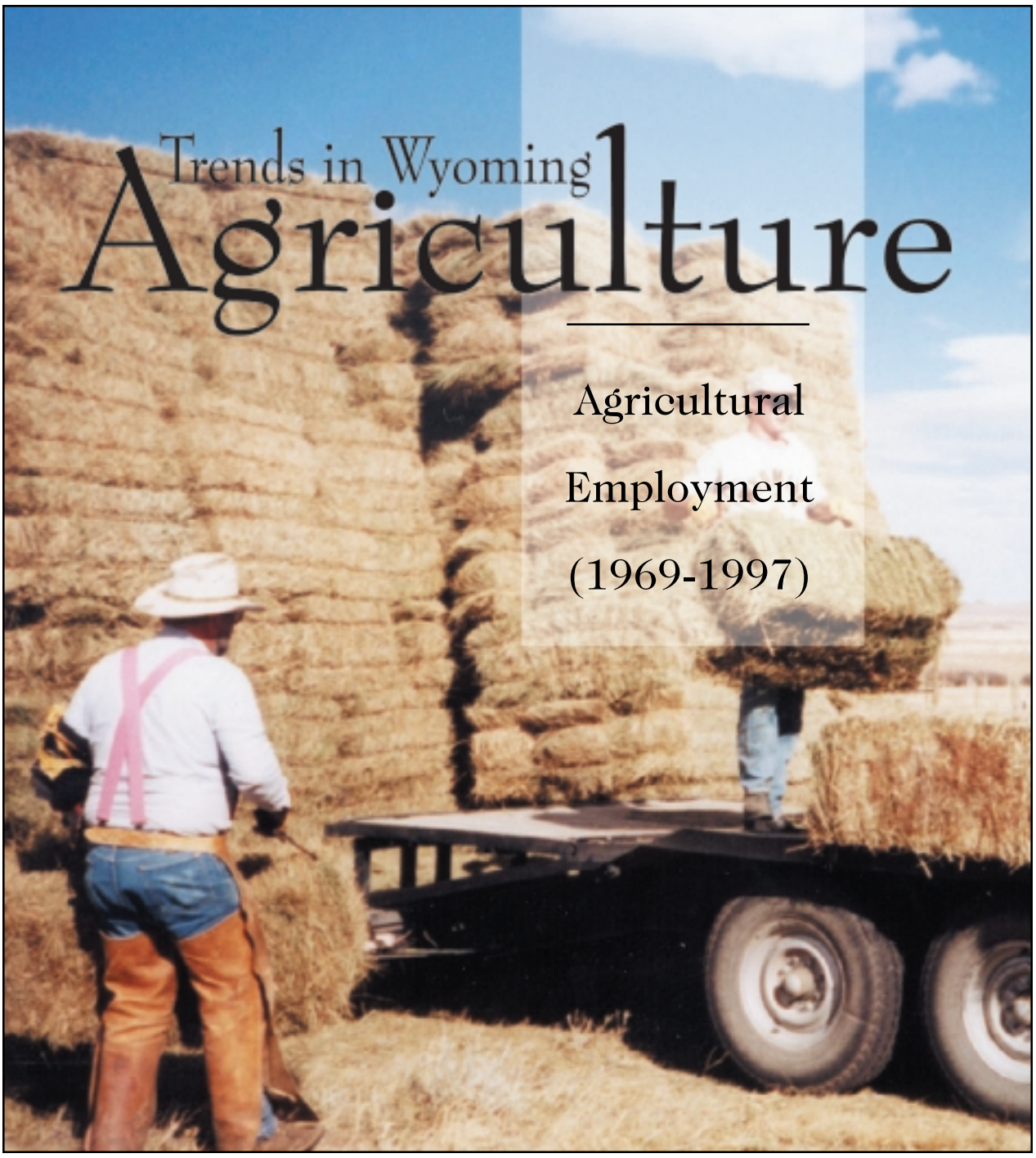


Thomas Foulke, Roger Coupal, David Taylor

College of Agriculture
Cooperative Extension Service
UNIVERSITY OF WYOMING

MP-106
October 2000

Authors:

Thomas Foulke, Information Specialist, University of Wyoming College of Agriculture Department of Agricultural and Applied Economics, P.O. Box 3354, Laramie, WY 82071

Roger Coupal, Assistant Professor, University of Wyoming College of Agriculture Department of Agricultural and Applied Economics, P.O. Box 3354, Laramie, WY 82071

David Taylor, Professor, University of Wyoming College of Agriculture Department of Agricultural and Applied Economics, P.O. Box 3354, Laramie, WY 82071

Editor: Tonya Talbert, College of Agriculture, Office of Communications and Technology
Graphic Designer: Tana Stith, College of Agriculture, Office of Communications and Technology

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Glen Whipple, Director, Cooperative Extension Service, University of Wyoming, Laramie, Wyoming 82071.

Historically, agriculture has been a pillar of Wyoming's economy. The state's economic base was founded on agriculture and mining and these are inseparably intertwined with its history and culture. However, the reality of the twenty-first century is that agriculture's share of the state's total economic activity has declined considerably.

Agriculture currently supplies only 2.37 percent of the Gross State Product (GSP) and accounts for only 1.5 percent of total employment (Wyoming DOE-DAI, 2000). Yet the numbers belie agriculture's important contributions not only to the state's economy but, more significantly, to its local communities. Agriculture is among the top five employers in 76 percent of Wyoming zip codes (Commerce, 1990). Agricultural operators are small businessmen and women whose operating needs run the gamut of local business and government offerings. The need for a broad variety of goods and services helps make and keep communities viable and encourages stability and growth. In addition, 97 percent of all private land in Wyoming is agricultural, creating a significant repository for the state's open space resources.

As Wyoming shifts toward a service-based economy, changes in the structure of agriculture, the economy, and local communities are bound to take place. How will this affect agricultural employment and what trends are currently taking shape? This report examines agricultural employment in Wyoming during a 28-year period (1969 to 1997) to gain historical perspective and identify trends in the sector. Producers, local business people, and officials concerned with the future of their communities may find insight into the changes being thrust upon them by shifts in economic activity.

The data for this report were obtained from the Bureau of Economic Analysis' Regional Economic Information System (REIS). The Bureau of Economic Analysis is a branch of the U.S. Department of Commerce. The REIS data covers 29 years of historical economic information for the country and is released on CD-ROM. The most current data are from the period 1969 to 1997.

The Big Picture

Nationwide, agricultural employment has been declining since the 1930s (Commerce, 1954, 1997). The major reason for the decline is increased productivity due to technology. The internal combustion engine has revolutionized the way farmers and ranchers have done business, allowing fewer workers to accomplish more work. The addition of newer and more efficient implements and production methods has had a multiplying effect as the horsepower of machinery has increased. Even seemingly small changes, such as the use of large round bales, have significantly decreased the need for labor on Wyoming farms and ranches. One or two people are now able to accomplish a whole hay crew's work with less time and at less cost. Even mundane electrical appliances have had significant impact on agricultural practices—think of the labor reduction due to electric shears in the sheep industry. To illustrate the impact of mechanization in agriculture, Table 1 shows the number of trucks and tractors on Wyoming farms in 1920 and 1997. Consider that in 1920 only 28.3 percent of Wyoming farms had telephones,

Table 1. Tractors and trucks on Wyoming farms, 1920 and 1997.

	1920	1997
Motortrucks (including pickups)	591	24,805
Tractors	1,075	19,006

**Source: 1920 Census and 1997 Census of Agriculture.*

6.6 percent had water piped to the house, and only 4.6 percent had gas or electric light (Commerce, 1920). As we enter the Information Age, all these technological features are taken for granted because they are found on virtually every agricultural operation in the state.

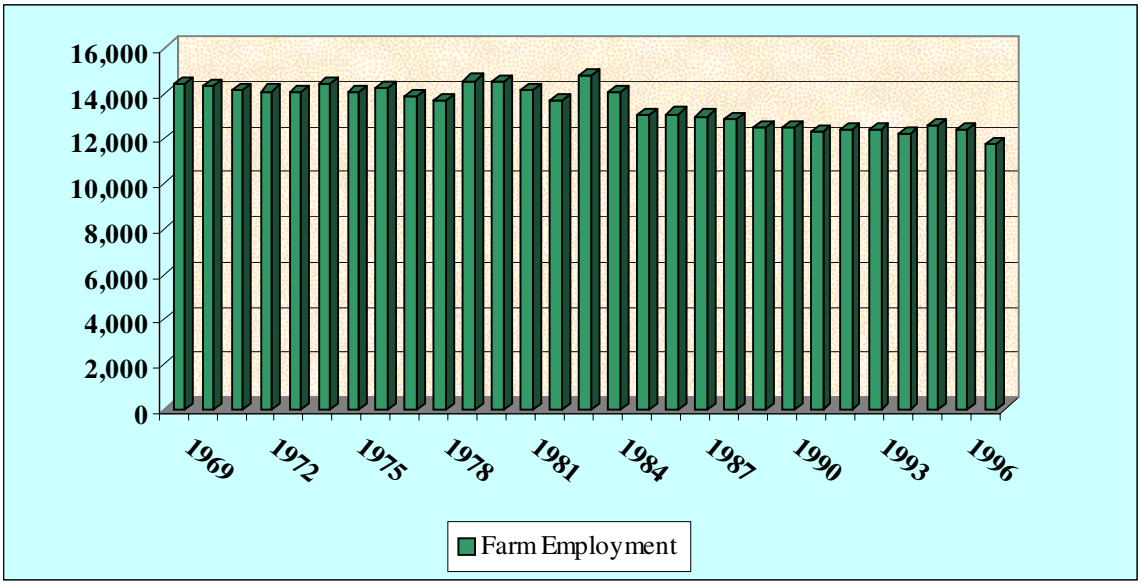
The deep impact of mechanization was a double-edged sword. As tractors and other machinery became more commonplace, agricultural productivity soared. Agriculturists were working just as hard, if not harder, with labor-saving tools. (New technology often adds work in the short run because there is a necessary learning period.) Additional production led to lower prices in the market place. This led producers to produce even more to capture smaller and smaller profit margins. Smaller producers were squeezed out; a smaller land base meant they did not have the productive capacity to generate sufficient profits to stay in business. Neighbor bought out neighbor in an attempt to form holdings large enough to generate income to support ever-larger operations. This process of consolidation has been going on since the 1930s, but it has been most pronounced since the 1960s.

Mechanization's impact on farm labor has been just as pronounced. Just as there were fewer proprietors due to consolidation, there was less need for hired labor to run more mechanized operations. Labor migrated to cities where manufacturing jobs offered higher wages.

The term mechanization encompasses just one aspect of technological change affecting agriculture. So far, only the mechanical aspect has been presented because of its obvious contribution. But there really was a progression of technological innovation that affected all of society throughout the twentieth century. The effects of mechanical innovation on agriculture were most pronounced from the 1930s through the 1960s. Hybridization and innovation in the biological sciences started to have a significant impact in the 1950s. The mid-1980s ushered in the personal computer and the information age. Personal computers and embedded electronics are now pervasive in agriculture. Chemical fertilizers have increased yields, while herbicides and pesticides have helped ensure the success of the crop. New drugs have helped increase the size and success of calf and lamb crops, while databases track their growth progress. Electronics have invaded the farm.

The trade off is that capital expenses have increased as labor costs have fallen. Agriculture is now more capital intensive than ever, and operators are more dependent on capital markets for cashflow and more sensitive to interest rates than in the past.

Figure 1. Wyoming agricultural employment, 1969-1997.



The net result is a more urbanized population that relies on fewer individuals for its food and fiber needs and that spends a smaller portion of its income to supply those needs. The farm population stood at 29.9 percent of the national population in 1920 and was an even higher 34.6 percent for the young state of Wyoming (Commerce, 1920). By the close of the century, the farm population was so small it was no longer counted. However, current estimates place it at less than 2 percent (Rathge and Highman, 1998).

Wyoming Agricultural Employment 1969-1997

Total Wyoming agricultural employment for the years 1969 to1997 is shown in Figure 1. Overall, the employment level in agriculture has decreased 18.8 percent during the period shown. This change is attributed to mechanization, which has resulted in large operations becoming larger and more productive. Yet there are other factors at work here that are not apparent from broad state level data.

Figures 2 and 3 show Wyoming agricultural employment broken down into its components of hired labor and proprietors. Figure 2 shows a dramatic 49.7 percent decrease in hired labor. This contrasts with Figure 3, which shows a 2.17 percent increase in the number of proprietors over the same period. The disparity is not due entirely to mechanization, though it is certainly prominent in the case of hired labor. The other factor involved is the size of the operation. Notice in Figure 3 that there was a noticeable decline in proprietorships in the early 1970s. Consolidation due to mechanization is the likely candidate for this trend, and it is likely the trend extended into years prior to this graph.

A period of volatility in agriculture caused by climatic (i.e., drought) and macroeconomic events (i.e., free floating exchange rate of the U.S. dollar, grain exports to the USSR, and inflation) started in 1973 and continued until the early 1980s. (For a more detailed discussion, see the companion report MP-104: *Trends in Wyoming*

Figure 2. Wyoming hired agricultural labor, 1969-1997.

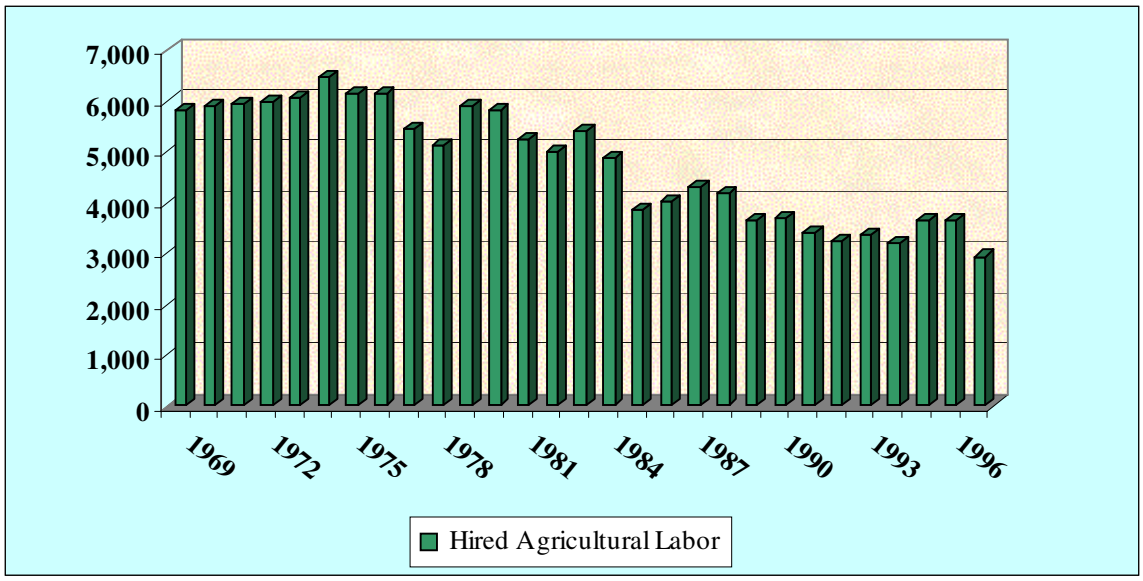
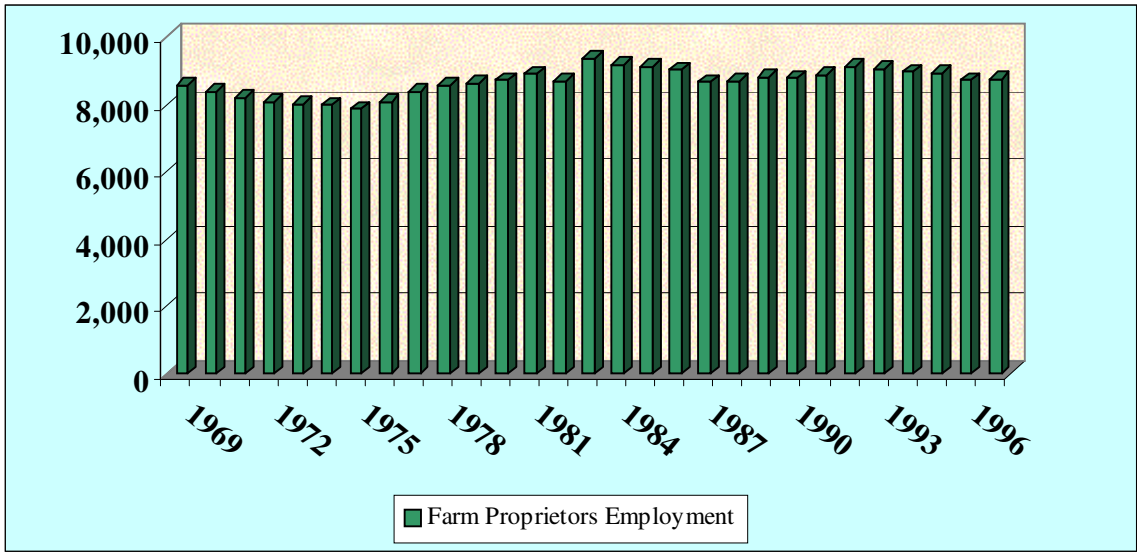


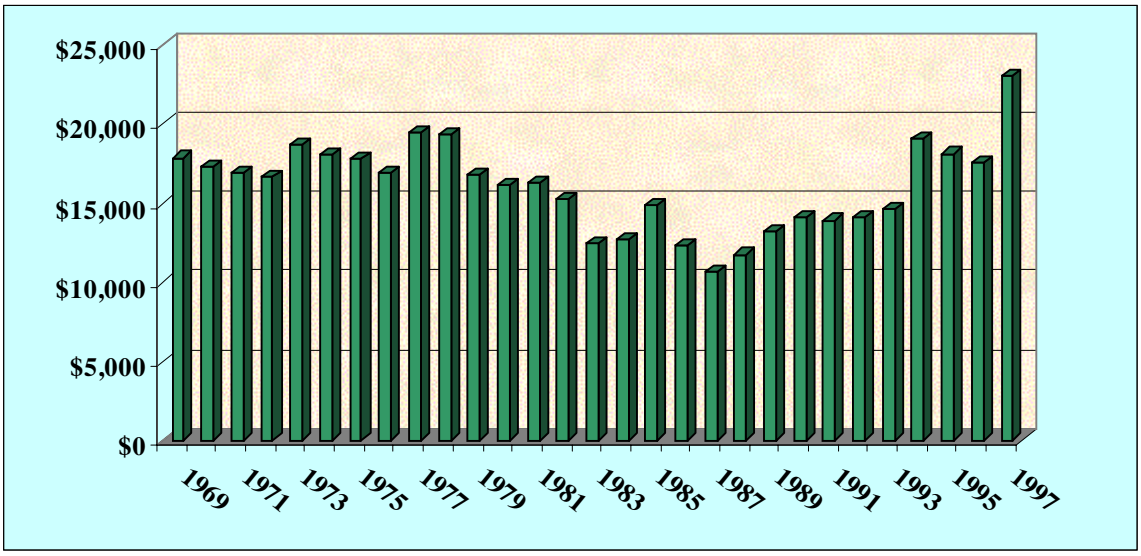
Figure 3. Wyoming agricultural proprietors, 1969-1997.



Agriculture: Agricultural Income 1969-1997.) It may take a year or so for the economics to catch up with producers because new producers won't jump into the market as soon as conditions are good, and producers who are failing may hang on for a few years trying to maintain their operation. But interest rates stabilized by the late 1980s, allowing producer numbers to follow suit.

So, why are there more producers and less hired labor even as average farm size has increased? The answer lies in the growth of small operations, which are associated more with lifestyle decisions than production. Often called "hobby farms" or "ranchettes," dramatic growth was observed in these smaller operations starting in the mid-1970s. Farms in the 10- to 49-acre size range increased 144 percent

Figure 4. Average farm wages per hired worker, 1969-1997.



between 1969 and 1997 (Commerce, 1969 and 1997). This pushed up the number of proprietors and farms for statistical purposes. Average farm size for large commercial operations grew larger and employed less hired labor due to mechanization, while the number of proprietors increased due to the surge in hobby farms and ranchettes. (For more information, see the companion publication MP-105: *Trends in Wyoming Agriculture: Size of Operation 1935-1997.*)

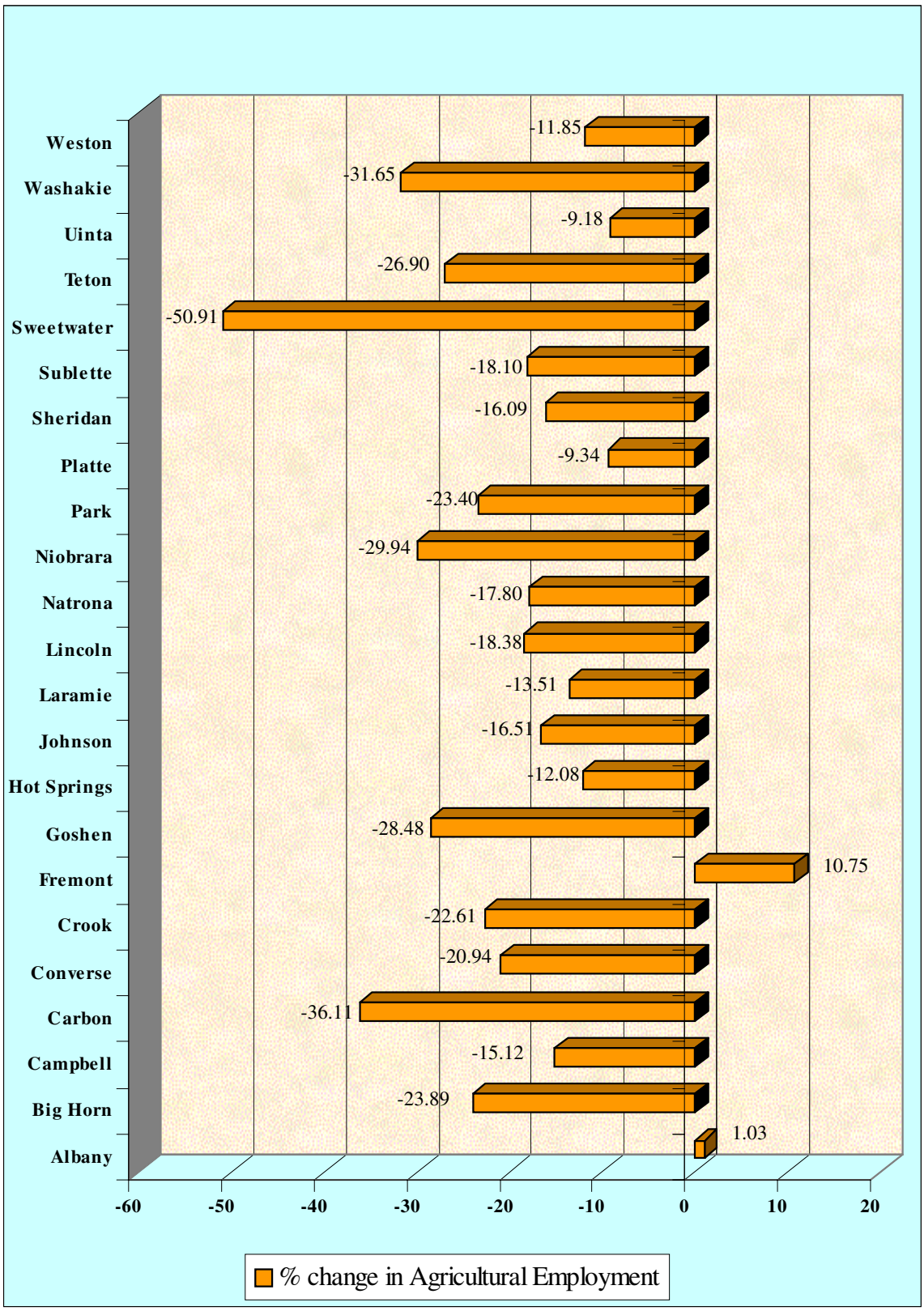
Compensation

Figure 4 shows average wages per hired farm worker in Wyoming for the period 1969 to 1997. Farm wages have been relatively stable in real terms (dollars adjusted for inflation to 1992 dollars). Wages did fall during the 1980s, a period of instability in agriculture, but have since rebounded and are above their historic level (on a per worker basis). The average wage per worker was $25,695 in 1997, up from $19,221 the year before (nominal dollars). This jump is attributed to a loss of 534 lower-paying jobs between 1996 and 1997. (For a more complete treatment of farm income and wages, see the companion publication MP-104: *Trends in Wyoming Agriculture: Agricultural Income 1969-1997.*)

The Counties

Figure 5 shows Wyoming agricultural employment by county. Only two counties showed growth in total agricultural employment during the period—Fremont and Albany. This was the result of increases in the number of proprietors, not hired labor. Figures 6 and 7 show proprietors and hired labor by county. These are the components of agricultural employment. Table 2 is included to show the actual employment numbers, as well as the percent of change over the time period. Some counties have relatively small numbers of agricultural employment. Consequently, small changes in employment appear as larger percentage changes.

Figure 5. Change in Wyoming agricultural employment by county, 1969-1997.



Hired Agricultural Labor

Hired agricultural labor declined in all of Wyoming's 23 counties from 1969 to 1997 (Figure 6 and Table 2). Again, the major reason was the consolidation of agricultural enterprises due to the increased productivity of mechanization. The authors suspect that land development, or at least subdivision of land into smaller parcels, played a part in several counties that experienced higher rates of development in recent years. This is particularly true of Lincoln, Park, Teton, Sheridan, and Sublette Counties, which are in close proximity to national park and/or forest recreation opportunities. Other counties, such as Sweetwater and Carbon, saw an increase in mineral activity and a reduction in the number of sheep operations, as well as some development. Counties that rely heavily on agriculture, such as Niobrara, saw employment numbers decrease due almost entirely to consolidation in the industry.

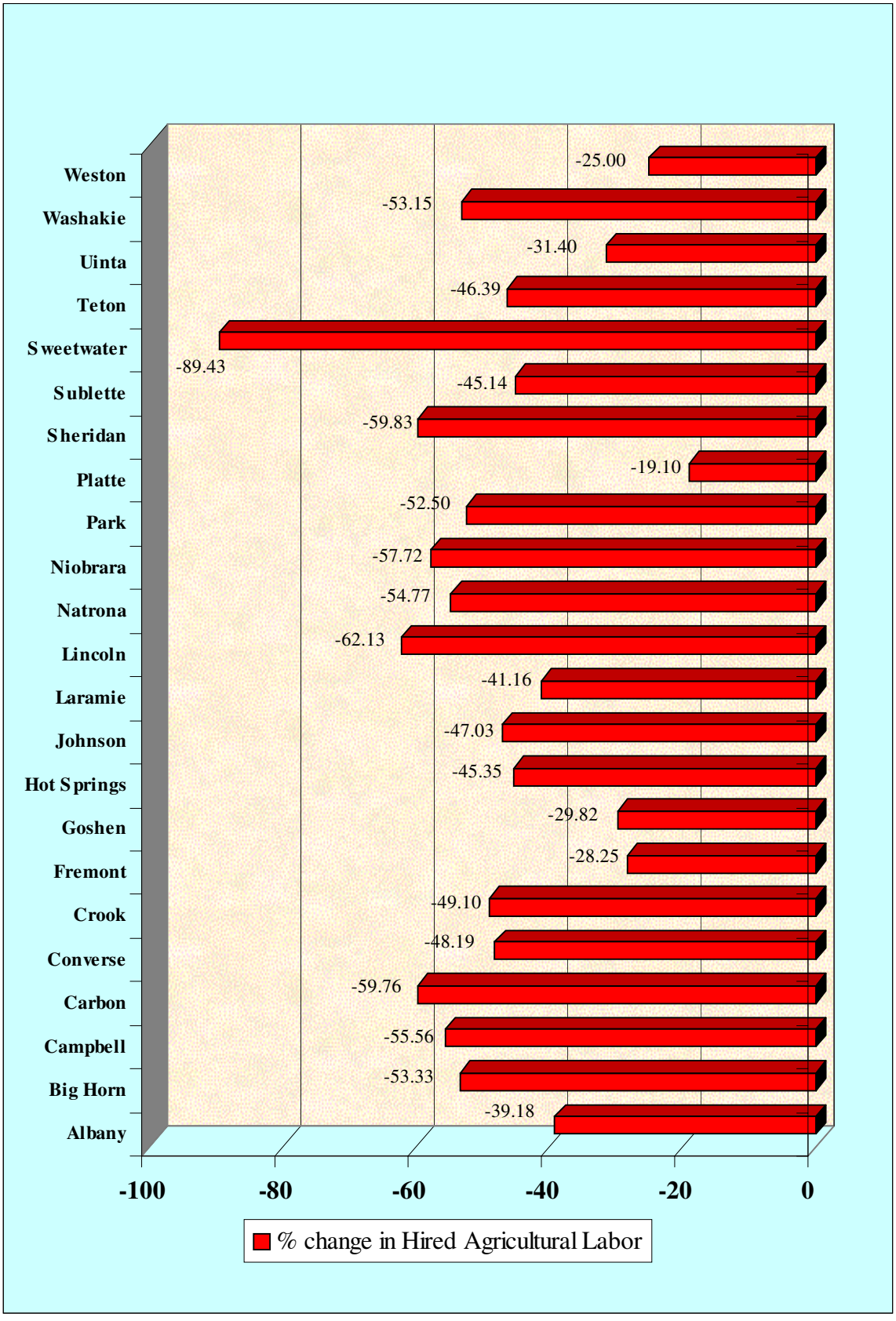
Agricultural Proprietors

The change in the number of agricultural proprietors on a county basis is shown in Figure 7 and Table 2. The overall increase in the number of proprietors by 2.17 percent reflects the increase in smaller holdings in some counties, even as others saw dramatic decreases due to consolidation. Though the data are not clear, those counties with some natural amenity value, such as national forest proximity, access to a larger regional center (jobs), and retention of some agricultural ethic in the community, have become more developed due to higher demand for land. This view is borne out in Albany, Carbon, Fremont, Lincoln, Sheridan, Sublette, and Sweetwater Counties, which show significant gains in proprietorship. Counties with decreases in proprietorship suffer from either consolidation in the industry or land going out of agriculture and into rural residential housing developments. The latter is true of counties such as Park and Teton. Those counties with large agricultural components, such as Crook, Niobrara, and Goshen, have seen proprietorships drop due to consolidation in the industry. Varying degrees of crossover between these two factors likely occur in all counties; however, the data used in this report cannot be used to separate out those effects.

Trends Going Forward

The twin trends of consolidation in agriculture and parceling out land for smaller enterprises are likely to continue. Profitability will continue for larger operations that are innovative users of resources in a changing economic climate. Land values in some areas will dictate that subdivision is the highest and best use of the land, even when used for agricultural production. There are signs that the recent upsurge in agricultural productivity is leveling off. Public research and development (R&D) monies have been stagnant since 1976. Private R&D monies out pace public funds but have been growing at about 1 percent per year (USDA, *Productivity,* 1999). What this means for agricultural employment is probably a leveling off in the drop in hired labor and maybe even a slight upswing in numbers because of the use of hired managers. The Wyoming Department of Employment and the Economic Analysis Division expects the number of farm managers, workers, and equipment

Figure 6. Change in Wyoming hired agricultural labor by county, 1969-1997.



operators to grow a modest 10 to 11 percent between 1998 and 2008 (Wyoming DOE-DAI, 2000).

The number of proprietors could grow slightly as more smallholdings are created. However, the aging demographics of proprietors hints that existing operations may have increased opportunities available in the next 5 to 10 years. (See companion publication MP-103: *Trends in Wyoming Agriculture: The Changing Demographics of Wyoming Agricultural Operators 1959-1997.*) The net result is that proprietor numbers statewide should stay in a fairly narrow range during the coming years, but more significant moves may be made at the county level.

Summary

Agricultural employment has been declining since the 1930s. Wyoming agricultural employment declined 18.8 percent from 1969 to 1997, mainly due to mechanization. The ability to cultivate or graze larger tracts of land with less labor has increased production, lowering commodity prices. Lower commodity prices pressure producers to consolidate to capture more of shrinking profit margins. This process has had a particularly negative effect on the industry's contribution to the overall labor market.

At the same time, parceling out agricultural land near forests and regional centers has allowed more small landowners to engage in agriculture while maintaining off-farm income sources. These small enterprises rarely employ hired labor. While the viability of many of these enterprises is in question, their presence is not. The gains and losses in employment are not evenly spread across Wyoming's counties. They reflect changing land use patterns as more individuals try to include quality of life issues in their lifestyles. These trends appear to be continuing for the foreseeable future, but this is uncharted territory for the Wyoming economy.

For more information on Wyoming's agricultural sector, visit the **Wyoming Economic Atlas** at http://Agecon.uwyo.edu/Econdev.

Figure 7. Change in Wyoming agricultural proprietors by county, 1969-1997.

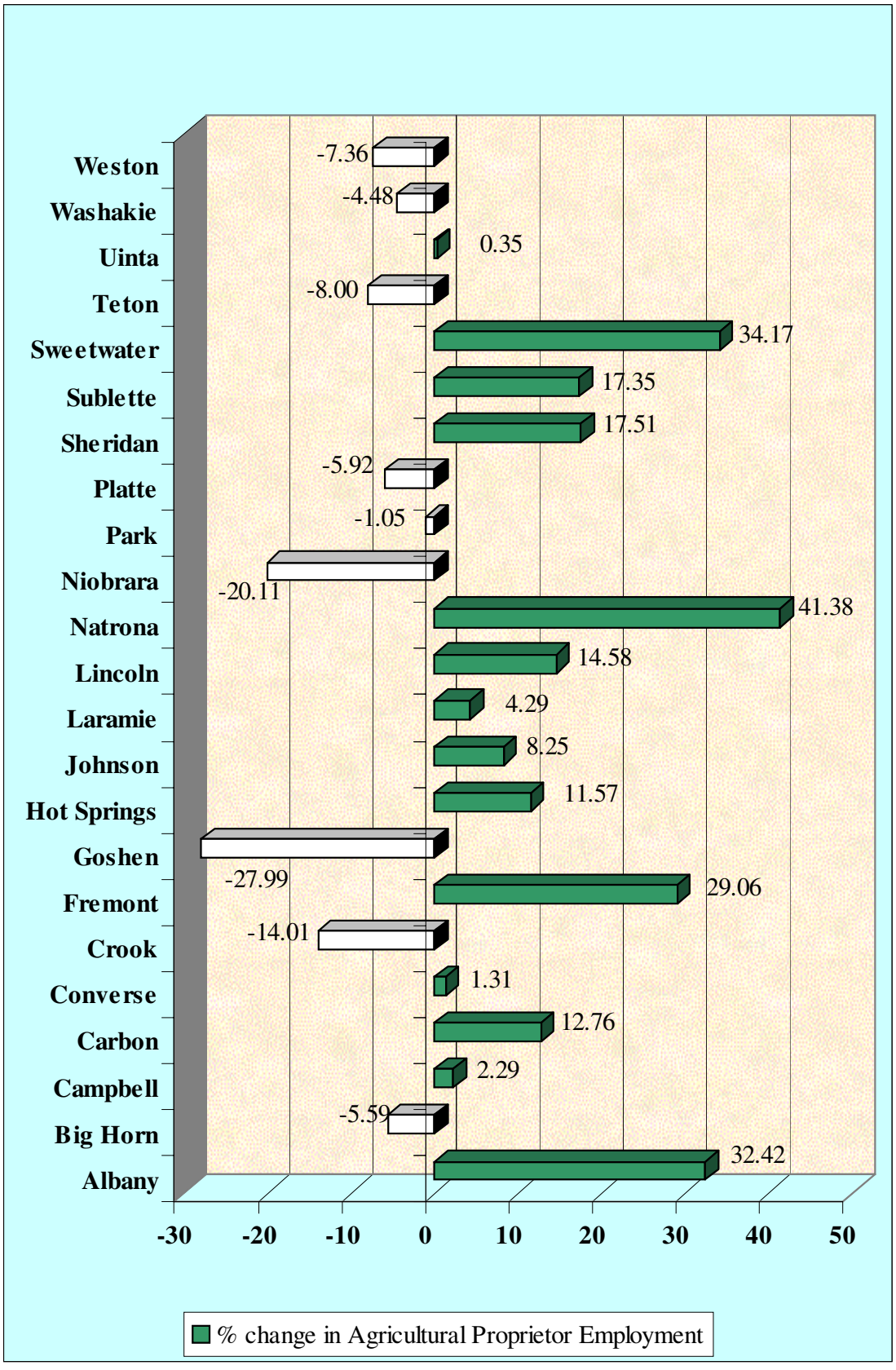


Table 2. Wyoming agricultural employment by county and category, 1969-1997.

	Agricultural employment			Hired agricultural labor			Agricultural proprietors		
	1969	1997	% change	1969	1997	% change	1969	1997	% change
Albany	390	394	1.03%	171	104	-39.18%	219	290	32.42%
Big Horn	900	685	-23.89%	345	161	-53.33%	555	524	-5.59%
Campbell	688	584	-15.12%	207	92	-55.56%	481	492	2.29%
Carbon	745	476	-36.11%	502	202	-59.76%	243	274	12.76%
Converse	554	438	-20.94%	249	129	-48.19%	305	309	1.31%
Crook	681	527	22.61%	167	85	-49.10%	514	442	-14.01%
Fremont	986	1,092	10.75%	315	226	-28.25%	671	866	29.06%
Goshen	1,236	884	-28.48%	332	233	-29.82%	904	651	-27.99%
Hot Springs	207	182	-12.08%	86	47	-45.35%	121	135	11.57%
Johnson	527	440	-16.51%	236	125	-47.03%	291	315	8.25%
Laramie	881	762	-13.51%	345	203	-41.16%	536	559	4.29%
Lincoln	854	697	-18.38%	367	139	-62.13%	487	558	14.58%
Natrona	528	434	-17.80%	325	147	-54.77%	203	287	41.38%
Niobrara	471	330	-29.94%	123	52	-57.72%	348	278	-20.11%
Park	1,013	776	-23.40%	440	209	-52.50%	573	567	-1.05%
Platte	685	621	-9.34%	178	144	-19.10%	507	477	-5.92%
Sheridan	808	678	-16.09%	351	141	-59.83%	457	537	17.51%
Sublette	453	371	-18.10%	257	141	-45.14%	196	230	17.35%
Sweetwater	385	189	-50.91%	265	28	-89.43%	120	161	34.17%
Teton	197	144	-26.90%	97	52	-46.39%	100	92	-8.00%
Uinta	403	366	-9.18%	121	83	-31.40%	282	283	0.35%
Washakie	455	311	-31.65%	254	119	-52.15%	201	192	-4.48%
Weston	346	305	-11.85%	88	66	-25.00%	258	239	-7.36%
Total percent change	14,393	11,686	-18.81%	5,821	2,928	-49.70%	8,572	8,758	2.17%
Average change			-19.17%			-47.54%			5.77%

References

Rathge, Richard and Paula Highman. "Population Change in the Great Plains: A History of Slow Decline." *Rural Development Perspectives*, Vol. 13, No.1, United States Department of Agriculture, 1998:19-27.

United States Department of Agriculture. *1997 Census of Agriculture, Volume 1, Geographic and Area Series, Part 50, Wyoming State and County Data*: various pages.

United States Department of Agriculture Economic Research Service. *Agricultural Research, Productivity and Technical Change*. Online summary report.

United States Department of Agriculture Economic Research Service. "Farm Income Briefing Room," *Agriculture Fact Book 98*, Internet site: http://www.econ.ag.gov/briefing/farmincome/finfidmu.htm.

United States Department of Agriculture Economic Research Service. "Forces Shaping U.S. Agriculture Briefing Room," Internet site: http://www.econ.ag.gov/Briefing/forces/ .

United States Department of Commerce Bureau of the Census. *Census of Agriculture, 1954, 1969*. Vol. 1: various pages.

United States Department of Commerce, Bureau of the Census, *The Twentieth Census of the United States, 1920, Vol. V*: 514, 894.

United States Department of Commerce Bureau of the Census. *Census of 1990*.

United States Department of Commerce Bureau of Economic Analysis. *Regional Economic Information System 1969-1997*. June 1999, data on CD-ROM.

Wyoming Department of Employment and Department of Administration and Information Economic Analysis Division. *Outlook 2000: Joint Economic & Demographic Forecast to 2008*. February 2000:6-7.