Technical Memorandum 4.1

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MEMORANDUM

TO:	TRIHYDRO
FROM:	HARVEY ECONOMICS
DATE:	JUNE 10, 2005
RE:	PLATTE RIVER BASIN WATER PLAN TECHNICAL MEMORANDUM 4.1. HISTORIC AND CURRENT ECONOMIC AND DEMOGRAPHIC CONDITIONS WITHIN THE PLATTE RIVER BASIN
PURPOSE:	THE PLATTE RIVER BASIN PLAN IS A PLANNING TOO DEVELOPED FOR THE WYOMING WATER DEVELOPMENT OFFICE. IT PRESENTS ESTIMATED CURRENT AND ESTIMATED FUTURE USES OF WATER IN WYOMING'S PLATTE RIVER BASIN. THE PLAN IS NOT USED TO DETERMINE COMPLIANCE WITH OR ADMINISTRATION OF STATE LAW, FEDERDAL LAW, COURT DECREES, INTERSTATE COMPACTS, OR INTERSTATE AGREEMENTS.

This technical memorandum provides the information on the Wyoming Platte River Basin (Basin) necessary to establish a baseline for projecting long-term economic and demographic activity, evaluating future water use opportunities and projecting future water demand. This memo, prepared by Harvey Economics (HE), includes:

- an examination of historical trends in the economics and demography of the Basin as a whole and by individual county;
- an overview of the current economic and demographic conditions within the Basin and in each subbasin; and
- a more detailed evaluation of the Basin's larger economic and water use sectors.

HE collected the data for this technical memorandum between November 2003 and March 2005. This information was drawn from numerous secondary sources, public documents and extensive personal communication with individuals knowledgeable about the Wyoming region.

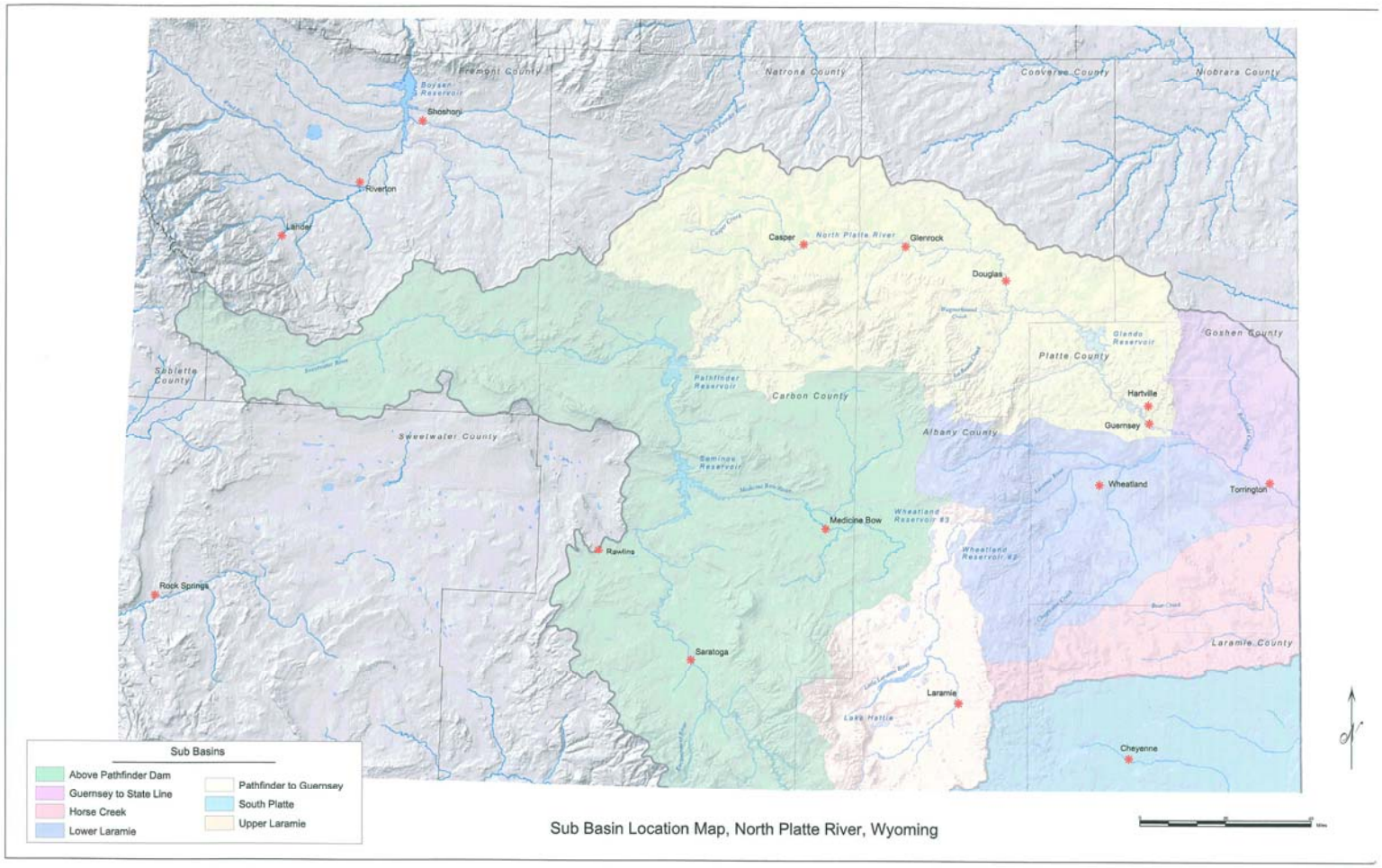
The Platte River Basin encompasses all or part of 10 Wyoming counties, including Albany, Carbon, Converse, Fremont, Goshen, Laramie, Natrona, Niobrara, Platte and Sublette. However, only about 1 percent of the total land mass of Sublette County is within the Basin, and there are no towns within the area. Therefore, the demographic and economic analysis of the Basin excludes Sublette County.

The remaining nine counties represent divergent geographic areas with distinct conditions, rendering basin-wide generalizations less useful. HE has considered the data at the basin,

subbasin and county level where possible to provide the most appropriate picture of the geographic area under examination. As described below, we have derived subbasin demographics to further develop our insights into the forces that influence growth and development in these areas.

A map of the Platte River Basin in Wyoming, the counties and the subbasins is illustrated in Exhibit I-1.

Exhibit I-1.
Map of the Platte River Basin



Sub Basin Location Map, North Platte River, Wyoming

Basin and Subbasin Allocations of Demographic and Economic Activity

Almost all demographic data are compiled by political units such as cities and counties, and most of the economic data are reported at the county, state or national level. For basinwide historic data, HE derived a percentage of population to include in the Basin for the five counties that have area and populations both inside and outside the Basin. The first step was to take the total county population and subtract the population of cities and towns in the Basin to arrive at a population for the unincorporated areas of the county. TriHydro determined the total land area in each county and the number of acres in each that lie within the Basin. For countywide data, the percentage of land within each county was applied to the unincorporated population and added to the population of the incorporated towns that also lie within the Basin to derive Basin population estimates. For other demographic and economic data only reported at the county level, the county population in the Basin was then divided into the total county population to derive a general percentage that was applied to all countywide data used in this analysis.

A similar process was followed to derive subbasin figures. Some counties lie within several subbasins, and Albany County has land area in all seven subbasins. Once again, HE assigned populations for incorporated towns to the appropriate subbasin and used TriHydro's land area data to determine percentages of each county's land area in each subbasin. The percentages were applied to unincorporated populations and then added to incorporated populations for a subbasin population total. This calculation provided a population for each subbasin area in each county. The data were then sorted and summed by subbasin. At this point, HE made further small adjustments because unincorporated population concentrations around large incorporated areas tended to be undercounted by the land mass percentage, while areas with very low populations but large land masses, often due to topography, tended to be over counted. Using its judgment, HE re-allocated population somewhat to capture this urban area effect. The resulting percentages of population by subbasin were applied to the remaining demographic and economic data presented here.

Demographic Overview

As of 2000, 222,000 people lived in 81,000 households in the Platte River Basin. This represented about 45 percent of Wyoming's 493,800 residents. Almost 71 percent of the Basin residents resided in the ten largest communities, and roughly 58 percent of the Basin's residents lived in Cheyenne, Casper and Laramie, the three largest cities. Populations and households for each of the seven subbasins and the ten largest cities in the Basin are shown in Exhibit I-2.

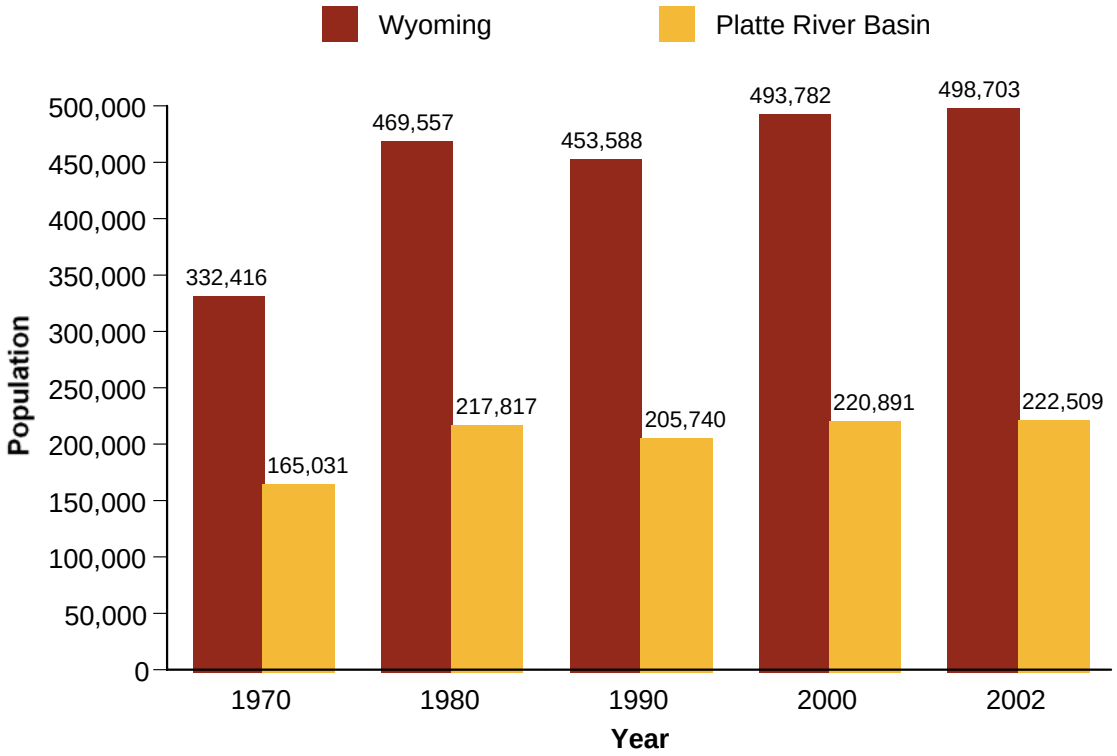
Exhibit I-2.
Year 2000 Subbasin Population and Households

Subbasin/City	Population	Households
Above Pathfinder	**16,381**	**6,369**
Rawlins	8,538	3,320
Saratoga	1,726	757
Guernsey to State Line	**9,967**	**4,107**
Torrington	5,776	2,436
Horse Creek	**2,389**	**827**
Lower Laramie	**7,844**	**3,140**
Wheatland	3,548	1,539
Pathfinder to Guernsey	**73,662**	**29,796**
Casper	49,644	20,343
Douglas	5,288	2,118
Evansville	2,255	848
Mills	2,591	1,161
South Platte	**80,349**	**31,528**
Cheyenne	53,011	22,324
Upper Laramie	**30,299**	**12,580**
Laramie	27,204	11,336
Total	**220,891**	**88,346**

Source: US Census Bureau, Wyoming Economic Analysis Division and Harvey Economics, 2005.

Historic population growth. Since 1970, the population of Wyoming has increased by about 50 percent, while the Basin has grown by about 35 percent. Although Basin growth has been about 1 percent per year on average, growth has been erratic in the past 30 years. At both the state and basin level, much of this growth was seen in the late seventies and early eighties, followed by losses that were gradually regained over the next two decades. This is illustrated by Exhibit I-3.

Exhibit I-3.
Population of Wyoming and the Platte River Basin, 1970 — 2002

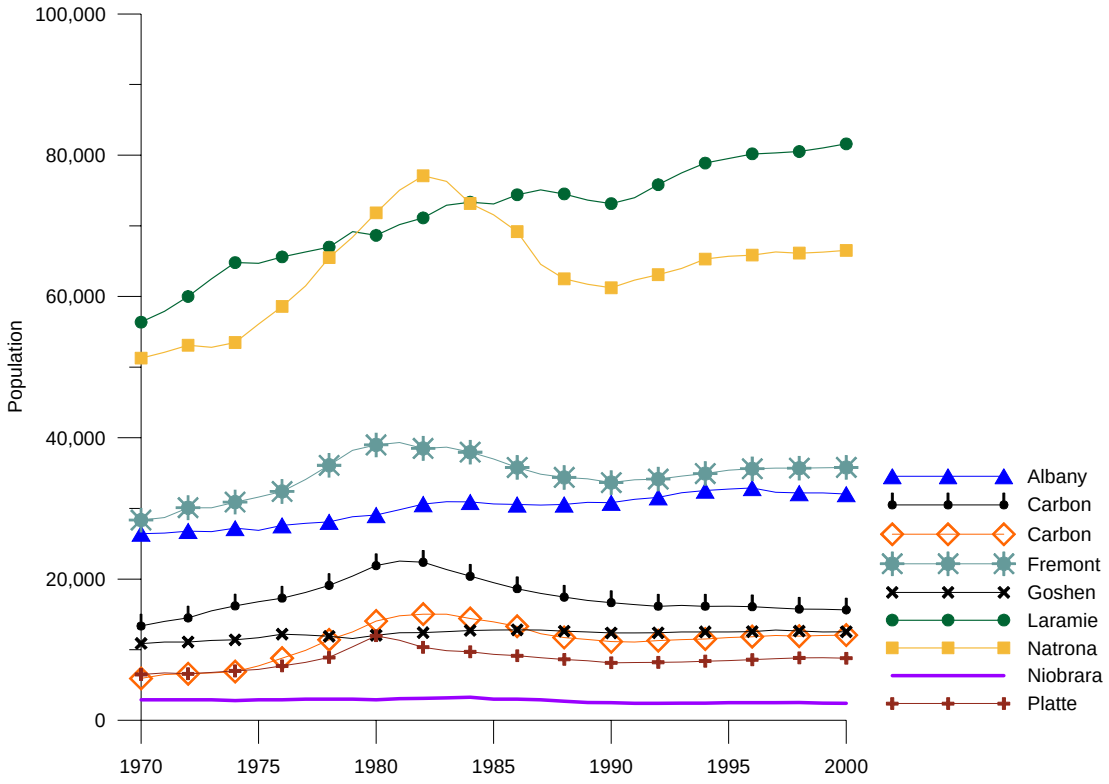


Source: US Census Bureau, Wyoming Economic Analysis Division and Harvey Economics, 2005.

The historical population patterns are quite similar between the State and the Basin during the period from 1970 to 2002. The data presented in Exhibit I-3 and for the intervening years (not shown) indicate that there was a growth spike in the late seventies and early eighties followed by a rapid decline in population, and followed by a period of slow growth. These trends are explained by an event referred to in Wyoming as the 1970s "energy boom," which was followed by the "energy bust" of the mid-eighties. Perception is that this boom was due to an increase in oil production, but the larger factor was the increase in hydrocarbon exploration and general construction during that period (Foulke 2001). The data indicate that as of 2002, the state had yet to regain the population of 510,000 it reached in 1982; the 2002 Basin population was actually only about 2 percent greater than the 1980 level.

While the state and Basin experienced similar population trends over the past thirty years, individual counties within the Basin experienced significant variations in population growth patterns during this period. Most notably, counties with economies that are dependent on the energy sector, Natrona and Carbon Counties, experienced the most dramatic population spikes as demonstrated in Exhibit I-4.

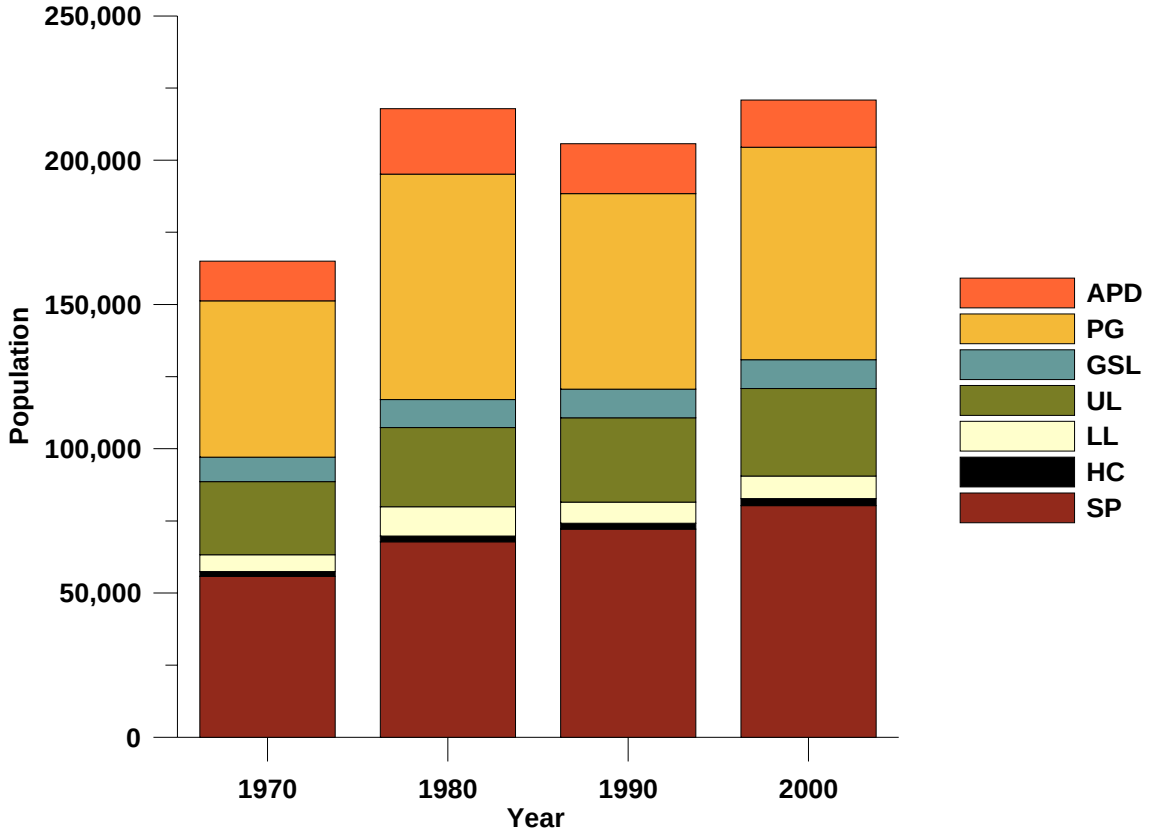
Exhibit I-4.
Historic Population in Basin Counties, 1970 to 2000



Source: US Census Bureau http://factfinder.census.gov/ and Harvey Economics, 2005.

Population trends by subbasin are depicted in Exhibit I-5. The Pathfinder to Guernsey Subbasin experienced the largest population spike in the 1980s as it encompasses Casper and Natrona County, which are highly natural resource dependent economies.

Exhibit I-5.
Historic Population by Subbasin, 1970 to 2000

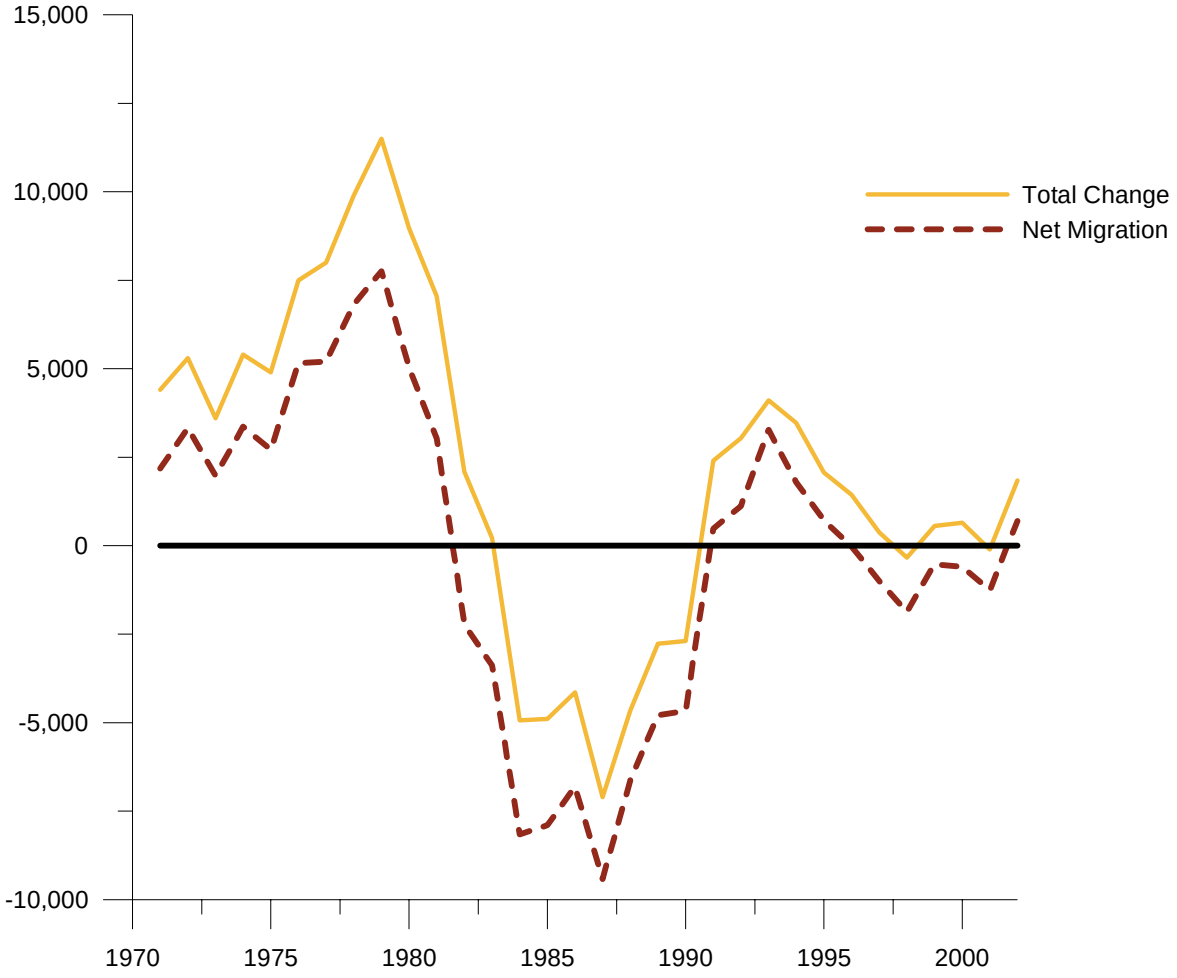


Note: Basin abbreviations - Above Pathfinder Dam (APD), Pathfinder to Guernsey (PG), Guernsey to State Line (GSL), Upper Laramie (UL), Lower Laramie (LL), Horse Creek (HC) and South Platte (SP).
Source: US Census Bureau http://factfinder.census.gov/ and Harvey Economics, 2005.

Since 1970, the combined population of the Basin counties has experienced a net natural increase; that is, the number of births less the number of deaths averaged about 2,200 per year. By subtracting the net natural population increase from the total population increase, it is possible to quantify changes in population due to net migration. Although the population of the nine county basins has grown by about 35 percent since 1970, the overall increase has been due to the net natural population increase and not to net in-migration. In fact, over that time period, migration was negative, with 4,570 more residents leaving the area than migrated in.

The components of population change for the Basin counties are shown in Exhibit I-6.

Exhibit I-6.
Components of Population Change 1971 to 2002, Platte River Basin Counties



Note: The area between the lines represents the natural population increase.

Source: State of Wyoming, Department of Health, Vital Records Services, selected years.

The aging population. In 2000, there was a variation in age distributions for the counties within the Basin. Albany County, with its university, had a more youthful population. Goshen, Niobrara and Platte Counties had a greater percentage of residents over the age of 55. Exhibit I-7 provides a comparison age cohorts by percentage for the Basin counties, Wyoming and the U.S.

Exhibit I-7.
Age Cohorts by Percentage for the U.S., Wyoming, and Basin Counties

Age Group	US	Wyoming	Albany	Carbon	Converse	Fremont	Goshen	Laramie	Natrona	Niobrara	Platte
0-19	29	30	26	27	31	31	28	29	30	25	28
20-34	21	19	35	17	16	16	16	21	19	13	14
35-54	29	31	24	33	33	30	28	30	31	31	31
55-64	9	9	7	10	9	10	11	9	9	12	12
65 & Older	12	12	8	12	11	13	17	11	13	19	17

Source: US Census Bureau, http://factfinder.census.gov.

During the 1990s, the population of Wyoming's 24 to 44 age group declined about 12 percent while the 45 to 64 group gained 39 percent (Foulke 2000). By 2025, a projected 20 percent of Wyoming's population will be 65 and older. This increasing portion of older residents is likely due to three factors: the aging of the large baby boom generation as seen across the U.S.; the in-migration of retirees seeking Wyoming's low cost of living; and the out-migration of young people looking for employment opportunities.

An older population can have a number of effects on a region, particularly in a rural environment. For example, increased demand for healthcare may induce a concentration of older residents in areas convenient to doctors and hospitals.

The average age of Wyoming's agricultural operators is also increasing significantly, although it is not yet clear what this phenomenon will mean for Wyoming (Foulke 2000). Within the Basin counties, the average age of ranchers is 54.3 years as compared to the state average of 54.1 years.

Unemployment and labor force participation. At the end of 2003, unemployment rates across the Basin varied from a high of 6.5 percent in Fremont County to a low of 1.9 percent in Albany County. Carbon, Converse, Fremont, Natrona and Platte all had unemployment rates higher than the 2003 state average of 4.4 percent. Unemployment rates by subbasin are provided in Exhibit I-8.

Exhibit I-8.
2003 Unemployment Rates in the Platte River Basin, by Subbasin

Subbasin	Unemployment Rate
Above Pathfinder	4.3%
Guernsey to State Line	3.9%
Horse Creek	4.2%
Lower Laramie	4.1%
Pathfinder to Guernsey	4.9%
South Platte	4.2%
Upper Laramie	2.0%

Source: Wyoming Economic Analysis Division http://eadiv.state.wy.us/i&e/i&e.asp, the US Census Bureau American Fact Finder 2000 Census and Harvey Economics, 2005.

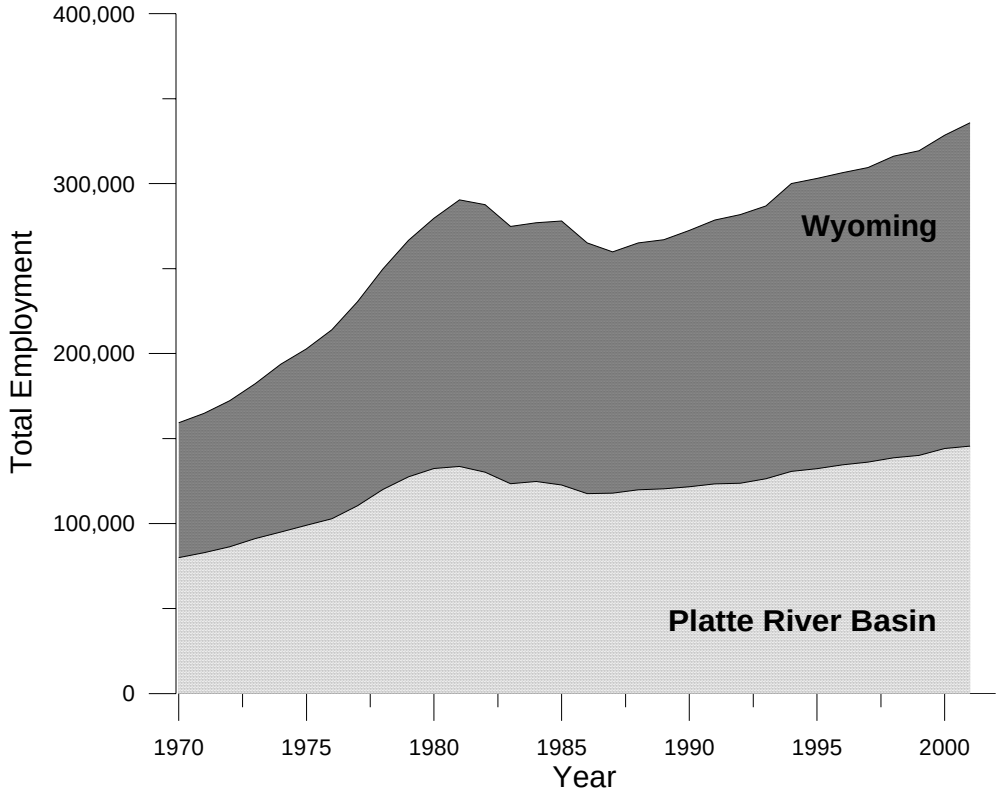
The labor force participation rate is the percentage of residents in a given region over the age of 16 who are employed or actively seeking work. In 2000, the labor participation rate for Wyoming was 70 percent. Within the Basin, only Albany County (71 percent) and Converse County (75 percent) had participation rates higher than the state average. Carbon (65 percent), Goshen (62 percent), Natrona (67 percent) and Platte (68 percent) Counties lagged behind the statewide average (WYEAD, Census 2005).

Economic Overview

As of 2002, there were a total of about 173,997 full and part-time jobs in the nine Basin counties. The study team estimates that 145,565 of those positions were within the Basin area. In 1971, the Basin accounted for approximately half the total employment in the state, but by the year 2001, that percentage had fallen to roughly 43 percent. During this time period, statewide employment grew at an average rate of 2.5 percent annually, while employment in the Platte River Basin grew at about 2 percent annually, on average, suggesting an increasing labor force participation rate. At both the state and Basin level, the “oil bust” is reflected in a drop of employment during the early eighties.

Exhibit I-9 depicts total employment in Wyoming and the Platte River Basin for 1970 through 2001.

Exhibit I-9.
Total Employment in Wyoming and the Platte River Basin, 1970 to 2001



Source: US Bureau of Economic Analysis, Regional Economic Information System, http://www.bea.doc.gov/bea/regional/reis/ and Harvey Economics, 2005.

Employment and Earnings by Sector

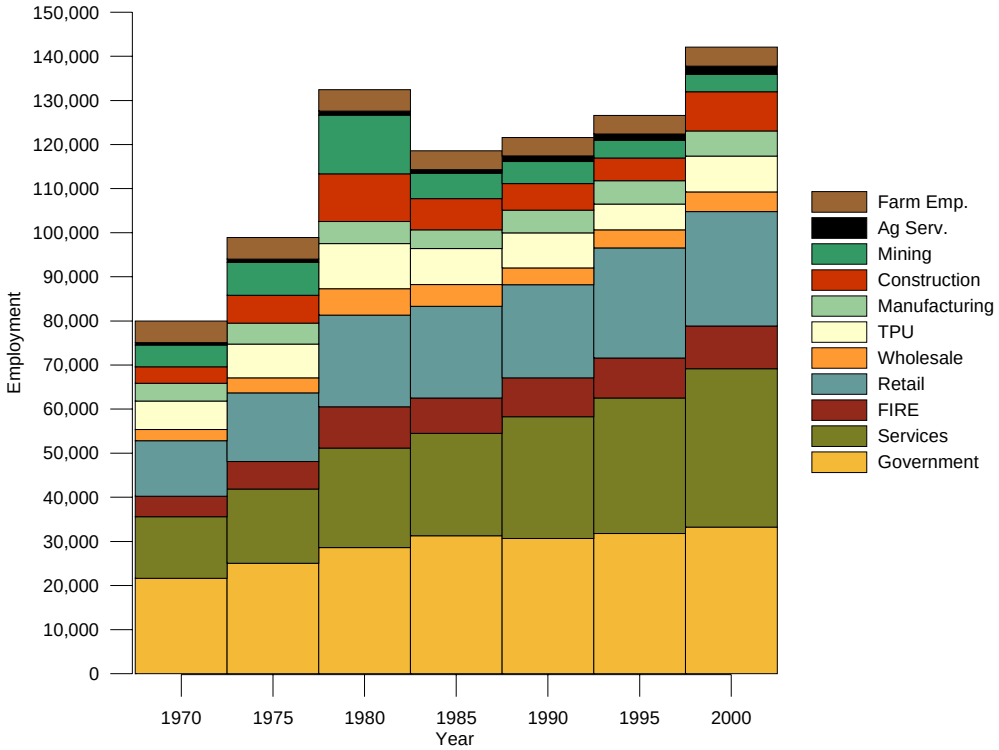
The proportion of employment by economic sector within the Basin, as compared to the state and the nation, provides insight into which sectors are most important to the regional economic base and which basin economic sectors lag behind state and national averages. The Wyoming portion of the Platte River Basin differs significantly from the nation, with about 23 percent of employment in the government sector as compared to 20 percent statewide and 14 percent nationally. The federal government, through various agencies such as the Bureau of Land Management (BLM) and the United States Forest Service (USFS), controls a large amount of land in the state and Basin. Within the Basin, the state capital, the University of Wyoming and F.E. Warren Air Force Base further contribute to the large employment needs in the government sector.

Mining in Wyoming accounts for about 6 percent of all jobs and about 3 percent within the Basin, compared with 0.5 percent nationally. Almost 60 percent of Basin mining employment takes place in Natrona County, with Converse, Fremont and Carbon Counties making up roughly 35 percent, indicating that mining is most important in the Above Pathfinder Dam and Pathfinder to Guernsey Subbasins. The other counties have little or no mining employment.

Agriculture also plays a larger role in Wyoming than in the nation as a whole, contributing about 4.6 percent of statewide employment and 4.3 percent in the Basin, as compared to 3.2 percent nationally. However, Wyoming's manufacturing sector in both the state and Basin is smaller than the national average, accounting for only about 4 percent of total employment in the Basin and the state, versus 12 percent nationally.

Exhibit I-10 provides a look at historic employment in the Platte Basin, by sector.

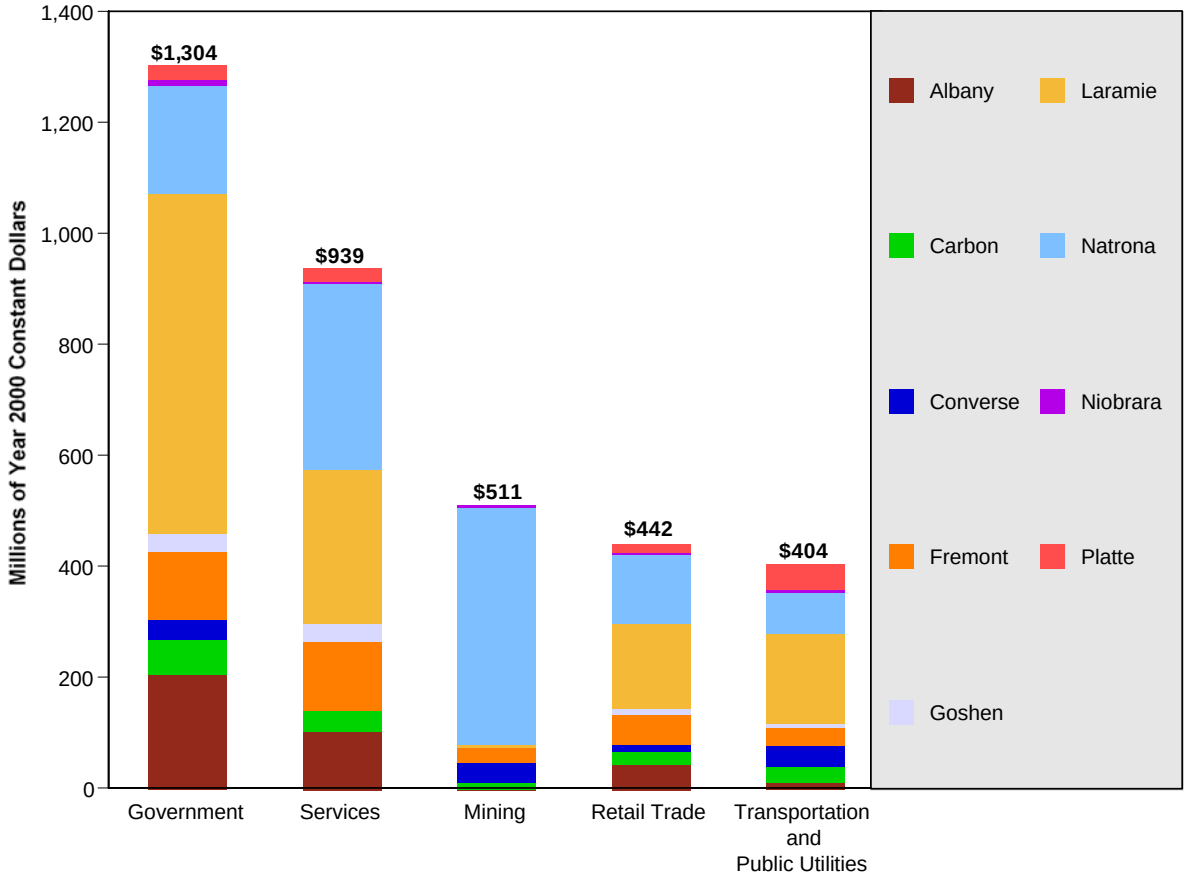
Exhibit I-10.
Platte Basin Historic Employment by Sector, 1970 to 2000



Source: U.S. Bureau of Economic Analysis, Regional Economic Information System, http://www.bea.doc.gov/bea/regional/reis/and Harvey Economics, 2005.

Figure I-11 depicts the earnings in each Basin county for the five highest earning employment sectors.

Exhibit I-11.
Earnings by County for Key Economic Sectors, 2000



Source: US Bureau of Economic Analysis, Regional Economic Information System, Local Area Annual Estimates, http://www.bea.doc.gov/bea/regional/data.htm and Harvey Economics, 2004.

Average earnings per employee within each economic sector vary widely. In 2000, the average annual earnings for farm employment were about $12,000. Service workers earned an average of $21,000, while government employees averaged wages of about $34,000. Transportation and public utility wages were about $43,000, on average. Mining provided the highest wage with average annual earnings of $101,000; however, this average is likely skewed by a relatively small number of executives or owners who have very high incomes and by incomes earned in the Basin counties by miners who live outside those counties.

Key Economic and Water Use Sectors

Agriculture's impact on the Basin's land and water use is significant. The energy and mineral sectors have historically added volatility to the Basin economy but also provide high paying jobs and often require a comparatively large amount of water. While municipal water consumption is a small percentage of the overall water used in the Basin, cities and towns have unique requirements that demand reliability. Travel, tourism and recreation contribute to the Basin economy and water plays an important, but somewhat different, role in this sector. Environmental water use is notable and indirectly affects the economy. Finally, there is an ongoing effort to attract new business and manufacturing interests into the area, which in the

long run may increase the Basin's economic base and may create new demand for water supplies. A discussion follows of each of these sectors.

The future of each of these sectors is integral to economic, demographic and water demand projections for the Platte River Basin. In two subsequent technical memoranda, HE will develop low, medium and high growth scenarios for these sectors for the purposes of water demand forecasts.

Agriculture

Almost half of Wyoming's irrigated acres lie within the Platte River Basin, and nearly half of the State's livestock are raised in the Basin.[1] To gain an understanding of the current status and future trends in this sector, HE conducted interviews with county extension agents within the Basin and with the Wyoming Department of Agriculture and consulted a number of secondary sources from Federal, state, and county agencies. In addition, TriHydro provided comprehensive data on irrigated and non-irrigated agricultural acreage and cropping patterns by county and subbasin.

As ranchers age and ranches change hands in the region, two seemingly contradictory trends have emerged. One is the consolidation of ranches, often to corporations, resulting in larger but often somewhat less productive ranches. The other is the subdivision of ranches, resulting in smaller operations. The latter trend is particularly evident in more populous areas where land values and incomes are higher and where the market for "hobby" farms is growing. For example, in Laramie County between 1997 and 2002, the number of family or individually owned operations climbed by 19 percent while the acres owned by the same groups declined by 3 percent (USDA 2002).

Cattle. As of 2005, there were about 560,000 head of cattle in the Platte River Basin. This is a 9 percent decline from 2000, when there were about 620,000 head. This decline is primarily due to the severe drought that began in the spring of 2000 and continues as of 2005 for most of the Basin (Drought Monitor 2005). Cattle counts in Goshen and Platte Counties are inflated by the presence of several feed lots in those counties. In addition to these cattle, which are counted as of January 1 each year, in some counties, yearlings from other states are brought in for grazing in April and then shipped back to those states in October. These yearlings are not included in the total cattle head counts.

It should be noted that the average calf, presumably the same age, weighs as much as 200 pounds more per animal than it would have in 1975, attributable to breeding and feed choice, primarily. Therefore, with cattle numbers at about the same level as in 1975, production in weight has actually increased. This is significant because calf prices per cwt (hundred weight) are the most important driver of agricultural economics in the Basin (Mount 2005). Since 1997, cattle prices have spiked and maintain a level higher than evident in previous years on a

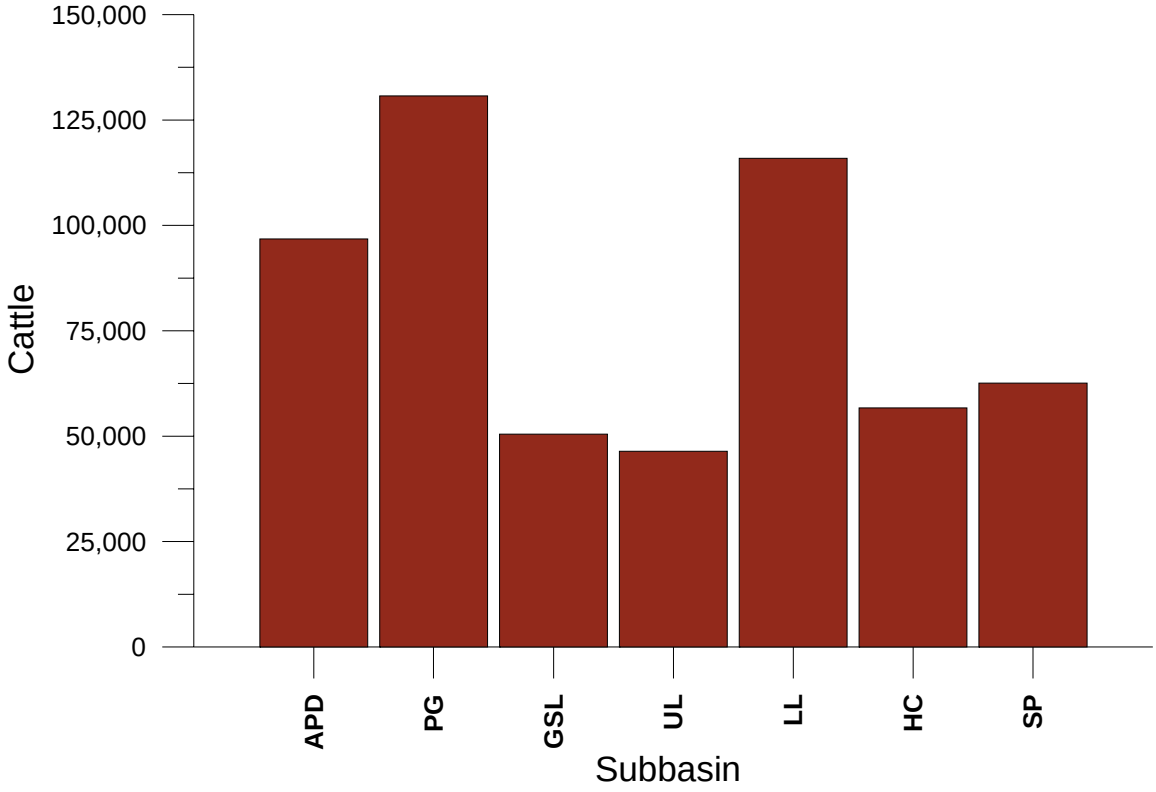
[1] Wyoming had roughly 1.3 million irrigated acres in 2004, according to the Wyoming Agricultural Statistics Service, and the Platte River Basin had about 612,000 irrigated acres, or 47 percent of the state total. Wyoming had about 1.35 million head of cattle in 2005, and the Platte River Basin had roughly 579,000 head of cattle in 2005, or 43 percent of the state total.

constant dollar basis. These prices have been sporadic on a constant dollar basis over the past decades.

Ranchers in the Basin depend on forage to supplement the hay they feed their animals. Therefore, during drought they cannot afford to raise as many cattle. Although hay and alfalfa are grown across the Basin, most areas are net importers of hay, much of it from the Wheatland area. As of 2005, hay cost $110 to $120 per ton, with a 1,000 pound cow requiring two tons to get through the winter (Extension agents 2005).

Most of the grazing land in the eastern portion of the Platte Basin is privately held, minimizing reliance on BLM land for grazing. However, in Natrona, Carbon and Converse Counties, public land for grazing is very important. BLM and USFS grazing policy has been fairly constant and no changes are anticipated.

Exhibit I-12.
Estimated Head of Cattle in the Platte River Basin, by Subbasin, 2004



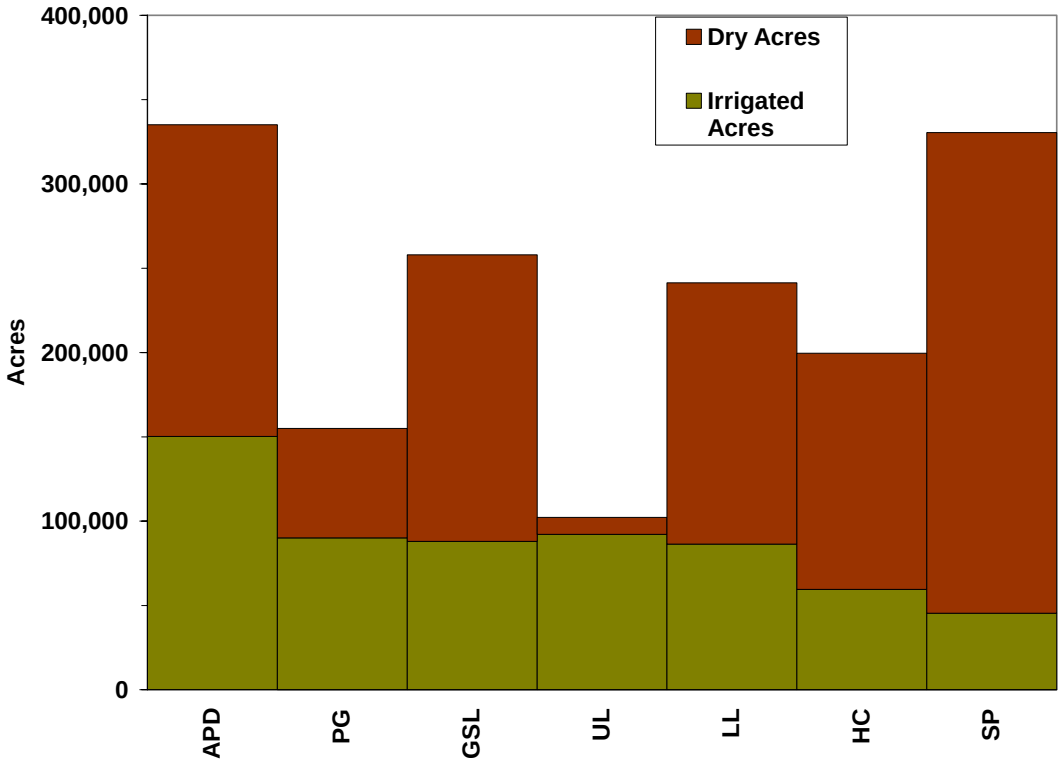
Note: Basin abbreviations - Above Pathfinder Dam (APD), Pathfinder to Guernsey (PG), Guernsey to State Line (GSL), Upper Laramie (UL), Lower Laramie (LL), Horse Creek (HC) and South Platte (SP).
Source: Wyoming Agricultural Statistics Service, http://www.nass.usda.gov:81/ipedbcnty/c_WYlvstk.htm and Harvey Economics, 2005.

Crops. Cropping patterns and livestock are closely related. Alfalfa and other hay account for about 70 percent of the irrigated crops in the Basin, and that hay is used directly to feed Basin livestock. Other irrigated crops include corn, dry beans, sugar beets, barley, winter wheat, oats

and spring wheat. Most irrigation is by flood, but pivots are increasing in some areas. Surface water is the most common water source, though groundwater is increasingly prevalent.

Energy and input prices, like fertilizer and equipment, influence crop patterns and rising prices can drive production levels. About 11 percent of the Basin's total landmass is used for dryland and irrigated agriculture; about 5 percent is irrigated. Exhibit I-13 provides the agricultural acreage, both irrigated and dry, for each of the subbasins in 2004.

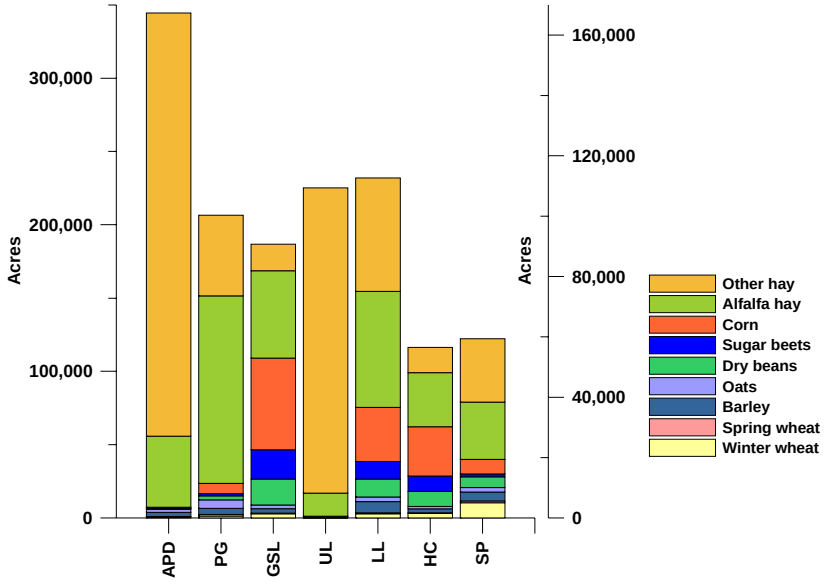
Exhibit I-13.
Irrigated and Dry Agricultural Acreage, by Subbasin, 2004



Note: Basin abbreviations - Above Pathfinder Dam (APD), Pathfinder to Guernsey (PG), Guernsey to State Line (GSL), Upper Laramie (UL), Lower Laramie (LL), Horse Creek (HC) and South Platte (SP).
Source: TriHydro, 2005 .

Cropping patterns by subbasin are illustrated in Exhibit I-14.

Exhibit I-14.
Cropping Patterns in Acres, by Subbasin, 2004.



Note: Basin abbreviations - Above Pathfinder Dam (APD), Pathfinder to Guernsey (PG), Guernsey to State Line (GSL), Upper Laramie (UL), Lower Laramie (LL), Horse Creek (HC) and South Platte (SP).
Source: TriHydro, Irrig Acres, crops by subbasin.xls, 2005.

The Above Pathfinder Dam and Upper Laramie subbasins are almost entirely dependant on livestock production that consumes the hay cultivated there, with very little in the way of cash crops. Crop production increases downstream toward Nebraska, where more favorable climate justifies the investment in cash crop production.

Sheep. In 1975, there were about 450,000 sheep in the Basin. Since that time, the number of sheep produced in the Basin has been in steady decline, falling to 107,000 in 2004. This decline is due to falling prices for wool, scarcity of affordable sheepherders and shearers and predators.

Dairies. The climate, limited growing season, distance to market and scarcity of water resources has discouraged development of a notable dairy industry in the Basin. There are a few dairies near the Nebraska border, but they are not a significant agricultural presence.

Energy, Minerals and Utilities

Across the Basin, the importance of the energy sector varies greatly. The Wyoming Department of Employment, Research and Planning considers Natrona County as highly dependent on oil and gas employment, while Carbon and Converse Counties are ranked as moderately dependent and Platte, Goshen, Laramie and Albany are not considered to be dependent on oil and gas employment. Exhibit I-15 provides mineral production for the Platte Basin in 1997 and 2001.

Exhibit I-15.
Mineral Production by Type for the Platte River Basin, 1997 and 2001

Commodity	1997	2001
Crude Oil, barrels	7,334,813	6,748,165
Stripper Oil, barrels	18,142,646	4,506,298
Natural Gas, mcf	232,802,748	282,691,325
Coal, tons	20,001,944	25,318,668
Bentonite, tons	106,732	101,777
Sand and Gravel, tons	3,428,032	3,802,093
Uranium, tons	1,725,730	1,602,678
Decorative Stone, tons	107,622	573
Granite Ballast, tons	2,733,625	2,721,963
Sodium Sulfate, tons	606	133
Underground Coal, tons	2,854,936	0
Limestone, tons	845,780	965,125
Shale, tons	121,170	173,320
Gold, tons	3	2
Leonardite, tons	58,672	52,521

Source: State of Wyoming Department of Revenue, Mineral Tax Division, selected years.

Oil production and refining. As of 2002, about 21 percent of the oil produced in Wyoming came from the Basin counties. Oil production has decreased each year for the past 19 years, and this trend is expected to continue unless widespread use of advanced tertiary production methods can stabilize production. Oil drilling and production do not use significant amounts of water except for injection production, drilling lubrication and well sealing. Most water is provided by a nearby groundwater wells.

As of 2004, there were three oil refineries in the study area together employing less than 800 people. Refineries require a large amount of water in cooling towers and for steam generation. New refineries or expansion of existing refineries are unlikely (Likwartz 2005).

Frontier Refinery in Cheyenne uses about 1,200 gallons per minute (GPM) from the city's municipal supply. The refinery's water use is constrained by the amount of effluent it is allowed to create, and the operator is thus incentivized to decrease water use. Production is expected to remain constant or decline over the long run. Even with an increase in production, the firm's expectations are that with improved technology, such as air cooling, water use will decline (Wohgnant 2004).

As of 2004, the Sinclair Refineries in Carbon County utilized about 1,500 GPM (4 cfs). They have a water right for about 1.5 cfs and a 50 year lease with the City of Sinclair for an additional 4.21 cfs. This lease is renewable for another 50 years. Current use is less than available supply, and unused water simply flows past the inlet. If production increases, plans are to employ air cooling as needed (Fritz 2004).

Natural gas. Wyoming is the third largest producer of natural gas in the U.S. and has the second largest size of reserves. About 18 percent of the state's natural gas is produced in the Basin counties. Production has increased steadily since 1992 when the pipeline from Rawlins along I-80 to California was completed. Coalbed methane extraction has the potential to continue the increase in natural gas production and to spawn significant economic growth in the Powder River Basin (Gillette) and the Great Divide Basin, which would positively affect Rawlins and Carbon County. Natural gas production uses minimal water supplies in drilling and may produce non-hydrologically linked groundwater in some instances with coalbed methane extraction. Water production is expected to be minimal with any coalbed methane development in the Basin (Likwartz 2005).

Coal mining. There are currently two mines within the Basin, one is closed and in reclamation, the other is closing in 2005 and will then be in reclamation. As of 2002, these mines accounted for 7 percent of the state's total production.

There are three coal mines outside the Basin, but within Converse County that help drive economic activity within the Basin. The mines provide between 500 and 600 well paying jobs to workers who live in the Douglas area. As of 2005, Carbon County had approximately 121 mining employees.

Water needs in coal mining are modest. Typically those needs are related mostly to dust suppression.

Other minerals. Converse County produces 98 percent of Wyoming's uranium and Natrona County produces 1.5 percent of the state's bentonite. Even so, these are relatively small operations with modest water needs.

Utilities. As of 2005, there were eight electric generating facilities within the Basin. Of these, the USBR operates six hydropower facilities, including Alcova (36 MW), Fremont Canyon (fed by Pathfinder at the upstream side of Alcova Reservoir, 67 MW), Glendo (38 MW), Guernsey (6 MW), Kortes (36 MW) and Seminoe (45 MW). The first priority for these facilities is irrigation, followed by minimum flow agreements, and then power generation. There is almost no consumptive water use from hydrogeneration.

The Laramie River Station in Platte County is operated by Basin Electric Power Cooperative, employs about 325 people and has a generating capacity of 1,670 MW. This coal-fired plant uses about 23,250 acre-feet of water each year and does not currently have plans for expansion.

The Dave Johnston Plant in Converse County is owned and operated by PacifiCorp and provides jobs to 195 full time employees. The plant burns coal for steam generated power and has a capacity of 817 MW. The facility consumes approximately 8,600 acre-feet of water annually. The plant owns three sets of water rights for a total of 11,266 acre-feet per year. As of 2005, management does not have plans for expansion of the plant (Dugan 2005).

Travel, Tourism and Recreation

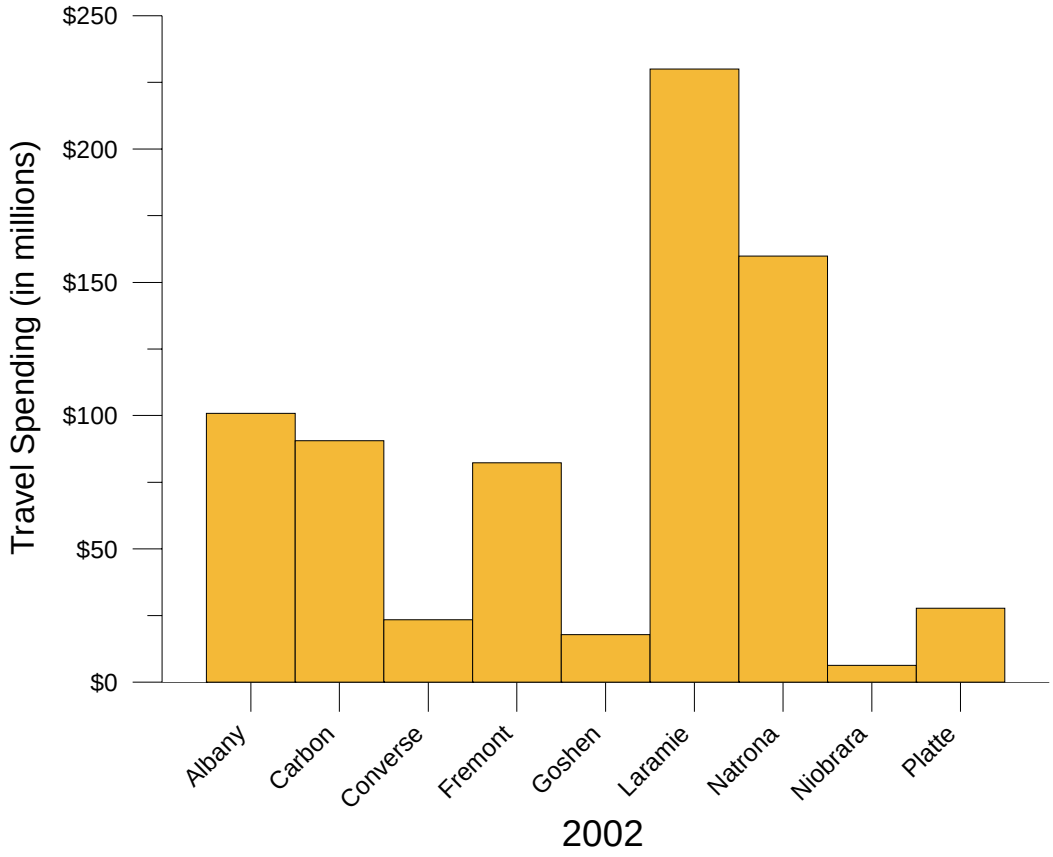
While travel, tourism and recreation are important to the economy of the Basin, the Basin lacks a large destination tourist attraction. Water is rarely consumed in recreational use, the

maintenance of golf courses being one exception. Water is an important aspect in Basin recreation and tourism. The Basin provides opportunities for boating, fishing, camping, golfing, nordic and downhill skiing. Much of this activity takes place on or near the North Platte River, its tributaries and associated reservoirs. Low water levels affect the desirability and enjoyment of these activities to varying degrees.

Local use and day trips from Colorado and other nearby areas account for much of the recreational activity and related travel within the Basin. Larger cities such as Casper and Laramie also attract conventions and other business related travel. In Basin areas that lack tourist attractions or recreational facilities, there is a benefit from drive through traffic to other tourist or recreational locations.

Travel and tourism provided about 9,600 jobs within the Basin in 2002 (Runyan 2003). Travel related spending varied significantly within the Basin counties as shown in Exhibit I-16

Exhibit I-16.
Travel Spending within the Platte Basin Counties, 2002



Source: Dean Runyon Associates. *The Economic Impact of Travel on Wyoming,* September 2003.

Reservoirs. There are a number of reservoirs in the Basin that provide recreational opportunities; however, the reservoirs were developed for flood control, irrigation and power, and as such, do not have a recreation reserve pool. As a result, recreational use at the reservoirs peaks in July and then declines as water levels are drawn down for irrigation. Drought also

impacts use, not only because of reduced water levels but also because of the prohibition of campfires. Even so, three of the largest reservoirs, Pathfinder, Glendo and Guernsey, together attract over 400,000 visitors each year. Glendo is the most popular of the three, and its use has dramatically increased in recent years, partially due to the banning of open alcohol containers in Nebraska State Parks and the closure of Horsetooth Reservoir in Colorado (as of 2005, Horsetooth Reservoir had reopened) (Thibodeau 2004).

The potential for additional vacation homes on federal lands surrounding the reservoirs are declining as land leases that are not renewed return to government control. However, development is increasing on private land adjacent to federal lands near popular reservoirs in Wyoming (Thibodeau 2004).

Golfing. There are 19 golf courses with nearly 300 holes covering more than 2,000 irrigated acres in the Basin. Unlike other recreational activities, golf courses do require consumptive use of water. Only a few new courses are anticipated in the near future across the Basin.

Manufacturing and Other Industry

As noted earlier in this analysis, Wyoming has proportionately less employment in the manufacturing sector as compared with the rest of the nation, due in part to the relatively small population base and limited workforce. However, there is a concerted effort in Basin counties to encourage location and development of manufacturing and light industry within the region and to reduce dependence on the more volatile energy sector.

Laramie County. Most industry in this Basin is located in and around Cheyenne. Manufacturing accounts for only about 3 percent of employment in the area. Large employers include a Lowe's distribution center (425), Echostar Communications and Union Pacific Railroad. As of early 2005, an industrial park south of the city near I-25 had been proposed, and a new Wal-Mart distribution center will be complete by 2007 and will employ up to 600 people.

Albany County. The University of Wyoming is located in Laramie and is the largest water user in the county. Mountain Cement Company in Laramie is the county's only other single large water user. Agriculture is the county's largest water consuming sector.

Platte County. The largest employers in the county are the Basin Electric Power Cooperative that operates the Laramie River Station, the Platte County School Districts and Platte County Memorial Hospital. No other businesses employ more than 100 people. It is the goal of the Wheatland Development Corporation to bring in 25 to 50 jobs per year. They would like to entice light industry but do not expect any companies that would be large water users. Agriculture is the most significant economic sector in the county, although it does not provide a great deal of direct employment.

There are potential growth opportunities in Platte County. The State and BLM are considering developing recreational facilities on the eastside of Glendo Reservoir that could also provide some economic stimulus to the area. A private college is considering locating in Wheatland, which might mean about 1,300 new jobs and would provide a relatively large boost to the economic development of the area.

Goshen County. The State is building a prison in Goshen County that will serve 750 inmates and employ 250 people. The prison is expected to create another 50 jobs indirectly in the county. The economy is dominated by agriculture and associated businesses. Western Sugar Cooperative operates a sugar beet factory in Torrington and is a large water user (450 GPM). A synthetic wood production firm will begin operation in 2006 in Torrington and other employers include an ethanol factory and cattle feedlots.

Converse County. As of 2005, there were no large manufacturing or industrial employers in Converse County. A food supplements manufacturer, Nutri-West, is located in Douglas, the firm has its own well and is not a large water user (Werner 2005). A business park is in the planning stage and, if developed, should provide 50 to 250 new jobs. A coal gasification plant has also been proposed and would generate significant construction employment over several years and ongoing employment of between 150 and 200 people. This facility would require a significant amount of water, but its prospect for development is still very uncertain.

Carbon County. The largest water users in Carbon County are parks and a golf course. The state prison in Rawlins houses 700 inmates and employs 300 and is the second largest user of water in the county. Other large employers include local government, the school district and Union Pacific Railroad. Major industries include transportation and energy, natural gas and agriculture. Rawlins would like to attract employers that need a secure water source, since the town has a sizable water supply with senior water rights (Grabow 2005).

Natrona County. The largest employers in Natrona County are the school district, medical center, the City of Casper and the County. Other large employers of more than 400 include True Company (oil services and other businesses) and the Wyoming Machine Company (heavy equipment manufacturing). Oil and gas production drive the economy and create many jobs in support of these industries (Winer 2005).

Environmental Water Use[2]

For the purposes of water demand forecasting, environmental water use includes only water used in efforts to enhance environmental conditions, such as improving or maintaining fish and wildlife habitats.

Much of the environmentally beneficial water use within the state results as a byproduct of other uses, such as reservoirs, and not from rights specifically directed at environmental protection. For example, Grey Reef Reservoir water released to maintain the quality of Casper's municipal water supply supports a downstream trout fishery on the North Platte River. Environmental protection is rarely a basis for maintaining minimum water levels in major reservoirs.

Existing instream flow agreements. As of September 2004, there are seven instream flow water right agreements within the study area as shown in Exhibit I-17.

[2] All of the information in this section comes from an email from Tom Annear, Water Management Coordinator. Wyoming Game and Fish. September 2004.

Exhibit I-17.
Existing Instream Flow Agreements in Wyoming Platte Basin, 2004

Stream	Location	Minimum Flow (cfs)
Hog Park Creek	Below Hog Park Reservoir	15 - year round
North Platte River	Below Kortes Dam	500 - year round
North Platte River	Below Pathfinder Dam	75 - year round
North Platte River	Below Grey Reef Dam	330 - year round
North Platte River	Below Glendo Dam	25 - October 1 to March 31
Laramie River	Below Greyrocks Dam	15 - August 1 to March 31 30 - April 1 to July 31
Middle Fork Crow Creek	Tributary to Granite Reservoir	8 - year round*

* Maximum release after original channels have adjusted to the added water. Water is added at more than one location but the combined total is 8 cfs, most of which is recaptured downstream in Granite Reservoir.

Source: Email communication from Tom Annear, Wyoming Fish and Game, September 2004.

Instream flow applications. As of 2004, the State of Wyoming has filed 11 applications for streams in the North Platte River Basin, as shown in Exhibit I-18.

Exhibit I-18.
Instream Flow Applications, Wyoming Game and Fish Department, 2004

Stream	Location	Minimum Flow (cfs)
Wagonhound Creek	Tributary to Medicine Bow River	2.2 - year round
Big Laramie River	Near Woods Landing	50 - October 1 to March 31 100 - April 1 to June 30 50 - July 1 to September 30
Encampment River	Near Encampment	54 - year round
Deer Creek	Near Glenrock	10 - October 1 to March 31 30 - April 1 to June 30 15 - July 1 to September 30
North Platte River	Pickaroon (near confluence with Douglas Creek)	163 - year round
Beaver Creek	Douglas Creek drainage	0.35 - year round
Camp Creek	Tributary to Douglas Creek	0.02 - year round
Douglas Creek	Tributary to North Platte River	5.5 - year round
Horse Creek	Tributary to North Platte River	0.2 - year round
Lake Creek	Tributary to Douglas Creek	0.5 - year round
Nugget Creek	Tributary to Douglas Creek	0.2 - year round

Source: Tom Annear, Wyoming Game & Fish, September 2004.

If granted, these rights would be junior to existing rights but could limit the amount of future upstream withdrawals. These potential flow requirements are relatively small, but the Wyoming State Engineer's Office is not currently issuing any instream flow rights in the Platte River System pending the results of the Platte River Cooperative Agreement.

Wetlands. As of 2005, the Wyoming Game and Fish Department is not involved in any significant wetlands projects within the Basin, nor are they aware of any projects in the near future.

Future environmental water use. Some traditional water users have expressed interest in using existing water rights to improve streamflows. For example, there has been discussion regarding the use of Monolith Ranch irrigation rights to improve instream flows in the Laramie River. However, such action is currently prohibited by state law. There has also been increasing interest from landowners in developing small, off channel ponds for fisheries. For the most part, these projects would utilize flow-through water rights, and consumptive water use would be minimal.

It appears that environmental water use may experience only minimal increases in the near future and that any significant increase might necessitate a change in statute.

Summary

As of 2002, there were about 223,000 people living in the Platte River Basin. Although the Basin has grown about 35 percent since 1970, this rate is slower than the 50 percent growth rate for the state during the same time period. Growth was rapid in the seventies, followed a loss of population in the early eighties, and gradual growth in the nineties that brought population back above 1980 levels. While this is true for the Basin as a whole, several Basin counties have seen almost no growth over this time period. Gains have come primarily in those counties with larger cities.

There were about 146,000 jobs within the Basin as of 2002, about 43 percent of all jobs statewide. This figure is down from about 50 percent in 1970. As of 2003, only one subbasin had an unemployment rate higher than the state average. The largest Basin sectors in terms of personal earnings and employment are government and services.

Important Basin sectors from a water use standpoint include agriculture, energy, minerals, utilities, travel, tourism and recreation. Mining plays an important role within the Basin, providing about 3 percent of all jobs with exceptionally high earnings which stimulate additional employment in support businesses and services. Agriculture, as the key water use sector, is comprised primarily of cattle ranching and hay production. Hay is the predominant crop, grown to feed the cattle produced there. As of 2005, agriculture continues to suffer from the effects of the ongoing drought. As of 2005, industry and manufacturing provided few jobs within the Basin. However, across the Basin there are considerable efforts being made to attract more of these jobs to the area.

Environmental water use is comprised of a series of instream flow agreements. There are a number of additional pending applications held in abeyance until the Platte River Cooperative Agreement is resolved.

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