TECHNICAL MEMORANDUM

SUBJECT:Green River Basin Plan IIPopulation Projections

DATE: 3/18/2009

PREPARED BY: WWC Engineering

Introduction

This memorandum presents population projections for the Green River Basin and its communities and rural areas for the time period from 2005 through 2055. The projections provide a basis for estimating municipal and domestic water needs in the Basin over the next 10, 30 and 50 years. They also provide a basis for assessing water-based recreational resource needs.

The river basin planning process developed by the Wyoming Water Development Commission (WWDC) specifies that population projections are developed for 10, 30 and 50 years into the future for each of the three planning scenarios:

- 1. Low Growth
- 2. Moderate Growth
- 3. High Growth

The rationale and approach employed in developing population projections for the Green River Basin are described below. The population projections and methods discussion draw heavily on the work done by Watts and Associates for the 2001 Green River Basin Water Planning Process Report and associated technical memoranda. Much of the content of this technical memorandum is updated from the work done by Watts and Associates in 2000.

Rationale and Approach

Three commonly accepted methods for producing population projections are: 1) time series analyses, 2) cohort survival analyses, and 3) employment-driven approaches. Each approach has advantages and disadvantages that must be evaluated in specific planning applications. Some methods combine more than one of the three approaches to produce projections.

Time series analyses typically involve assessing past growth trends and using those trends to project population into the future. Analytical methods used with this approach include computing average annual historical growth rates and fitting linear or non-linear equations to historical population data or indicators of population growth such as school enrollments, sales

tax revenues, or other variables. Projections are usually based upon the assumption that future population changes will mimic past average annual growth rates or trends. The time series approach is relatively easy to implement, and its results are easily understandable. Its main disadvantage is that it does not explicitly consider the three primary determinants of regional population change: mortality rates, fertility rates, and migration patterns. Instead, the method implicitly assumes that past trends in relationships among these variables will continue into the future.

The cohort survival approach explicitly recognizes the three primary determinants of population change and requires forecasts of future mortality and fertility rates as well as net migration patterns. Projections of mortality and fertility rates by age and sex group (cohort) are available from the U.S. Census Bureau (USCB), as are projections of net migration patterns for different regions of the country. Projections of change for each cohort can be combined to produce forecasts of future population for a given geographic area. The advantage of the cohort survival approach is that it explicitly recognizes the determinants of population change and takes them into account in developing projections. Its primary disadvantage is that in rural areas with relatively small population bases, the effects of changing migration patterns over time can overwhelm the effects of changes in mortality and fertility rates, thus making the projections extremely sensitive to assumptions about future net migration patterns.

Employment-driven approaches to population projections are based upon the assumption that net migration patterns are primarily determined by job availability, and that job availability can be projected into the future with reasonable accuracy. Thus, if we could accurately project how many jobs would be available in the Green River Basin in the year 2055, we could estimate population in that year based upon estimates of how many people would be associated with each job. Estimates of the number of persons associated with each job may or may not explicitly take into account such factors as labor force participation rates, fertility rates, and mortality rates. If these factors are taken into account, the employment-driven approach becomes a special case of the cohort survival approach where net migration estimates are based upon employment forecasts.

The employment-driven approach incorporating labor force participation, fertility, and mortality rate changes is the most sophisticated approach commonly used for projecting regional population changes and can provide relatively accurate forecasts over relatively short time frames. Its primary disadvantage lies in the difficulty of forecasting economic activity and associated labor requirements by economic sector over long time periods. It is doubtful that future economic activity by sector could be forecast reliably 50 years into the future. Technological changes that affect the amount of labor needed by each sector often cannot be forecast reliably. For example, Wyoming's Powder River Basin has become the world's leading coal producer in recent decades with little growth in employment opportunities because of productivity gains associated with mechanized mining equipment. Accurately forecasting current levels of mining employment in the Powder River Basin 30 years ago would have been very difficult because the technology that determines current employment levels did not exist then.

Another disadvantage of the employment-driven approach is that a significant amount of Wyoming's Green River Basin employment is tied to the energy and mineral exploration and extraction sector that utilizes a high level of transient workers who are only in the basin for a limited time period. These workers often live in "man camps" or motels and do not establish permanent residence. Using these jobs as indicators of population growth is very difficult due to this transient nature. Due to this itinerant nature of the workforce, the more sophisticated methods may yield the most erroneous answer or estimates.

United States migration patterns have been influenced in recent decades as employment has become less dependent upon local job availability and more dependent upon amenities and lifestyle variables such as climate, local infrastructure, crime rates, and scenic attributes. Many industries and jobs in the U.S. economy are now "portable" in the sense that they can be shifted from one locale to another based upon amenities or lifestyle variables with little change in competitive advantage. However, much of the Green River Basin employment is specific to the region and as such the nationwide migration patterns are not indicative of migration patterns of the basin.

There is no compelling reason to generate population projections for the Green River Basin using one method to the exclusion of others. Instead, the approach taken for this study is quite similar to the approach used in the 2001 Green River Basin plan and involves using aspects of three different methods to create a range of projections representative of low, moderate, and high growth scenarios.

One of the methods involves using population for Wyoming cities, towns, and counties reported by the US Census Bureau (USCB) and refining and extending forecasts prepared by the Wyoming Department of Administration and Information (WDAI). The WDAI methodology incorporates elements of all three approaches described above. The second method involves refining and allocating to the Basin the population projections for the state of Wyoming prepared by the USCB. These projections were developed using the cohort survival approach with net migration pattern based upon address changes reported on federal tax returns. The third method involves a time series analysis of past population trends in the Basin to estimate a likely maximum rate of future population growth.

Incorporating the state and federal projections into the analysis provides a basis for comparability with population projections that will be prepared for the other river basins in the state.

Historic Population of the Green River Basin

The first step in preparing population estimates for the Green River Basin was to analyze past census data and determine trends in population that the basin has experienced over the previous 50 years. The population of the basin is estimated at 34,325 in 1950 and grew to about 60,284 in 2005. These estimates are based on USCB reported populations of incorporated cities and towns plus an estimated rural population in the basin.

The basin rural population was estimated using the USCB populations of the counties that make up the Green River Basin. The boundaries of the counties that make up the Green River Basin do not adhere to the geographical boundary of the Basin. The steps followed, in estimating the rural population, are as listed below:

- Cities and towns in a county were determined to be in the Basin or out of the Basin using maps showing the basin boundary, and the city and town populations were allocated accordingly.
- Each county's rural population was estimated by subtracting the populations of all cities and towns in a county from the county total.
- A proportion of the rural population of each county was allocated to the Basin based upon the proportion of the land area in each county that is in the Basin.
- The proportion of each county's land area that is in the Basin was estimated from data from the University of Wyoming, Department of Geography and Recreation's Geographic Information System.

Not all counties were assumed to have a Green River Basin population. Fremont and Teton Counties have only very small areas within the Basin and those areas are in high elevation remote areas with very sparse or no population. Therefore, none of the Fremont or Teton County rural population was allocated to the Green River Basin.

In the Framework Water Planning process, completed in 2007, WDAI estimated that there were 54,760 people in the basin in 2000 based on a GIS analysis of the Census block data for Wyoming (WDAI). The digital base map for this analysis was prepared by WWDO. The digital census block data was then compared to the map of the basin and determined to be in the basin or out of the basin. This estimate is very likely the most accurate estimate of the population of the Green River Basin, however, this type of data is not readily available for older historical time frames. A GIS based estimate of basin population for two points in time, 2000 and 2005, is not enough to base a forecast on.

Figure 1 shows the State of Wyoming estimated population for the period 1950 to 2000 (WDAI, USCB) and the population of the Green Basin estimated for the time period 1950 to 2000 (USCB).



Figure 2 shows the population of the Green River Basin from the 1970 Green River Plan, the 2001 Green River Plan and WDAI estimates for 2000 and 2005. The slope of the lines are similar with the exception of the 2001 Low Growth scenario. This indicates that growth will likely occur in a similar manner in the basin. The start point for the projections has been the major difference.



Current Population Estimates

The next step in developing population projections for the Green River Basin was to estimate its current population. The starting point or current date for the population projections was determined jointly with the Wyoming Water Development Office (WWDO) and was set at 2005. The decennial census data is the most accurate population data available and the results of the 2000 decennial census will be referenced throughout this technical memorandum.

The Division of Economic Analysis of the WDAI produces estimates of the population of Wyoming's counties, cities, and towns on an annual basis, and projects those estimates into the future. These estimates and forecasts are available from a WDAI web site (WDAI, 2005). The WDAI forecasts for the year 2005 were used as current population estimates for this report and could be used to develop comparable current population baselines in other basins. WDAI's most recent forecasts cover the period from 2000 to 2020.

Because the geographical boundaries of the Green River Basin do not adhere to county lines, WDAI county population estimates were adjusted as described above to reflect only the proportion of each county that lies within the Basin's boundaries.

Based upon the methodology described above, the total current or 2005 population of Wyoming's Green River Basin is estimated to be 60,284 persons. This estimate represents an increase of 31,284 persons over the 1970 Wyoming Water Planning Report No. 3 estimate of 29,000 persons. WDAI estimated the population of the Green River Basin at 56,229 persons for 2005 in the 2007 Framework Water Plan.

The geographical distribution of the Basin's current population by county is depicted in Figure 3. That figure shows that almost two-thirds of the Basin's current population (63 percent) resides in Sweetwater County. Lincoln, Sublette, and Uinta Counties each have 11 percent to 13 percent of the Basin's population, while Carbon County has only 2 percent. The relatively large population concentration in Sweetwater County is attributable to the fact that it contains the two largest communities in the Basin, Rock Springs and Green River. These two cities, with a combined population of about 30,559, account for 51 percent of the Basin's current population.



Extended WDAI Population Projections

The Division of Economic Analysis of the WDAI produces population forecasts for Wyoming counties, cities, and towns. The county population forecasts are based upon time series data from which growth rates are derived from variables such as population, sales tax collections, and school enrollments. These growth rates are used to forecast individual county population totals, and these county totals are adjusted to make them consistent with state-level population forecasts that incorporate elements of the cohort survival and employment-driven approaches. Population projections for cities and towns within each county are based upon population "shares" as derived from census counts or estimates.

The state-level forecasts are employment-driven with respect to magnitude, although they explicitly take into account fertility, mortality, and migration patterns by cohort. The state population forecast totals are controlled to match employment projections produced by the Division of Economic Analysis through Economy.Com (WDAI). Thus, the total county-level projections are essentially employment-driven also.

The Division of Economic Analysis forecasts population 10 to 15 years into the future because of the uncertainties associated with such projections. WDAI's most recent projections are through the year 2020 and are more aggressive than past forecasts, a reflection of the relatively increased economic growth that the Basin and many other parts of the state have witnessed in recent years. A reasonable set of moderate growth rate population projections for the Green River Basin can be derived be extending the Basin population estimates based on the WDAI's latest estimates and projections covering the period from 2000 to 2020. The estimates were extended using the Microsoft Excel regression forecast function. The results are shown in Figure 4 and there is little difference in a straight times series analysis and projection based on 50 years of USCB data. This forecast is also shown on Figure 4.



Allocation of U.S. Census Bureau Projections

The USCB periodically produces population forecasts for each of the 50 states using the cohort survival approach. The most recent forecast for the state of Wyoming is a population projection through the year 2030 (USCB, 2005). The Series A forecasts and the Series B forecasts (USCB, 1999) were used in the 2001 Green River Basin Plan population projections. Both 2005 and the 1999 projections use the cohort-survival approach and incorporate the USCB's "middle series" projections of fertility and mortality rates by cohort for each state. Both series also use migration patterns based upon recent data concerning address changes reported on federal income tax returns. There is a significant difference between the 2005 population forecasts and the 1999 Series A and Series B population forecasts for the state of Wyoming.

The 2005 projections indicate a very slow future population growth for Wyoming based upon migration patterns and cohort survival estimates. During that period, there was a moderate influx of new residents into some parts of Wyoming from elsewhere in the country. The effects of this migration pattern are apparent in parts of the Green River Basin, including the Pinedale area. The USCB projections are based upon the assumption that this moderate rate of net inmigration will continue into the future, and that fertility and mortality rates for the state will follow the USCB's middle series projections.

A reasonable set of low growth population projections for the Green River Basin can be developed from the USCB's 2005 projections for Wyoming using the Microsoft Excel Regression Forecast function. The results of this forecast are shown in Figure 5.



Historical Growth Projections

A third set of Green River Basin population projections was created by assuming that the area would experience a total population increase during the period from 2015 to 2030 that is of the same magnitude that occurred during the 10-year period from 1970 to 1980. From 1970 to 1980, the population of the Basin grew from 29,574 to 60,255, an increase of 30,681 persons. That increase came about as a result of rapid development of energy and mineral resources in the Basin, and the associated influx of workers. If a similar increase in energy and mineral development were to occur again during the planning horizon, it is possible that the Basin population could increase by another 30,000 persons. If the 30,000 person influx is added to the Moderate Growth Projection over the 2015 to 2030 time frame it could result in a Basin-wide population of approximately 113,000 persons by the year 2030. Although the possibility of the Basin experiencing a return to the boom conditions of the 1970s seems remote under present circumstances, the assumption that it might happen is a reasonable basis for a high growth scenario for population forecasting.

Low, Moderate, and High Growth Projections

The three methods described above were used to generate population forecasts through the year 2055 for each community and rural area in the Basin. Generally, the allocated USCB extended forecasts resulted in the smallest forecast for each community and rural area. The WDAI extended forecasts were generally more moderate but still exhibited considerable growth, and the moderate growth plus an influx of persons similar to the 1970s generally produced the largest forecasts. There were some exceptions to these generalities, however. The extended WDAI forecasts showed significantly faster population growth in Sublette County through the year 2020 than in other parts of the Basin.

The results of the low, moderate, and high growth projections for the entire Basin are depicted graphically in Figure 6. That figure shows that the low growth scenario projects a very small Basin-wide population increase over the next 50 years. For this scenario, the current Basin-wide population of 60,284 is projected to increase to only 66,464 by the year 2055.



The moderate growth scenario indicates that Basin-wide population will increase to a total of 104,225 persons by the year 2055, an increase of about 44,000 over current levels. This projection is consistent with the WDAI's forecast that future net migration patterns will be positive for Wyoming and the Green River Basin.

The high growth scenario results show the Basin's population increasing from 60,284 to 134,225 over the next 50 years. This result was predetermined by the assumption that a population influx would occur of a magnitude similar to that experienced during the period from 1970 through 1980.

Table 1 shows the decimal change in the populations of the basin cities, towns, rural areas, and the counties based on WDAI 2005 population estimates and projections through 2020. The changes for 2035 and 2055 were estimated using the Microsoft Excel Regression Forecast function. Low, moderate, and high growth projections for communities and rural areas of the Basin are given in Tables 2 through 4. The results in Table 2 indicate that under low growth assumptions, communities and rural areas in Carbon, Sweetwater, and Uinta Counties will experience small population decreases over the next 50 years, while there will be very modest growth in other parts of the Basin. The moderate growth projections in Table 3 indicate that most parts of the Basin will experience population growth in the next 50 years, with the exception of the two small communities and the rural portion of Carbon County and the two communities and the rural area of Uinta County. The high growth projections in Table 4 indicate that the Basin will experience population growth following a pattern similar to the moderate growth scenario with an in flux of persons between 2015 and 2030 similar to the influx of persons experienced by the basin in the 1970s.

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			Рори	lation	.	1	Change	in Popula	tion - WD	AI	Change Est.	in Pop.
County/ Community	2000	2005	2010	2015	2020	2000	2005	2010	2015	2020	2035	2055
Carbon Co.	1075	1106	1123	1113	1104	0.0184	0.0183	0.0167	0.0158	0.0148	0.0120	0.0081
Baggs	348	354	363	360	357	0.0060	0.0059	0.0054	0.0051	0.0048	0.0039	0.0026
Dixon	79	81	82	81	81	0.0014	0.0013	0.0012	0.0011	0.0011	0.0009	0.0006
Rural	648	671	678	672	666	0.0111	0.0111	0.0101	0.0095	0.0090	0.0072	0.0048
Lincoln Co.	7300	7781	8824	9556	10335	0.1253	0.1291	0.1316	0.1354	0.1391	0.1491	0.1626
Diamondville	716	695	817	885	957	0.0123	0.0115	0.0122	0.0125	0.0129	0.0134	0.0143
Kemmerer	2651	2560	3001	3250	3515	0.0455	0.0425	0.0447	0.0461	0.0473	0.0488	0.0517
La Barge	431	421	492	532	576	0.0074	0.0070	0.0073	0.0075	0.0078	0.0080	0.0085
Opal	102	99	116	126	136	0.0018	0.0016	0.0017	0.0018	0.0018	0.0019	0.0020
Rural	3400	4006	4398	4763	5151	0.0583	0.0665	0.0656	0.0675	0.0693	0.0769	0.0861
Sublette												
Co.	5594	6541	8377	9879	11636	0.0960	0.1085	0.1249	0.1400	0.1566	0.2015	0.2626
Big Piney	408	455	596	703	828	0.0070	0.0075	0.0089	0.0100	0.0111	0.0143	0.0185
Marbleton	720	811	1057	1247	1469	0.0124	0.0135	0.0158	0.0177	0.0198	0.0253	0.0329
Pinedale	1402	1658	2092	2467	2905	0.0241	0.0275	0.0312	0.0350	0.0391	0.0501	0.0651
Rural	3064	3617	4632	5462	6434	0.0526	0.0600	0.0691	0.0774	0.0866	0.1118	0.1460
Sweetwater												
Co.	37613	38015	41620	42809	43990	0.6455	0.6306	0.6205	0.6068	0.5919	0.5536	0.5012
Bairoil	97	96	106	109	112	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0013
Granger	146	146	161	166	170	0.0025	0.0024	0.0024	0.0024	0.0023	0.0021	0.0019
Green	11808	11797	12085	13356	13725	0 2027	0 1055	0 1036	0 1803	0 18/7	0 1721	0 1552
Rock	11000	11707	12305	15550	10720	0.2021	0.1300	0.1350	0.1035	0.1047	0.1721	0.1552
Springs	18649	18772	20626	21216	21801	0.3201	0.3114	0.3075	0.3007	0.2934	0.2746	0.2489
Superior	244	239	266	272	281	0.0042	0.0040	0.0040	0.0039	0.0038	0.0035	0.0031
Wamsutter	261	265	291	300	308	0.0045	0.0044	0.0043	0.0043	0.0041	0.0039	0.0036
Rural	6408	6710	7185	7390	7593	0.1100	0.1113	0.1071	0.1047	0.1022	0.0960	0.0871
Uinta Co.	6685	6840	7133	7195	7250	0.1147	0.1135	0.1063	0.1020	0.0976	0.0839	0.0655
Lyman	1938	1937	2030	2047	2063	0.0333	0.0321	0.0303	0.0290	0.0278	0.0234	0.0178
Mountain												
View	1153	1163	1219	1230	1239	0.0198	0.0193	0.0182	0.0174	0.0167	0.0142	0.0110
Rural	3594	3740	3884	3918	3948	0.0617	0.0620	0.0579	0.0555	0.0531	0.0462	0.0368
TOTAL BASI	N Popula	tions						1				
	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	2055
Low Level	58267	60284	61762	62727	63077	62849	62130	64051	64655	65258	65861	66464
Moderate									A 4 - 4 -			
Level	58267	60284	67078	70552	74314	78808	83044	87280	91517	95753	99989	104225
High Level	58267	60284	67078	70552	84314	98808	113044	117280	121517	125753	129989	134225
	1	1	1	1	1	1	1	1		1	1	1

Table 1 - Green River Basin Population Percentage Changes

	2000	2005	2010	2015	2020	2035	2055
Carbon Co.	1075	1106	1034	990	937	766	535
Baggs	348	354	334	320	303	248	175
Dixon	79	81	76	72	69	56	38
Rural	648	671	625	598	565	462	321
Lincoln Co.	7300	7781	8125	8496	8772	9548	10810
Diamondville	716	695	752	787	812	857	948
Kemmerer	2651	2560	2763	2890	2983	3127	3436
La Barge	431	421	453	473	489	515	568
Opal	102	99	107	112	115	122	134
Rural	3400	4006	4050	4234	4372	4928	5725
Sublette Co.	5594	6541	7714	8783	9876	12908	17453
Big Piney	408	455	549	625	703	913	1232
Marbleton	720	811	973	1109	1247	1622	2189
Pinedale	1402	1658	1926	2193	2466	3210	4329
Rural	3064	3617	4265	4856	5461	7163	9703
Sweetwater Co.	37613	38015	38322	38061	37338	35457	33310
Bairoil	97	96	98	97	95	89	83
Granger	146	146	148	148	144	137	129
Green River	11808	11787	11956	11875	11650	11022	10317
Rock Springs	18649	18772	18991	18863	18504	17586	16545
Superior	244	239	245	242	239	224	207
Wamsutter	261	265	268	267	261	251	239
Rural	6408	6710	6616	6570	6445	6148	5790
Uinta Co.	6685	6840	6568	6397	6153	5373	4356
Lyman	1938	1937	1869	1820	1751	1501	1182
Mountain View	1153	1163	1122	1094	1052	911	731
Rural	3594	3740	3576	3483	3351	2961	2444
TOTAL BASIN	58267	60284	61762	62727	63077	64052	66465

Table 2 – Green River Basin Population Projections – Low Level Growth

					0111		
	2000	2005	2010	2015	2020	2035	2055
Carbon Co.	1075	1106	1123	1113	1104	1043	839
Baggs	348	354	363	360	357	339	275
Dixon	79	81	82	81	81	76	60
Rural	648	671	678	672	666	629	504
Lincoln Co.	7300	7781	8824	9556	10335	13010	16952
Diamondville	716	695	817	885	957	1168	1486
Kemmerer	2651	2560	3001	3250	3515	4261	5388
La Barge	431	421	492	532	576	701	890
Opal	102	99	116	126	136	166	211
Rural	3400	4006	4398	4763	5151	6715	8977
Sublette Co.	5594	6541	8377	9879	11636	17589	27368
Big Piney	408	455	596	703	828	1244	1932
Marbleton	720	811	1057	1247	1469	2210	3433
Pinedale	1402	1658	2092	2467	2905	4375	6788
Rural	3064	3617	4632	5462	6434	9760	15215
Sweetwater Co.	37613	38015	41620	42809	43990	48316	52235
Bairoil	97	96	106	109	112	122	130
Granger	146	146	161	166	170	187	202
Green River	11808	11787	12985	13356	13725	15019	16178
Rock Springs	18649	18772	20626	21216	21801	23964	25946
Superior	244	239	266	272	281	305	325
Wamsutter	261	265	291	300	308	342	374
Rural	6408	6710	7185	7390	7593	8377	9080
Uinta Co.	6685	6840	7133	7195	7250	7322	6831
Lyman	1938	1937	2030	2047	2063	2045	1853
Mountain View	1153	1163	1219	1230	1239	1242	1146
Rural	3594	3740	3884	3918	3948	4035	3832
TOTAL BASIN	58267	60284	67078	70552	74314	87280	104226

Table 3 – Green River Basin Population Projections- Moderate Level Growth

	Olccilia		opulatio		ons riigi		
	2000	2005	2010	2015	2020	2035	2055
Carbon Co.	1075	1106	1123	1113	1252	1402	1081
Baggs	348	354	363	360	405	455	354
Dixon	79	81	82	81	92	102	78
Rural	648	671	678	672	755	845	649
Lincoln Co.	7300	7781	8824	9556	11726	17482	21831
Diamondville	716	695	817	885	1086	1569	1914
Kemmerer	2651	2560	3001	3250	3988	5725	6939
La Barge	431	421	492	532	654	942	1146
Opal	102	99	116	126	154	223	271
Rural	3400	4006	4398	4763	5844	9023	11561
Sublette Co.	5594	6541	8377	9879	13202	23635	35246
Big Piney	408	455	596	703	939	1672	2488
Marbleton	720	811	1057	1247	1667	2970	4421
Pinedale	1402	1658	2092	2467	3296	5878	8742
Rural	3064	3617	4632	5462	7300	13115	19594
Sweetwater							
Co.	37613	38015	41620	42809	49909	64922	67270
Bairoil	97	96	106	109	127	164	168
Granger	146	146	161	166	193	251	260
Green River	11808	11787	12985	13356	15572	20181	20834
Rock Springs	18649	18772	20626	21216	24735	32201	33414
Superior	244	239	266	272	319	409	419
Wamsutter	261	265	291	300	349	459	482
Rural	6408	6710	7185	7390	8615	11257	11693
Uinta Co.	6685	6840	7133	7195	8225	9838	8797
Lyman	1938	1937	2030	2047	2341	2748	2387
Mountain							
View	1153	1163	1219	1230	1406	1669	1475
Rural	3594	3740	3884	3918	4479	5422	4936
TOTAL BASIN	58267	60284	67078	70552	84314	117280	134225

Table 3 – Green River Basin Population Projections – High Level Growth

Aging Population

Wyoming's population is older than the National population. The median age in Wyoming was 38.4 years (Equality State Almanac, 2007) while the National population median age was 36.6 years (Census, 2007). Wyoming has progressed from one of the younger States to one of the older States. In 1980, the median age for Wyoming was 26.7 years and the median age for the Nation was 30.0 years(WDIA, 2007).

Table 5 shows the 2005 age groups of the population of the 5 counties that encompass the populated area of the Green River Basin. To estimate the population by age cohort in the Green River Basin data for the five counties that encompass the Green River Basin were used. The counties used are Carbon, Lincoln, Sublette, Sweetwater and Uinta. The table also shows the distribution across the age cohorts.

Age Group			County			Total	Percent
Years	Carbon	Lincoln	Sublette	Sweetwater	etwater Unita		
Less than 5	847	981	347	2678	1468	6321	0.066
5 to 14	1650	2175	814	4961	2976	12576	0.131
15 to 19	979	1279	489	3092	1694	7533	0.078
20 to 24	1003	1259	460	2791	1685	7198	0.075
25 to 34	1658	1759	864	4619	2235	11135	0.116
35 to 44	2185	1956	981	5213	2621	12956	0.135
45 to 54	2831	2727	1277	6994	3626	17455	0.182
55 to 64	2128	1858	935	4495	2083	11499	0.120
65 to 74	1140	1111	475	1762	831	5319	0.055
75 +	910	894	284	1370	720	4178	0.043
Total	15331	15999	6926	37975	19939	96170	1.000

Table 5 - 2005 Aging Population of the 5 county area of covering the Green River Basin

Source: Equality State Almanac 2007

Table 6 shows the projected distribution across age cohorts from 2005 out to 2055 for the State. These projections were done by extending the projections prepared by the US Bureau of Census for Wyoming through the year 2030 (Census, 2005). The percentage distributions show how the population of the State will age over the next 50 years if the recent aging trends continue. It is assumed that Green River Basin will age in a similar manner.

Age Groups Years	2000	2010	2020	2030	2035	2040	2050	2055
Less than 5	0.063	0.063	0.053	0.049	0.047	0.044	0.039	0.036
5 to 14	0.147	0.125	0.123	0.108	0.102	0.096	0.084	0.078
15 to 19	0.085	0.060	0.057	0.054	0.045	0.040	0.030	0.026
20 to 24	0.068	0.063	0.050	0.051	0.045	0.042	0.036	0.032
25 to 34	0.121	0.137	0.112	0.099	0.099	0.095	0.085	0.081
35 to 44	0.160	0.116	0.136	0.117	0.110	0.105	0.094	0.089
45 to 54	0.150	0.152	0.114	0.140	0.125	0.122	0.115	0.112
55 to 64	0.090	0.144	0.147	0.116	0.140	0.144	0.153	0.157
65 to 74	0.064	0.076	0.125	0.131	0.149	0.162	0.187	0.199
75 +	0.054	0.063	0.081	0.134	0.135	0.147	0.173	0.186
Total	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

 Table 6 - Aging Population Distribution of Wyoming 2000 to 2055 Estimated

 Percent of Population

Source: US Census Bureau

Table 7 shows the basin population by age cohort for 2005 and 10, 30 and 50 years into the future for the moderate growth scenario. These projections are based on the State percentage age distributions in Table 6.

	200	5 ¹	201	5 ²	203	5 ²	20	055 ²
Age Group Years	Percent of Pop.	Pop.						
Less than 5	0.066	3962	0.058	4092	0.047	4067	0.036	3773
5 to 14	0.131	7883	0.124	8748	0.102	8898	0.078	8145
15 to 19	0.078	4722	0.059	4127	0.045	3910	0.026	2668
20 to 24	0.075	4512	0.057	3986	0.045	3945	0.032	3377
25 to 34	0.116	6980	0.125	8784	0.099	8645	0.081	8427
35 to 44	0.135	8121	0.126	8890	0.110	9640	0.089	9240
45 to 54	0.182	10942	0.133	9383	0.125	10945	0.112	11652
55 to 64	0.120	7208	0.146	10265	0.140	12258	0.157	16327
65 to 74	0.055	3334	0.101	7090	0.149	13005	0.199	20741
75 +	0.043	2619	0.072	5080	0.135	11748	0.186	19407
Total ³	1.00	60284	1.00	70552	1.00	87280	1.00	104226

 Table 7 - Green River Basin Estimated Aging Population - Moderate Growth

¹Estimates are based on the 5 County area that encompasses the Green River Basin. Table 5

²Estimates are based on the State population percentage break down by age group. Table 6

³Column sums may not equal Total due to rounding errors.

Employment

Employment figures and data are not reported or maintained on a river basin basis. To approximate the employment situation in the Green River Basin data for the five counties that encompass the Green River Basin were used. The counties used are Carbon, Lincoln, Sublette, Sweetwater and Uinta. The first step was to determine the 2005 existing situation, the existing employment for the five counties. This information is shown in Table 8. The total numbers employed in 2005 is almost 53,000 (Equality State Almanac, 2007). The employed numbers were compared to the total estimated population for the 5 counties to determine the labor force participation rate for the area. In 2005, about 57 percent of the population of the 5 counties made up the labor force (Equality State Almanac, 2007). The participation rate was applied to the Green River Basin estimated population to determine the 2005 estimated labor force. To estimate future labor force participation rates, aging information from the other counties were compared to the projected aging population of the basin. Labor force participation rates were determined for the Counties that exhibited similar age distribution to the projections for the Green River Basin. These participation rates were applied to the projected populations for the three planning scenarios, Low Growth, Moderate Growth, and High Growth. The results of the Green River Basin estimated labor force analysis are presented in Table 9.

County	Labor Force Employed
Carbon	7,530
Lincoln	7,686
Sublette	5,109
Sweetwater	22,044
Uinta	10,599
GRB Total	52,968

Table 8 -	2005	Labor	Force	Emplo	oved
14010 0					

Source: Equality State Almanac 2007

Table 9 - Estimated Green River Basin Labor Force 2005 to 2055 by Growth Scenario

Scenario	2005	2015	2035	2055
Low Growth	34,326	35,127	34,652	34,695
Moderate Growth	34,326	39,509	47,218	54,406
High Growth	34,326	39,509	63,448	70,065

Table 10 shows the estimated employment for each of the three growth scenarios. Figure 7 shows graphically the three employment scenarios.

	Table To Green River Basin Employment Estimates												
Scenario	2005	2015	2025	2035	2045	2055							
Low Growth	33200	33975	33536	33096	33028	32960							
Moderate Growth	33200	38213	41656	45098	48392	51686							
High Growth	33200	38213	49406	60600	63581	66562							

Table 10 Green River Basin Employment Estimates



The employment by the various job descriptions is not maintained for the hydrologic basin, however, employment is available by job category for the five county area. The most recent information available on a county specific basis is for 2003 and 2004. This information is presented by county in Table 11. While these numbers are not entirely accurate for the basin, they do give one the feel for the distribution of employment by job category.

	Carbon	L	incoln		Sub	lette	Swee	twater	Un	ita
FULL AND										
PART TIME										
EMPLOYMENT	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Wage and Salary	6,964	7,020	6,581	6,493	3,100	3,426	21,290	22,209	9,528	9,379
Proprietors	2,616	2,718	2,712	2,799	1,711	1,778	3,669	3,824	2,618	2,710
TOTAL	9,580	9,738	9,293	9,292	4,811	5,204	24,959	26,033	12,146	12,089
Farm	535	539	665	668	388	390	195	195	400	401
Forestry, Fishing, Related Activities	135	140	83	83	89	80	(D)	(D)	84	80
Mining	185	261	651	684	675	784	(D)	(D)	703	722
Utilities	56	56	(D)	(D)	23	24	(D)	(D)	67	70
Construction	667	(D)	1,602	1,412	504	617	2,029	2,037	1,305	1,099
Manufacturing	465	(D)	359	362	(D)	92	1,201	1,176	372	354
Wholesale Trade	153	183	(D)	(D)	17	16	(D)	(D)	210	243
Retail Trade	1,125	1,095	999	1,025	475	484	2,967	3,038	1,684	1,657
Transportation & Warehousing	506	514	208	215	108	112	1,207	1,312	428	458
Information	86	100	158	172	42	48	255	260	237	294
Finance & Insurance	250	243	252	255	114	118	580	571	222	221
Real Estate,										
Rental & Leasing	356	380	362	382	186	194	689	761	431	450
Professional &										
Technical Services	271	(D)	286	293	251	248	637	678	479	492
Management of										
Companies &	(D)		(D)	(D)	(D)	(D)	02	104	(D)	(D)
Administrative &	(D)	(D)	(D)	(D)	(D)	(D)	92	104	(D)	(D)
Waste Services	(D)	301	(D)	(D)	(D)	(D)	841	879	(D)	(D)
Educational	25	20	24	27	(D)	(D)	(D)	11/	(D)	(D)
Health Care &	20	20	34	57	(D)	(D)	(D)	114	(D)	(D)
Social Assistance	537	595	354	(D)	(D)	(D)	(D)	1,298	(D)	(D)
Arts,Entertainment & Recreation	234	246	134	138	126	127	325	337	186	176
Accommodation &										
Food Services	973	1,037	578	590	405	450	2,127	2,295	799	769
Other Services, except public										
administration	500	512	386	416	231	250	1,093	1,104	549	550
Government &										
Enterprises	2,223	2,115	1,645	1,633	759	803	4,219	4,209	2,234	2,171

 Table 11 - Employment in the 5 County area that Encompasses the Green River Basin

Source: Equality State Almanac 2007

(D) - not shown to avoid disclosure of confidential information.

Table 12 shows the 2005 five county employed labor force, the county average wage and the county total earnings. The table also shows the average wage for the five county area and the total earnings for the five county area. These numbers are not totally accurate for the river basin planning area but are indicative of the employment and earnings situation in the Green River Basin.

County	Labor Force Employed	Average Wage	County Earnings
Carbon	7,530	\$28,903.00	\$217,639,590.00
Lincoln	7,686	\$31,524.00	\$242,293,464.00
Sublette	5,109	\$36,751.00	\$187,760,859.00
Sweetwater	22,044	\$42,088.00	\$927,787,872.00
Uinta	10,599	\$31,056.00	\$329,162,544.00
GRB Total	52,968	\$35,958.40	\$1,904,644,329.00

Table 12 - 2005 Labor Force Employed and Average Annual Wage	s
for the 5 Counties that make up the Green River Basin	

Source: Equality State Almanac 2007

Projection of future wages and earnings has not been attempted in this analysis.

Conclusions

The results described above are scenarios for gauging the adequacy of current municipal and domestic water supplies and facilities in the Basin. They are not intended to be predictions of population growth. They also provide benchmarks for gauging future demand for water-based recreation opportunities. To the extent that current water supplies and facilities are adequate to meet municipal needs based upon the low to moderate growth scenarios, there may be little need for future development unless the area economy returns to "boom" conditions reminiscent of the 1970s. To the extent that current water supplies and facilities are inadequate to meet municipal needs based upon the low scenarios, development plans can be formulated to address those needs.

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