate goods. The REMI results also show that total output or sales in Wyoming’s economy decline by \$133,522 from a ten employee loss and \$-809,063 in the second simulation. Retail trade sales are a significant portion of this reduced output, but other industries such as construction and accommodation and food services are also affected. Table 2 on page 3 show the sales differences for each industry when retail trade firm employment changes.
3. Gross State Product (GSP) is a measure of the total value of goods and services produced in a state. GSP is equivalent to sales less intermediate inputs. GSP is a value added concept and is similar to the national measure of GDP. According to the Bureau of Economic Analysis (BEA), GSP is considered one of the most comprehensive measures of economic activity in a state. The reduction in retail trade firm employment by 10 employees causes Wyoming GSP to diminish by \$77,852. The larger reduction of retail trade firm employment, a decrease of 60 persons, causes the state’s GSP to fall by \$472,179. Changes in GSP by industry may be located on page 3, table 2.
4. Personal income is defined as the income received by all persons from all sources. This sum includes net earnings, rental income, personal dividend income, personal interest income, and transfer payments. The first simulation initiated a change in personal income of \$-42,657. Once 60 employees were removed from retail trade firm employment, personal income reduces by \$266,905.
5. The firm employment shock introduced to Wyoming’s economy also induces some demographic effects. REMI is able to model any changes that may occur to Wyoming’s population due to an economic impact. The population remains unchanged when retail trade firm employment decreases by 10. However, when 60 employees are removed from retail trade firm employment, it triggers a change to Wyoming’s population, a reduction of three persons.

Table 2 – Industry impacts from a reduction in retail trade firm employment

Economic Sector	Output (sales) \$		Gross State Product (\$)	
	-10 employees	-60 employees	-10 employees	-60 employees
Agricultural Services, Forestry, Fishing, Other	-9	-77	0	-38
Mining	0	547	0	547
Utilities	-1,367	-8,546	-820	-4,923
Construction	-5,469	-36,371	-2,461	-16,815
Manufacturing	-820	-4,102	-273	-1,367
Wholesale Trade	-1,367	-7,794	-820	-4,923
Retail Trade	-108,287	-648,967	-62,901	-376,786
Transportation, Warehousing	-137	-2,051	-205	-1,094
Information	-1,231	-6,836	-615	-3,965
Finance, Insurance	-2,187	-12,445	-1,436	-8,477
Real Estate, Rental, Leasing	-2,871	-20,233	-2,051	-15,037
Professional, Scientific, Technical Services	-1,709	-10,528	-1,231	-7,178
Management of Companies, Enterprises	-991	-6,068	-709	-4,349
Administrative, Support, Waste Services	-1,914	-11,246	-1,367	-8,067
Educational Services	-68	-367	-38	-205
Health Care, Social Assistance	-957	-7,930	-615	-4,991
Arts, Entertainment, Recreation	-308	-1,778	-188	-1,077
Accommodation, Food Services	-2,187	-14,085	-1,094	-7,247
Other services (excluding government)	-1,641	-10,186	-1,026	-6,187
TOTAL	\$ -133,522	\$ -809,063	\$ -77,852	\$ -472,179

Scenario 2: Losses in specialized industry employment

Another REMI analysis was conducted in order to determine the impact a fire might have on employment in more specialized, smaller industries in Wyoming. Two different types of manufacturing sectors were modeled. The first, sawmills and wood preservation, and the other, sugar and confectionary product manufacturing, which includes sugar beet manufacturing. In 2002, there were 14 sawmills and wood preservation establishments in Wyoming. A majority of these establishments employ 20-49 workers. In the first REMI simulation, 25 employees were removed from this industry. A separate simulation was run to determine the impact of reducing employment in sugar beet manufacturing. According to the Census Bureau's 2002 County

Business Patterns, 226 persons are employed in four sugar beet manufacturing establishments in Wyoming. The average number of employees in these establishments is 56 persons. In REMI, industry employment was decreased by 56 in the sugar and confectionary product manufacturing sector in 2005. Table 3 details the impacts from both industry employment simulations for 2005.

Table 3 – Effects of a reduction in industry employment due to a fire

Variable	Manufacturing	
	<i>Sawmills & wood preservation (-25 employees)</i>	<i>Sugar beet manufacturing (-56 employees)</i>
Total Employment	-42	-92
Output (sales)	\$ -6.7 Million	\$ -18 Million
Gross State Product (GSP)	\$ -1.78 Million	\$ -7 Million
Personal Income	\$ -1.28 Million	\$ -2.95 Million
Population Change	-8	-16

Scenario 2: Impact Summary

1. Removing 25 employees from sawmills and wood preservation industry employment causes Wyoming's total employment to decrease by 42. The reduction in sugar beet manufacturing employment initiates an even larger decrease in total employment, -92. The larger decreases in overall employment indicate that it is difficult for these unemployed to find similar employment due to the industry specialization and the small number of establishments in the state. Most of the job losses occur in manufacturing, but other sectors experience declines as well. Reduced sawmills and wood preservation employment induces a loss of three jobs in agricultural services, forestry, and fishing and a two position decline in accommodation and food services. Retail trade employment is down by eight, accommodation and food services loses five positions, and construction employment declines by four when sugar beet manufacturing industry employment decreases.
2. Industry employment reduction in sawmills and wood preservation and sugar beet manufacturing causes millions of dollars in lost sales, \$ -6.7 million and \$ -18 million, respectively. Table 4 on page 5 depicts the decreased output of other industries that are impacted by these employment shocks. Aside from manufacturing, the industries that experience the largest losses in output include agricultural services, forestry and fishing, and retail trade.
3. GSP is an excellent gauge to use in determining how the overall economy of Wyoming is affected by an economic impact. Altering industry employment induces a decline in GSP of \$1.78 million in the first simulation and \$ -7 million in the other. In 2004, according to the BEA, total Wyoming GSP was approximately \$24.3 billion.
4. According to the REMI results, total personal income declines by \$1.28 million in 2005 when 25 employees are removed from sawmills and wood preservation industry employment. A larger portion of personal income, \$ 2.95 million, is lost when sugar beet manufacturing industry employment decreases.

5. Loss of employment in sawmills and wood preservation manufacturing reduces Wyoming's population by 8 persons. In the sugar beet manufacturing simulation, results indicate a population decrease of 16. This may be explained by the specialized nature of these two manufacturing industries, the unemployed may have to relocate to different areas to regain employment because there are fewer of these types of establishments in Wyoming.

Table 4 – Industry impacts from a reduction in industry employment

Economic Sector	Output (sales) \$		Gross State Product (\$)	
	Sawmills & wood preservation (-25 employees)	Sugar beet manufacturing (-56 employees)	Sawmills & wood preservation (-25 employees)	Sugar beet manufacturing (-56 employees)
Agricultural Services, Forestry, Fishing, Other	-185,124	-3,931	-96,003	-2,093
Mining	-2,187	-12,032	-820	-5,196
Utilities	-52,716	-142,227	-29,466	-73,556
Construction	-153,467	-397,088	-71,240	-184,551
Manufacturing	-5,549,138	-15,449,955	-1,100,996	-5,473,436
Wholesale Trade	-131,674	-368,987	-84,086	-235,706
Retail Trade	-185,239	-461,893	-107,611	-268,166
Transportation, Warehousing	-39,789	-105,695	-20,990	-55,308
Information	-16,953	-62,901	-9,776	-36,165
Finance, Insurance	-69,186	-197,741	-47,107	-132,477
Real Estate, Rental, Leasing	-48,954	-122,269	-36,509	-91,610
Professional, Scientific, Technical Services	-42,725	-155,302	-29,535	-106,315
Management of Companies, Enterprises	-8,255	-86,242	-5,914	-61,788
Administrative, Support, Waste Services	-26,897	-74,623	-18,662	-51,787
Educational Services	-1,966	-4,641	-1,115	-2,640
Health Care, Social Assistance	-38,149	-88,054	-23,926	-54,964
Arts, Entertainment, Recreation	-9,862	-22,596	-6,033	-13,821
Accommodation, Food Services	-73,293	-173,884	-37,598	-89,695
Other services (excluding government)	-85,049	-155,532	-51,993	-94,007
TOTAL	\$ -6,720,623	\$ -18,085,593	\$ -1,779,379	\$ -7,033,282