6. Water Demand

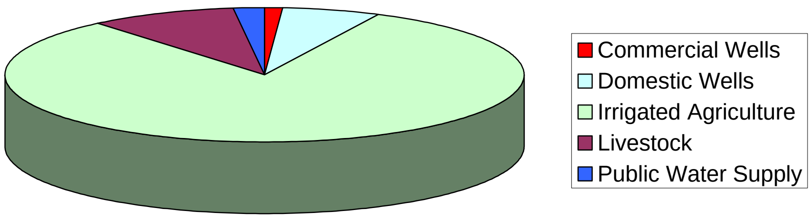
This section focuses on the second regional water planning question: What is the region's current and projected future demand for water? To address this question, current and historical water uses within the Southwest Region have been evaluated and are presented in Section 6.1. In order to estimate future water demand, it is important to understand demographic and economic trends in the region, and these are presented in Section 6.2. Based on current and historical uses and demographic and economic trends, projected future water demands for the region are presented in Section 6.3.

6.1 Present Uses

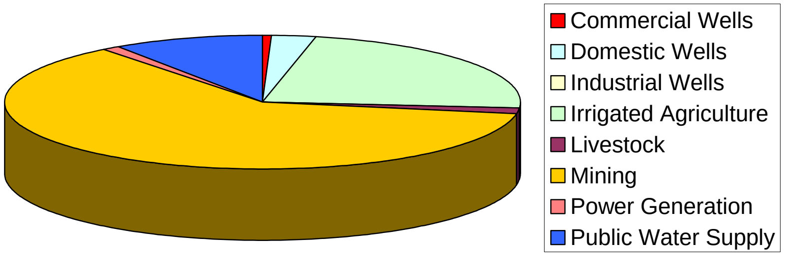
Present and historical water use (Figures 6-1 and 6-2, respectively) was determined based on information from the OSE, which tracks water use in New Mexico, supplemented with information contributed by water users within the region. OSE tracks withdrawals, depletions, and return flow in several categories, including public water supply and self-supplied domestic, irrigated agriculture, self-supplied livestock, self-supplied commercial, industrial, mining, power, and reservoir evaporation. Table 6-1 shows withdrawals and depletions in each category for the years 1975, 1980, 1985, 1990, 1995, and 2000 based on the OSE inventories for those years, and Figure 6-2 shows withdrawals for the same years (Sorensen, 1976; Sorensen, 1981; Wilson, 1986; Wilson, 1992; Wilson and Lucero, 1997; Wilson et al., 2003). No data from before 1975 are available. Appendix E1 provides the same data by county.

Over the years, the OSE has made a few changes in the way that water demand is categorized and reported, including:

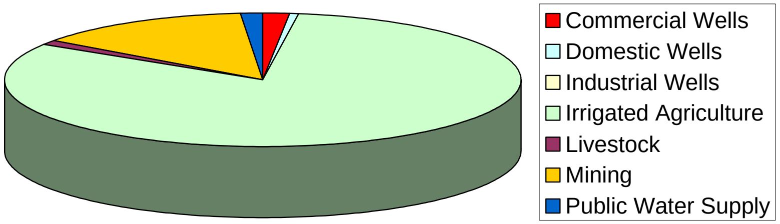
- Fish and wildlife and recreation were previously (1975 through 1985) reported as separate categories, but are now included in the commercial category.
- Rural, urban, and military uses were separate categories until 1990, when they were replaced with the public water supply and self-supplied domestic categories.
- The OSE stopped reporting stock pond evaporation (which was previously a separate category) after 1985.



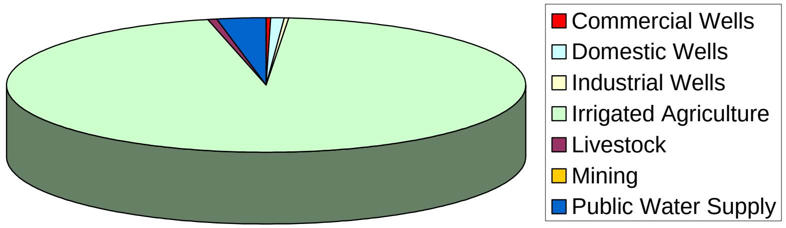
Catron County



Grant County



Hidalgo County



Luna County

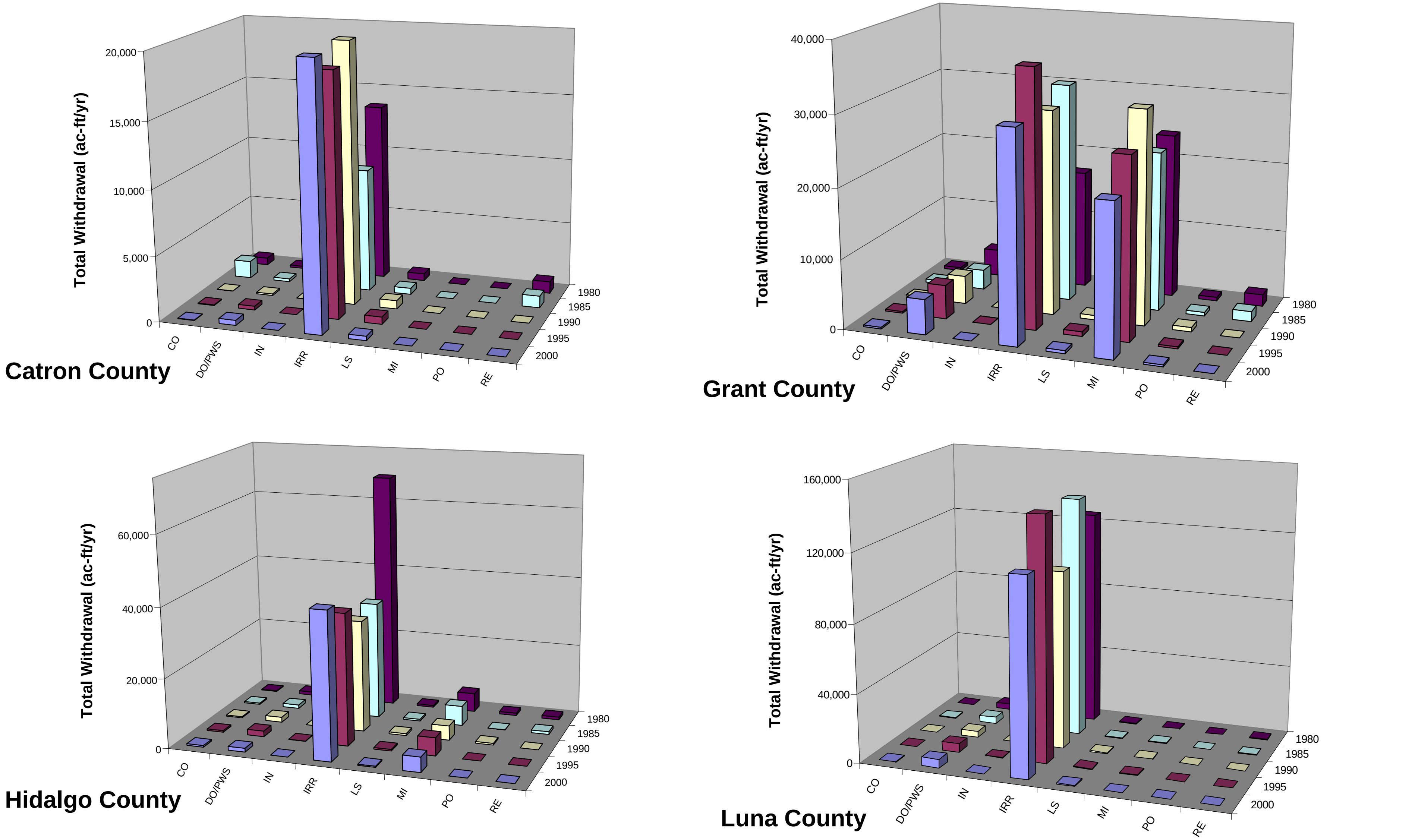
Figure 6-1

SOUTHWEST NEW MEXICO REGIONAL WATER PLAN

Current Water Use

Daniel B. Stephens & Associates, Inc.

5/25/05



CO	= Commercial (self-supplied)	LS	= Livestock (self-supplied)
DO/PWS	= Self-supplied domestic/public water supply	MI	= Mining (self-supplied)
IN	= Industrial (self-supplied)	PO	= Power (self-supplied)
IRR	= Irrigated agriculture	RE	= Reservoir Evaporation

SOUTHWEST NEW MEXICO REGIONAL WATER PLAN

Historical Withdrawals

Figure 6-2

Daniel B. Stephens & Associates, Inc.

5/25/05

Table 6-1. Water Use in the Southwest New Mexico Water Planning Region, 1975 Through 2000

Use Category	Withdrawal (acre-feet)		Depletion (acre-feet)		Return Flow (acre-feet)		Total Withdrawal (acre-feet)	Total Depletion (acre-feet)	Total Return Flow (acre-feet)
	SW	GW	SW	GW	SW	GW			
2000 Water Year									
Commercial (self-supplied)	8	973	8	861	0	112	981	869	112
Domestic/public supply	176	11,461	88	7,216	88	4,245	11,637	7,304	4,333
Industrial (self-supplied)	0	72	0	56	0	16	72	56	16
Irrigated agriculture	76,645	129,256	21,102	81,125	55,543	48,131	205,901	102,227	103,674
Livestock (self-supplied)	502	993	502	993	0	0	1,495	1,495	0
Mining (self-supplied)	0	25,832	0	21,330	0	4,502	25,832	21,330	4,502
Power (self-supplied)	0	280	0	280	0	0	280	280	0
Reservoir evaporation	0	0	0	0	0	0	0	0	0
Totals	77,331	168,866	21,700	111,860	55,631	57,006	246,197	133,561	112,637
1995 Water Year									
Commercial (self-supplied)	8	916	8	558	0	358	924	566	358
Domestic/public supply	126	11,717	63	6,355	63	5,362	11,843	6,418	5,425
Industrial (self-supplied)	0	143	0	89	0	54	143	89	54
Irrigated agriculture	77,738	156,245	19,383	93,418	58,355	62,827	233,983	112,801	121,182
Livestock (self-supplied)	760	1,339	760	1,339	0	0	2,099	2,099	0
Mining (self-supplied)	0	31,277	0	25,547	0	5,730	31,277	25,547	5,730
Power (self-supplied)	0	283	0	283	0	0	283	283	0
Reservoir evaporation	0	0	0	0	0	0	0	0	0
Totals	78,632	201,920	20,214	127,589	58,418	74,331	280,552	147,803	132,749
1990 Water Year									
Commercial (self-supplied)	8	709	8	447	0	262	717	455	262
Domestic/public supply	126	9,345	63	5,000	63	4,345	9,471	5,063	4,408
Industrial (self-supplied)	0	172	0	134	0	38	172	134	38
Irrigated agriculture	57,285	127,748	11,741	76,935	45,544	50,813	185,033	88,676	96,357
Livestock (self-supplied)	809	1,533	809	1,531	0	2	2,342	2,340	2

Note: A breakdown of water use by county is provided in Appendix E1.
Source: Wilson et al., 2003. See note at the end of the table for general description of the procedures used to obtain these estimates.

SW = Surface water
GW = Groundwater

Table 6-1. Water Use 1975 Through 2000, Southwest New Mexico Water Planning Region
Page 2 of 3

Use Category	Withdrawal (acre-feet)		Depletion (acre-feet)		Return Flow (acre-feet)		Total Withdrawal (acre-feet)	Total Depletion (acre-feet)	Total Return Flow (acre-feet)
	SW	GW	SW	GW	SW	GW			
1990 Water Year (continued)									
Mining (self-supplied)	0	35,015	0	28,753	0	6,262	35,015	28,753	6,262
Power (self-supplied)	0	1,123	0	1,123	0	0	1,123	1,123	0
Reservoir evaporation	0	0	0	0	0	0	0	0	0
Totals	58,228	175,645	12,621	113,923	45,607	61,722	233,873	126,544	107,329
1985 Water Year [a]									
Commercial	1,752	820	962	444	790	376	2,572	1,406	1,166
Domestic/Public Supply	0	7,890	0	3,938	0	3,952	7,890	3,938	3,952
Industrial	0	10	0	5	0	5	10	5	5
Irrigated Agriculture	70,195	144,220	14,702	69,118	55,493	75,102	214,415	83,820	130,595
Livestock	1,049	1,122	1,049	1,115	0	7	2,171	2,164	7
Minerals	10,087	18,885	4,156	14,743	5,931	4,142	28,972	18,899	10,073
Power	0	556	0	556	0	0	556	556	0
Reservoir Evaporation	3,373	0	3,373	0	0	0	3,373	3,373	0
Totals	86,456	173,503	24,242	89,919	62,214	83,584	259,959	114,161	145,798
1980 Water Year [a]									
Commercial	1,015	570	984	355	31	215	1,585	1,339	246
Domestic/Public Supply	0	8,637	0	4,309	0	4,328	8,637	4,309	4,328
Industrial	0	10	0	6	0	4	10	6	4
Irrigated Agriculture	37,680	186,190	12,650	116,730	25,030	69,460	223,870	129,380	94,490
Livestock	1,108	1,140	1,108	1,133	0	7	2,248	2,241	7
Minerals	9,936	19,683	4,019	15,248	5,917	4,435	29,619	19,267	10,352
Power	0	1,243	0	1,243	0	0	1,243	1,243	0
Reservoir Evaporation	3,622	0	3,622	0	0	0	3,622	3,622	0
Totals	53,361	217,473	22,383	139,024	30,978	78,449	270,834	161,407	109,427

Note: A breakdown of water use by county is provided in Appendix E1.
Source: Wilson et al., 2003. See note at the end of the table for information regarding the procedures used to obtain these estimates.
[a] Water use categories originally reported by OSE in 1975, 1980, and 1985 revised to reflect current OSE reporting categories

SW = Surface water
GW = Groundwater

Table 6-1. Water Use 1975 Through 2000, Southwest New Mexico Water Planning Region
Page 3 of 3

Use Category	Withdrawal (acre-feet)		Depletion (acre-feet)		Return Flow (acre-feet)		Total Withdrawal (acre-feet)	Total Depletion (acre-feet)	Total Return Flow (acre-feet)
	SW	GW	SW	GW	SW	GW			
1975 Water Year [a]									
Commercial	802	0	802	0	0	0	802	802	0
Domestic/Public Supply	0	7,978	0	3,984	0	3,994	7,978	3,984	3,994
Industrial	0	162	0	97	0	65	162	97	65
Irrigated Agriculture	30,730	229,270	13,490	133,430	17,240	95,840	260,000	146,920	113,080
Livestock	1,176	1,174	1,176	1,174	0	0	2,350	2,350	0
Mining	9,393	15,553	4,978	10,921	4,415	4,632	24,946	15,899	9,047
Power	0	336	0	336	0	0	336	336	0
Reservoir Evaporation	15,852	0	15,852	0	0	0	15,852	15,852	0
Totals	57,953	254,473	36,298	149,942	21,655	104,531	312,426	186,240	126,186
1975 to 2000 Average [a]									
Commercial	599	665	462	444	137	220	1,263	906	357
Domestic/Public Supply	71	9,505	36	5,134	36	4,371	9,576	5,169	4,407
Industrial	0	95	0	64	0	30	95	64	30
Irrigated Agriculture	58,379	162,155	15,511	95,126	42,868	67,029	220,534	110,637	109,896
Livestock	901	1,217	901	1,214	0	3	2,117	2,115	3
Mining	4,903	24,374	2,192	19,424	2,711	4,950	29,277	21,616	7,661
Power	0	637	0	637	0	0	637	637	0
Reservoir Evaporation	3,808	0	3,808	0	0	0	3,808	3,808	0
Totals	68,660	198,647	22,910	122,043	45,751	76,604	267,307	144,953	122,354

Note: As outlined by Wilson et al. (2003), these water use values are a combination of measured and estimated values. Statewide, the portion of withdrawals that are directly measured are:

Commercial:	67.96%	Livestock	21.14
Domestic:	0.0	Mining	99.98
Public water supply:	96.00	Power	99.98
Industrial	99.94	Reservoir evaporation	95.77
Irrigated agriculture	52.54		

Note: A breakdown of water use by county is provided in Appendix E1.

SW = Surface water
GW = Groundwater

[a] Water use categories originally reported by OSE in 1975, 1980, and 1985 revised to reflect current OSE reporting categories

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The OSE data include only the amount of water that is used by people or is indirectly used through a man-made structure (i.e., reservoir evaporation) and thus do not include natural riparian consumption. Estimates for riparian consumption are provided in the water budget discussed in Section 7. Information for each of the current OSE categories is summarized and discussed in Sections 6.1.1 through 6.1.5.

Water use data were also obtained from selected communities in the region. These data include pumped and metered water quantities for the years of 2000 through 2002 (Appendix E2). This information was used to help develop the water use projections presented in Section 6.3. Water use in each surface water and groundwater basin is also discussed in Section 7.

6.1.1 Public Water Supply and Self-Supplied Domestic

These two OSE categories include domestic use from both public water supplies that serve whole communities and private domestic wells that serve only one or a few residences, as discussed in Sections 6.1.1.1 and 6.1.1.2, respectively.

6.1.1.1 Public Water Supply

This category includes community water systems that rely on surface water and/or groundwater diversions other than private domestic wells and that consist of common collection, treatment, storage, and distribution facilities operated for the delivery of water to multiple service connections (Wilson et al., 2003). Water used for the irrigation of self-supplied golf courses, playing fields, and parks, or water used to maintain the water level in ponds and lakes owned and operated by a municipality or water utility is also included in this category. Inclusion of these uses allows comparison of the total amount of water used by the system to the water rights owned by these public water suppliers.

Information on public water systems in the four counties was compiled from the New Mexico Rural Water Association records and is summarized in Appendix E2, Tables E2-1 through E2-4. As indicated on these tables, 37 public water systems in the planning region are registered with the New Mexico Rural Water Association. The public water systems listed include both incorporated municipalities and smaller mutual domestic associations, such as mobile home communities.

The water use details in Appendix E2 are summarized in Table 6-2. All of the municipalities listed rely totally on groundwater, and the amounts shown on Table 6-2 represent total system pumping (or total withdrawals). To aid in assessing seasonal variability, available information on monthly withdrawals (well pumping), based on metered water diversions for each municipality, is shown in Appendix E2. As indicated by the figures in Appendix E2, most of the municipalities show increased diversions in the summer months, corresponding to increased outdoor watering.

Table 6-2. Summary of Municipal and Per Capita Water Demand

Location	Estimated Population Served [a]	Water Pumped				Estimated Per Capita Demand (gpcd)		
		2001		2002				
		M gal	ac-ft	M gal	ac-ft	2000 [b]	2001	2002 [c]
Catron County								
Reserve	318	25.6	78.6	28.7	88.1	NA	221	247
Grant County								
Bayard	2,536	106.3	326.2	109.7	336.6	126	115	118
Santa Clara	1,944	82.0	251.6	74.6	228.9	117	116	105
Silver City [d]	13,700	928.0	2,847.5	918.8	2,819.2	234	186	184
Hidalgo County								
Lordsburg	3,300	NA	NA	254.5	780.9	216	NA	211
Luna County								
Columbus	1,765	NA	NA	67.9	208.3	126	NA	105
Deming	16,000	1,310.0	4020.5	1,328.0	4,074.8	223	224	227
Total	39,563	2,451.9	7,524.4	2,782.2	8,536.9	---	---	---

[a] Estimated population in the water service area may differ from the estimated population in the incorporated community discussed in Section 6.2.
[b] Source: Wilson, 2001
[c] Gallons pumped based on water system records supplied to Engineers Inc., divided by population served.
[d] Silver City's water system provides bulk water to Arenas Valley, Pinos Altos, Rosedale, and Tyrone.

M gal = Million gallons
ac-ft = Acre-feet
gpcd = Gallons per capita per day
NA = Not available

Table 6-3 shows the overall per capita demand for each county based on the total diversions for all public water supply systems presented in Appendix E2.

Table 6-3. Summary of Total Diversions and Per Capita Demand for Public Supply Wells in 2000

County	Municipal Well Diversions (ac-ft/yr)	Population Served by Public Wells	Per Capita Demand	
			(ac-ft/yr)	(gpd)
Catron	150	860	0.17	156
Grant	3,920	21,860	0.18	160
Hidalgo	880	3,940	0.22	199
Luna	4,320	18,250	0.24	211

ac-ft/yr = Acre-feet per year gpd = Gallons per day

6.1.1.2 Self-Supplied Domestic Wells

This category includes self-supplied residences, which may be single-family dwellings or multi-family dwellings, with wells permitted by the OSE under NMSA Section 72-12-1 (Section 4.4.1; Appendix C).

Diversions from domestic wells were estimated based on the 2000 census minus the population served by municipal wells (as reported by Wilson et al. [2003] and modified by Engineers Inc.) and multiplied by a per capita demand of 0.1 acre-foot per person (90 gpcd). This per capita demand value is based on the OSE (Wilson et al., 2003) estimates of average domestic use, which range between 80 and 100 gpcd. The growth rate for residential, commercial and municipal uses was equal, and therefore, the self-supplied and public supply sectors were projected to grow at the same rate. The OSE report also provides estimates of total domestic use (self-supplied domestic) in each county. Comparison of DBS&A's estimates to the OSE's for each county in the Southwest Region (Table 6-4) reveals that, overall, DBS&A's estimates are 8 percent higher than the OSE estimates. The difference is due to the revised estimates for the population served by public water supplies to adjust for some overestimates in the OSE report (Wilson et al., 2003). For instance, in Grant County, the OSE report lists both the Central Water System and the Santa Clara Village, which are actually the same system, thus effectively doubling the estimated population served by that system.

Actual diversions from domestic wells may be higher in the Gila and San Francisco Basins, where water rights have reportedly been transferred to domestic wells for extensive gardening (Howard Hutchison, personal communication with John Burkstaller, April 2005).

Table 6-4. Comparison of Estimates of Domestic Well Diversions by County

Estimate Source	Estimated Domestic Well Diversions (ac-ft/yr [a])				
	Catron	Grant	Hidalgo	Luna	Total
DBS&A	268	923	200	676	2,067
OSE [b]	224	778	193	717	1,913
Difference	44	144	6	-41	154
Difference (%)	20	19	3	-6	8

[a] Unless otherwise noted [b] Wilson et al., 2003

6.1.2 Self-Supplied Commercial, Industrial, Mining, and Power

Wilson et al. (2003) define these categories as follows:

- Commercial includes self-supplied businesses (e.g., motels, restaurants, recreational resorts, and campgrounds) and institutions. Self-supplied golf courses that are not watered by a public water supply are also included, as are off-stream fish hatcheries engaged in the production of fish for release.

- Industrial includes self-supplied enterprises engaged in the processing of raw materials or the manufacturing of durable or non-durable goods. Water used for the construction of highways, subdivisions, and other construction projects is also included.

- Mining includes self-supplied enterprises engaged in the extraction of minerals occurring naturally in the earth's crust, including (1) solids, such as coal and smelting ores, (2) liquids, such as crude petroleum, and (3) gases, such as natural gas. Water used for drilling and/or processing at a mine site is also included.

- Power includes all self-supplied power-generating facilities. Water used in conjunction with coal mining operations that are contiguous with a power-generating facility that owns and/or operates the mines is also included.

As shown in Table 6-1, the self-supplied commercial, industrial, and power categories are a relatively small part of the planning region's water demand, although water use in the power sector is expected to increase in the future (Section 6.3). The higher commercial water uses shown in 1975, 1980, and 1985 are due to the inclusion of fish and wildlife and recreation water use estimates, which were reported for those years but are no longer estimated. The mining category in Grant County has been and will likely continue to be a major component of the water demand, as discussed below. In addition, the Mogollon Mining District in Catron County could reopen with the increase in the price of silver and gold.

Copper mining and processing in Grant County has generally taken place in primarily two areas: Tyrone, south of Silver City, and at Chino/Santa Rita, near Hurley. Water use at the mines has typically involved processing, dust control, mine dewatering, heap-leach operations, and slurry disposal of tailing materials. Phelps Dodge Mining Company (Phelps Dodge) provided information regarding water use and rights at its mines in the planning region, as summarized in Sections 6.1.2.1 through 6.1.2.4.

6.1.2.1 Chino Mine

The Chino Mines Company water rights are all based on permits in the Mimbres River Basin. The water rights information provided by Phelps Dodge (2003a) was compared, by permit number, to the data in the OSE's WATERS database, and in some instances, the WATERS information was different or missing. According to Phelps Dodge, Chino Mines Company currently retains 25,306 acre-feet of water rights in the Mimbres Valley (groundwater) Basin for use at the mine and processing facilities.

Due to reductions in mining and processing of copper ore, reported water diversions at the Chino facility has been declining in the past few years (Phelps Dodge, 2003a):

- 1999: 19,104 acre-feet
- 2000: 17,229 acre-feet
- 2001: 11,091 acre-feet
- 2002: 4,947 acre-feet

The reduction in production was in response to market conditions. As market conditions continue to improve, it is expected that use of water at the facility will approach that of more typical operation years, such as 1999.

Chino Mines Company also retains surface water diversion rights, currently in the amount of 12,138 acre-feet. Some of these surface waters may be diverted in the future for processing once the James Canyon dam/reservoir project is completed. The James Canyon reservoir will hold about 950 acre-feet of water at its normal pool elevation (URS Greiner-Woodward Clyde, 2000).

As part of ore processing, water is stored in various reservoirs or tailing ponds at the Chino facility. The mine is permitted by the OSE to store up to 4,585 acre-feet of water in their processing and tailing ponds. Based on data provided by Chino Mines Company, the water being stored is about 1,680 acre-feet, or 37 percent of the maximum.

6.1.2.2 Cobre Mine

The Cobre Mining Company division of Phelps Dodge also has permitted water rights for mining and ore processing. Based on data provided by Chino Mines Company, the annual permitted water use at the Cobre Mine is 4,753 acre-feet (Phelps Dodge, 2003b). Water use at the Cobre Mine has also declined recently due to ore production curtailment:

- 1999: 796.7 acre-feet
- 2000: 359.8 acre-feet
- 2001: 57.9 acre-feet
- 2002: 54.1 acre-feet

6.1.2.3 Tyrone Mine

Water use at the Tyrone Mine is obtained from surface diversion of the Gila River, which is pumped into Bill Evans Lake, and from wells that are in both the Gila-San Francisco and Mimbres Valley Basins. The permitted diversions are (Phelps Dodge, 2003c):

- Gila River: About 9,425 acre-feet
- Gila-San Francisco Basin: 1,309 acre–feet
- Mimbres Valley Basin: 2,090 acre-feet

The total permitted annual diversion at the Tyrone Mine is about 12,825 acre-feet. The total amount permitted for consumptive use at the mine is 8,137 acre-feet, not including 1,272 acre-feet of water (consumptive use) that has been temporarily leased to a local rancher in the Gila River Valley. The reported water diversions for 2002 at Tyrone were about 5,021 acre-feet (Phelps Dodge, 2003c).

6.1.2.4 Hidalgo Smelter

Phelps Dodge also has permitted water rights in Hidalgo County, where they formerly operated a copper smelter. The smelter was closed in 1999 and water use at the facility has dropped considerably. The primary current water uses at the plant are maintenance and environmental compliance. The permitted, consumptive water rights for the plant are reportedly 6,648.8 acre-feet (Phelps Dodge, 2003c). An additional 340 acre-feet of water has been permitted for the company town site of Playas.

6.1.3 Self-Supplied Livestock

Livestock water use will vary from year to year in response to fluctuating numbers of livestock as market and forage conditions dictate. Limited data were available regarding livestock numbers for the Southwest Region. The total withdrawals and depletions for self-supplied livestock in the region, as presented in the last three OSE water use reports (Wilson, 1992; Wilson and Lucero, 1997; Wilson et al., 2003), are provided in Table 6-5. The values presented in Table 6-5 include withdrawals (also referred to as diversions) and depletions of both surface water and groundwater.

Table 6-5. Livestock Water Use

Reporting Year	Total Withdrawal (acre-feet)				Total Depletion (acre-feet)			
	Catron	Grant	Hidalgo	Luna	Catron	Grant	Hidalgo	Luna
1990	640	626	557	518	640	626	556	517
1995	557	654	441	447	557	654	441	447
2000	332	419	320	424	332	419	320	424

Virtually all the livestock in the region are cattle. The number of cattle in the four counties was estimated from New Mexico Agricultural Statistics (NMASS, 2003) (Table 6-6).

Table 6-6. Estimated Number of Cattle by County

Year	Catron	Grant	Hidalgo	Luna
2000	28,050	36,000	27,000	37,000
2001	24,000	36,000	27,000	34,000

Source: NMASS, 2003

Using the water depletion values from the OSE and cattle numbers for 2000, the water consumption per animal can be estimated, assuming that other livestock such as sheep and horses are minimal in number compared to cattle.

- Catron: 10.6 gallons per day per head (gpd/head)
- Grant: 10.4 gpd/head
- Hidalgo: 10.6 gpd/head
- Luna: 11.1 gpd/head

These per-head or per-capita consumption rates are consistent with the values presented as typical in Section 5.6 of the OSE's 2000 water use report (Wilson et al., 2003). Livestock use represents a relatively small proportion (about 1 percent) of the total depletions in the region.

Much of the livestock grazing in Grant and Catron Counties is done on federally owned forest land. Local ranchers have allotments from the U.S. Forest Service within the Gila National Forest area. In order to support grazing in the National Forest, wells, springs, and dirt tanks have been developed by the ranchers. The U.S. Forest Service has 745 recorded but not declared water use sites in the Gila National Forest, including wells, springs, and stock tanks (USFS, 2003a). Some of the sites have first use dates of around 1880. The water use breakdown (in acre-feet) at these sites is:

- Domestic: 25
- Irrigation: 40
- Stock watering: 917.15
- Recreation: 93
- Total: 1,074.60

As indicated, the majority of the water use is for stock watering. Most of the sites are springs and stock tanks that have declared water rights, typically ranging from 0.5 to 4 acre-feet. The springs and stock tanks typically respond to wet season runoff and often evaporate to very low or no volumes in the late spring. Because most of these water use sites are in the Gila-San Francisco Basin, the development of a spring or construction of a dirt stock tank that is not on the declared list can only be done if a declared site is retired and/or breached.

The USFS also maintains a list of wells within the Gila-San Francisco watershed. Currently they have 61 wells listed in that basin (USFS, 2003b).

6.1.4 Irrigated Agriculture

Irrigated agriculture is one of the largest water uses in the Southwest Region, particularly in Catron, Hidalgo, and Luna Counties. The water used for agriculture irrigates a variety of crops, ranging from primarily hay in Catron, Grant, and Hidalgo counties to a wide variety of vegetables, grains, and hay crops in Luna County.

The water use for irrigated agricultural is obtained from both surface water and groundwater sources. Luna and most of Hidalgo counties rely on groundwater sources, while irrigation in Catron, Grant, and northwest Hidalgo counties is based primarily on surface diversion from the Gila, San Francisco, and Mimbres Rivers.

Where legal decrees exist, the number of acres that can legally be irrigated are established in the decree (Section 4). However, a review of recent data indicates that the number of acres that are being or have recently been actually irrigated (referred to herein as *irrigated* land) is less than the reported total acreage that legally can be irrigated (i.e., holds water rights), referred to herein as *irrigable* land. This deviation appears to be related to variable and poor agricultural market conditions, the lack of surface water for diversion, and the transfer of agricultural water rights to municipalities and power plants. A localized reversal of this trend appears to be ongoing as the water rights owned by Phelps-Dodge’s Hidalgo Smelter in southern Hidalgo County are being put back into agricultural use.

Sections 6.1.4.1 through 6.1.4.4 discuss the reported water use and irrigated acres by county in the Southwest Region, as reported by several researchers. Table 6-7 compares total irrigated crop acreage data from three of the major data sources for irrigated agricultural data: the OSE, the WRRI (Lansford et al., 1991, 1992, 1993, 1995, 1996, 1997), and the New Mexico Agricultural Statistics (NMASS). The total cropland acreage provided in the WRRI reports is based on the acreages reported by the U.S. Bureau of Indian Affairs (for Indian lands) and the U.S. Bureau of Reclamation (for Reclamation projects), acreages set forth in adjudications and court decrees and in State Engineer licenses and permits, and, where these data are lacking, recent aerial photography.

As shown in Table 6-7, differences between OSE and WRRI data are generally less than 1 percent, although in a few cases, significant differences occur that are difficult to reconcile, such as the difference between total irrigated acreage reported in Catron County in 1995 by the two agencies. The NMASS consistently under-reports total irrigated acreages relative to the other two data sources, in part because, as a national agricultural data service, it does not include in its crop totals locally important crops such as chile and other vegetable cash crops.

Table 6-7. Total Irrigated Acreage by County, 1995

County	Total Acres Irrigated in 1995		
	OSE (Wilson et al, 1997)	WRRI (Lansford et al., 1996)	NMASS (2003)
Catron	1,489	2,315	1,400
Grant	3,327	3,315	1,100
Hidalgo	10,513	10,640	5,800
Luna	45,135	45,135	19,300

The *New Mexico Stockman* (a publication of the New Mexico Cattle Growers Association) was also used as a reference for cropping patterns and irrigated acreage totals, although 1995 data were not available to compare directly with the other data sources listed above. Overall, the acreages reported in the New Mexico Stockman in 2000 and 2001 are similar to those reported by the other data sources for those years. The reference sources and data are presented in more detail in Appendix E3. In addition to the reported acreages, the total withdrawals estimated by the OSE for irrigated agriculture, as reported by the OSE, are shown on Figure 6-2, and withdrawals and depletions are summarized in Table 6-1.

6.1.4.1 Catron County

According to conversations with ranchers and farmers in Catron County (Appendix E3), most of the agriculture water use is for hay crops, including alfalfa hay, meadow hay and all other hay types. In the San Francisco and Tularosa River basins, water diverted from the rivers for irrigation is distributed by lateral ditches that are subsequently connected by gated entrances to farmland. The water is distributed based on a system of timed shares rather than by acres irrigated.

Table 6-8 summarizes the irrigated acres and use of surface water and groundwater as reported by the OSE (Sorenson, 1976, 1981; Wilson, 1986, 1992; Wilson and Lucero, 1997; Wilson et al., 2003) for Catron County.

Table 6-8. Irrigation Surface Water and Groundwater Use in Catron County

Reporting Year	Total Acres Irrigated	Total Withdrawal (acre-feet)	Total Depletion (acre-feet)
1975	NA	4,870	2,060
1980	NA	13,660	2,630
1985	NA	9,505	1,300
1990	1,541	20,022	3,033
1995	1,489	18,486	2,733
1999	1,937	19,963	2,934

NA = Information not available

Acreages reported in the New Mexico Agricultural Statistics (NMASS, 2003) and the *New Mexico Stockman* (2001, 2002) vary slightly from those presented by the OSE. Based on these sources, the total irrigable land (acreage with water rights) is about 4,000 acres while the land actually irrigated for hay crops in 2000 and 2001 ranged from about 2,300 to 2,500 acres. The reason for this discrepancy is likely due to economics: the costs of pumping water and producing the crop have increased sufficiently to remove adequate incentive to farm all the land available at all times.

According to ranchers and farmers along the San Francisco River (Appendix E3), the amount of land that is irrigated has decreased in recent years due to low flows in the river and the lateral ditches. Thus, the irrigated acres in Catron County will likely range from about 2,000 acres (actual irrigated acreage as reported by the OSE [Wilson et al., 2003], New Mexico Agricultural Statistics Service [NMASS, 2003], and *New Mexico Stockman* [2001, 2002]) to about 4,000 acres (the estimated maximum permitted acreage). The total depletions due to irrigation fluctuate some from year to year, but have generally remained fairly constant over the past 15 years.

6.1.4.2 Grant County

Cropland in Grant County is irrigated by a combination of surface water and groundwater. According to the *New Mexico Stockman* (2001, 2002) the distribution of irrigable land in Grant County is 3,690 acres of groundwater irrigation rights, 1,840 acres of surface water irrigation rights, and 1,420 acres of combined water rights, for a total of 6,950 acres. This total irrigable acreage is the same as that reported in the New Mexico Agricultural Statistics (NMASS, 2003) and similar to the 7,340 acres of prime and important farmland shown on the Soil Conservation Service (SCS) *Important Farmlands Map* (1983).

The actual cropland that was apparently irrigated appears to vary somewhat, based on the source of the data and the dates reported. The OSE (Wilson, 1992; Wilson and Lucero, 1997; Wilson et al., 2003) reported that the irrigated acreage ranged from 3,327 to 3,493 acres in the period of 1990 to 2000 (Table 6-9).

Table 6-9. Irrigation Surface Water and Groundwater Use in Grant County

Reporting Year	Total Acres Irrigated	Total Withdrawal (acre-feet)	Total Depletion (acre-feet)
1975	NA	17,540	9,270
1980	NA	17,090	7,790
1985	NA	31,405	4,738
1990	3,493	29,238	5,813
1995	3,327	36,492	5,813
2000	3,422	29,871	5,813

NA = Information not available

Irrigated acres reported in the New Mexico Agricultural Statistics (NMASS, 1986, 1998) were 4,110 acres in 1986 and 4,893 acres in 1998. The *New Mexico Stockman* (2001, 2002) reported that about 2,300 acres of hay was grown in 2000 and 2,100 acres in 2001.

Irrigated agriculture in Grant County occurs primarily along the Gila and Mimbres Rivers. Much of the water that was formerly used for irrigation along the Gila River, east of U.S. Highway 180, has been acquired by the Phelps Dodge Tyrone Mine. According to mine personnel (Phelps Dodge, 2003d), 4,087 acres of irrigable acreage along the Gila River was converted to mining/industrial use and is diverted to Bill Evans Lake. The original diversion for the 4,087 acres was based on a source diversion of 2.9 acre-feet per acre or 11,853 ac-ft/yr. However, the mining/industrial diversion for this acreage is based on 1.6 acre-feet per acre or 6,582 ac-ft/yr.

Phelps Dodge Tyrone has recently leased some of the water back to a local rancher for hay production and cattle grazing. The Nature Conservancy also owns 113 acres of water rights land (2.9 acre-feet per acre) along the Gila River, above the U.S. Highway 180 bridge. About five or six farmers and ranchers are believed to also have acreage with water rights, generally ranging in size from 40 to 80 acres, above the U.S. Highway 180 bridge.

The consumptive irrigation requirement for surface irrigated land in Grant County is reported to range from 0.907 to 2.083 acre-feet per acre along the Gila River, from the upper reaches to Red Rock, respectively (Wilson et al., 2003).

Irrigation along the Gila River also occurs near Red Rock, in the southwest part of the county. The principal crop in this area appears to be alfalfa hay.

The irrigable land in the Mimbres River valley is used primarily by small ranchers and farmers to grow fruits and vegetables, along with some hay and pasture for cattle grazing. According to information provided by the OSE during a June 12, 2003 Water Master hearing for the Mimbres River, 1,485 acres of adjudicated acreage exists in the upper part of the river (above San Lorenzo). However, based on discussions at that meeting, the actual acreage irrigated is less than that amount due to very low flows recently in the river. One of the major sources of water to this part of the river is Bear Canyon Lake; however, the lake only provides 270 acre-feet of water annually to ditches along the river and thus cannot alone meet the needs of the system.

The consumptive irrigation requirement for surface irrigated land in the Mimbres River area is reported to be 1.509 acre-feet per acre (Wilson et al., 2003). The USFS (2003c) reports that diversion in the Mimbres Valley is 2.7 acre-feet per acre.

Irrigable land below San Lorenzo along the Mimbres River is also used for fruit production and some hay and cattle grazing. Based on the SCS *Important Farmlands Map* (1983), the irrigable acreage below San Lorenzo is 1,000 acres or less. The USFS (2003c) reports that a total of 2,626 acres of land with irrigation water rights exists in the Mimbres Valley. Irrigation withdrawals nearly doubled between 1980 and 1985, but although they fluctuate some from year to year, total depletions due to irrigation have generally remained fairly constant over the past 20 years.

6.1.4.3 Hidalgo County

According to the *New Mexico Stockman* (2001), the primary source of irrigation water in Hidalgo County is groundwater. Except for the Virden Valley, which is supplied primarily with surface water and some supplemental groundwater, irrigation use in the county is supplied by groundwater from the San Simon, Animas Valley, Lordsburg, Gila-San Francisco, and Playas Valley administrative basins. The reported total of irrigable acreage ranges from 40,420 acres (*New Mexico Stockman*, 2001) to 38,420 acres (NMASS, 1998). The latter figure does not include an estimated 3,300 acres of irrigable land in the Virden area, which is administered by the Gila Water Commission, based in Safford, Arizona.

The acreage that has actually been recently irrigated for crop production is estimated to be less than 50 percent of the total available irrigable acreage. Again, this discrepancy occurs because the costs of pumping water and producing the crop have increased sufficiently to remove adequate incentive to farm all the available land at all times. Table 6-10 summarizes the irrigated acreage and water withdrawals as presented by the OSE (Sorenson, 1976, 1981; Wilson, 1986, 1992; Wilson and Lucero, 1997; Wilson et al., 2003).

The New Mexico Agricultural Statistics Service (NMASS, 1986, 1998) reported that actual areas irrigated were 13,361 acres in 1986 and 12,663 acres in 1998. The *New Mexico Stockman* (2001, 2002) also reported major crop production acreage totaling 7,800 in 2001 and 8,100 acres in 2000 (Table 6-11).

Table 6-10. Irrigation Surface Water and Groundwater Use in Hidalgo County

Reporting Year	Total Acres Irrigated	Total Withdrawal (acre-feet)	Total Depletion (acre-feet)
1975	NA	75,390	44,170
1980	NA	67,600	41,300
1985	NA	33,618	16,640
1990	9,090	31,966	18,844
1995	10,513	37,670	21,770
2000	11,627	41,884	24,672

NA = Information not available

Table 6-11. Crop Acreage in Hidalgo County in 2000 and 2001

Crop	Irrigated Acreage	
	2000	2001
Alfalfa	1,000	1,000
All other hay	300	300
Chile	2,600	2,200
Corn	1,800	2,700
Cotton	600	700
Sorghum	1,100	1,100
Wheat	900	1,100
Other grain	NA	NA
Total	8,300	9,100

Source: NMASS 2004
NA = Not available

Phelps Dodge's Hidalgo Smelter owns irrigation rights to 9,000 acres in south-central Hidalgo County. Although the company has not been using the groundwater associated with this acreage for agriculture, this land has recently been leased to a local farmer/rancher, and an estimated 3,000 to 3,500 acres of the land are being irrigated this year. The primary crops being irrigated are chile and alfalfa, and approximately 500 acres are being irrigated for hay/grass for cattle grazing.

The water diversion rate for the Hidalgo Smelter land is reported to be 3 acre-feet per acre. The diversion for irrigation in the Virden Valley (the Globe Equity decree area) is 6 acre-feet per acre.

According to the OSE (Wilson et al., 2003), the consumptive irrigation requirements for groundwater range from a low of 1.111 to a high of 2.908 acre-feet per acre, for the San Simon Valley and the Playas Valley, respectively. OSE-reported withdrawals (Figure 6-2) show a sharp decline in water use between 1980 and 1985, from about 68,000 ac-ft/yr to 34,000 ac-ft/yr. Since 1985, withdrawals have fluctuated between 32,000 and 42,000 ac-ft/yr.

6.1.4.4 Luna County

The primary source of irrigation water in Luna County is reportedly groundwater (*New Mexico Stockman*, 2001, 2002). The total irrigable acreage for Luna County has been reported to be as high as 73,950 acres (NMASS, 1998), but the acreage that has actually been irrigated is considerably less than the maximum acreage. Table 6-12 summarizes the acreage irrigated and the water withdrawals as presented by the OSE (Wilson, 1992; Wilson and Lucero, 1997; Wilson et al., 2003). Based on the figures in Table 6-12, the water depletion is about 58 percent of the total reported withdrawals.

Table 6-12. Irrigated Surface Water and Groundwater Use in Luna County

Reporting Year	Total Irrigated	Total Withdrawal (acre-feet)	Total Depletion (acre-feet)
1975	NA	162,200	91,420
1980	NA	125,520	77,660
1985	NA	139,887	61,142
1990	44,250	103,807	60,986
1995	45,135	141,335	81,404
2000	42,302	114,183	68,211

NA = Information not available

The New Mexico Agricultural Statistics Service (NMASS, 1986, 1998) reported that 38,246 acres were irrigated in 1986 and 38,662 in 1998.

The Luna County Farm Service Agency provided a detailed breakdown of the various crops and acreages from 1990 to 2002 (NRCS, undated). Table 6-13 summarizes the major crops for selected years and the total acres reported.

Table 6-13. Crop Acreage in Luna County, 1990 through 2000

Crop	Irrigated Acreage		
	1990	1995	2000
Alfalfa	2,056	1,950	1,888
Chile	10,029	7,083	6,213
Corn	821	891	1,920
Onions	2,147	3,010	2,832
Sorghum	1,707	1,849	2,297
Cotton	6,089	4,606	4,807
Wheat	1,165	2,942	3,459
Estimated totals	33,187	26,817	32,215

Source: (NRCS, undated)

The irrigated water diversion rate from groundwater (except for a small amount of flood water potential along the Mimbres River, 99 percent of irrigation water use is from groundwater) for Luna County is 3 acre-feet per acre. According to the OSE (Wilson et al, 2003), the consumptive irrigation requirement for groundwater ranges from 1.53 acre-feet per acre to 1.713 acre-feet per acre in the Nutt-Hockett and Mimbres Valley areas, respectively.

Some irrigated acreage water rights have recently been acquired by the City of Deming and Duke Energy. The City of Deming has acquired water rights for 2,500 acres of agricultural land. The consumptive (municipal) use from this land is 1.6 acre-feet per acre or 4,000 ac-ft/yr. Duke Energy acquired apparently about 2,900 acre-feet of former cropland water for cooling their power plant equipment (NM OSE, 2003b). The power plant is currently under construction. Assuming a consumptive use of 1.6 acre-feet per acre, this amount of water diversion would reduce the land available for agriculture by about 4,300 acres. Since 1980, OSE-reported withdrawals in Luna County have varied between 125,000 and 141,000 ac-ft/yr.

6.1.5 Reservoir Evaporation

Although the OSE-reported depletions of surface water resulting from evaporation dropped greatly from 1975 to 1990 (Table 6-1), these decreases are due more to a change in the way the OSE reported evaporation data, rather than actual decreases in evaporation. In 1975 the reservoir evaporation category listed in Table 6-1 included reservoir, stock pond, and playa lake evaporation. However, playa lake and stock pond evaporation were no longer inventoried by the OSE after 1975 and 1985, respectively. In addition, since 1990 the OSE has reported reservoir evaporation only for reservoirs with 5,000 or more acre-feet of storage, and because there are no reservoirs of this size in the planning region, no water use has been reported in this category since 1990.

Despite these reporting changes, current reservoir evaporation can be estimated based on the three years of available OSE reservoir and stock pond evaporation data, which more accurately reflect the total evaporation in the region. OSE-reported depletions for these categories was 3,752 acre-feet in 1975 (after subtracting the playa lake evaporation component) (Sorensen, 1976), 3,622 acre-feet in 1980 (Sorensen, 1981), and 3,373 acre-feet in 1985 (Wilson, 1986). All reservoir evaporation is a consumptive use; there is no return flow in this category.

6.2 Projected Demographics

Future water demand in the Southwest Region depends on the future growth of the region's population and economy. Accordingly, Southwest Planning & Marketing (SWPM) projected growth in 10-year increments from 2000 to 2040. The projections were based on two different growth scenarios: a low-growth scenario and a high-growth one. The results of SWPM's analysis are provided in Appendix E4 and summarized below.

The population projections developed by SWPM under both low and high growth scenarios are summarized in Table 6-14 and depicted on Figure 6-3. Factors expected to affect the rate of population change include:

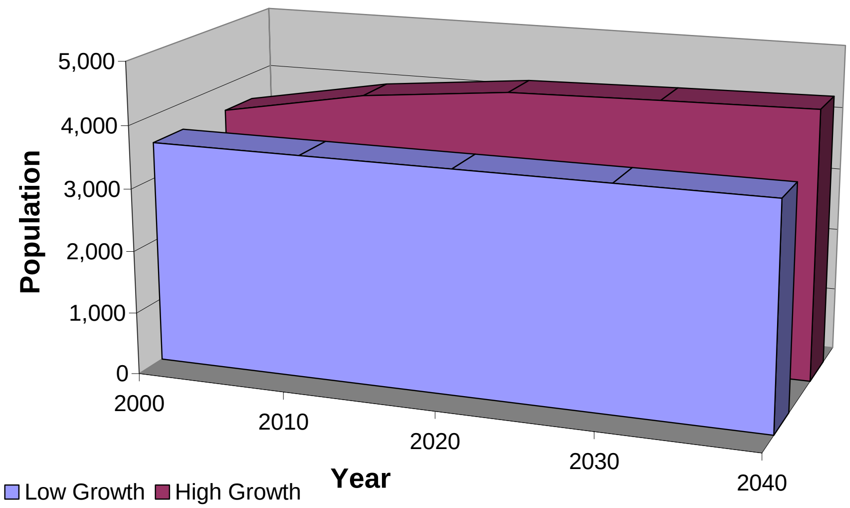
- *Catron County:* The low projection assumes that population will increase to some degree, due to the conversion of ranch land to low-density residential developments that

Table 6-14. Estimated Population Growth 2000 to 2040
Southwest New Mexico Water Planning Region

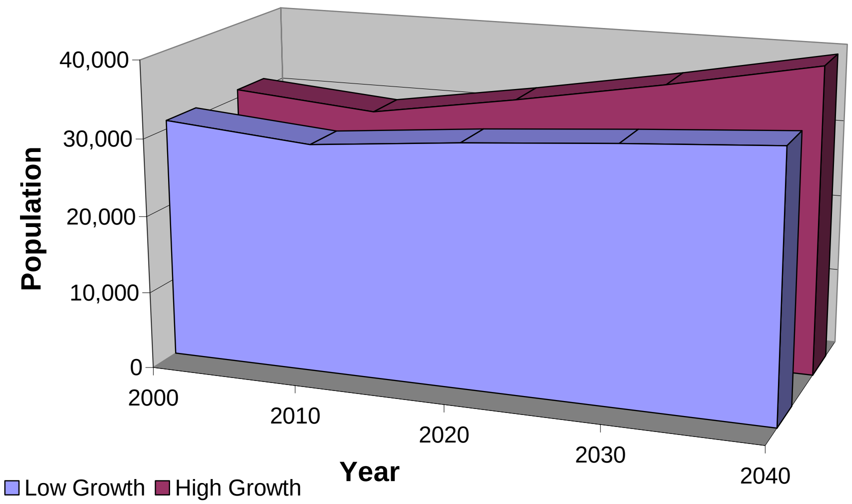
County	Current (2000) Population	Growth Scenario		Estimated Population			
		Type	Description [a]	2010	2020	2030	2040
Catron	3,567	Low	No growth or decline	3,567	3,567	3,567	3,567
		High	Slow growth	3,999	4,233	4,288	4,336
Grant	31,083	Low	Initial decline followed by moderate growth	29,563	31,417	32,958	34,335
		High	Initial decline followed by higher growth	29,563	32,656	36,073	39,847
Hidalgo	5,929	Low	Increasingly negative growth rate	5,800	5,623	5,380	5,117
		High	Initial decline followed by no growth or decline	6,720	7,085	7,120	7,127
Luna	25,189	Low	Moderate growth	28,493	31,598	34,253	36,510
		High	Significant growth	32,181	39,499	46,339	52,572
Total Southwest Region	65,858	Low	Sum of low population projections for four counties	67,423	72,205	76,158	79,529
		High	Sum of high population projections for four counties	72,463	83,473	93,820	103,882

[a] More detailed descriptions of the low and high growth scenarios are provided in Appendix E4.

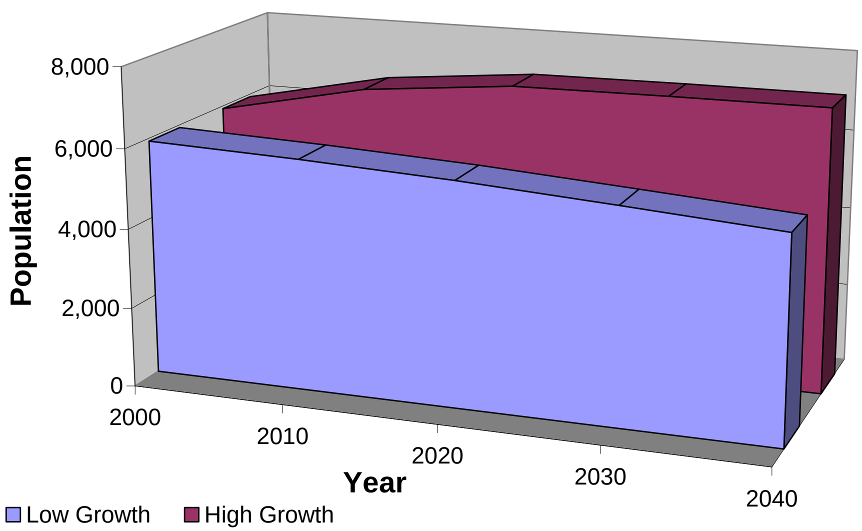
BBER = Bureau of Business and Economic Research



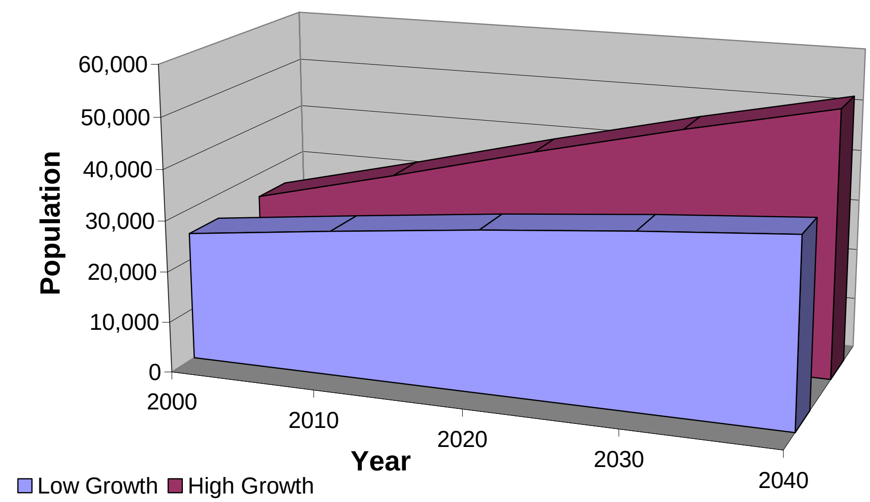
Catron County



Grant County



Hidalgo County



Luna County

SOUTHWEST NEW MEXICO REGIONAL WATER PLAN

Projected Population

Figure 6-3

are primarily being populated through in-migration of retirees and people purchasing second homes or vacation properties, but that such in-migration may be balanced by out-migration due to a lack of economic opportunity and declining ranching activities resulting from drought and environmental concerns. The high projection assumes that a slow rate of growth will occur.

- *Grant County:* The economy of Grant County has historically been driven by the mining sector, and recent layoffs in that and other sectors are resulting in some out-migration. However, a variety of economic development efforts are ongoing, and the area is increasingly becoming an attractive location for retirees. In addition, it is expected that employment in the mining sector will at least partially recover as the market for copper improves to a point that the area's mines once again can continue to be economically viable.

- *Hidalgo County:* The majority of the population in Hidalgo County is in Lordsburg, which is therefore expected to drive changes in population in the county. The closure of Phelps Dodge's mining operations in Playas is expected to cause an initial decline in population, but the purchase of the town of Playas by New Mexico Tech for use as a research and training facility is expected to slowly reverse the population down-trend in that area.

- *Luna County:* Industrial and retirement community development in the county's major population center, Deming, and along the U.S.-Mexico border will be the primary drivers for population growth in Luna County.

SWPM also analyzed how economic activity and/or the projected growth (or decline) in population will affect water use in eight use sectors:

- Residential (self-supplied)
- Commercial (self-supplied)
- Municipal water supply
- Industrial (self-supplied)
- Power (self-supplied)

- Mining (self-supplied)
- Irrigated agriculture
- Livestock (self-supplied)

The reservoir evaporation water use category is not driven by population growth.

Future water demand in the residential, commercial, and municipal sectors depends in large part on the degree of population growth and therefore varies throughout the Southwest Region, from stable to slowly increasing population in Hidalgo County to moderate growth in Luna County. Any growth will likely be driven by tourism and in-migration of residents.

The industrial sector is not large in the Southwest Region, but power generation is becoming increasingly prominent and mining has been a major factor in the economy of Grant County for decades. All of these sectors have the potential to use large amounts of water. Water use related to mining will continue to fluctuate with the copper market. Growth in the industrial sector is expected to be relatively small, limited primarily to Luna County with small initial growth spurts in Grant and Hidalgo Counties within the next 10 to 20 years. The largest increase will likely be seen in the power generation sector, which has the potential for significant growth in Hidalgo and Luna Counties within the next 10 to 20 years.

For the most part, the irrigated agriculture sector and is projected to either remain constant or decline slightly in the Southwest Region, and the livestock sector is expected to remain steady or slightly increase to earlier levels. The one exception is Hidalgo County, where livestock is expected to grow significantly over the next 10 years due to the addition of one and possibly more head cattle feedlots in the county. Irrigation in Hidalgo County has increased recently due to the transfer of water rights from the recently closed Playas Smelter. Additionally, irrigated agriculture may increase locally if water becomes available through the CAP (Section 6.3).

6.3 Projected Water Uses for 40-Year Planning Horizon

This section provides estimates of future water use in the region. To assist in bracketing the uncertainty of the projections, low and high water use estimates were developed, based on growth projections in the various sectors for each county (Section 6.2; Appendix E4) and input from the steering committee. Sections 6.3.1 through 6.3.7 describe the methods or assumptions used in projecting future water use for the various use sectors in each county. Estimates of projected municipal water use in the Southwest Region are provided on Table 6-15 and estimates of projected future water use in all sectors in the entire region are shown on Table 6-16. Projections of future water use for each sector, segregated by County and showing the growth rates and assumptions used to project future water use, are included in Appendix E5. Better estimates could be made if the regional aquifers were modeled; however, this section uses the best information available. Reconciliation of demand with supply is addressed in Section 7.

For planning purposes Table 6-16 also includes a safety factor for selected uses to account for the possibility of underestimating the population projections. The reason for adopting this safety factor is that there is inherent uncertainty in estimating population growth and associated water uses, and by the time any underestimate of population becomes evident, some options for developing renewable water supplies may no longer be viable. Accordingly, a safety factor of 20 percent was applied to the highest projection for public, commercial, power, industrial, domestic, and livestock uses.

The safety factor for domestic well diversions also includes an increase of 1,120 ac-ft/yr to account for a 0.6-acre-foot per capita demand for self-supplied wells in the Gila and San Francisco Basins. This amount was set based on concern that the 2,420 residents currently supplied by domestic wells in these basins have transferred water rights to their domestic wells and have extensive gardens. The value of 0.6 ac-ft/yr per person is 0.5 acre-feet more than the amount used for all other domestic wells in the region.

Figure 6-4 shows the projected water use by sector in 2040 for the low and high projections, as well as the 20 percent safety factor projection for selected uses. Figure 6-5 shows the projected gap between supply and demand in 2040 for the public, domestic, commercial, and industrial use sectors. The total projected gap in 2040 under the low, high, and 20 percent safety factor projections is about 3,000, 11,600, and 16,400 ac-ft/yr, respectively. Most of this gap is in Luna and Grant Counties, for which the gap under the high projection is about 6,300 and 5,000 ac-ft, respectively. The projected gap in 2040 in Catron and Hidalgo Counties is less than 1,000 ac-ft, even under the 20 percent safety factor projection.

Table 6-15. Estimated Future Public Water Supply Use in the Southwest Region

Location	Estimated 2002 Per Capita Use (gpcd)	Growth Scenario [a]	Projected Withdrawals (ac-ft/yr) by Public Systems			
			2010	2020	2030	2040
Catron County						
Public systems	156	Low	150	150	150	150
		High	170	180	190	190
Grant County						
All public systems	160	Low	3,690	3,940	4,160	4,350
		High	3,690	3,940	4,590	5,130
Rural public	70	Low	410	420	430	440
		High	410	430	450	470
Silver City	235	Low	2610	2810	2980	3130
		High	2610	2940	3320	3740
Mining district [a]	107	Low	670	710	750	790
		High	670	740	830	930
Hidalgo County						
All public systems	199	Low	860	830	800	760
		High	980	1,030	1,030	1,030
Rural public	152	Low	90	90	90	80
		High	150	170	180	180
Lordsburg	205	Low	760	740	710	670
		High	830	850	860	860
Luna County						
All public systems	211	Low	4,990	5,560	6,060	6,480
		High	5,660	7,020	8,300	9,490
Rural public	161	Low	820	840	860	870
		High	840	860	840	810
Deming	227	Low	4170	4720	5200	5610
		High	4820	6160	7460	8680
	Total	Low	9,690	10,490	11,160	11,740
		High	10,500	12,340	14,110	15,840

[a] Bayard, Hurley and Santa Clara

gpcd = Gallon per capita day
gpd = Gallons per day

Table 6-16. Projected Withdrawals in the Southwest Region

Sector	2000 Total Withdrawal (ac-ft)	Growth Scenario	Projected Withdrawals (ac-ft)			
			2010	2020	2030	2040
Public supply	9,260	Low	9,690	10,490	11,160	11,740
		High	10,530	12,340	14,110	15,840
		High + 20%	12,600	14,810	16,940	19,010
Commercial	980	Low	980	1,000	1,010	1,020
		High	1,090	3,980	4,350	4,750
		High + 20%	1,310	4,780	5,230	5,700
Industrial	80	Low	90	110	125	150
		High	120	170	220	260
		High + 20%	150	210	270	310
Mining	25,830	Low	21,930	21,930	21,930	21,930
		High	39,470	39,470	39,470	39,470
Power	280	Low	280	280	280	280
		High	2,120	3,200	3,200	3,230
		High + 20%	2,540	3,840	3,840	3,840
Irrigated agriculture	205,900	Low	202,790	183,400	165,870	150,010
		High	225,470	225,470	225,470	225,470
Livestock	1,500	Low	1,920	1,920	1,920	1,920
		High	2,370	2,490	2,610	2,750
		High + 20%	2,840	2,990	3,140	3,300
Domestic	2,070	Low	2,110	2,240	2,390	2,480
		High	2,270	2,600	2,880	3,160
		High + 20% + Gila/SF Basin [a]	3,280	4,180	4,910	5,240
Reservoir evaporation	---	Low [b]	3,580	3,580	3,580	3,580
		High [c]	3,750	3,750	3,750	3,750
Total	245,900	Low	243,400	225,000	208,300	193,100
		High	287,200	293,500	296,100	298,600
		High + 20%	345,800	353,400	356,500	359,600

[a] Domestic use per capita in the Gila & SF River Basin set to 0.6 af/person, which increases diversions by1,210 afy.
[b] Average 1975 through 1985 use (years when stock pond and small reservoir evaporation were estimated), excluding playa lake evaporation
[c] Based on 1975 data, when stock pond, small reservoir, and playa lake evaporation were estimated by OSE

ac-ft = Acre-feet
--- = Reservoir evaporation is no longer calculated by the OSE for the Southwest Region since there are no reservoirs greater than 5,000 ac-ft in size.

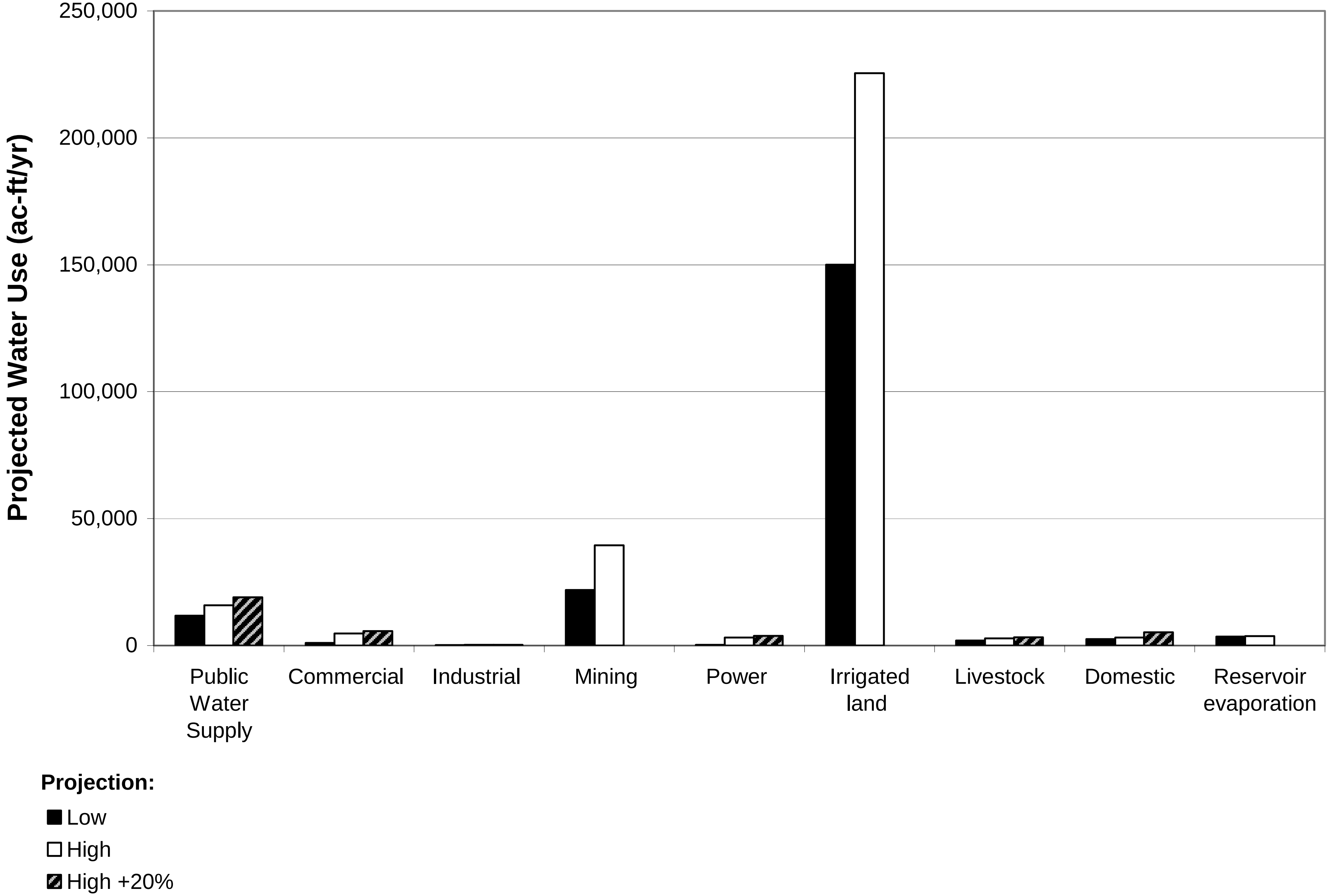


Figure 6-4

SOUTHWEST NEW MEXICO REGIONAL WATER PLAN

Projected Water Use in 2040

Daniel B. Stephens & Associates, Inc.

5/25/05

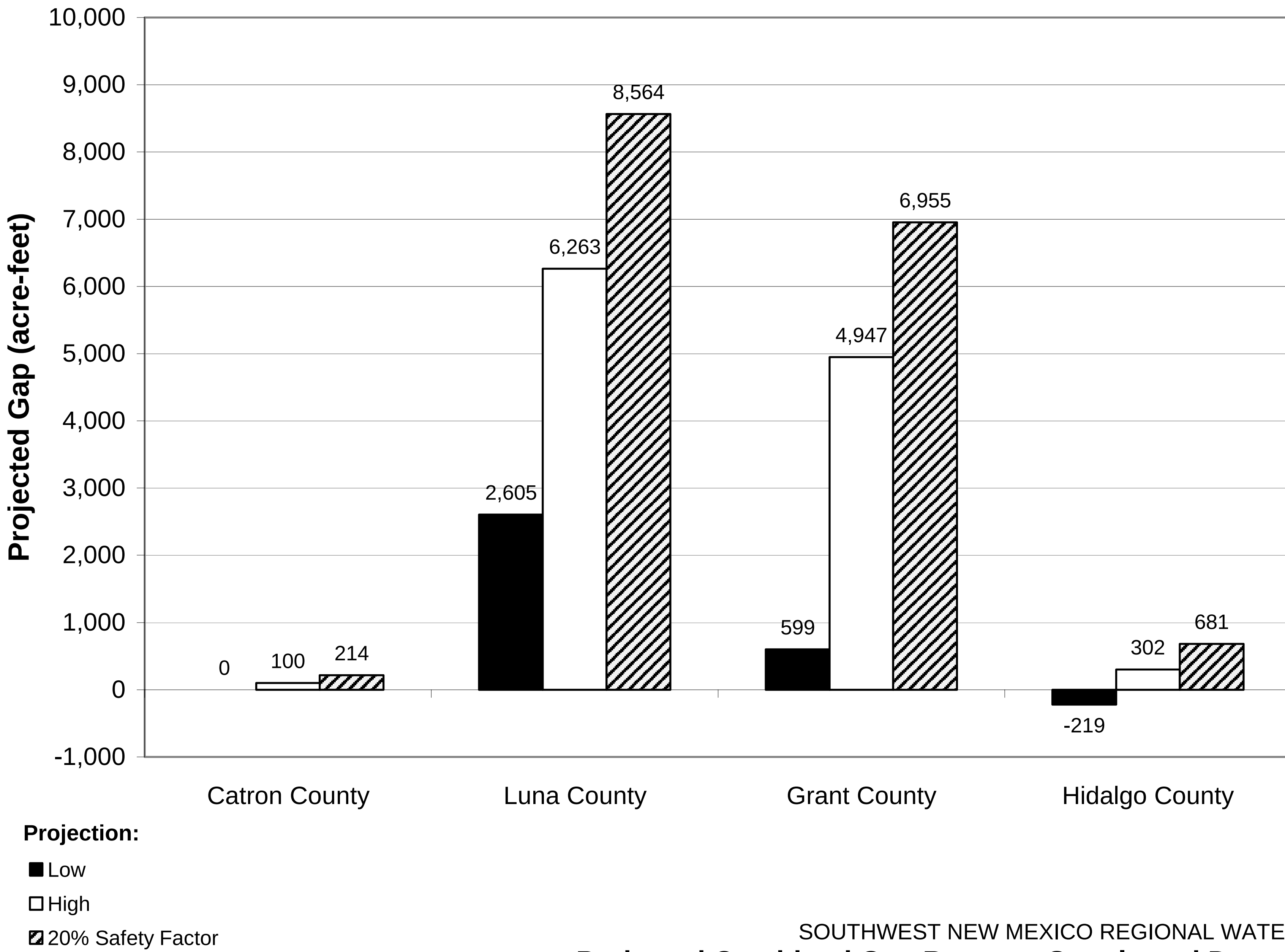


Figure 6-5

SOUTHWEST NEW MEXICO REGIONAL WATER PLAN

Projected Combined Gap Between Supply and Demand for Public, Domestic, Commercial, and Industrial Uses in 2040

Daniel B. Stephens & Associates, Inc.

5/25/05

6.3.1 Public Water Supply and Self-Supplied Domestic

The public water supply projections are based on the county and municipal population growth estimates developed by SWPM (Section 6.2; Appendix E4). The per capita use for individual communities, based on pumping and population records, varied from about 50 gallons per capita per day (gpcd) to more than 200 gpcd, and county average per capita use rates varied from 156 gpcd to 211 gpcd. Future water use was projected by multiplying the current county average usage rate by the high population projections to determine the high water use projection. Likewise, the low water use projection was determined by multiplying the same per capita demand figures by the low population projection. The per capita water use rate was calculated based on the total public supply system pumping divided by the population served by these systems (Table 6-3). While the projected water use could be reduced through conservation efforts as discussed in Section 8.2, the projections presented here illustrate what could result if no alternatives are implemented to reduce water demand.

The domestic self-supplied projections were based on DBS&A estimates of domestic use (Section 6.1.1.2) and the population growth projections for each county as presented by SWPM (Appendix E4). The results are presented in Table 6-16.

6.3.2 Commercial and Industrial

Commercial and industrial water use is typically very small in the region. The low and high projections for this sector (Table 6-16) were developed based on growth rates that are proportional to the population projections (Section 6.2; Appendix E4). One exception to this methodology is the assumption for the high water use scenario that about 2,800 ac-ft/yr of water from the CAP allocation would be available for commercial use around 2020 in Grant County.

6.3.3 Irrigated Agriculture

For the past 10 years, the acreage of irrigable land (land that holds irrigation water rights) in the region appears to have remained relatively consistent. Typically the land areas that are actually irrigated are considerably smaller than the total acreage with irrigation water rights (Section 6.1.4).

For the low water use projection, the projected irrigated agriculture water use (Table 6-16) was reduced by 1 percent a year from the 2000 OSE levels for irrigated agriculture (Table 6-1; Wilson et al., 2003). For the high water use projection, some increases in irrigated land uses were included in Hidalgo, Grant, and Catron Counties, assuming that CAP water would be available around 2010. Luna County irrigated land water use was not increased for CAP water, due to the distance from the Gila River to the primary agriculture areas in the County.

6.3.4 Livestock

The low water use projection assumed that the livestock numbers would remain similar to the 2000 OSE values (Wilson et al., 2003) for the next 40 years, except in Hidalgo County, where a 20,000-head feedlot is expected to begin operating in 2004 or 2005. The high water use projections assumed a small growth, 5 per cent every 10 years, except for Hidalgo County, where another new 20,000-head feedlot planned in the county is included in the 2010 projection (Table 6-16; Appendix E5).

6.3.5 Power

The low power water use assumption for the region (Table 6-16; Appendix E5) is based on the current (2000) OSE-reported values for the power sector (Wilson et al., 2003). The high use projections assume that an additional power plant will be on-line in about 2005, consuming about 1,000,000 gpd (1,120 ac-ft/yr) in Luna County. Additional water use in the power sector is assumed in Luna and Hidalgo Counties as new power plants will likely be built after 2005. Biomass power plants are also being considered in Catron County, which may affect future water demands.

6.3.6 Mining

The principal area for mining in the region is located in Grant County. Since about 2000, the copper mines in the county have been in reduced production and therefore using less water than a few years prior to 2000. Nevertheless, it is expected that copper mining and reclamation will continue in the region for the next 30 to 40 years or more. Water previously used for mining operations may be used for reclamation activities. For instance, Phelps Dodge estimates that nearly 9,000 ac-ft/yr of fresh water will be required to be blended with contaminated groundwater.

The low water use projections for the mining sector in each county are based on the 2000 OSE values (Wilson et al., 2003) and no growth in this sector (Table 6-16). The high water use projections are based on the estimated current water rights (groundwater) for the Phelps-Dodge Chino, Cobre, and Tyrone mines in Grant County. No future water use was assumed for the Fence Lake Mine in Catron County, because the mining company has recently announced that it doesn't intend to pursue the project. Additional mining activities (such as the Fence Lake Mine) could occur over the 40-year period; however, no data to accurately predict likely uses is currently available.

In addition to the potential Fence Lake Mine, the Bureau of Land Management is soliciting bids for helium reserves in northeastern Catron County, and the Mogollon Mining District in southern Catron County could become active if silver and gold prices rise. The 1992 water plan estimated 1,000 ac-ft for such projects. Additionally, though somewhat speculative at this time, there is a potential for carbon dioxide (CO_2) extraction in western Catron County. The high water use projection for this county includes an estimated usage of 1,000 ac-ft/yr for the potential mine; however, the amount of water usage for such an operation is highly uncertain, as the project is still in very preliminary stages of development.

6.3.7 Reservoir Evaporation

As with irrigated agriculture, reservoir evaporation is dependent on climatic conditions. Additionally, any potential for new or reduced storage must be considered in developing reservoir evaporation estimates. Two scenarios were again used to bracket the possible conditions:

- Low water use: This scenario assumed that reservoir evaporation over the planning period is equal to the average use for this category (3,582 acre-feet), based on the three years of available OSE data (1975, 1980, and 1985).

- High water use: This scenario assumed that reservoir evaporation over the planning period is equal to the maximum use for this category (3,752 acre-feet in 1975, not including playa lake evaporation), based on the three years of available OSE data (1975, 1980, and 1985).