6.0 WATER USE PROJECTIONS

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6.0 WATER USE PROJECTIONS

This chapter discusses current water use and future water demand projections for the six water use sectors: agriculture, industrial, municipal, rural domestic, environmental, and recreation. A comparison is made between the future projected demands and the available water supply. The effects of conservation on water demand projections and water supply are presented. Future water use opportunities are also discussed.

Demand projections and future water use opportunities were presented in the 2001 Bear River Basin Plan, Chapter 6 (Forsgren Associates, 2001) and Appendix Q, Technical Memoranda, Future Economic and Demographic Scenarios and Future Water Demand Projections (BBC Research and Consulting, 2000). Results from the 2001 Plan are reviewed here and compared with information and data collected as part of this Plan Update. The analyses presented in the plan and Appendix Q are detailed and a good presentation of the economic and demographic conditions of the Basin as well as presenting projections of future conditions. The data and information presented in this report are used for comparison purposes and no attempt has been made to repeat the analyses conducted as part of the 2001 Plan.

6.1 ECONOMIC AND POPULATION PROJECTIONS

Economic growth and activity in the Basin were based on four sectors including agriculture, energy, tourism and manufacturing (Forsgren Associates, 2001). These sectors best reflected the economics of the Basin during the analysis. Discussions for this report focus on six water use sectors, which are agricultural, industrial, municipal, rural domestic, environmental and recreation. These water use sectors will be compared to the four economic sectors to provide a basis for the review and evaluation. To compare economic growth and activities to water use sectors, agricultural will represent agriculture, industrial will represent energy and manufacturing, and environmental and recreation will represent tourism. Dynamics in municipal and rural domestic populations will be used to help explain changes in economic activity in all sectors since populations grow as economies expand.

Population estimates are made annually by AIEAD. Figure 6-1 illustrates the changes in population from 1999, and shows two population growth projections made in the 2001 Plan: a low growth projection of 15,100 people and a high growth projection of 29,000 people. The Figure also shows that the estimated population has been very close to the low growth projection. The 2010 census shows some increase over the low growth projection with a population of 15,796. An estimated population growth scenario prepared by AIEAD shows the population increasing to 16,274 by 2030. This increase is greater than the low growth scenario but much less than the high growth or the mid growth scenario of 21,500 persons proposed in the Statewide Framework Water Plan (WWC, 2007). The AIEAD 2030 population projection was used to make municipal and rural domestic water use projections for this update. The labor market was not analyzed, but the overall population data and other water use sector data does not indicate a significant change in the labor market.

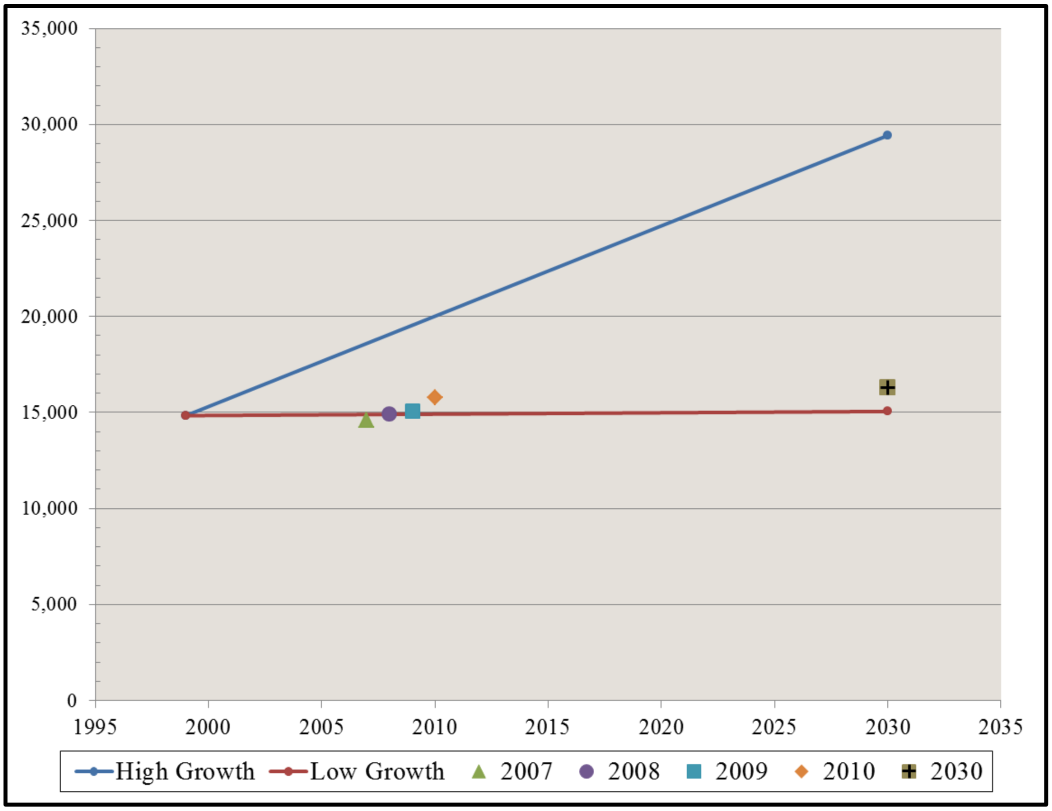


Figure 6-1: Bear River Basin Population and Population Projections

6.2 AGRICULTURAL WATER USE

In the 2001 Plan, two scenarios were developed to project future agricultural water use for livestock and irrigation. The scenarios focused on low and high growth projections. For this update, current use was estimated based on the newest available data and plotted to compare the current use to the projected uses developed in the 2001 Plan.

6.2.1 IRRIGATION

Water supply, water use efficiency, irrigation methods, availability of groundwater, storage, and crop types all impact water use. As water supply increases, land owners are able to deliver more water to their crops. Diversion, conveyance and application efficiencies have an effect on consumptive use because more efficient water delivery means the crop will have more supply to satisfy the crop irrigation requirement. In some cases, such as sprinkler irrigation, the diverted water more efficiently meets the crop's needs, resulting in decreased return flows. Much of the agricultural irrigation in the Wyoming Bear River Basin depends on return flows to meet the crop's water demands. Changes to the types of crop planted also have an effect on water use. When economic conditions are favorable for growing a more valuable crop, a change in overall consumptive use of water may occur, depending on the new crop's needs.

The assumptions made for the irrigated acreage, crop types, and irrigation practices were not changed from the 2001 Plan. Irrigated acreage projections to the year 2030 are presented in Figure 6-2. Along with Idaho and Utah, the SEO recently began a project to improve the quality of the irrigated lands mapping throughout the Basin. This information, once completed, will provide a more accurate picture of irrigation and water rights in the Basin.

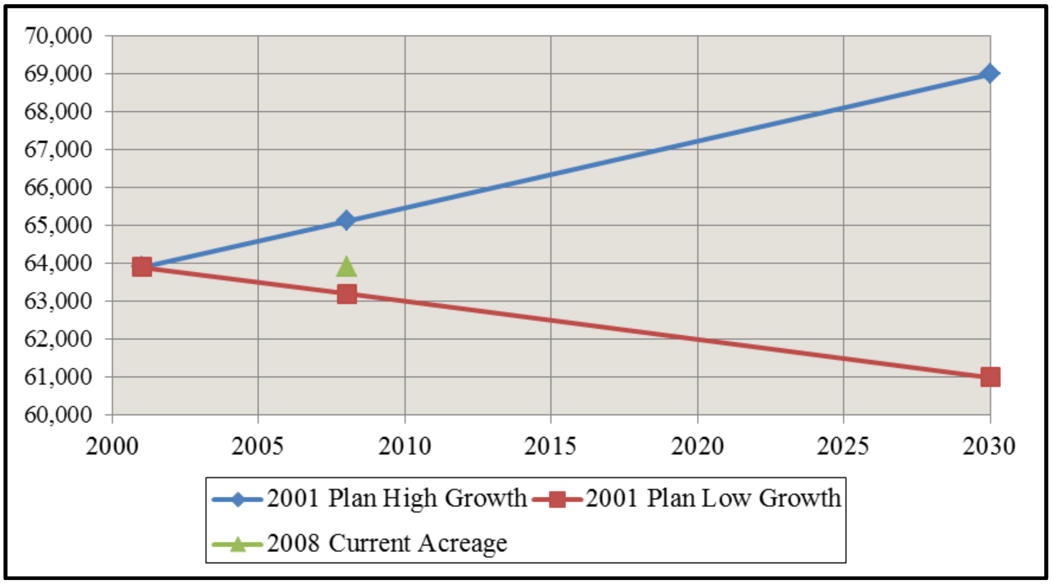


Figure 6-2: 2001 Irrigated Acreage Projections and 2008 Irrigated Acreage

Diversion totals decreased and fell below the low growth projection made in the 2001 Plan. Both inflows and diversions decreased due to drier climatic conditions from 2001 to 2004. Diversion amounts are expected to increase as wetter conditions have been observed over the last two years (2010 and 2011). The amounts shown in Figure 6-3 are the head gate diversion amounts. Efficiencies, irrigation water requirements and crop consumptive use all factor into these values.

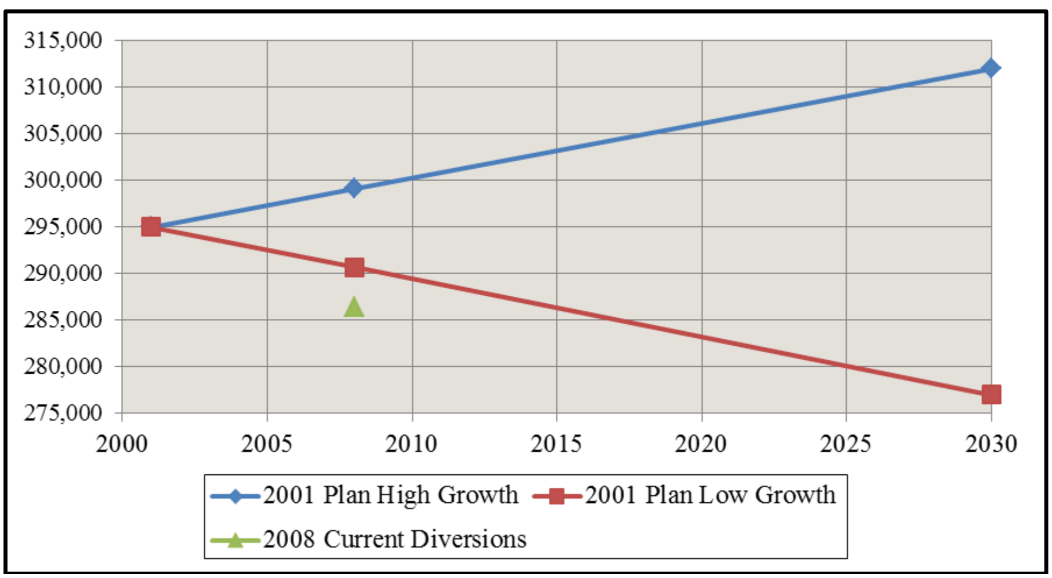


Figure 6-3: 2001 Diversions Projections versus 2008 Diversions

Table 6-1shows a comparison of the total inflows and diversions for dry, normal and wet conditions (May through September) from the 2001 Plan and this update. The period May through September was chosen in order to remain consistent with the model output tables shown in Chapter 7, section 7.1.3. The total diversions in Table 6-1 represent the model diversion data input, which is different than the model diversion summary. The difference is the model's diversion summary does not use the diversion input in every case due to the internal balancing of the water budget. For example, when a diversion (from the diversion input) is greater than the calculated available flow at a node, the model ignores the input data and sets the diversion value to zero to ensure there will not be a negative flow at the node. Note that the volume of diversions exceeds the inflow for every case. This is indicative of the amount of water returning to the system for downstream use. Framework Table 5-3, presented in Appendix A, represents January through December values.

Table 6-1: Inflow and Diversion Comparison, May-September

Description	2001 Plan	2011 Plan Update	2001 Plan	2011 Plan Update	2001 Plan	2011 Plan Update
	Dry Conditions (AF)		Normal Conditions (AF)		Wet Condition (AF)	
Inflow Gage 10011500	66,868	63,399	124,011	110,857	193,738	174,274
Inflow Gage 10015700	1,118	2,398	3,889	7,108	10,490	16,646
Inflow Gage 10032000	46,407	45,093	110,470	97,211	165,423	167,829
Ungaged gains or losses	3,582	-32,268	128,850	68,322	361,263	189,789
Total Inflows	***117,976***	***78,622***	***367,220***	***283,498***	***730,913***	***548,538***
Total Diversions	***336,055***	***271,958***	***607,887***	***519,593***	***897,801***	***794,987***

Difference in values between the 2001 Plan and this update are due in part to different methodologies used to discern hydrologic conditions. In the 2001 Plan, the hydrologic conditions for a specific gage were determined by the locations of "natural breaks" in the ranked flow values for the period of record. For this plan, the 20 % dry and 20 % wet years were used to define dry and wet years, as was recommended for basin planning in the Guidelines for Development of Basin Plans (States West Water Resources Corporation, 2001). Because of the difference in approach, comparisons are only for informational purposes. Future basin plans should follow the analysis in the guidance document so that comparisons can be based on the accepted approach.

IWR is calculated by subtracting the monthly effective precipitation from the CU. The supply limited consumptive use is the amount of diverted water the crop actually uses. Tables 6-2 and 6-3 compare the IWR and supply limited CU between the 2001 Plan and this update. The increase in IWR and decrease in supply limited CU is consistent with drier conditions and a limited water supply.

Table 6-2: Average Annual Irrigation Water Requirements

Location	2001 Basin Plan (AFY)	2011 Basin Plan Update (AFY)
Upper Division	64,300	65,042
Central Division	32,600	34,362
Total Bear River Basin	***96,900***	***99,404***

Table 6-3: Average Annual Supply-Limited Crop Consumptive Use Estimates

Location	2001 Basin Plan (AFY)	2011 Basin Plan Update (AFY)
Upper Division	62,600	58,671
Central Division	31,600	32,538
Total Bear River Basin	***94,200***	***91,209***

These values are expected to fluctuate depending on supply and crop type. The majority of irrigation in the Basin is for hay or pasture, with approximately 92% of cropland being grass hay and pasture, and the remaining 8% being used to grow alfalfa for hay and forage. The crops grown, and the percentages, were assumed to have remained the same as in the 2001 Plan.

6.2.2 LIVESTOCK

The number of cattle and sheep in the Basin were obtained from the United States Department of Agriculture (USDA), National Agriculture Statistics Service (USDA, 2008 and 2011). Lincoln and Uinta Counties data were downloaded and plotted to look at the general trends for those counties. The 2001 Plan estimated that 25% of the livestock reported to be in Lincoln and Uinta Counties can be attributed to the Bear River Basin. Using the USDA National Agriculture Statistics Service data and assumptions from the 2001 Plan, the number of cattle and sheep in the basin were estimated and plotted. The number of sheep was not available for the years 2004 through 2007.

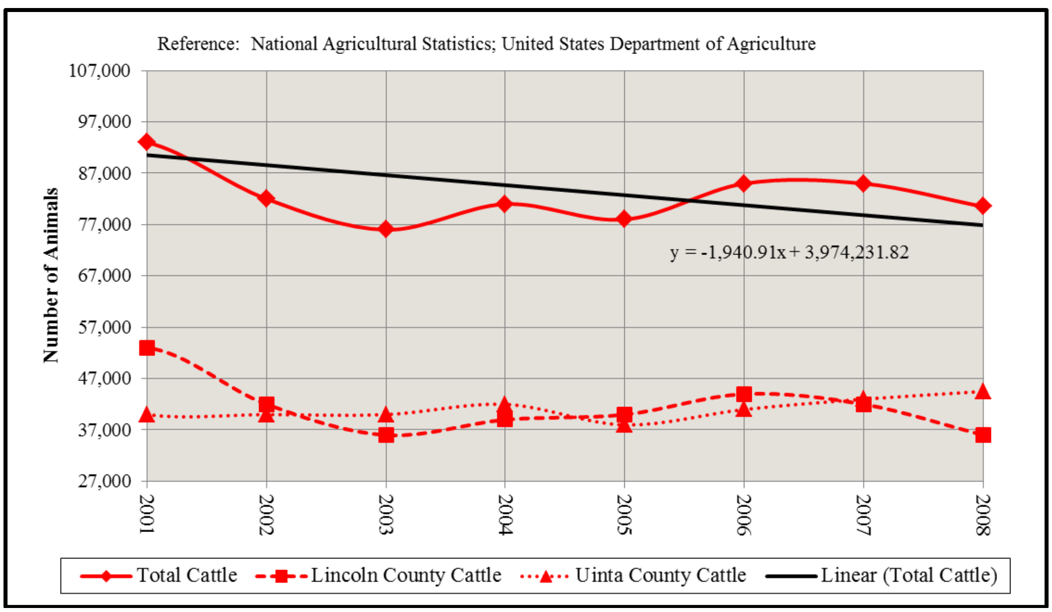


Figure 6-4: Lincoln and Uinta County Cattle Numbers, 2001-2008

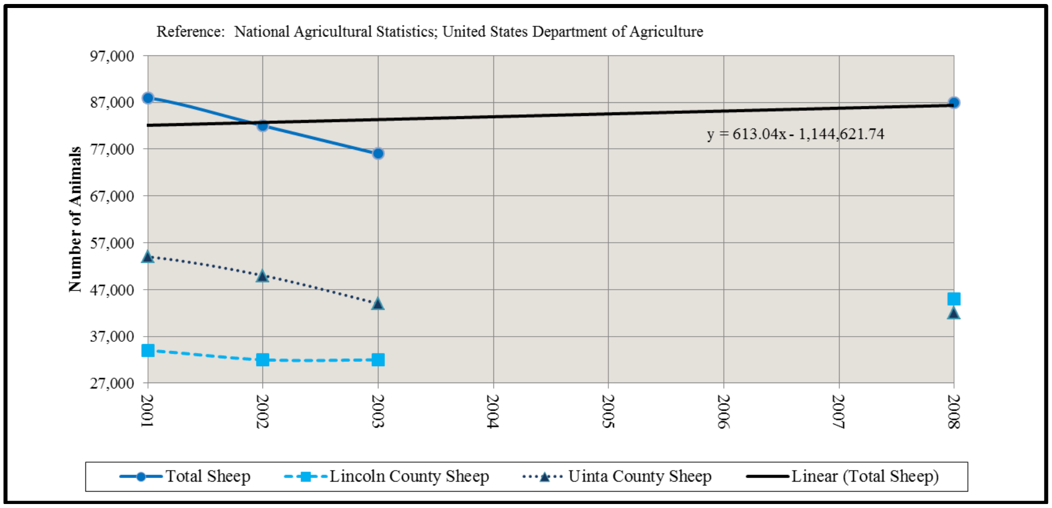


Figure 6-5: Lincoln and Uinta County Sheep Numbers, 2001-2008

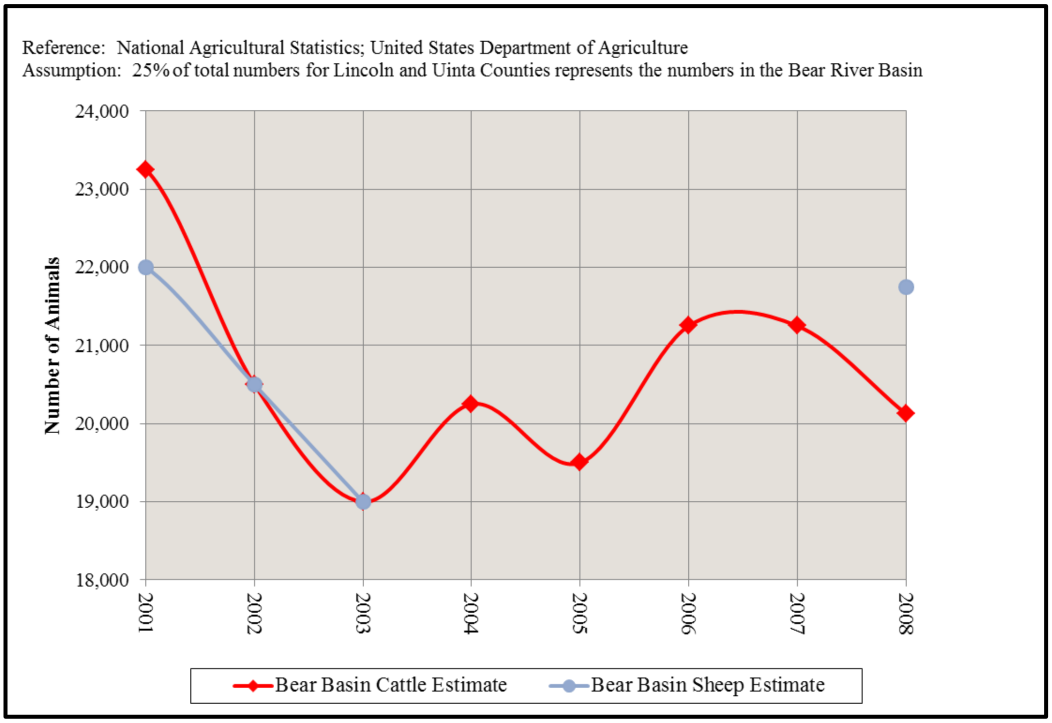


Figure 6-6: Bear River Basin Cattle and Sheep Estimates, 2001-2008

The county cattle numbers show an average decline of 20% from the number in the 2001 plan, with declines in both Lincoln and Uinta Counties being comparable. The number of sheep increased slightly overall with a slight decline in Uinta County and an increase in Lincoln County. The 2001 Basin Plan's low growth scenario stated that the BLM may expand its no conversion of sheep to cattle grazing policy, which would reduce the number of AUMs in the Basin. A separate analysis to determine consumptive use of livestock showed a significant decrease in the AUMs.

The 2001 Plan used permitted AUMs for allotments in the Basin to determine the consumptive use for livestock. The same methodology was applied for this update and the results mirrored the data from USDA National Agriculture Statistics Service. The BLM's RAS website was used to obtain the "authorized use" for each allotment. The RAS provided the AUMs permitted for each allotment and the amount of private and public land therein. The RAS data is for the year 2011. Attempts to obtain 2008 data were unsuccessful. Allotment use is fairly static; therefore, the 2011 data is applicable for this analysis. The AUMs were converted to AUs following the method described in Chapter 5, section 5.1.1.4. The decrease in AUMs also fell below the low growth projection from the 2001 Plan. The 2001 Plan's high growth livestock consumptive use estimates were 528 acre-feet for 2001, 548 acre-feet for 2008, and 610 acre-feet or 2030. Calculated for this update, the estimated livestock consumptive use for 2011 is 345 acre-feet.

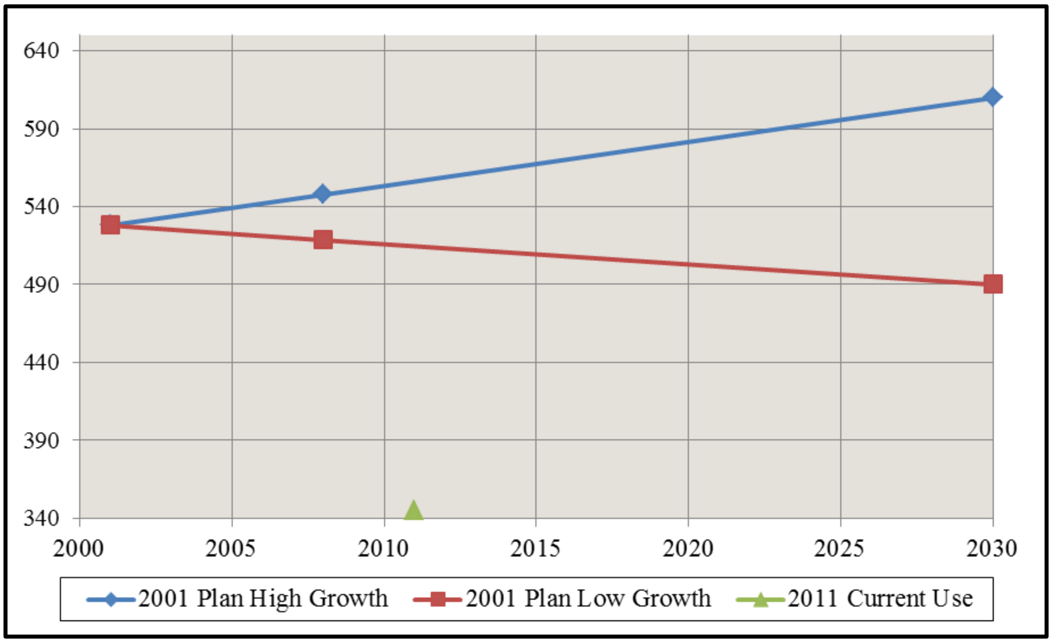


Figure 6-7: Livestock Consumptive Use Projections to 2030 (AFY)

6.3 INDUSTRIAL WATER USE

Natural gas production and processing was the only self-supplied water consuming industry in the Basin during development of the 2001 Bear Plan. That plan presented two growth scenarios for natural gas processing water use within the Basin, a high scenario and a low scenario. The high growth scenario estimated that natural gas production and processing would increase by 15% over the 30-year planning period. This increase would raise the consumptive water use to approximately 460 acre-feet per year.

The low growth scenario indicated that natural gas production and processing in the Basin would cease by 2027, three years before the end of the planning period. This would eliminate water use for gas processing. Figure 6-8 shows the water use as projected in the 2001 Plan.

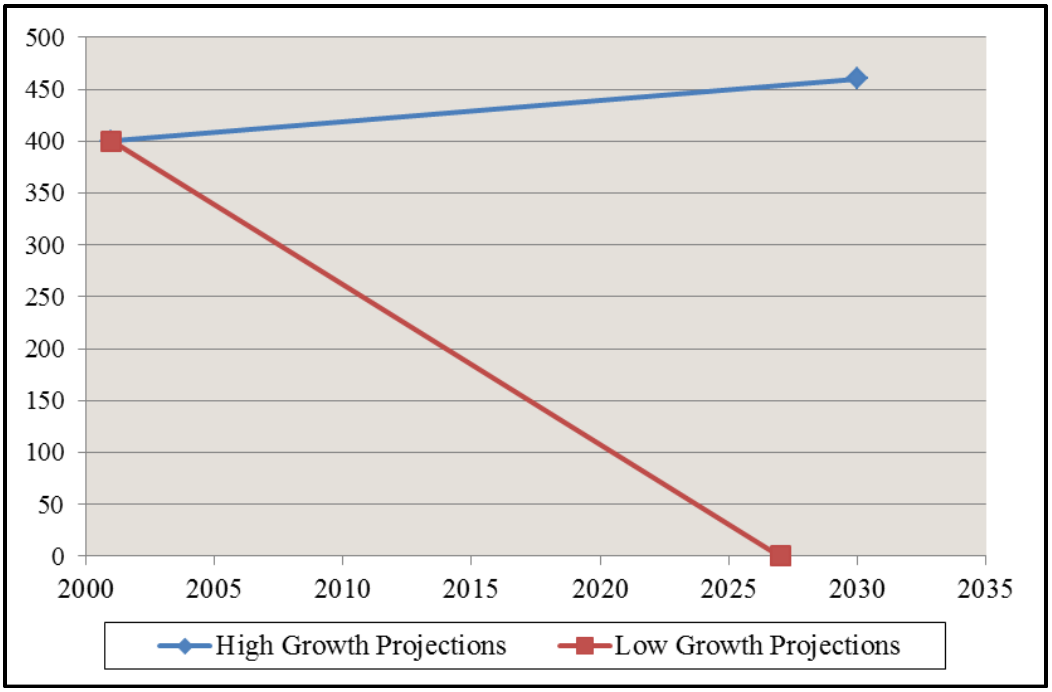


Figure 6-8: 2001 Bear River Basin Plan Industrial Water Use Trends (AFY)

During this review, it was found that there are no new industrial water uses within the Basin. As in the 2001 Plan, the only industry supplying its own water was the natural gas processing plants. These processing plants have become more water efficient and now only use a fraction of the water previously required. Both BP America (formerly BP Amoco) and the Chevron Corporation operate gas processing plants in the Basin. BP America reduced its groundwater use for gas production from approximately 90 acre-feet per year to approximately 5.2 acre-feet per year. This was the result of reduced production and the closing of their Whitney Canyon plant. Chevron now processes their natural gas as well as BP America's production from the Whitney Canyon/Carter Creek Unit. Formerly, Chevron used a water intensive natural gas processing procedure, using 310 acre-feet of surface water annually from Woodruff Narrows Reservoir. They have improved their gas processing water efficiency and now only use between 22 and 37 acre-feet per year. These reductions in water use have resulted from some reduced natural gas production, but mainly from improvements in processing and the closing of one processing plant.

Future natural gas production in the Basin is uncertain. Mr. Matthews of Chevron Corporation indicated that the Painter Field Unit is still viable but production has decreased (personal communication, Matthews, 2009). He also indicated the East Painter Field and the Whitney Canyon/Carter Creek Field both have ten years of production remaining. The availability of natural gas reserves, production and processing technology, and energy demands will influence production within the existing Basin fields and the potential development of other natural gas resources in the Basin.

It would seem that the high growth projection for industrial water use of 460 acre-feet annually presented in the 2001 Plan would be very high, unless a new industry requiring large quantities of water was established in the Basin. At this time, it seems a continued low industrial water demand of between 27 and 42 acre-feet annually will continue for the next 10 to 20 years.

It is difficult to predict economic changes and demands for products over an extended planning period. Therefore, to provide a comparison of current industrial water use with potential future industrial development and increased water use, a low growth, mid growth and high growth scenario were developed. The low growth scenario corresponds to the closing of the natural gas processing plants within the Basin by 2030 and no further water intensive industrial development occurring during the planning period. The mid growth scenario estimates a 100% increase in industrial water use and the high growth scenario anticipates a 200% increase in water use (see Figure 6-7). The low growth scenario goes to zero industrial water use by 2030 as the natural gas processing ceases. The mid growth scenario would increase water use to 84 acre-feet annually, and the high growth scenario would increase to 126 acre-feet per year. These are modest increases compared to the projections in the 2001 Plan but provide a point of comparison for looking at potential future water uses.

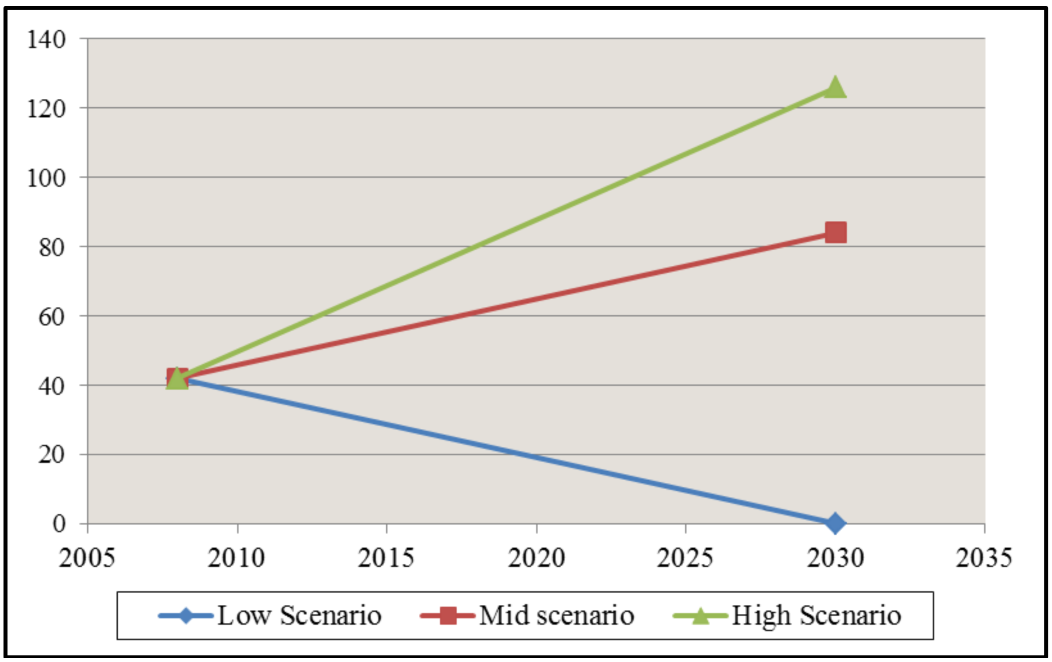


Figure 6-9: Industrial Water Use Projections by Scenario

The ratio of surface water use compared with groundwater use is estimated as the current surface water and groundwater use ratio. Currently, about 5 acre-feet of groundwater is used in natural gas processing and a maximum of 37 acre-feet of surface water is used. The ratio is 88% surface water and 12% groundwater. In the mid growth scenario, about 74 acre feet of surface water and 10 acre-feet of groundwater would be used. Under the high growth scenario, 111 acre-feet of surface water and 15 acre-feet of groundwater would be used. The low growth scenario show that water use goes to zero by 2030 as natural gas production ceases.

6.4 MUNICIPAL AND DOMESTIC WATER USE

Table 6-4 presents municipal consumptive water use for 2009 and projected use for 2030. The information presented in the table was calculated using the 2030 population estimates provided by AIEAD and the average per capita daily demands outlined in Table 6-5. It was assumed that the average gallons per capita per day use values would not change from the numbers reported in the 2009 phone call data with water managers (personal communications, Hansen 2009, Rhodes 2009, and Walker 2009). The average per capita daily demands are calculated for each municipality and rural domestic users.

Table 6-4: Updated Municipal and Rural Domestic Water Use Projections

City/Town	2009 Consumed (AFY)		2030 Consumed (AFY)	
	Surface Water	Groundwater	Surface Water	Groundwater
Evanston	2,408	--	2,610	--
Cokeville	--	665	--	861
Bear River	--	27	93	--
Rural Domestic	--	533	--	465
Total	***2,480***	***1,224***	***2,703***	***1,326***

Table 6-5: Updated Per Capita Water Withdrawal Estimates for 2009 and 2030

Municipality	2009 Est. Population	2030 Est. Population	Avg. Day (gpcpd)	2009 Withdrawals (AFY)		2030 Withdrawals (AFY)	
				Surface Water	Groundwater	Surface Water	Groundwater
Evanston	11,773	12,760	310	4,088	--	4,431	--
Cokeville	501	649	1,334	--	749		970
Bear River	162	557	285	--	52	178	--
Rural Dom.	2,642	2,308	180	--	533	--	465
Total	***15,078***	***16,274***		***4,088***	***1,334***	***4,609***	***1,435***

The average day use values (see Table 6-5) for Evanston and Bear River were collected through personal correspondence with the municipalities. The average day use value listed for the town of Cokeville was calculated from the annual water use data submitted by Cokeville for the 2009 Water System Survey (WDC, 2009).

The 2001 Plan reported the projected municipal water use for the year 2030. Data from the 2001 Plan has been included in Table 6-6 for comparison to the water consumption estimates reported above in Table 6-4. The town of Bear River did not incorporate until after the 2001 report was published. As a result, the town of Bear River's water use was included with rural domestic water use.

Table 6-6: 2001 Bear River Basin Plan Projected Consumptive Water Use Data

Location	High Growth 2030 (AFY)		Low Growth 2030 (AFY)	
	Normal Demand	High Demand	Normal Demand	High Demand
Evanston	4,678	5,885	2,352	2,959
Cokeville	513	516	364	365
Rural Domestic	959	959	504	504
Total	***6,150***	***7,360***	***3,220***	***3,828***

Note: Normal Demand corresponds to an average water year, and High Demand corresponds to dry hydrological conditions.

Data from Table 6-4 shows that municipal consumptive use for 2009 was 3,632 acre-feet per year for surface and groundwater sources combined. The 2030 projected use for surface and groundwater sources from Table 6-4 is 4,029 acre-feet per year. The updated 2030 estimates are similar but slightly higher than the low growth scenario developed for the 2001 Plan (see Table

6-6). The difference could be due in part to the average per capita use values used for each of the municipal systems. These values were calculated from local data, and in some cases, they are higher than those used in the previous plan.

6.5 ENVIRONMENTAL

With little quantitative data available for this sector, the ability to project growth for environmental water uses is limited. There is, however, one component of the environmental water use sector with enough available information to discuss in this chapter. According the USFWS website, Cokeville Meadows National Wildlife Refuge has an approved acquisition boundary of 26,657 acres. To date, however, they have only purchased 8,106 acres. Land acquisition is expected to continue from willing sellers (USFWS, 2011). As a result, it is anticipated that the acreage within the refuge will continue to expand. A communication from the Water Division IV Superintendent (Henderson, 2011) indicated land purchases for the refuge should not change the water use if the USFWS continues to operate the irrigation water rights as they were under agricultural production. However, a "crop" change from hayed ground to more cattails, and expansion to higher dikes, excavated ponds, and longer impoundments has been noted.

6.5.1 ENVIRONMENTAL SUMMARY

Most of the environmental water uses are concentrated in the Central Division, including all of the Basin's instream flow filings (see Figure 5-6). Several efforts have been undertaken to improve Bonneville cutthroat trout habitat in the Central Division. Additionally, Cokeville National Wildlife Refuge is the largest environmental use in the Basin and it is split between the Upper and Central Divisions.

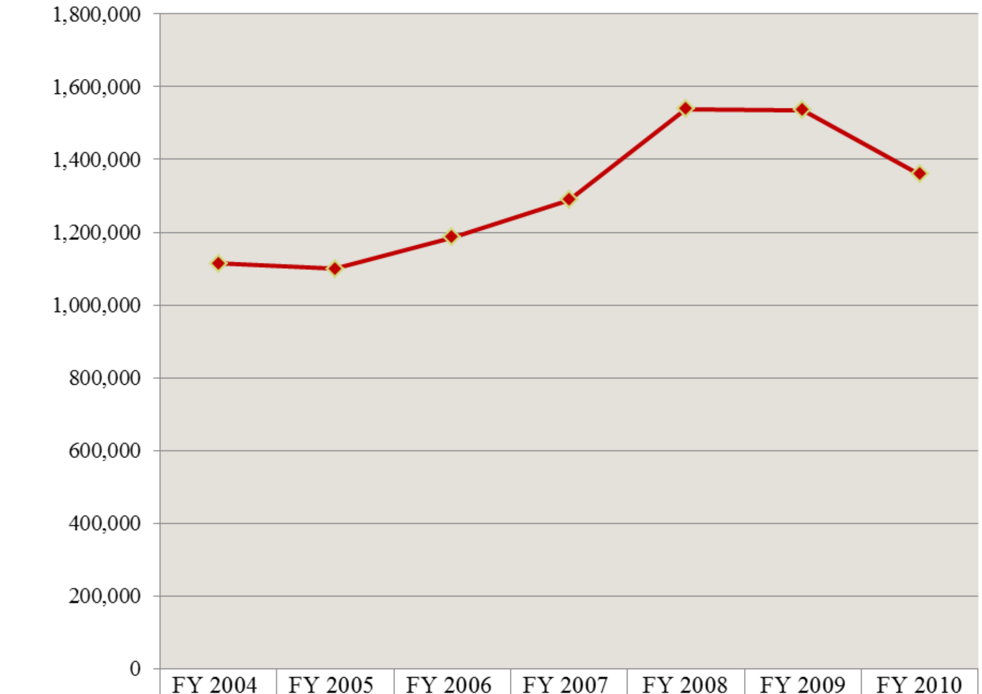
These data help demonstrate the fact that despite limited numerical data, environmental uses are significant in the Bear River Basin and should be considered in any future projects.

6.6 RECREATION

There are several trends that can be reported to explain growth in the recreational sector. Data were collected for the following recreational water use components:

- Leisure and hospitality sales and use tax for Uinta County,
- Duck and goose hunter days,
- State park visitation trends, and
- Phone call survey data from county planners.

One way that recreational water use can be tracked is by looking at sales and use tax data. Figure 6-10 shows the leisure and hospitality sales and use tax data for Uinta County from 2004 to 2010 (AIEAD, 2011). In 2004, the data were restructured from Services to Leisure and Hospitality. As a result of this restructuring, data before 2004 cannot be compared. The data show a positive trend in leisure and hospitality revenues, especially for 2008 and 2009.



	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010
Sales Tax	1,113,722	1,099,524	1,186,187	1,288,900	1,539,451	1,535,878	1,359,205

Figure 6-10: Uinta County Leisure and Hospitality Sales Tax in Dollars

Phone calls were made to the county planners for Lincoln and Uinta Counties. The planners gave further clarification on the peak sales and use tax figures for 2008 and 2009. During that time frame, construction began on a large interstate natural gas pipeline. This resulted in a large transient population in the Evanston area. When the pipeline construction in the Evanston area was completed, many of the workers followed their employer to other states to work on construction in other areas (personal communication, Williams, 2011). However, even with the data from 2008 and 2009 removed, the leisure and hospitality taxes are still trending upward (see Figure 6-11).

Additional data provided by the GFD can be used to track trends in duck and goose hunting (see Chapter 5, section 5.6.3). Graphs of number of hunters show a positive trend (see Figure 6-12).

The Wyoming Department of State Parks and Cultural Resources provided visitor data for walking trails and the visitor center at Bear River State Park (see Chapter 5, section 5.6.1). In general, the number of visitors using the park appears to be decreasing from 1999 to 2009, with an increase in use only in 2002. Given the other trends described above, it is possible that this is a localized phenomenon. Further analysis would be required to determine the reasons for this trend.

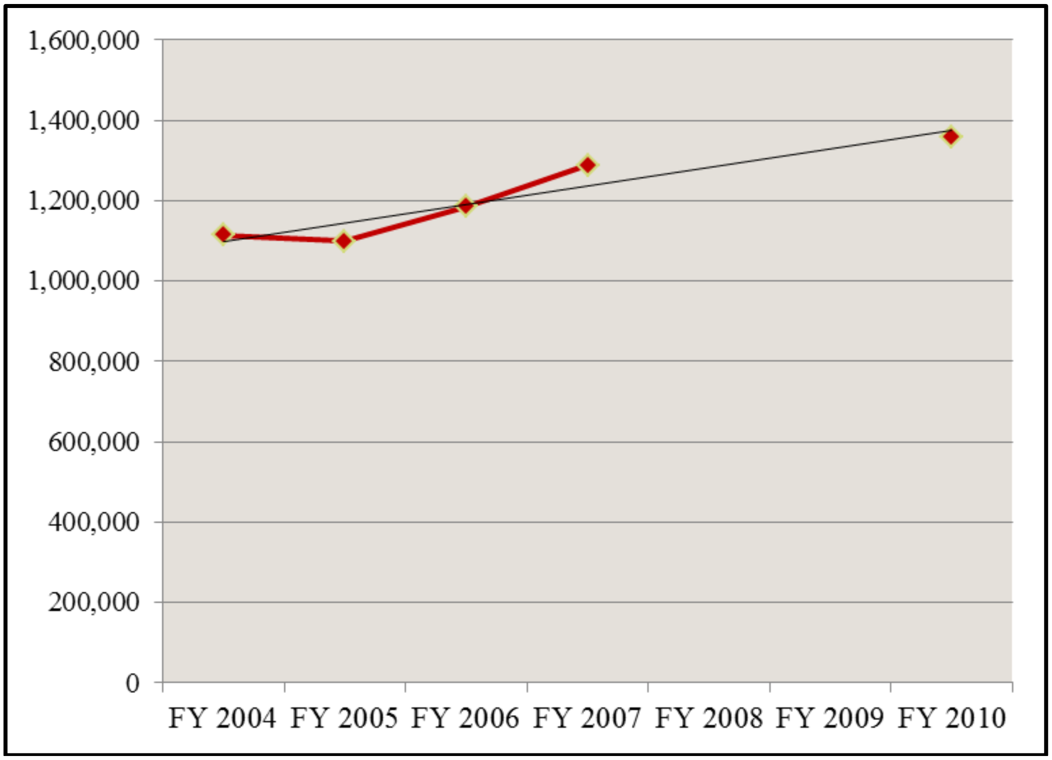


Figure 6-11: Leisure and Hospitality Sales Tax Trends in Dollars

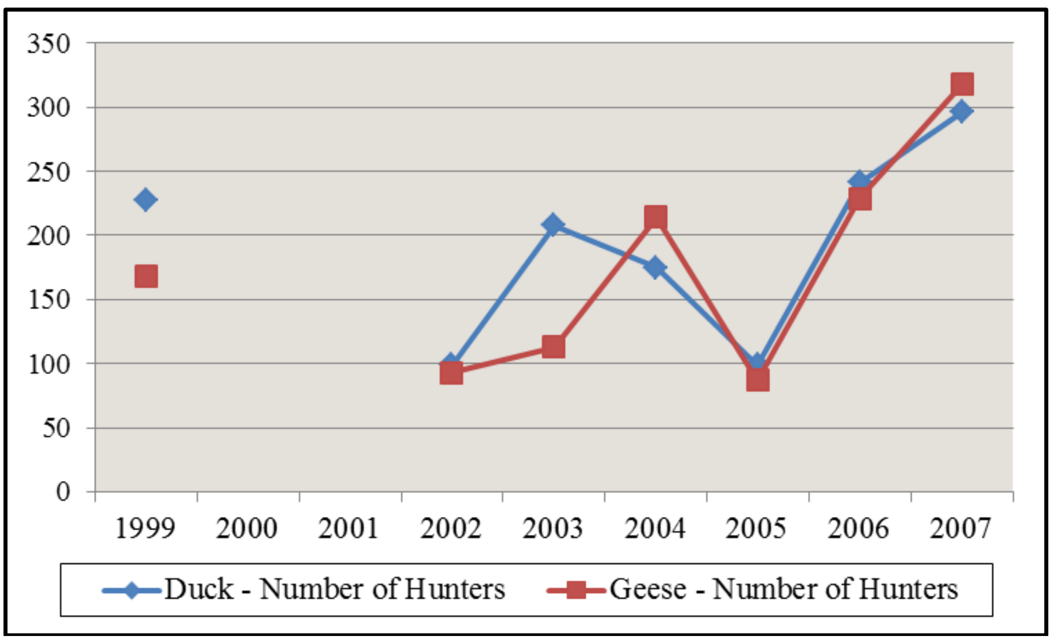


Figure 6-12: Number of Waterfowl Hunters within Bear River Basin

6.6.1 RECREATIONAL WATER USE SUMMARY

Recreational data gathered for this report generally show an upward trend. Specifically, sales tax, duck hunter, and goose hunter data are all trending upward. Visitation data for the park for the same timeframe shows a downward trend.

One conclusion that can be drawn from this data is that recreational uses are important to the Basin and should be considered in any future project completions.

6.7 RESERVOIR EVAPORATION

Reservoir evaporation is not a conventional consumptive use like agriculture or industrial; however, it is considered a consumptive use in these analyses and is the second largest use of water in the Basin. Projected changes to evaporation are difficult to predict due to the variables used to calculate evaporation. The variables are temperature, precipitation, pan evaporation, and the surface acreage of each water body. Temperature, precipitation, and pan evaporation are a part of the climate which is variable and difficult to predict, one variable does not necessarily correlate with or influence the other. In addition, reservoir capacity is dependent on snow pack and precipitation and the operation of the reservoir. Reservoir operation data are very limited in the Basin, which means estimates of water elevations must be assumed, and this can have a large effect on evaporation.

The 2001 Basin Plan estimated the total evaporation to be 5,280 acre-feet. This update estimates 5,361 acre-feet of evaporation for current conditions. To project evaporation over the planning period, temperature, precipitation, and pan evaporation was assumed to remain relatively consistent over the planning period. With this assumption, the reservoir surface acreage is the only variable that changes simplifying the calculations.

6.8 SUMMARY OF PROJECTED WATER USE

Table 6-7 provides a comparison of the consumptive water uses from the 2001 Plan and this update. Much of the decrease in consumptive water use between the 2001 Plan and this update is due to decreases in irrigation water use. Municipal and rural domestic consumptive uses have increased but not enough to offset the decreases in irrigation, industrial and livestock water uses.

A full economic analysis was not undertaken for this update, and therefore, the growth projections follow simple estimates of increased water use to 2030. Additionally, only mid and low growth scenarios are presented. There is no indication of large expansions in agricultural (primarily irrigation) or industrial water use, that would drive large water use increases and help create a high growth potential. Data available from the AIEAD indicates only slow population growth to 2030 and these data were used to develop the growth scenarios. Table 6-8 presents the growth scenarios developed for this update.

Table 6-7: Comparison of Consumptive Water Use between the 2001 Plan and 2011 Update under Normal Hydrologic Conditions

Source	Sector	2011 Basin Plan Update (AFY)	2001 Basin Plan (AFY)
Surface Water	Irrigation	89,309	92,300
	Livestock	345	528
	Industrial	37	310
	Municipal	2,408	2,304
	Reservoir Evaporation	5,361	5,280
	Subtotal	*97,460*	*100,722*
Groundwater	Irrigation	1,900	1,900
	Industrial	5	90
	Municipal	692	505
	Rural Domestic	533	500
	Subtotal	*3,130*	*2,995*
	Total	***100,590***	**103,717**

Table 6-8: Low and Mid Growth Consumptive Water Use Projections to 2030

Source	Sector	Low Growth Scenario (AFY)	Mid Growth Scenario (AFY)
Surface Water	Irrigation	89,309	92,300
	Livestock	345	528
	Industrial	0	74
	Municipal	2,435	2,703
	Reservoir Evaporation	5,361	5,361
	Subtotal	*97,450*	*100,966*
Groundwater	Irrigation	1,900	1,900
	Industrial	0	10
	Municipal	665	861
	Rural Domestic	533	465
	Subtotal	3,098	3,326
	Total	***100,548***	***104,202***

Assumptions used to develop the two growth scenarios are presented below.

<u>Low Growth Scenario:</u>

- Irrigation consumptive water use remains at 89,309 acre-feet even though hydrologic conditions and water availability improve over the projected time period. Additionally, groundwater irrigation use remains the same over the period.
- Livestock consumptive water use remains at 345 acre-feet over the projected time period.
- Industrial consumptive water use goes to zero during the projected time period as the natural gas fields are taken out of production.
- Municipal water use remains flat over the projected time period.
- Reservoir evaporation remains the same over the projected time period.
- Rural domestic consumptive water use remains constant over the projected time period.

<u>Mid Growth Scenario:</u>

- Irrigation consumptive water use increases as hydrologic conditions improve and more water is available over the period to the level estimated in the 2001 Plan (92,300 acre-feet), and groundwater irrigation water use remains at 1,900 acre-feet.
- Livestock numbers increase to levels estimated in the 2001 Plan and consumptive water use returns to 528 acre-feet annually.
- Industrial consumptive water use increases over the time period to 84 acre-feet as production is spurred by improved technologies and increased demand for natural gas. Seventy-four acre-feet of use would be from surface water and 10 acre-feet would be from groundwater.
- Municipal water use increases to match the projected population growth through the projected time period.
- Reservoir evaporation remains constant over the projected time period at 5,361 acre-feet per year.
- Rural domestic consumptive water use decreases from 533 to 488 acre-feet annually as more households are included within cities and towns or as they are included in regional water systems. It should be noted that the estimated population growth for the Basin was greater for cities and towns than for rural areas in the AIEAD analysis.

Figure 6-13 illustrates the projected changes of water use to 2030. Because of the low population growth projections and slow economic development, there is not a significant change in water use over the period. The mid growth projection shows a slight increase in water use above the 2001 Plan estimated water use.

The mid growth scenario may be the most likely water use scenario, since the major decrease in water use between the 2001 Plan and the 2011 update was due to the drought related decrease in agricultural water use. As the drought subsides and water is more available, agricultural water use may return to more normal conditions as shown in the 2001 Plan.

Also of importance are the environmental and recreational water uses. These uses are considered non-consumptive but can play an important role in the economy and in future water use and development. These variables should be further evaluated and considered in any future project planning process.

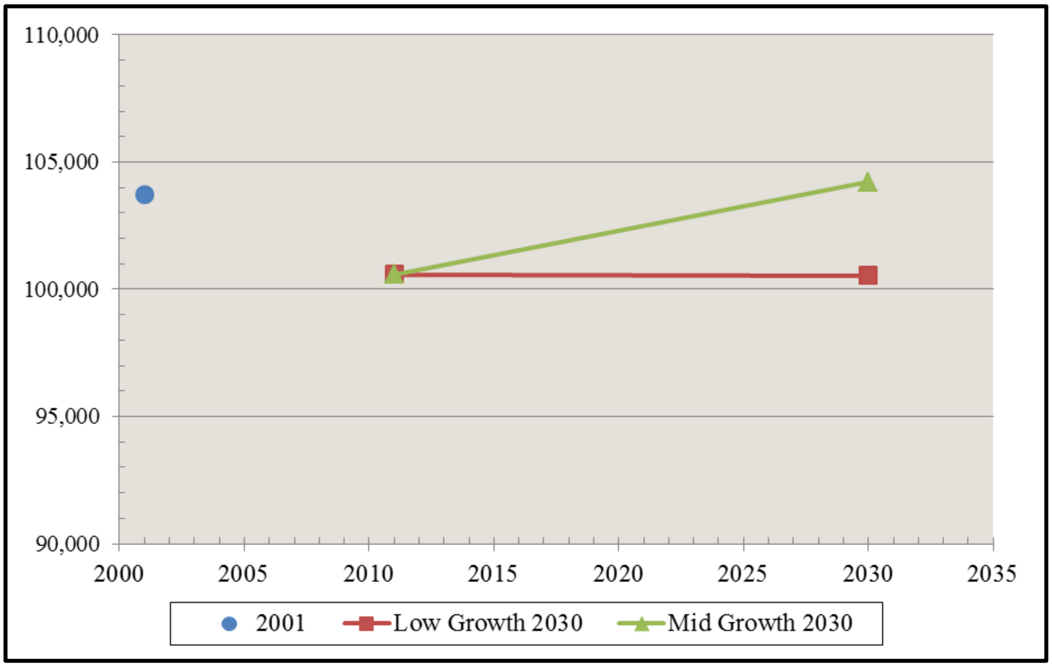


Figure 6-13: Consumptive Water Use Projections for the Low and Mid Growth Scenarios

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