Appendix 2-K

Detailed Water Budget Details

Antelope Subbasin

Sustainable Groundwater Management Act

Groundwater Sustainability Plan Appendix 2-K Detailed Water Budget Results - Draft

January 2022

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1 DETAILED HISTORICAL WATER BUDGET

1.1 Surface Water System Water Budget Results

1.1.1 Inflows

1.1.1.1 *Surface Water Inflow by Water Source Type*

Per the GSP Regulations, surface inflows must be reported by water source type. According to the Regulations (23 CCR § 351(ak)):

> *"Water source type" represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.*

Major surface water inflows to the Antelope Subbasin are summarized below according to water source type.

1.1.1.1.1 Local Supplies

Local supply inflows to the Antelope Subbasin predominantly include runoff from upgradient small watersheds adjacent to the Subbasin and surface inflows along Sacramento River, Antelope Creek, Salt Creek, Craig Creek, and New Creek. A portion of these local supplies are diverted by local water rights users for beneficial use within the Subbasin.

1.1.1.1.2 Central Valley Project

Central Valley Project (CVP) inflows to the Antelope Subbasin include surface water diverted by small CVP contractors to irrigated land along the Sacramento River.

1.1.1.1.3 Summary of Surface Inflows

The annual volume of surface water inflows is summarized by water source type in **Table 1** and **Figure 1**. Between 1990 and 2018, total surface inflows from all sources averaged approximately 43 thousand acre-feet (taf) per year. Of this total, local supplies averaged approximately 42 taf per year, while CVP supplies averaged 610 acre-feet per year.

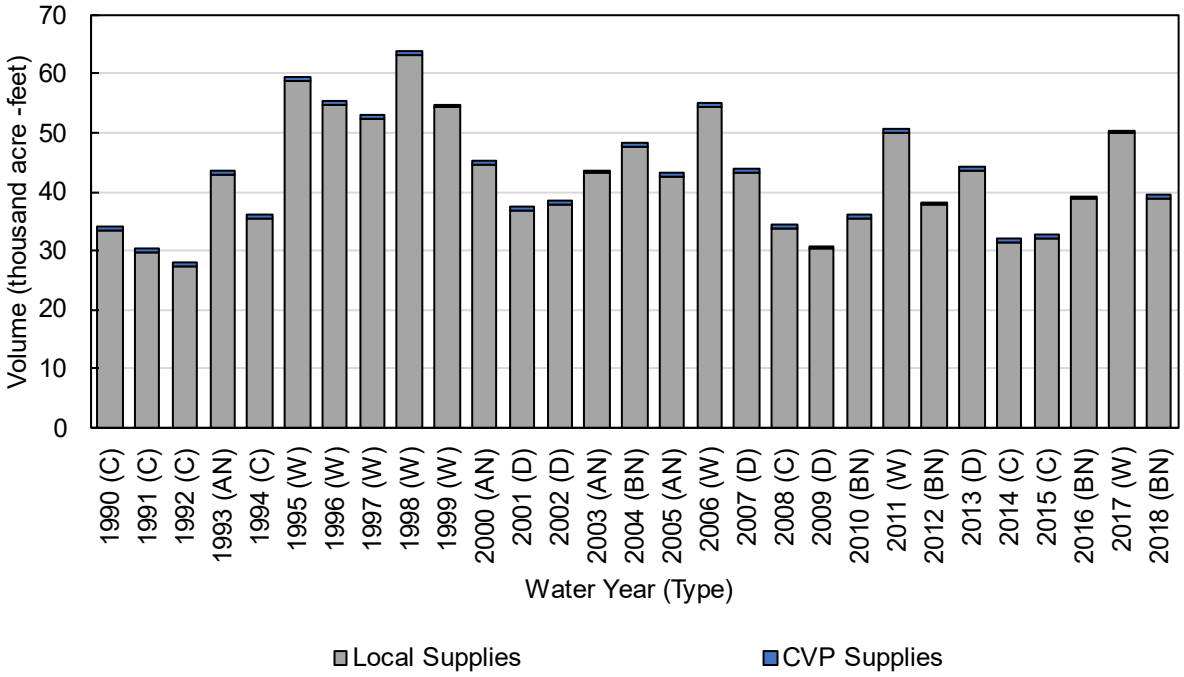

70
60
50
40
30
20
10
0
Volume (thousand acre -feet)
1990 (C)
1991 (C)
1992 (C)
1993 (AN)
1994 (C)
1995 (W)
1996 (W)
1997 (W)
1998 (W)
1999 (W)
2000 (AN)
2001 (D)
2002 (D)
2003 (AN)
2004 (BN)
2005 (AN)
2006 (W)
2007 (D)
2008 (C)
2009 (D)
2010 (BN)
2011 (W)
2012 (BN)
2013 (D)
2014 (C)
2015 (C)
2016 (BN)
2017 (W)
2018 (BN)
Water Year (Type)
Local Supplies
CVP Supplies

Table 1. Antelope Subbasin Historical Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)		CVP Supplies	Local Supplies	Total
1990 (C)		610	34,000	34,000
1991 (C)		610	30,000	30,000
1992 (C)		610	28,000	28,000
1993 (AN)		610	43,000	44,000
1994 (C)		610	36,000	36,000
1995 (W)		610	59,000	60,000
1996 (W)		610	55,000	55,000
1997 (W)		610	52,000	53,000
1998 (W)		610	63,000	64,000
1999 (W)		620	54,000	55,000
2000 (AN)		580	45,000	45,000
2001 (D)		600	37,000	38,000
2002 (D)		640	38,000	38,000
2003 (AN)		580	43,000	44,000
2004 (BN)		620	48,000	48,000
2005 (AN)		600	43,000	43,000
2006 (W)		610	55,000	55,000
2007 (D)		650	43,000	44,000
2008 (C)		600	34,000	34,000
2009 (D)		620	30,000	31,000
2010 (BN)		610	36,000	36,000
2011 (W)		630	50,000	51,000
2012 (BN)		560	38,000	38,000
2013 (D)		650	44,000	44,000
2014 (C)		640	32,000	32,000
2015 (C)		610	32,000	33,000
2016 (BN)		580	39,000	39,000
2017 (W)		580	50,000	50,000
Average (1990-2018)		610	42,000	43,000
1990-2018	W	610	55,000	55,000
	AN	590	43,000	44,000
	BN	600	40,000	40,000
	D	630	38,000	39,000
	C	610	32,000	33,000

1.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Table 2** and **Figure 2** by water use sector. Total precipitation is highly variable between years in the study area, ranging from approximately 24 taf (14.9 inches) during average critically dry years to over 81 taf (50.22 inches) during average wet years.

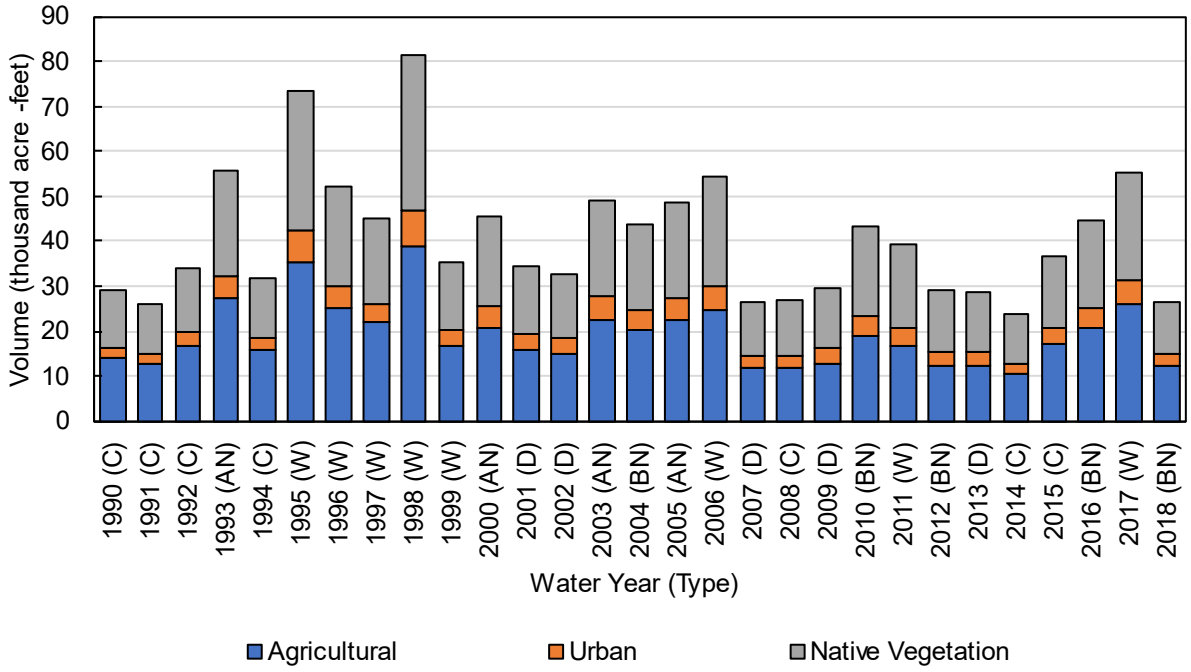


Figure 2. Antelope Subbasin Historical Precipitation, by Water Use Sector

Table 2. Antelope Subbasin Historical Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		14,000	2,400	13,000	29,000
1991 (C)		13,000	2,200	11,000	26,000
1992 (C)		17,000	2,900	14,000	34,000
1993 (AN)		27,000	4,900	23,000	56,000
1994 (C)		16,000	2,900	13,000	32,000
1995 (W)		35,000	7,000	31,000	74,000
1996 (W)		25,000	5,000	22,000	52,000
1997 (W)		22,000	4,400	19,000	45,000
1998 (W)		39,000	8,000	35,000	81,000
1999 (W)		17,000	3,500	15,000	36,000
2000 (AN)		21,000	4,700	20,000	45,000
2001 (D)		16,000	3,500	15,000	34,000
2002 (D)		15,000	3,300	14,000	33,000
2003 (AN)		23,000	5,100	21,000	49,000
2004 (BN)		20,000	4,600	19,000	44,000
2005 (AN)		22,000	5,100	21,000	49,000
2006 (W)		24,000	5,700	24,000	55,000
2007 (D)		12,000	2,700	12,000	26,000
2008 (C)		12,000	2,800	12,000	27,000
2009 (D)		13,000	3,100	14,000	30,000
2010 (BN)		19,000	4,600	20,000	43,000
2011 (W)		17,000	4,100	19,000	39,000
2012 (BN)		12,000	3,100	14,000	29,000
2013 (D)		12,000	2,900	14,000	29,000
2014 (C)		10,000	2,400	11,000	24,000
2015 (C)		17,000	3,600	16,000	37,000
2016 (BN)		20,000	4,500	20,000	45,000
2017 (W)		26,000	5,400	24,000	56,000
2018 (BN)		12,000	2,600	12,000	27,000
Average (1990-2018)		19,000	4,000	18,000	41,000
1990-2018	W	26,000	5,400	24,000	55,000
	AN	23,000	5,000	22,000	50,000
	BN	17,000	3,900	17,000	38,000
	D	14,000	3,100	14,000	30,000
	C	14,000	2,700	13,000	30,000

1.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 3** and **Table 3**. The majority of groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 12 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 11 taf in above-normal years to 16 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 4** and **Table 4**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, totaling 0.50 taf and 0.970 taf per year, on average.

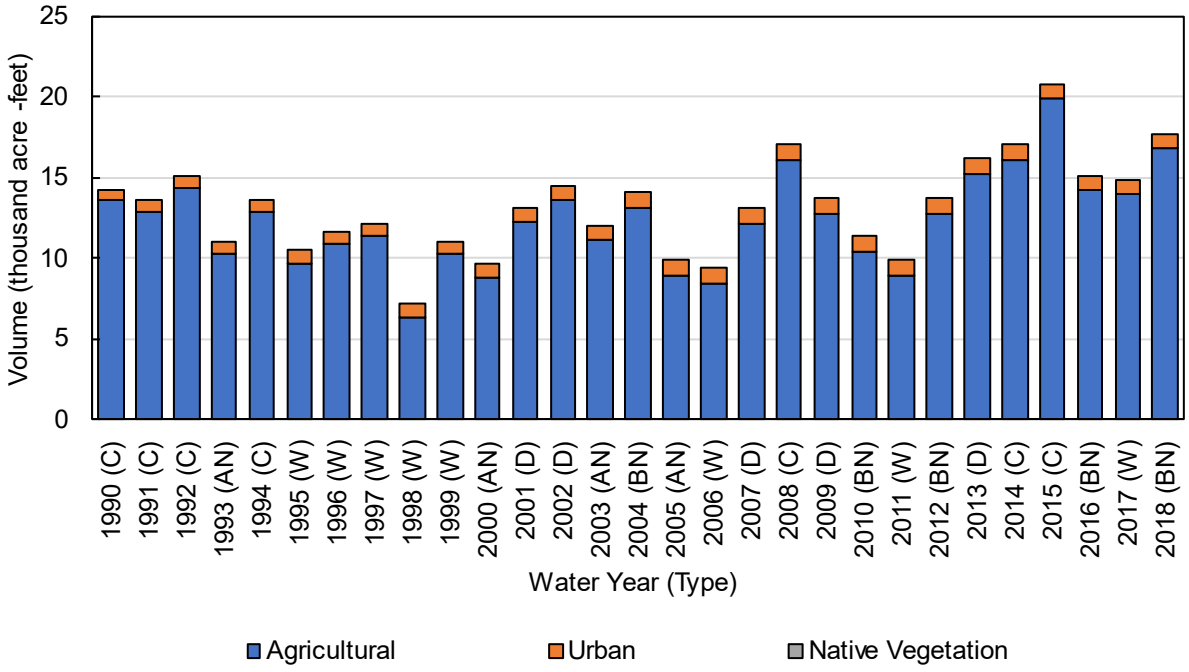


Figure 3. Antelope Subbasin Historical Groundwater Pumping, by Water Use Sector

Table 3. Antelope Subbasin Historical Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		14,000	660	0	14,000
1991 (C)		13,000	700	0	14,000
1992 (C)		14,000	730	0	15,000
1993 (AN)		10,000	750	0	11,000
1994 (C)		13,000	770	0	14,000
1995 (W)		9,700	820	0	11,000
1996 (W)		11,000	810	0	12,000
1997 (W)		11,000	810	0	12,000
1998 (W)		6,400	820	0	7,200
1999 (W)		10,000	830	0	11,000
2000 (AN)		8,700	860	0	9,600
2001 (D)		12,000	850	0	13,000
2002 (D)		14,000	870	0	14,000
2003 (AN)		11,000	890	0	12,000
2004 (BN)		13,000	910	0	14,000
2005 (AN)		9,000	920	0	9,900
2006 (W)		8,400	930	0	9,400
2007 (D)		12,000	930	0	13,000
2008 (C)		16,000	960	0	17,000
2009 (D)		13,000	960	0	14,000
2010 (BN)		10,000	970	0	11,000
2011 (W)		9,000	980	0	9,900
2012 (BN)		13,000	980	0	14,000
2013 (D)		15,000	980	0	16,000
2014 (C)		16,000	960	0	17,000
2015 (C)		20,000	820	0	21,000
2016 (BN)		14,000	860	0	15,000
2017 (W)		14,000	880	0	15,000
2018 (BN)		17,000	930	0	18,000
Average (1990-2018)		12,000	870	0	13,000
1990-2018	W	10,000	860	0	11,000
	AN	9,800	860	0	11,000
	BN	13,000	930	0	14,000
	D	13,000	920	0	14,000
	C	15,000	800	0	16,000

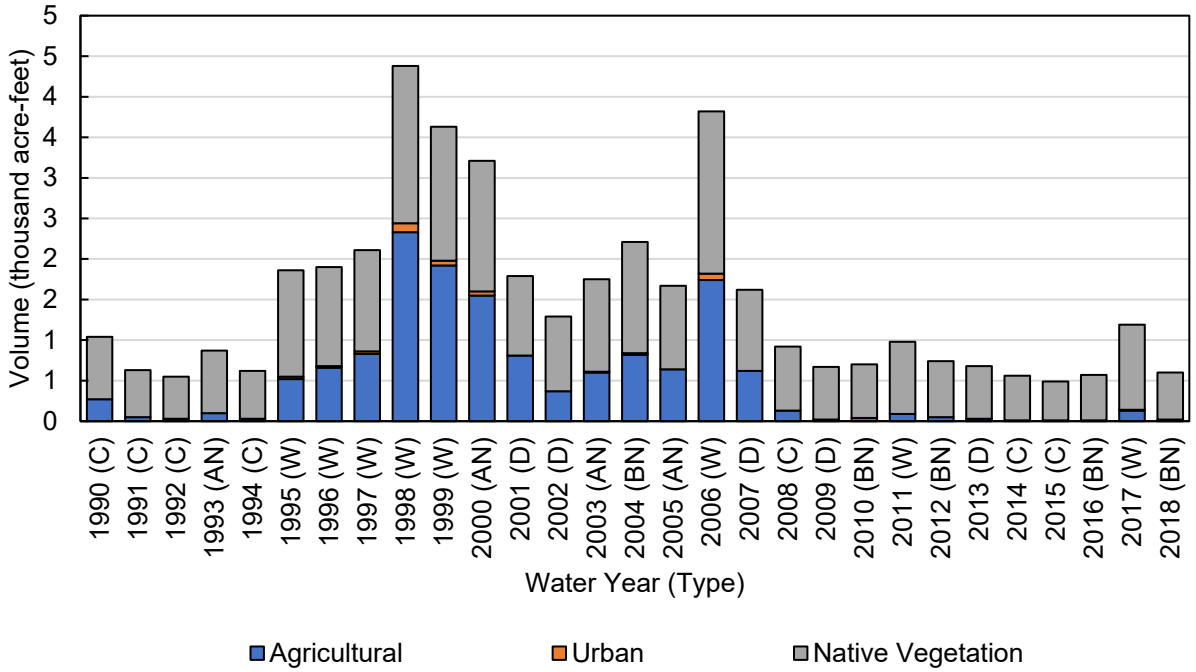


Figure 1. Antelope Subbasin Groundwater Uptake, by Water Use Sector

Table 1. Antelope Subbasin Historical Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		270	0	770	1,000
1991 (C)		50	0	580	630
1992 (C)		30	0	520	550
1993 (AN)		100	0	770	870
1994 (C)		30	0	590	620
1995 (W)		520	30	1,300	1,900
1996 (W)		660	20	1,200	1,900
1997 (W)		830	30	1,300	2,100
1998 (W)		2,300	110	1,900	4,400
1999 (W)		1,900	60	1,700	3,600
2000 (AN)		1,600	50	1,600	3,200
2001 (D)		810	0	980	1,800
2002 (D)		370	0	920	1,300
2003 (AN)		600	10	1,100	1,800
2004 (BN)		820	20	1,400	2,200
2005 (AN)		640	0	1,000	1,700
2006 (W)		1,700	80	2,000	3,800
2007 (D)		620	0	1,000	1,600
2008 (C)		130	0	790	920
2009 (D)		20	0	650	670
2010 (BN)		40	0	660	700
2011 (W)		90	0	890	980
2012 (BN)		50	0	690	740
2013 (D)		30	0	650	680
2014 (C)		10	0	550	560
2015 (C)		10	0	480	490
2016 (BN)		10	0	560	570
2017 (W)		130	10	1,100	1,200
2018 (BN)		20	0	580	600
Average (1990-2018)		500	10	970	1,500
1990-2018	W	1,000	40	1,400	2,500
	AN	720	20	1,100	1,900
	BN	190	0	770	960
	D	370	0	840	1,200
	C	80	0	610	690

1.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 5** and **Table 5**, averaging approximately 53 taf per year.

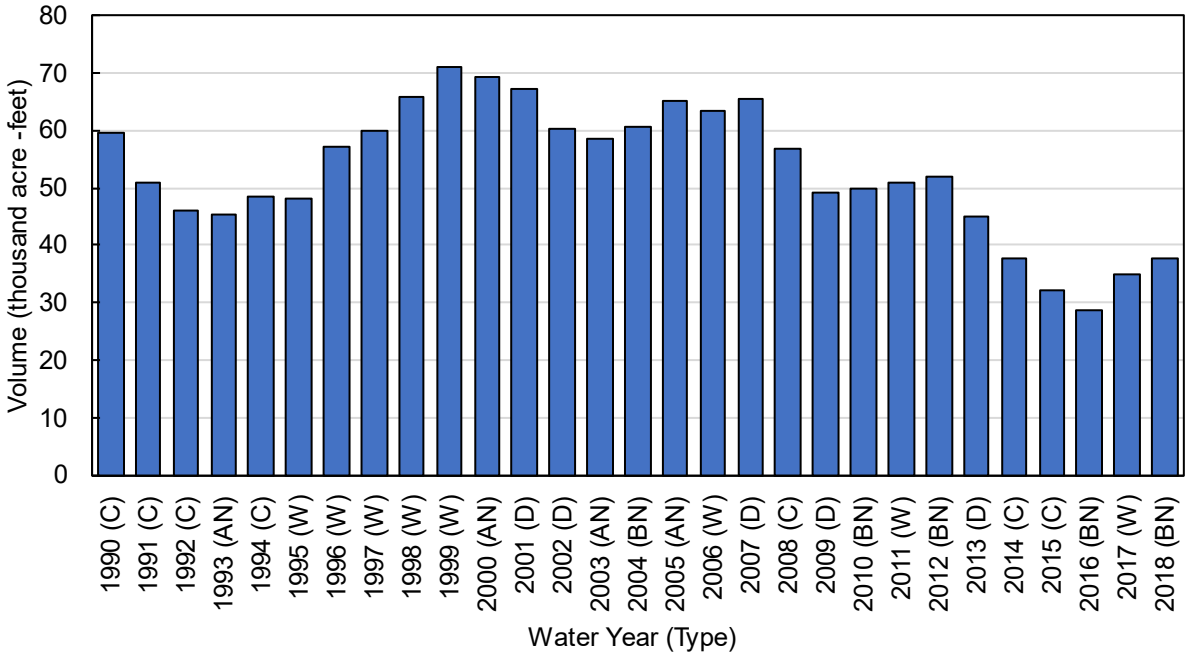


Figure 5. Antelope Subbasin Historical Groundwater Discharge to Surface Water

Table 5. Antelope Subbasin Historical Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)		Groundwater Discharge to Surface Water
1990 (C)		60,000
1991 (C)		51,000
1992 (C)		46,000
1993 (AN)		45,000
1994 (C)		48,000
1995 (W)		48,000
1996 (W)		57,000
1997 (W)		60,000
1998 (W)		66,000
1999 (W)		71,000
2000 (AN)		69,000
2001 (D)		67,000
2002 (D)		60,000
2003 (AN)		58,000
2004 (BN)		61,000
2005 (AN)		65,000
2006 (W)		63,000
2007 (D)		65,000
2008 (C)		57,000
2009 (D)		49,000
2010 (BN)		50,000
2011 (W)		51,000
2012 (BN)		52,000
2013 (D)		45,000
2014 (C)		38,000
2015 (C)		32,000
2016 (BN)		29,000
2017 (W)		35,000
2018 (BN)		38,000
Average (1990-2018)		53,000
1990-2018	W	56,000
	AN	60,000
	BN	46,000
	D	57,000
	C	47,000

1.1.2 Outflows

1.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 6 through Figure 9**, and **Table 6 through Table 9**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest observed in 1998, at approximately 42 taf, and greatest in 1990, at approximately 48 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 16 taf in above-normal and wet years and about 20 to 21 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and relatively constant between years, averaging about 0.4 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to meet a portion of their consumptive use requirements. ET of groundwater uptake by native vegetation and agricultural crops and totals 0.970 and 0.50 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 26 and 27 taf in wet and above-normal years, respectively and 24 taf in dry and critical water years. Much of the total ET of precipitation results from the large acreage of native vegetation in the Antelope Subbasin, though significant volumes result from agricultural and urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 10** and **Table 2K-10**. The total volume is relatively small and constant between years, averaging about 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

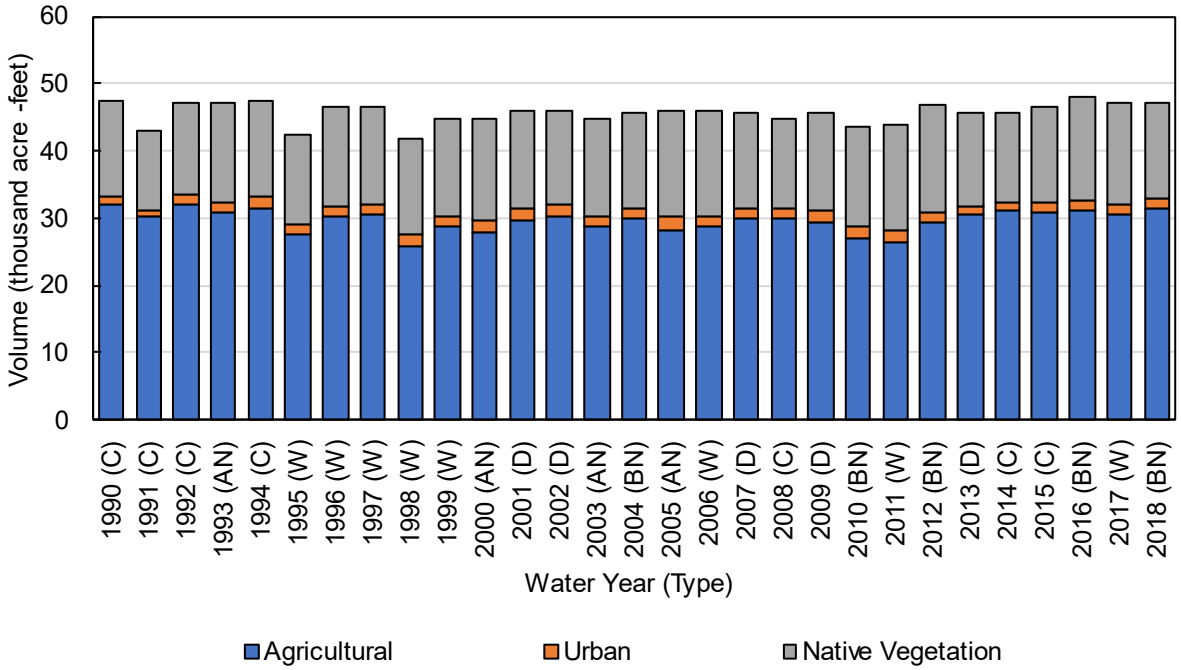


Figure 6. Antelope Subbasin Historical Total Evapotranspiration, by Water Use Sector

Table 6. Antelope Subbasin Historical Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		32,000	1,300	14,000	48,000
1991 (C)		30,000	1,100	12,000	43,000
1992 (C)		32,000	1,400	14,000	47,000
1993 (AN)		31,000	1,600	15,000	47,000
1994 (C)		32,000	1,600	14,000	47,000
1995 (W)		28,000	1,500	13,000	42,000
1996 (W)		30,000	1,600	15,000	46,000
1997 (W)		31,000	1,600	14,000	46,000
1998 (W)		26,000	1,700	14,000	42,000
1999 (W)		29,000	1,500	14,000	45,000
2000 (AN)		28,000	1,800	15,000	45,000
2001 (D)		30,000	1,600	15,000	46,000
2002 (D)		30,000	1,500	14,000	46,000
2003 (AN)		29,000	1,700	14,000	45,000
2004 (BN)		30,000	1,500	14,000	46,000
2005 (AN)		28,000	2,000	16,000	46,000
2006 (W)		29,000	1,800	15,000	46,000
2007 (D)		30,000	1,600	14,000	46,000
2008 (C)		30,000	1,300	14,000	45,000
2009 (D)		29,000	1,700	15,000	46,000
2010 (BN)		27,000	1,700	15,000	44,000
2011 (W)		26,000	1,800	16,000	44,000
2012 (BN)		29,000	1,700	16,000	47,000
2013 (D)		30,000	1,400	14,000	46,000
2014 (C)		31,000	1,300	13,000	46,000
2015 (C)		31,000	1,400	14,000	46,000
2016 (BN)		31,000	1,700	15,000	48,000
2017 (W)		31,000	1,600	15,000	47,000
2018 (BN)		32,000	1,500	14,000	47,000
Average (1990-2018)		30,000	1,600	14,000	46,000
1990-2018	W	29,000	1,600	15,000	45,000
	AN	29,000	1,800	15,000	46,000
	BN	30,000	1,600	15,000	46,000
	D	30,000	1,500	14,000	46,000
	C	31,000	1,400	14,000	46,000

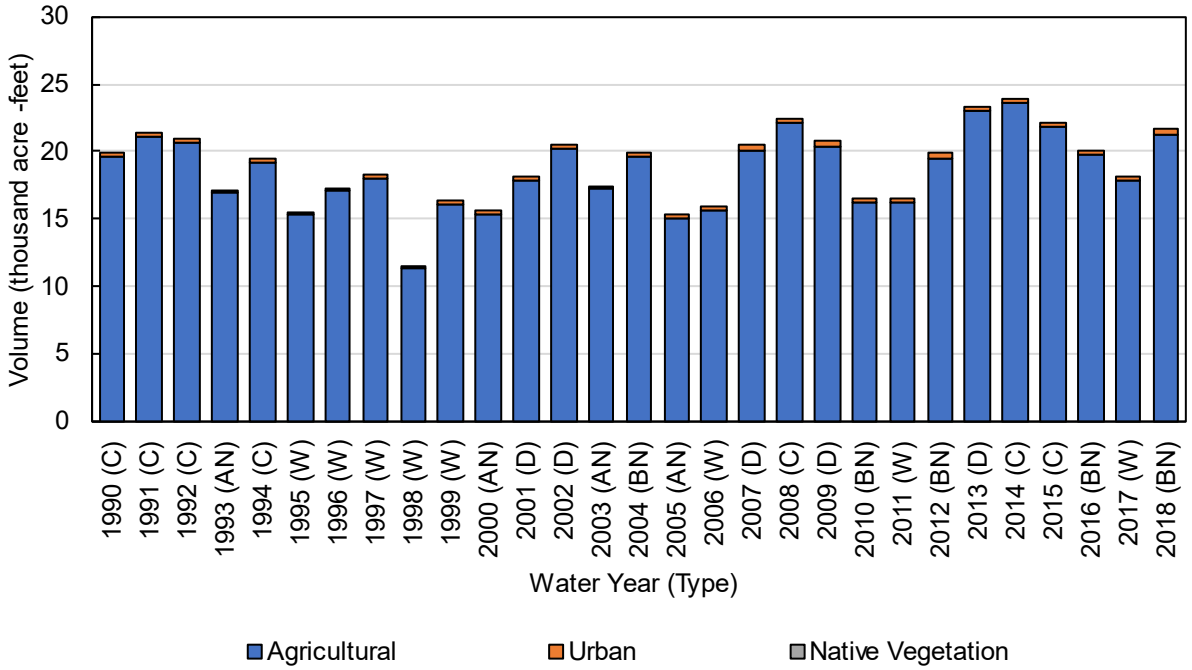


Figure 7. Antelope Subbasin Historical Evapotranspiration of Applied Water, by Water Use Sector

Table 7. Antelope Subbasin Historical Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		20,000	290	0	20,000
1991 (C)		21,000	270	0	21,000
1992 (C)		21,000	270	0	21,000
1993 (AN)		17,000	210	0	17,000
1994 (C)		19,000	330	0	19,000
1995 (W)		15,000	160	0	15,000
1996 (W)		17,000	220	0	17,000
1997 (W)		18,000	250	0	18,000
1998 (W)		11,000	150	0	11,000
1999 (W)		16,000	290	0	16,000
2000 (AN)		15,000	270	0	16,000
2001 (D)		18,000	310	0	18,000
2002 (D)		20,000	310	0	21,000
2003 (AN)		17,000	250	0	17,000
2004 (BN)		20,000	240	0	20,000
2005 (AN)		15,000	300	0	15,000
2006 (W)		16,000	240	0	16,000
2007 (D)		20,000	400	0	20,000
2008 (C)		22,000	340	0	22,000
2009 (D)		20,000	390	0	21,000
2010 (BN)		16,000	300	0	17,000
2011 (W)		16,000	350	0	17,000
2012 (BN)		20,000	420	0	20,000
2013 (D)		23,000	350	0	23,000
2014 (C)		24,000	380	0	24,000
2015 (C)		22,000	260	0	22,000
2016 (BN)		20,000	270	0	20,000
2017 (W)		18,000	220	0	18,000
2018 (BN)		21,000	400	0	22,000
Average (1990-2018)		19,000	290	0	19,000
1990-2018	W	16,000	240	0	16,000
	AN	16,000	260	0	16,000
	BN	19,000	330	0	20,000
	D	20,000	350	0	21,000
	C	21,000	310	0	21,000

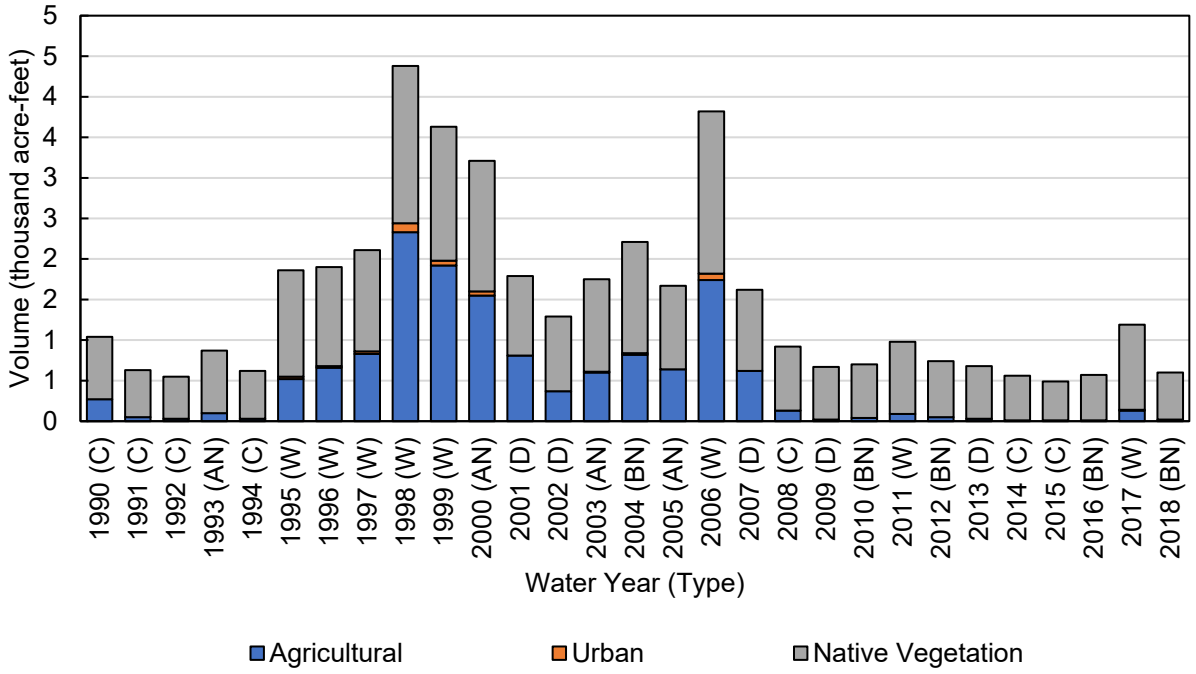


Figure 2. Antelope Subbasin Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 2. Antelope Subbasin Historical Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		270	0	770	1,000
1991 (C)		50	0	580	630
1992 (C)		30	0	520	550
1993 (AN)		100	0	770	870
1994 (C)		30	0	590	620
1995 (W)		520	30	1,300	1,900
1996 (W)		660	20	1,200	1,900
1997 (W)		830	30	1,300	2,100
1998 (W)		2,300	110	1,900	4,400
1999 (W)		1,900	60	1,700	3,600
2000 (AN)		1,600	50	1,600	3,200
2001 (D)		810	0	980	1,800
2002 (D)		370	0	920	1,300
2003 (AN)		600	10	1,100	1,800
2004 (BN)		820	20	1,400	2,200
2005 (AN)		640	0	1,000	1,700
2006 (W)		1,700	80	2,000	3,800
2007 (D)		620	0	1,000	1,600
2008 (C)		130	0	790	920
2009 (D)		20	0	650	670
2010 (BN)		40	0	660	700
2011 (W)		90	0	890	980
2012 (BN)		50	0	690	740
2013 (D)		30	0	650	680
2014 (C)		10	0	550	560
2015 (C)		10	0	480	490
2016 (BN)		10	0	560	570
2017 (W)		130	10	1,100	1,200
2018 (BN)		20	0	580	600
Average (1990-2018)		500	10	970	1,500
1990-2018	W	1,000	40	1,400	2,500
	AN	720	20	1,100	1,900
	BN	190	0	770	960
	D	370	0	840	1,200
	C	80	0	610	690

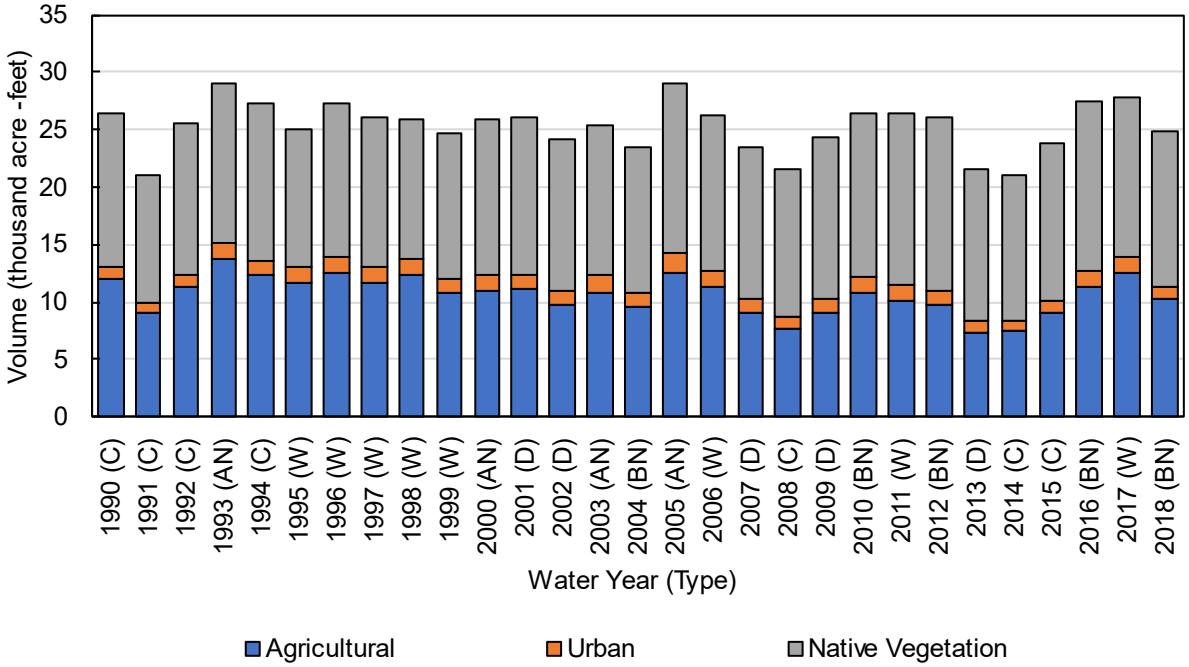


Figure 9. Antelope Subbasin Historical Evapotranspiration of Precipitation, by Water Use Sector

Table 9. Antelope Subbasin Historical Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		12,000	1,000	13,000	26,000
1991 (C)		9,000	850	11,000	21,000
1992 (C)		11,000	1,100	13,000	25,000
1993 (AN)		14,000	1,400	14,000	29,000
1994 (C)		12,000	1,200	14,000	27,000
1995 (W)		12,000	1,300	12,000	25,000
1996 (W)		13,000	1,300	13,000	27,000
1997 (W)		12,000	1,300	13,000	26,000
1998 (W)		12,000	1,400	12,000	26,000
1999 (W)		11,000	1,200	13,000	25,000
2000 (AN)		11,000	1,500	14,000	26,000
2001 (D)		11,000	1,300	14,000	26,000
2002 (D)		9,800	1,200	13,000	24,000
2003 (AN)		11,000	1,400	13,000	25,000
2004 (BN)		9,600	1,200	13,000	24,000
2005 (AN)		13,000	1,700	15,000	29,000
2006 (W)		11,000	1,400	13,000	26,000
2007 (D)		9,100	1,200	13,000	23,000
2008 (C)		7,700	1,000	13,000	22,000
2009 (D)		9,100	1,300	14,000	24,000
2010 (BN)		11,000	1,400	14,000	26,000
2011 (W)		10,000	1,500	15,000	26,000
2012 (BN)		9,700	1,300	15,000	26,000
2013 (D)		7,400	1,000	13,000	22,000
2014 (C)		7,500	940	13,000	21,000
2015 (C)		9,000	1,200	14,000	24,000
2016 (BN)		11,000	1,400	15,000	27,000
2017 (W)		12,000	1,400	14,000	28,000
2018 (BN)		10,000	1,100	13,000	25,000
Average (1990-2018)		11,000	1,300	13,000	25,000
1990-2018	W	12,000	1,400	13,000	26,000
	AN	12,000	1,500	14,000	27,000
	BN	10,000	1,300	14,000	26,000
	D	9,300	1,200	13,000	24,000
	C	9,900	1,000	13,000	24,000

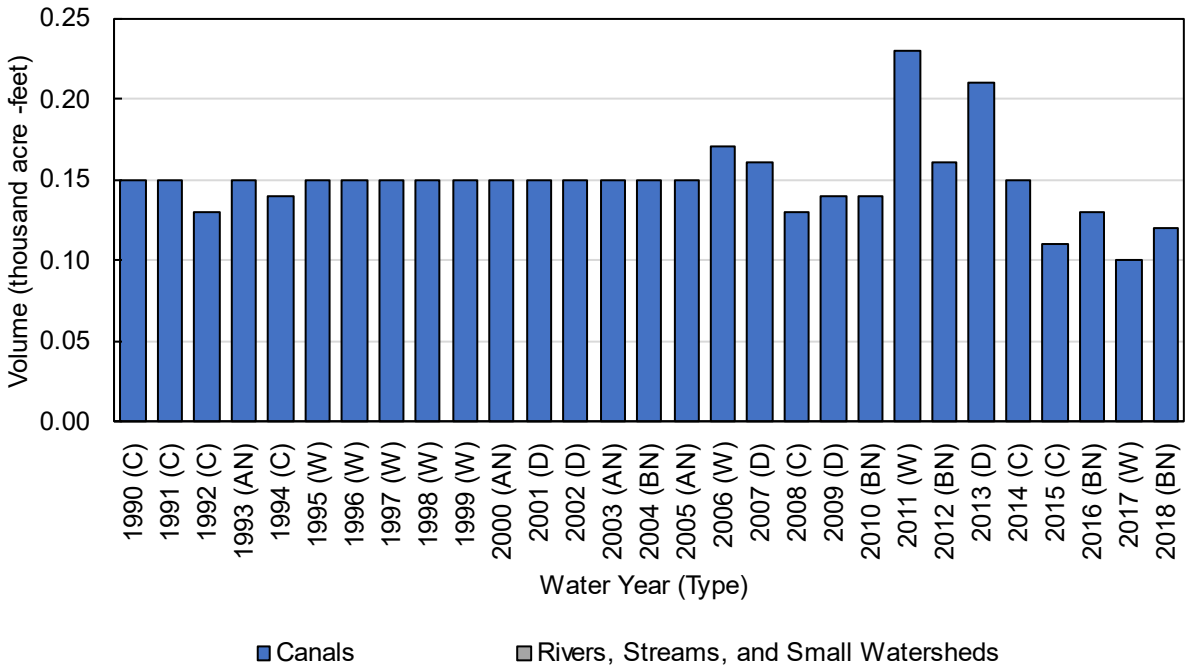


Figure 10. Antelope Subbasin Historical Evaporation of Surface Water Sources

Table 10. Antelope Subbasin Historical Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
1990 (C)		150	0	150
1991 (C)		150	0	150
1992 (C)		130	0	130
1993 (AN)		150	0	150
1994 (C)		140	0	140
1995 (W)		150	0	150
1996 (W)		150	0	150
1997 (W)		150	0	150
1998 (W)		150	0	150
1999 (W)		150	0	150
2000 (AN)		150	0	150
2001 (D)		150	0	150
2002 (D)		150	0	150
2003 (AN)		150	0	150
2004 (BN)		150	0	150
2005 (AN)		150	0	150
2006 (W)		170	0	170
2007 (D)		160	0	160
2008 (C)		130	0	130
2009 (D)		140	0	140
2010 (BN)		140	0	140
2011 (W)		230	0	230
2012 (BN)		160	0	160
2013 (D)		210	0	210
2014 (C)		150	0	150
2015 (C)		110	0	110
2016 (BN)		130	0	130
2017 (W)		100	0	100
2018 (BN)		120	0	120
Average (1990-2018)		150	0	150
1990-2018	W	160	0	160
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

1.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 11** and **Table 11** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 39 taf per year and range from 29 taf or less in dry years up to 86 taf in 1998. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

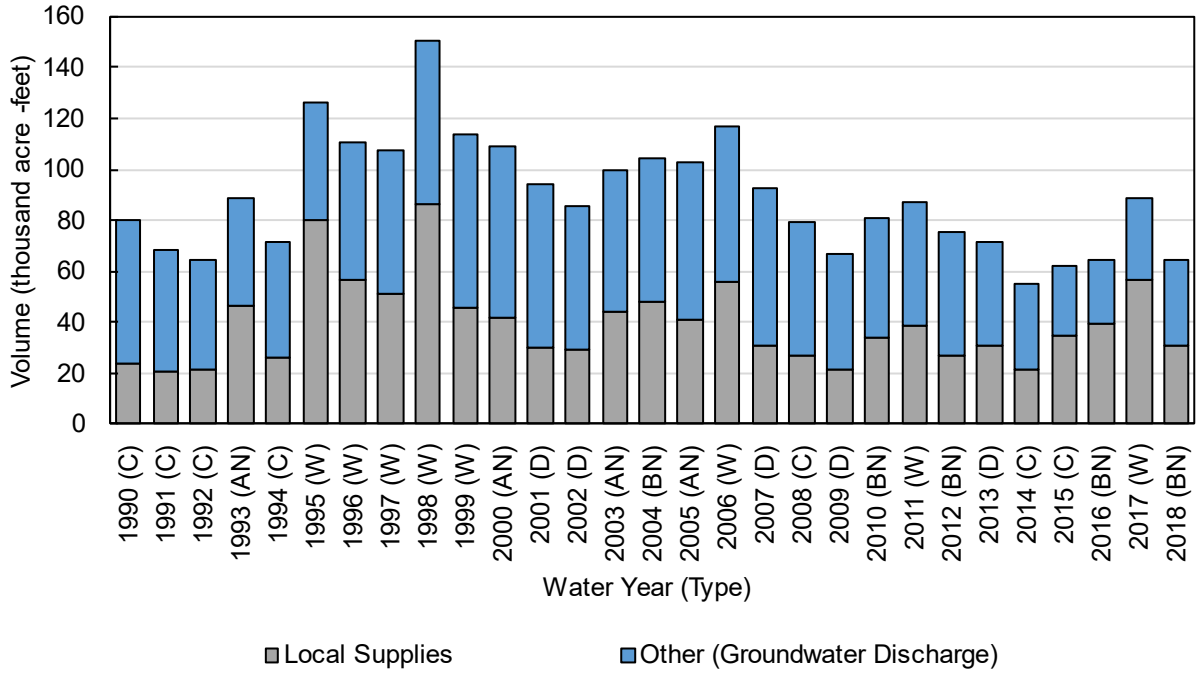


Figure 11. Antelope Subbasin Historical Surface Water Outflows, by Water Source Type

Table 11. Antelope Subbasin Historical Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)		CVP	Local Supplies	Other (Groundwater Discharge)	Total
1990 (C)		0	24,000	57,000	80,000
1991 (C)		0	20,000	48,000	68,000
1992 (C)		0	22,000	43,000	64,000
1993 (AN)		0	46,000	43,000	89,000
1994 (C)		0	26,000	45,000	72,000
1995 (W)		0	80,000	46,000	130,000
1996 (W)		0	57,000	54,000	110,000
1997 (W)		0	51,000	57,000	110,000
1998 (W)		0	86,000	64,000	150,000
1999 (W)		0	46,000	68,000	110,000
2000 (AN)		0	42,000	67,000	110,000
2001 (D)		0	30,000	64,000	94,000
2002 (D)		0	29,000	56,000	86,000
2003 (AN)		0	44,000	55,000	100,000
2004 (BN)		0	48,000	57,000	100,000
2005 (AN)		0	41,000	62,000	100,000
2006 (W)		0	56,000	61,000	120,000
2007 (D)		0	31,000	62,000	93,000
2008 (C)		0	27,000	52,000	79,000
2009 (D)		0	22,000	45,000	67,000
2010 (BN)		0	34,000	47,000	81,000
2011 (W)		0	39,000	48,000	87,000
2012 (BN)		0	27,000	48,000	75,000
2013 (D)		0	31,000	41,000	71,000
2014 (C)		0	22,000	33,000	55,000
2015 (C)		0	35,000	28,000	62,000
2016 (BN)		0	40,000	25,000	65,000
2017 (W)		0	57,000	32,000	89,000
2018 (BN)		0	31,000	34,000	65,000
Average (1990-2018)		0	39,000	50,000	89,000
1990-2018	W	0	59,000	54,000	110,000
	AN	0	43,000	57,000	100,000
	BN	0	36,000	42,000	78,000
	D	0	29,000	54,000	82,000
	C	0	25,000	44,000	69,000

1.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 12** and **Table 12** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

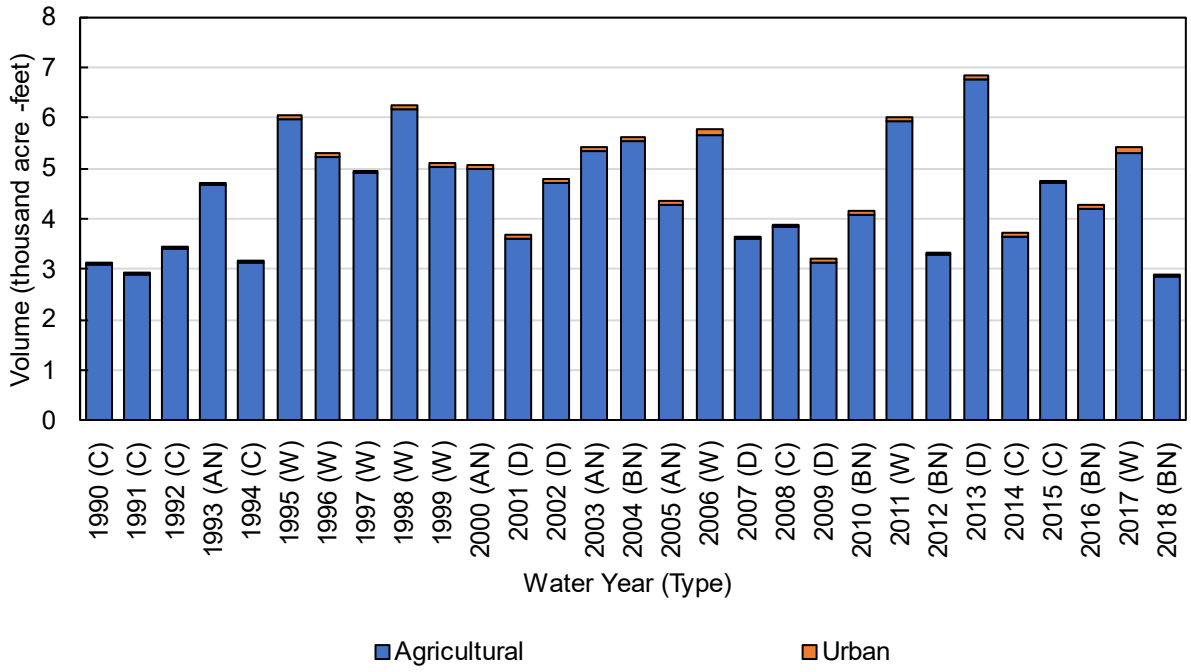


Figure 12. Antelope Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector

Table 12. Antelope Subbasin Historical Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		3,100	50	0	3,100
1991 (C)		2,900	40	0	2,900
1992 (C)		3,400	50	0	3,500
1993 (AN)		4,700	60	0	4,700
1994 (C)		3,100	50	0	3,200
1995 (W)		6,000	70	0	6,000
1996 (W)		5,200	80	0	5,300
1997 (W)		4,900	70	0	5,000
1998 (W)		6,200	90	0	6,300
1999 (W)		5,000	90	0	5,100
2000 (AN)		5,000	80	0	5,100
2001 (D)		3,600	60	0	3,700
2002 (D)		4,700	70	0	4,800
2003 (AN)		5,300	80	0	5,400
2004 (BN)		5,500	90	0	5,600
2005 (AN)		4,300	80	0	4,400
2006 (W)		5,700	100	0	5,800
2007 (D)		3,600	50	0	3,700
2008 (C)		3,800	70	0	3,900
2009 (D)		3,100	50	0	3,200
2010 (BN)		4,100	90	0	4,200
2011 (W)		5,900	90	0	6,000
2012 (BN)		3,300	50	0	3,300
2013 (D)		6,800	70	0	6,800
2014 (C)		3,700	50	0	3,700
2015 (C)		4,700	60	0	4,800
2016 (BN)		4,200	60	0	4,300
2017 (W)		5,300	90	0	5,400
2018 (BN)		2,900	50	0	2,900
Average (1990-2018)		4,500	70	0	4,600
1990-2018	W	5,500	90	0	5,600
	AN	4,800	80	0	4,900
	BN	4,000	70	0	4,100
	D	4,400	60	0	4,400
	C	3,500	50	0	3,600

1.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 13** and **Table 13** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from less than 4.6 taf annually during some critical and dry years to about 18 taf in 1998.

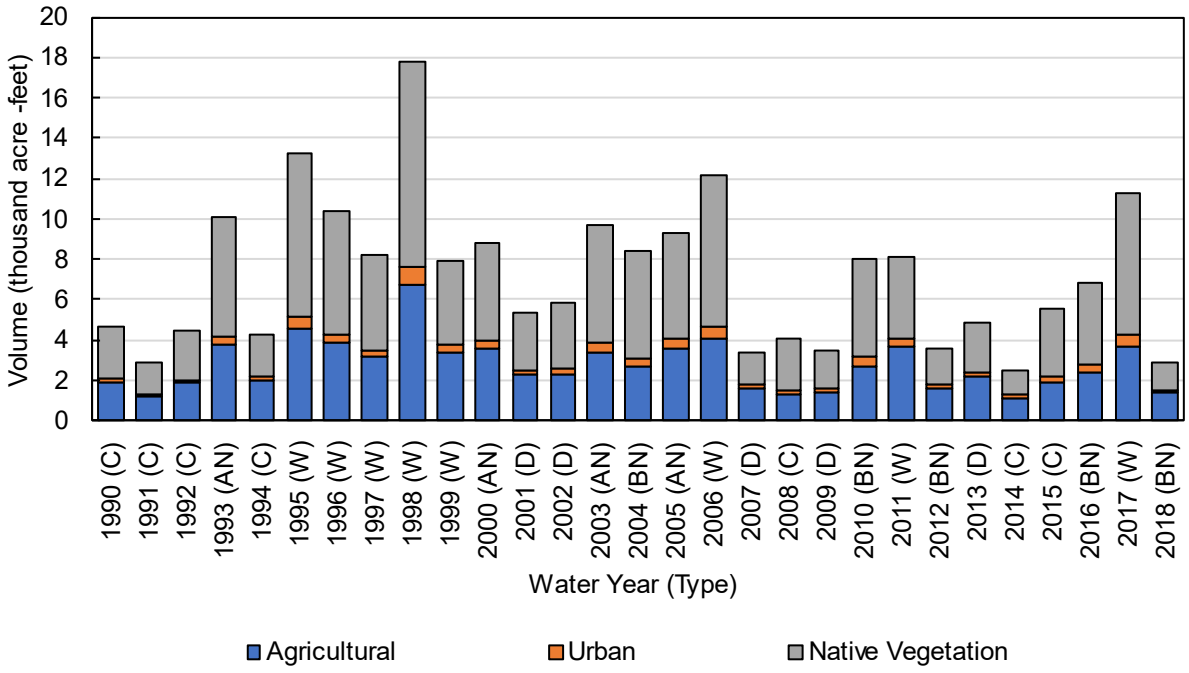


Figure 13. Antelope Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector

Table 13. Antelope Subbasin Historical Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
1990 (C)		1,900	190	2,600	4,700
1991 (C)		1,200	110	1,500	2,900
1992 (C)		1,900	180	2,500	4,500
1993 (AN)		3,800	410	5,900	10,000
1994 (C)		2,000	170	2,100	4,300
1995 (W)		4,600	610	8,100	13,000
1996 (W)		3,900	460	6,100	10,000
1997 (W)		3,200	360	4,700	8,300
1998 (W)		6,800	860	10,000	18,000
1999 (W)		3,400	380	4,200	7,900
2000 (AN)		3,600	440	4,800	8,800
2001 (D)		2,300	250	2,900	5,400
2002 (D)		2,300	280	3,300	5,900
2003 (AN)		3,400	470	5,900	9,700
2004 (BN)		2,700	430	5,300	8,400
2005 (AN)		3,600	450	5,300	9,300
2006 (W)		4,100	600	7,500	12,000
2007 (D)		1,600	140	1,600	3,400
2008 (C)		1,300	200	2,500	4,100
2009 (D)		1,400	180	1,900	3,500
2010 (BN)		2,700	440	4,900	8,000
2011 (W)		3,700	360	4,000	8,100
2012 (BN)		1,600	170	1,800	3,600
2013 (D)		2,200	210	2,500	4,900
2014 (C)		1,200	130	1,200	2,500
2015 (C)		2,000	260	3,400	5,600
2016 (BN)		2,400	340	4,100	6,800
2017 (W)		3,700	570	7,000	11,000
2018 (BN)		1,400	140	1,400	2,900
Average (1990-2018)		2,700	340	4,100	7,200
1990-2018	W	4,100	530	6,500	11,000
	AN	3,600	440	5,500	9,500
	BN	2,200	300	3,500	6,000
	D	2,000	210	2,400	4,600
	C	1,600	180	2,300	4,100

1.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 14** and **Table 14.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than four (4) taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.1 taf per year.

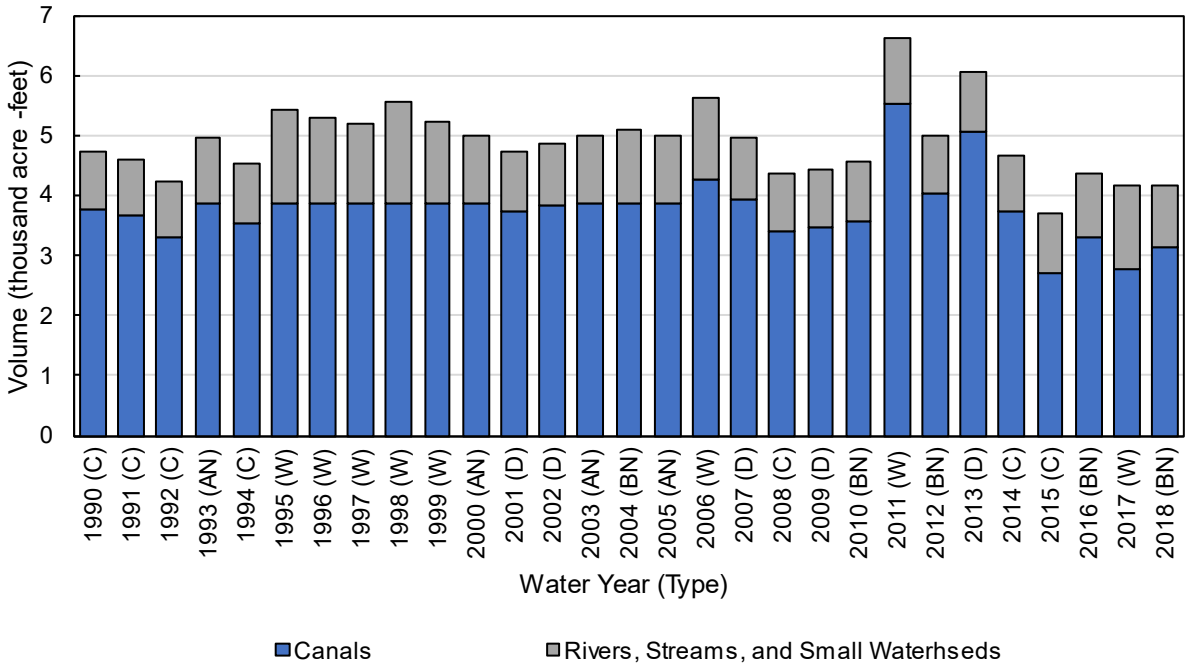


Figure 14. Antelope Subbasin Historical Infiltration of Surface Water, by Water Use Sector

Table 14. Antelope Subbasin Historical Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
1990 (C)		3,800	960	4,700
1991 (C)		3,700	920	4,600
1992 (C)		3,300	930	4,200
1993 (AN)		3,900	1,100	5,000
1994 (C)		3,500	980	4,500
1995 (W)		3,900	1,500	5,400
1996 (W)		3,900	1,400	5,300
1997 (W)		3,900	1,300	5,200
1998 (W)		3,900	1,700	5,600
1999 (W)		3,900	1,400	5,200
2000 (AN)		3,900	1,100	5,000
2001 (D)		3,700	1,000	4,700
2002 (D)		3,800	1,000	4,900
2003 (AN)		3,900	1,100	5,000
2004 (BN)		3,900	1,200	5,100
2005 (AN)		3,900	1,100	5,000
2006 (W)		4,300	1,400	5,600
2007 (D)		3,900	1,100	5,000
2008 (C)		3,400	980	4,400
2009 (D)		3,500	950	4,400
2010 (BN)		3,600	990	4,600
2011 (W)		5,500	1,100	6,600
2012 (BN)		4,000	980	5,000
2013 (D)		5,100	1,000	6,100
2014 (C)		3,700	940	4,700
2015 (C)		2,700	980	3,700
2016 (BN)		3,300	1,100	4,400
2017 (W)		2,800	1,400	4,200
2018 (BN)		3,200	1,000	4,200
Average (1990-2018)		3,800	1,100	4,900
1990-2018	W	4,000	1,400	5,400
	AN	3,900	1,100	5,000
	BN	3,600	1,100	4,600
	D	4,000	1,000	5,000
	C	3,400	960	4,400

1.1.3 Change in Root Zone Storage

Estimates of change in root zone storage are provided in **Figure 15** and **Table 15**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average below 0.10 taf over many years.

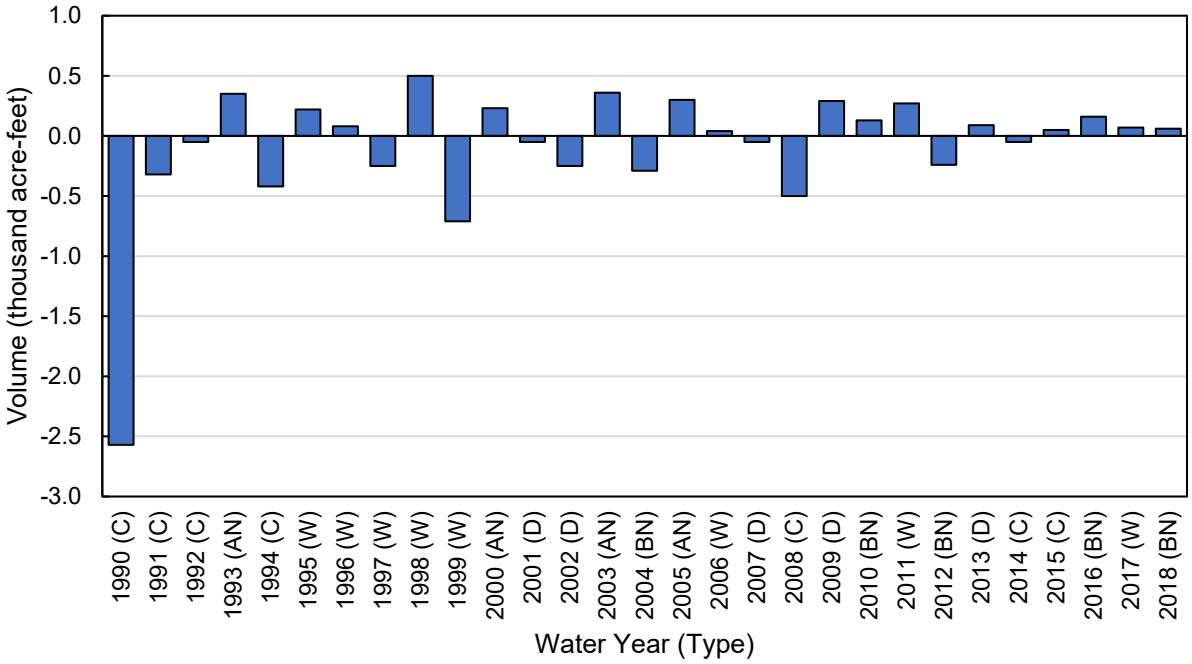


Figure 15. Antelope Subbasin Historical Change in Root Zone Storage

Table 15. Antelope Subbasin Historical Change in Root Zone Storage (acre-feet)

Water Year (Type)		Change in Root Zone Storage
1990 (C)		-2,600
1991 (C)		-320
1992 (C)		-50
1993 (AN)		350
1994 (C)		-420
1995 (W)		220
1996 (W)		80
1997 (W)		-250
1998 (W)		500
1999 (W)		-710
2000 (AN)		230
2001 (D)		-50
2002 (D)		-250
2003 (AN)		360
2004 (BN)		-290
2005 (AN)		300
2006 (W)		40
2007 (D)		-50
2008 (C)		-500
2009 (D)		290
2010 (BN)		130
2011 (W)		270
2012 (BN)		-240
2013 (D)		90
2014 (C)		-50
2015 (C)		50
2016 (BN)		160
2017 (W)		70
2018 (BN)		60
Average (1990-2018)		-90
1990-2018	W	30
	AN	310
	BN	-40
	D	10
	C	-550

1.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction and uptake. When calculated for the historical water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from historical cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, Groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the historical water budget period are presented below for the Antelope Subbasin. **Figure 16** and **Table 16** show the average net recharge from the SWS over 1990-2018 based on the historical water budget results. Historically, the average net recharge in the Antelope Subbasin was approximately two (2) taf per year between 1990-2018, indicating net outflows from the SWS to the GWS during the historical water budget period. As illustrated on the cumulative net recharge plot in **Figure 16**, this results in a cumulative net positive recharge (i.e., net discharge from the SWS to the GWS) of about 60 taf over the 29-year historical water budget period. Although this means there has historically been more recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage is increasing or that the Subbasin groundwater system has been sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

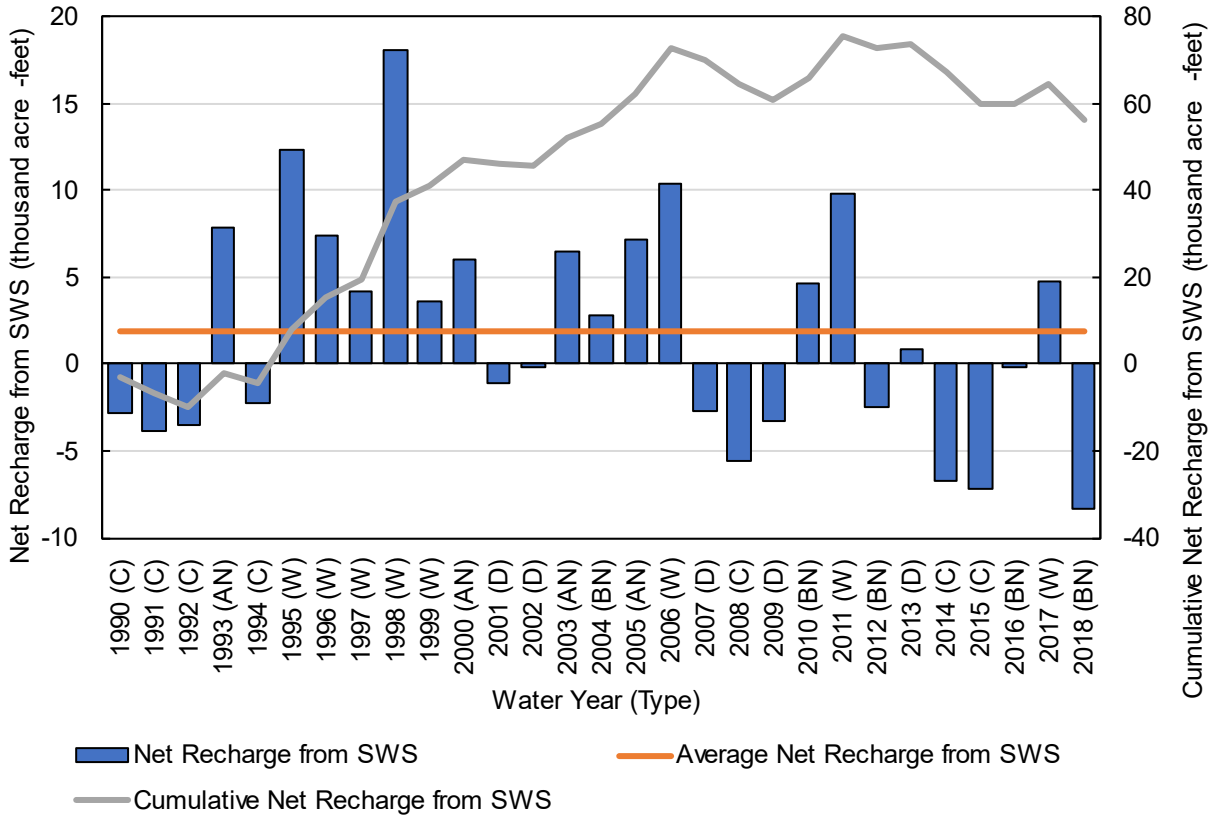


Figure 16. Antelope Subbasin Historical Net Recharge Overview, 1990-2018

Table 16. Antelope Subbasin Historical Water Budget: Average Net Recharge from SWS by Water Year Type (acre-feet)

Year Type	Number of Years	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	8	5,600	11,000	5,400	13,000	9,000
AN	4	4,900	9,500	5,000	12,000	7,400
BN	5	4,100	6,000	4,600	15,000	-300
D	5	4,400	4,600	5,000	15,000	-1,000
C	7	3,600	4,100	4,400	17,000	-4,900
Annual Average (1990-2018)	29	4,600	7,200	4,900	15,000	2,000

1.2 Groundwater System Water Budget Results

Historical water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

1.1.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

1.1.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Historical lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 17** and **Table 17**. The total historical net subsurface flows to and from all adjacent subbasins averages about 50 taf per year occurring as inflow to the Antelope Subbasin. The largest historical subsurface flows occur across the boundary with the Red Bluff Subbasin with somewhat less subsurface flow occurring across the boundaries with the Bend Subbasin although these flows are still considerable. Much smaller flows occur across the boundaries with the Los Molinos Subbasin.

Historical subsurface flows with the Red Bluff Subbasin average about 25 taf occurring as inflows to the Antelope Subbasin. This makes up about half of the subsurface inflows occurring to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Bend Subbasin to the Antelope Subbasin average about 4.7 and 20 taf, respectively. The magnitudes of the subsurface inflows from the Bend Subbasin and Red Bluff Subbasins are relatively consistent from year to year; however, the inflows/outflows with the

Los Molinos Subbasin are somewhat variable. Historical subsurface flows across the boundary with the Los Molinos Subbasin generally occur as inflows with some smaller volumes of outflows occurring in 1992, 1993, 2015, and 2016.

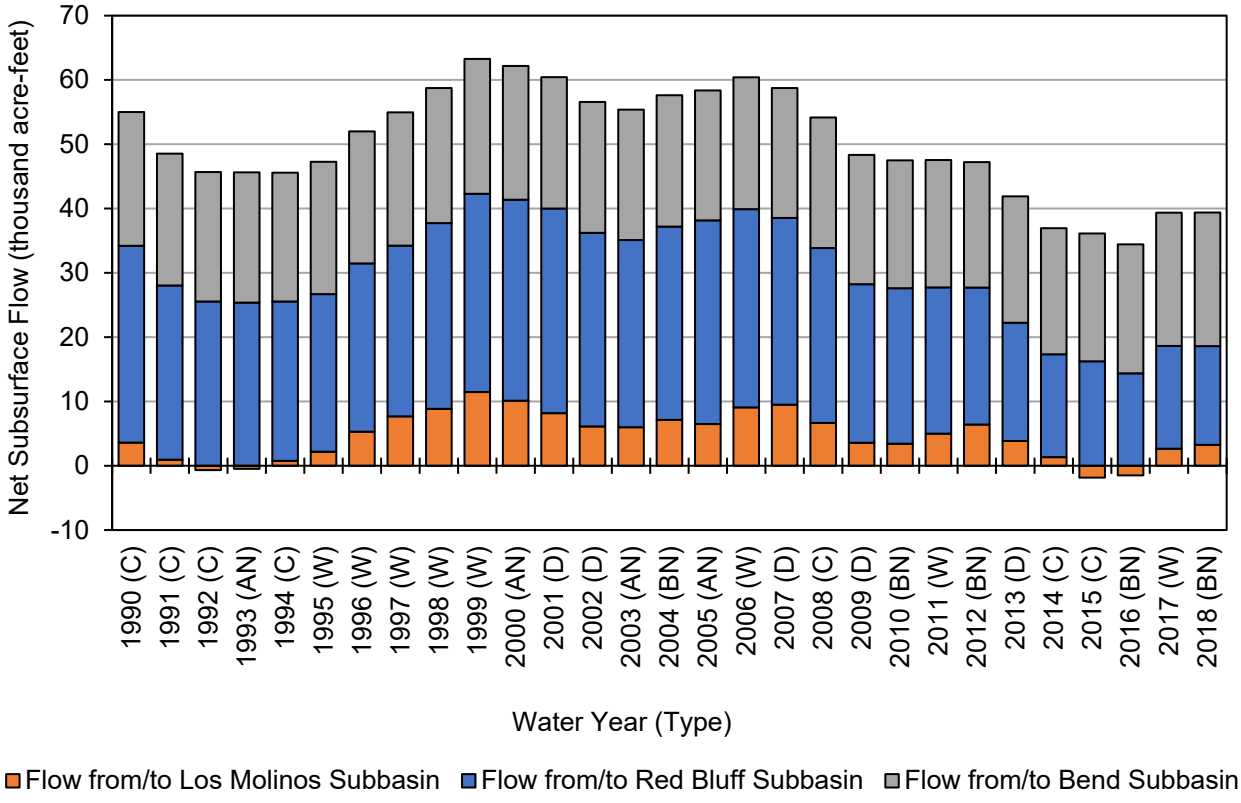


Figure 17. Antelope Subbasin Historical Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 17. Antelope Subbasin Historical Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

Water Year (Type)		Bend	Red Bluff	Los Molinos	Total
1990 (C)		31,000	3,600	21,000	55,000
1991 (C)		27,000	930	21,000	49,000
1992 (C)		26,000	-690	20,000	45,000
1993 (AN)		25,000	-480	20,000	45,000
1994 (C)		25,000	770	20,000	46,000
1995 (W)		25,000	2,200	21,000	47,000
1996 (W)		26,000	5,300	21,000	52,000
1997 (W)		27,000	7,700	21,000	55,000
1998 (W)		29,000	8,800	21,000	59,000
1999 (W)		31,000	11,000	21,000	63,000
2000 (AN)		31,000	10,000	21,000	62,000
2001 (D)		32,000	8,200	20,000	60,000
2002 (D)		30,000	6,100	20,000	57,000
2003 (AN)		29,000	6,000	20,000	55,000
2004 (BN)		30,000	7,100	20,000	58,000
2005 (AN)		32,000	6,500	20,000	58,000
2006 (W)		31,000	9,100	21,000	60,000
2007 (D)		29,000	9,500	20,000	59,000
2008 (C)		27,000	6,700	20,000	54,000
2009 (D)		25,000	3,600	20,000	48,000
2010 (BN)		24,000	3,400	20,000	47,000
2011 (W)		23,000	5,000	20,000	48,000
2012 (BN)		21,000	6,400	19,000	47,000
2013 (D)		18,000	3,800	20,000	42,000
2014 (C)		16,000	1,300	20,000	37,000
2015 (C)		16,000	-1,800	20,000	34,000
2016 (BN)		14,000	-1,500	20,000	33,000
2017 (W)		16,000	2,700	21,000	39,000
2018 (BN)		15,000	3,300	21,000	39,000
Average (1990-2018)		25,000	4,700	20,000	50,000
1990-2018	W	26,000	6,500	21,000	53,000
	AN	29,000	4,000	20,000	53,000
	BN	20,000	2,900	20,000	43,000
	D	27,000	6,200	20,000	53,000
	C	24,000	1,500	20,000	46,000

1.1.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Historical lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 18** and **Table 18**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average historical subsurface inflow from the upland areas is about 0.3 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

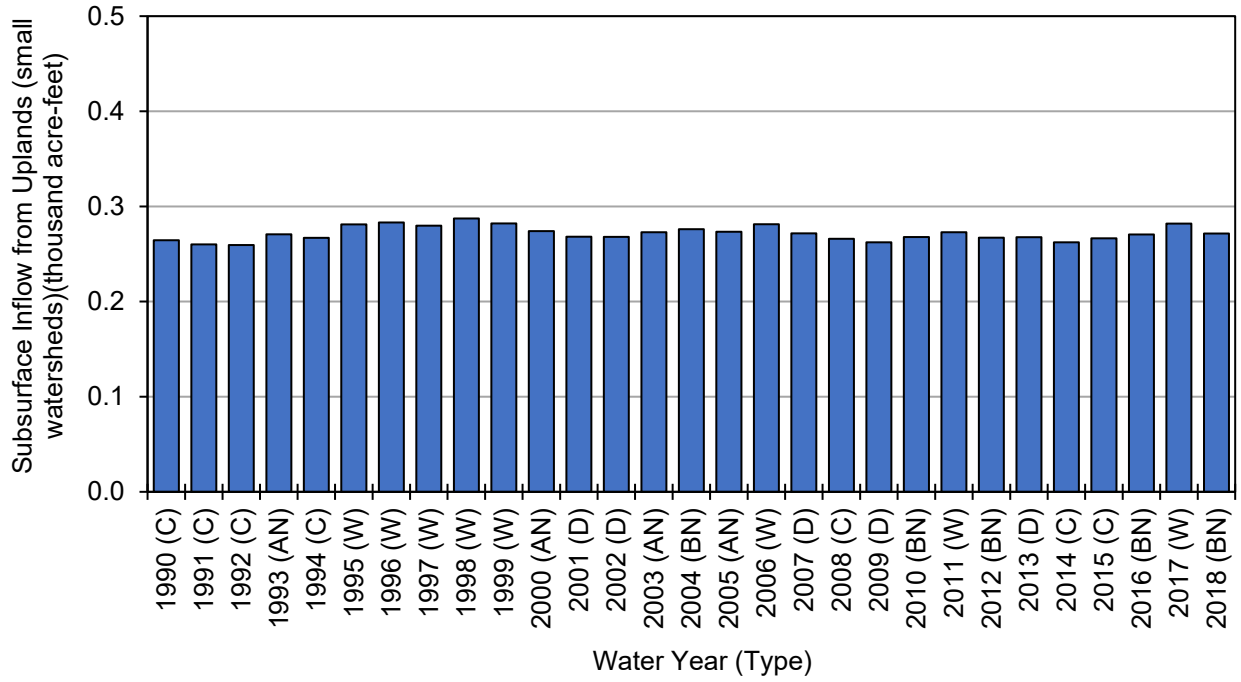


Figure 18. Antelope Subbasin Historical Subsurface Groundwater Inflows from Upland Areas

Table 18. Antelope Subbasin Historical Subsurface Groundwater Inflows from Adjacent Uplands (Small Watersheds) (acre-feet)

Water Year (Type)		Subsurface Inflow from Uplands
1990 (C)		260
1991 (C)		260
1992 (C)		260
1993 (AN)		270
1994 (C)		270
1995 (W)		280
1996 (W)		280
1997 (W)		280
1998 (W)		290
1999 (W)		280
2000 (AN)		270
2001 (D)		270
2002 (D)		270
2003 (AN)		270
2004 (BN)		280
2005 (AN)		270
2006 (W)		280
2007 (D)		270
2008 (C)		270
2009 (D)		260
2010 (BN)		270
2011 (W)		270
2012 (BN)		270
2013 (D)		270
2014 (C)		260
2015 (C)		270
2016 (BN)		270
2017 (W)		280
2018 (BN)		270
Average (1990-2018)		270
1990-2018	W	280
	AN	270
	BN	270
	D	270
	C	260

1.1.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 19** and **Table 19**. The average annual deep percolation from the SWS over the historical water budget period is approximately 12 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

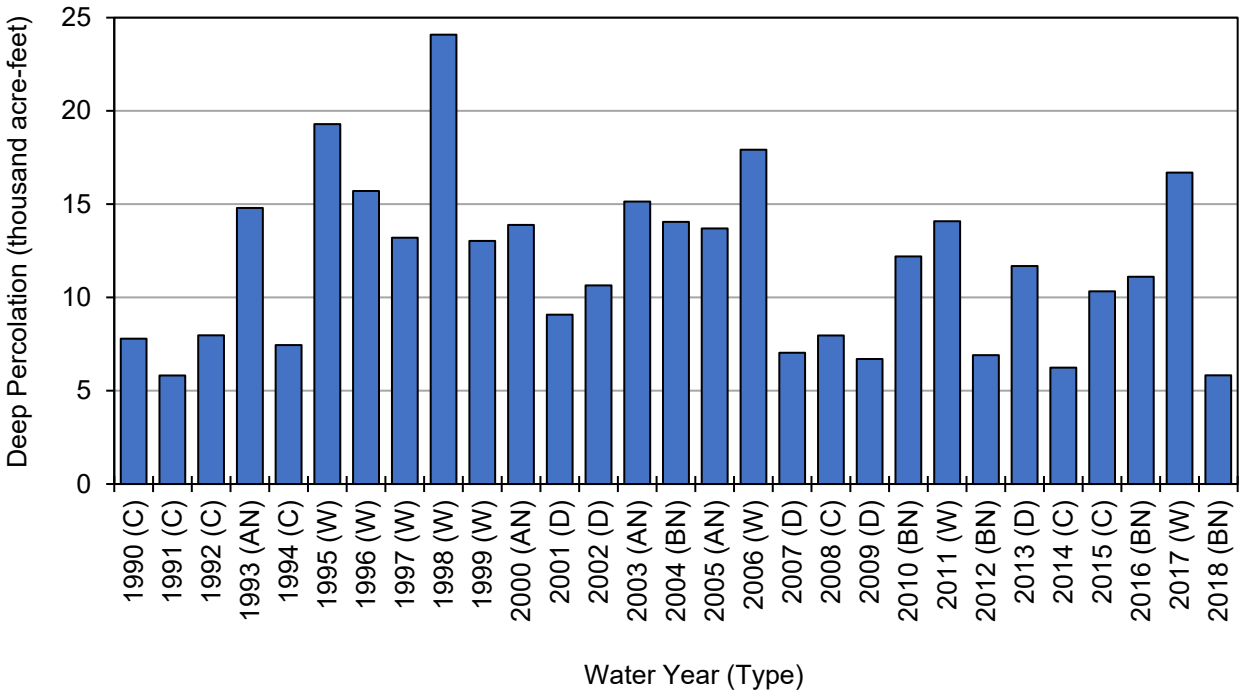


Figure 19. Antelope Subbasin Historical Deep Percolation

Table 19. Antelope Subbasin Historical Deep Percolation from the SWS (acre-feet)

Water Year (Type)		Deep Percolation from the SWS
1990 (C)		7,800
1991 (C)		5,800
1992 (C)		8,000
1993 (AN)		15,000
1994 (C)		7,400
1995 (W)		19,000
1996 (W)		16,000
1997 (W)		13,000
1998 (W)		24,000
1999 (W)		13,000
2000 (AN)		14,000
2001 (D)		9,100
2002 (D)		11,000
2003 (AN)		15,000
2004 (BN)		14,000
2005 (AN)		14,000
2006 (W)		18,000
2007 (D)		7,000
2008 (C)		8,000
2009 (D)		6,700
2010 (BN)		12,000
2011 (W)		14,000
2012 (BN)		6,900
2013 (D)		12,000
2014 (C)		6,200
2015 (C)		10,000
2016 (BN)		11,000
2017 (W)		17,000
2018 (BN)		5,800
Average (1990-2018)		12,000
1990-2018	W	17,000
	AN	15,000
	BN	10,000
	D	9,000
	C	7,700

1.1.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 20** and **Table 20**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the historical annual net seepage values are always highly negative with an average annual net stream seepage value of -55 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

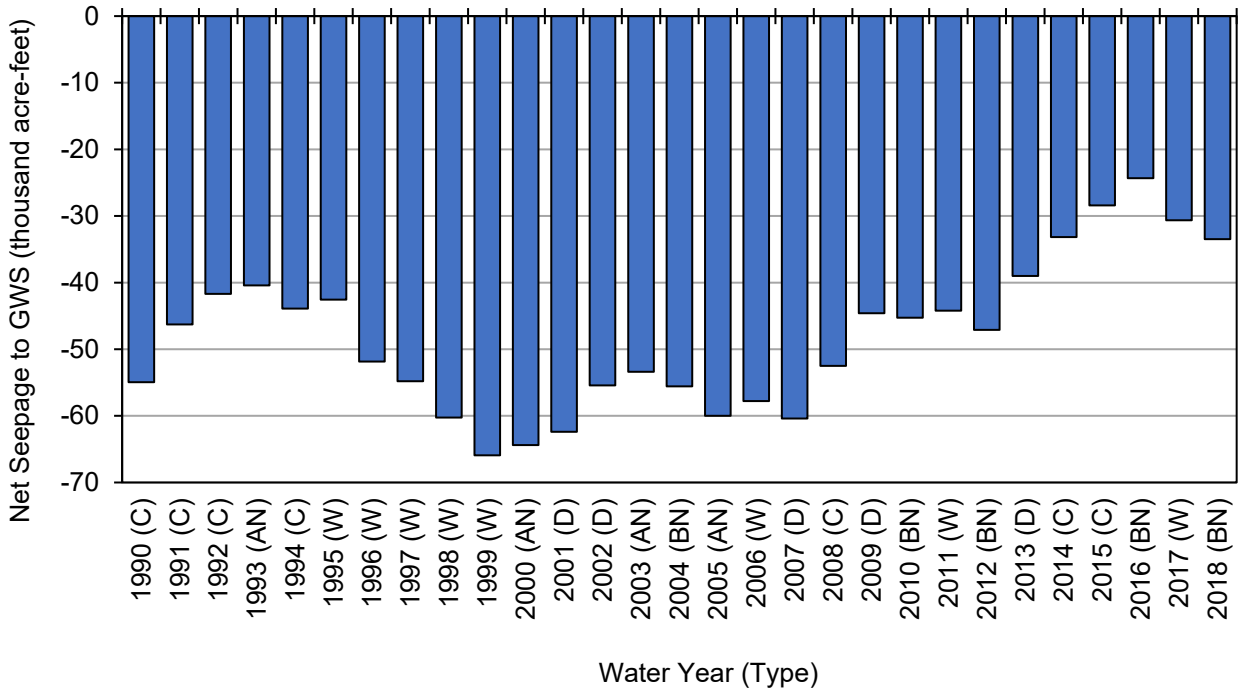


Figure 20. Antelope Subbasin Historical Net Stream Seepage to GWS/ Discharge to Surface Water

Table 20. Antelope Subbasin Historical Net Stream Seepage (net flows as acre-feet)

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
1990 (C)		-52,000
1991 (C)		-83,000
1992 (C)		-77,000
1993 (AN)		-68,000
1994 (C)		-59,000
1995 (W)		-55,000
1996 (W)		-46,000
1997 (W)		-42,000
1998 (W)		-40,000
1999 (W)		-44,000
2000 (AN)		-43,000
2001 (D)		-52,000
2002 (D)		-55,000
2003 (AN)		-60,000
2004 (BN)		-66,000
2005 (AN)		-64,000
2006 (W)		-62,000
2007 (D)		-55,000
2008 (C)		-53,000
2009 (D)		-56,000
2010 (BN)		-60,000
2011 (W)		-58,000
2012 (BN)		-60,000
2013 (D)		-53,000
2014 (C)		-45,000
2015 (C)		-45,000
2016 (BN)		-44,000
2017 (W)		-47,000
2018 (BN)		-39,000
Average (1990-2018)		-55,000
1990-2018	W	32,000
	AN	33,000
	BN	23,000
	D	33,000
	C	25,000

Note: negative values indicate net groundwater discharge to surface water

1.1.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Historical groundwater extractions are summarized in **Figure 21** and **Table 21** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the historical water budget period average about -15 taf per year. Overall, groundwater pumping represents a larger fraction (about eight times) of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -13 taf over the historical period and groundwater uptake averaged about -1.5 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

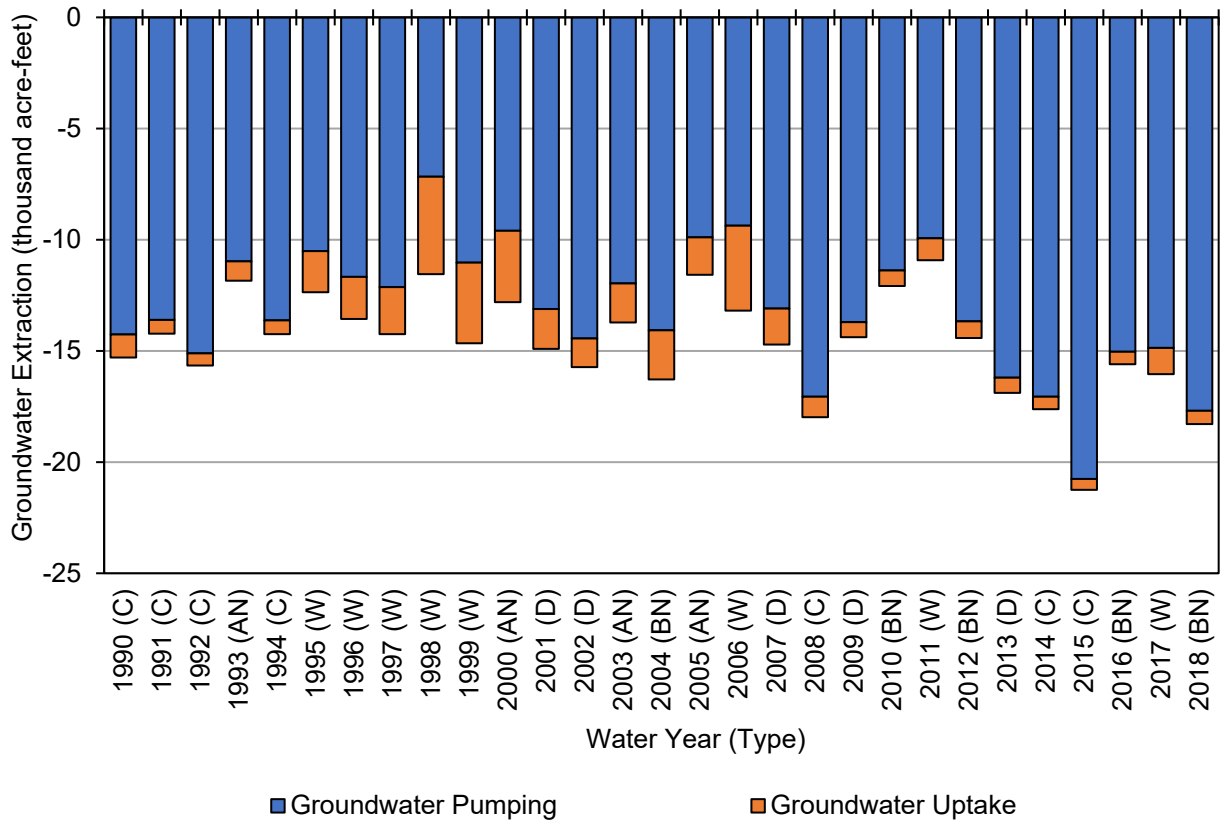


Figure 21. Antelope Subbasin Historical Groundwater Extractions

Table 21. Antelope Subbasin Historical Groundwater Extractions (acre-feet)

Water Year (Type)		Groundwater Pumping	Groundwater Uptake	Total
1990 (C)		-14,000	-1,000	-15,000
1991 (C)		-14,000	-620	-14,000
1992 (C)		-15,000	-550	-16,000
1993 (AN)		-11,000	-870	-12,000
1994 (C)		-14,000	-620	-14,000
1995 (W)		-11,000	-1,900	-12,000
1996 (W)		-12,000	-1,900	-14,000
1997 (W)		-12,000	-2,100	-14,000
1998 (W)		-7,200	-4,400	-12,000
1999 (W)		-11,000	-3,600	-15,000
2000 (AN)		-9,600	-3,200	-13,000
2001 (D)		-13,000	-1,800	-15,000
2002 (D)		-14,000	-1,300	-16,000
2003 (AN)		-12,000	-1,800	-14,000
2004 (BN)		-14,000	-2,200	-16,000
2005 (AN)		-9,900	-1,700	-12,000
2006 (W)		-9,400	-3,800	-13,000
2007 (D)		-13,000	-1,600	-15,000
2008 (C)		-17,000	-920	-18,000
2009 (D)		-14,000	-670	-14,000
2010 (BN)		-11,000	-700	-12,000
2011 (W)		-9,900	-980	-11,000
2012 (BN)		-14,000	-740	-14,000
2013 (D)		-16,000	-680	-17,000
2014 (C)		-17,000	-560	-18,000
2015 (C)		-21,000	-490	-21,000
2016 (BN)		-15,000	-570	-16,000
2017 (W)		-15,000	-1,200	-16,000
2018 (BN)		-18,000	-600	-18,000
Average (1990-2018)		-13,000	-1,500	-15,000
1990-2018	W	-11,000	-2,500	-13,000
	AN	-11,000	-1,400	-12,000
	BN	-14,000	-900	-15,000
	D	-14,000	-1,200	-15,000
	C	-16,000	-690	-17,000

1.1.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Historical vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 22** and **Table 22** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 34 taf per year over the historical water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

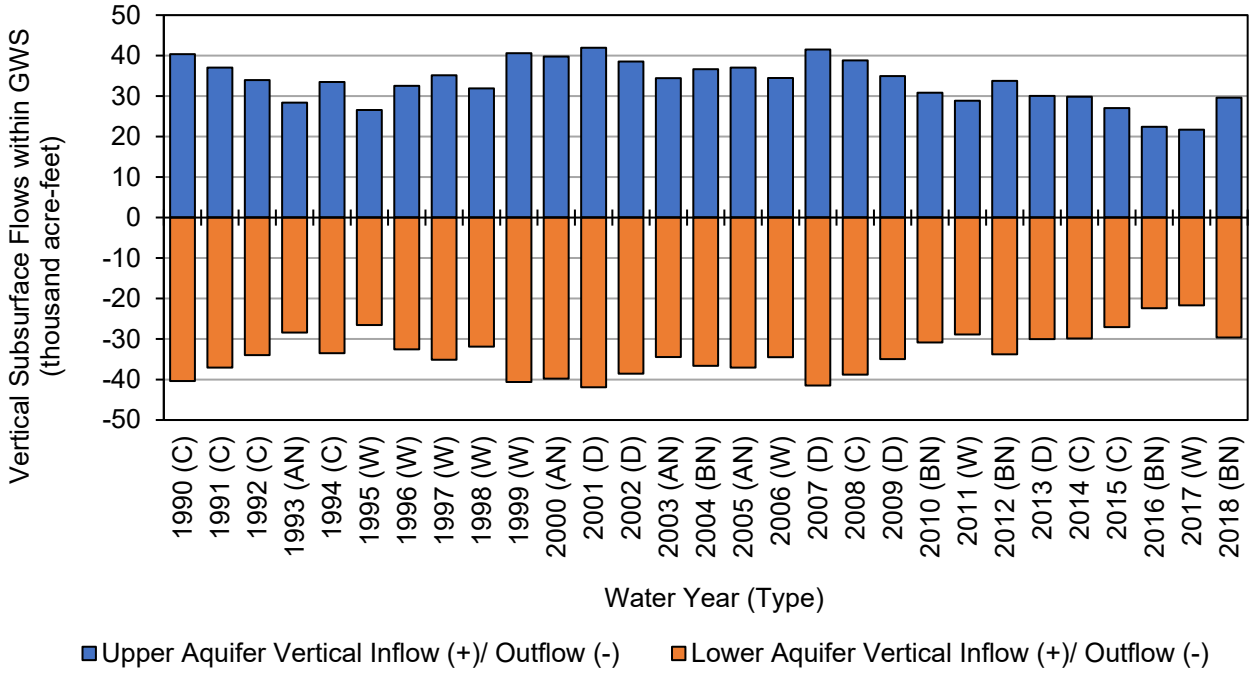


Figure 3. Antelope Subbasin Historical Vertical Subsurface Flow within the GWS

Table 3. Antelope Subbasin Historical Vertical Subsurface Flows within the GWS (acre-feet)

Water Year (Type)		Upper Aquifer to (-) / from (+) Lower Aquifer
1990 (C)		35,000
1991 (C)		51,000
1992 (C)		53,000
1993 (AN)		47,000
1994 (C)		42,000
1995 (W)		40,000
1996 (W)		37,000
1997 (W)		34,000
1998 (W)		28,000
1999 (W)		33,000
2000 (AN)		27,000
2001 (D)		33,000
2002 (D)		35,000
2003 (AN)		32,000
2004 (BN)		41,000
2005 (AN)		40,000
2006 (W)		42,000
2007 (D)		39,000
2008 (C)		34,000
2009 (D)		37,000
2010 (BN)		37,000
2011 (W)		34,000
2012 (BN)		41,000
2013 (D)		39,000
2014 (C)		35,000
2015 (C)		31,000
2016 (BN)		29,000
2017 (W)		34,000
2018 (BN)		30,000
Average (1990-2018)		34,000
1990-2018	W	31,000
	AN	35,000
	BN	31,000
	D	37,000
	C	34,000

1.1.6 Change in Groundwater Storage

Historical change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 23** and **Figure 24,** and **Table 23**. Values for total change in storage in the GWS and cumulative change in storage over the historical water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the 29-year historical period, the average total annual change in groundwater storage is about -0.610 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the historical period is about -18 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are higher in the Lower Aquifer (average -7.1 taf per year) compared to the Upper Aquifer (average -3.5 taf per year).

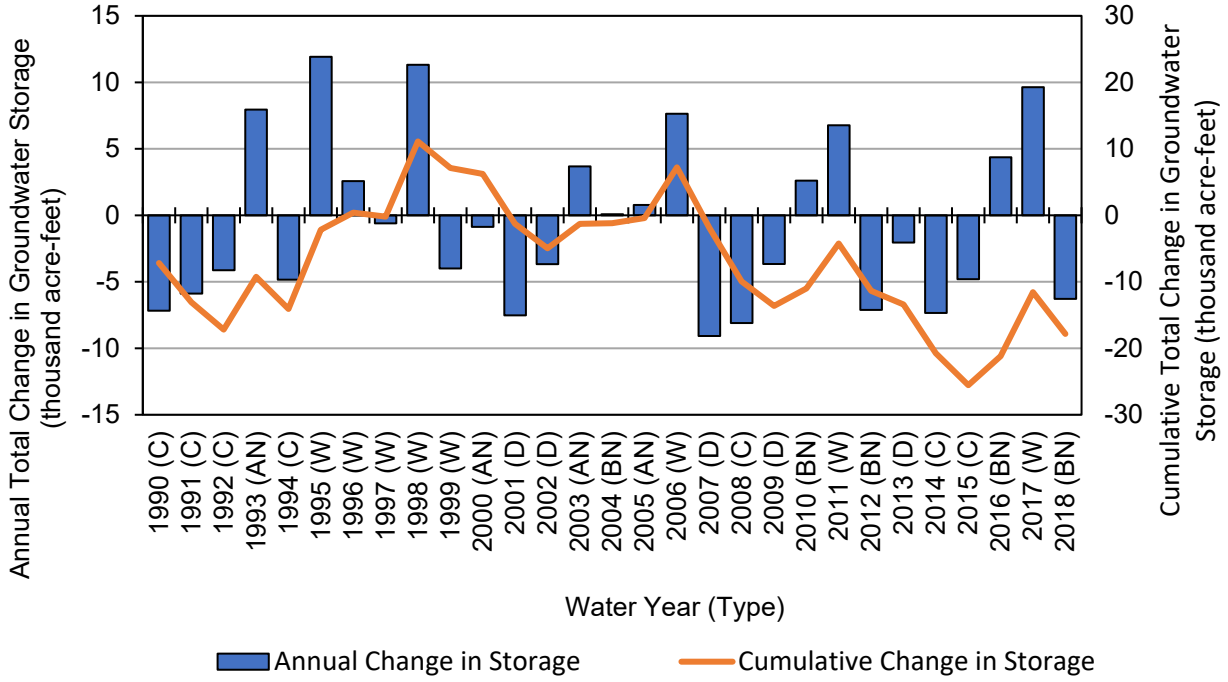


Figure 23. Antelope Subbasin Historical Total Change in Storage within the GWS

Table 4. Antelope Subbasin Historical Change in Groundwater Storage (acre-feet)

Water Year (Type)		Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
1990 (C)		-4,500	-2,600	-7,200	-7,200
1991 (C)		-3,400	-2,500	-5,900	-13,000
1992 (C)		-2,400	-1,800	-4,100	-17,000
1993 (AN)		5,300	2,600	8,000	-9,200
1994 (C)		-3,100	-1,800	-4,800	-14,000
1995 (W)		7,500	4,400	12,000	-2,200
1996 (W)		1,500	1,100	2,600	400
1997 (W)		-620	19	-600	-200
1998 (W)		6,900	4,400	11,000	11,000
1999 (W)		-2,900	-1,100	-4,000	7,100
2000 (AN)		-500	-370	-880	6,200
2001 (D)		-4,600	-2,900	-7,500	-1,300
2002 (D)		-2,200	-1,500	-3,700	-5,000
2003 (AN)		2,400	1,300	3,700	-1,300
2004 (BN)		-8	89	81	-1,200
2005 (AN)		570	200	780	-410
2006 (W)		4,600	3,000	7,600	7,200
2007 (D)		-5,600	-3,500	-9,100	-1,800
2008 (C)		-5,000	-3,100	-8,100	-10,000
2009 (D)		-1,900	-1,800	-3,700	-14,000
2010 (BN)		1,900	750	2,600	-11,000
2011 (W)		4,500	2,300	6,800	-4,200
2012 (BN)		-4,700	-2,500	-7,100	-11,000
2013 (D)		-970	-1,100	-2,000	-13,000
2014 (C)		-4,300	-3,100	-7,300	-21,000
2015 (C)		-2,900	-1,900	-4,800	-26,000
2016 (BN)		3,000	1,400	4,400	-21,000
2017 (W)		5,700	3,900	9,600	-12,000
2018 (BN)		-3,900	-2,400	-6,300	-18,000
Average (1990-2018)		-330	-290	-610	
1990-2018	W	3,400	2,300	5,700	
	AN	1,800	820	4,100	
	BN	-740	-520	-330	
	D	-3,100	-2,100	-5,200	
	C	-3,700	-2,400	-6,000	

Note: positive values indicate increases in groundwater storage, negative values indicate decreases in groundwater storage.

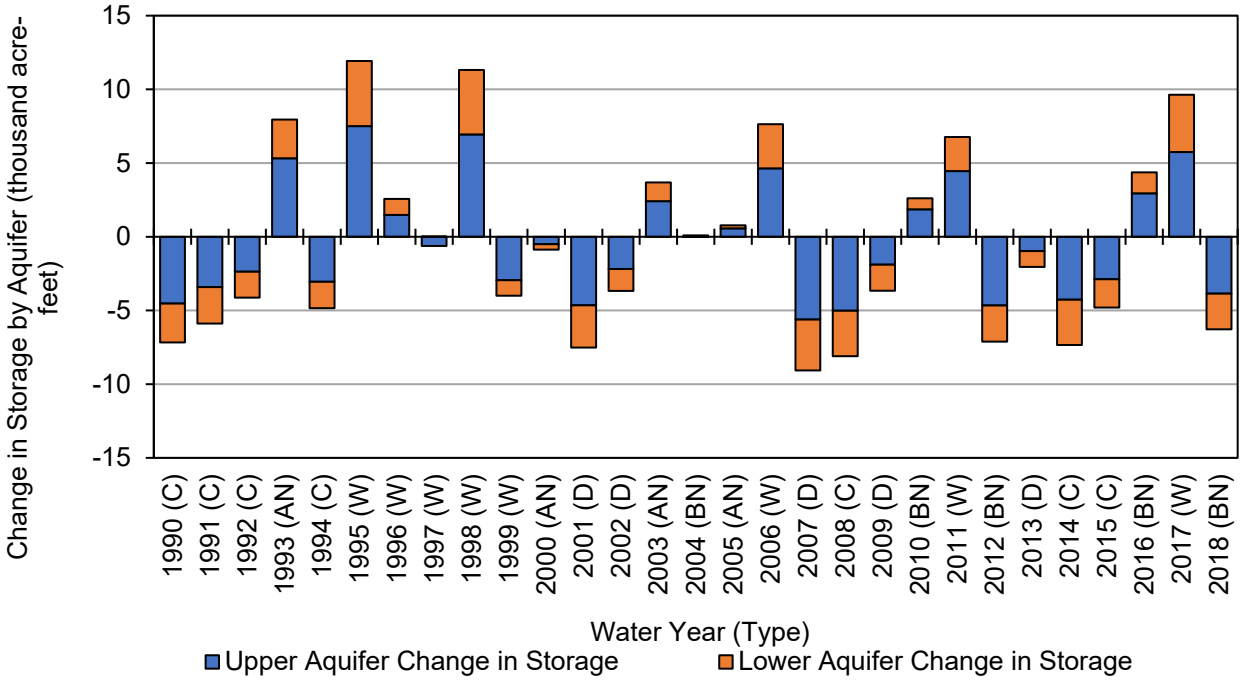


Figure 4. Antelope Subbasin Historical Change in Groundwater Storage by Aquifer

2 DETAILED PROJECTED (CURRENT LAND USE) WATER BUDGET

This section presents the results of the Projected (Current Land Use) scenario. The Current Land Use scenario assumes constant land use conditions based on 2018 conditions.

2.1 Surface Water System Water Budget Results

2.1.1 Inflows

2.1.1.1 *Surface Water Inflow by Water Source Type*

The projected annual volume of surface water inflows is summarized by water source type in **Figure 25** and **Table 24**. Over the projected (current land use) period, surface water inflows average about 43 taf per year. Virtually, all inflows of the SWS are local supplies. The CVP supplies are very small and average about 0.610 taf per year.

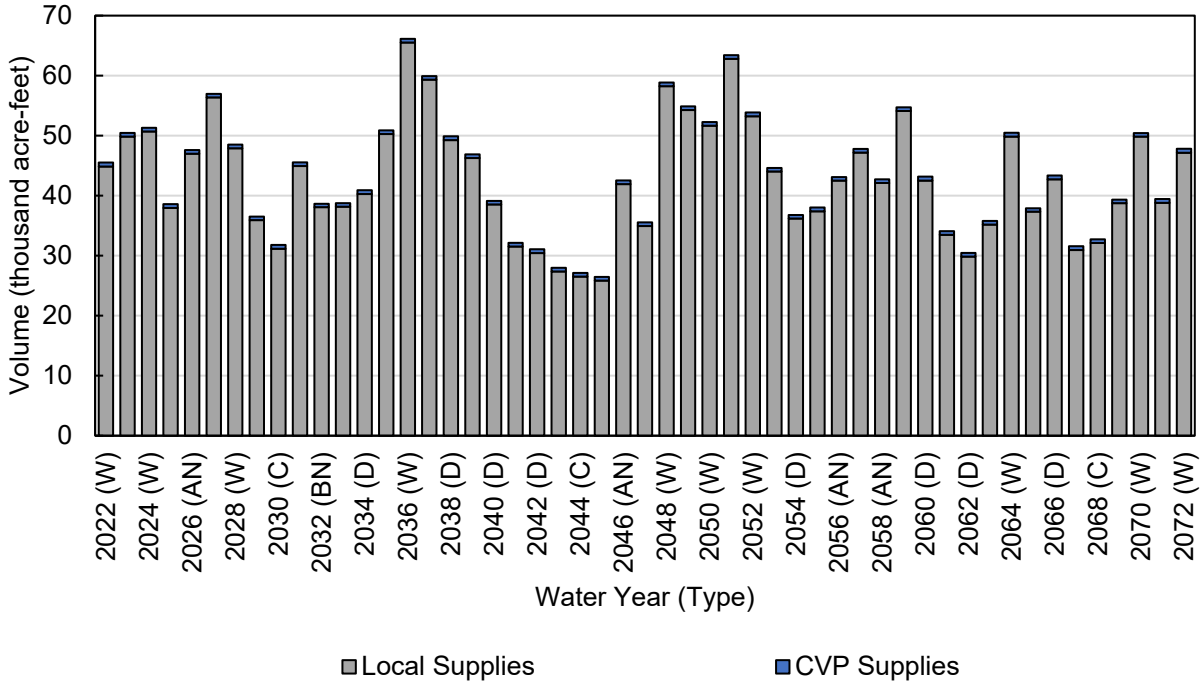


Figure 25. Antelope Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type

Table 24. Antelope Subbasin Projected (Current Land Use) Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	45,000	46,000
2023 (W)	610	50,000	50,000
2024 (W)	610	51,000	51,000
2025 (BN)	630	38,000	39,000
2026 (AN)	610	47,000	48,000
2027 (W)	610	56,000	57,000
2028 (W)	620	48,000	49,000
2029 (C)	600	36,000	37,000
2030 (C)	640	31,000	32,000
2031 (AN)	610	45,000	46,000
2032 (BN)	560	38,000	39,000
2033 (AN)	580	38,000	39,000
2034 (D)	640	40,000	41,000
2035 (W)	610	50,000	51,000
2036 (W)	610	66,000	66,000
2037 (W)	610	59,000	60,000
2038 (D)	640	49,000	50,000
2039 (W)	610	46,000	47,000
2040 (D)	600	39,000	39,000
2041 (C)	610	32,000	32,000
2042 (D)	650	30,000	31,000
2043 (C)	610	27,000	28,000
2044 (C)	610	27,000	27,000
2045 (C)	610	26,000	26,000
2046 (AN)	610	42,000	43,000
2047 (C)	610	35,000	36,000
2048 (W)	610	58,000	59,000
2049 (W)	610	54,000	55,000
2050 (W)	610	52,000	52,000
2051 (W)	610	63,000	63,000
2052 (W)	620	53,000	54,000
2053 (AN)	580	44,000	45,000
2054 (D)	600	36,000	37,000
2055 (D)	640	37,000	38,000
2056 (AN)	580	43,000	43,000
2057 (BN)	620	47,000	48,000

Water Year (Type)		CVP Supplies	Local Supplies	Total
2058 (AN)		600	42,000	43,000
2059 (W)		610	54,000	55,000
2060 (D)		650	43,000	43,000
2061 (C)		600	33,000	34,000
2062 (D)		620	30,000	30,000
2063 (BN)		610	35,000	36,000
2064 (W)		630	50,000	50,000
2065 (BN)		560	37,000	38,000
2066 (D)		650	43,000	43,000
2067 (C)		640	31,000	32,000
2068 (C)		610	32,000	33,000
2069 (BN)		580	39,000	39,000
2070 (W)		580	50,000	50,000
2071 (BN)		630	39,000	39,000
2072 (W)		650	47,000	48,000
Average (2022-2072)		610	43,000	43,000
2022-2072	W	620	53,000	54,000
	AN	600	43,000	44,000
	BN	600	39,000	40,000
	D	630	39,000	39,000
	C	610	31,000	32,000

2.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Figure 26** and **Table 25**. Total precipitation is highly variable between years in the study area, ranging from approximately 30 taf (18.6 inches) during average critically dry years to 56 taf (34.72 inches) during average wet years.

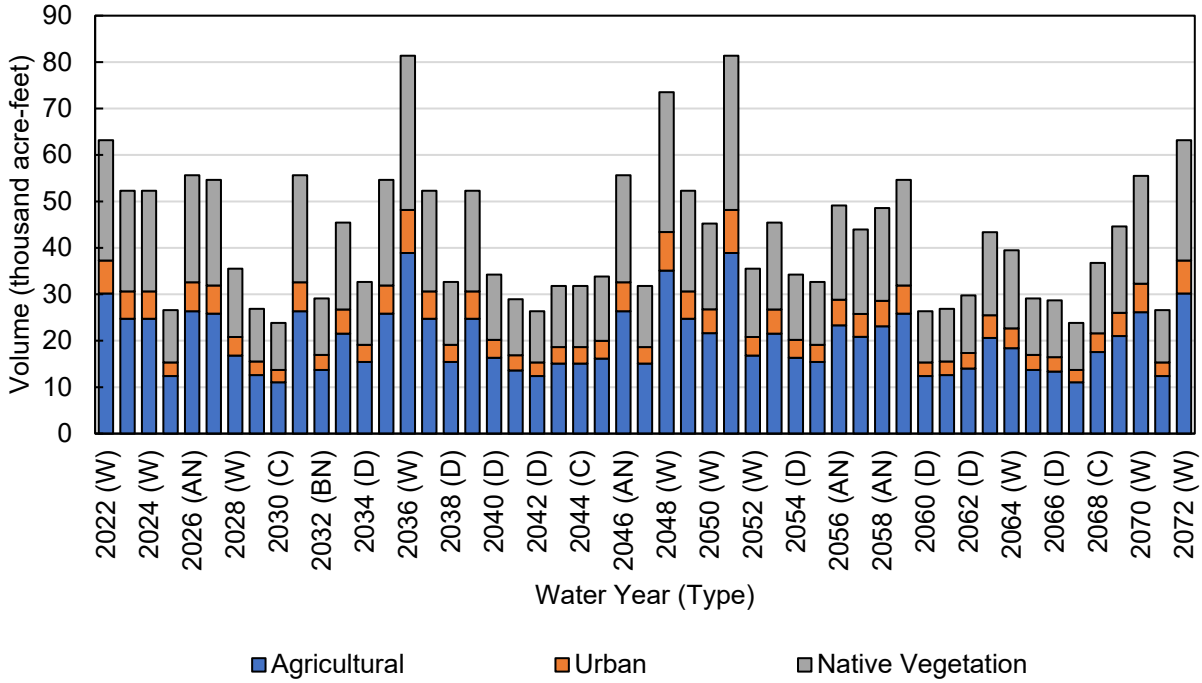


Figure 26. Antelope Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector

Table 25. Antelope Subbasin Projected (Current Land Use) Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	30,000	7,100	26,000	63,000
2023 (W)	25,000	5,900	22,000	52,000
2024 (W)	25,000	5,900	22,000	52,000
2025 (BN)	12,000	2,900	11,000	27,000
2026 (AN)	26,000	6,200	23,000	56,000
2027 (W)	26,000	6,100	23,000	55,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	13,000	2,900	11,000	27,000
2030 (C)	11,000	2,700	10,000	24,000
2031 (AN)	26,000	6,200	23,000	56,000
2032 (BN)	14,000	3,200	12,000	29,000
2033 (AN)	22,000	5,200	19,000	45,000
2034 (D)	15,000	3,700	14,000	33,000
2035 (W)	26,000	6,100	23,000	55,000
2036 (W)	39,000	9,300	33,000	81,000
2037 (W)	25,000	5,900	22,000	52,000
2038 (D)	15,000	3,700	14,000	33,000
2039 (W)	25,000	5,900	22,000	52,000
2040 (D)	16,000	3,900	14,000	34,000
2041 (C)	14,000	3,300	12,000	29,000
2042 (D)	12,000	2,900	11,000	26,000
2043 (C)	15,000	3,600	13,000	32,000
2044 (C)	15,000	3,600	13,000	32,000
2045 (C)	16,000	3,800	14,000	34,000
2046 (AN)	26,000	6,200	23,000	56,000
2047 (C)	15,000	3,600	13,000	32,000
2048 (W)	35,000	8,300	30,000	74,000
2049 (W)	25,000	5,900	22,000	52,000
2050 (W)	22,000	5,100	18,000	45,000
2051 (W)	39,000	9,300	33,000	81,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	22,000	5,200	19,000	45,000
2054 (D)	16,000	3,900	14,000	34,000
2055 (D)	15,000	3,700	14,000	33,000
2056 (AN)	23,000	5,500	20,000	49,000
2057 (BN)	21,000	4,900	18,000	44,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		23,000	5,500	20,000	49,000
2059 (W)		26,000	6,100	23,000	55,000
2060 (D)		12,000	2,900	11,000	26,000
2061 (C)		13,000	2,900	11,000	27,000
2062 (D)		14,000	3,300	12,000	30,000
2063 (BN)		21,000	4,900	18,000	43,000
2064 (W)		18,000	4,300	17,000	39,000
2065 (BN)		14,000	3,200	12,000	29,000
2066 (D)		13,000	3,100	12,000	29,000
2067 (C)		11,000	2,700	10,000	24,000
2068 (C)		18,000	4,000	15,000	37,000
2069 (BN)		21,000	5,000	19,000	45,000
2070 (W)		26,000	6,100	23,000	56,000
2071 (BN)		12,000	2,900	11,000	27,000
2072 (W)		30,000	7,100	26,000	63,000
Average (2022-2072)		20,000	4,800	18,000	43,000
2022-2072	W	26,000	6,200	23,000	56,000
	AN	24,000	5,700	21,000	51,000
	BN	16,000	3,900	15,000	35,000
	D	15,000	3,500	13,000	31,000
	C	14,000	3,300	12,000	30,000

2.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 27** and **Table 26**. Virtually all groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 14 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 13 taf in above-normal years to 18 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 28** and **Table 27**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, totaling 0.290 taf and 0.880 taf per year, on average.

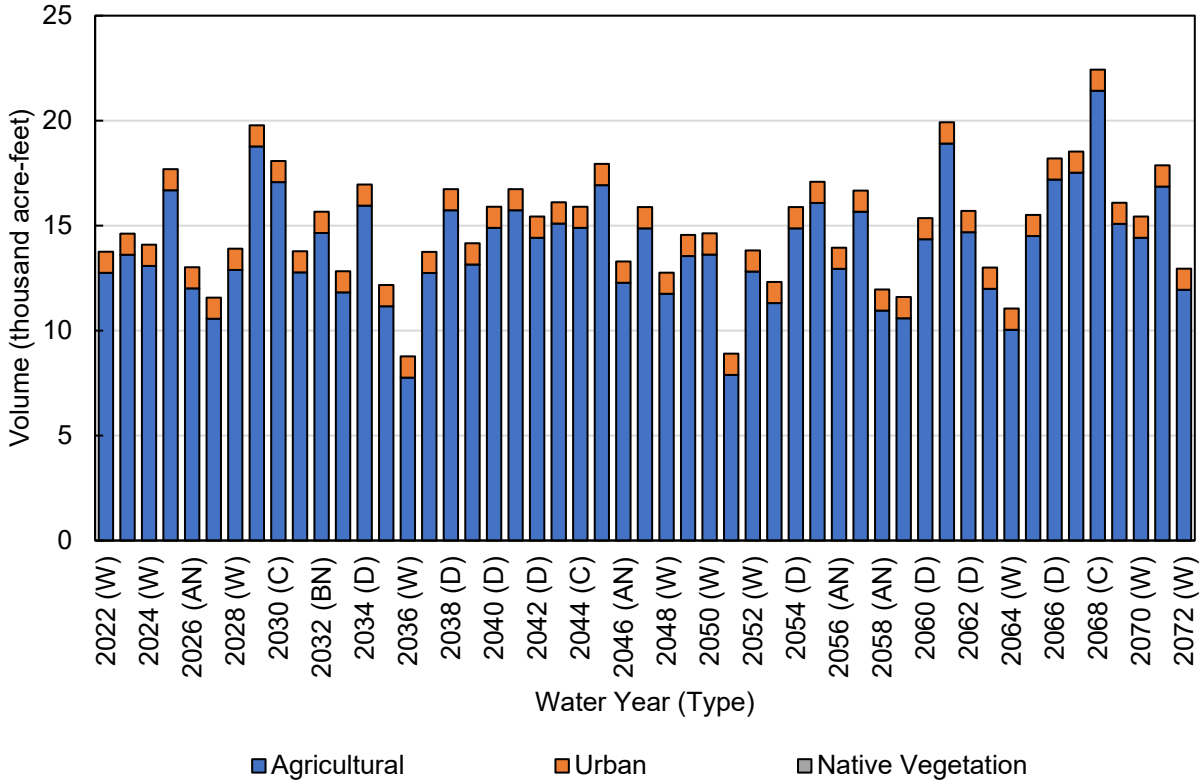


Figure 27. Antelope Subbasin Projected (Current Land Use) Groundwater Pumping, by Water Use Sector

Table 26. Antelope Subbasin Projected (Current Land Use) Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,100	0	14,000
2023 (W)	14,000	1,100	0	15,000
2024 (W)	14,000	1,100	0	15,000
2025 (BN)	17,000	1,100	0	18,000
2026 (AN)	12,000	1,100	0	13,000
2027 (W)	11,000	1,100	0	12,000
2028 (W)	13,000	1,100	0	15,000
2029 (C)	19,000	1,100	0	20,000
2030 (C)	17,000	1,100	0	18,000
2031 (AN)	13,000	1,100	0	14,000
2032 (BN)	15,000	1,100	0	16,000
2033 (AN)	12,000	1,100	0	13,000
2034 (D)	16,000	1,100	0	17,000
2035 (W)	11,000	1,100	0	13,000
2036 (W)	8,400	1,100	0	9,500
2037 (W)	13,000	1,100	0	15,000
2038 (D)	16,000	1,100	0	17,000
2039 (W)	14,000	1,100	0	15,000
2040 (D)	15,000	1,100	0	16,000
2041 (C)	16,000	1,100	0	17,000
2042 (D)	15,000	1,100	0	16,000
2043 (C)	15,000	1,100	0	16,000
2044 (C)	15,000	1,100	0	16,000
2045 (C)	17,000	1,100	0	18,000
2046 (AN)	12,000	1,100	0	14,000
2047 (C)	15,000	1,100	0	16,000
2048 (W)	12,000	1,100	0	13,000
2049 (W)	14,000	1,100	0	15,000
2050 (W)	14,000	1,100	0	15,000
2051 (W)	8,500	1,100	0	9,600
2052 (W)	13,000	1,100	0	14,000
2053 (AN)	12,000	1,100	0	13,000
2054 (D)	15,000	1,100	0	16,000
2055 (D)	16,000	1,100	0	17,000
2056 (AN)	13,000	1,100	0	14,000
2057 (BN)	16,000	1,100	0	17,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		11,000	1,100	0	12,000
2059 (W)		11,000	1,100	0	12,000
2060 (D)		15,000	1,100	0	16,000
2061 (C)		19,000	1,100	0	20,000
2062 (D)		15,000	1,100	0	16,000
2063 (BN)		12,000	1,100	0	13,000
2064 (W)		10,000	1,100	0	11,000
2065 (BN)		15,000	1,100	0	16,000
2066 (D)		17,000	1,100	0	18,000
2067 (C)		18,000	1,100	0	19,000
2068 (C)		22,000	1,100	0	23,000
2069 (BN)		15,000	1,100	0	16,000
2070 (W)		15,000	1,100	0	16,000
2071 (BN)		17,000	1,100	0	18,000
2072 (W)		12,000	1,100	0	13,000
Average (2022-2072)		14,000	1,100	0	15,000
2022-2072	W	12,000	1,100	0	13,000
	AN	12,000	1,100	0	13,000
	BN	15,000	1,100	0	16,000
	D	16,000	1,100	0	17,000
	C	17,000	1,100	0	18,000

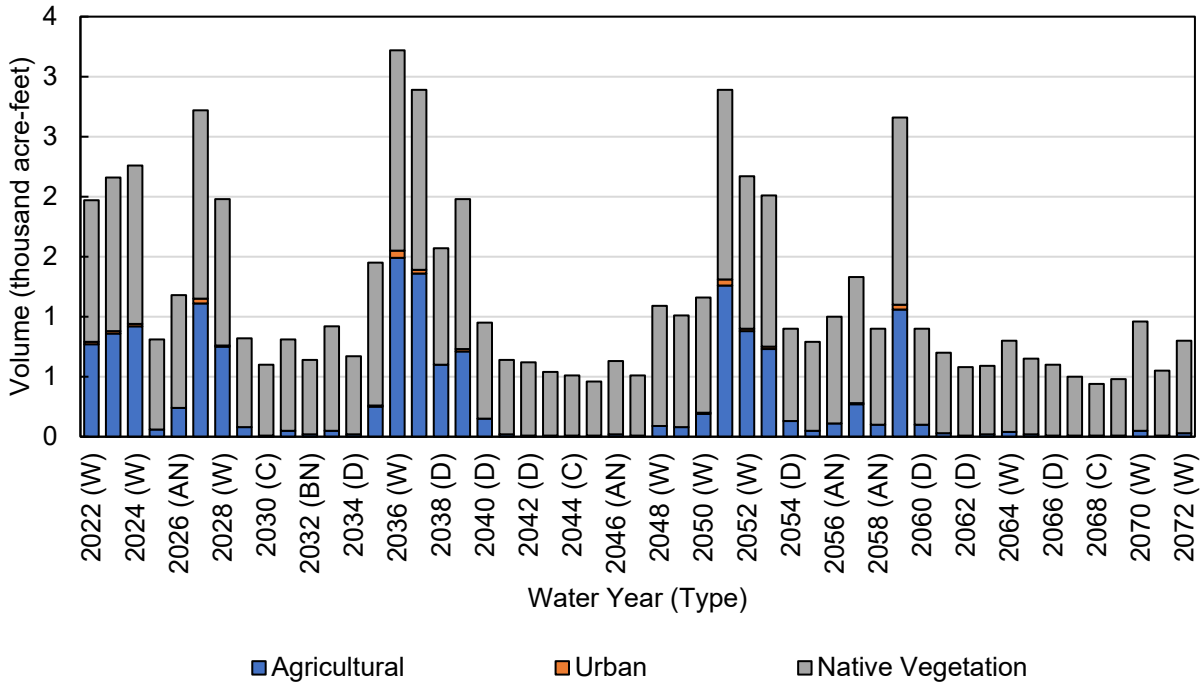


Figure 5. Antelope Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector

Table 5. Antelope Subbasin Projected (Current Land Use) Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (BN)	770	20	1,200	2,000
2023 (W)	860	20	1,300	2,200
2024 (W)	920	20	1,300	2,300
2025 (W)	60	0	750	810
2026 (BN)	240	0	940	1,200
2027 (AN)	1,100	40	1,600	2,700
2028 (W)	750	10	1,200	2,000
2029 (W)	80	0	740	820
2030 (C)	10	0	590	600
2031 (C)	50	0	760	810
2032 (AN)	20	0	620	640
2033 (BN)	50	0	870	920
2034 (AN)	20	0	650	670
2035 (D)	250	10	1,200	1,500
2036 (W)	1,500	60	1,700	3,200
2037 (W)	1,400	30	1,500	2,900
2038 (W)	600	0	970	1,600
2039 (D)	710	20	1,300	2,000
2040 (W)	150	0	800	950
2041 (D)	20	0	620	640
2042 (C)	10	0	610	620
2043 (D)	10	0	530	540
2044 (C)	10	0	500	510
2045 (C)	10	0	450	460
2046 (C)	20	0	610	630
2047 (AN)	10	0	500	510
2048 (C)	90	0	1,000	1,100
2049 (W)	80	0	930	1,000
2050 (W)	190	10	960	1,200
2051 (W)	1,300	50	1,600	2,900
2052 (W)	880	20	1,300	2,200
2053 (W)	730	20	1,300	2,000
2054 (AN)	130	0	770	900
2055 (D)	50	0	740	790
2056 (D)	110	0	890	1,000
2057 (AN)	270	10	1,100	1,300

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (BN)		100	0	800	900
2059 (AN)		1,100	40	1,600	2,700
2060 (W)		100	0	800	900
2061 (D)		30	0	670	700
2062 (C)		10	0	570	580
2063 (D)		20	0	570	590
2064 (BN)		40	0	760	800
2065 (W)		20	0	630	650
2066 (BN)		10	0	590	600
2067 (D)		10	0	490	500
2068 (C)		10	0	430	440
2069 (C)		10	0	470	480
2070 (BN)		50	0	910	960
2071 (W)		10	0	540	550
2072 (W)		30	0	770	800
Average (2022-2072)		290	10	880	1,200
2022-2072	W	660	20	1,200	1,900
	AN	190	0	880	1,100
	BN	60	0	660	720
	D	120	0	720	840
	C	20	0	550	570

2.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 29** and **Table 28**, averaging approximately 33 taf per year.

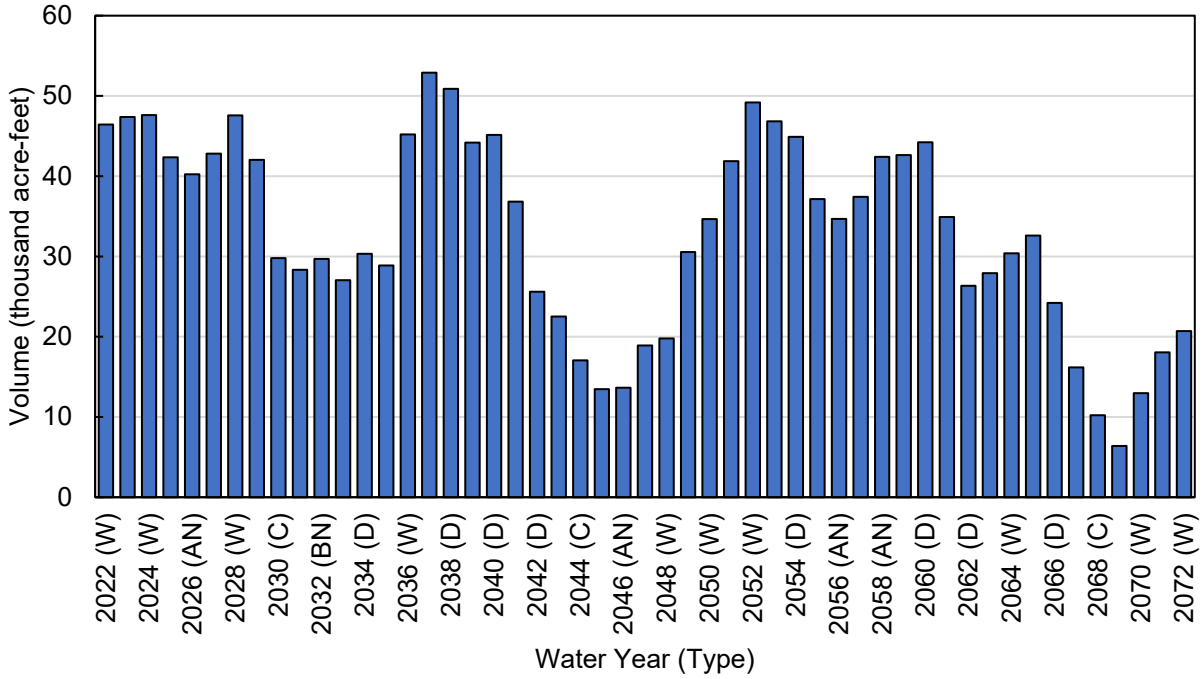


Figure 29. Antelope Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water

Table 28. Antelope Subbasin Projected (Current Land Use) Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)	Groundwater Discharge to Surface Water
2022 (W)	46,000
2023 (W)	47,000
2024 (W)	48,000
2025 (BN)	42,000
2026 (AN)	40,000
2027 (W)	43,000
2028 (W)	48,000
2029 (C)	42,000
2030 (C)	30,000
2031 (AN)	28,000
2032 (BN)	30,000
2033 (AN)	27,000
2034 (D)	30,000
2035 (W)	29,000
2036 (W)	45,000
2037 (W)	53,000
2038 (D)	51,000
2039 (W)	44,000
2040 (D)	45,000
2041 (C)	37,000
2042 (D)	26,000
2043 (C)	23,000
2044 (C)	17,000
2045 (C)	13,000
2046 (AN)	14,000
2047 (C)	19,000
2048 (W)	20,000
2049 (W)	31,000
2050 (W)	35,000
2051 (W)	42,000
2052 (W)	49,000
2053 (AN)	47,000
2054 (D)	45,000
2055 (D)	37,000
2056 (AN)	35,000
2057 (BN)	37,000

Water Year (Type)		Groundwater Discharge to Surface Water
2058 (AN)		42,000
2059 (W)		43,000
2060 (D)		44,000
2061 (C)		35,000
2062 (D)		26,000
2063 (BN)		28,000
2064 (W)		30,000
2065 (BN)		33,000
2066 (D)		24,000
2067 (C)		16,000
2068 (C)		10,000
2069 (BN)		6,400
2070 (W)		13,000
2071 (BN)		18,000
2072 (W)		21,000
Average (2022-2072)		33,000
2022-2072	W	38,000
	AN	33,000
	BN	28,000
	D	37,000
	C	24,000

2.1.2 Outflows

2.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 30** through **Figure 33**, and **Table 29** through **Table 32**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest projected in 2036, at approximately 43 taf, and greatest in multiple years, at approximately 49 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 18 taf in above-normal and wet years and about 20 to 22 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and relatively constant between years, averaging less than 0.320 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to

meet a portion of their consumptive use requirements. ET of groundwater uptake by native vegetation and agricultural crops and totals 0.80 and 0.290 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 56 taf in wet years and 30 taf in critical water years. Much of the total ET of precipitation results from the large acreage of native vegetation and Agricultural land in the Antelope Subbasin, though some contribution is from urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 34** and **Table 33**. The total volume is relatively small and constant between years, averaging less than 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

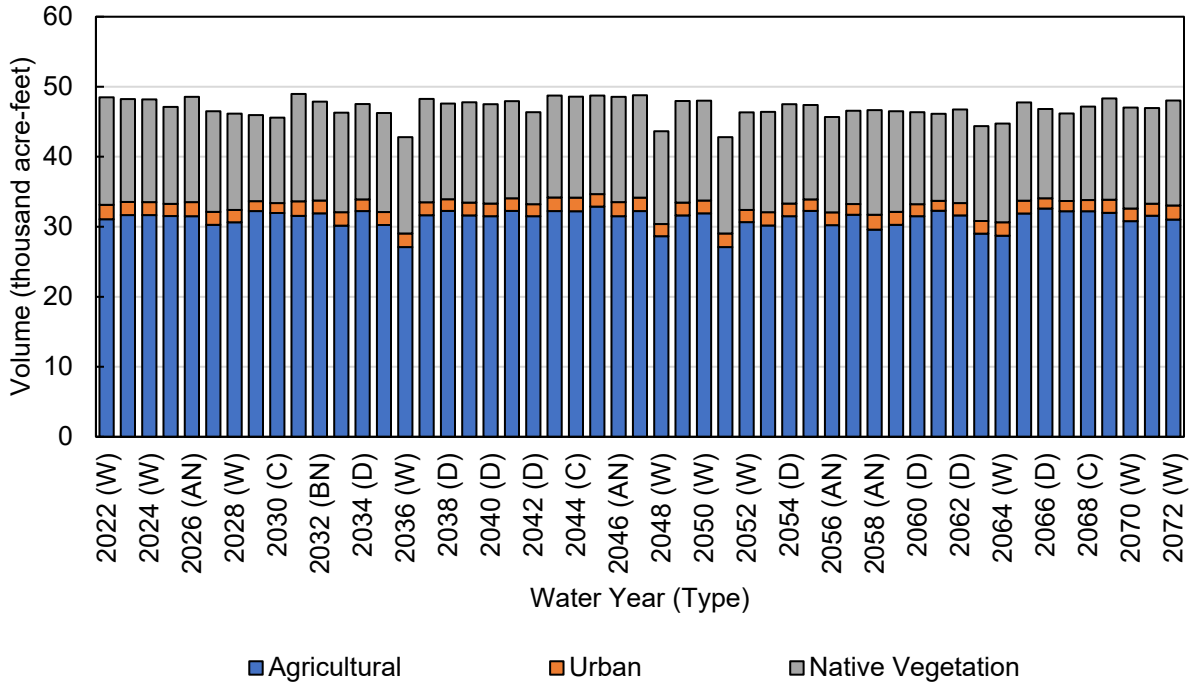


Figure 30. Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector

Table 29. Antelope Subbasin Projected (Current Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	31,000	2,100	15,000	48,000
2023 (W)	32,000	1,900	15,000	48,000
2024 (W)	32,000	1,900	15,000	48,000
2025 (BN)	32,000	1,700	14,000	47,000
2026 (AN)	32,000	2,000	15,000	49,000
2027 (W)	30,000	1,900	14,000	47,000
2028 (W)	31,000	1,700	14,000	46,000
2029 (C)	32,000	1,400	12,000	46,000
2030 (C)	32,000	1,400	12,000	46,000
2031 (AN)	32,000	2,100	15,000	49,000
2032 (BN)	32,000	1,800	14,000	48,000
2033 (AN)	30,000	1,900	14,000	46,000
2034 (D)	32,000	1,700	14,000	48,000
2035 (W)	30,000	1,800	14,000	46,000
2036 (W)	27,000	1,900	14,000	43,000
2037 (W)	32,000	1,900	15,000	48,000
2038 (D)	32,000	1,700	14,000	48,000
2039 (W)	32,000	1,800	14,000	48,000
2040 (D)	32,000	1,800	14,000	48,000
2041 (C)	32,000	1,800	14,000	48,000
2042 (D)	32,000	1,700	13,000	46,000
2043 (C)	32,000	2,000	15,000	49,000
2044 (C)	32,000	1,900	14,000	49,000
2045 (C)	33,000	1,800	14,000	49,000
2046 (AN)	32,000	2,000	15,000	49,000
2047 (C)	32,000	1,900	15,000	49,000
2048 (W)	29,000	1,700	13,000	44,000
2049 (W)	32,000	1,800	15,000	48,000
2050 (W)	32,000	1,900	14,000	48,000
2051 (W)	27,000	1,900	14,000	43,000
2052 (W)	31,000	1,800	14,000	46,000
2053 (AN)	30,000	1,900	14,000	46,000
2054 (D)	32,000	1,800	14,000	48,000
2055 (D)	32,000	1,700	13,000	47,000
2056 (AN)	30,000	1,800	14,000	46,000
2057 (BN)	32,000	1,500	13,000	47,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		30,000	2,100	15,000	47,000
2059 (W)		30,000	1,900	14,000	46,000
2060 (D)		32,000	1,700	13,000	46,000
2061 (C)		32,000	1,400	12,000	46,000
2062 (D)		32,000	1,800	13,000	47,000
2063 (BN)		29,000	1,800	14,000	44,000
2064 (W)		29,000	1,900	14,000	45,000
2065 (BN)		32,000	1,800	14,000	48,000
2066 (D)		33,000	1,500	13,000	47,000
2067 (C)		32,000	1,500	12,000	46,000
2068 (C)		32,000	1,600	13,000	47,000
2069 (BN)		32,000	1,900	14,000	48,000
2070 (W)		31,000	1,800	14,000	47,000
2071 (BN)		32,000	1,700	14,000	47,000
2072 (W)		31,000	2,000	15,000	48,000
Average (2022-2072)		31,000	1,800	14,000	47,000
2022-2072	W	30,000	1,900	14,000	47,000
	AN	31,000	2,000	15,000	47,000
	BN	31,000	1,800	14,000	47,000
	D	32,000	1,700	14,000	47,000
	C	32,000	1,700	13,000	47,000

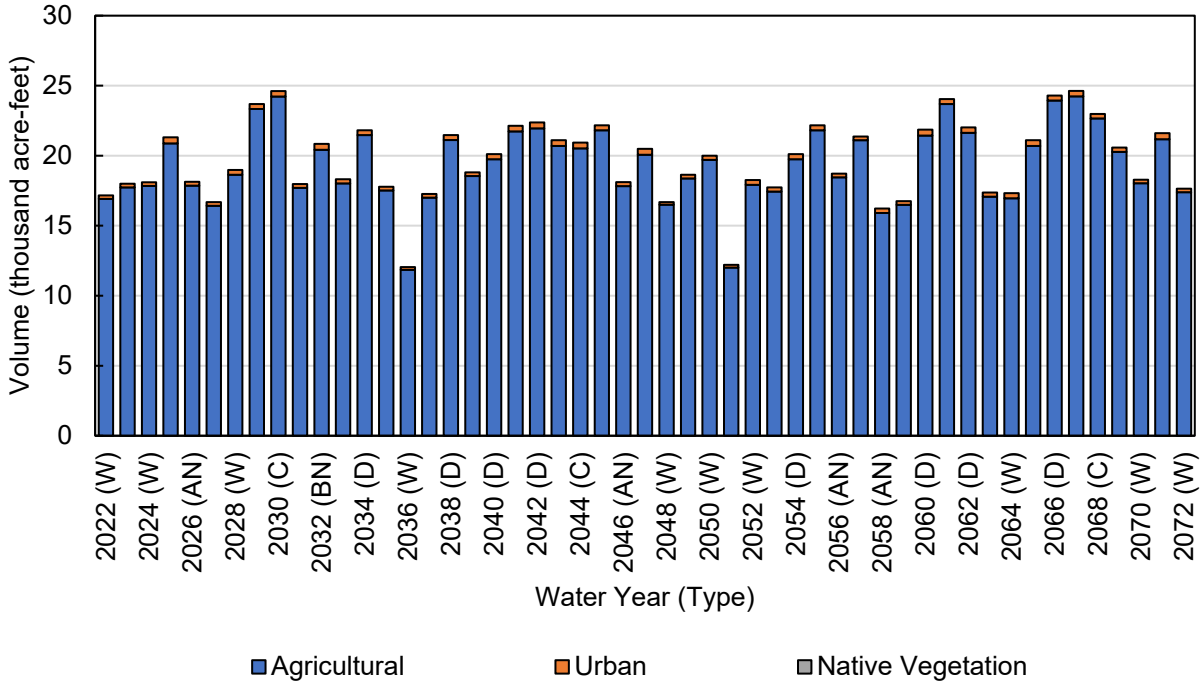


Figure 31. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Applied Water, by Water Use Sector

Table 30. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	250	0	17,000
2023 (W)	18,000	270	0	18,000
2024 (W)	18,000	260	0	18,000
2025 (BN)	21,000	430	0	21,000
2026 (AN)	18,000	280	0	18,000
2027 (W)	16,000	260	0	17,000
2028 (W)	19,000	340	0	19,000
2029 (C)	23,000	350	0	24,000
2030 (C)	24,000	380	0	25,000
2031 (AN)	18,000	280	0	18,000
2032 (BN)	20,000	420	0	21,000
2033 (AN)	18,000	300	0	18,000
2034 (D)	21,000	350	0	22,000
2035 (W)	18,000	260	0	18,000
2036 (W)	12,000	190	0	12,000
2037 (W)	17,000	260	0	17,000
2038 (D)	21,000	350	0	21,000
2039 (W)	19,000	260	0	19,000
2040 (D)	20,000	360	0	20,000
2041 (C)	22,000	410	0	22,000
2042 (D)	22,000	430	0	22,000
2043 (C)	21,000	420	0	21,000
2044 (C)	21,000	410	0	21,000
2045 (C)	22,000	360	0	22,000
2046 (AN)	18,000	280	0	18,000
2047 (C)	20,000	420	0	20,000
2048 (W)	17,000	190	0	17,000
2049 (W)	18,000	260	0	19,000
2050 (W)	20,000	300	0	20,000
2051 (W)	12,000	190	0	12,000
2052 (W)	18,000	340	0	18,000
2053 (AN)	17,000	300	0	18,000
2054 (D)	20,000	360	0	20,000
2055 (D)	22,000	350	0	22,000
2056 (AN)	18,000	270	0	19,000
2057 (BN)	21,000	260	0	21,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		16,000	320	0	16,000
2059 (W)		16,000	260	0	17,000
2060 (D)		21,000	420	0	22,000
2061 (C)		24,000	350	0	24,000
2062 (D)		22,000	390	0	22,000
2063 (BN)		17,000	300	0	17,000
2064 (W)		17,000	360	0	17,000
2065 (BN)		21,000	420	0	21,000
2066 (D)		24,000	350	0	24,000
2067 (C)		24,000	390	0	25,000
2068 (C)		23,000	320	0	23,000
2069 (BN)		20,000	310	0	21,000
2070 (W)		18,000	250	0	18,000
2071 (BN)		21,000	430	0	22,000
2072 (W)		17,000	250	0	18,000
Average (2022-2072)		19,000	320	0	20,000
2022-2072	W	17,000	260	0	17,000
	AN	18,000	290	0	18,000
	BN	20,000	370	0	21,000
	D	21,000	370	0	22,000
	C	22,000	380	0	23,000

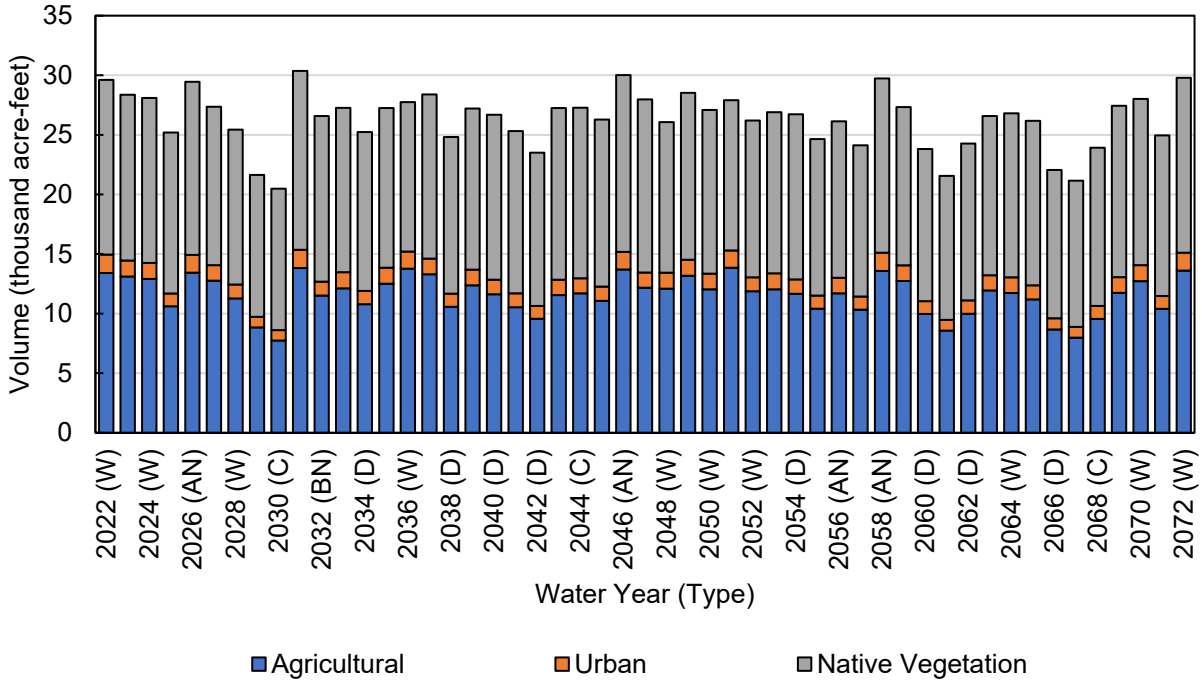


Figure 32. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 31. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	770	20	1,200	2,000
2023 (W)	860	20	1,300	2,200
2024 (W)	920	20	1,300	2,300
2025 (BN)	60	0	750	810
2026 (AN)	240	0	940	1,200
2027 (W)	1,100	40	1,600	2,700
2028 (W)	750	10	1,200	2,000
2029 (C)	80	0	740	820
2030 (C)	10	0	590	600
2031 (AN)	50	0	760	810
2032 (BN)	20	0	620	640
2033 (AN)	50	0	870	920
2034 (D)	20	0	650	670
2035 (W)	250	10	1,200	1,500
2036 (W)	1,500	60	1,700	3,200
2037 (W)	1,400	30	1,500	2,900
2038 (D)	600	0	970	1,600
2039 (W)	710	20	1,300	2,000
2040 (D)	150	0	800	950
2041 (C)	20	0	620	640
2042 (D)	10	0	610	620
2043 (C)	10	0	530	540
2044 (C)	10	0	500	510
2045 (C)	10	0	450	460
2046 (AN)	20	0	610	630
2047 (C)	10	0	500	510
2048 (W)	90	0	1,000	1,100
2049 (W)	80	0	930	1,000
2050 (W)	190	10	960	1,200
2051 (W)	1,300	50	1,600	2,900
2052 (W)	880	20	1,300	2,200
2053 (AN)	730	20	1,300	2,000
2054 (D)	130	0	770	900
2055 (D)	50	0	740	790
2056 (AN)	110	0	890	1,000
2057 (BN)	270	10	1,100	1,300

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		100	0	800	900
2059 (W)		1,100	40	1,600	2,700
2060 (D)		100	0	800	900
2061 (C)		30	0	670	700
2062 (D)		10	0	570	580
2063 (BN)		20	0	570	590
2064 (W)		40	0	760	800
2065 (BN)		20	0	630	650
2066 (D)		10	0	590	600
2067 (C)		10	0	490	500
2068 (C)		10	0	430	440
2069 (BN)		10	0	470	480
2070 (W)		50	0	910	960
2071 (BN)		10	0	540	550
2072 (W)		30	0	770	800
Average (2022-2072)		290	10	880	1,200
2022-2072	W	660	20	1,200	1,900
	AN	190	0	880	1,100
	BN	60	0	660	720
	D	120	0	720	840
	C	20	0	550	570

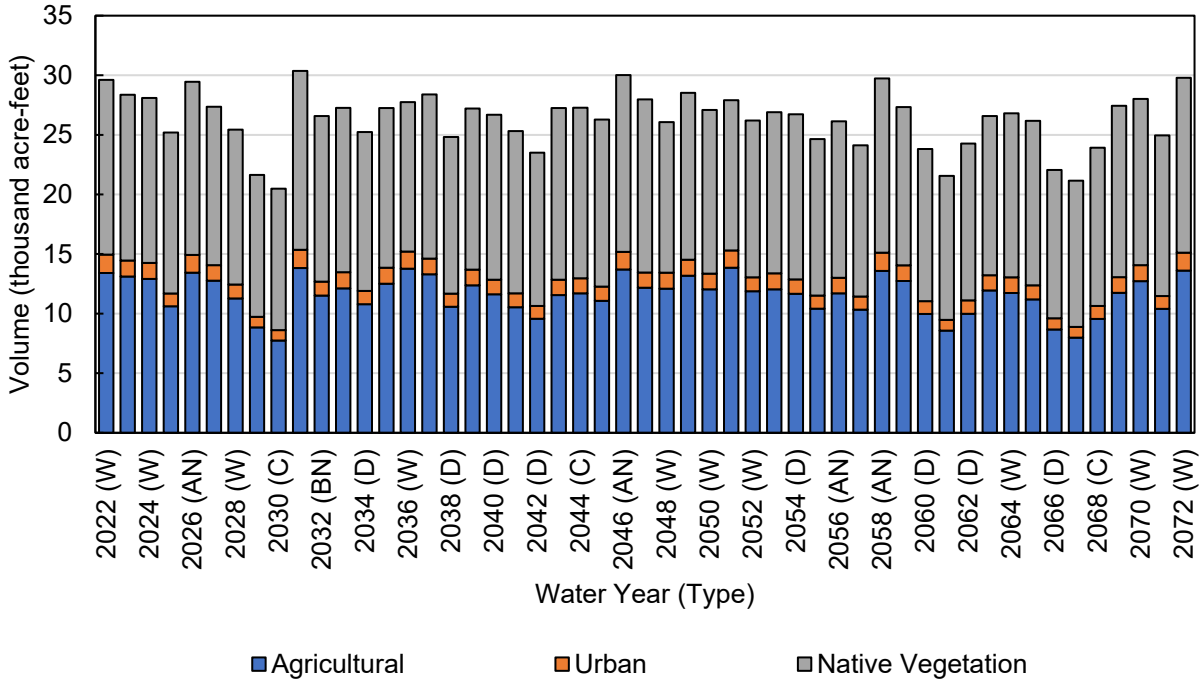


Figure 33. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Precipitation, by Water Use Sector

Table 32. Antelope Subbasin Projected (Current Land Use) Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,500	15,000	30,000
2023 (W)	13,000	1,400	14,000	28,000
2024 (W)	13,000	1,300	14,000	28,000
2025 (BN)	11,000	1,100	14,000	25,000
2026 (AN)	13,000	1,500	15,000	29,000
2027 (W)	13,000	1,300	13,000	27,000
2028 (W)	11,000	1,200	13,000	25,000
2029 (C)	8,900	880	12,000	22,000
2030 (C)	7,700	870	12,000	20,000
2031 (AN)	14,000	1,500	15,000	30,000
2032 (BN)	12,000	1,200	14,000	27,000
2033 (AN)	12,000	1,400	14,000	27,000
2034 (D)	11,000	1,100	13,000	25,000
2035 (W)	13,000	1,300	13,000	27,000
2036 (W)	14,000	1,400	13,000	28,000
2037 (W)	13,000	1,300	14,000	28,000
2038 (D)	11,000	1,100	13,000	25,000
2039 (W)	12,000	1,300	14,000	27,000
2040 (D)	12,000	1,200	14,000	27,000
2041 (C)	11,000	1,200	14,000	25,000
2042 (D)	9,600	1,100	13,000	24,000
2043 (C)	12,000	1,300	14,000	27,000
2044 (C)	12,000	1,300	14,000	27,000
2045 (C)	11,000	1,200	14,000	26,000
2046 (AN)	14,000	1,500	15,000	30,000
2047 (C)	12,000	1,300	15,000	28,000
2048 (W)	12,000	1,300	13,000	26,000
2049 (W)	13,000	1,300	14,000	29,000
2050 (W)	12,000	1,300	14,000	27,000
2051 (W)	14,000	1,500	13,000	28,000
2052 (W)	12,000	1,200	13,000	26,000
2053 (AN)	12,000	1,300	14,000	27,000
2054 (D)	12,000	1,200	14,000	27,000
2055 (D)	10,000	1,100	13,000	25,000
2056 (AN)	12,000	1,300	13,000	26,000
2057 (BN)	10,000	1,100	13,000	24,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		14,000	1,500	15,000	30,000
2059 (W)		13,000	1,300	13,000	27,000
2060 (D)		10,000	1,100	13,000	24,000
2061 (C)		8,600	890	12,000	22,000
2062 (D)		10,000	1,100	13,000	24,000
2063 (BN)		12,000	1,300	13,000	27,000
2064 (W)		12,000	1,300	14,000	27,000
2065 (BN)		11,000	1,200	14,000	26,000
2066 (D)		8,700	940	12,000	22,000
2067 (C)		8,000	890	12,000	21,000
2068 (C)		9,600	1,100	13,000	24,000
2069 (BN)		12,000	1,300	14,000	27,000
2070 (W)		13,000	1,300	14,000	28,000
2071 (BN)		10,000	1,100	13,000	25,000
2072 (W)		14,000	1,500	15,000	30,000
Average (2022-2072)		12,000	1,200	14,000	26,000
2022-2072	W	13,000	1,300	14,000	28,000
	AN	13,000	1,400	14,000	29,000
	BN	11,000	1,200	14,000	26,000
	D	10,000	1,100	13,000	25,000
	C	10,000	1,100	13,000	24,000

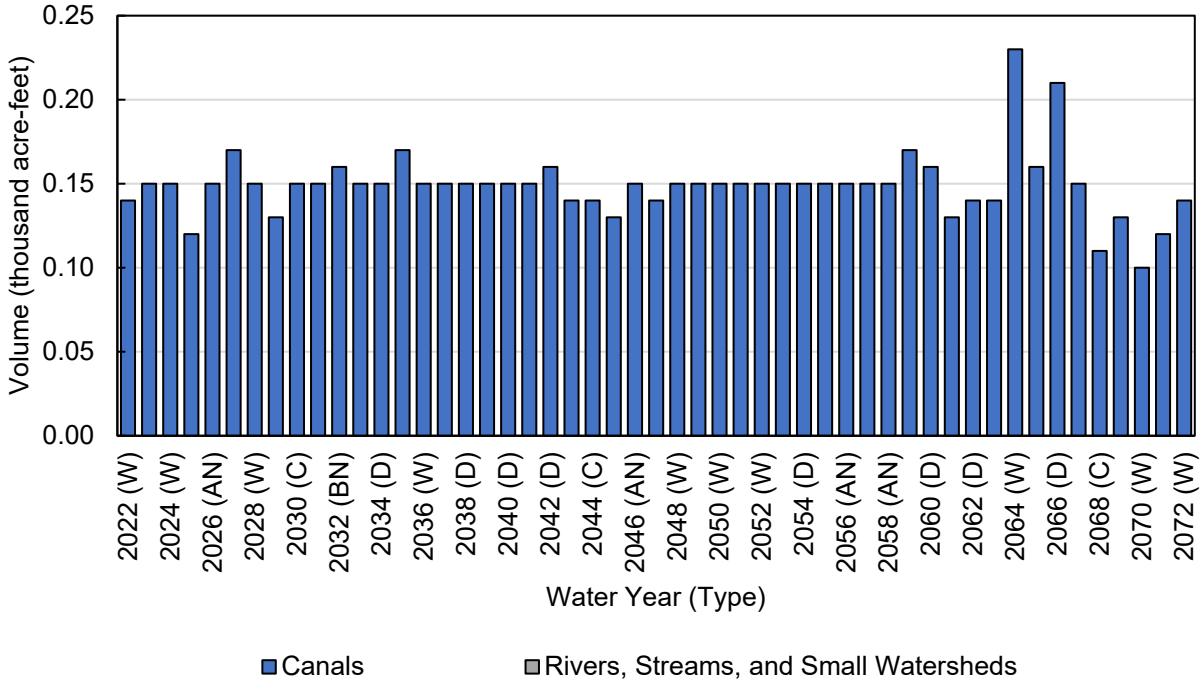


Figure 34. Antelope Subbasin Projected (Current Land Use) Evaporation of Surface Water Sources

Table 33. Antelope Subbasin Projected (Current Land Use) Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds[1]	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	160	0	160
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
2059 (W)		170	0	170
2060 (D)		160	0	160
2061 (C)		130	0	130
2062 (D)		140	0	140
2063 (BN)		140	0	140
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	150	0	150
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

2.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 35** and **Table 34** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 81 taf per year, and range on average from 55 taf in critical years up to 100 taf in wet years. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

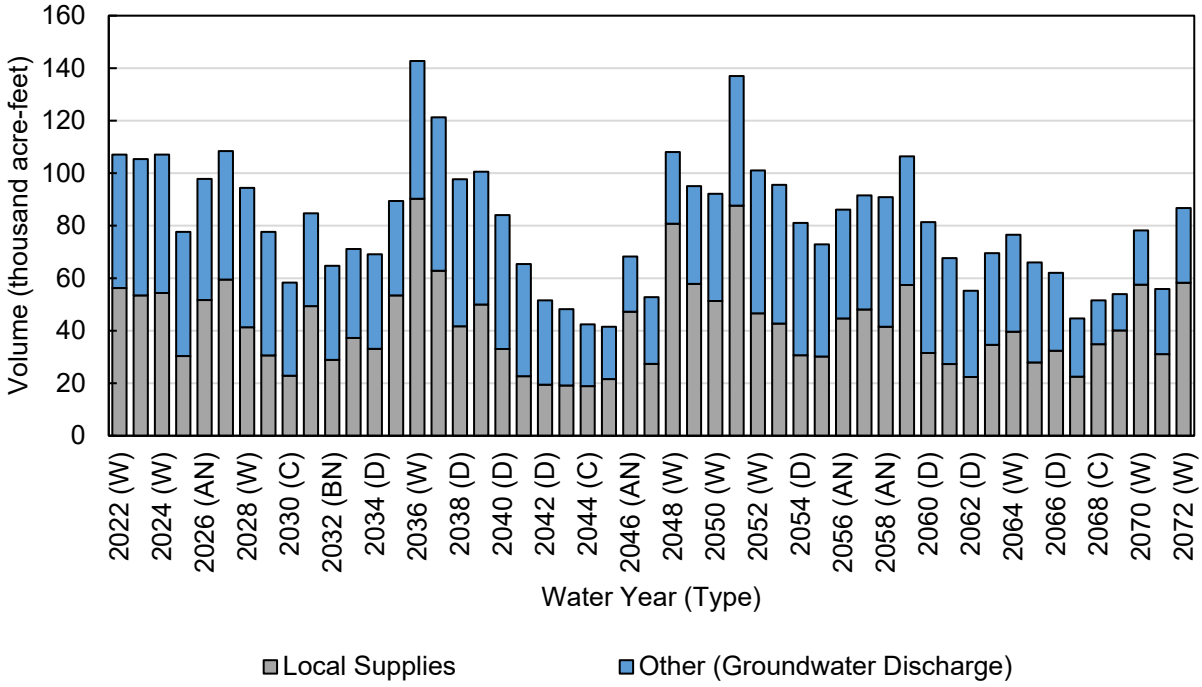


Figure 35. Antelope Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type

Table 34. Antelope Subbasin Projected (Current Land Use) Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	56,000	51,000	110,000
2023 (W)	0	53,000	52,000	110,000
2024 (W)	0	54,000	53,000	110,000
2025 (BN)	0	30,000	47,000	78,000
2026 (AN)	0	52,000	46,000	98,000
2027 (W)	0	59,000	49,000	110,000
2028 (W)	0	41,000	53,000	94,000
2029 (C)	0	31,000	47,000	78,000
2030 (C)	0	23,000	35,000	58,000
2031 (AN)	0	49,000	35,000	85,000
2032 (BN)	0	29,000	36,000	65,000
2033 (AN)	0	37,000	34,000	71,000
2034 (D)	0	33,000	36,000	69,000
2035 (W)	0	53,000	36,000	89,000
2036 (W)	0	90,000	52,000	140,000
2037 (W)	0	63,000	58,000	120,000
2038 (D)	0	42,000	56,000	98,000
2039 (W)	0	50,000	51,000	100,000
2040 (D)	0	33,000	51,000	84,000
2041 (C)	0	23,000	43,000	65,000
2042 (D)	0	19,000	32,000	52,000
2043 (C)	0	19,000	29,000	48,000
2044 (C)	0	19,000	24,000	42,000
2045 (C)	0	22,000	20,000	41,000
2046 (AN)	0	47,000	21,000	68,000
2047 (C)	0	27,000	25,000	53,000
2048 (W)	0	81,000	27,000	110,000
2049 (W)	0	58,000	37,000	95,000
2050 (W)	0	51,000	41,000	92,000
2051 (W)	0	88,000	49,000	140,000
2052 (W)	0	47,000	54,000	100,000
2053 (AN)	0	43,000	53,000	96,000
2054 (D)	0	31,000	50,000	81,000
2055 (D)	0	30,000	43,000	73,000
2056 (AN)	0	45,000	41,000	86,000

Water Year (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2057 (BN)		0	48,000	43,000	92,000
2058 (AN)		0	42,000	49,000	91,000
2059 (W)		0	57,000	49,000	110,000
2060 (D)		0	32,000	50,000	81,000
2061 (C)		0	27,000	40,000	68,000
2062 (D)		0	22,000	33,000	55,000
2063 (BN)		0	35,000	35,000	70,000
2064 (W)		0	40,000	37,000	77,000
2065 (BN)		0	28,000	38,000	66,000
2066 (D)		0	32,000	30,000	62,000
2067 (C)		0	23,000	22,000	45,000
2068 (C)		0	35,000	17,000	52,000
2069 (BN)		0	40,000	14,000	54,000
2070 (W)		0	58,000	21,000	78,000
2071 (BN)		0	31,000	25,000	56,000
2072 (W)		0	58,000	28,000	87,000
Average (2022-2072)		0	42,000	39,000	81,000
2022-2072	W	0	59,000	44,000	100,000
	AN	0	45,000	40,000	85,000
	BN	0	34,000	34,000	68,000
	D	0	30,000	42,000	73,000
	C	0	25,000	30,000	55,000

2.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 36** and **Table 35** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

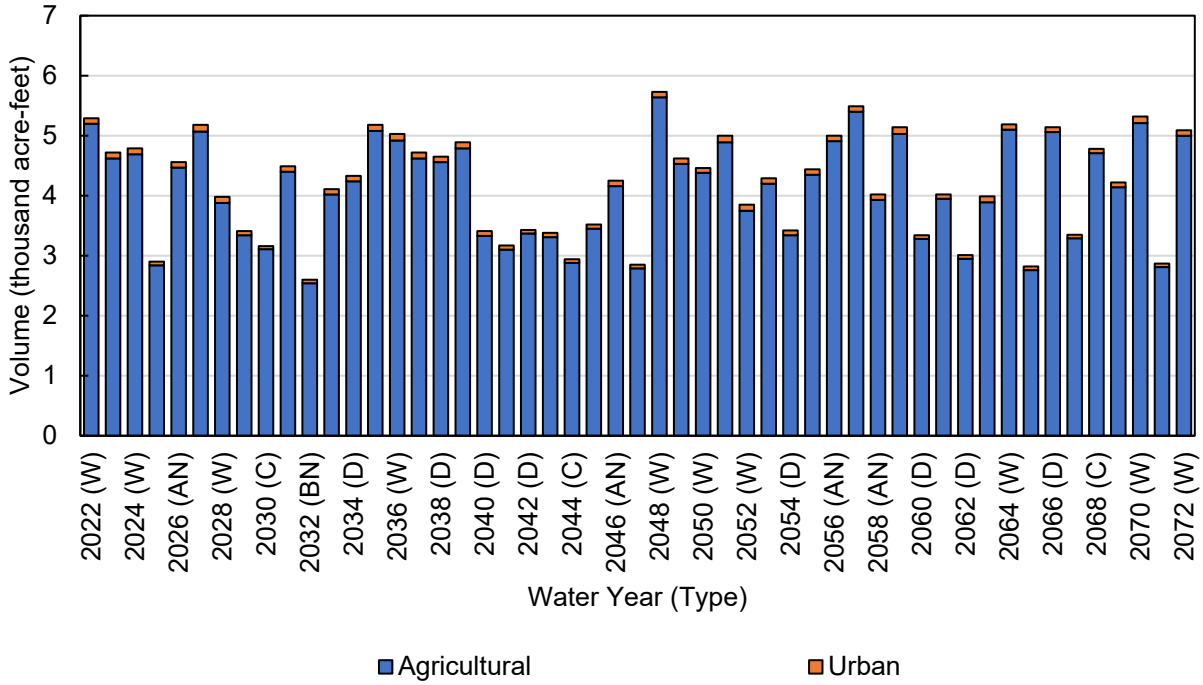


Figure 36. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector

Table 35. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	90	0	5,300
2023 (W)	4,600	100	0	4,700
2024 (W)	4,700	100	0	4,800
2025 (BN)	2,800	60	0	2,900
2026 (AN)	4,500	90	0	4,600
2027 (W)	5,100	110	0	5,200
2028 (W)	3,900	100	0	4,000
2029 (C)	3,300	70	0	3,400
2030 (C)	3,100	50	0	3,200
2031 (AN)	4,400	90	0	4,500
2032 (BN)	2,500	60	0	2,600
2033 (AN)	4,000	90	0	4,100
2034 (D)	4,200	90	0	4,300
2035 (W)	5,100	100	0	5,200
2036 (W)	4,900	110	0	5,000
2037 (W)	4,600	100	0	4,700
2038 (D)	4,600	90	0	4,700
2039 (W)	4,800	100	0	4,900
2040 (D)	3,300	80	0	3,400
2041 (C)	3,100	70	0	3,200
2042 (D)	3,400	60	0	3,400
2043 (C)	3,300	70	0	3,400
2044 (C)	2,900	60	0	2,900
2045 (C)	3,500	70	0	3,500
2046 (AN)	4,200	90	0	4,300
2047 (C)	2,800	60	0	2,900
2048 (W)	5,600	90	0	5,700
2049 (W)	4,500	90	0	4,600
2050 (W)	4,400	80	0	4,500
2051 (W)	4,900	110	0	5,000
2052 (W)	3,800	100	0	3,900
2053 (AN)	4,200	90	0	4,300
2054 (D)	3,300	80	0	3,400
2055 (D)	4,400	90	0	4,400
2056 (AN)	4,900	90	0	5,000
2057 (BN)	5,400	90	0	5,500

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,900	90	0	4,000
2059 (W)		5,000	110	0	5,100
2060 (D)		3,300	60	0	3,300
2061 (C)		4,000	70	0	4,000
2062 (D)		3,000	60	0	3,000
2063 (BN)		3,900	100	0	4,000
2064 (W)		5,100	90	0	5,200
2065 (BN)		2,800	60	0	2,800
2066 (D)		5,100	80	0	5,100
2067 (C)		3,300	60	0	3,400
2068 (C)		4,700	70	0	4,800
2069 (BN)		4,100	80	0	4,200
2070 (W)		5,200	110	0	5,300
2071 (BN)		2,800	60	0	2,900
2072 (W)		5,000	90	0	5,100
Average (2022-2072)		4,100	80	0	4,200
2022-2072	W	4,800	100	0	4,900
	AN	4,300	90	0	4,400
	BN	3,500	70	0	3,600
	D	3,800	80	0	3,900
	C	3,400	70	0	3,500

2.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 37** and **Table 36** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from

less than 3 taf annually during some critical and dry years to about 17 taf in 2036.

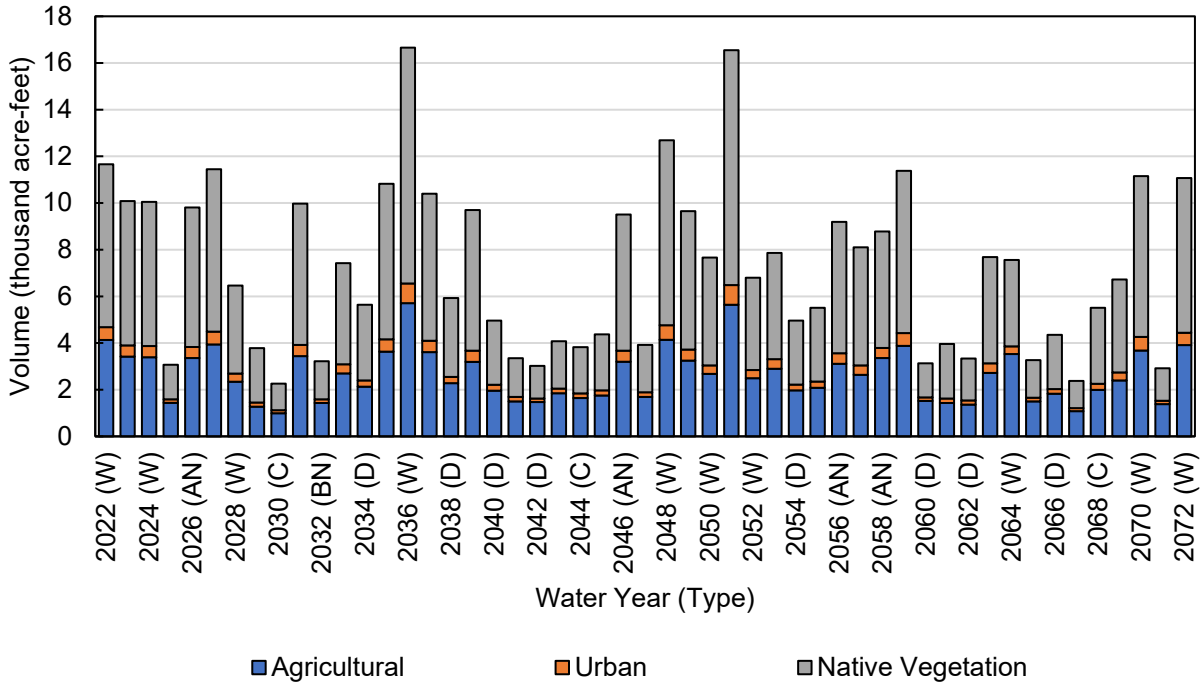


Figure 37. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector

Table 36. Antelope Subbasin Projected (Current Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,100	550	7,000	12,000
2023 (W)	3,400	480	6,200	10,000
2024 (W)	3,400	480	6,200	10,000
2025 (BN)	1,400	150	1,500	3,100
2026 (AN)	3,400	470	6,000	9,800
2027 (W)	3,900	550	7,000	11,000
2028 (W)	2,300	350	3,800	6,500
2029 (C)	1,300	180	2,300	3,800
2030 (C)	990	130	1,100	2,300
2031 (AN)	3,400	480	6,100	10,000
2032 (BN)	1,400	160	1,600	3,200
2033 (AN)	2,700	390	4,300	7,400
2034 (D)	2,100	270	3,200	5,600
2035 (W)	3,600	530	6,700	11,000
2036 (W)	5,700	840	10,000	17,000
2037 (W)	3,600	490	6,300	10,000
2038 (D)	2,300	270	3,400	5,900
2039 (W)	3,200	480	6,000	9,700
2040 (D)	2,000	250	2,800	5,000
2041 (C)	1,500	190	1,700	3,400
2042 (D)	1,500	150	1,400	3,000
2043 (C)	1,900	200	2,000	4,100
2044 (C)	1,600	200	2,000	3,800
2045 (C)	1,800	220	2,400	4,400
2046 (AN)	3,200	470	5,800	9,500
2047 (C)	1,700	200	2,000	3,900
2048 (W)	4,100	620	7,900	13,000
2049 (W)	3,300	470	5,900	9,700
2050 (W)	2,700	360	4,600	7,700
2051 (W)	5,600	840	10,000	17,000
2052 (W)	2,500	350	4,000	6,800
2053 (AN)	2,900	410	4,600	7,900
2054 (D)	2,000	250	2,700	5,000
2055 (D)	2,100	270	3,200	5,500
2056 (AN)	3,100	450	5,600	9,200
2057 (BN)	2,600	400	5,100	8,100

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,400	430	5,000	8,800
2059 (W)		3,900	550	7,000	11,000
2060 (D)		1,500	150	1,500	3,100
2061 (C)		1,400	190	2,300	4,000
2062 (D)		1,400	180	1,800	3,300
2063 (BN)		2,700	410	4,600	7,700
2064 (W)		3,500	330	3,700	7,600
2065 (BN)		1,500	160	1,600	3,300
2066 (D)		1,800	200	2,300	4,400
2067 (C)		1,100	130	1,200	2,400
2068 (C)		2,000	260	3,300	5,500
2069 (BN)		2,400	340	4,000	6,700
2070 (W)		3,700	580	6,900	11,000
2071 (BN)		1,400	150	1,400	2,900
2072 (W)		3,900	530	6,600	11,000
Average (2022-2072)		2,600	350	4,200	7,100
2022-2072	W	3,700	520	6,400	11,000
	AN	3,200	440	5,300	8,900
	BN	1,900	250	2,800	5,000
	D	1,800	220	2,500	4,500
	C	1,500	190	2,000	3,700

2.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 38** and **Table 37.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts, as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than 4 taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.1 taf per year.

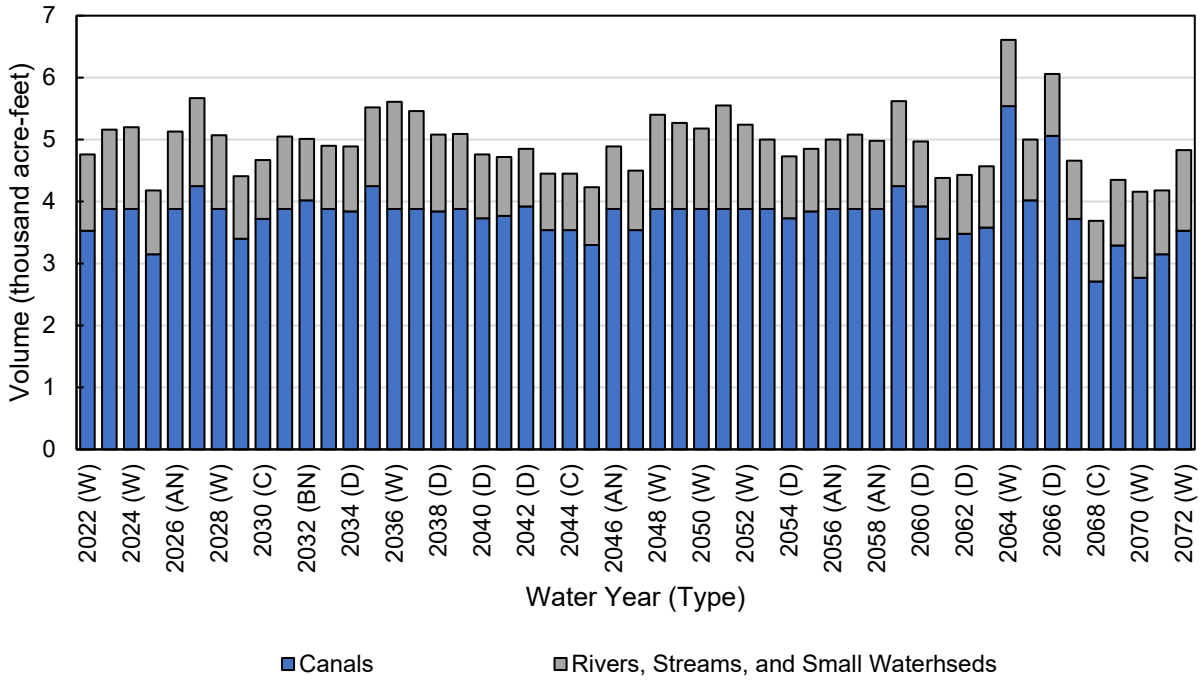


Figure 38. Antelope Subbasin Projected (Current Land Use) Infiltration of Surface Water, by Water Use Sector

Table 37. Antelope Subbasin Projected (Current Land Use) Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	3,500	1,200	4,800
2023 (W)	3,900	1,300	5,200
2024 (W)	3,900	1,300	5,200
2025 (BN)	3,200	1,000	4,200
2026 (AN)	3,900	1,300	5,100
2027 (W)	4,300	1,400	5,700
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	950	4,700
2031 (AN)	3,900	1,200	5,100
2032 (BN)	4,000	990	5,000
2033 (AN)	3,900	1,000	4,900
2034 (D)	3,800	1,100	4,900
2035 (W)	4,300	1,300	5,500
2036 (W)	3,900	1,700	5,600
2037 (W)	3,900	1,600	5,500
2038 (D)	3,800	1,200	5,100
2039 (W)	3,900	1,200	5,100
2040 (D)	3,700	1,000	4,800
2041 (C)	3,800	950	4,700
2042 (D)	3,900	930	4,900
2043 (C)	3,500	910	4,500
2044 (C)	3,500	910	4,500
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,000	4,900
2047 (C)	3,500	960	4,500
2048 (W)	3,900	1,500	5,400
2049 (W)	3,900	1,400	5,300
2050 (W)	3,900	1,300	5,200
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,200
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,700	1,000	4,700
2055 (D)	3,800	1,000	4,900
2056 (AN)	3,900	1,100	5,000
2057 (BN)	3,900	1,200	5,100

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2058 (AN)		3,900	1,100	5,000
2059 (W)		4,300	1,400	5,600
2060 (D)		3,900	1,100	5,000
2061 (C)		3,400	980	4,400
2062 (D)		3,500	950	4,400
2063 (BN)		3,600	990	4,600
2064 (W)		5,500	1,100	6,600
2065 (BN)		4,000	980	5,000
2066 (D)		5,100	1,000	6,100
2067 (C)		3,700	940	4,700
2068 (C)		2,700	980	3,700
2069 (BN)		3,300	1,100	4,400
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,300	4,800
Average (2022-2072)		3,800	1,200	4,900
2022-2072	W	3,900	1,400	5,300
	AN	3,900	1,100	5,000
	BN	3,600	1,000	4,600
	D	3,900	1,000	5,000
	C	3,500	950	4,400

2.1.3 Change in Root Zone Storage

Estimates of projected change in root zone storage are provided in **Figure 39** and **Table 38**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average near zero over many years.

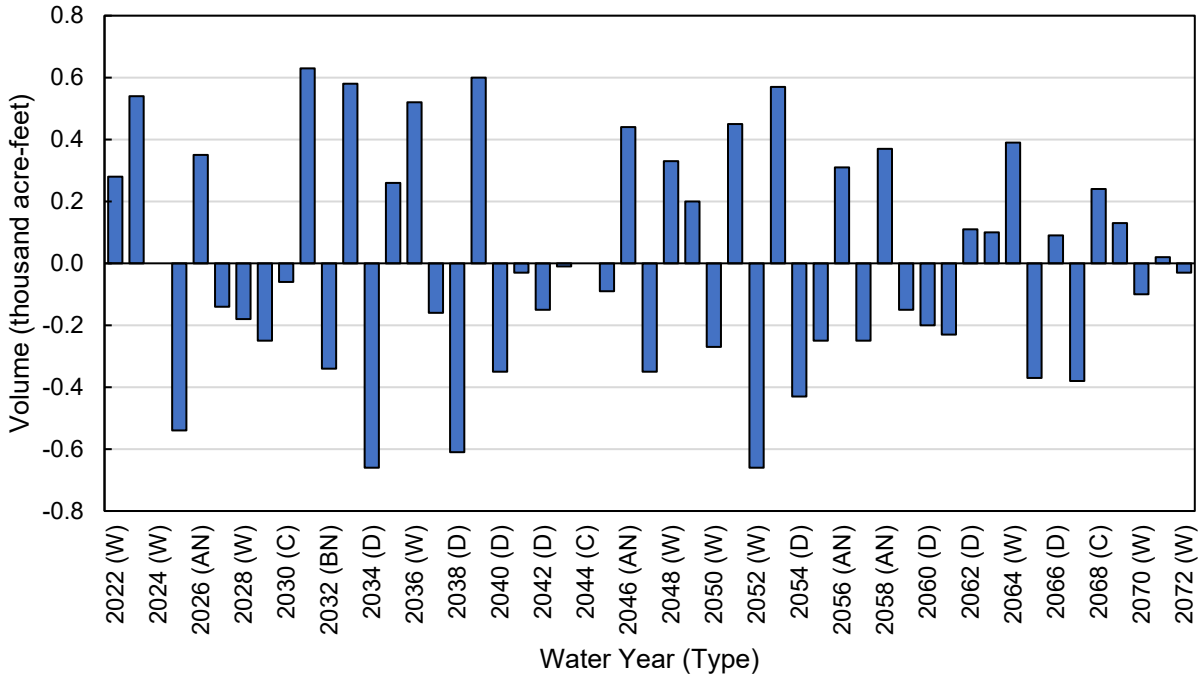


Figure 39. Antelope Subbasin Projected (Current Land Use) Change in Root Zone Storage

Table 38. Antelope Subbasin Projected (Current Land Use) Change in Root Zone Storage (acre-feet)

Water Year (Type)	Change in Root Zone Storage
2022 (W)	280
2023 (W)	540
2024 (W)	0
2025 (BN)	-540
2026 (AN)	350
2027 (W)	-140
2028 (W)	-180
2029 (C)	-250
2030 (C)	-60
2031 (AN)	630
2032 (BN)	-340
2033 (AN)	580
2034 (D)	-660
2035 (W)	260
2036 (W)	520
2037 (W)	-160
2038 (D)	-610
2039 (W)	600
2040 (D)	-350
2041 (C)	-30
2042 (D)	-150
2043 (C)	-10
2044 (C)	0
2045 (C)	-90
2046 (AN)	440
2047 (C)	-350
2048 (W)	330
2049 (W)	200
2050 (W)	-270
2051 (W)	450
2052 (W)	-660
2053 (AN)	570
2054 (D)	-430
2055 (D)	-250
2056 (AN)	310
2057 (BN)	-250

Water Year (Type)		Change in Root Zone Storage
2058 (AN)		370
2059 (W)		-150
2060 (D)		-200
2061 (C)		-230
2062 (D)		110
2063 (BN)		100
2064 (W)		390
2065 (BN)		-370
2066 (D)		90
2067 (C)		-380
2068 (C)		240
2069 (BN)		130
2070 (W)		-100
2071 (BN)		20
2072 (W)		-30
Average (2022-2072)		10
2022-2072	W	100
	AN	460
	BN	-180
	D	-270
	C	-120

2.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction. When calculated for the projected (current land use) water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from projected cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the projected (current land use) water budget period are presented below for the Antelope Subbasin. **Figure 40** and **Table 39** show the average net recharge from the

SWS over 2022-2072 based on the projected (current land use) water budget results. Under current land use conditions, the average net recharge in the Antelope Subbasin was projected as approximately 0.70 taf per year between 2022-2072, indicating net inflows to the GWS from the SWS during the projected (current land use) water budget period. As illustrated on the cumulative net recharge plot in **Figure 40**, this results in a cumulative net positive recharge (i.e., net recharge to the GWS from the SWS) of about eight (8) taf over the 51-year projected (current land use) water budget period. Although this means there is projected to be more recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage will increase or that the Subbasin groundwater system will be sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

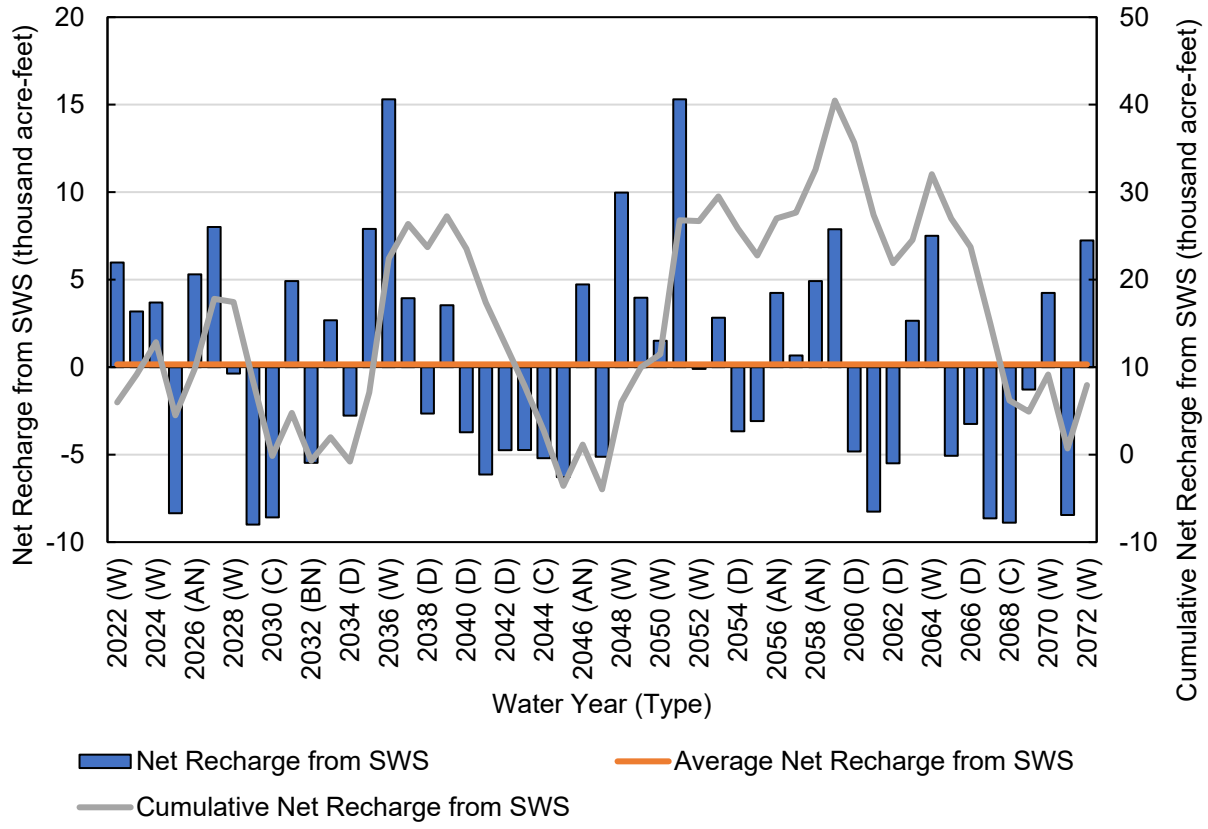


Figure 40. Antelope Subbasin Projected (Current Land Use) Net Recharge Overview, 2022-2072

Table 39. Antelope Subbasin Projected (Current Land Use) Water Budget: Average Net Recharge from SWS, by Water Year Type (acre-feet)

Year Type	Number of Years	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	18	4,900	10,660	5,300	14,810	6,050
AN	7	4,390	8,930	4,990	14,090	4,220
BN	7	3,560	5,000	4,620	16,790	-3,610
D	9	3,910	4,540	4,960	17,200	-3,790
C	10	3,460	3,740	4,420	18,700	-7,080
Annual Average (2022-2072)	51	4,190	7,120	4,930	16,170	70

2.2 Groundwater System Water Budget Results

Projected (Current Land Use) water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

2.2.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin are projected to occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows are projected to occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

2.2.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Projected lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 41** and **Table 40**. The total projected net subsurface flows to and from all adjacent subbasins averages about 42 taf per year occurring as inflow to the Antelope Subbasin. The largest projected subsurface flows occur across the boundary with the Bend Subbasin with somewhat less subsurface flow occurring across the boundaries with the Red Bluff Subbasin although these flows are still considerable. Much smaller flows occur across the boundaries with the Los Molinos Subbasin.

Projected subsurface flows with the Bend Subbasin average about 21 taf occurring as inflows to the Antelope Subbasin. This makes up about half of the projected subsurface inflows to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Red Bluff Subbasin to the Antelope Subbasin are projected to average about 2.9 and 418 taf, respectively. The projected magnitudes of the subsurface inflows from the Bend Subbasin are relatively consistent from year to year; however, the inflows/outflows with the

Red Bluff and Los Molinos Subbasins are somewhat variable. Projected subsurface flows across the boundary with the Los Molinos Subbasin generally occur as inflows with some smaller volumes of outflows occurring periodically.

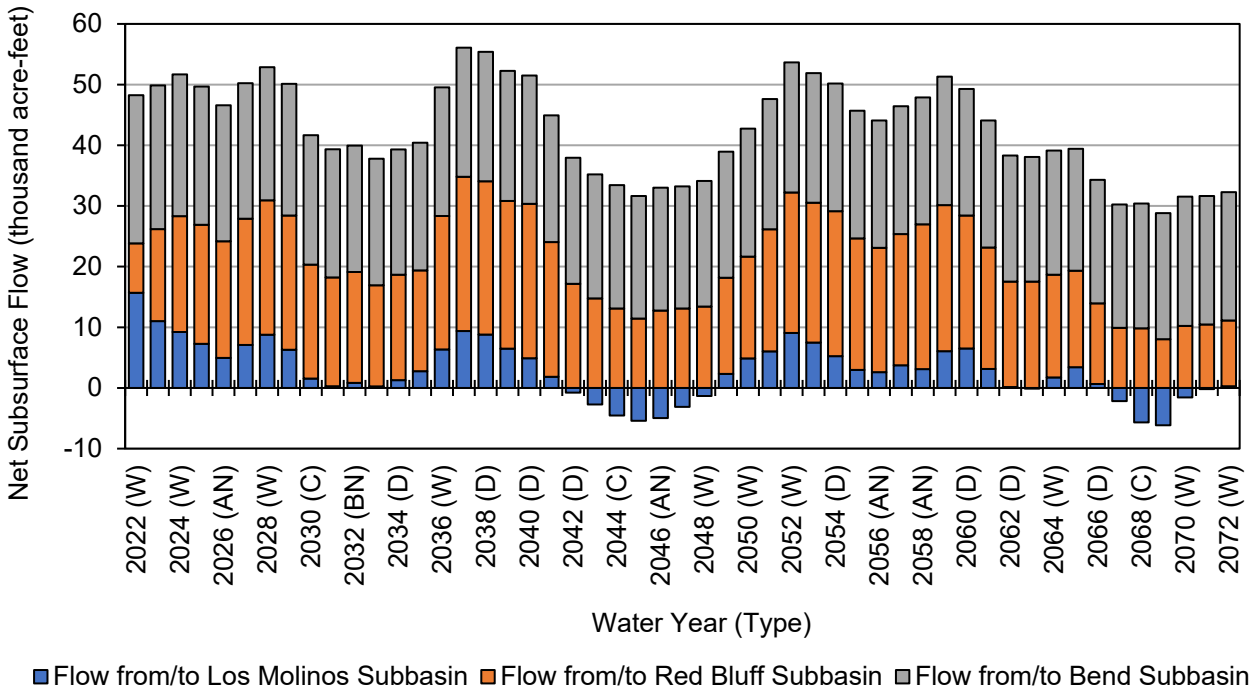


Figure 41. Antelope Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 40. Antelope Subbasin Projected (Current Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

Water Year (Type)	Red Bluff	Los Molinos	Bend	Total
2022 (BN)	8,200	16,000	24,000	49,000
2023 (W)	15,000	11,000	24,000	50,000
2024 (W)	19,000	9,200	23,000	52,000
2025 (W)	20,000	7,300	23,000	50,000
2026 (BN)	19,000	4,900	22,000	47,000
2027 (AN)	21,000	7,100	22,000	51,000
2028 (W)	22,000	8,800	22,000	53,000
2029 (W)	22,000	6,300	22,000	50,000
2030 (C)	19,000	1,600	21,000	42,000
2031 (C)	18,000	290	21,000	40,000
2032 (AN)	18,000	850	21,000	40,000
2033 (BN)	17,000	260	21,000	38,000
2034 (AN)	17,000	1,300	21,000	40,000
2035 (D)	17,000	2,800	21,000	41,000
2036 (W)	22,000	6,400	21,000	50,000
2037 (W)	25,000	9,400	21,000	56,000
2038 (W)	25,000	8,800	21,000	56,000
2039 (D)	24,000	6,500	21,000	53,000
2040 (W)	25,000	4,900	21,000	52,000
2041 (D)	22,000	1,800	21,000	45,000
2042 (C)	17,000	-780	21,000	37,000
2043 (D)	15,000	-2,700	20,000	33,000
2044 (C)	13,000	-4,500	20,000	29,000
2045 (C)	11,000	-5,400	20,000	27,000
2046 (C)	13,000	-5,000	20,000	28,000
2047 (AN)	13,000	-3,100	20,000	30,000
2048 (C)	13,000	-1,300	21,000	33,000
2049 (W)	16,000	2,300	21,000	39,000
2050 (W)	17,000	4,900	21,000	43,000
2051 (W)	20,000	6,000	21,000	48,000
2052 (W)	23,000	9,100	21,000	54,000
2053 (W)	23,000	7,500	21,000	52,000
2054 (AN)	24,000	5,200	21,000	50,000
2055 (D)	22,000	3,000	21,000	46,000
2056 (D)	21,000	2,600	21,000	44,000
2057 (AN)	22,000	3,700	21,000	47,000
2058 (BN)	24,000	3,100	21,000	48,000
2059 (AN)	24,000	6,100	21,000	52,000

Water Year (Type)		Red Bluff	Los Molinos	Bend	Total
2060 (W)		22,000	6,500	21,000	50,000
2061 (D)		20,000	3,100	21,000	44,000
2062 (C)		17,000	150	21,000	39,000
2063 (D)		18,000	-110	21,000	38,000
2064 (BN)		17,000	1,700	20,000	39,000
2065 (W)		16,000	3,400	20,000	40,000
2066 (BN)		13,000	650	20,000	35,000
2067 (D)		9,900	-2,200	20,000	28,000
2068 (C)		9,800	-5,700	21,000	25,000
2069 (C)		8,000	-6,100	21,000	23,000
2070 (BN)		10,000	-1,600	21,000	30,000
2071 (W)		10,000	-200	21,000	32,000
2072 (W)		11,000	290	21,000	33,000
Average (2022-2072)		18,000	2,900	21,000	42,000
2022-2072	W	18,000	5,800	22,000	46,000
	AN	19,000	2,000	21,000	43,000
	BN	16,000	1,300	21,000	38,000
	D	20,000	3,300	21,000	45,000
	C	14,000	1,700	21,000	37,000

Note: positive values represent net inflows to Antelope Subbasin, negative values represent net outflows from Antelope Subbasin.

2.2.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Projected lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 42** and **Table 41**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average projected subsurface inflow from the upland areas is about 0.270 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

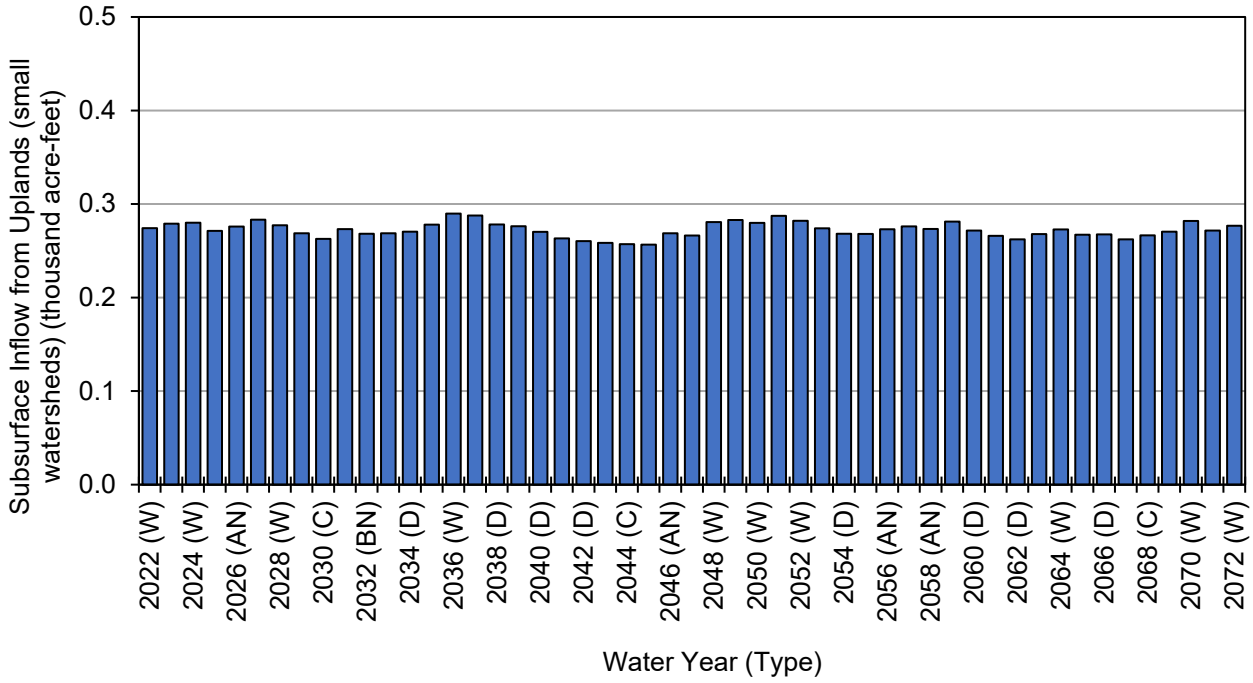


Figure 42. Antelope Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Upland Areas

Table 41. Antelope Subbasin Projected (Current Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (Small Watersheds) (acre-feet)

Water Year (Type)	Subsurface Inflow from Uplands
2022 (W)	270
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280

Water Year (Type)		Subsurface Inflow from Uplands
2060 (D)		270
2061 (C)		270
2062 (D)		260
2063 (BN)		270
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

2.2.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 43** and **Table 42**. The average annual deep percolation from the SWS over the projected water budget period is approximately 11 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

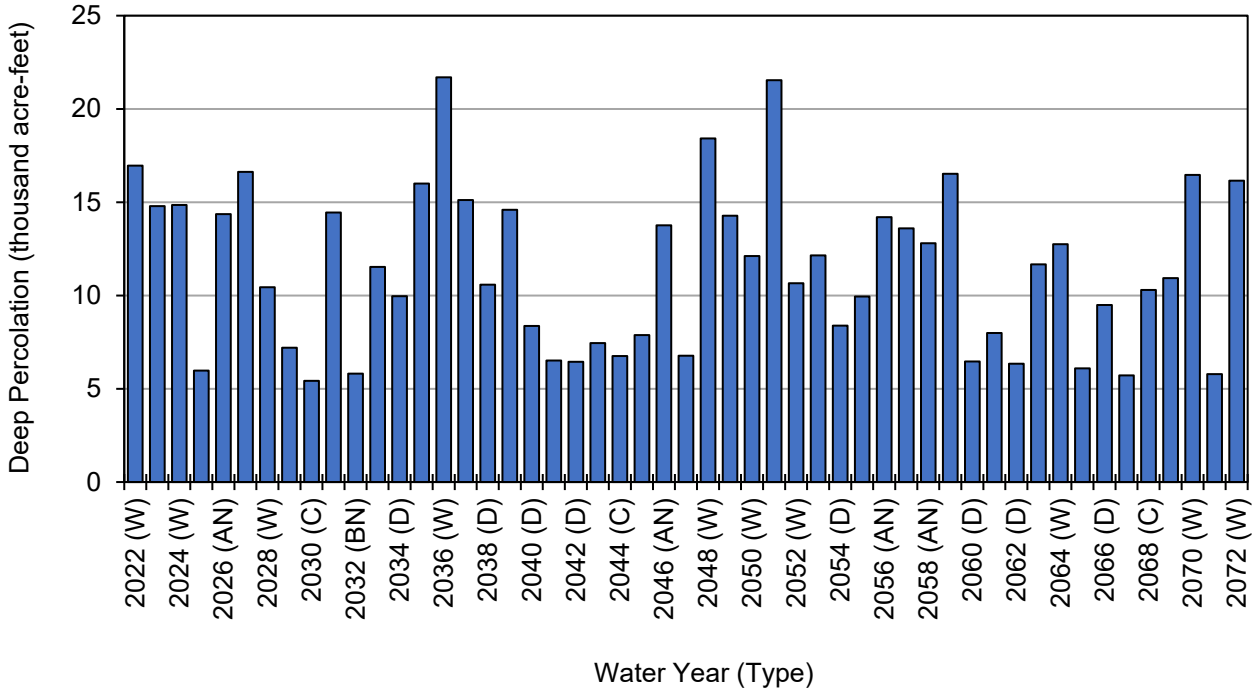


Figure 43. Antelope Subbasin Projected (Current Land Use) Deep Percolation

Table 42. Antelope Subbasin Projected (Current Land Use) Deep Percolation from the SWS (acre-feet)

Water Year (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	6,000
2026 (AN)	14,000
2027 (W)	17,000
2028 (W)	10,000
2029 (C)	7,200
2030 (C)	5,400
2031 (AN)	14,000
2032 (BN)	5,800
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	22,000
2037 (W)	15,000
2038 (D)	11,000
2039 (W)	15,000
2040 (D)	8,400
2041 (C)	6,500
2042 (D)	6,400
2043 (C)	7,500
2044 (C)	6,800
2045 (C)	7,900
2046 (AN)	14,000
2047 (C)	6,800
2048 (W)	18,000
2049 (W)	14,000
2050 (W)	12,000
2051 (W)	22,000
2052 (W)	11,000
2053 (AN)	12,000
2054 (D)	8,400
2055 (D)	9,900
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	17,000

Water Year (Type)		Deep Percolation from the SWS
2060 (D)		6,500
2061 (C)		8,000
2062 (D)		6,300
2063 (BN)		12,000
2064 (W)		13,000
2065 (BN)		6,100
2066 (D)		9,500
2067 (C)		5,700
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,800
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	16,000
	AN	13,000
	BN	8,600
	D	8,400
	C	7,100

2.2.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 44** and **Table 43**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the projected annual net seepage values are always highly negative with an average annual net stream seepage value of -38 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

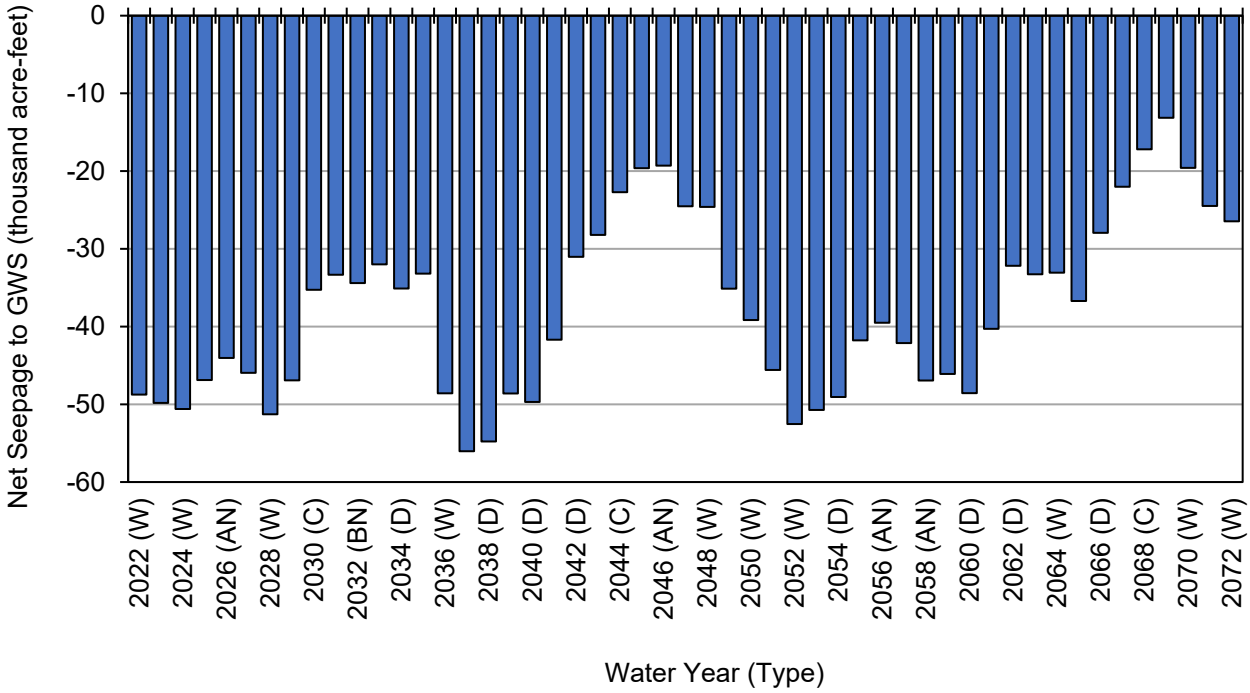


Figure 44. Antelope Subbasin Projected (Current Land Use) Net Stream Seepage to GWS/Discharge to Surface Water

Table 43. Antelope Subbasin Projected (Current Land Use) Net Stream Seepage (net flows as acre-feet)

Water Year (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-49,000
2023 (W)	-50,000
2024 (W)	-51,000
2025 (BN)	-47,000
2026 (AN)	-44,000
2027 (W)	-46,000
2028 (W)	-51,000
2029 (C)	-47,000
2030 (C)	-35,000
2031 (AN)	-33,000
2032 (BN)	-34,000
2033 (AN)	-32,000
2034 (D)	-35,000
2035 (W)	-33,000
2036 (W)	-49,000
2037 (W)	-56,000
2038 (D)	-55,000
2039 (W)	-49,000
2040 (D)	-50,000
2041 (C)	-42,000
2042 (D)	-31,000
2043 (C)	-28,000
2044 (C)	-23,000
2045 (C)	-20,000
2046 (AN)	-19,000
2047 (C)	-25,000
2048 (W)	-25,000
2049 (W)	-35,000
2050 (W)	-39,000
2051 (W)	-46,000
2052 (W)	-53,000
2053 (AN)	-51,000
2054 (D)	-49,000
2055 (D)	-42,000
2056 (AN)	-40,000
2057 (BN)	-42,000
2058 (AN)	-47,000
2059 (W)	-46,000

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
2060 (D)		-49,000
2061 (C)		-40,000
2062 (D)		-32,000
2063 (BN)		-33,000
2064 (W)		-33,000
2065 (BN)		-37,000
2066 (D)		-28,000
2067 (C)		-22,000
2068 (C)		-17,000
2069 (BN)		-13,000
2070 (W)		-20,000
2071 (BN)		-24,000
2072 (W)		-26,000
Average (2022-2072)		-38,000
2022-2072	W	-42,000
	AN	-38,000
	BN	-33,000
	D	-41,000
	C	-32,000

Note: negative values indicate net groundwater discharge to surface water

2.2.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Projected groundwater extractions are summarized in **Figure 45** and **Table 44** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the projected water budget period average about -15 taf per year. Overall, groundwater pumping represents a larger fraction (about eight times) of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -15 taf over the projected period and groundwater uptake averaged about -1.2 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

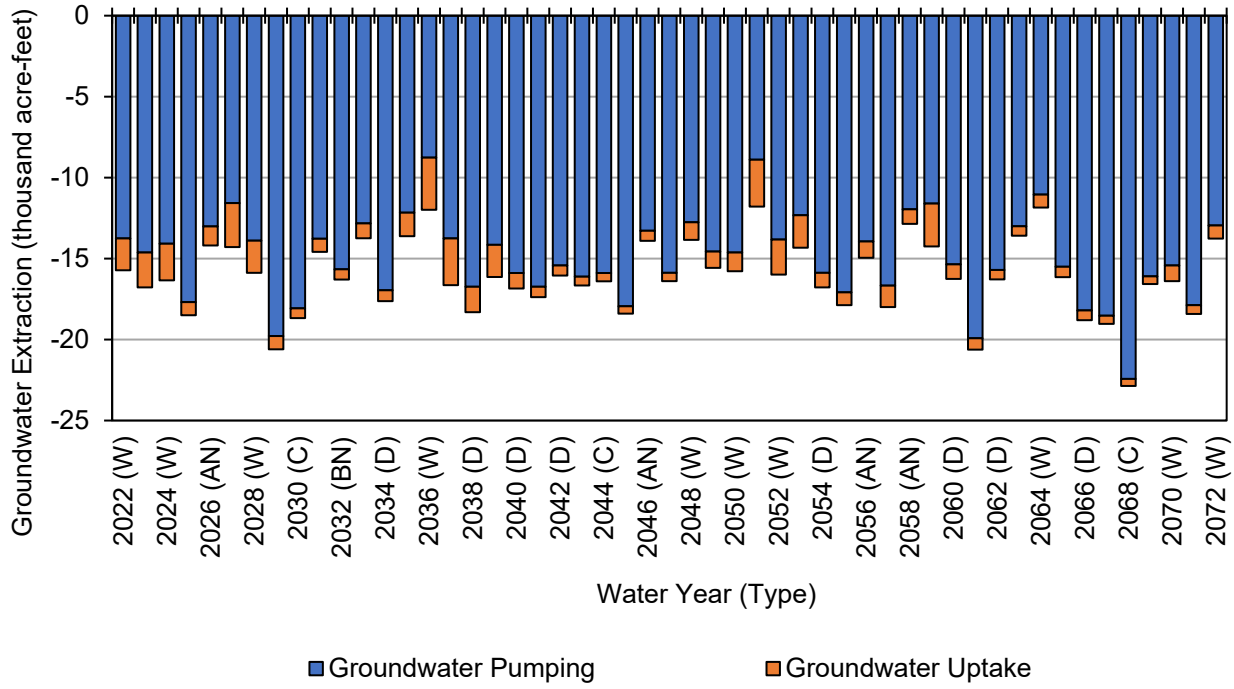


Figure 45. Antelope Subbasin Projected (Current Land Use) Groundwater Extractions

Table 44. Antelope Subbasin Projected (Current Land Use) Groundwater Extractions (acre-feet)

Water Year (Type)	Groundwater Pumping
2022 (W)	-14,000
2023 (W)	-15,000
2024 (W)	-14,000
2025 (BN)	-18,000
2026 (AN)	-13,000
2027 (W)	-12,000
2028 (W)	-14,000
2029 (C)	-20,000
2030 (C)	-18,000
2031 (AN)	-14,000
2032 (BN)	-16,000
2033 (AN)	-13,000
2034 (D)	-17,000
2035 (W)	-12,000
2036 (W)	-8,800
2037 (W)	-14,000
2038 (D)	-17,000
2039 (W)	-14,000
2040 (D)	-16,000
2041 (C)	-17,000
2042 (D)	-15,000
2043 (C)	-16,000
2044 (C)	-16,000
2045 (C)	-18,000
2046 (AN)	-13,000
2047 (C)	-16,000
2048 (W)	-13,000
2049 (W)	-15,000
2050 (W)	-15,000
2051 (W)	-8,900
2052 (W)	-14,000
2053 (AN)	-12,000
2054 (D)	-16,000
2055 (D)	-17,000
2056 (AN)	-14,000
2057 (BN)	-17,000
2058 (AN)	-12,000
2059 (W)	-12,000

Water Year (Type)		Groundwater Pumping
2060 (D)		-15,000
2061 (C)		-20,000
2062 (D)		-16,000
2063 (BN)		-13,000
2064 (W)		-11,000
2065 (BN)		-16,000
2066 (D)		-18,000
2067 (C)		-19,000
2068 (C)		-22,000
2069 (BN)		-16,000
2070 (W)		-15,000
2071 (BN)		-18,000
2072 (W)		-13,000
Average (2022-2072)		-15,000
2022-2072	W	-13,000
	AN	-13,000
	BN	-16,000
	D	-16,000
	C	-18,000

2.2.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Projected vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 46** and **Table 45** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 29 taf per year over the projected water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

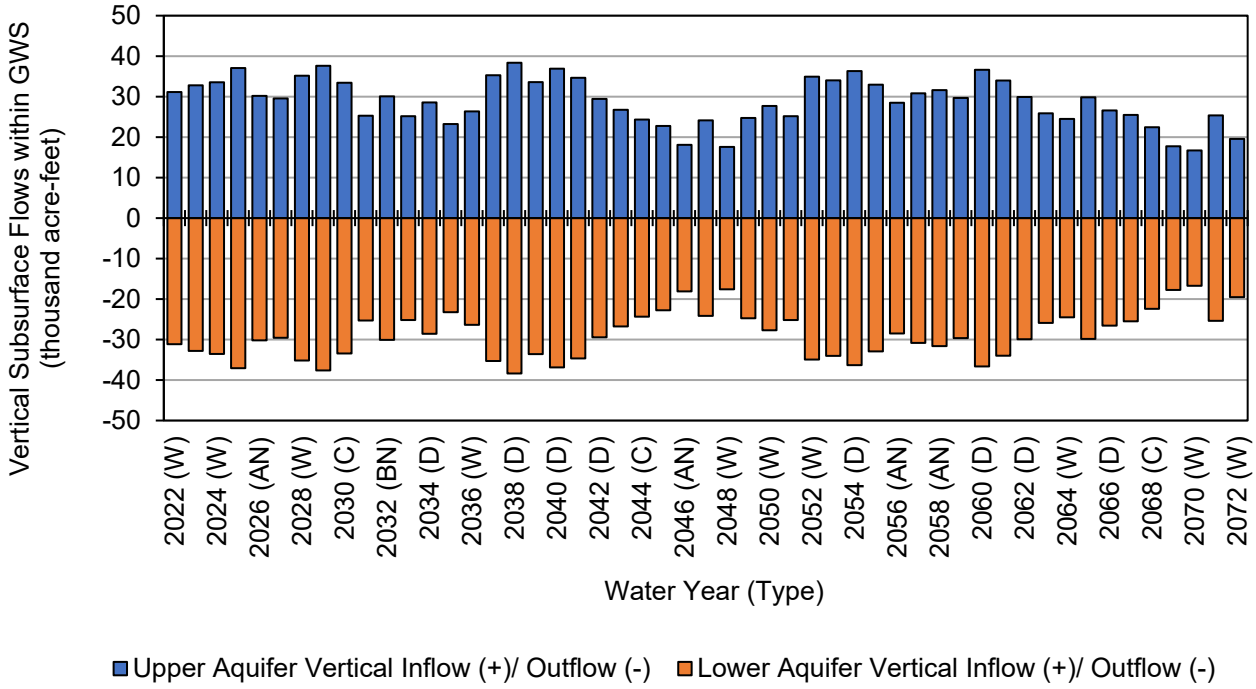


Figure 46. Antelope Subbasin Projected (Current Land Use) Vertical Subsurface Flow within the GWS

Table 45. Antelope Subbasin Projected (Current Land Use) Vertical Subsurface Flows within the GWS (acre-feet)

Water Year (Type)	Upper Aquifer to (-) / from (+) Lower Aquifer
2022 (W)	31,000
2023 (W)	33,000
2024 (W)	34,000
2025 (BN)	37,000
2026 (AN)	30,000
2027 (W)	30,000
2028 (W)	35,000
2029 (C)	38,000
2030 (C)	33,000
2031 (AN)	25,000
2032 (BN)	30,000
2033 (AN)	25,000
2034 (D)	29,000
2035 (W)	23,000
2036 (W)	26,000
2037 (W)	35,000
2038 (D)	38,000
2039 (W)	34,000
2040 (D)	37,000
2041 (C)	35,000
2042 (D)	29,000
2043 (C)	27,000
2044 (C)	24,000
2045 (C)	23,000
2046 (AN)	18,000
2047 (C)	24,000
2048 (W)	18,000
2049 (W)	25,000
2050 (W)	28,000
2051 (W)	25,000
2052 (W)	35,000
2053 (AN)	34,000
2054 (D)	36,000
2055 (D)	33,000
2056 (AN)	28,000
2057 (BN)	31,000
2058 (AN)	32,000
2059 (W)	30,000

Water Year (Type)		Upper Aquifer to (-) / from (+) Lower Aquifer
2060 (D)		37,000
2061 (C)		34,000
2062 (D)		30,000
2063 (BN)		26,000
2064 (W)		25,000
2065 (BN)		30,000
2066 (D)		27,000
2067 (C)		25,000
2068 (C)		22,000
2069 (BN)		18,000
2070 (W)		17,000
2071 (BN)		25,000
2072 (W)		20,000
Average (2022-2072)		29,000
2022-2072	W	28,000
	AN	28,000
	BN	28,000
	D	33,000
	C	29,000

2.2.6 Change in Groundwater Storage

Projected change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 47** and **Figure 48,** and **Table 46**. Values for total change in storage in the GWS and cumulative change in storage over the historical water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the projected period, the average total annual change in groundwater storage is about -0.290 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the projected period is about -15 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are lower in the Lower Aquifer (average -0.130 taf per year) compared to the Upper Aquifer (average -0.160 taf per year).

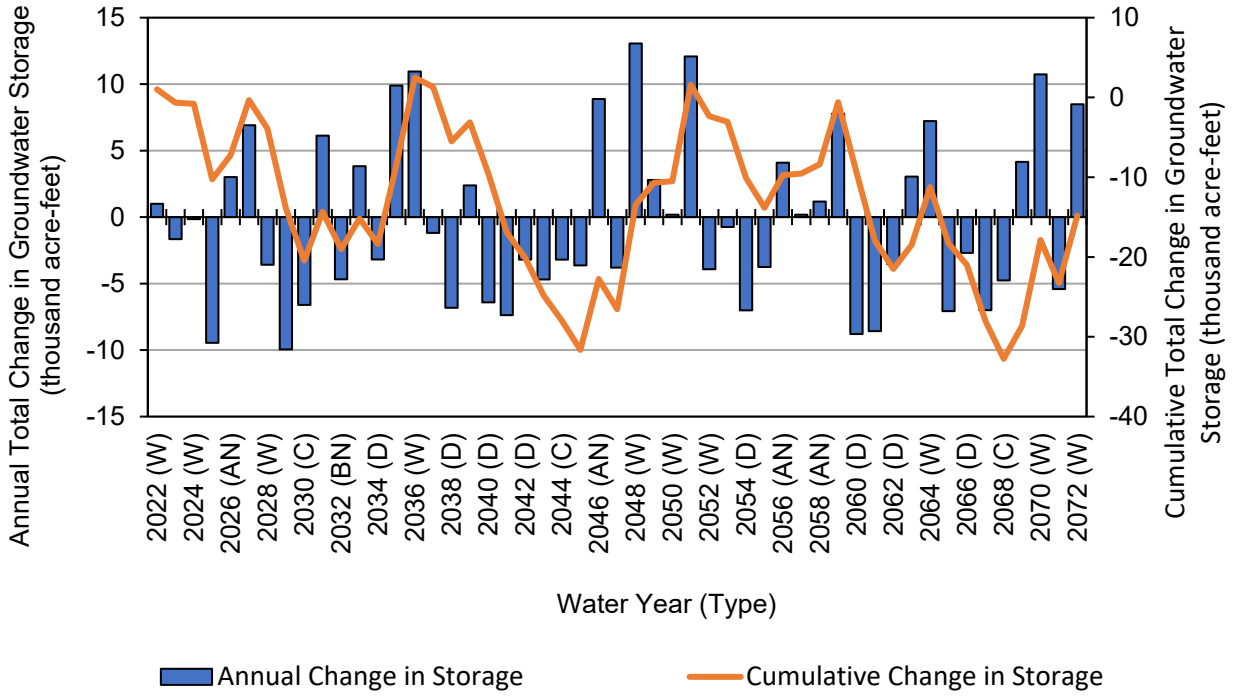


Figure 47. Antelope Subbasin Projected (Current Land Use) Total Change in Storage within the GWS

Table 46. Antelope Subbasin Projected (Current Land Use) Change in Groundwater Storage (acre-feet)

Water Year (Type)	Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2022 (BN)	590	420	1,000	1,000
2023 (W)	-1,300	-340	-1,700	-650
2024 (W)	-210	63	-150	-800
2025 (W)	-5,900	-3,600	-9,500	-10,000
2026 (BN)	2,000	1,000	3,000	-7,200
2027 (AN)	4,200	2,700	6,900	-330
2028 (W)	-2,400	-1,200	-3,600	-3,900
2029 (W)	-6,100	-3,800	-9,900	-14,000
2030 (C)	-3,400	-3,200	-6,600	-20,000
2031 (C)	3,900	2,200	6,100	-14,000
2032 (AN)	-2,900	-1,800	-4,700	-19,000
2033 (BN)	2,500	1,300	3,800	-15,000
2034 (AN)	-2,000	-1,200	-3,200	-18,000
2035 (D)	6,200	3,700	9,900	-8,500
2036 (W)	6,500	4,500	11,000	2,500
2037 (W)	-1,100	-57	-1,200	1,300
2038 (W)	-4,400	-2,400	-6,800	-5,500
2039 (D)	1,700	690	2,400	-3,100
2040 (W)	-4,000	-2,400	-6,400	-9,500
2041 (D)	-4,400	-3,000	-7,400	-17,000
2042 (C)	-1,500	-1,700	-3,200	-20,000
2043 (D)	-2,800	-1,900	-4,700	-25,000
2044 (C)	-1,700	-1,500	-3,200	-28,000
2045 (C)	-2,100	-1,500	-3,600	-32,000
2046 (C)	5,800	3,100	8,900	-23,000
2047 (AN)	-2,400	-1,400	-3,800	-27,000
2048 (C)	8,100	5,000	13,000	-13,000
2049 (W)	1,500	1,300	2,800	-11,000
2050 (W)	-250	430	190	-10,000
2051 (W)	7,300	4,800	12,000	1,600
2052 (W)	-3,000	-940	-3,900	-2,300
2053 (W)	-470	-270	-740	-3,100
2054 (AN)	-4,300	-2,700	-7,000	-10,000
2055 (D)	-2,200	-1,500	-3,800	-14,000
2056 (D)	2,700	1,400	4,100	-9,700
2057 (AN)	22	160	190	-9,500
2058 (BN)	770	400	1,200	-8,400

Water Year (Type)		Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2059 (AN)		4,700	3,100	7,800	-600
2060 (W)		-5,400	-3,400	-8,800	-9,400
2061 (D)		-5,300	-3,300	-8,600	-18,000
2062 (C)		-1,800	-1,800	-3,500	-21,000
2063 (D)		2,100	960	3,000	-18,000
2064 (BN)		4,700	2,600	7,200	-11,000
2065 (W)		-4,600	-2,400	-7,100	-18,000
2066 (BN)		-1,400	-1,300	-2,700	-21,000
2067 (D)		-4,000	-3,000	-7,000	-28,000
2068 (C)		-2,800	-1,900	-4,800	-33,000
2069 (C)		2,900	1,300	4,200	-29,000
2070 (BN)		6,400	4,300	11,000	-18,000
2071 (W)		-3,400	-2,100	-5,400	-23,000
2072 (W)		5,300	3,100	8,500	-15,000
Average (2022-2072)		-160	-130	-290	
2022-2072	W	2,700	1,900	4,600	
	AN	2,500	1,300	3,800	
	BN	-1,700	-1,100	-2,700	
	D	-3,000	-2,100	-5,000	
	C	-3,500	-2,400	-6,800	

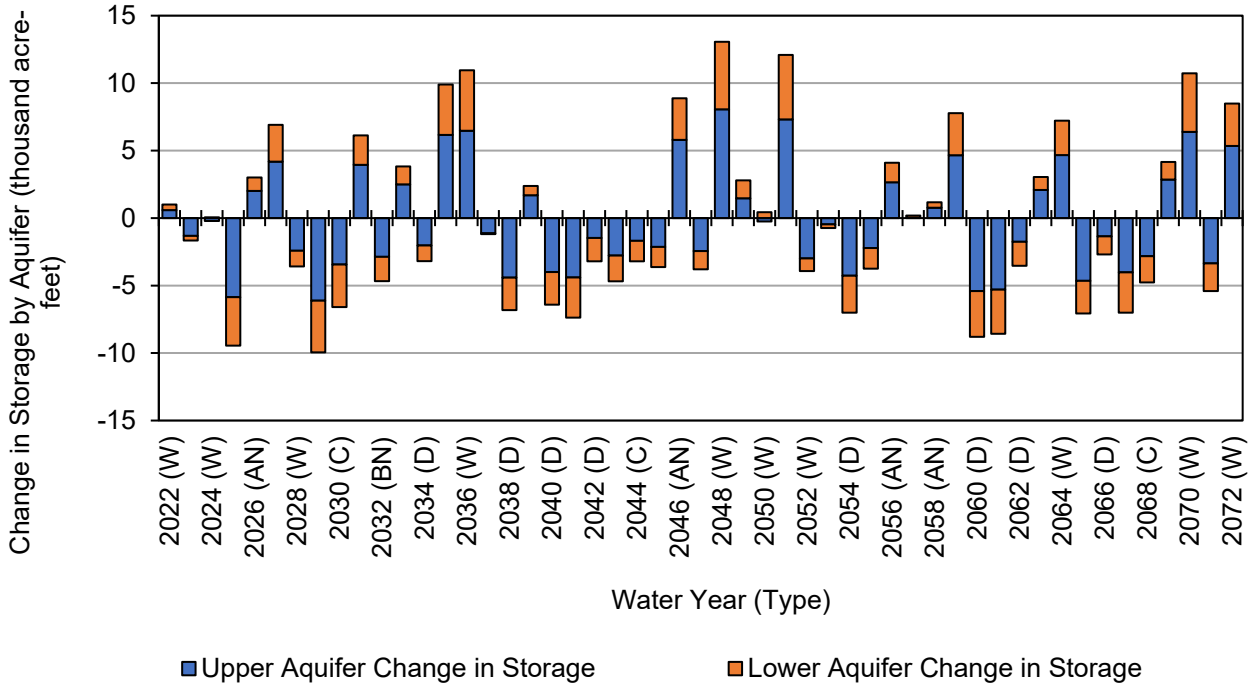


Figure 48. Antelope Subbasin Projected (Current Land Use) Change in Groundwater Storage by Aquifer

3 DETAILED PROJECTED (FUTURE LAND USE) WATER BUDGET

This section presents the results of the Projected (Future Land Use) scenario. The Future Land Use scenario assumes transient land use conditions based on assumed projected development within the Antelope Subbasin.

3.1 Surface Water System Water Budget Results

3.1.1 Inflows

3.1.1.1 *Surface Water Inflow by Water Source Type*

The projected annual volume of surface water inflows is summarized by water source type in **Figure 49** and **Table 47**. Over the projected (future land use) period, surface water inflows average about 43 taf per year. Virtually, all inflows of the SWS are local supplies. The CVP supplies are very small and average about 0.610 taf per year.

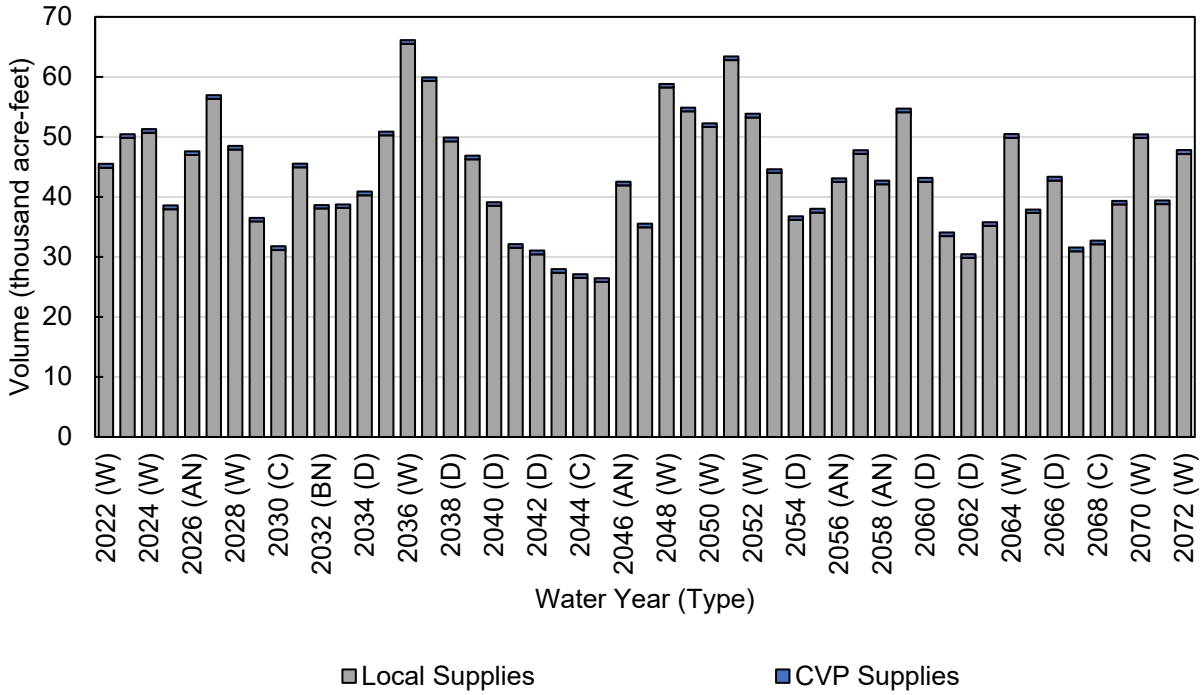


Figure 49. Antelope Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type

Table 47. Antelope Subbasin Projected (Future Land Use) Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	45,000	46,000
2023 (W)	610	50,000	50,000
2024 (W)	610	51,000	51,000
2025 (BN)	630	38,000	39,000
2026 (AN)	610	47,000	48,000
2027 (W)	610	56,000	57,000
2028 (W)	620	48,000	49,000
2029 (C)	600	36,000	37,000
2030 (C)	640	31,000	32,000
2031 (AN)	610	45,000	46,000
2032 (BN)	560	38,000	39,000
2033 (AN)	580	38,000	39,000
2034 (D)	640	40,000	41,000
2035 (W)	610	50,000	51,000
2036 (W)	610	66,000	66,000
2037 (W)	610	59,000	60,000
2038 (D)	640	49,000	50,000
2039 (W)	610	46,000	47,000
2040 (D)	600	39,000	39,000
2041 (C)	610	32,000	32,000
2042 (D)	650	30,000	31,000
2043 (C)	610	27,000	28,000
2044 (C)	610	27,000	27,000
2045 (C)	610	26,000	26,000
2046 (AN)	610	42,000	43,000
2047 (C)	610	35,000	36,000
2048 (W)	610	58,000	59,000
2049 (W)	610	54,000	55,000
2050 (W)	610	52,000	52,000
2051 (W)	610	63,000	63,000
2052 (W)	620	53,000	54,000
2053 (AN)	580	44,000	45,000
2054 (D)	600	36,000	37,000
2055 (D)	640	37,000	38,000
2056 (AN)	580	43,000	43,000
2057 (BN)	620	47,000	48,000

Water Year (Type)		CVP Supplies	Local Supplies	Total
2058 (AN)		600	42,000	43,000
2059 (W)		610	54,000	55,000
2060 (D)		650	43,000	43,000
2061 (C)		600	33,000	34,000
2062 (D)		620	30,000	30,000
2063 (BN)		610	35,000	36,000
2064 (W)		630	50,000	50,000
2065 (BN)		560	37,000	38,000
2066 (D)		650	43,000	43,000
2067 (C)		640	31,000	32,000
2068 (C)		610	32,000	33,000
2069 (BN)		580	39,000	39,000
2070 (W)		580	50,000	50,000
2071 (BN)		630	39,000	39,000
2072 (W)		650	47,000	48,000
Average (2022-2072)		610	43,000	43,000
2022-2072	W	620	53,000	54,000
	AN	600	43,000	44,000
	BN	600	39,000	40,000
	D	630	39,000	39,000
	C	610	31,000	32,000

3.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Figure 50** and **Table 48**. Total precipitation is highly variable between years in the study area, ranging from approximately 30 taf (18.6 inches) during average critically dry years to 56 taf (34.7 inches) during average wet years.

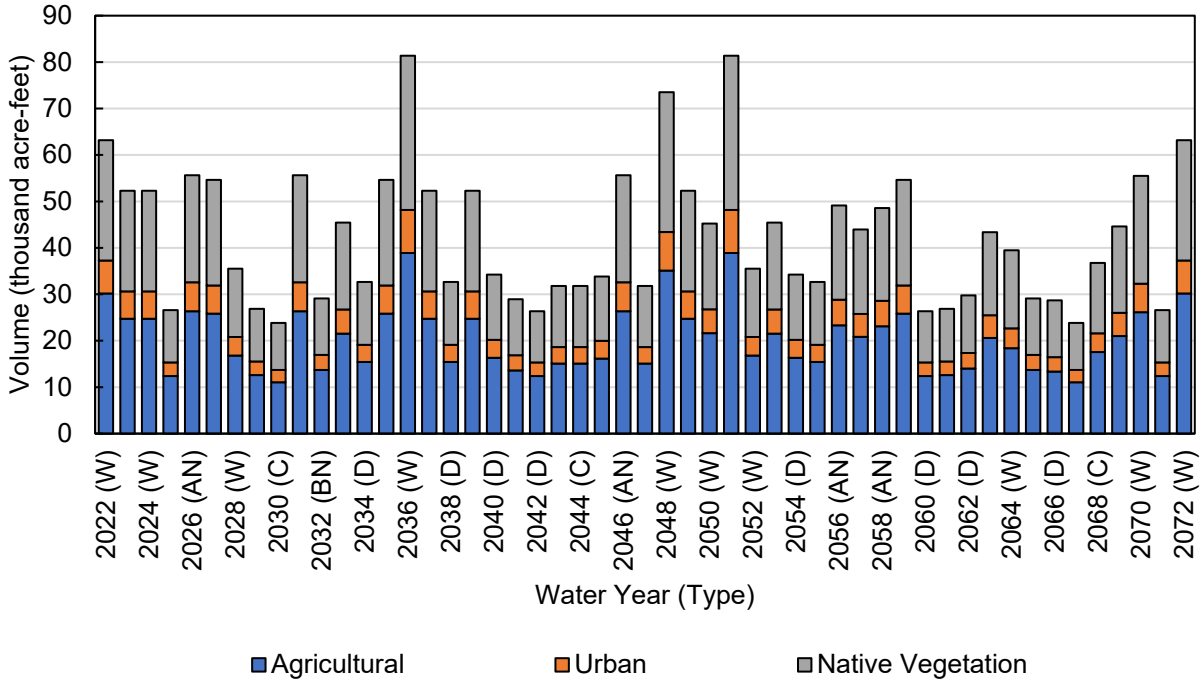


Figure 50. Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector

Table 48. Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	30,000	7,100	26,000	63,000
2023 (W)	25,000	5,900	22,000	52,000
2024 (W)	25,000	5,900	22,000	52,000
2025 (BN)	12,000	2,900	11,000	27,000
2026 (AN)	26,000	6,200	23,000	56,000
2027 (W)	26,000	6,100	23,000	55,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	13,000	2,900	11,000	27,000
2030 (C)	11,000	2,700	10,000	24,000
2031 (AN)	26,000	6,200	23,000	56,000
2032 (BN)	14,000	3,200	12,000	29,000
2033 (AN)	22,000	5,200	19,000	45,000
2034 (D)	15,000	3,700	14,000	33,000
2035 (W)	26,000	6,100	23,000	55,000
2036 (W)	39,000	9,300	33,000	81,000
2037 (W)	25,000	5,900	22,000	52,000
2038 (D)	15,000	3,700	14,000	33,000
2039 (W)	25,000	5,900	22,000	52,000
2040 (D)	16,000	3,900	14,000	34,000
2041 (C)	14,000	3,300	12,000	29,000
2042 (D)	12,000	2,900	11,000	26,000
2043 (C)	15,000	3,600	13,000	32,000
2044 (C)	15,000	3,600	13,000	32,000
2045 (C)	16,000	3,800	14,000	34,000
2046 (AN)	26,000	6,200	23,000	56,000
2047 (C)	15,000	3,600	13,000	32,000
2048 (W)	35,000	8,300	30,000	74,000
2049 (W)	25,000	5,900	22,000	52,000
2050 (W)	22,000	5,100	18,000	45,000
2051 (W)	39,000	9,300	33,000	81,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	22,000	5,200	19,000	45,000
2054 (D)	16,000	3,900	14,000	34,000
2055 (D)	15,000	3,700	14,000	33,000
2056 (AN)	23,000	5,500	20,000	49,000
2057 (BN)	21,000	4,900	18,000	44,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		23,000	5,500	20,000	49,000
2059 (W)		26,000	6,100	23,000	55,000
2060 (D)		12,000	2,900	11,000	26,000
2061 (C)		13,000	2,900	11,000	27,000
2062 (D)		14,000	3,300	12,000	30,000
2063 (BN)		21,000	4,900	18,000	43,000
2064 (W)		18,000	4,300	17,000	39,000
2065 (BN)		14,000	3,200	12,000	29,000
2066 (D)		13,000	3,100	12,000	29,000
2067 (C)		11,000	2,700	10,000	24,000
2068 (C)		18,000	4,000	15,000	37,000
2069 (BN)		21,000	5,000	19,000	45,000
2070 (W)		26,000	6,100	23,000	56,000
2071 (BN)		12,000	2,900	11,000	27,000
2072 (W)		30,000	7,100	26,000	63,000
Average (2022-2072)		20,000	4,800	18,000	43,000
2022-2072	W	26,000	6,200	23,000	56,000
	AN	24,000	5,700	21,000	51,000
	BN	16,000	3,900	15,000	35,000
	D	15,000	3,500	13,000	31,000
	C	14,000	3,300	12,000	30,000

3.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 51** and **Table 49**. Virtually all groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 15 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 13 taf in wet years to 18 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 52** and **Table 50**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, totaling 0.1 taf and 0.790 taf per year, on average.

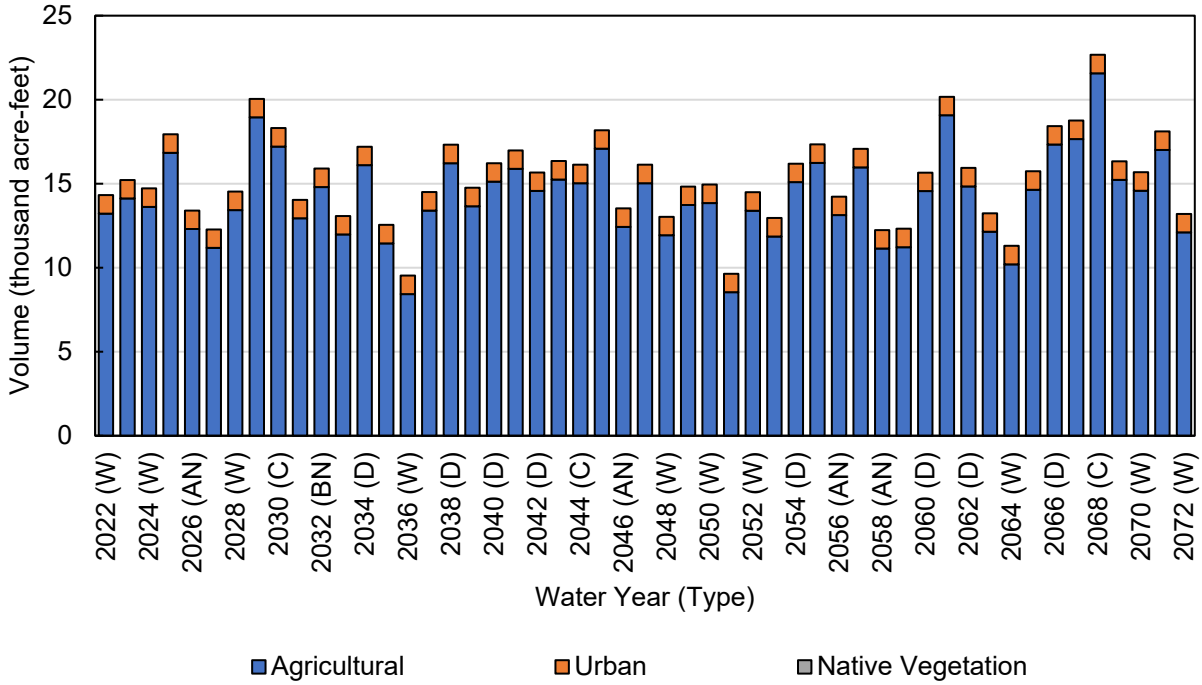


Figure 51. Antelope Subbasin Projected (Future Land Use) Groundwater Pumping, by Water Use Sector

Table 49. Antelope Subbasin Projected (Future Land Use) Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	13,000	1,100	0	14,000
2023 (W)	14,000	1,100	0	15,000
2024 (W)	14,000	1,100	0	15,000
2025 (BN)	17,000	1,100	0	18,000
2026 (AN)	12,000	1,100	0	13,000
2027 (W)	11,000	1,100	0	12,000
2028 (W)	13,000	1,100	0	15,000
2029 (C)	19,000	1,100	0	20,000
2030 (C)	17,000	1,100	0	18,000
2031 (AN)	13,000	1,100	0	14,000
2032 (BN)	15,000	1,100	0	16,000
2033 (AN)	12,000	1,100	0	13,000
2034 (D)	16,000	1,100	0	17,000
2035 (W)	11,000	1,100	0	13,000
2036 (W)	8,400	1,100	0	9,500
2037 (W)	13,000	1,100	0	15,000
2038 (D)	16,000	1,100	0	17,000
2039 (W)	14,000	1,100	0	15,000
2040 (D)	15,000	1,100	0	16,000
2041 (C)	16,000	1,100	0	17,000
2042 (D)	15,000	1,100	0	16,000
2043 (C)	15,000	1,100	0	16,000
2044 (C)	15,000	1,100	0	16,000
2045 (C)	17,000	1,100	0	18,000
2046 (AN)	12,000	1,100	0	14,000
2047 (C)	15,000	1,100	0	16,000
2048 (W)	12,000	1,100	0	13,000
2049 (W)	14,000	1,100	0	15,000
2050 (W)	14,000	1,100	0	15,000
2051 (W)	8,500	1,100	0	9,600
2052 (W)	13,000	1,100	0	14,000
2053 (AN)	12,000	1,100	0	13,000
2054 (D)	15,000	1,100	0	16,000
2055 (D)	16,000	1,100	0	17,000
2056 (AN)	13,000	1,100	0	14,000
2057 (BN)	16,000	1,100	0	17,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		11,000	1,100	0	12,000
2059 (W)		11,000	1,100	0	12,000
2060 (D)		15,000	1,100	0	16,000
2061 (C)		19,000	1,100	0	20,000
2062 (D)		15,000	1,100	0	16,000
2063 (BN)		12,000	1,100	0	13,000
2064 (W)		10,000	1,100	0	11,000
2065 (BN)		15,000	1,100	0	16,000
2066 (D)		17,000	1,100	0	18,000
2067 (C)		18,000	1,100	0	19,000
2068 (C)		22,000	1,100	0	23,000
2069 (BN)		15,000	1,100	0	16,000
2070 (W)		15,000	1,100	0	16,000
2071 (BN)		17,000	1,100	0	18,000
2072 (W)		12,000	1,100	0	13,000
Average (2022-2072)		14,000	1,100	0	15,000
2022-2072	W	12,000	1,100	0	13,000
	AN	12,000	1,100	0	13,000
	BN	15,000	1,100	0	16,000
	D	16,000	1,100	0	17,000
	C	17,000	1,100	0	18,000

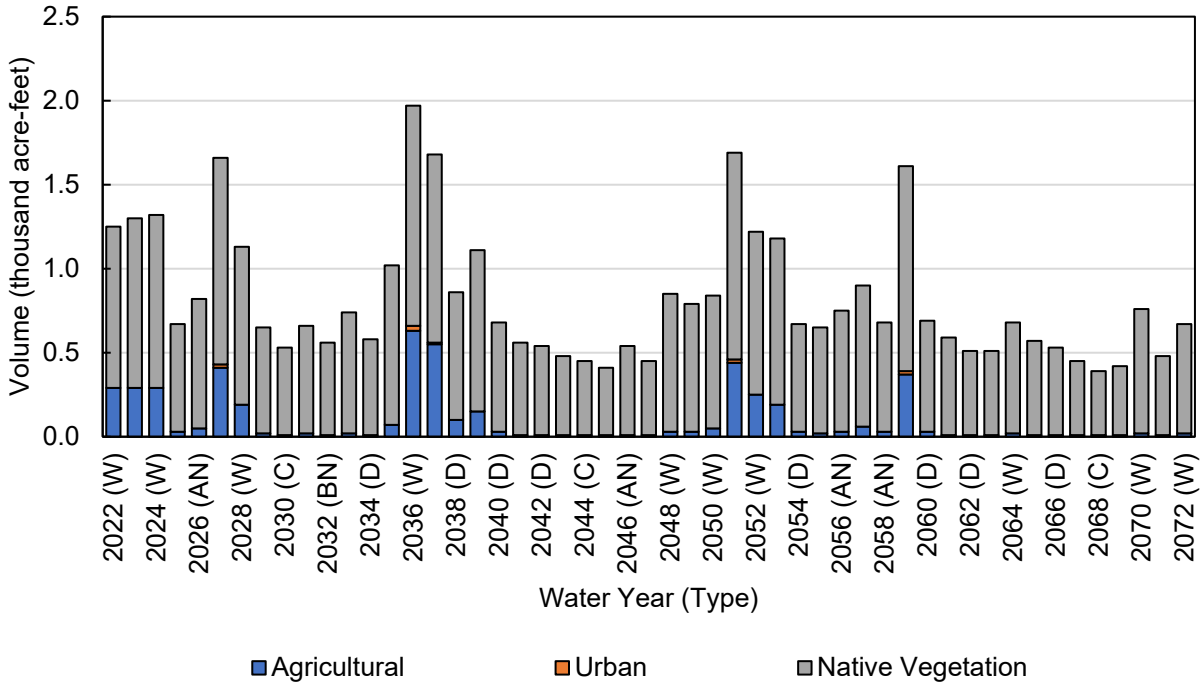


Figure 52 Antelope Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector

Table 50. Antelope Subbasin Projected (Future Land Use) Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (BN)	290	0	960	1,300
2023 (W)	290	0	1,000	1,300
2024 (W)	290	0	1,000	1,300
2025 (W)	30	0	640	670
2026 (BN)	50	0	770	820
2027 (AN)	410	20	1,200	1,700
2028 (W)	190	0	940	1,100
2029 (W)	20	0	630	650
2030 (C)	10	0	520	530
2031 (C)	20	0	640	660
2032 (AN)	10	0	550	560
2033 (BN)	20	0	720	740
2034 (AN)	10	0	570	580
2035 (D)	70	0	950	1,000
2036 (W)	630	30	1,300	2,000
2037 (W)	550	10	1,100	1,700
2038 (W)	100	0	760	860
2039 (D)	150	0	960	1,100
2040 (W)	30	0	650	680
2041 (D)	10	0	550	560
2042 (C)	10	0	530	540
2043 (D)	10	0	470	480
2044 (C)	10	0	440	450
2045 (C)	10	0	400	410
2046 (C)	10	0	530	540
2047 (AN)	10	0	440	450
2048 (C)	30	0	820	850
2049 (W)	30	0	760	790
2050 (W)	50	0	790	840
2051 (W)	440	20	1,200	1,700
2052 (W)	250	0	970	1,200
2053 (W)	190	0	990	1,200
2054 (AN)	30	0	640	670
2055 (D)	20	0	630	650
2056 (D)	30	0	720	750
2057 (AN)	60	0	840	900

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (BN)		30	0	650	680
2059 (AN)		370	20	1,200	1,600
2060 (W)		30	0	660	690
2061 (D)		10	0	580	590
2062 (C)		10	0	500	510
2063 (D)		10	0	500	510
2064 (BN)		20	0	660	680
2065 (W)		10	0	560	570
2066 (BN)		10	0	520	530
2067 (D)		10	0	440	450
2068 (C)		10	0	380	390
2069 (C)		10	0	410	420
2070 (BN)		20	0	740	760
2071 (W)		10	0	470	480
2072 (W)		20	0	650	670
Average (2022-2072)		100	0	720	820
2022-2072	W	230	10	960	1,200
	AN	50	0	720	770
	BN	20	0	570	590
	D	30	0	610	630
	C	10	0	490	500

3.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 53** and **Table 51**, averaging approximately 33 taf per year.

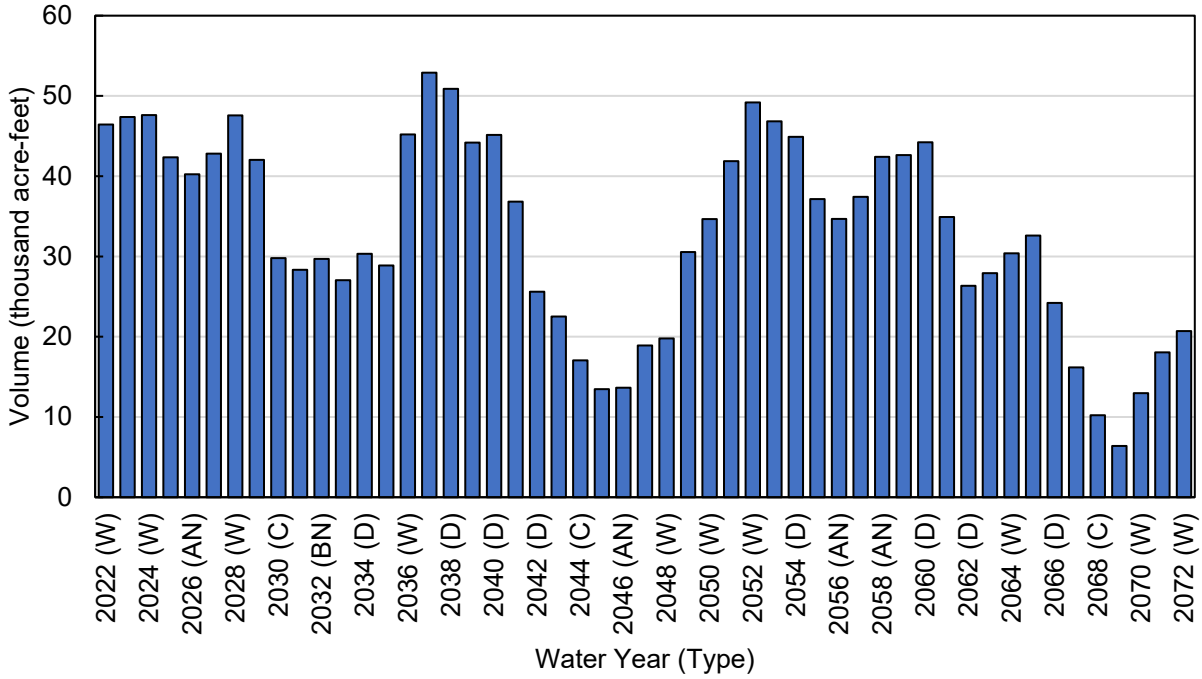


Figure 53. Antelope Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water

Table 51. Antelope Subbasin Projected (Future Land Use) Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)	Groundwater Discharge to Surface Water
2022 (W)	46,000
2023 (W)	47,000
2024 (W)	48,000
2025 (BN)	42,000
2026 (AN)	40,000
2027 (W)	43,000
2028 (W)	48,000
2029 (C)	42,000
2030 (C)	30,000
2031 (AN)	28,000
2032 (BN)	30,000
2033 (AN)	27,000
2034 (D)	30,000
2035 (W)	29,000
2036 (W)	45,000
2037 (W)	53,000
2038 (D)	51,000
2039 (W)	44,000
2040 (D)	45,000
2041 (C)	37,000
2042 (D)	26,000
2043 (C)	23,000
2044 (C)	17,000
2045 (C)	13,000
2046 (AN)	14,000
2047 (C)	19,000
2048 (W)	20,000
2049 (W)	31,000
2050 (W)	35,000
2051 (W)	42,000
2052 (W)	49,000
2053 (AN)	47,000
2054 (D)	45,000
2055 (D)	37,000
2056 (AN)	35,000
2057 (BN)	37,000

Water Year (Type)		Groundwater Discharge to Surface Water
2058 (AN)		42,000
2059 (W)		43,000
2060 (D)		44,000
2061 (C)		35,000
2062 (D)		26,000
2063 (BN)		28,000
2064 (W)		30,000
2065 (BN)		33,000
2066 (D)		24,000
2067 (C)		16,000
2068 (C)		10,000
2069 (BN)		6,400
2070 (W)		13,000
2071 (BN)		18,000
2072 (W)		21,000
Average (2022-2072)		33,000
2022-2072	W	38,000
	AN	33,000
	BN	28,000
	D	37,000
	C	24,000

3.1.2 Outflows

3.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 53** through **Figure 56**, and **Table 51** through **Table 54**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest projected in 2036, at approximately 43 taf, and greatest in multiple years, at approximately 49 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 18 taf in above-normal and wet years and about 20 to 22 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and averages less than 0.360 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to meet a portion of their consumptive use

requirements. ET of groundwater uptake by native vegetation and agricultural crops totals 0.720 and 0.100 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 28 taf in wet years and 24 taf in critical water years. Much of the total ET of precipitation results from the large acreage of native vegetation and Agricultural land in the Antelope Subbasin, though some contribution is from urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 57** and **Table 55**. The total volume is relatively small and constant between years, averaging less than 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

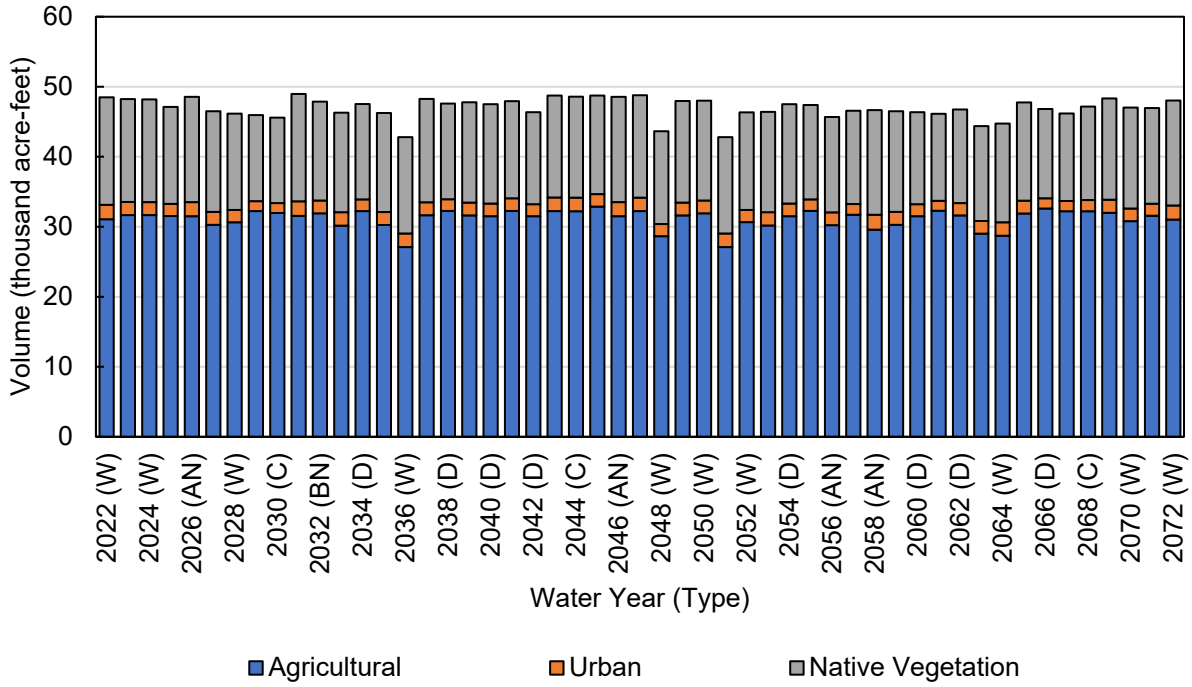


Figure 53. Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector

Table 51. Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	31,000	2,100	15,000	48,000
2023 (W)	32,000	1,900	15,000	48,000
2024 (W)	32,000	1,900	15,000	48,000
2025 (BN)	32,000	1,700	14,000	47,000
2026 (AN)	32,000	2,000	15,000	49,000
2027 (W)	30,000	1,900	14,000	47,000
2028 (W)	31,000	1,700	14,000	46,000
2029 (C)	32,000	1,400	12,000	46,000
2030 (C)	32,000	1,400	12,000	46,000
2031 (AN)	32,000	2,100	15,000	49,000
2032 (BN)	32,000	1,800	14,000	48,000
2033 (AN)	30,000	1,900	14,000	46,000
2034 (D)	32,000	1,700	14,000	48,000
2035 (W)	30,000	1,800	14,000	46,000
2036 (W)	27,000	1,900	14,000	43,000
2037 (W)	32,000	1,900	15,000	48,000
2038 (D)	32,000	1,700	14,000	48,000
2039 (W)	32,000	1,800	14,000	48,000
2040 (D)	32,000	1,800	14,000	48,000
2041 (C)	32,000	1,800	14,000	48,000
2042 (D)	32,000	1,700	13,000	46,000
2043 (C)	32,000	2,000	15,000	49,000
2044 (C)	32,000	1,900	14,000	49,000
2045 (C)	33,000	1,800	14,000	49,000
2046 (AN)	32,000	2,000	15,000	49,000
2047 (C)	32,000	1,900	15,000	49,000
2048 (W)	29,000	1,700	13,000	44,000
2049 (W)	32,000	1,800	15,000	48,000
2050 (W)	32,000	1,900	14,000	48,000
2051 (W)	27,000	1,900	14,000	43,000
2052 (W)	31,000	1,800	14,000	46,000
2053 (AN)	30,000	1,900	14,000	46,000
2054 (D)	32,000	1,800	14,000	48,000
2055 (D)	32,000	1,700	13,000	47,000
2056 (AN)	30,000	1,800	14,000	46,000
2057 (BN)	32,000	1,500	13,000	47,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		30,000	2,100	15,000	47,000
2059 (W)		30,000	1,900	14,000	46,000
2060 (D)		32,000	1,700	13,000	46,000
2061 (C)		32,000	1,400	12,000	46,000
2062 (D)		32,000	1,800	13,000	47,000
2063 (BN)		29,000	1,800	14,000	44,000
2064 (W)		29,000	1,900	14,000	45,000
2065 (BN)		32,000	1,800	14,000	48,000
2066 (D)		33,000	1,500	13,000	47,000
2067 (C)		32,000	1,500	12,000	46,000
2068 (C)		32,000	1,600	13,000	47,000
2069 (BN)		32,000	1,900	14,000	48,000
2070 (W)		31,000	1,800	14,000	47,000
2071 (BN)		32,000	1,700	14,000	47,000
2072 (W)		31,000	2,000	15,000	48,000
Average (2022-2072)		31,000	1,800	14,000	47,000
2022-2072	W	30,000	1,900	14,000	47,000
	AN	31,000	2,000	15,000	47,000
	BN	31,000	1,800	14,000	47,000
	D	32,000	1,700	14,000	47,000
	C	32,000	1,700	13,000	47,000

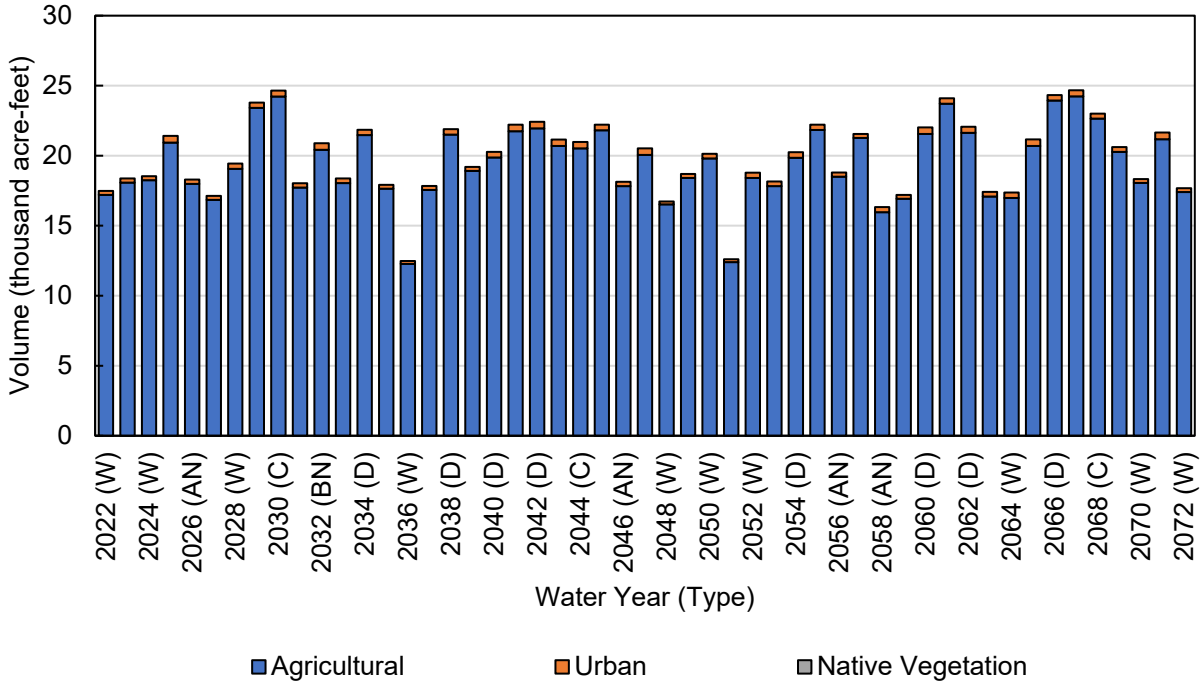


Figure 54. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Applied Water, by Water Use Sector

Table 52. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	17,000	280	0	17,000
2023 (W)	18,000	290	0	18,000
2024 (W)	18,000	290	0	19,000
2025 (BN)	21,000	470	0	21,000
2026 (AN)	18,000	300	0	18,000
2027 (W)	17,000	280	0	17,000
2028 (W)	19,000	380	0	19,000
2029 (C)	23,000	380	0	24,000
2030 (C)	24,000	420	0	25,000
2031 (AN)	18,000	310	0	18,000
2032 (BN)	20,000	470	0	21,000
2033 (AN)	18,000	330	0	18,000
2034 (D)	21,000	380	0	22,000
2035 (W)	18,000	280	0	18,000
2036 (W)	12,000	210	0	12,000
2037 (W)	18,000	290	0	18,000
2038 (D)	22,000	380	0	22,000
2039 (W)	19,000	290	0	19,000
2040 (D)	20,000	400	0	20,000
2041 (C)	22,000	460	0	22,000
2042 (D)	22,000	470	0	22,000
2043 (C)	21,000	460	0	21,000
2044 (C)	21,000	460	0	21,000
2045 (C)	22,000	400	0	22,000
2046 (AN)	18,000	300	0	18,000
2047 (C)	20,000	460	0	21,000
2048 (W)	17,000	200	0	17,000
2049 (W)	18,000	290	0	19,000
2050 (W)	20,000	330	0	20,000
2051 (W)	12,000	210	0	13,000
2052 (W)	18,000	380	0	19,000
2053 (AN)	18,000	330	0	18,000
2054 (D)	20,000	400	0	20,000
2055 (D)	22,000	380	0	22,000
2056 (AN)	19,000	300	0	19,000
2057 (BN)	21,000	280	0	22,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		16,000	360	0	16,000
2059 (W)		17,000	280	0	17,000
2060 (D)		22,000	470	0	22,000
2061 (C)		24,000	390	0	24,000
2062 (D)		22,000	440	0	22,000
2063 (BN)		17,000	340	0	17,000
2064 (W)		17,000	390	0	17,000
2065 (BN)		21,000	470	0	21,000
2066 (D)		24,000	390	0	24,000
2067 (C)		24,000	430	0	25,000
2068 (C)		23,000	350	0	23,000
2069 (BN)		20,000	340	0	21,000
2070 (W)		18,000	280	0	18,000
2071 (BN)		21,000	470	0	22,000
2072 (W)		17,000	270	0	18,000
Average (2022-2072)		19,000	360	0	20,000
2022-2072	W	17,000	290	0	18,000
	AN	18,000	320	0	18,000
	BN	20,000	410	0	21,000
	D	22,000	410	0	22,000
	C	22,000	420	0	23,000

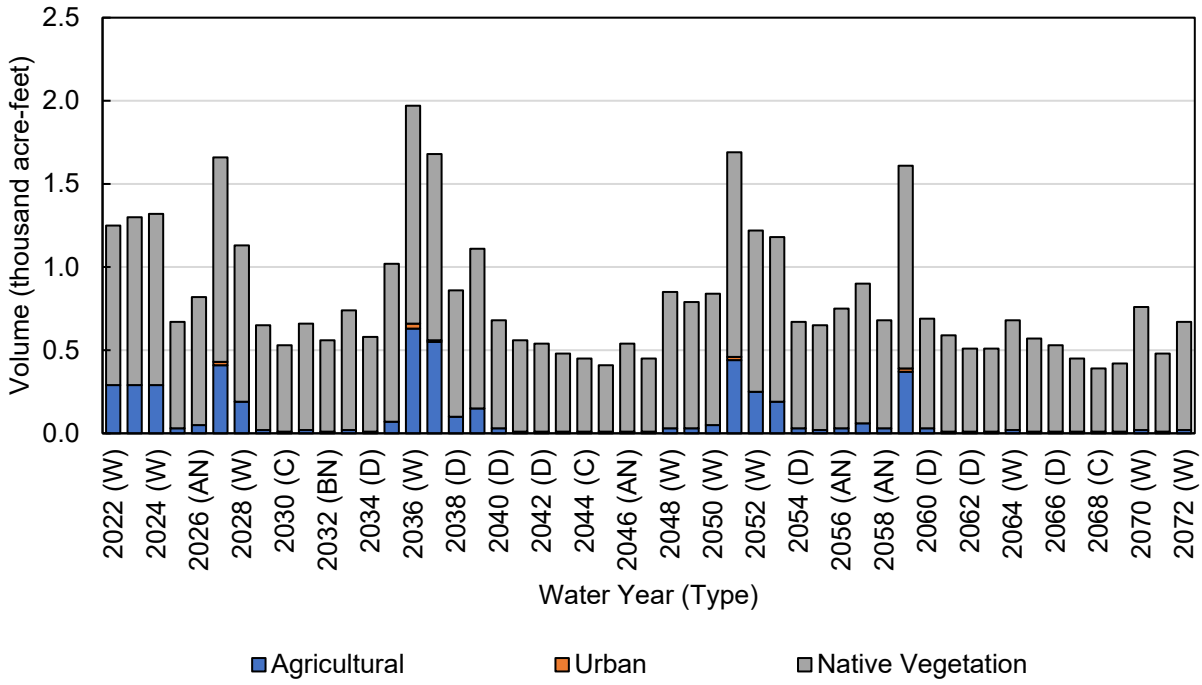


Figure 55. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 53. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	290	0	960	1,300
2023 (W)	290	0	1,000	1,300
2024 (W)	290	0	1,000	1,300
2025 (BN)	30	0	640	670
2026 (AN)	50	0	770	820
2027 (W)	410	20	1,200	1,700
2028 (W)	190	0	940	1,100
2029 (C)	20	0	630	650
2030 (C)	10	0	520	530
2031 (AN)	20	0	640	660
2032 (BN)	10	0	550	560
2033 (AN)	20	0	720	740
2034 (D)	10	0	570	580
2035 (W)	70	0	950	1,000
2036 (W)	630	30	1,300	2,000
2037 (W)	550	10	1,100	1,700
2038 (D)	100	0	760	860
2039 (W)	150	0	960	1,100
2040 (D)	30	0	650	680
2041 (C)	10	0	550	560
2042 (D)	10	0	530	540
2043 (C)	10	0	470	480
2044 (C)	10	0	440	450
2045 (C)	10	0	400	410
2046 (AN)	10	0	530	540
2047 (C)	10	0	440	450
2048 (W)	30	0	820	850
2049 (W)	30	0	760	790
2050 (W)	50	0	790	840
2051 (W)	440	20	1,200	1,700
2052 (W)	250	0	970	1,200
2053 (AN)	190	0	990	1,200
2054 (D)	30	0	640	670
2055 (D)	20	0	630	650
2056 (AN)	30	0	720	750
2057 (BN)	60	0	840	900

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		30	0	650	680
2059 (W)		370	20	1,200	1,600
2060 (D)		30	0	660	690
2061 (C)		10	0	580	590
2062 (D)		10	0	500	510
2063 (BN)		10	0	500	510
2064 (W)		20	0	660	680
2065 (BN)		10	0	560	570
2066 (D)		10	0	520	530
2067 (C)		10	0	440	450
2068 (C)		10	0	380	390
2069 (BN)		10	0	410	420
2070 (W)		20	0	740	760
2071 (BN)		10	0	470	480
2072 (W)		20	0	650	670
Average (2022-2072)		100	0	720	820
2022-2072	W	230	10	960	1,200
	AN	50	0	720	770
	BN	20	0	570	590
	D	30	0	610	630
	C	10	0	490	500

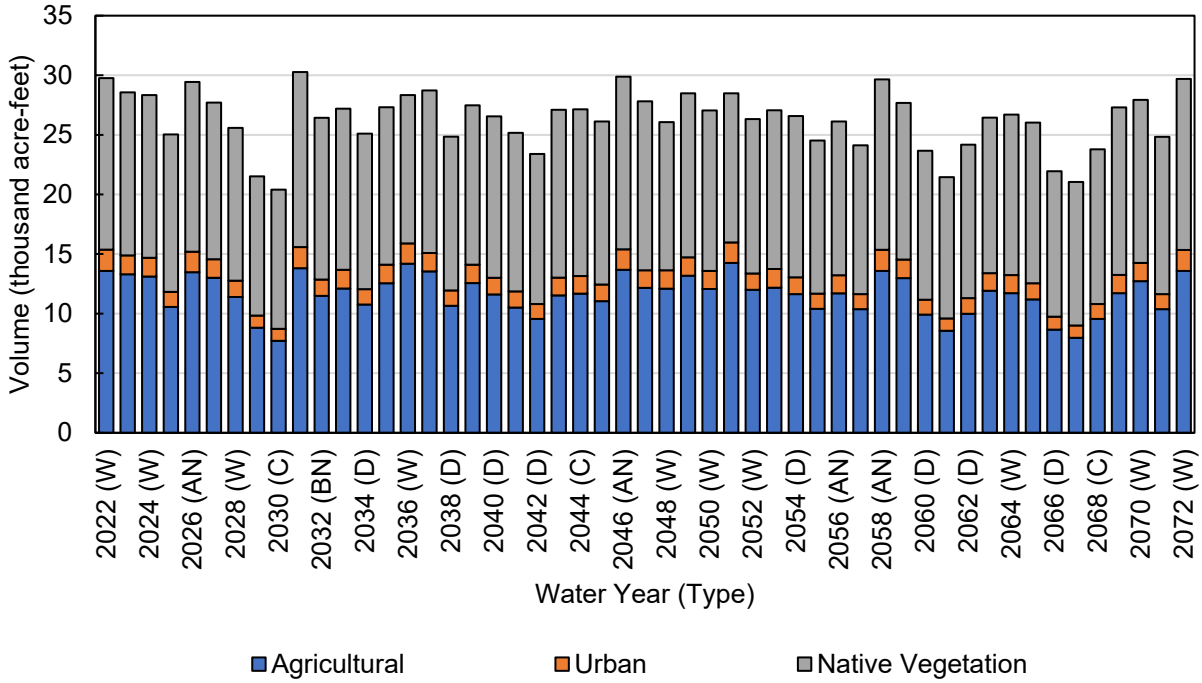


Figure 56. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Precipitation, by Water Use Sector

Table 54. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	14,000	1,800	14,000	30,000
2023 (W)	13,000	1,600	14,000	29,000
2024 (W)	13,000	1,600	14,000	28,000
2025 (BN)	11,000	1,300	13,000	25,000
2026 (AN)	13,000	1,700	14,000	29,000
2027 (W)	13,000	1,600	13,000	28,000
2028 (W)	11,000	1,400	13,000	26,000
2029 (C)	8,800	1,000	12,000	22,000
2030 (C)	7,700	1,000	12,000	20,000
2031 (AN)	14,000	1,800	15,000	30,000
2032 (BN)	11,000	1,400	14,000	26,000
2033 (AN)	12,000	1,600	14,000	27,000
2034 (D)	11,000	1,300	13,000	25,000
2035 (W)	13,000	1,600	13,000	27,000
2036 (W)	14,000	1,700	12,000	28,000
2037 (W)	14,000	1,600	14,000	29,000
2038 (D)	11,000	1,300	13,000	25,000
2039 (W)	13,000	1,600	13,000	27,000
2040 (D)	12,000	1,400	14,000	27,000
2041 (C)	11,000	1,400	13,000	25,000
2042 (D)	9,600	1,300	13,000	23,000
2043 (C)	12,000	1,500	14,000	27,000
2044 (C)	12,000	1,500	14,000	27,000
2045 (C)	11,000	1,400	14,000	26,000
2046 (AN)	14,000	1,700	14,000	30,000
2047 (C)	12,000	1,500	14,000	28,000
2048 (W)	12,000	1,500	12,000	26,000
2049 (W)	13,000	1,600	14,000	28,000
2050 (W)	12,000	1,500	13,000	27,000
2051 (W)	14,000	1,700	13,000	28,000
2052 (W)	12,000	1,400	13,000	26,000
2053 (AN)	12,000	1,600	13,000	27,000
2054 (D)	12,000	1,400	14,000	27,000
2055 (D)	10,000	1,300	13,000	25,000
2056 (AN)	12,000	1,500	13,000	26,000
2057 (BN)	10,000	1,300	12,000	24,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		14,000	1,800	14,000	30,000
2059 (W)		13,000	1,600	13,000	28,000
2060 (D)		9,900	1,300	12,000	24,000
2061 (C)		8,600	1,000	12,000	21,000
2062 (D)		10,000	1,300	13,000	24,000
2063 (BN)		12,000	1,500	13,000	26,000
2064 (W)		12,000	1,500	13,000	27,000
2065 (BN)		11,000	1,400	13,000	26,000
2066 (D)		8,700	1,100	12,000	22,000
2067 (C)		8,000	1,000	12,000	21,000
2068 (C)		9,600	1,300	13,000	24,000
2069 (BN)		12,000	1,500	14,000	27,000
2070 (W)		13,000	1,500	14,000	28,000
2071 (BN)		10,000	1,300	13,000	25,000
2072 (W)		14,000	1,800	14,000	30,000
Average (2022-2072)		12,000	1,400	13,000	26,000
2022-2072	W	13,000	1,600	13,000	28,000
	AN	13,000	1,700	14,000	29,000
	BN	11,000	1,400	13,000	26,000
	D	10,000	1,300	13,000	25,000
	C	10,000	1,300	13,000	24,000

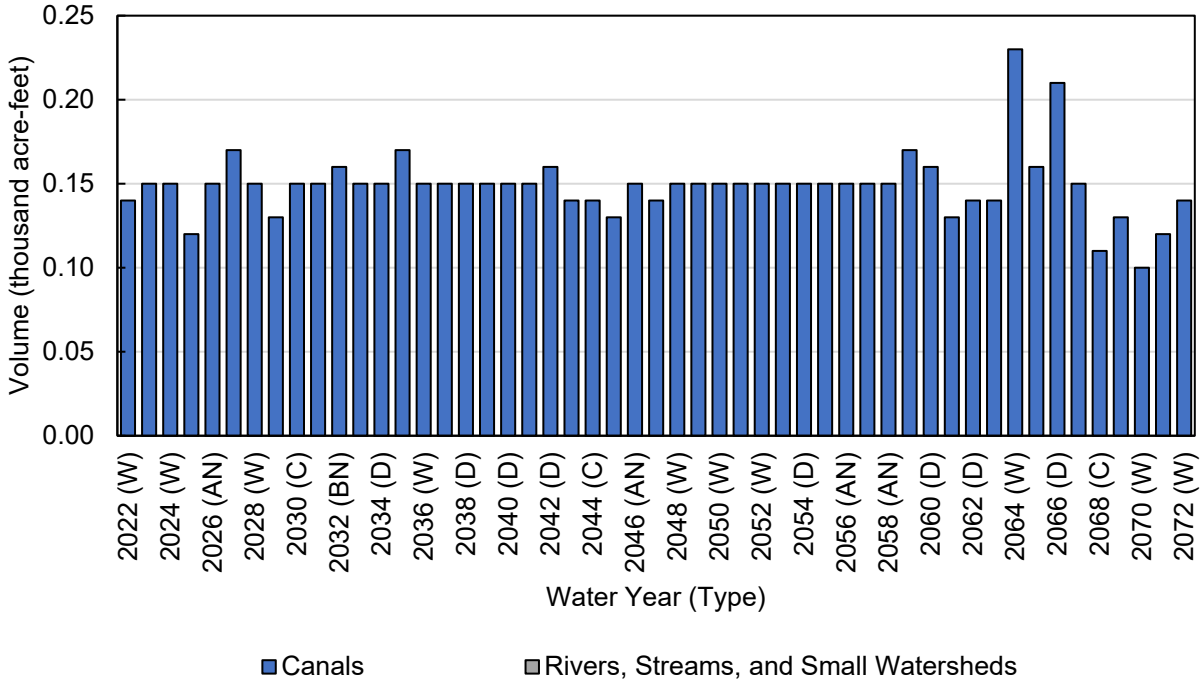


Figure 57. Antelope Subbasin Projected (Future Land Use) Evaporation of Surface Water Sources

Table 55. Antelope Subbasin Projected (Future Land Use) Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds[1]	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	160	0	160
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
2059 (W)		170	0	170
2060 (D)		160	0	160
2061 (C)		130	0	130
2062 (D)		140	0	140
2063 (BN)		140	0	140
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	150	0	150
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

3.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 58** and **Table 56** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 72 taf per year, and range on average from 45 taf in critically dry years up to 94 taf in wet years. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

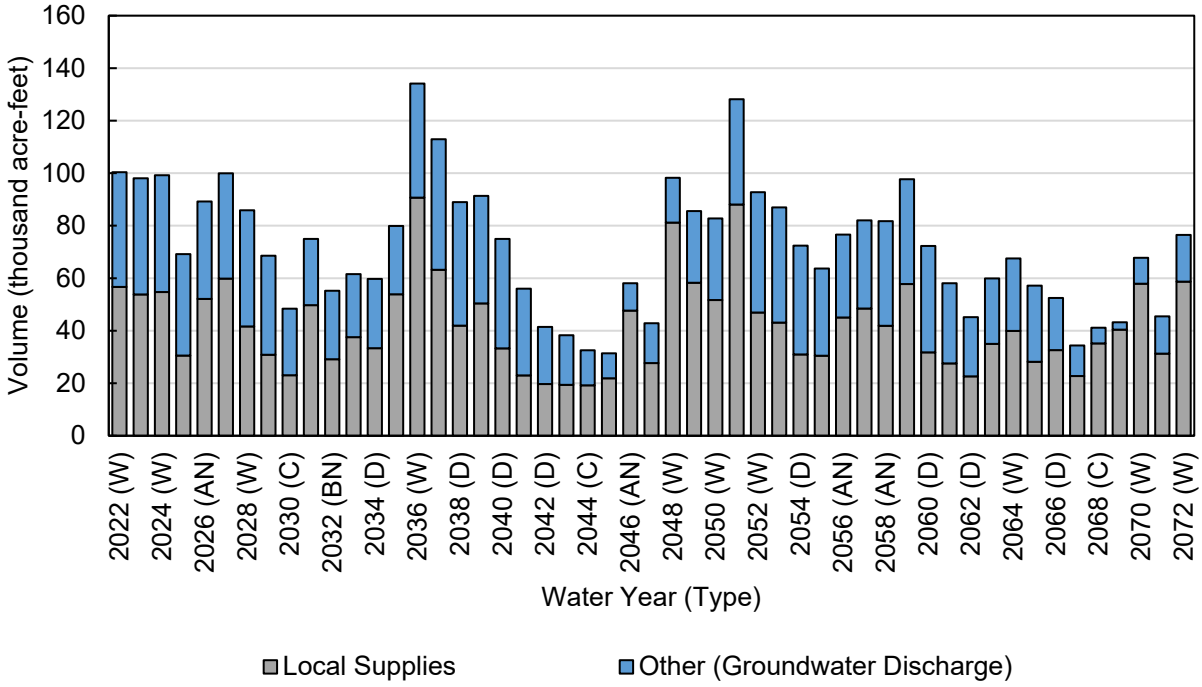


Figure 58. Antelope Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type

Table 56. Antelope Subbasin Projected (Future Land Use) Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (BN)	0	57,000	44,000	100,000
2023 (W)	0	54,000	44,000	98,000
2024 (W)	0	55,000	44,000	99,000
2025 (W)	0	31,000	39,000	69,000
2026 (BN)	0	52,000	37,000	89,000
2027 (AN)	0	60,000	40,000	100,000
2028 (W)	0	42,000	44,000	86,000
2029 (W)	0	31,000	38,000	69,000
2030 (C)	0	23,000	25,000	48,000
2031 (C)	0	50,000	25,000	75,000
2032 (AN)	0	29,000	26,000	55,000
2033 (BN)	0	38,000	24,000	62,000
2034 (AN)	0	33,000	26,000	60,000
2035 (D)	0	54,000	26,000	80,000
2036 (W)	0	91,000	43,000	130,000
2037 (W)	0	63,000	50,000	110,000
2038 (W)	0	42,000	47,000	89,000
2039 (D)	0	50,000	41,000	91,000
2040 (W)	0	33,000	42,000	75,000
2041 (D)	0	23,000	33,000	56,000
2042 (C)	0	20,000	22,000	41,000
2043 (D)	0	19,000	19,000	38,000
2044 (C)	0	19,000	13,000	33,000
2045 (C)	0	22,000	9,500	31,000
2046 (C)	0	48,000	10,000	58,000
2047 (AN)	0	28,000	15,000	43,000
2048 (C)	0	81,000	17,000	98,000
2049 (W)	0	58,000	27,000	86,000
2050 (W)	0	52,000	31,000	83,000
2051 (W)	0	88,000	40,000	130,000
2052 (W)	0	47,000	46,000	93,000
2053 (W)	0	43,000	44,000	87,000
2054 (AN)	0	31,000	41,000	72,000
2055 (D)	0	30,000	33,000	64,000
2056 (D)	0	45,000	32,000	77,000

Water Year (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2057 (AN)		0	48,000	34,000	82,000
2058 (BN)		0	42,000	40,000	82,000
2059 (AN)		0	58,000	40,000	98,000
2060 (W)		0	32,000	41,000	72,000
2061 (D)		0	28,000	31,000	58,000
2062 (C)		0	23,000	23,000	45,000
2063 (D)		0	35,000	25,000	60,000
2064 (BN)		0	40,000	28,000	68,000
2065 (W)		0	28,000	29,000	57,000
2066 (BN)		0	33,000	20,000	52,000
2067 (D)		0	23,000	12,000	34,000
2068 (C)		0	35,000	6,000	41,000
2069 (C)		0	40,000	2,800	43,000
2070 (BN)		0	58,000	9,800	68,000
2071 (W)		0	31,000	14,000	45,000
2072 (W)		0	59,000	18,000	77,000
Average (2022-2072)		0	42,000	30,000	72,000
2022-2072	W	0	59,000	35,000	94,000
	AN	0	45,000	30,000	76,000
	BN	0	35,000	24,000	59,000
	D	0	31,000	33,000	63,000
	C	0	25,000	20,000	45,000

3.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 59** and **Table 57** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

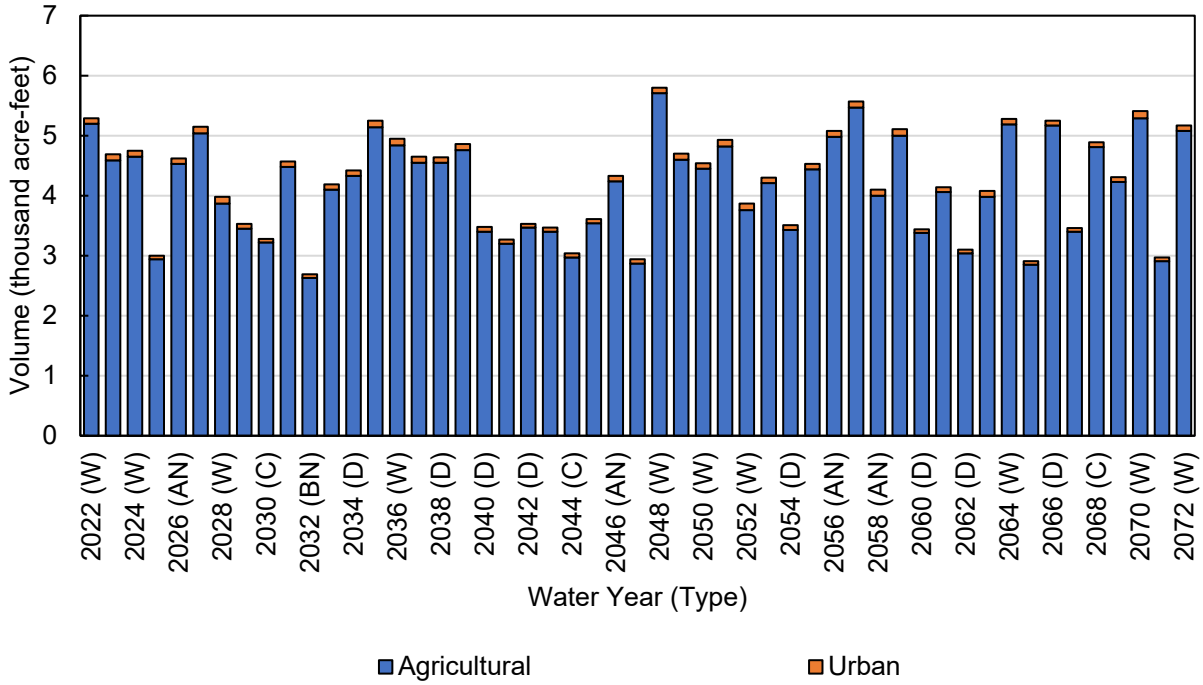


Figure 59. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector

Table 57. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,200	90	0	5,300
2023 (W)	4,600	100	0	4,700
2024 (W)	4,700	100	0	4,800
2025 (BN)	2,900	60	0	3,000
2026 (AN)	4,500	90	0	4,600
2027 (W)	5,000	110	0	5,200
2028 (W)	3,900	110	0	4,000
2029 (C)	3,500	80	0	3,500
2030 (C)	3,200	60	0	3,300
2031 (AN)	4,500	90	0	4,600
2032 (BN)	2,600	60	0	2,700
2033 (AN)	4,100	90	0	4,200
2034 (D)	4,300	90	0	4,400
2035 (W)	5,100	110	0	5,300
2036 (W)	4,800	110	0	5,000
2037 (W)	4,600	100	0	4,700
2038 (D)	4,600	90	0	4,600
2039 (W)	4,800	100	0	4,900
2040 (D)	3,400	80	0	3,500
2041 (C)	3,200	70	0	3,300
2042 (D)	3,500	60	0	3,500
2043 (C)	3,400	70	0	3,500
2044 (C)	3,000	70	0	3,000
2045 (C)	3,500	70	0	3,600
2046 (AN)	4,200	90	0	4,300
2047 (C)	2,900	70	0	2,900
2048 (W)	5,700	90	0	5,800
2049 (W)	4,600	100	0	4,700
2050 (W)	4,500	90	0	4,500
2051 (W)	4,800	110	0	4,900
2052 (W)	3,800	110	0	3,900
2053 (AN)	4,200	90	0	4,300
2054 (D)	3,400	80	0	3,500
2055 (D)	4,400	90	0	4,500
2056 (AN)	5,000	100	0	5,100
2057 (BN)	5,500	100	0	5,600

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		4,000	100	0	4,100
2059 (W)		5,000	110	0	5,100
2060 (D)		3,400	60	0	3,400
2061 (C)		4,100	80	0	4,100
2062 (D)		3,000	60	0	3,100
2063 (BN)		4,000	100	0	4,100
2064 (W)		5,200	90	0	5,300
2065 (BN)		2,900	60	0	2,900
2066 (D)		5,200	80	0	5,300
2067 (C)		3,400	60	0	3,500
2068 (C)		4,800	80	0	4,900
2069 (BN)		4,200	80	0	4,300
2070 (W)		5,300	120	0	5,400
2071 (BN)		2,900	60	0	3,000
2072 (W)		5,100	90	0	5,200
Average (2022-2072)		4,200	90	0	4,300
2022-2072	W	4,800	100	0	4,900
	AN	4,400	90	0	4,500
	BN	3,600	70	0	3,700
	D	3,900	80	0	4,000
	C	3,500	70	0	3,600

3.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 60** and **Table 58** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from less than 3 taf annually during some critical and dry years to about 16 taf in 2036.

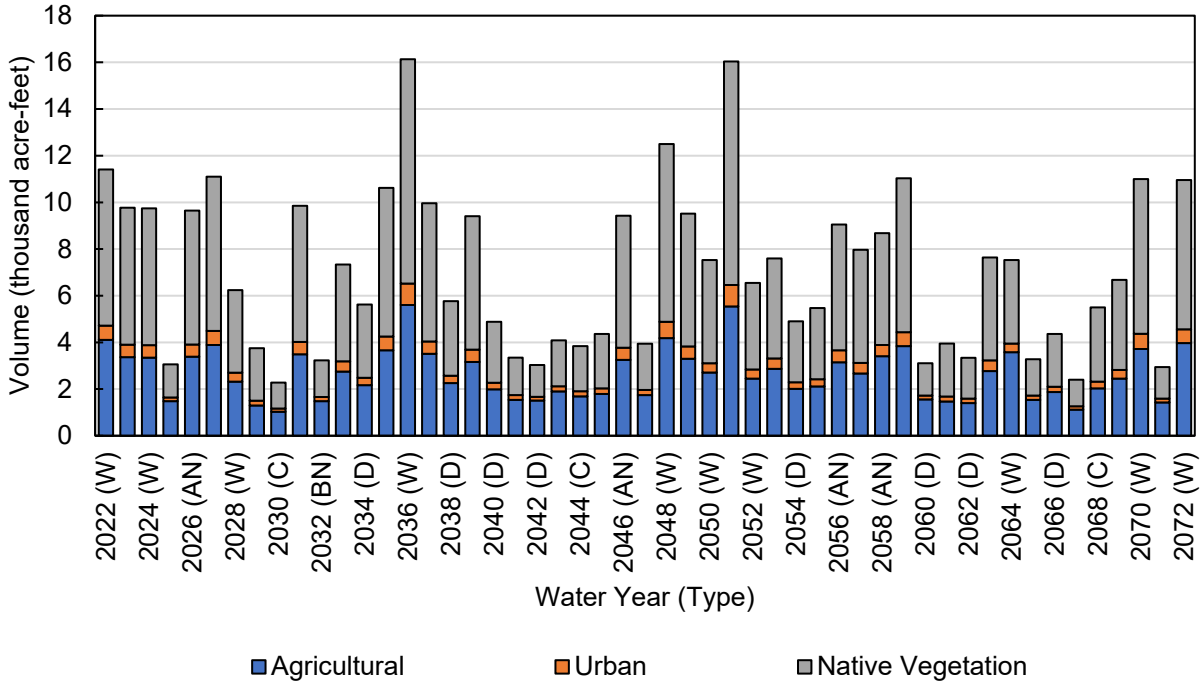


Figure 60. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector

Table 58. Antelope Subbasin Projected (Future Land Use) Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	4,100	610	6,700	11,000
2023 (W)	3,400	530	5,900	9,800
2024 (W)	3,400	530	5,900	9,700
2025 (BN)	1,500	160	1,400	3,100
2026 (AN)	3,400	520	5,700	9,700
2027 (W)	3,900	600	6,600	11,000
2028 (W)	2,300	380	3,500	6,200
2029 (C)	1,300	200	2,300	3,800
2030 (C)	1,000	140	1,100	2,300
2031 (AN)	3,500	530	5,800	9,900
2032 (BN)	1,500	180	1,600	3,200
2033 (AN)	2,800	440	4,200	7,300
2034 (D)	2,200	310	3,100	5,600
2035 (W)	3,700	590	6,400	11,000
2036 (W)	5,600	920	9,600	16,000
2037 (W)	3,500	530	5,900	10,000
2038 (D)	2,300	310	3,200	5,800
2039 (W)	3,200	530	5,700	9,400
2040 (D)	2,000	280	2,600	4,900
2041 (C)	1,500	200	1,600	3,400
2042 (D)	1,500	160	1,400	3,000
2043 (C)	1,900	220	2,000	4,100
2044 (C)	1,700	220	1,900	3,800
2045 (C)	1,800	240	2,300	4,400
2046 (AN)	3,300	520	5,700	9,400
2047 (C)	1,700	220	2,000	3,900
2048 (W)	4,200	700	7,600	13,000
2049 (W)	3,300	530	5,700	9,500
2050 (W)	2,700	400	4,400	7,500
2051 (W)	5,500	920	9,600	16,000
2052 (W)	2,500	390	3,700	6,600
2053 (AN)	2,900	440	4,300	7,600
2054 (D)	2,000	280	2,600	4,900
2055 (D)	2,100	310	3,100	5,500
2056 (AN)	3,200	510	5,400	9,100
2057 (BN)	2,700	450	4,900	8,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,400	480	4,800	8,700
2059 (W)		3,800	600	6,600	11,000
2060 (D)		1,600	160	1,400	3,100
2061 (C)		1,500	210	2,300	4,000
2062 (D)		1,400	190	1,800	3,300
2063 (BN)		2,800	460	4,400	7,600
2064 (W)		3,600	370	3,600	7,500
2065 (BN)		1,500	180	1,600	3,300
2066 (D)		1,900	230	2,300	4,400
2067 (C)		1,100	140	1,100	2,400
2068 (C)		2,000	290	3,200	5,500
2069 (BN)		2,500	370	3,900	6,700
2070 (W)		3,700	650	6,600	11,000
2071 (BN)		1,400	160	1,400	2,900
2072 (W)		4,000	590	6,400	11,000
Average (2022-2072)		2,600	390	4,000	7,000
2022-2072	W	3,700	570	6,100	10,000
	AN	3,200	490	5,100	8,800
	BN	2,000	280	2,700	5,000
	D	1,900	250	2,400	4,500
	C	1,600	210	2,000	3,800

3.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 61**and **Table 59.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts, as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than four (4) taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.1 taf per year.

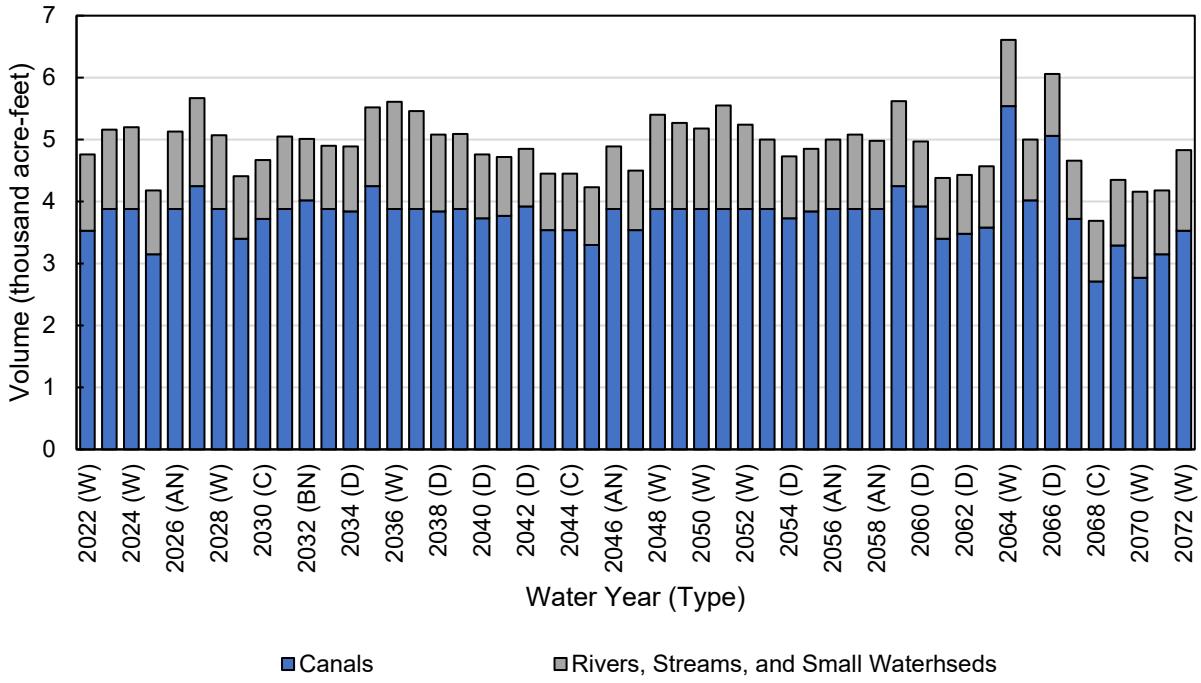


Figure 61. Antelope Subbasin Projected (Future Land Use) Infiltration of Surface Water, by Water Use Sector

Table 59. Antelope Subbasin Projected (Future Land Use) Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	3,500	1,200	4,800
2023 (W)	3,900	1,300	5,200
2024 (W)	3,900	1,300	5,200
2025 (BN)	3,200	1,000	4,200
2026 (AN)	3,900	1,300	5,100
2027 (W)	4,300	1,400	5,700
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	950	4,700
2031 (AN)	3,900	1,200	5,100
2032 (BN)	4,000	990	5,000
2033 (AN)	3,900	1,000	4,900
2034 (D)	3,800	1,100	4,900
2035 (W)	4,300	1,300	5,500
2036 (W)	3,900	1,700	5,600
2037 (W)	3,900	1,600	5,500
2038 (D)	3,800	1,200	5,100
2039 (W)	3,900	1,200	5,100
2040 (D)	3,700	1,000	4,800
2041 (C)	3,800	950	4,700
2042 (D)	3,900	930	4,900
2043 (C)	3,500	910	4,500
2044 (C)	3,500	910	4,500
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,000	4,900
2047 (C)	3,500	960	4,500
2048 (W)	3,900	1,500	5,400
2049 (W)	3,900	1,400	5,300
2050 (W)	3,900	1,300	5,200
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,200
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,700	1,000	4,700
2055 (D)	3,800	1,000	4,900
2056 (AN)	3,900	1,100	5,000
2057 (BN)	3,900	1,200	5,100

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2058 (AN)		3,900	1,100	5,000
2059 (W)		4,300	1,400	5,600
2060 (D)		3,900	1,100	5,000
2061 (C)		3,400	980	4,400
2062 (D)		3,500	950	4,400
2063 (BN)		3,600	990	4,600
2064 (W)		5,500	1,100	6,600
2065 (BN)		4,000	980	5,000
2066 (D)		5,100	1,000	6,100
2067 (C)		3,700	940	4,700
2068 (C)		2,700	980	3,700
2069 (BN)		3,300	1,100	4,400
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,300	4,800
Average (2022-2072)		3,800	1,200	4,900
2022-2072	W	3,900	1,400	5,300
	AN	3,900	1,100	5,000
	BN	3,600	1,000	4,600
	D	3,900	1,000	5,000
	C	3,500	950	4,400

3.1.3 Change in Root Zone Storage

Estimates of projected change in root zone storage are provided in **Figure 62** and **Table 60**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average near zero over many years.

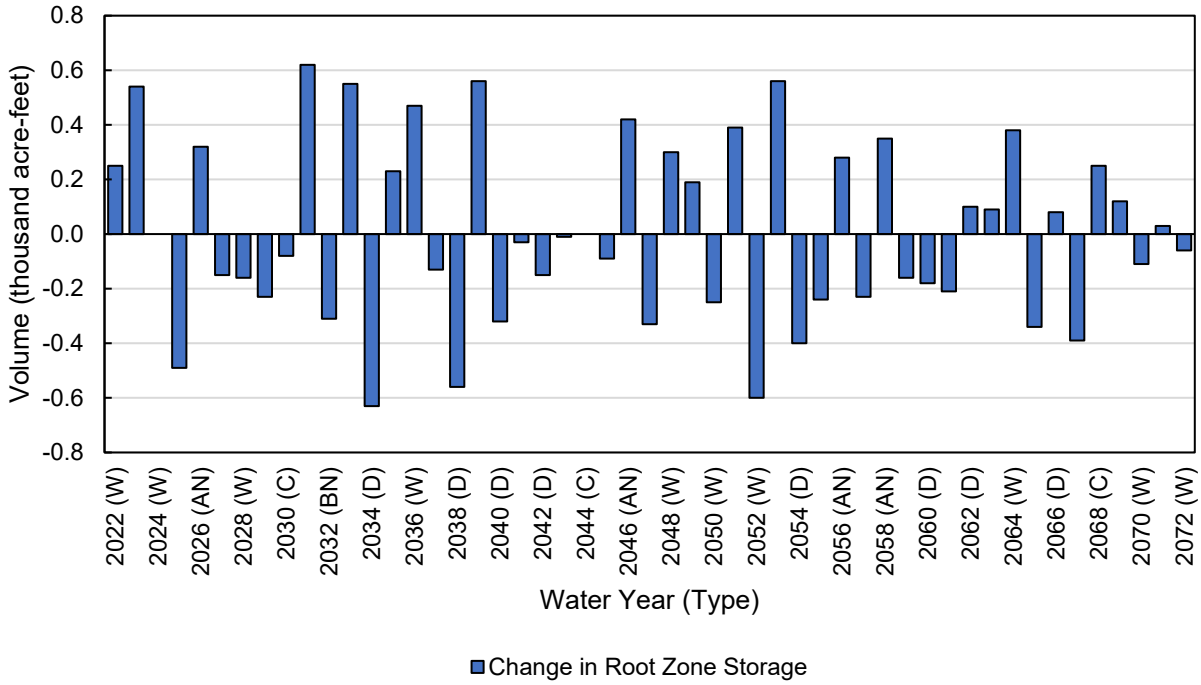


Figure 62. Antelope Subbasin Projected (Future Land Use) Change in Root Zone Storage

Table 60. Antelope Subbasin Projected (Future Land Use) Change in Root Zone Storage (acre-feet)

Water Year (Type)	Change in Root Zone Storage
2022 (W)	250
2023 (W)	540
2024 (W)	0
2025 (BN)	-490
2026 (AN)	320
2027 (W)	-150
2028 (W)	-160
2029 (C)	-230
2030 (C)	-80
2031 (AN)	620
2032 (BN)	-310
2033 (AN)	550
2034 (D)	-630
2035 (W)	230
2036 (W)	470
2037 (W)	-130
2038 (D)	-560
2039 (W)	560
2040 (D)	-320
2041 (C)	-30
2042 (D)	-150
2043 (C)	-10
2044 (C)	0
2045 (C)	-90
2046 (AN)	420
2047 (C)	-330
2048 (W)	300
2049 (W)	190
2050 (W)	-250
2051 (W)	390
2052 (W)	-600
2053 (AN)	560
2054 (D)	-400
2055 (D)	-240
2056 (AN)	280
2057 (BN)	-230

Water Year (Type)		Change in Root Zone Storage
2058 (AN)		350
2059 (W)		-160
2060 (D)		-180
2061 (C)		-210
2062 (D)		100
2063 (BN)		90
2064 (W)		380
2065 (BN)		-340
2066 (D)		80
2067 (C)		-390
2068 (C)		250
2069 (BN)		120
2070 (W)		-110
2071 (BN)		30
2072 (W)		-60
Average (2022-2072)		0
2022-2072	W	90
	AN	440
	BN	-160
	D	-260
	C	-110

3.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction. When calculated for the projected (future land use) water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from projected cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the projected (current land use) water budget period are presented below for the Antelope Subbasin. **Figure 63** and **Table 61** show the average net recharge from the

SWS over 2022-2072 based on the projected (future land use) water budget results. Under future land use conditions, the average net recharge in the Antelope Subbasin was projected as approximately 0.087 taf per year between 2022-2072, indicating net inflows to the GWS from the SWS during the projected (current land use) water budget period. As illustrated on the cumulative net recharge plot in **Figure 63**, this results in a cumulative net positive recharge (i.e., net recharge to the GWS from the SWS) of about 4.4 taf over the 51-year projected (future land use) water budget period. Although this means there is projected to be more recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage will increase or that the Subbasin groundwater system will be sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

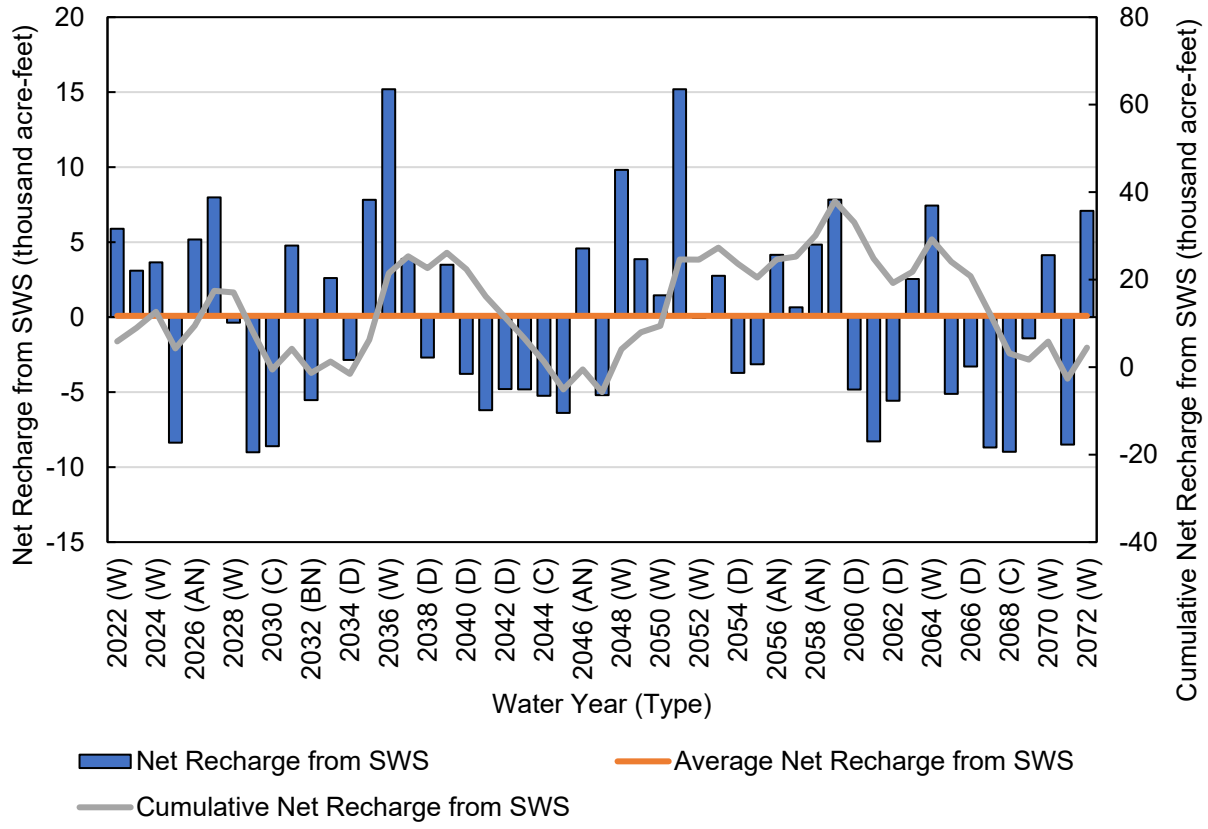


Figure 63. Antelope Subbasin Projected (Future Land Use) Net Recharge Overview

Table 61. Antelope Subbasin Projected (Future Land Use) Water Budget: Average Net Recharge from SWS, by Water Year Type (acre-feet)

Year Type	Number of Years	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	18	4,900	10,400	5,300	15,000	6,000
AN	7	4,500	8,800	5,000	14,000	4,100
BN	7	3,700	5,000	4,600	17,000	-3,700
D	9	4,000	4,500	5,000	17,000	-3,900
C	10	3,600	3,800	4,400	19,000	-7,100
Annual Average (2022-2072)	51	4,300	7,000	5,000	16,000	0

3.2 Groundwater System Water Budget Results

Projected (Future Land Use) water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

3.2.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin are projected to occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows are projected to occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

3.2.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Projected lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 64** and **Table 62**. The total projected net subsurface flows to and from all adjacent subbasins averages about 42 taf per year occurring as inflow to the Antelope Subbasin. The largest projected subsurface flows occur across the boundary with the Bend Subbasin with somewhat less subsurface flow occurring across the boundaries with the Los Molinos and Red Bluff Subbasins although these flows are still considerable.

Projected subsurface flows with the Bend Subbasin average about 22 taf occurring as inflows to the Antelope Subbasin. This makes up about two-thirds of the projected subsurface inflows to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Red Bluff Subbasin to the Antelope Subbasin are projected to average about 2.6 and eight (8) taf, respectively. The projected magnitudes of the subsurface inflows from the Bend Subbasin are relatively consistent from year to year; however, the inflows/outflows with the Red Bluff and Los Molinos Subbasins are somewhat variable. Projected subsurface

flows across the boundary with the Los Molinos and Red Bluff Subbasins generally occur as inflows with some volumes of outflows occurring periodically.

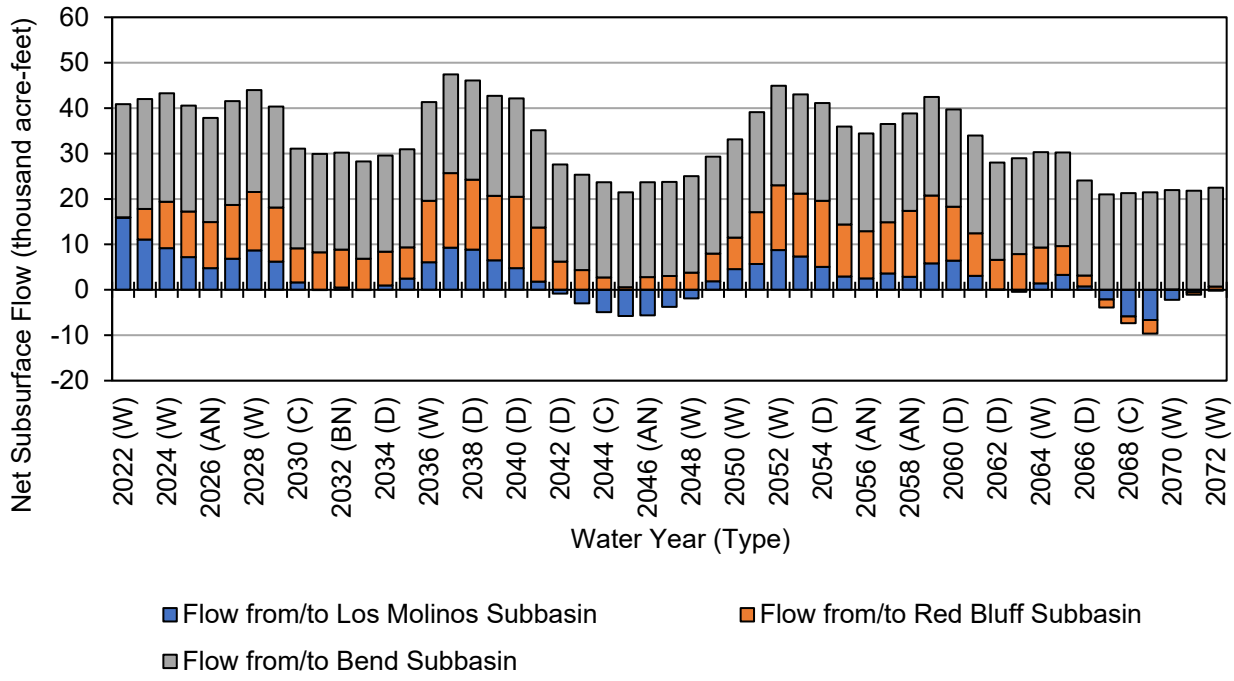


Figure 64. Antelope Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 62. Antelope Subbasin Projected (Future Land Use) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

Water Year (Type)	Red Bluff	Los Molinos	Bend	Total
2022 (W)	88	16,000	25,000	41,000
2023 (W)	6,700	11,000	24,000	42,000
2024 (W)	10,000	9,200	24,000	44,000
2025 (BN)	10,000	7,200	23,000	41,000
2026 (AN)	10,000	4,800	23,000	38,000
2027 (W)	12,000	6,800	23,000	42,000
2028 (W)	13,000	8,700	22,000	44,000
2029 (C)	12,000	6,200	22,000	41,000
2030 (C)	7,500	1,600	22,000	31,000
2031 (AN)	8,200	-53	22,000	30,000
2032 (BN)	8,300	520	21,000	30,000
2033 (AN)	6,900	-65	21,000	28,000
2034 (D)	7,400	970	21,000	30,000
2035 (W)	6,900	2,500	22,000	31,000
2036 (W)	14,000	6,100	22,000	42,000
2037 (W)	16,000	9,300	22,000	48,000
2038 (D)	15,000	8,800	22,000	46,000
2039 (W)	14,000	6,500	22,000	43,000
2040 (D)	16,000	4,800	22,000	42,000
2041 (C)	12,000	1,800	21,000	35,000
2042 (D)	6,200	-820	21,000	27,000
2043 (C)	4,300	-3,000	21,000	23,000
2044 (C)	2,700	-4,900	21,000	19,000
2045 (C)	590	-5,800	21,000	16,000
2046 (AN)	2,800	-5,600	21,000	18,000
2047 (C)	3,000	-3,700	21,000	20,000
2048 (W)	3,800	-1,900	21,000	23,000
2049 (W)	6,100	1,900	21,000	30,000
2050 (W)	6,900	4,600	22,000	33,000
2051 (W)	11,000	5,700	22,000	39,000
2052 (W)	14,000	8,800	22,000	45,000
2053 (AN)	14,000	7,400	22,000	43,000
2054 (D)	15,000	5,100	22,000	41,000
2055 (D)	11,000	2,900	22,000	36,000
2056 (AN)	10,000	2,500	22,000	35,000
2057 (BN)	11,000	3,600	22,000	37,000
2058 (AN)	15,000	2,900	21,000	39,000
2059 (W)	15,000	5,800	22,000	43,000

Water Year (Type)		Red Bluff	Los Molinos	Bend	Total
2060 (D)		12,000	6,400	21,000	40,000
2061 (C)		9,400	3,100	22,000	34,000
2062 (D)		6,500	76	21,000	28,000
2063 (BN)		7,900	-450	21,000	29,000
2064 (W)		7,900	1,400	21,000	31,000
2065 (BN)		6,400	3,300	21,000	31,000
2066 (D)		2,400	760	21,000	24,000
2067 (C)		-1,800	-2,100	21,000	17,000
2068 (C)		-1,500	-5,900	21,000	14,000
2069 (BN)		-3,000	-6,600	21,000	12,000
2070 (W)		83	-2,200	22,000	20,000
2071 (BN)		-500	-560	22,000	21,000
2072 (W)		710	-200	22,000	23,000
Average (2022-2072)		8,000	2,600	22,000	33,000
2022-2072	W	8,800	5,500	22,000	37,000
	AN	9,500	1,700	22,000	33,000
	BN	5,800	990	22,000	29,000
	D	10,000	3,200	21,000	35,000
	C	4,800	-1,300	21,000	25,000

Note: positive values represent net inflows to Antelope Subbasin, negative values represent net outflows from Antelope Subbasin.

3.2.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Projected lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 65** and **Table 63**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average projected subsurface inflow from the upland areas is about 0.270 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

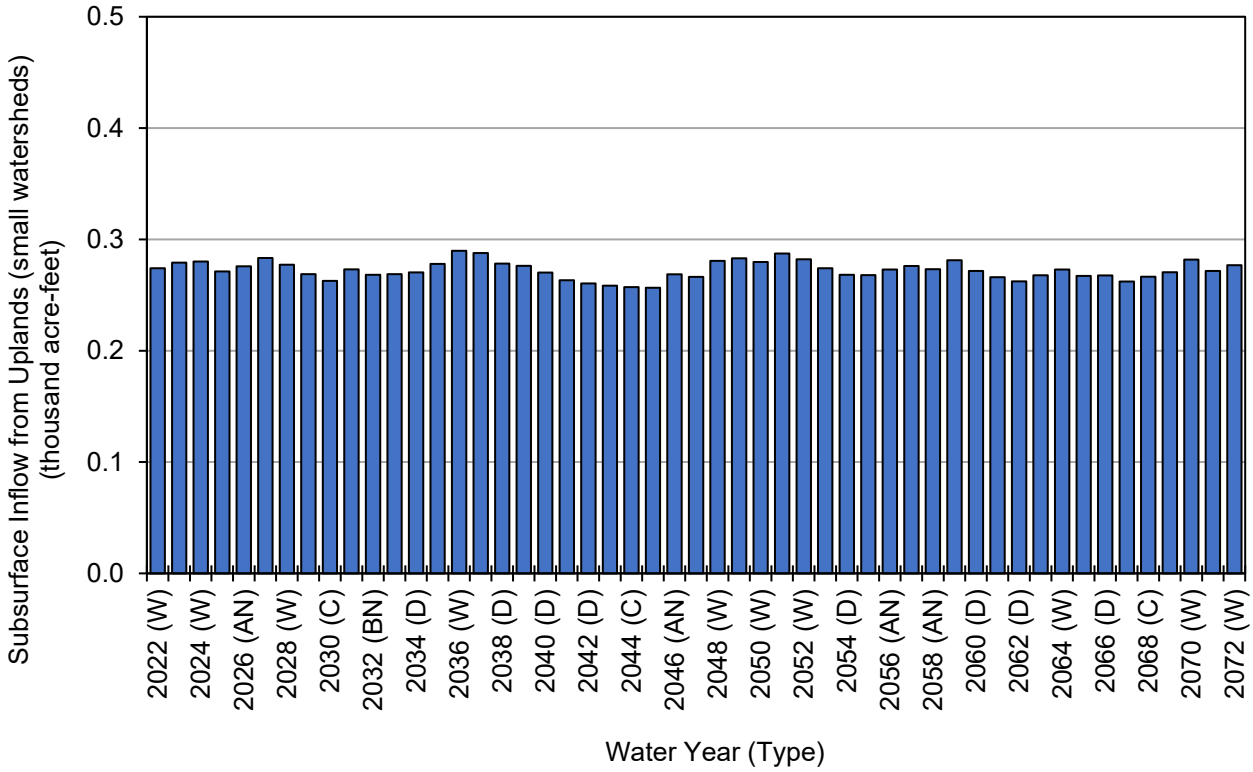


Figure 65. Antelope Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Upland Areas

Table 63. Antelope Subbasin Projected (Future Land Use) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet)

Water Year (Type)	Subsurface Inflow from Uplands
2022 (W)	270
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	280
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	270
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	280
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280

Water Year (Type)		Subsurface Inflow from Uplands
2060 (D)		270
2061 (C)		270
2062 (D)		260
2063 (BN)		270
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

3.2.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 66** and **Table 64**. The average annual deep percolation from the SWS over the projected water budget period is approximately 11 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

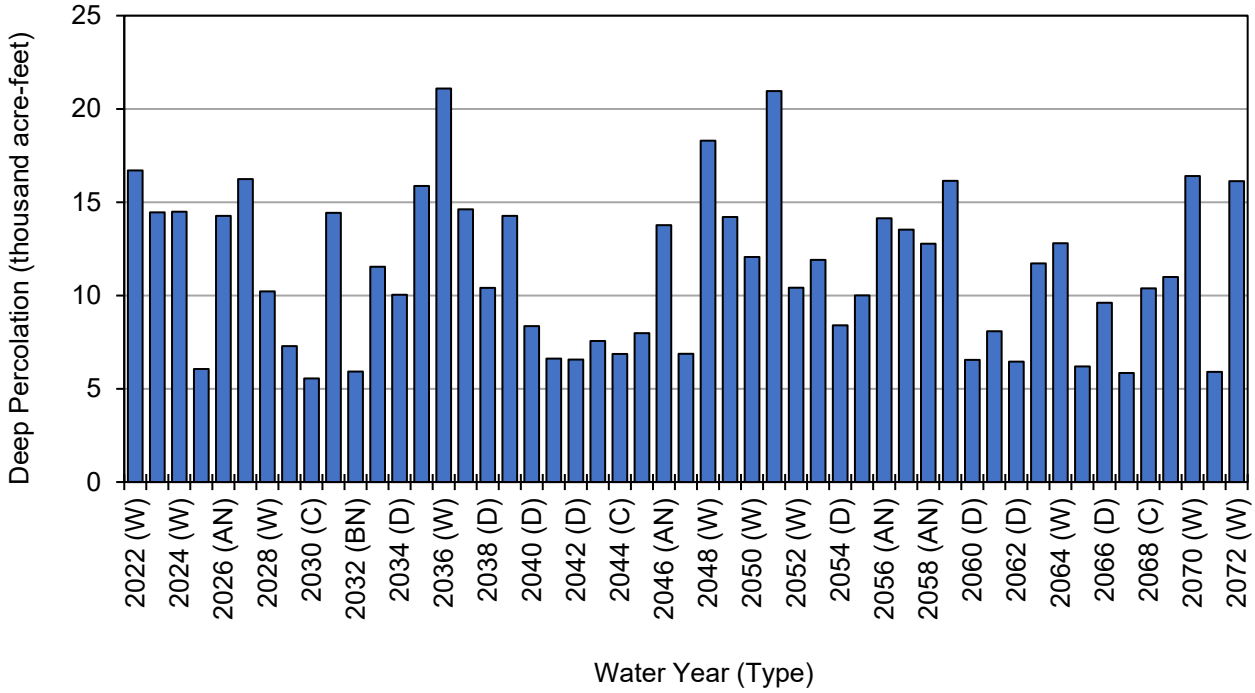


Figure 66. Antelope Subbasin Projected (Future Land Use) Deep Percolation

Table 64. Antelope Subbasin Projected (Future Land Use) Deep Percolation from the SWS (acre-feet)

Water Year (Type)	Deep Percolation from the SWS
2022 (W)	17,000
2023 (W)	14,000
2024 (W)	14,000
2025 (BN)	6,100
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	10,000
2029 (C)	7,300
2030 (C)	5,600
2031 (AN)	14,000
2032 (BN)	5,900
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	21,000
2037 (W)	15,000
2038 (D)	10,000
2039 (W)	14,000
2040 (D)	8,400
2041 (C)	6,600
2042 (D)	6,600
2043 (C)	7,600
2044 (C)	6,900
2045 (C)	8,000
2046 (AN)	14,000
2047 (C)	6,900
2048 (W)	18,000
2049 (W)	14,000
2050 (W)	12,000
2051 (W)	21,000
2052 (W)	10,000
2053 (AN)	12,000
2054 (D)	8,400
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000

Water Year (Type)		Deep Percolation from the SWS
2060 (D)		6,500
2061 (C)		8,100
2062 (D)		6,500
2063 (BN)		12,000
2064 (W)		13,000
2065 (BN)		6,200
2066 (D)		9,600
2067 (C)		5,800
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,900
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,600
	D	8,500
	C	7,300

3.2.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 67** and Table **65**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the projected annual net seepage values are always highly negative with an average annual net stream seepage value of -28 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

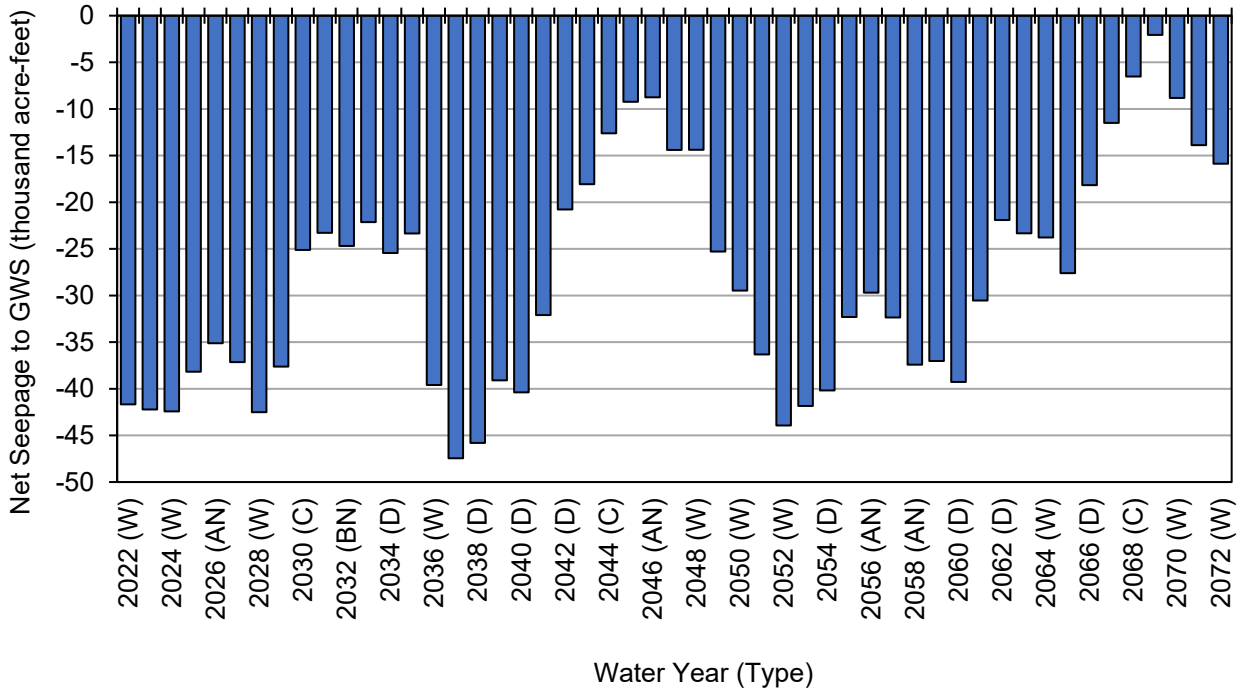


Figure 67. Antelope Subbasin Projected (Future Land Use) Net Stream Seepage to GWS/Discharge to Surface Water

Table 65. Antelope Subbasin Projected (Future Land Use) Net Stream Seepage (net flows as acre-feet)

Water Year (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-42,000
2023 (W)	-42,000
2024 (W)	-42,000
2025 (BN)	-38,000
2026 (AN)	-35,000
2027 (W)	-37,000
2028 (W)	-43,000
2029 (C)	-38,000
2030 (C)	-25,000
2031 (AN)	-23,000
2032 (BN)	-25,000
2033 (AN)	-22,000
2034 (D)	-25,000
2035 (W)	-23,000
2036 (W)	-40,000
2037 (W)	-47,000
2038 (D)	-46,000
2039 (W)	-39,000
2040 (D)	-40,000
2041 (C)	-32,000
2042 (D)	-21,000
2043 (C)	-18,000
2044 (C)	-13,000
2045 (C)	-9,200
2046 (AN)	-8,800
2047 (C)	-14,000
2048 (W)	-14,000
2049 (W)	-25,000
2050 (W)	-29,000
2051 (W)	-36,000
2052 (W)	-44,000
2053 (AN)	-42,000
2054 (D)	-40,000
2055 (D)	-32,000
2056 (AN)	-30,000
2057 (BN)	-32,000
2058 (AN)	-37,000
2059 (W)	-37,000

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
2060 (D)		-39,000
2061 (C)		-31,000
2062 (D)		-22,000
2063 (BN)		-23,000
2064 (W)		-24,000
2065 (BN)		-28,000
2066 (D)		-18,000
2067 (C)		-12,000
2068 (C)		-6,500
2069 (BN)		-2,100
2070 (W)		-8,800
2071 (BN)		-14,000
2072 (W)		-16,000
Average (2022-2072)		-28,000
2022-2072	W	-33,000
	AN	-28,000
	BN	-23,000
	D	-32,000
	C	-20,000

Note: negative values indicate net groundwater discharge to surface water

3.2.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Projected groundwater extractions are summarized in **Figure 69** and **Table 66** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the projected water budget period average about -16 taf per year. Overall, groundwater pumping represents a majority of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -15 taf over the projected period and groundwater uptake averaged about -0.820 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

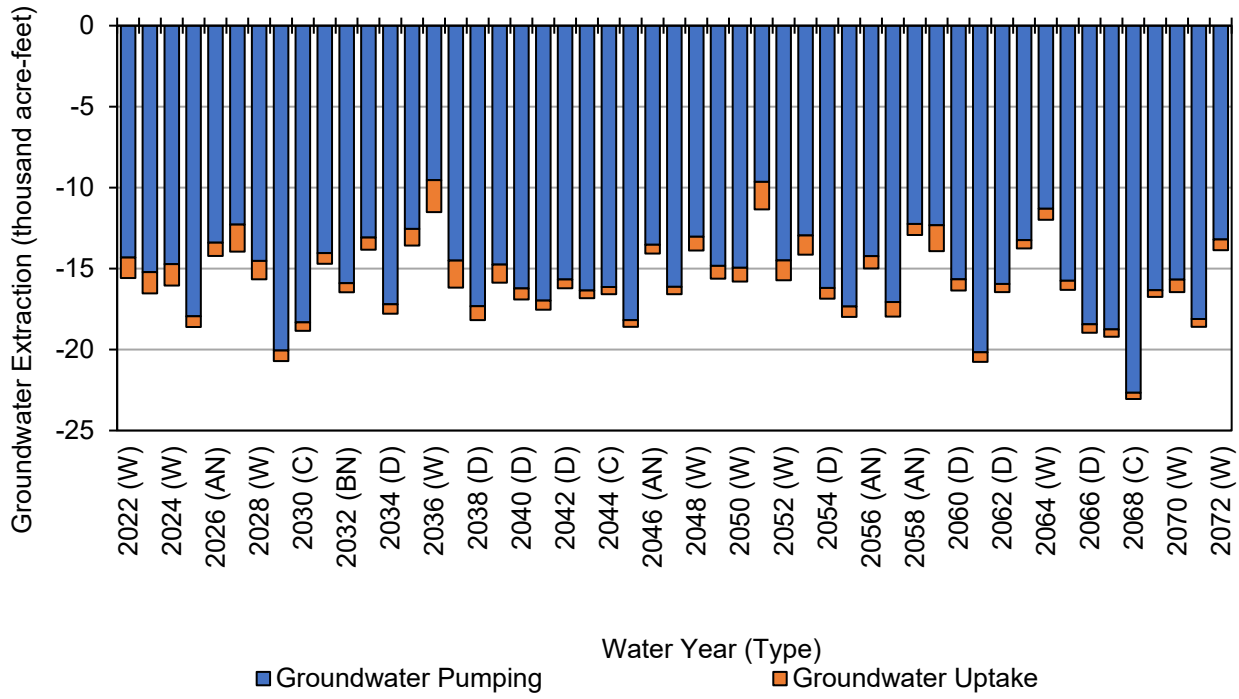


Figure 69. Antelope Subbasin Projected (Future Land Use) Groundwater Extractions

Table 66. Antelope Subbasin Projected (Future Land Use) Groundwater Extractions (acre-feet)

Water Year (Type)	Groundwater Pumping	Groundwater Uptake	Total
2022 (W)	-14,000	-1,300	-16,000
2023 (W)	-15,000	-1,300	-17,000
2024 (W)	-15,000	-1,300	-16,000
2025 (BN)	-18,000	-660	-19,000
2026 (AN)	-13,000	-820	-14,000
2027 (W)	-12,000	-1,700	-14,000
2028 (W)	-15,000	-1,100	-16,000
2029 (C)	-20,000	-660	-21,000
2030 (C)	-18,000	-530	-19,000
2031 (AN)	-14,000	-660	-15,000
2032 (BN)	-16,000	-560	-16,000
2033 (AN)	-13,000	-750	-14,000
2034 (D)	-17,000	-580	-18,000
2035 (W)	-13,000	-1,000	-14,000
2036 (W)	-9,500	-2,000	-12,000
2037 (W)	-15,000	-1,700	-16,000
2038 (D)	-17,000	-860	-18,000
2039 (W)	-15,000	-1,100	-16,000
2040 (D)	-16,000	-680	-17,000
2041 (C)	-17,000	-560	-18,000
2042 (D)	-16,000	-540	-16,000
2043 (C)	-16,000	-480	-17,000
2044 (C)	-16,000	-440	-17,000
2045 (C)	-18,000	-410	-19,000
2046 (AN)	-14,000	-540	-14,000
2047 (C)	-16,000	-450	-17,000
2048 (W)	-13,000	-850	-14,000
2049 (W)	-15,000	-800	-16,000
2050 (W)	-15,000	-840	-16,000
2051 (W)	-9,600	-1,700	-11,000
2052 (W)	-14,000	-1,200	-16,000
2053 (AN)	-13,000	-1,200	-14,000
2054 (D)	-16,000	-670	-17,000
2055 (D)	-17,000	-650	-18,000
2056 (AN)	-14,000	-750	-15,000
2057 (BN)	-17,000	-900	-18,000
2058 (AN)	-12,000	-680	-13,000
2059 (W)	-12,000	-1,600	-14,000

Water Year (Type)		Groundwater Pumping	Groundwater Uptake	Total
2060 (D)		-16,000	-690	-16,000
2061 (C)		-20,000	-590	-21,000
2062 (D)		-16,000	-510	-16,000
2063 (BN)		-13,000	-510	-14,000
2064 (W)		-11,000	-680	-12,000
2065 (BN)		-16,000	-570	-16,000
2066 (D)		-18,000	-530	-19,000
2067 (C)		-19,000	-450	-19,000
2068 (C)		-23,000	-380	-23,000
2069 (BN)		-16,000	-410	-17,000
2070 (W)		-16,000	-770	-16,000
2071 (BN)		-18,000	-480	-19,000
2072 (W)		-13,000	-660	-14,000
Average (2022-2072)		-15,000	-820	-16,000
2022-2072	W	-13,000	-1,200	-15,000
	AN	-13,000	-770	-14,000
	BN	-16,000	-590	-17,000
	D	-17,000	-640	-17,000
	C	-18,000	-500	-19,000

3.2.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Projected vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 70** and **Table 67** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 24 taf per year over the projected water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

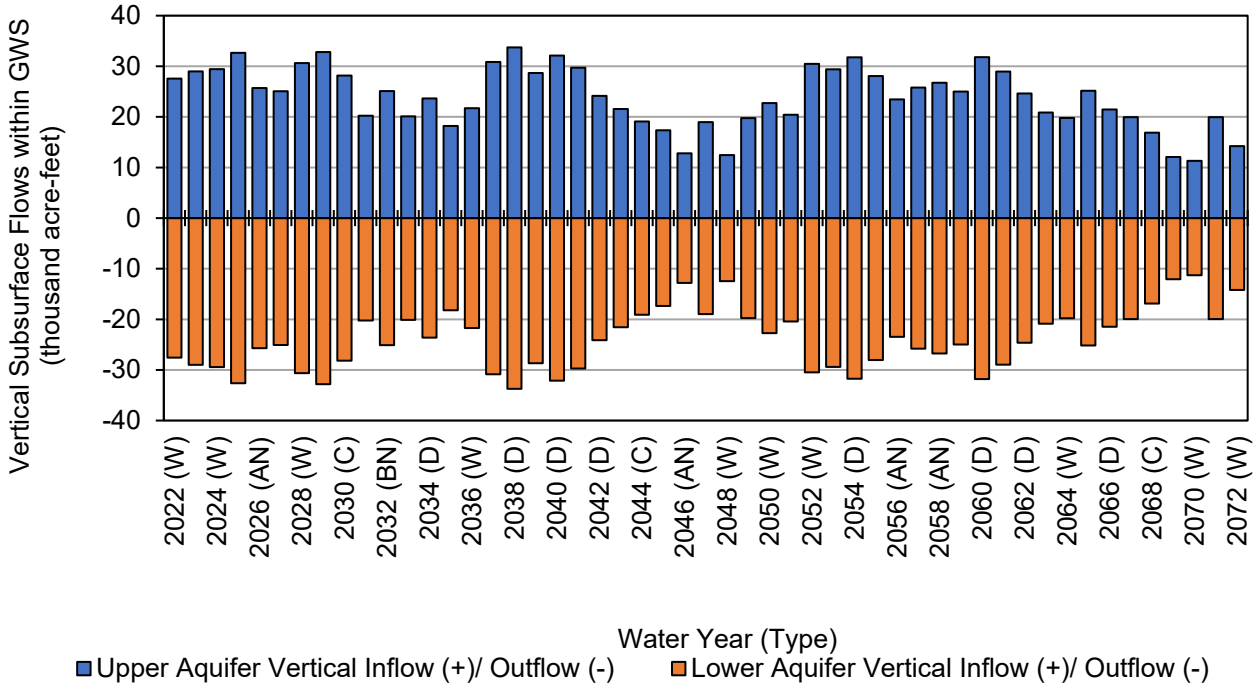


Figure 70. Antelope Subbasin Projected (Future Land Use) Vertical Subsurface Flow within the GWS

Table 67. Antelope Subbasin Projected (Future Land Use) Vertical Subsurface Flows within the GWS (acre-feet)

Water Year (Type)	Upper Aquifer to (-) / from (+) Lower Aquifer
2022 (W)	27,600
2023 (W)	29,000
2024 (W)	29,400
2025 (BN)	32,600
2026 (AN)	25,700
2027 (W)	25,100
2028 (W)	30,600
2029 (C)	32,800
2030 (C)	28,200
2031 (AN)	20,200
2032 (BN)	25,100
2033 (AN)	20,100
2034 (D)	23,600
2035 (W)	18,200
2036 (W)	21,700
2037 (W)	30,900
2038 (D)	33,700
2039 (W)	28,700
2040 (D)	32,100
2041 (C)	29,700
2042 (D)	24,100
2043 (C)	21,500
2044 (C)	19,100
2045 (C)	17,400
2046 (AN)	12,800
2047 (C)	19,000
2048 (W)	12,400
2049 (W)	19,700
2050 (W)	22,700
2051 (W)	20,400
2052 (W)	30,500
2053 (AN)	29,400
2054 (D)	31,800
2055 (D)	28,100
2056 (AN)	23,500
2057 (BN)	25,800
2058 (AN)	26,700
2059 (W)	25,000

Water Year (Type)		Upper Aquifer to (-) / from (+) Lower Aquifer
2060 (D)		31,800
2061 (C)		29,000
2062 (D)		24,600
2063 (BN)		20,900
2064 (W)		19,800
2065 (BN)		25,200
2066 (D)		21,500
2067 (C)		20,000
2068 (C)		16,900
2069 (BN)		12,100
2070 (W)		11,300
2071 (BN)		19,900
2072 (W)		14,200
Average (2022-2072)		24,000
2022-2072	W	23,000
	AN	23,000
	BN	23,000
	D	28,000
	C	23,000

3.2.6 Change in Groundwater Storage

Projected change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 71** and **Figure 72,** and **Table 68**. Values for total change in storage in the GWS and cumulative change in storage over the historical water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the projected period, the average total annual change in groundwater storage is about -0.330 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the projected period is about -17 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are generally the same in the Lower Aquifer (average -0.200 taf per year) compared to the Upper Aquifer (average -0.200 taf per year).

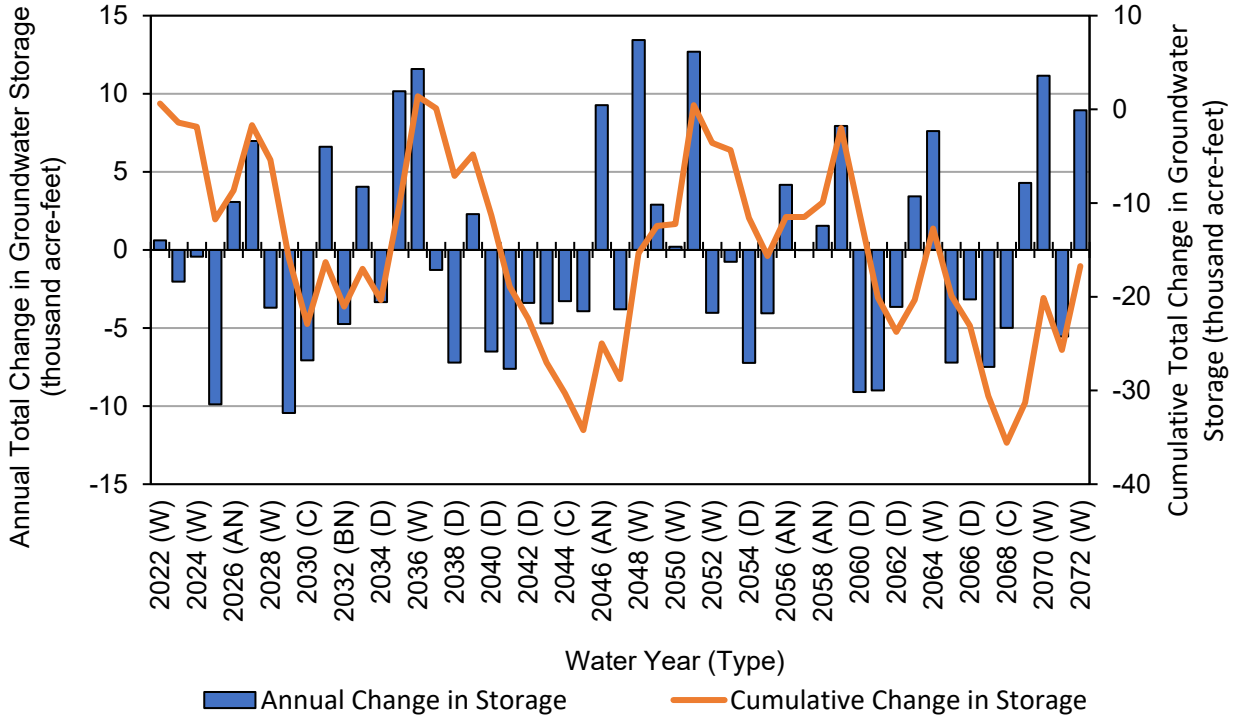


Figure 71. Antelope Subbasin Projected (Future Land Use) Total Change in Storage within the GWS

Table 68. Antelope Subbasin Projected (Future Land Use) Change in Groundwater Storage (acre-feet)

Water Year (Type)	Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2022 (W)	370	240	620	620
2023 (W)	-1,500	-530	-2,000	-1,400
2024 (W)	-350	-83	-440	-1,800
2025 (BN)	-6,100	-3,800	-9,900	-12,000
2026 (AN)	2,000	1,000	3,100	-8,700
2027 (W)	4,200	2,700	7,000	-1,700
2028 (W)	-2,500	-1,200	-3,700	-5,400
2029 (C)	-6,400	-4,100	-10,000	-16,000
2030 (C)	-3,700	-3,400	-7,100	-23,000
2031 (AN)	4,200	2,400	6,600	-16,000
2032 (BN)	-2,900	-1,900	-4,700	-21,000
2033 (AN)	2,600	1,400	4,000	-17,000
2034 (D)	-2,100	-1,300	-3,300	-20,000
2035 (W)	6,300	3,900	10,000	-10,000
2036 (W)	6,800	4,800	12,000	1,400
2037 (W)	-1,200	-98	-1,300	120
2038 (D)	-4,600	-2,600	-7,200	-7,100
2039 (W)	1,600	670	2,300	-4,800
2040 (D)	-4,000	-2,500	-6,500	-11,000
2041 (C)	-4,500	-3,100	-7,600	-19,000
2042 (D)	-1,600	-1,800	-3,400	-22,000
2043 (C)	-2,800	-1,900	-4,700	-27,000
2044 (C)	-1,700	-1,500	-3,300	-30,000
2045 (C)	-2,300	-1,600	-3,900	-34,000
2046 (AN)	6,000	3,200	9,300	-25,000
2047 (C)	-2,400	-1,400	-3,800	-29,000
2048 (W)	8,300	5,200	13,000	-15,000
2049 (W)	1,500	1,300	2,900	-12,000
2050 (W)	-230	420	200	-12,000
2051 (W)	7,600	5,100	13,000	440
2052 (W)	-3,000	-980	-4,000	-3,600
2053 (AN)	-510	-250	-760	-4,300
2054 (D)	-4,400	-2,900	-7,200	-12,000
2055 (D)	-2,400	-1,700	-4,100	-16,000
2056 (AN)	2,700	1,500	4,200	-11,000
2057 (BN)	-67	66	-1	-11,000
2058 (AN)	950	590	1,500	-9,900

Water Year (Type)		Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2059 (W)		4,700	3,200	7,900	-2,000
2060 (D)		-5,600	-3,500	-9,100	-11,000
2061 (C)		-5,500	-3,500	-9,000	-20,000
2062 (D)		-1,800	-1,800	-3,700	-24,000
2063 (BN)		2,300	1,100	3,400	-20,000
2064 (W)		4,900	2,700	7,600	-13,000
2065 (BN)		-4,700	-2,500	-7,200	-20,000
2066 (D)		-1,600	-1,600	-3,200	-23,000
2067 (C)		-4,300	-3,200	-7,500	-31,000
2068 (C)		-2,900	-2,000	-5,000	-36,000
2069 (BN)		2,900	1,400	4,300	-31,000
2070 (W)		6,600	4,500	11,000	-20,000
2071 (BN)		-3,400	-2,100	-5,500	-26,000
2072 (W)		5,600	3,300	8,900	-17,000
Average (2022-2072)		-170	-160	-330	
2022-2072	W	2,800	2,000	4,700	
	AN	2,600	1,400	4,000	
	BN	-1,700	-1,100	-2,800	
	D	-3,100	-2,200	-5,300	
	C	2,800	-2,600	-6,200	

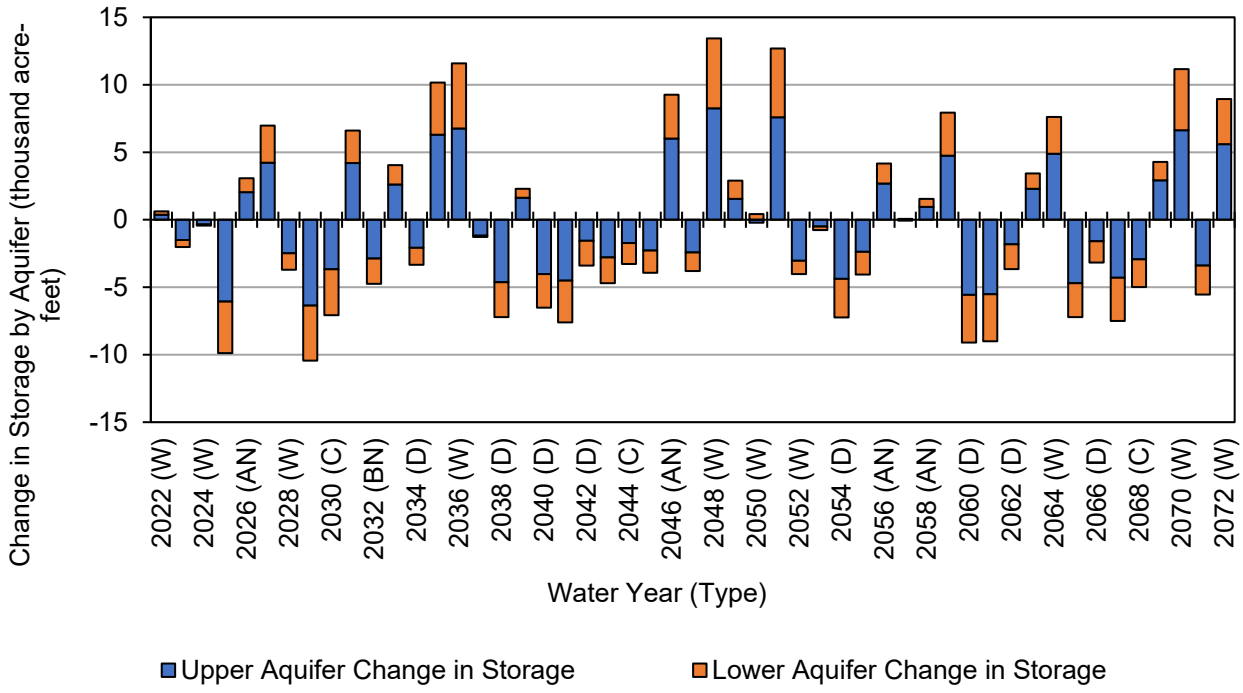


Figure 72. Antelope Subbasin Projected (Future Land Use) Change in Groundwater Storage by Aquifer

4 DETAILED PROJECTED (FUTURE LAND USE WITH CLIMATE CHANGE) WATER BUDGET

This section presents the results of the Projected (Future Land Use with Climate Change) scenario. The Future Land Use with Climate Change scenario assumes transient land use conditions based on assumed projected development and assumed projected climate change within the Antelope Subbasin.

4.1 Surface Water System Water Budget Results

4.1.1 Inflows

4.1.1.1 *Surface Water Inflow by Water Source Type*

The projected annual volume of surface water inflows is summarized by water source type in **Figure 73** and **Table 69**. Over the projected (future land use with climate change) period, surface water inflows average about 46 taf per year. Virtually, all inflows of the SWS are local supplies. The CVP supplies are very small and average about 0.610 taf per year.

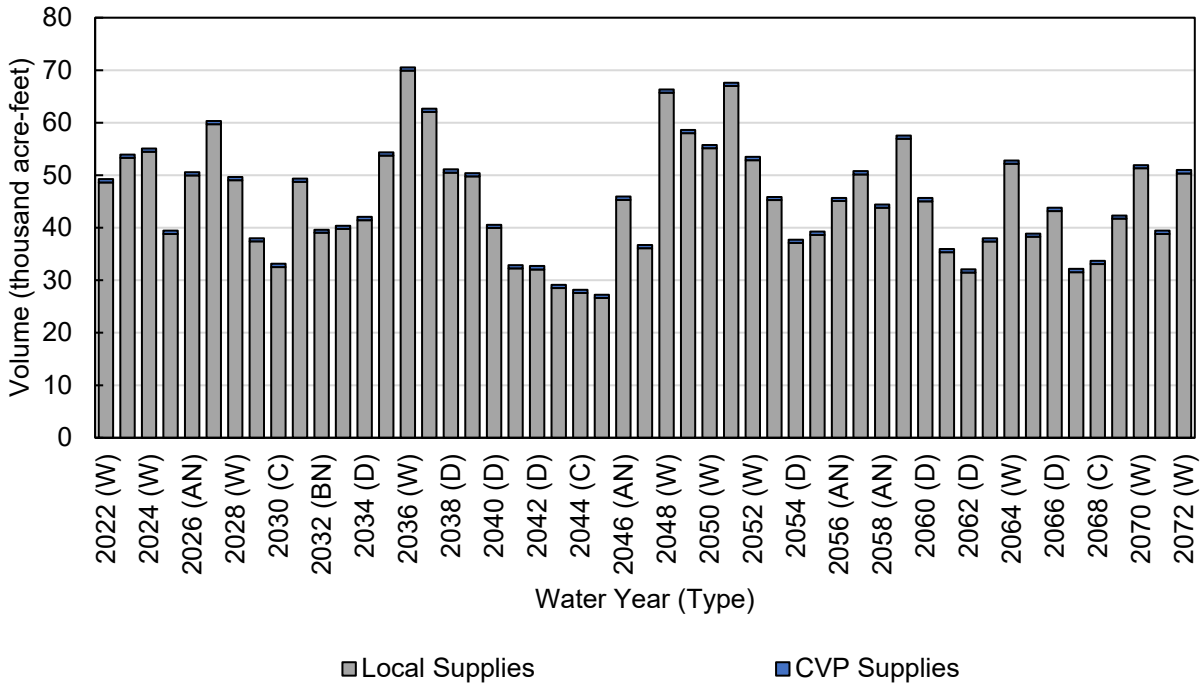


Figure 73. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Inflows, by Water Source Type

Table 69. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Inflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Total
2022 (W)	650	49,000	49,000
2023 (W)	610	53,000	54,000
2024 (W)	610	54,000	55,000
2025 (BN)	630	39,000	39,000
2026 (AN)	610	50,000	51,000
2027 (W)	610	60,000	60,000
2028 (W)	620	49,000	50,000
2029 (C)	600	37,000	38,000
2030 (C)	640	33,000	33,000
2031 (AN)	610	49,000	49,000
2032 (BN)	560	39,000	40,000
2033 (AN)	580	40,000	40,000
2034 (D)	640	41,000	42,000
2035 (W)	610	54,000	54,000
2036 (W)	610	70,000	71,000
2037 (W)	610	62,000	63,000
2038 (D)	640	50,000	51,000
2039 (W)	610	50,000	50,000
2040 (D)	600	40,000	41,000
2041 (C)	610	32,000	33,000
2042 (D)	650	32,000	33,000
2043 (C)	610	29,000	29,000
2044 (C)	610	28,000	28,000
2045 (C)	610	27,000	27,000
2046 (AN)	610	45,000	46,000
2047 (C)	610	36,000	37,000
2048 (W)	610	66,000	66,000
2049 (W)	610	58,000	59,000
2050 (W)	610	55,000	56,000
2051 (W)	610	67,000	68,000
2052 (W)	620	53,000	53,000
2053 (AN)	580	45,000	46,000
2054 (D)	600	37,000	38,000
2055 (D)	640	39,000	39,000
2056 (AN)	580	45,000	46,000
2057 (BN)	620	50,000	51,000

Water Year (Type)		CVP Supplies	Local Supplies	Total
2058 (AN)		600	44,000	44,000
2059 (W)		610	57,000	58,000
2060 (D)		650	45,000	46,000
2061 (C)		600	35,000	36,000
2062 (D)		620	31,000	32,000
2063 (BN)		610	37,000	38,000
2064 (W)		630	52,000	53,000
2065 (BN)		560	38,000	39,000
2066 (D)		650	43,000	44,000
2067 (C)		640	32,000	32,000
2068 (C)		610	33,000	34,000
2069 (BN)		580	42,000	42,000
2070 (W)		580	51,000	52,000
2071 (BN)		630	39,000	39,000
2072 (W)		650	50,000	51,000
Average (2022-2072)		610	45,000	46,000
2022-2072	W	620	56,000	57,000
	AN	600	45,000	46,000
	BN	600	41,000	41,000
	D	630	40,000	41,000
	C	610	32,000	33,000

4.1.1.2 *Precipitation*

Precipitation estimates for the Antelope Subbasin are provided in **Figure 74** and **Table 70**. Total precipitation is highly variable between years in the study area, ranging from approximately 31 taf (19.22 inches) during average critically dry years to 60 taf (37.2 inches) during average wet years.

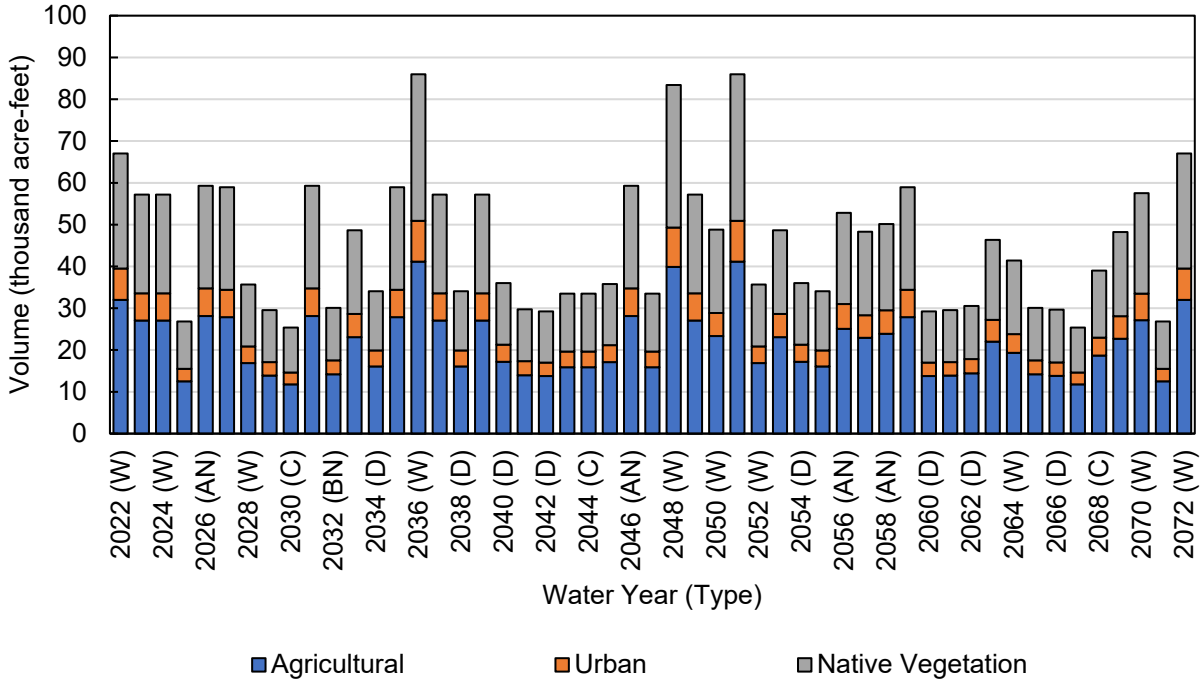


Figure 74. Antelope Subbasin Projected (Future Land Use with Climate Change) Precipitation, by Water Use Sector

Table 70. Antelope Subbasin Projected (Future Land Use) Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	32,000	7,500	28,000	67,000
2023 (W)	27,000	6,500	24,000	57,000
2024 (W)	27,000	6,500	24,000	57,000
2025 (BN)	13,000	3,000	11,000	27,000
2026 (AN)	28,000	6,700	25,000	59,000
2027 (W)	28,000	6,600	25,000	59,000
2028 (W)	17,000	4,000	15,000	36,000
2029 (C)	14,000	3,200	12,000	30,000
2030 (C)	12,000	2,800	11,000	25,000
2031 (AN)	28,000	6,700	25,000	59,000
2032 (BN)	14,000	3,300	13,000	30,000
2033 (AN)	23,000	5,600	20,000	49,000
2034 (D)	16,000	3,800	14,000	34,000
2035 (W)	28,000	6,600	25,000	59,000
2036 (W)	41,000	9,800	35,000	86,000
2037 (W)	27,000	6,500	24,000	57,000
2038 (D)	16,000	3,800	14,000	34,000
2039 (W)	27,000	6,500	24,000	57,000
2040 (D)	17,000	4,100	15,000	36,000
2041 (C)	14,000	3,400	12,000	30,000
2042 (D)	14,000	3,300	12,000	29,000
2043 (C)	16,000	3,800	14,000	33,000
2044 (C)	16,000	3,800	14,000	33,000
2045 (C)	17,000	4,100	15,000	36,000
2046 (AN)	28,000	6,700	25,000	59,000
2047 (C)	16,000	3,800	14,000	33,000
2048 (W)	40,000	9,400	34,000	83,000
2049 (W)	27,000	6,500	24,000	57,000
2050 (W)	23,000	5,500	20,000	49,000
2051 (W)	41,000	9,800	35,000	86,000
2052 (W)	17,000	4,000	15,000	36,000
2053 (AN)	23,000	5,600	20,000	49,000
2054 (D)	17,000	4,100	15,000	36,000
2055 (D)	16,000	3,800	14,000	34,000
2056 (AN)	25,000	5,900	22,000	53,000
2057 (BN)	23,000	5,400	20,000	48,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		24,000	5,600	21,000	50,000
2059 (W)		28,000	6,600	25,000	59,000
2060 (D)		14,000	3,300	12,000	29,000
2061 (C)		14,000	3,200	12,000	30,000
2062 (D)		14,000	3,400	13,000	31,000
2063 (BN)		22,000	5,200	19,000	46,000
2064 (W)		19,000	4,500	18,000	41,000
2065 (BN)		14,000	3,300	13,000	30,000
2066 (D)		14,000	3,200	13,000	30,000
2067 (C)		12,000	2,800	11,000	25,000
2068 (C)		19,000	4,300	16,000	39,000
2069 (BN)		23,000	5,400	20,000	48,000
2070 (W)		27,000	6,400	24,000	58,000
2071 (BN)		13,000	3,000	11,000	27,000
2072 (W)		32,000	7,500	28,000	67,000
Average (2022-2072)		21,000	5,100	19,000	45,000
2022-2072	W	28,000	6,700	25,000	60,000
	AN	26,000	6,100	22,000	54,000
	BN	17,000	4,100	15,000	37,000
	D	15,000	3,600	14,000	33,000
	C	15,000	3,500	13,000	31,000

4.1.1.3 *Groundwater Extraction by Water Use Sector*

Total groundwater extraction in the Antelope Subbasin represents a combination of groundwater pumping to support agricultural and urban water demands, including rural residential use, and groundwater uptake by crops, urban vegetation, and native vegetation.

Estimates of groundwater pumping by water use sector are provided in **Figure 75** and **Table 71**. Virtually all groundwater pumping in the Antelope Subbasin is used to meet agricultural demand, averaging 16 taf per year. Groundwater pumping for urban use is approximately one (1) taf per year. The total groundwater extraction varies from about 16 taf in wet years to 21 taf in critically dry years based on variability in surface water supplies, precipitation, and crop water demand.

When groundwater is near the land surface, groundwater uptake can also be a source of supply for vegetation. Estimates of groundwater uptake by vegetation are provided in **Figure 76** and **Table 72**. The majority of groundwater uptake is consumed directly by agricultural crops and native vegetation, averaging 0.8 taf and 0.730 taf per year, respectively.

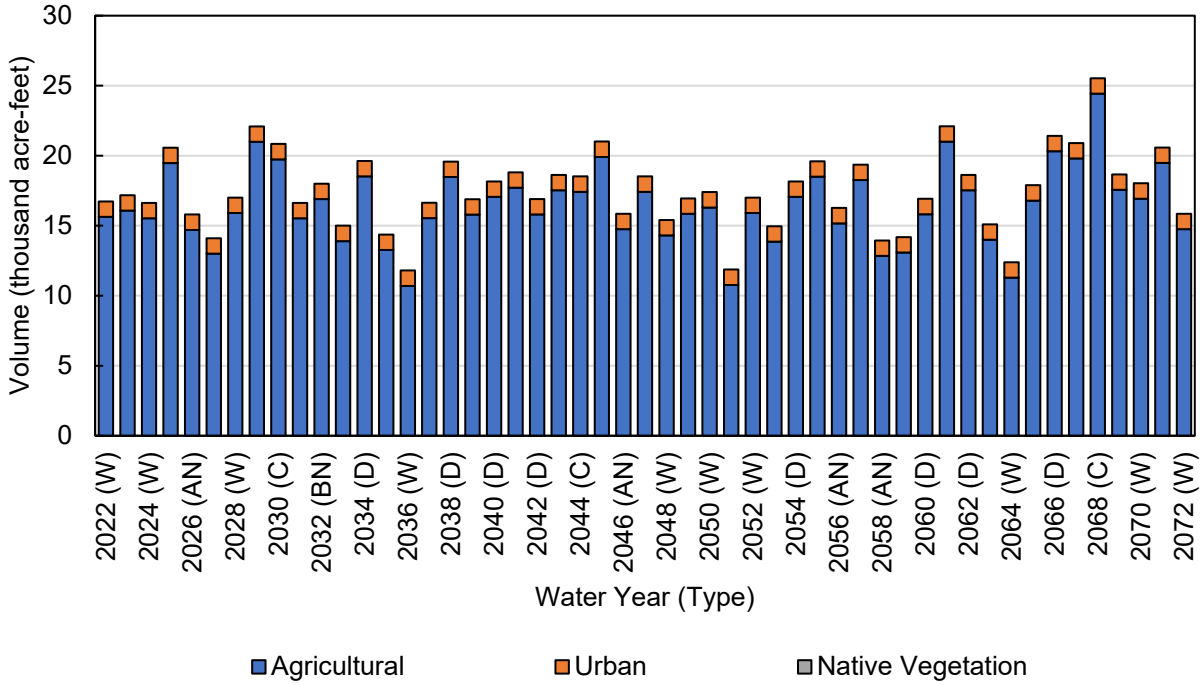


Figure 75. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Pumping, by Water Use Sector

Table 71. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Pumping, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	16,000	1,100	0	17,000
2023 (W)	16,000	1,100	0	17,000
2024 (W)	16,000	1,100	0	17,000
2025 (BN)	19,000	1,100	0	21,000
2026 (AN)	15,000	1,100	0	16,000
2027 (W)	13,000	1,100	0	14,000
2028 (W)	16,000	1,100	0	17,000
2029 (C)	21,000	1,100	0	22,000
2030 (C)	20,000	1,100	0	21,000
2031 (AN)	16,000	1,100	0	17,000
2032 (BN)	17,000	1,100	0	18,000
2033 (AN)	14,000	1,100	0	15,000
2034 (D)	19,000	1,100	0	20,000
2035 (W)	13,000	1,100	0	14,000
2036 (W)	11,000	1,100	0	12,000
2037 (W)	16,000	1,100	0	17,000
2038 (D)	18,000	1,100	0	20,000
2039 (W)	16,000	1,100	0	17,000
2040 (D)	17,000	1,100	0	18,000
2041 (C)	18,000	1,100	0	19,000
2042 (D)	16,000	1,100	0	17,000
2043 (C)	18,000	1,100	0	19,000
2044 (C)	17,000	1,100	0	19,000
2045 (C)	20,000	1,100	0	21,000
2046 (AN)	15,000	1,100	0	16,000
2047 (C)	17,000	1,100	0	19,000
2048 (W)	14,000	1,100	0	15,000
2049 (W)	16,000	1,100	0	17,000
2050 (W)	16,000	1,100	0	17,000
2051 (W)	11,000	1,100	0	12,000
2052 (W)	16,000	1,100	0	17,000
2053 (AN)	14,000	1,100	0	15,000
2054 (D)	17,000	1,100	0	18,000
2055 (D)	19,000	1,100	0	20,000
2056 (AN)	15,000	1,100	0	16,000
2057 (BN)	18,000	1,100	0	19,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		13,000	1,100	0	14,000
2059 (W)		13,000	1,100	0	14,000
2060 (D)		16,000	1,100	0	17,000
2061 (C)		21,000	1,100	0	22,000
2062 (D)		18,000	1,100	0	19,000
2063 (BN)		14,000	1,100	0	15,000
2064 (W)		11,000	1,100	0	12,000
2065 (BN)		17,000	1,100	0	18,000
2066 (D)		20,000	1,100	0	21,000
2067 (C)		20,000	1,100	0	21,000
2068 (C)		24,000	1,100	0	26,000
2069 (BN)		18,000	1,100	0	19,000
2070 (W)		17,000	1,100	0	18,000
2071 (BN)		19,000	1,100	0	21,000
2072 (W)		15,000	1,100	0	16,000
Average (2022-2072)		16,000	1,100	0	18,000
2022-2072	W	14,000	1,100	0	16,000
	AN	14,000	1,100	0	15,000
	BN	17,000	1,100	0	19,000
	D	18,000	1,100	0	19,000
	C	20,000	1,100	0	21,000

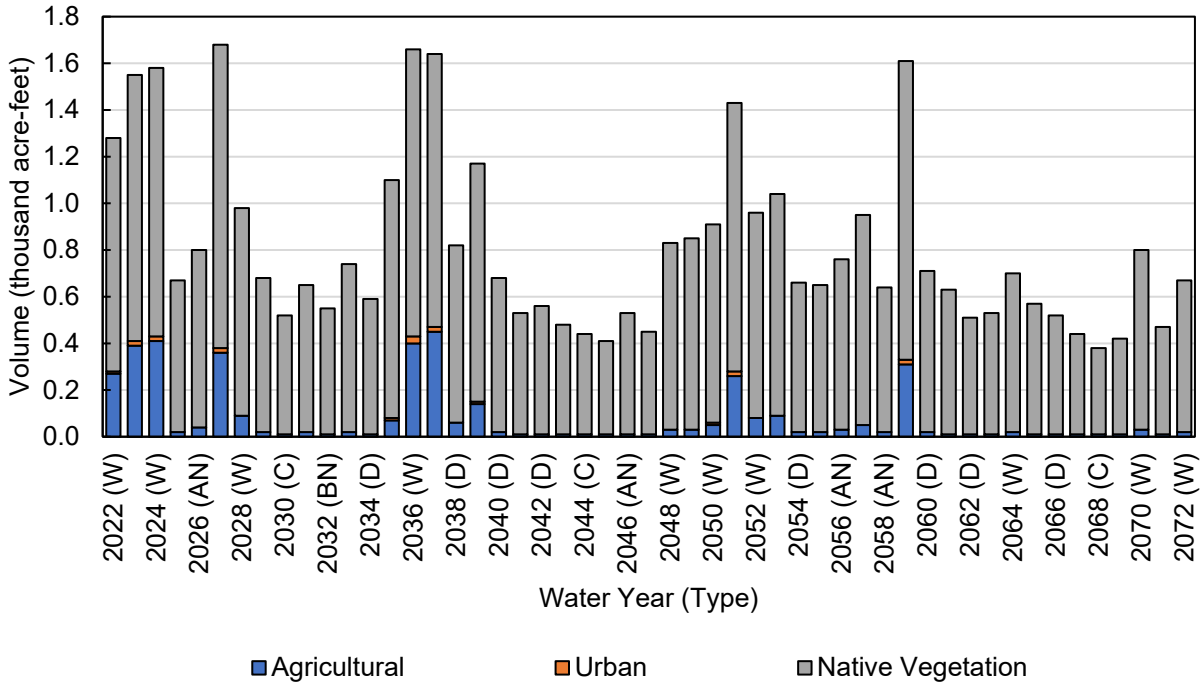


Figure 76. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Uptake, by Water Use Sector

Table 72. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (BN)	270	10	1,000	1,300
2023 (W)	390	20	1,100	1,600
2024 (W)	410	20	1,200	1,600
2025 (W)	20	0	650	670
2026 (BN)	40	0	760	800
2027 (AN)	360	20	1,300	1,700
2028 (W)	90	0	890	980
2029 (W)	20	0	660	680
2030 (C)	10	0	510	520
2031 (C)	20	0	630	650
2032 (AN)	10	0	540	550
2033 (BN)	20	0	720	740
2034 (AN)	10	0	580	590
2035 (D)	70	10	1,000	1,100
2036 (W)	400	30	1,200	1,700
2037 (W)	450	20	1,200	1,600
2038 (W)	60	0	760	820
2039 (D)	140	10	1,000	1,200
2040 (W)	20	0	660	680
2041 (D)	10	0	520	530
2042 (C)	10	0	550	560
2043 (D)	10	0	470	480
2044 (C)	10	0	430	440
2045 (C)	10	0	400	410
2046 (C)	10	0	520	530
2047 (AN)	10	0	440	450
2048 (C)	30	0	800	830
2049 (W)	30	0	820	850
2050 (W)	50	10	850	910
2051 (W)	260	20	1,200	1,400
2052 (W)	80	0	880	960
2053 (W)	90	0	950	1,000
2054 (AN)	20	0	640	660
2055 (D)	20	0	630	650
2056 (D)	30	0	730	760
2057 (AN)	50	0	900	950

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (BN)		20	0	620	640
2059 (AN)		310	20	1,300	1,600
2060 (W)		20	0	690	710
2061 (D)		10	0	620	630
2062 (C)		10	0	500	510
2063 (D)		10	0	520	530
2064 (BN)		20	0	680	700
2065 (W)		10	0	560	570
2066 (BN)		10	0	510	520
2067 (D)		10	0	430	440
2068 (C)		10	0	370	380
2069 (C)		10	0	410	420
2070 (BN)		30	0	770	800
2071 (W)		10	0	460	470
2072 (W)		20	0	650	670
Average (2022-2072)		80	0	730	810
2022-2072	W	190	10	990	1,200
	AN	30	0	700	740
	BN	20	0	580	590
	D	20	0	610	630
	C	10	0	490	500

4.1.1.4 *Groundwater Discharge to Surface Waterways*

Groundwater discharge to surface water, as described herein, represents a gain, or increase of flow, in waterways that traverse or flow along the boundary of the Antelope Subbasin. Groundwater discharge in the Antelope Subbasin is calculated from the Tehama IHM as the net groundwater outflow to water reaches (i.e., groundwater discharge) in excess of groundwater inflows from waterway reaches (i.e., seepage). The total volume of estimated groundwater discharge to surface water is summarized in **Figure 77** and **Table 73**, averaging approximately 27 taf per year.

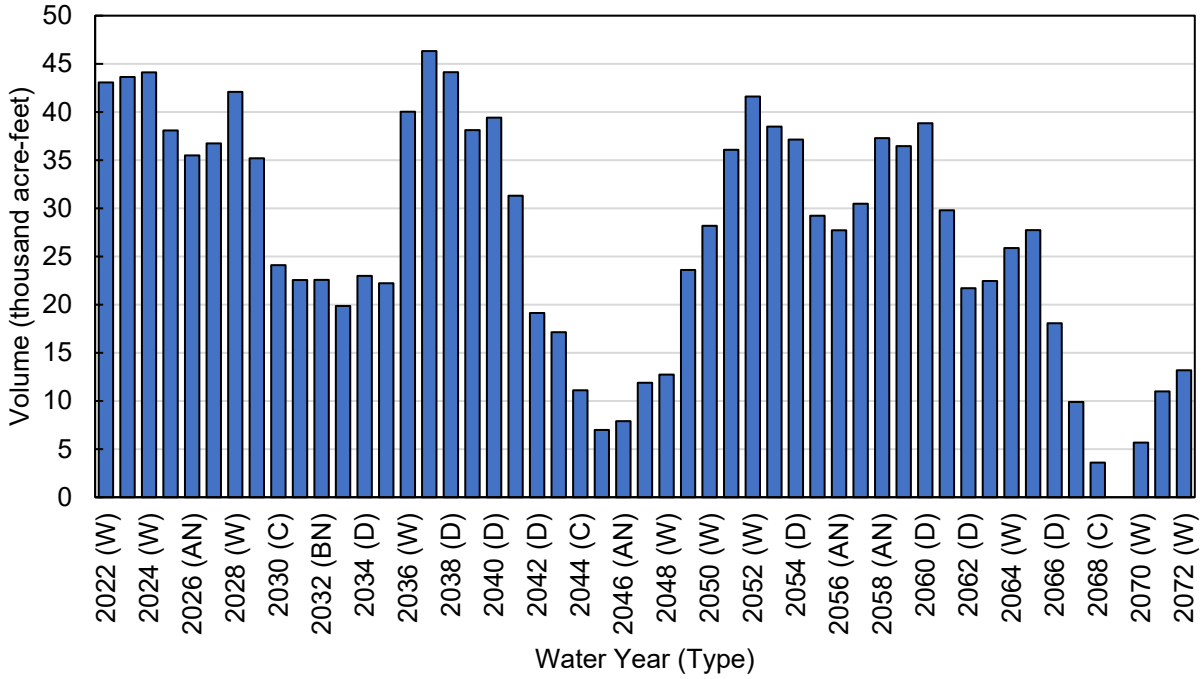


Figure 77. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Discharge to Surface Water

Table 73. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Discharge to Surface Water (acre-feet)

Water Year (Type)	Groundwater Discharge to Surface Water
2022 (W)	43,000
2023 (W)	44,000
2024 (W)	44,000
2025 (BN)	38,000
2026 (AN)	35,000
2027 (W)	37,000
2028 (W)	42,000
2029 (C)	35,000
2030 (C)	24,000
2031 (AN)	23,000
2032 (BN)	23,000
2033 (AN)	20,000
2034 (D)	23,000
2035 (W)	22,000
2036 (W)	40,000
2037 (W)	46,000
2038 (D)	44,000
2039 (W)	38,000
2040 (D)	39,000
2041 (C)	31,000
2042 (D)	19,000
2043 (C)	17,000
2044 (C)	11,000
2045 (C)	7,000
2046 (AN)	7,900
2047 (C)	12,000
2048 (W)	13,000
2049 (W)	24,000
2050 (W)	28,000
2051 (W)	36,000
2052 (W)	42,000
2053 (AN)	38,000
2054 (D)	37,000
2055 (D)	29,000
2056 (AN)	28,000
2057 (BN)	30,000

Water Year (Type)		Groundwater Discharge to Surface Water
2058 (AN)		37,000
2059 (W)		36,000
2060 (D)		39,000
2061 (C)		30,000
2062 (D)		22,000
2063 (BN)		22,000
2064 (W)		26,000
2065 (BN)		28,000
2066 (D)		18,000
2067 (C)		9,900
2068 (C)		3,600
2069 (BN)		0
2070 (W)		5,700
2071 (BN)		11,000
2072 (W)		13,000
Average (2022-2072)		27,000
2022-2072	W	32,000
	AN	27,000
	BN	22,000
	D	30,000
	C	18,000

4.1.2 Outflows

4.1.2.1 *Evapotranspiration by Water Use Sector*

Evapotranspiration (ET) by water use sector is reported in **Figure 78** through **Figure 81**, and **Table 74** through **Table 77**. First, total ET is reported, followed by ET from applied water (ET of water actively applied from surface water deliveries or groundwater pumping), ET of groundwater uptake (ET of shallow water extracted directly by vegetation), and ET from precipitation (ET of water supplied through rainfall).

Total ET varies between years, with the lowest projected in 2036 and 2051, at approximately 46 taf, and greatest 2031, at approximately 53 taf. Agricultural ET tends to increase slightly in drier years due to increased climatic demand, while the ET of native vegetation typically decreases due to reduced water supply.

ET of applied water occurs primarily from agricultural land, averaging about 20 taf in above-normal and wet years and about 23 to 25 taf in years classified as below normal, dry, or critical. Urban ET of applied water is lower and averages less than 0.350 taf per year. Native vegetation and agricultural crops in the Antelope Subbasin also directly consume shallow groundwater to meet a portion of their consumptive use

requirements. ET of groundwater uptake by native vegetation and agricultural crops totals 0.730 and 0.080 taf per year, on average.

ET of precipitation generally follows the pattern of precipitation, with higher volumes occurring in wet years when more precipitation occurs. Across all water use sectors, ET of precipitation in the Antelope Subbasin averages about 29 taf in wet years and 25 taf in critically dry water years. Much of the total ET of precipitation results from the large acreage of native vegetation and Agricultural land in the Antelope Subbasin, though some contribution is from urban areas as well.

Evaporation from rivers, streams, and canals in the Antelope Subbasin is reported in **Figure 82** and **Table 75**. The total volume is relatively small and constant between years, averaging 0.150 taf per year. Evaporation from upgradient small watersheds is minimal and is also not considered to substantially contribute to the subbasin SWS water budget.

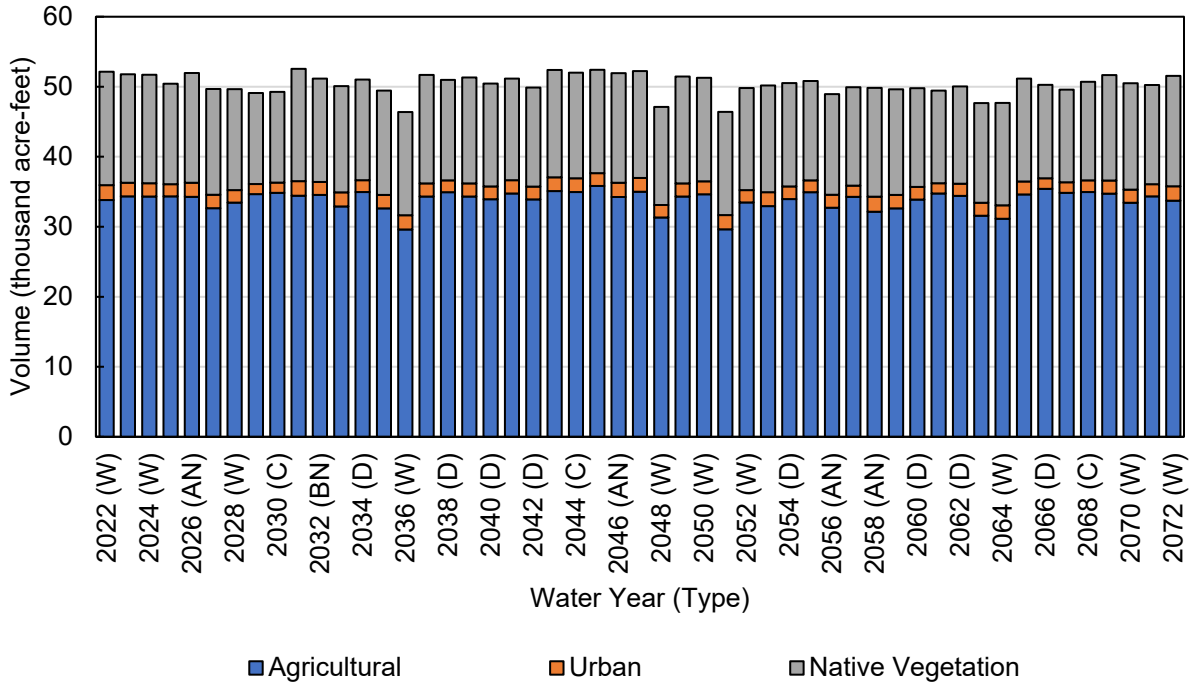


Figure 78. Antelope Subbasin Projected (Future Land Use with Climate Change) Total Evapotranspiration, by Water Use Sector

Table 74. Antelope Subbasin Projected (Future Land Use) Total Evapotranspiration, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	34,000	2,100	16,000	52,000
2023 (W)	34,000	1,900	16,000	52,000
2024 (W)	34,000	1,900	15,000	52,000
2025 (BN)	34,000	1,700	14,000	50,000
2026 (AN)	34,000	2,000	16,000	52,000
2027 (W)	33,000	1,900	15,000	50,000
2028 (W)	33,000	1,800	14,000	50,000
2029 (C)	35,000	1,400	13,000	49,000
2030 (C)	35,000	1,500	13,000	49,000
2031 (AN)	34,000	2,100	16,000	53,000
2032 (BN)	35,000	1,900	15,000	51,000
2033 (AN)	33,000	2,000	15,000	50,000
2034 (D)	35,000	1,700	14,000	51,000
2035 (W)	33,000	1,900	15,000	49,000
2036 (W)	30,000	2,000	15,000	46,000
2037 (W)	34,000	1,900	15,000	52,000
2038 (D)	35,000	1,700	14,000	51,000
2039 (W)	34,000	1,900	15,000	51,000
2040 (D)	34,000	1,800	15,000	50,000
2041 (C)	35,000	1,900	15,000	51,000
2042 (D)	34,000	1,800	14,000	50,000
2043 (C)	35,000	2,000	15,000	52,000
2044 (C)	35,000	2,000	15,000	52,000
2045 (C)	36,000	1,800	15,000	52,000
2046 (AN)	34,000	2,000	16,000	52,000
2047 (C)	35,000	2,000	15,000	52,000
2048 (W)	31,000	1,800	14,000	47,000
2049 (W)	34,000	1,900	15,000	51,000
2050 (W)	35,000	1,900	15,000	51,000
2051 (W)	30,000	2,000	15,000	46,000
2052 (W)	33,000	1,800	15,000	50,000
2053 (AN)	33,000	2,000	15,000	50,000
2054 (D)	34,000	1,800	15,000	51,000
2055 (D)	35,000	1,700	14,000	51,000
2056 (AN)	33,000	1,900	14,000	49,000
2057 (BN)	34,000	1,600	14,000	50,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		32,000	2,100	16,000	50,000
2059 (W)		33,000	1,900	15,000	50,000
2060 (D)		34,000	1,800	14,000	50,000
2061 (C)		35,000	1,500	13,000	49,000
2062 (D)		34,000	1,700	14,000	50,000
2063 (BN)		32,000	1,900	14,000	48,000
2064 (W)		31,000	1,900	15,000	48,000
2065 (BN)		35,000	1,900	15,000	51,000
2066 (D)		35,000	1,500	13,000	50,000
2067 (C)		35,000	1,500	13,000	50,000
2068 (C)		35,000	1,700	14,000	51,000
2069 (BN)		35,000	1,900	15,000	52,000
2070 (W)		33,000	1,900	15,000	51,000
2071 (BN)		34,000	1,700	14,000	50,000
2072 (W)		34,000	2,100	16,000	52,000
Average (2022-2072)		34,000	1,800	15,000	50,000
2022-2072	W	33,000	1,900	15,000	50,000
	AN	33,000	2,000	15,000	51,000
	BN	34,000	1,800	14,000	50,000
	D	34,000	1,700	14,000	50,000
	C	35,000	1,700	14,000	51,000

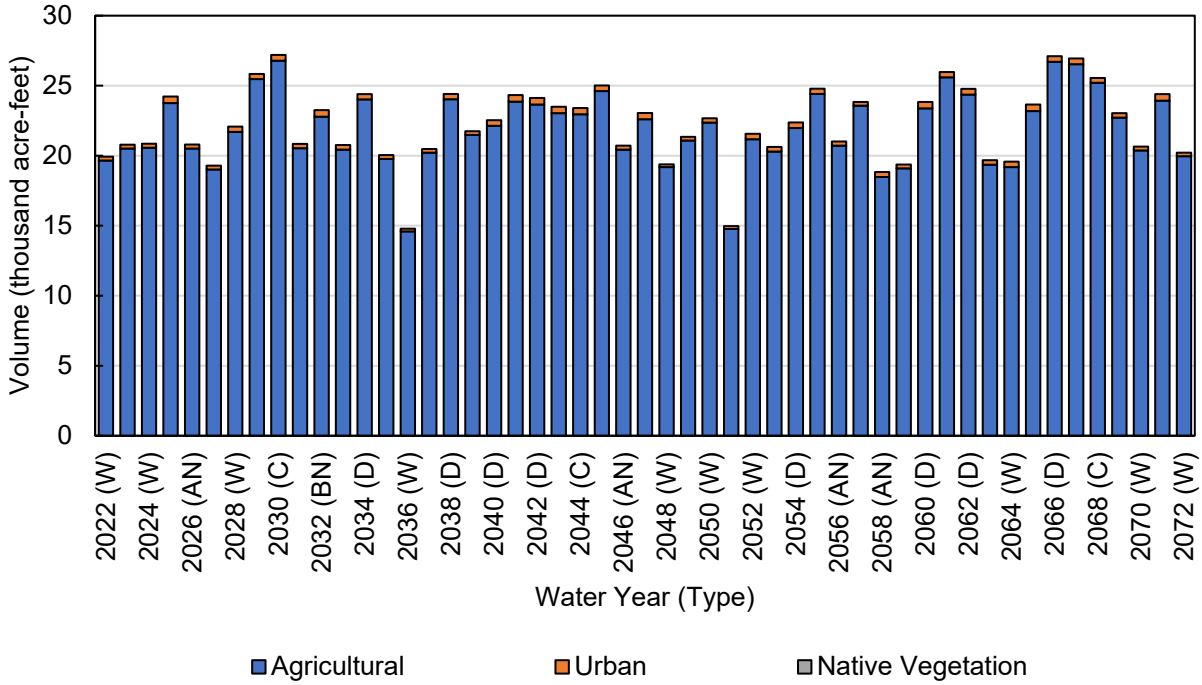


Figure 79. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Applied Water, by Water Use Sector

Table 75. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	20,000	270	0	20,000
2023 (W)	21,000	280	0	21,000
2024 (W)	21,000	280	0	21,000
2025 (BN)	24,000	470	0	24,000
2026 (AN)	21,000	290	0	21,000
2027 (W)	19,000	280	0	19,000
2028 (W)	22,000	380	0	22,000
2029 (C)	25,000	370	0	26,000
2030 (C)	27,000	410	0	27,000
2031 (AN)	21,000	300	0	21,000
2032 (BN)	23,000	460	0	23,000
2033 (AN)	20,000	330	0	21,000
2034 (D)	24,000	380	0	24,000
2035 (W)	20,000	270	0	20,000
2036 (W)	15,000	200	0	15,000
2037 (W)	20,000	270	0	20,000
2038 (D)	24,000	380	0	24,000
2039 (W)	21,000	270	0	22,000
2040 (D)	22,000	390	0	23,000
2041 (C)	24,000	470	0	24,000
2042 (D)	24,000	460	0	24,000
2043 (C)	23,000	450	0	23,000
2044 (C)	23,000	440	0	23,000
2045 (C)	25,000	390	0	25,000
2046 (AN)	20,000	290	0	21,000
2047 (C)	23,000	450	0	23,000
2048 (W)	19,000	190	0	19,000
2049 (W)	21,000	270	0	21,000
2050 (W)	22,000	310	0	23,000
2051 (W)	15,000	210	0	15,000
2052 (W)	21,000	380	0	22,000
2053 (AN)	20,000	330	0	21,000
2054 (D)	22,000	390	0	22,000
2055 (D)	24,000	380	0	25,000
2056 (AN)	21,000	290	0	21,000
2057 (BN)	24,000	270	0	24,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		18,000	350	0	19,000
2059 (W)		19,000	280	0	19,000
2060 (D)		23,000	460	0	24,000
2061 (C)		26,000	370	0	26,000
2062 (D)		24,000	420	0	25,000
2063 (BN)		19,000	320	0	20,000
2064 (W)		19,000	380	0	20,000
2065 (BN)		23,000	460	0	24,000
2066 (D)		27,000	390	0	27,000
2067 (C)		27,000	420	0	27,000
2068 (C)		25,000	340	0	26,000
2069 (BN)		23,000	320	0	23,000
2070 (W)		20,000	280	0	21,000
2071 (BN)		24,000	470	0	24,000
2072 (W)		20,000	260	0	20,000
Average (2022-2072)		20,000	270	0	20,000
2022-2072	W	20,000	270	0	20,000
	AN	21,000	280	0	21,000
	BN	21,000	280	0	21,000
	D	24,000	470	0	24,000
	C	21,000	290	0	21,000

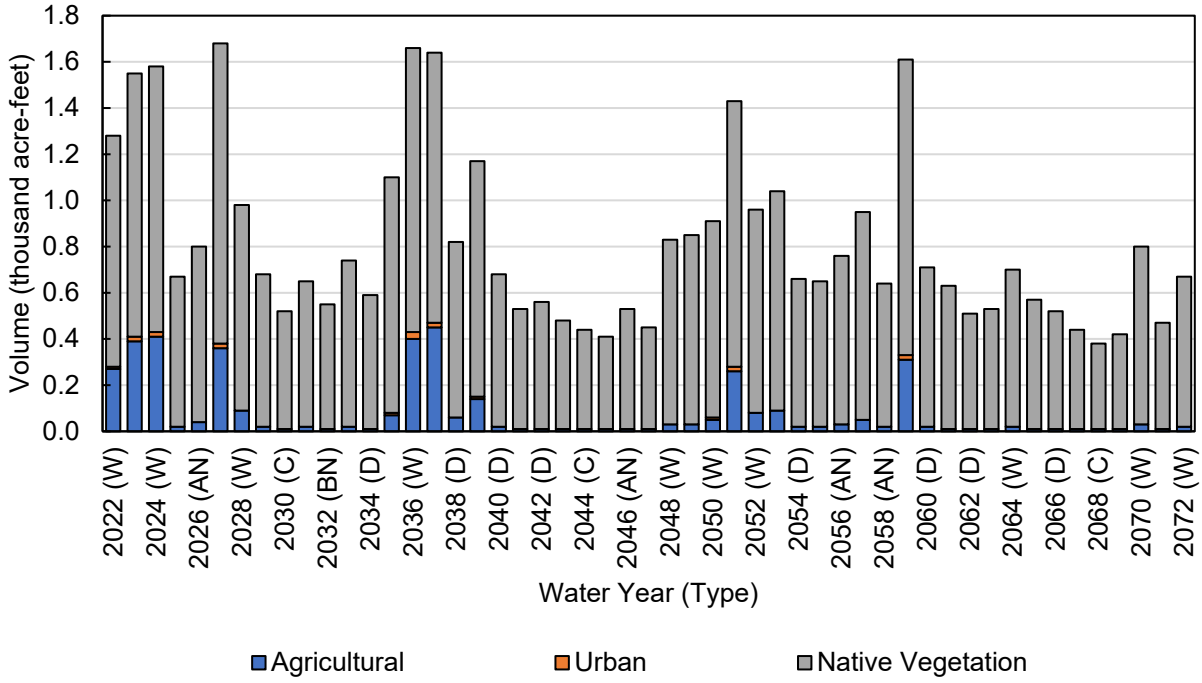


Figure 80. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Groundwater Uptake, by Water Use Sector

Table 76. Antelope Subbasin Projected (Future Land Use) Evapotranspiration of Groundwater Uptake, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	270	10	1,000	1,300
2023 (W)	390	20	1,100	1,600
2024 (W)	410	20	1,200	1,600
2025 (BN)	20	0	650	670
2026 (AN)	40	0	760	800
2027 (W)	360	20	1,300	1,700
2028 (W)	90	0	890	980
2029 (C)	20	0	660	680
2030 (C)	10	0	510	520
2031 (AN)	20	0	630	650
2032 (BN)	10	0	540	550
2033 (AN)	20	0	720	740
2034 (D)	10	0	580	590
2035 (W)	70	10	1,000	1,100
2036 (W)	400	30	1,200	1,700
2037 (W)	450	20	1,200	1,600
2038 (D)	60	0	760	820
2039 (W)	140	10	1,000	1,200
2040 (D)	20	0	660	680
2041 (C)	10	0	520	530
2042 (D)	10	0	550	560
2043 (C)	10	0	470	480
2044 (C)	10	0	430	440
2045 (C)	10	0	400	410
2046 (AN)	10	0	520	530
2047 (C)	10	0	440	450
2048 (W)	30	0	800	830
2049 (W)	30	0	820	850
2050 (W)	50	10	850	910
2051 (W)	260	20	1,200	1,400
2052 (W)	80	0	880	960
2053 (AN)	90	0	950	1,000
2054 (D)	20	0	640	660
2055 (D)	20	0	630	650
2056 (AN)	30	0	730	760
2057 (BN)	50	0	900	950

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		20	0	620	640
2059 (W)		310	20	1,300	1,600
2060 (D)		20	0	690	710
2061 (C)		10	0	620	630
2062 (D)		10	0	500	510
2063 (BN)		10	0	520	530
2064 (W)		20	0	680	700
2065 (BN)		10	0	560	570
2066 (D)		10	0	510	520
2067 (C)		10	0	430	440
2068 (C)		10	0	370	380
2069 (BN)		10	0	410	420
2070 (W)		30	0	770	800
2071 (BN)		10	0	460	470
2072 (W)		20	0	650	670
Average (2022-2072)		80	0	730	810
2022-2072	W	190	10	990	1,200
	AN	30	0	700	740
	BN	20	0	580	590
	D	20	0	610	630
	C	10	0	490	500

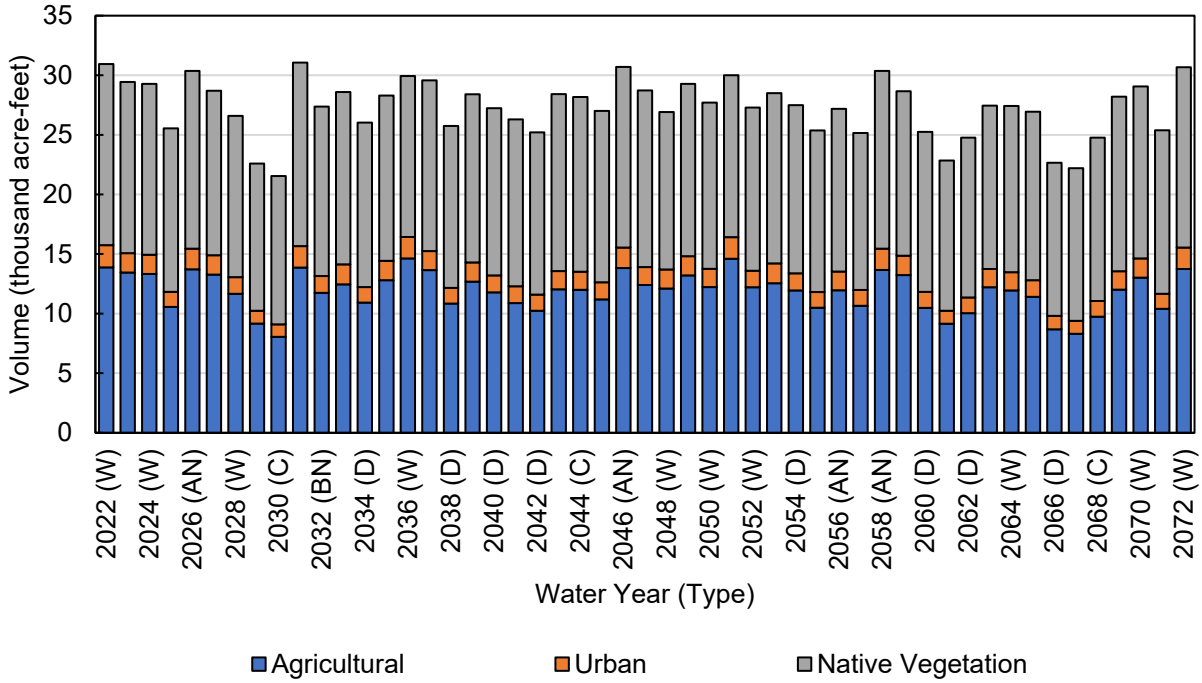


Figure 81. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Precipitation, by Water Use Sector

Table 77. Antelope Subbasin Projected (Future Land Use with Climate Change) Evapotranspiration of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	14,000	1,900	15,000	31,000
2023 (W)	13,000	1,600	14,000	29,000
2024 (W)	13,000	1,600	14,000	29,000
2025 (BN)	11,000	1,300	14,000	26,000
2026 (AN)	14,000	1,700	15,000	30,000
2027 (W)	13,000	1,600	14,000	29,000
2028 (W)	12,000	1,400	14,000	27,000
2029 (C)	9,200	1,100	12,000	23,000
2030 (C)	8,100	1,100	12,000	22,000
2031 (AN)	14,000	1,800	15,000	31,000
2032 (BN)	12,000	1,400	14,000	27,000
2033 (AN)	12,000	1,700	14,000	29,000
2034 (D)	11,000	1,300	14,000	26,000
2035 (W)	13,000	1,600	14,000	28,000
2036 (W)	15,000	1,800	14,000	30,000
2037 (W)	14,000	1,600	14,000	30,000
2038 (D)	11,000	1,300	14,000	26,000
2039 (W)	13,000	1,600	14,000	28,000
2040 (D)	12,000	1,400	14,000	27,000
2041 (C)	11,000	1,400	14,000	26,000
2042 (D)	10,000	1,400	14,000	25,000
2043 (C)	12,000	1,500	15,000	28,000
2044 (C)	12,000	1,500	15,000	28,000
2045 (C)	11,000	1,400	14,000	27,000
2046 (AN)	14,000	1,700	15,000	31,000
2047 (C)	12,000	1,500	15,000	29,000
2048 (W)	12,000	1,600	13,000	27,000
2049 (W)	13,000	1,600	14,000	29,000
2050 (W)	12,000	1,500	14,000	28,000
2051 (W)	15,000	1,800	14,000	30,000
2052 (W)	12,000	1,400	14,000	27,000
2053 (AN)	13,000	1,700	14,000	29,000
2054 (D)	12,000	1,400	14,000	27,000
2055 (D)	11,000	1,300	14,000	25,000
2056 (AN)	12,000	1,600	14,000	27,000
2057 (BN)	11,000	1,300	13,000	25,000

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		14,000	1,800	15,000	30,000
2059 (W)		13,000	1,600	14,000	29,000
2060 (D)		10,000	1,400	13,000	25,000
2061 (C)		9,200	1,100	13,000	23,000
2062 (D)		10,000	1,300	13,000	25,000
2063 (BN)		12,000	1,500	14,000	27,000
2064 (W)		12,000	1,500	14,000	27,000
2065 (BN)		11,000	1,400	14,000	27,000
2066 (D)		8,700	1,100	13,000	23,000
2067 (C)		8,300	1,100	13,000	22,000
2068 (C)		9,800	1,300	14,000	25,000
2069 (BN)		12,000	1,600	15,000	28,000
2070 (W)		13,000	1,600	14,000	29,000
2071 (BN)		10,000	1,300	14,000	25,000
2072 (W)		14,000	1,800	15,000	31,000
Average (2022-2072)		12,000	1,500	14,000	27,000
2022-2072	W	13,000	1,600	14,000	29,000
	AN	13,000	1,700	15,000	30,000
	BN	11,000	1,400	14,000	27,000
	D	11,000	1,300	14,000	26,000
	C	10,000	1,300	14,000	25,000

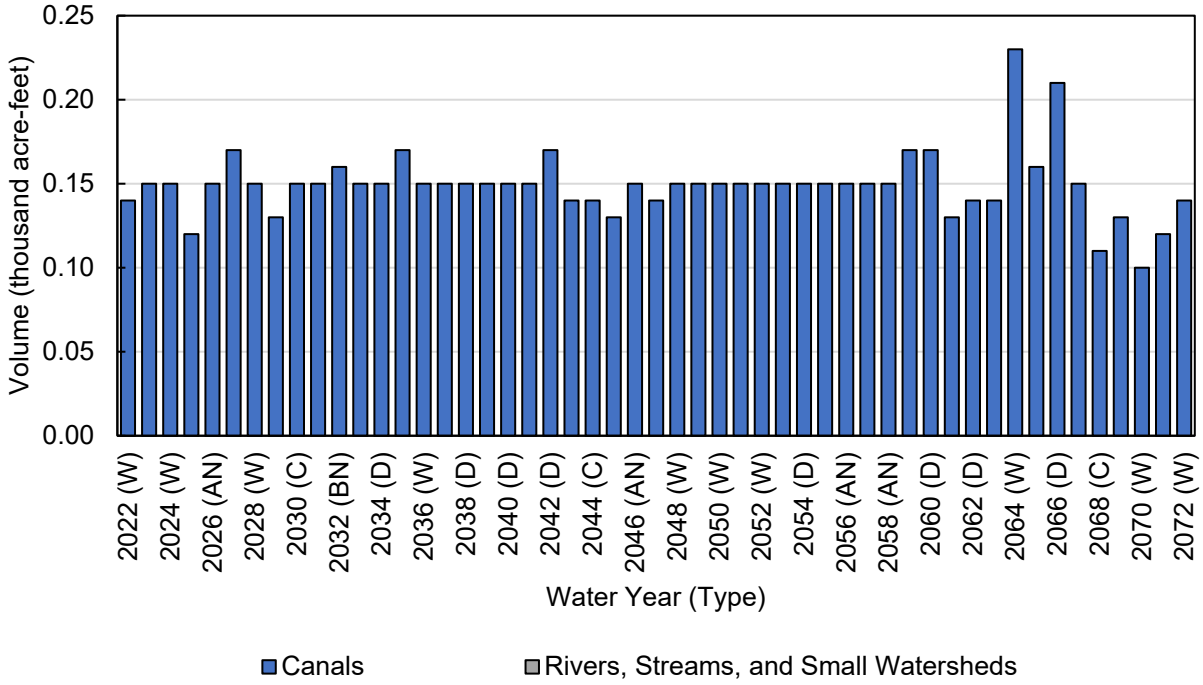


Figure 82. Antelope Subbasin Projected (Future Land Use with Climate Change) Evaporation of Surface Water Sources

Table 78. Antelope Subbasin Projected (Future Land Use with Climate Change) Evaporation of Surface Water Sources, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds[1]	Total
2022 (W)	140	0	140
2023 (W)	150	0	150
2024 (W)	150	0	150
2025 (BN)	120	0	120
2026 (AN)	150	0	150
2027 (W)	170	0	170
2028 (W)	150	0	150
2029 (C)	130	0	130
2030 (C)	150	0	150
2031 (AN)	150	0	150
2032 (BN)	160	0	160
2033 (AN)	150	0	150
2034 (D)	150	0	150
2035 (W)	170	0	170
2036 (W)	150	0	150
2037 (W)	150	0	150
2038 (D)	150	0	150
2039 (W)	150	0	150
2040 (D)	150	0	150
2041 (C)	150	0	150
2042 (D)	170	0	170
2043 (C)	140	0	140
2044 (C)	140	0	140
2045 (C)	130	0	130
2046 (AN)	150	0	150
2047 (C)	140	0	140
2048 (W)	150	0	150
2049 (W)	150	0	150
2050 (W)	150	0	150
2051 (W)	150	0	150
2052 (W)	150	0	150
2053 (AN)	150	0	150
2054 (D)	150	0	150
2055 (D)	150	0	150
2056 (AN)	150	0	150
2057 (BN)	150	0	150
2058 (AN)	150	0	150

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds[1]	Total
2059 (W)		170	0	170
2060 (D)		170	0	170
2061 (C)		130	0	130
2062 (D)		140	0	140
2063 (BN)		140	0	140
2064 (W)		230	0	230
2065 (BN)		160	0	160
2066 (D)		210	0	210
2067 (C)		150	0	150
2068 (C)		110	0	110
2069 (BN)		130	0	130
2070 (W)		100	0	100
2071 (BN)		120	0	120
2072 (W)		140	0	140
Average (2022-2072)		150	0	150
2022-2072	W	150	0	150
	AN	150	0	150
	BN	140	0	140
	D	160	0	160
	C	140	0	140

[1] Includes ET of riparian vegetation along rivers and streams.

4.1.2.2 *Surface Water Outflow by Water Source Type*

Surface water outflows from the Antelope Subbasin are summarized in **Figure 83** and **Table 79** by water source type. In the Antelope Subbasin, local supply outflows primarily include outflows of runoff, tailwater, and net drainage from land surfaces, in addition to runoff from small watersheds and stream outflows to the Sacramento River. Local supply outflows average approximately 46 taf per year, and range on average from 27 taf in critically dry years up to 66 taf in wet years. Other surface water outflows that leave the subbasin include outflow of groundwater discharge to the Sacramento River, Antelope Creek, Salt Creek, Craig Creek and New Creek. This water travels along each respective waterway as part of the flow in the river or creek.

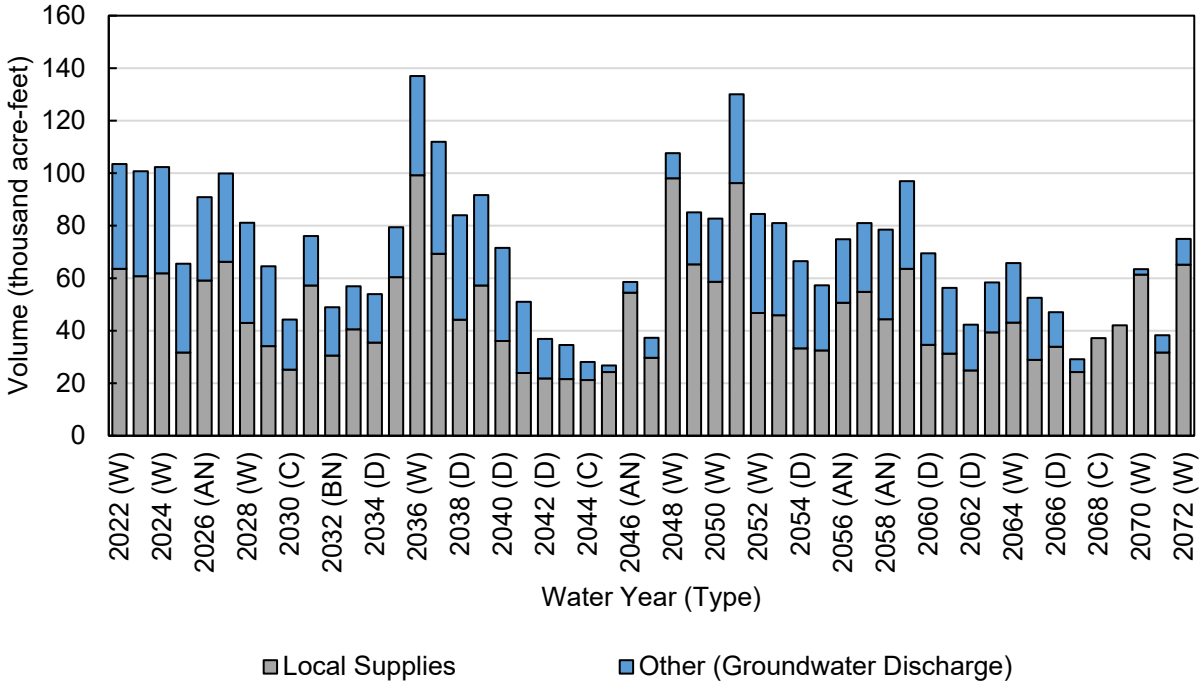


Figure 83. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Outflows, by Water Source Type

Table 79. Antelope Subbasin Projected (Future Land Use with Climate Change) Surface Water Outflows, by Water Source Type (acre-feet)

Water Year (Type)	CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2022 (W)	0	64,000	40,000	100,000
2023 (W)	0	61,000	40,000	100,000
2024 (W)	0	62,000	40,000	100,000
2025 (BN)	0	32,000	34,000	66,000
2026 (AN)	0	59,000	32,000	91,000
2027 (W)	0	66,000	34,000	100,000
2028 (W)	0	43,000	38,000	81,000
2029 (C)	0	34,000	30,000	65,000
2030 (C)	0	25,000	19,000	44,000
2031 (AN)	0	57,000	19,000	76,000
2032 (BN)	0	31,000	18,000	49,000
2033 (AN)	0	41,000	16,000	57,000
2034 (D)	0	35,000	19,000	54,000
2035 (W)	0	60,000	19,000	79,000
2036 (W)	0	99,000	38,000	140,000
2037 (W)	0	69,000	43,000	110,000
2038 (D)	0	44,000	40,000	84,000
2039 (W)	0	57,000	34,000	92,000
2040 (D)	0	36,000	35,000	72,000
2041 (C)	0	24,000	27,000	51,000
2042 (D)	0	22,000	15,000	37,000
2043 (C)	0	22,000	13,000	35,000
2044 (C)	0	21,000	6,900	28,000
2045 (C)	0	24,000	2,500	27,000
2046 (AN)	0	55,000	4,100	59,000
2047 (C)	0	30,000	7,700	37,000
2048 (W)	0	98,000	9,500	110,000
2049 (W)	0	65,000	20,000	85,000
2050 (W)	0	59,000	24,000	83,000
2051 (W)	0	96,000	34,000	130,000
2052 (W)	0	47,000	38,000	84,000
2053 (AN)	0	46,000	35,000	81,000
2054 (D)	0	33,000	33,000	66,000
2055 (D)	0	32,000	25,000	57,000
2056 (AN)	0	51,000	24,000	75,000

Water Year (Type)		CVP Supplies	Local Supplies	Other (Groundwater Discharge)	Total
2057 (BN)		0	55,000	26,000	81,000
2058 (AN)		0	44,000	34,000	78,000
2059 (W)		0	64,000	33,000	97,000
2060 (D)		0	35,000	35,000	69,000
2061 (C)		0	31,000	25,000	56,000
2062 (D)		0	25,000	17,000	42,000
2063 (BN)		0	39,000	19,000	58,000
2064 (W)		0	43,000	23,000	66,000
2065 (BN)		0	29,000	24,000	53,000
2066 (D)		0	34,000	13,000	47,000
2067 (C)		0	24,000	4,900	29,000
2068 (C)		0	37,000	0	37,000
2069 (BN)		0	42,000	0	42,000
2070 (W)		0	61,000	2,100	63,000
2071 (BN)		0	32,000	6,600	38,000
2072 (W)		0	65,000	9,800	75,000
Average (2022-2072)		0	46,000	23,000	69,000
2022-2072	W	0	66,000	29,000	94,000
	AN	0	50,000	24,000	74,000
	BN	0	37,000	18,000	55,000
	D	0	33,000	26,000	59,000
	C	0	27,000	14,000	41,000

4.1.2.3 *Deep Percolation of Applied Water*

Estimated deep percolation of applied water (equal to infiltration of applied water in 23 CCR § 354.18(b)(2)) is summarized in **Figure 84** and **Table 80** by water use sector. Deep percolation of applied water is dominated by agricultural irrigation and varies between years, following the pattern of surface water diversions and deliveries to irrigated lands.

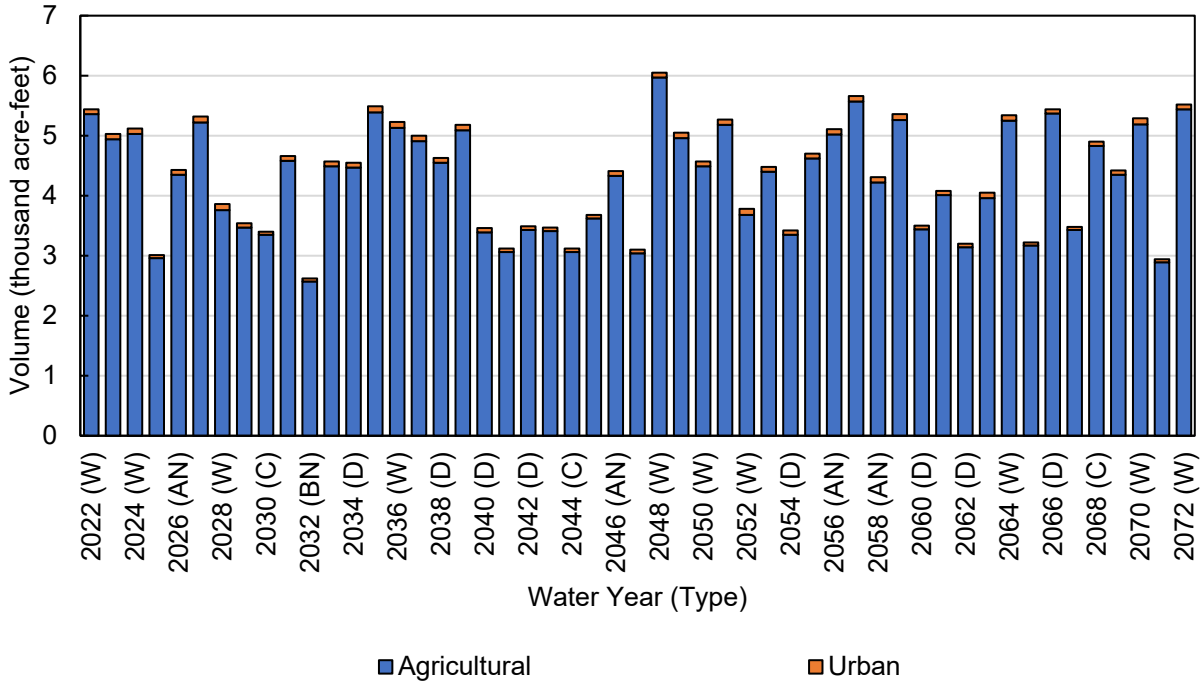


Figure 84. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Applied Water, by Water Use Sector

Table 80. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Applied Water, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	5,400	80	0	5,400
2023 (W)	4,900	90	0	5,000
2024 (W)	5,000	90	0	5,100
2025 (BN)	3,000	50	0	3,000
2026 (AN)	4,400	80	0	4,400
2027 (W)	5,200	100	0	5,300
2028 (W)	3,800	100	0	3,900
2029 (C)	3,500	70	0	3,500
2030 (C)	3,400	50	0	3,400
2031 (AN)	4,600	80	0	4,700
2032 (BN)	2,600	50	0	2,600
2033 (AN)	4,500	80	0	4,600
2034 (D)	4,500	80	0	4,600
2035 (W)	5,400	100	0	5,500
2036 (W)	5,100	100	0	5,200
2037 (W)	4,900	90	0	5,000
2038 (D)	4,600	80	0	4,600
2039 (W)	5,100	90	0	5,200
2040 (D)	3,400	70	0	3,500
2041 (C)	3,100	60	0	3,100
2042 (D)	3,400	60	0	3,500
2043 (C)	3,400	60	0	3,500
2044 (C)	3,100	60	0	3,100
2045 (C)	3,600	60	0	3,700
2046 (AN)	4,300	80	0	4,400
2047 (C)	3,000	60	0	3,100
2048 (W)	6,000	80	0	6,100
2049 (W)	5,000	90	0	5,100
2050 (W)	4,500	80	0	4,600
2051 (W)	5,200	90	0	5,300
2052 (W)	3,700	100	0	3,800
2053 (AN)	4,400	80	0	4,500
2054 (D)	3,400	70	0	3,400
2055 (D)	4,600	80	0	4,700
2056 (AN)	5,000	90	0	5,100
2057 (BN)	5,600	90	0	5,700

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		4,200	90	0	4,300
2059 (W)		5,300	100	0	5,400
2060 (D)		3,400	60	0	3,500
2061 (C)		4,000	70	0	4,100
2062 (D)		3,100	60	0	3,200
2063 (BN)		4,000	90	0	4,100
2064 (W)		5,300	90	0	5,300
2065 (BN)		3,200	50	0	3,200
2066 (D)		5,400	70	0	5,400
2067 (C)		3,400	50	0	3,500
2068 (C)		4,800	70	0	4,900
2069 (BN)		4,400	70	0	4,400
2070 (W)		5,200	100	0	5,300
2071 (BN)		2,900	50	0	2,900
2072 (W)		5,400	80	0	5,500
Average (2022-2072)		4,300	80	0	4,400
2022-2072	W	5,000	90	0	5,100
	AN	4,500	80	0	4,600
	BN	3,600	60	0	3,700
	D	4,000	70	0	4,000
	C	3,500	60	0	3,600

4.1.2.4 *Deep Percolation of Precipitation*

Estimated deep percolation of precipitation (equal to infiltration of precipitation in 23 CCR § 354.18(b)(2)) is provided in **Figure 85** and **Table 81** by water use sector. Deep percolation of precipitation to the GWS is highly variable from year to year due to variation in the timing and amount of precipitation, ranging from less than four (4) taf annually during some critical and dry years to about 10 taf in wet years.

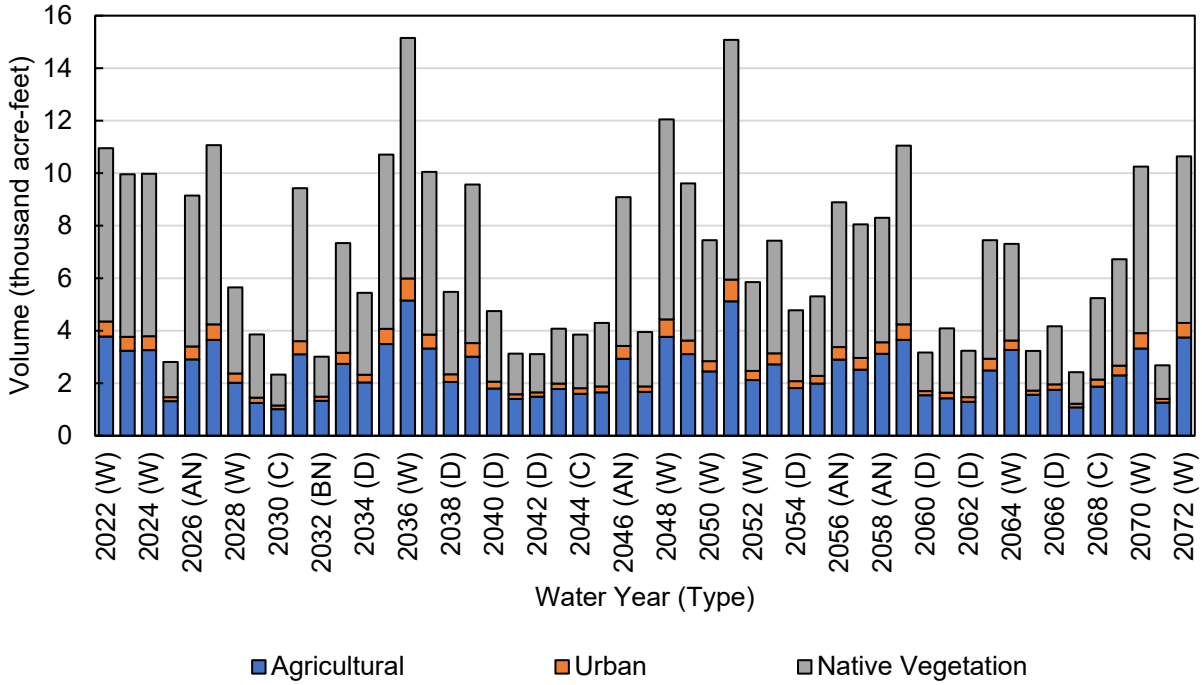


Figure 85. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Precipitation, by Water Use Sector

Table 81. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation of Precipitation, by Water Use Sector (acre-feet)

Water Year (Type)	Agricultural	Urban	Native Vegetation	Total
2022 (W)	3,800	570	6,600	11,000
2023 (W)	3,200	530	6,200	10,000
2024 (W)	3,300	530	6,200	10,000
2025 (BN)	1,300	150	1,300	2,800
2026 (AN)	2,900	490	5,800	9,200
2027 (W)	3,700	590	6,800	11,000
2028 (W)	2,000	350	3,300	5,700
2029 (C)	1,300	200	2,400	3,900
2030 (C)	1,000	140	1,200	2,300
2031 (AN)	3,100	500	5,800	9,400
2032 (BN)	1,300	160	1,500	3,000
2033 (AN)	2,700	420	4,200	7,300
2034 (D)	2,000	290	3,100	5,400
2035 (W)	3,500	580	6,600	11,000
2036 (W)	5,200	840	9,200	15,000
2037 (W)	3,300	530	6,200	10,000
2038 (D)	2,100	290	3,100	5,500
2039 (W)	3,000	520	6,000	9,600
2040 (D)	1,800	260	2,700	4,800
2041 (C)	1,400	180	1,600	3,100
2042 (D)	1,500	160	1,500	3,100
2043 (C)	1,800	210	2,100	4,100
2044 (C)	1,600	210	2,000	3,900
2045 (C)	1,700	230	2,400	4,300
2046 (AN)	2,900	490	5,700	9,100
2047 (C)	1,700	210	2,100	4,000
2048 (W)	3,800	660	7,600	12,000
2049 (W)	3,100	520	6,000	9,600
2050 (W)	2,500	390	4,600	7,500
2051 (W)	5,100	830	9,100	15,000
2052 (W)	2,100	350	3,400	5,900
2053 (AN)	2,700	420	4,300	7,400
2054 (D)	1,800	260	2,700	4,800
2055 (D)	2,000	290	3,000	5,300
2056 (AN)	2,900	480	5,500	8,900
2057 (BN)	2,500	440	5,100	8,100

Water Year (Type)		Agricultural	Urban	Native Vegetation	Total
2058 (AN)		3,100	440	4,700	8,300
2059 (W)		3,700	590	6,800	11,000
2060 (D)		1,500	160	1,500	3,200
2061 (C)		1,400	210	2,500	4,100
2062 (D)		1,300	180	1,800	3,200
2063 (BN)		2,500	440	4,500	7,500
2064 (W)		3,300	360	3,700	7,300
2065 (BN)		1,600	160	1,500	3,200
2066 (D)		1,800	210	2,200	4,200
2067 (C)		1,100	140	1,200	2,400
2068 (C)		1,900	270	3,100	5,200
2069 (BN)		2,300	370	4,100	6,700
2070 (W)		3,300	590	6,300	10,000
2071 (BN)		1,300	140	1,300	2,700
2072 (W)		3,700	560	6,300	11,000
Average (2022-2072)		2,400	370	4,000	6,800
2022-2072	W	3,400	550	6,100	10,000
	AN	2,900	460	5,100	8,500
	BN	1,800	270	2,800	4,900
	D	1,800	230	2,400	4,400
	C	1,500	200	2,100	3,700

4.1.2.5 *Infiltration of Surface Water*

Estimated infiltration of surface water (seepage) by water source is provided in **Figure 86**and **Table 82.** Seepage in the Antelope Subbasin comes from the small CVP contractors that divert water to irrigated land, as well as conveyance of supply delivered to water districts as well as conveyance of supply delivered to water districts. The total seepage from all canals and diversions is less than four (4) taf per year, on average. Runoff from upgradient small watersheds also contributes seepage to the Antelope Subbasin. The total seepage from rivers, streams, and small watersheds average about 1.2 taf per year.

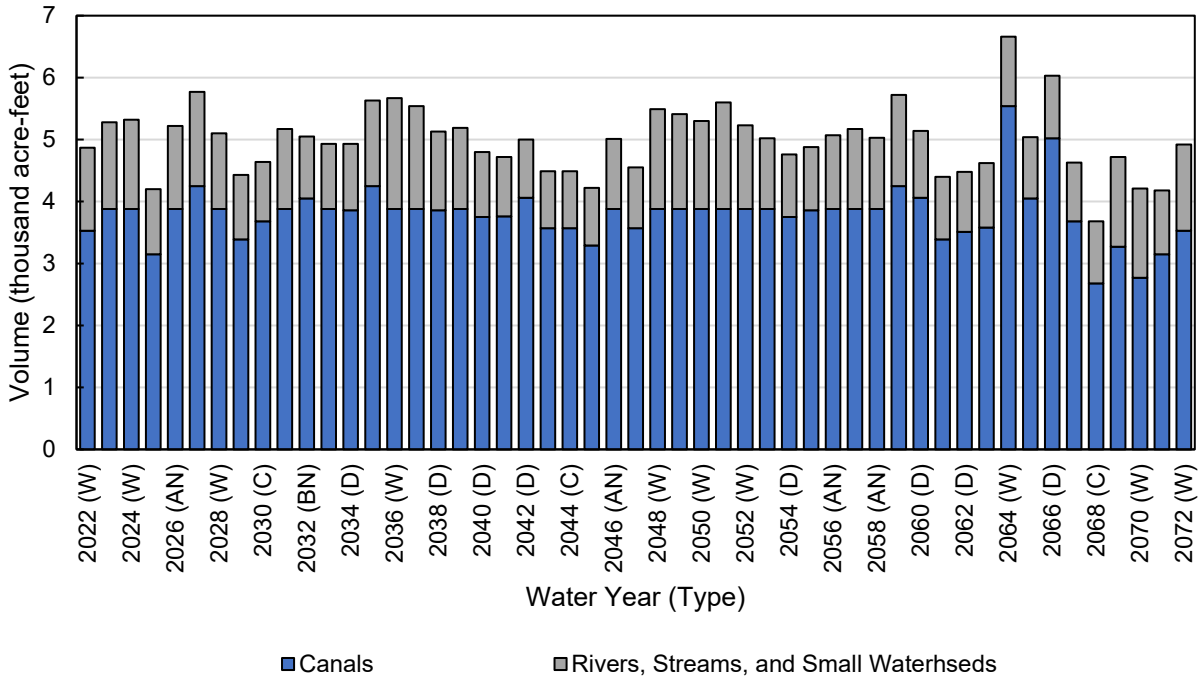


Figure 86. Antelope Subbasin Projected (Future Land Use with Climate Change) Infiltration of Surface Water, by Water Use Sector

Table 82. Antelope Subbasin Projected (Future Land Use with Climate Change) Infiltration of Surface Water, by Water Use Sector (acre-feet)

Water Year (Type)	Canals	Rivers, Streams, and Small Watersheds	Total
2022 (W)	3,500	1,300	4,900
2023 (W)	3,900	1,400	5,300
2024 (W)	3,900	1,400	5,300
2025 (BN)	3,200	1,100	4,200
2026 (AN)	3,900	1,300	5,200
2027 (W)	4,300	1,500	5,800
2028 (W)	3,900	1,200	5,100
2029 (C)	3,400	1,000	4,400
2030 (C)	3,700	960	4,600
2031 (AN)	3,900	1,300	5,200
2032 (BN)	4,100	1,000	5,100
2033 (AN)	3,900	1,100	4,900
2034 (D)	3,900	1,100	4,900
2035 (W)	4,300	1,400	5,600
2036 (W)	3,900	1,800	5,700
2037 (W)	3,900	1,700	5,500
2038 (D)	3,900	1,300	5,100
2039 (W)	3,900	1,300	5,200
2040 (D)	3,800	1,100	4,800
2041 (C)	3,800	960	4,700
2042 (D)	4,100	940	5,000
2043 (C)	3,600	920	4,500
2044 (C)	3,600	920	4,500
2045 (C)	3,300	930	4,200
2046 (AN)	3,900	1,100	5,000
2047 (C)	3,600	980	4,600
2048 (W)	3,900	1,600	5,500
2049 (W)	3,900	1,500	5,400
2050 (W)	3,900	1,400	5,300
2051 (W)	3,900	1,700	5,600
2052 (W)	3,900	1,400	5,200
2053 (AN)	3,900	1,100	5,000
2054 (D)	3,800	1,000	4,800
2055 (D)	3,900	1,000	4,900
2056 (AN)	3,900	1,200	5,100
2057 (BN)	3,900	1,300	5,200

Water Year (Type)		Canals	Rivers, Streams, and Small Watersheds	Total
2058 (AN)		3,900	1,200	5,000
2059 (W)		4,300	1,500	5,700
2060 (D)		4,100	1,100	5,100
2061 (C)		3,400	1,000	4,400
2062 (D)		3,500	970	4,500
2063 (BN)		3,600	1,000	4,600
2064 (W)		5,500	1,100	6,700
2065 (BN)		4,100	990	5,000
2066 (D)		5,000	1,000	6,000
2067 (C)		3,700	950	4,600
2068 (C)		2,700	1,000	3,700
2069 (BN)		3,300	1,500	4,700
2070 (W)		2,800	1,400	4,200
2071 (BN)		3,200	1,000	4,200
2072 (W)		3,500	1,400	4,900
Average (2022-2072)		3,800	1,200	5,000
2022-2072	W	3,900	1,500	5,400
	AN	3,900	1,200	5,100
	BN	3,600	1,100	4,700
	D	4,000	1,100	5,000
	C	3,500	970	4,400

4.1.3 Change in Root Zone Storage

Estimates of projected change in root zone storage are provided in **Figure 87** and **Table 83**. Inter-annual changes in storage within the SWS consist primarily of root zone soil moisture storage changes, are relatively small, and tend to average near zero over many years.

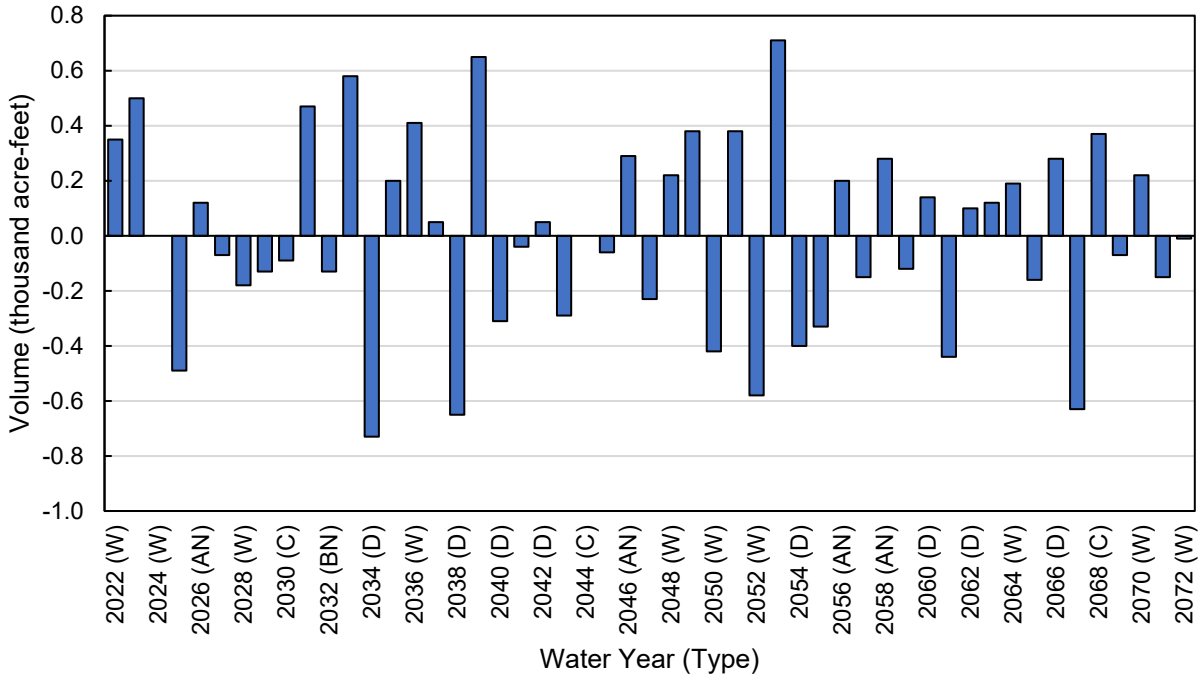


Figure 87. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Root Zone Storage

Table 83. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Root Zone Storage (acre-feet)

Water Year (Type)	Change in Root Zone Storage
2022 (W)	350
2023 (W)	500
2024 (W)	0
2025 (BN)	-490
2026 (AN)	120
2027 (W)	-70
2028 (W)	-180
2029 (C)	-130
2030 (C)	-90
2031 (AN)	470
2032 (BN)	-130
2033 (AN)	580
2034 (D)	-730
2035 (W)	200
2036 (W)	410
2037 (W)	50
2038 (D)	-650
2039 (W)	650
2040 (D)	-310
2041 (C)	-40
2042 (D)	50
2043 (C)	-290
2044 (C)	0
2045 (C)	-60
2046 (AN)	290
2047 (C)	-230
2048 (W)	220
2049 (W)	380
2050 (W)	-420
2051 (W)	380
2052 (W)	-580
2053 (AN)	710
2054 (D)	-400
2055 (D)	-330
2056 (AN)	200
2057 (BN)	-150

Water Year (Type)		Change in Root Zone Storage
2058 (AN)		280
2059 (W)		-120
2060 (D)		140
2061 (C)		-440
2062 (D)		100
2063 (BN)		120
2064 (W)		190
2065 (BN)		-160
2066 (D)		280
2067 (C)		-630
2068 (C)		370
2069 (BN)		-70
2070 (W)		220
2071 (BN)		-150
2072 (W)		-10
Average (2022-2072)		10
2022-2072	W	120
	AN	380
	BN	-150
	D	-210
	C	-150

4.1.4 Net Recharge from Surface Water System

Net recharge from the SWS is a useful metric that equates only the impacts of the SWS on recharge and extraction from the GWS, providing valuable insight to the combined effects of land surface processes on the underlying GWS. Net recharge from the SWS is calculated as the total groundwater recharge minus the total groundwater extraction. When calculated for the projected (future land use with climate change) water budget, average net recharge from the SWS represents the average surplus (when positive) or shortage (when negative) of recharge that has resulted from projected cropping, land use practices, and average hydrologic conditions, when comparing groundwater extractions with deep percolation and infiltration from the SWS to the GWS. Net recharge does not include groundwater discharges to surface water and is not a full accounting of all exchanges occurring between the SWS and GWS. Although net recharge is a useful water balance metric, groundwater sustainability is not defined by the balance of net recharge from the SWS. Other important factors must be considered in the complete assessment of groundwater sustainability, including but not limited to subsurface groundwater flows and groundwater discharge to surface water. The sustainable yield and management criteria for the Antelope Subbasin are described in later sections of the GSP.

Annual values for net recharge from the SWS over the projected (future land use with climate change) water budget period are presented below for the Antelope Subbasin. **Figure 88** and **Table 84** show the average net recharge from the SWS over 2022-2072 based on the projected (future land use with climate change) water budget results. Under future land use conditions, the average net recharge in the Antelope Subbasin was projected as approximately -2.2 taf per year between 2022-2072, indicating net outflows from the GWS to the SWS during the projected (future land use with climate change) water budget period. As illustrated on the cumulative net recharge plot in **Figure 88**, this results in a cumulative net negative recharge (i.e., net loss from the GWS to the SWS) of about 107 taf over the 51-year projected (future land use with climate change) water budget period. Although this means there is projected to be less recharge from the SWS to the GWS than extractions and discharges from the GWS to the SWS, this alone does not necessarily mean that groundwater storage will decrease or that the Subbasin groundwater system will not be sustainable. The complete Subbasin water budget, including the GWS water budget results, provide an indication of whether total groundwater inflows and outflows are in balance.

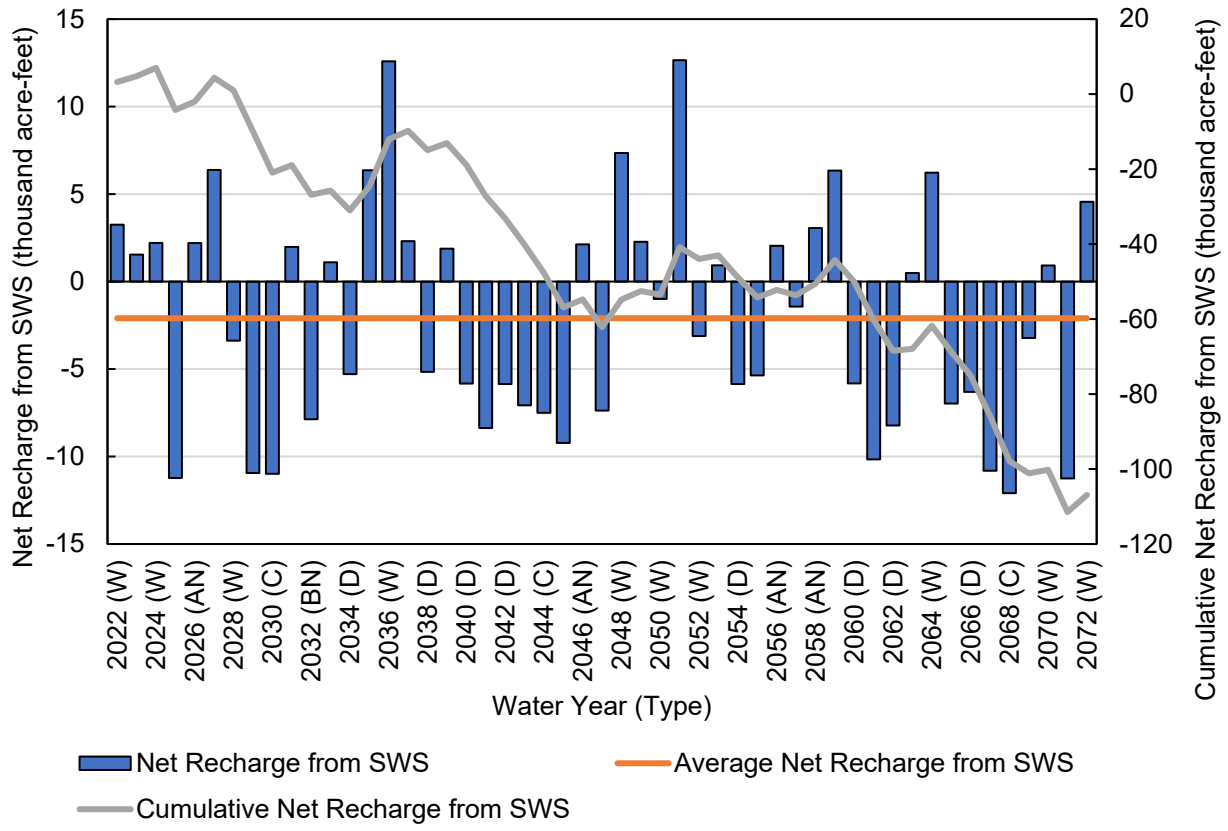


Figure 88. Antelope Subbasin Projected (Future Land Use with Climate Change) Net Recharge Overview, 2022-2072

Table 84. Antelope Subbasin Projected (Future Land Use with Climate Change) Water Budget: Average Net Recharge from SWS, by Water Year Type (acre-feet)

Year Type	Deep Perc. of Applied Water (a)	Deep Perc. of Precipitation (b)	Infil. of Surface Water (c)	Groundwater Extraction/ Uptake (d)	Net Recharge from SWS (a+b+c-d)
W	5,100	10,100	5,400	17,000	4,000
AN	4,600	8,500	5,100	16,000	1,900
BN	3,700	4,900	4,700	19,000	-5,900
D	4,000	4,400	5,000	19,000	-5,900
C	3,600	3,700	4,400	21,000	-9,400
Annual Average (2022-2072)	4,400	6,800	5,000	18,000	-2,200

4.2 Groundwater System Water Budget Results

Projected (Future Land Use with climate change) water budget results for different components of the GWS are presented in the sections below. Inflows and outflows from the GWS that occur through exchanges with the SWS are discussed in the SWS water budget results, although these components are also noted in the sections below relating to the GWS water budget. In contrast to the SWS water budget, many of the GWS water budget components change in flow direction over time representing inflows during some periods and outflows during other periods, depending on Subbasin conditions. The GWS water budget results are presented with net inflows indicated by positive values and net outflows as negative values.

4.2.1 Lateral Subsurface Groundwater Flows

Subsurface groundwater flows to and from the Antelope Subbasin are projected to occur between the Bend Subbasin to the north, the Red Bluff Subbasin to the west, and the Los Molinos Subbasin to the south. Additional subsurface groundwater inflows are projected to occur from the upland foothill (small watershed) areas adjoining the Antelope Subbasin to the east.

4.2.1.1 *Lateral Subsurface Flows to/from Adjacent Subbasins*

Projected lateral subsurface flows occurring from and to adjacent subbasin are summarized in **Figure 89** and **Table 85**. The total projected net subsurface flows to and from all adjacent subbasins averages about 28 taf per year occurring as inflow to the Antelope Subbasin. The largest projected subsurface flows occur across the boundary with the Bend Subbasin with somewhat less subsurface flow occurring across the boundaries with the Los Molinos and Red Bluff Subbasins although these flows are still considerable.

Projected subsurface flows with the Bend Subbasin average about 22 taf occurring as inflows to the Antelope Subbasin. This makes up a majority of the projected subsurface inflows to the Antelope Subbasin. Annual subsurface flows from the Los Molinos Subbasin and the Red Bluff Subbasin to the Antelope Subbasin are projected to average about 1.9 and 4.4 taf, respectively. The projected magnitudes of the subsurface inflows from the Bend Subbasin are relatively consistent from year to year; however, the inflows/outflows with the Red Bluff and Los Molinos Subbasins are somewhat variable. Projected subsurface flows across the boundary

with the Los Molinos and Red Bluff Subbasins generally occur as inflows with some volumes of outflows occurring periodically.

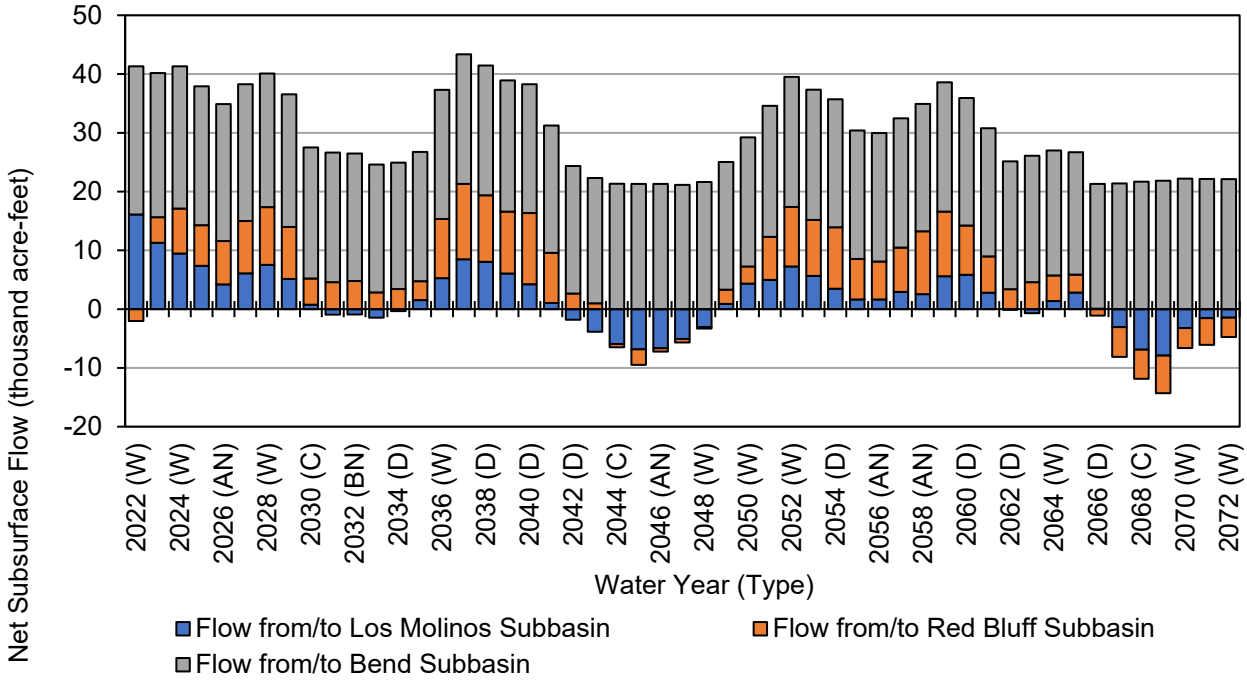


Figure 89. Antelope Subbasin Projected (Future Land Use with Climate Change) Lateral Subsurface Groundwater Flows to/from Adjacent Subbasins

Table 85. Antelope Subbasin Projected (Future Land Use with Climate Change) Lateral Subsurface Groundwater Flows Between Adjacent Subbasins (net flows as acre-feet)

Water Year (Type)	Red Bluff	Los Molinos	Bend	Total
2022 (W)	-2,000	16,000	25,000	39,000
2023 (W)	4,400	11,000	25,000	40,000
2024 (W)	7,600	9,500	24,000	41,000
2025 (BN)	6,900	7,400	24,000	38,000
2026 (AN)	7,400	4,200	23,000	35,000
2027 (W)	8,900	6,100	23,000	38,000
2028 (W)	9,800	7,500	23,000	40,000
2029 (C)	8,800	5,100	23,000	37,000
2030 (C)	4,500	760	22,000	28,000
2031 (AN)	4,600	-930	22,000	26,000
2032 (BN)	4,800	-900	22,000	26,000
2033 (AN)	2,900	-1,500	22,000	23,000
2034 (D)	3,400	-330	21,000	25,000
2035 (W)	3,200	1,600	22,000	27,000
2036 (W)	10,000	5,300	22,000	37,000
2037 (W)	13,000	8,500	22,000	43,000
2038 (D)	11,000	8,000	22,000	41,000
2039 (W)	11,000	6,100	22,000	39,000
2040 (D)	12,000	4,200	22,000	38,000
2041 (C)	8,500	1,000	22,000	31,000
2042 (D)	2,700	-1,800	22,000	23,000
2043 (C)	1,000	-3,800	21,000	18,000
2044 (C)	-550	-6,000	21,000	15,000
2045 (C)	-2,600	-6,900	21,000	12,000
2046 (AN)	-590	-6,600	21,000	14,000
2047 (C)	-620	-5,100	21,000	15,000
2048 (W)	-250	-3,100	22,000	18,000
2049 (W)	2,400	890	22,000	25,000
2050 (W)	2,900	4,400	22,000	29,000
2051 (W)	7,300	5,000	22,000	35,000
2052 (W)	10,000	7,200	22,000	40,000
2053 (AN)	9,500	5,700	22,000	37,000
2054 (D)	10,000	3,500	22,000	36,000
2055 (D)	6,900	1,600	22,000	30,000
2056 (AN)	6,500	1,600	22,000	30,000
2057 (BN)	7,500	2,900	22,000	32,000
2058 (AN)	11,000	2,500	22,000	35,000
2059 (W)	11,000	5,600	22,000	39,000

Water Year (Type)		Red Bluff	Los Molinos	Bend	Total
2060 (D)		8,400	5,800	22,000	36,000
2061 (C)		6,200	2,800	22,000	31,000
2062 (D)		3,400	-88	22,000	25,000
2063 (BN)		4,600	-690	21,000	25,000
2064 (W)		4,400	1,400	21,000	27,000
2065 (BN)		3,000	2,800	21,000	27,000
2066 (D)		-1,100	58	21,000	20,000
2067 (C)		-5,100	-3,100	21,000	13,000
2068 (C)		-5,000	-6,900	22,000	9,800
2069 (BN)		-6,400	-7,900	22,000	7,500
2070 (W)		-3,400	-3,200	22,000	16,000
2071 (BN)		-4,500	-1,500	22,000	16,000
2072 (W)		-3,300	-1,500	22,000	17,000
Average (2022-2072)		4,400	1,900	22,000	4,400
2022-2072	W	5,400	4,900	23,000	5,400
	AN	5,800	720	22,000	5,800
	BN	2,300	300	22,000	2,300
	D	6,400	2,300	22,000	6,400
	C	1,500	-2,200	22,000	1,500

Note: positive values represent net inflows to Antelope Subbasin, negative values represent net outflows from Antelope Subbasin.

4.2.1.2 *Lateral Subsurface Flows from Upland Areas (Small Watersheds)*

Projected lateral subsurface inflows occurring from upland or foothill areas (small watersheds outside of the Central Valley Floor) to the east of the Antelope Subbasin are summarized in **Figure 90** and **Table 86**. This component does not include surface water inflows to the Antelope Subbasin which are discussed as part of the SWS water budget. The average projected subsurface inflow from the upland areas is about 0.270 taf per year and varies only very minimally from year to year. The volume of subsurface inflows from upland areas is small relative to the net subsurface inflows occurring between adjacent subbasins.

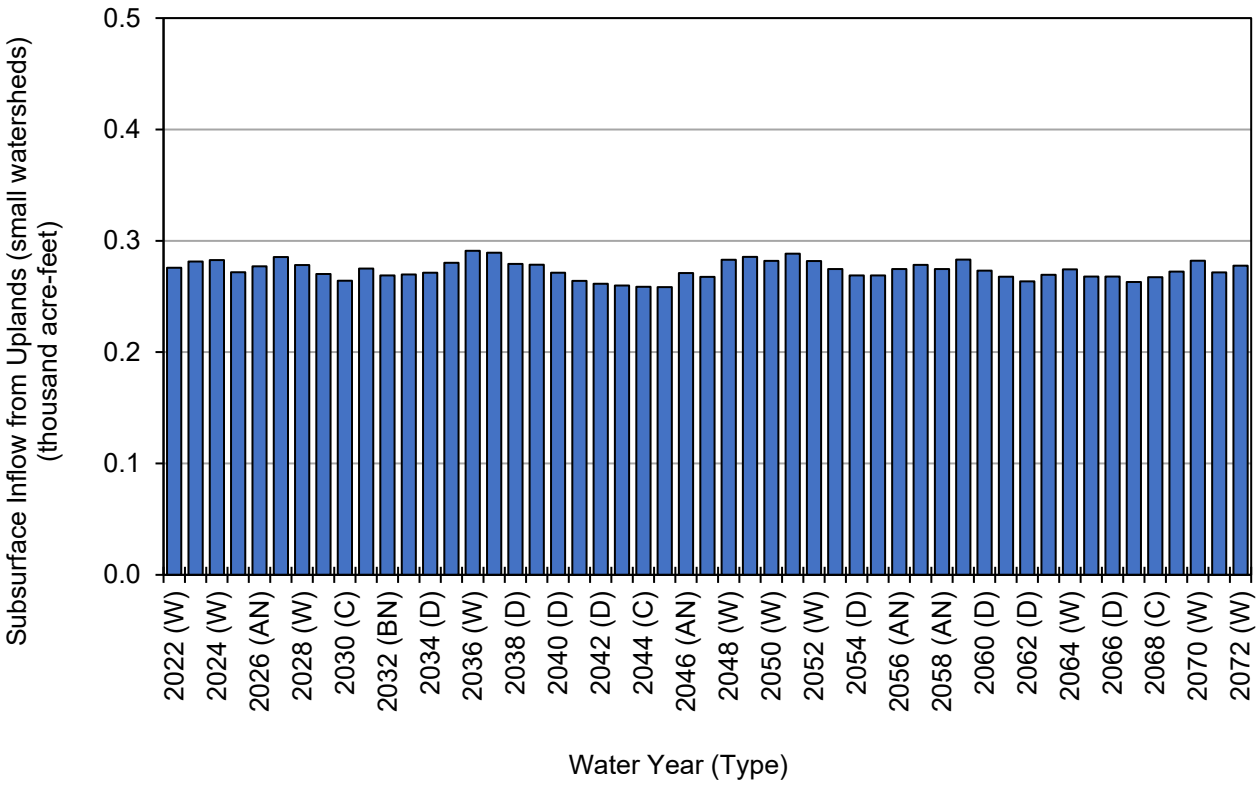


Figure 90. Antelope Subbasin Projected (Future Land Use with Climate Change) Subsurface Groundwater Inflows from Upland Areas

Table 86. Antelope Subbasin Projected (Future Land Use with Climate Change) Subsurface Groundwater Inflows from Adjacent Uplands (small watersheds) (acre-feet)

Water Year (Type)	Subsurface Inflow from Uplands
2022 (W)	280
2023 (W)	280
2024 (W)	280
2025 (BN)	270
2026 (AN)	280
2027 (W)	290
2028 (W)	280
2029 (C)	270
2030 (C)	260
2031 (AN)	280
2032 (BN)	270
2033 (AN)	270
2034 (D)	270
2035 (W)	280
2036 (W)	290
2037 (W)	290
2038 (D)	280
2039 (W)	280
2040 (D)	270
2041 (C)	260
2042 (D)	260
2043 (C)	260
2044 (C)	260
2045 (C)	260
2046 (AN)	270
2047 (C)	270
2048 (W)	280
2049 (W)	290
2050 (W)	280
2051 (W)	290
2052 (W)	280
2053 (AN)	270
2054 (D)	270
2055 (D)	270
2056 (AN)	270
2057 (BN)	280
2058 (AN)	270
2059 (W)	280

Water Year (Type)		Subsurface Inflow from Uplands
2060 (D)		270
2061 (C)		270
2062 (D)		260
2063 (BN)		270
2064 (W)		270
2065 (BN)		270
2066 (D)		270
2067 (C)		260
2068 (C)		270
2069 (BN)		270
2070 (W)		280
2071 (BN)		270
2072 (W)		280
Average (2022-2072)		270
2022-2072	W	280
	AN	270
	BN	270
	D	270
	C	260

4.2.2 Deep Percolation From the SWS

Deep percolation from the SWS includes infiltration of water below the root zone (deep percolation) from precipitation and applied water. These two water budget components are summarized in the SWS water budget as outflows to the SWS and are presented as aggregated deep percolation inflows to the GWS in **Figure 91** and **Table 87**. The average annual deep percolation from the SWS over the projected water budget period is approximately 11 taf per year. Greater volumes of deep percolation occur during wetter years when infiltration of precipitation is higher.

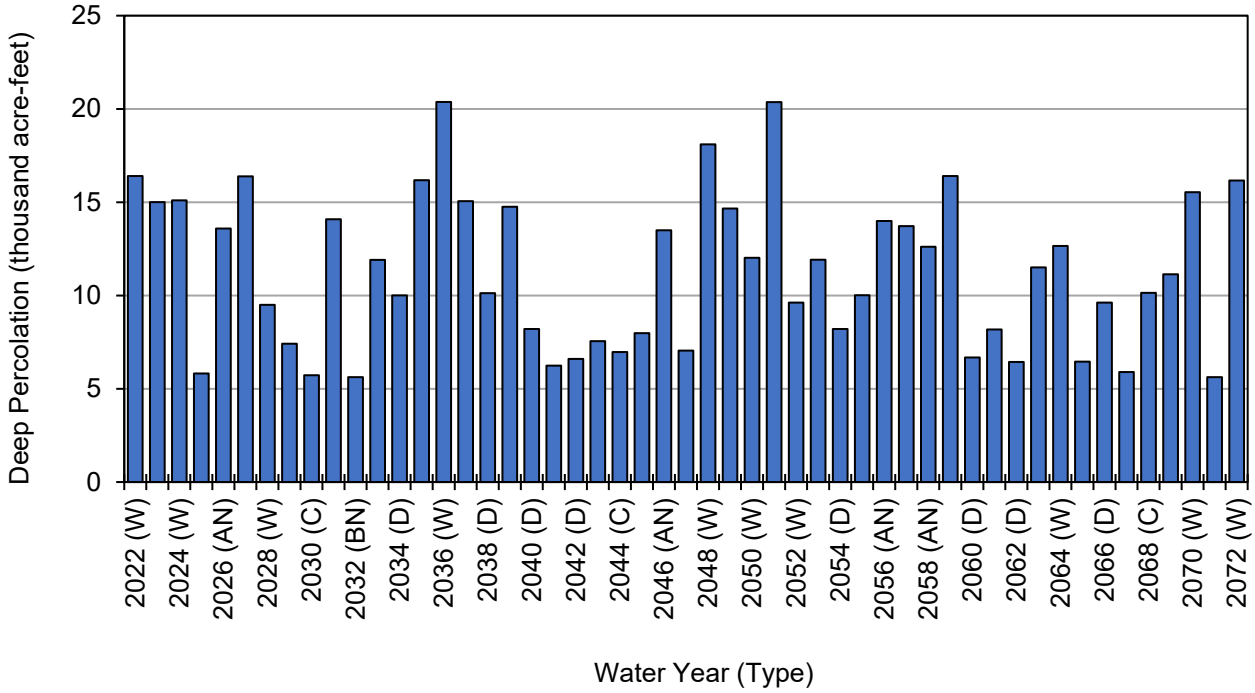


Figure 91. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation

Table 87. Antelope Subbasin Projected (Future Land Use with Climate Change) Deep Percolation from the SWS (acre-feet)

Water Year (Type)	Deep Percolation from the SWS
2022 (W)	16,000
2023 (W)	15,000
2024 (W)	15,000
2025 (BN)	5,800
2026 (AN)	14,000
2027 (W)	16,000
2028 (W)	9,500
2029 (C)	7,400
2030 (C)	5,700
2031 (AN)	14,000
2032 (BN)	5,600
2033 (AN)	12,000
2034 (D)	10,000
2035 (W)	16,000
2036 (W)	20,000
2037 (W)	15,000
2038 (D)	10,000
2039 (W)	15,000
2040 (D)	8,200
2041 (C)	6,200
2042 (D)	6,600
2043 (C)	7,600
2044 (C)	7,000
2045 (C)	8,000
2046 (AN)	13,000
2047 (C)	7,000
2048 (W)	18,000
2049 (W)	15,000
2050 (W)	12,000
2051 (W)	20,000
2052 (W)	9,600
2053 (AN)	12,000
2054 (D)	8,200
2055 (D)	10,000
2056 (AN)	14,000
2057 (BN)	14,000
2058 (AN)	13,000
2059 (W)	16,000

Water Year (Type)		Deep Percolation from the SWS
2060 (D)		6,700
2061 (C)		8,200
2062 (D)		6,400
2063 (BN)		12,000
2064 (W)		13,000
2065 (BN)		6,500
2066 (D)		9,600
2067 (C)		5,900
2068 (C)		10,000
2069 (BN)		11,000
2070 (W)		16,000
2071 (BN)		5,600
2072 (W)		16,000
Average (2022-2072)		11,000
2022-2072	W	15,000
	AN	13,000
	BN	8,600
	D	8,400
	C	7,300

4.2.3 Net Stream Seepage/Groundwater Discharge to Surface Water

The flow of water between the GWS and SWS through seepage of water from streams and canals and groundwater discharging into streams is discussed as part of the SWS water budget. These components are combined for presentation in the GWS water budget as a net volume of stream seepage (**Figure 92** and **Table 88**). Positive total net seepage values represent a net inflow of water from the SWS to the GWS via stream and canal seepage indicating that the overall volume of stream seepage is greater than the volume of any groundwater discharging into surface waterways. Negative net seepage values represent a net outflow of groundwater from the GWS to the SWS through groundwater discharge to surface water. When net seepage is negative, it means that more groundwater is discharging into the surface waterways than is seeping from surface waterways into the GWS.

In the Antelope Subbasin, the projected annual net seepage values are always highly negative with an average annual net stream seepage value of -22 taf per year indicating that groundwater discharge is providing considerable flow to the surface waterways. The annual net stream seepage values tend to be more negative in dry years and less negative in wet years corresponding with more net groundwater discharge to surface water in drier years and less groundwater discharge in wetter years.

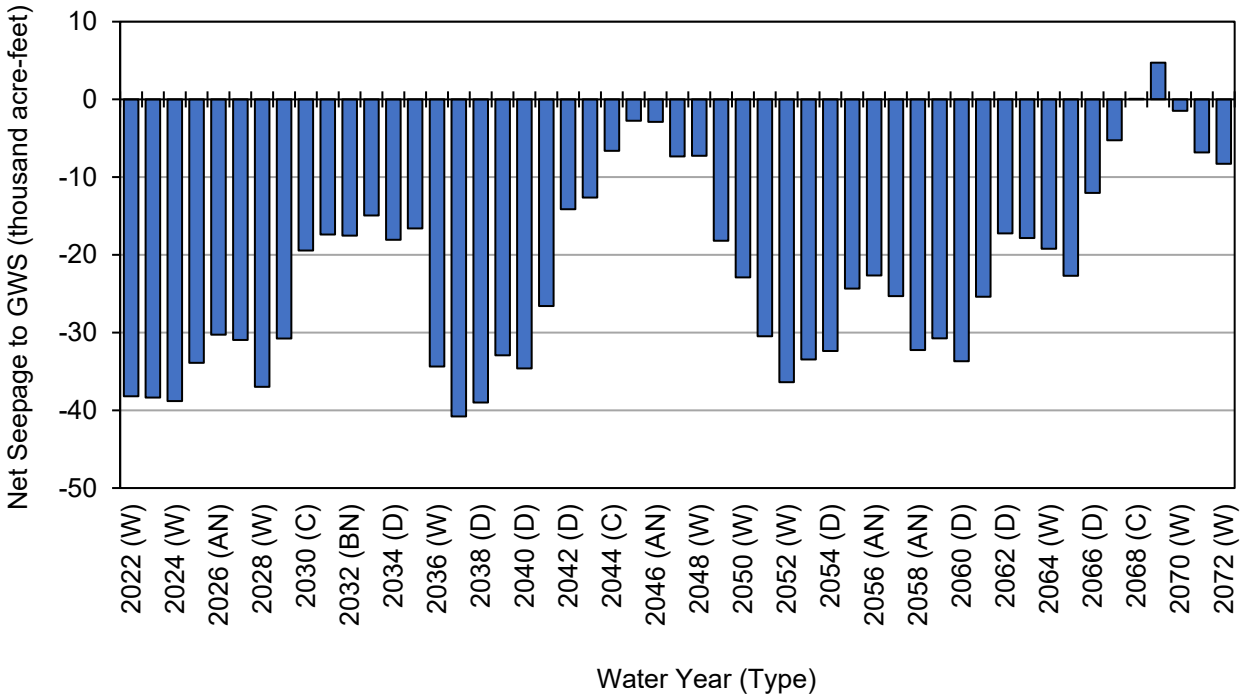


Figure 92. Antelope Subbasin Projected (Future Land Use with Climate Change) Net Stream Seepage to GWS/Discharge to Surface Water

Table 88. Antelope Subbasin Projected (Future Land Use with Climate Change) Net Stream Seepage (net flows as acre-feet)

Water Year (Type)	Total Net Seepage from Surface Waterways and Canals
2022 (W)	-38,000
2023 (W)	-38,000
2024 (W)	-39,000
2025 (BN)	-34,000
2026 (AN)	-30,000
2027 (W)	-31,000
2028 (W)	-37,000
2029 (C)	-31,000
2030 (C)	-19,000
2031 (AN)	-17,000
2032 (BN)	-18,000
2033 (AN)	-15,000
2034 (D)	-18,000
2035 (W)	-17,000
2036 (W)	-34,000
2037 (W)	-41,000
2038 (D)	-39,000
2039 (W)	-33,000
2040 (D)	-35,000
2041 (C)	-27,000
2042 (D)	-14,000
2043 (C)	-13,000
2044 (C)	-6,600
2045 (C)	-2,800
2046 (AN)	-2,900
2047 (C)	-7,300
2048 (W)	-7,200
2049 (W)	-18,000
2050 (W)	-23,000
2051 (W)	-30,000
2052 (W)	-36,000
2053 (AN)	-33,000
2054 (D)	-32,000
2055 (D)	-24,000
2056 (AN)	-23,000
2057 (BN)	-25,000
2058 (AN)	-32,000
2059 (W)	-31,000

Water Year (Type)		Total Net Seepage from Surface Waterways and Canals
2060 (D)		-34,000
2061 (C)		-25,000
2062 (D)		-17,000
2063 (BN)		-18,000
2064 (W)		-19,000
2065 (BN)		-23,000
2066 (D)		-12,000
2067 (C)		-5,300
2068 (C)		81
2069 (BN)		4,700
2070 (W)		-1,500
2071 (BN)		-6,800
2072 (W)		-8,300
Average (2022-2072)		-22,000
2022-2072	W	-27,000
	AN	-22,000
	BN	-17,000
	D	-25,000
	C	-14,000

Note: negative values indicate net groundwater discharge to surface water

4.2.4 Groundwater Extraction

Groundwater extractions are exchanges that occur between the GWS and the SWS. Groundwater extraction from the GWS occurs through groundwater pumping to meet water demands for urban and agricultural needs and also through groundwater (root water) uptake by plants directly from shallow groundwater during times and at locations of sufficiently shallow groundwater conditions. Projected groundwater extractions are summarized in **Figure 93** and **Table 89** and also presented and discussed in the SWS water budget sections. Total groundwater extractions over the projected water budget period average about -18 taf per year. Overall, groundwater pumping represents a majority of the groundwater extractions than groundwater uptake. Groundwater pumping averaged about -18 taf over the projected period and groundwater uptake averaged about -0.810 taf. In wetter periods, groundwater uptake increases and groundwater pumping decreases. Accordingly, during drier periods groundwater pumping increases and water uptake by plants from shallow groundwater decreases in response to the higher water demands for irrigation and other uses and the greater depths to groundwater that also tend to occur during dry periods.

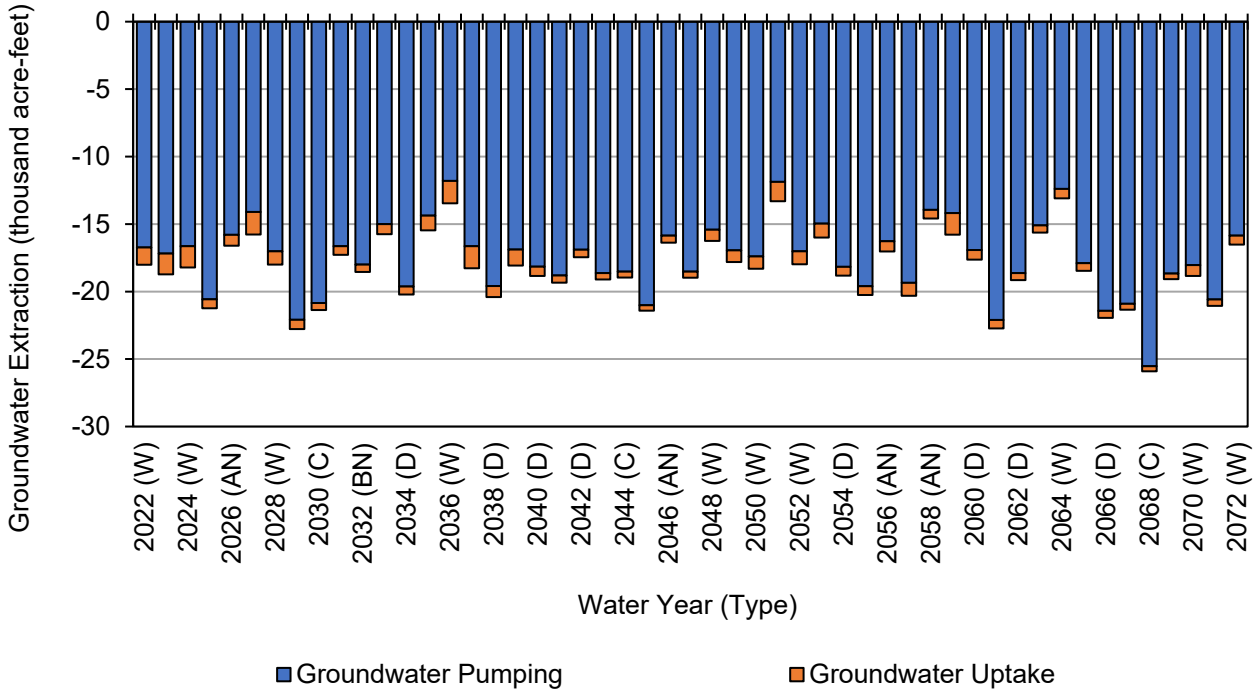


Figure 93. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Extractions

Table 89. Antelope Subbasin Projected (Future Land Use with Climate Change) Groundwater Extractions (acre-feet)

Water Year (Type)	Groundwater Pumping	Groundwater Uptake	Total
2022 (W)	-17,000	-1,300	-18,000
2023 (W)	-17,000	-1,500	-19,000
2024 (W)	-17,000	-1,600	-18,000
2025 (BN)	-21,000	-670	-21,000
2026 (AN)	-16,000	-810	-17,000
2027 (W)	-14,000	-1,700	-16,000
2028 (W)	-17,000	-980	-18,000
2029 (C)	-22,000	-680	-23,000
2030 (C)	-21,000	-520	-21,000
2031 (AN)	-17,000	-650	-17,000
2032 (BN)	-18,000	-550	-19,000
2033 (AN)	-15,000	-750	-16,000
2034 (D)	-20,000	-590	-20,000
2035 (W)	-14,000	-1,100	-15,000
2036 (W)	-12,000	-1,700	-13,000
2037 (W)	-17,000	-1,600	-18,000
2038 (D)	-20,000	-820	-20,000
2039 (W)	-17,000	-1,200	-18,000
2040 (D)	-18,000	-680	-19,000
2041 (C)	-19,000	-530	-19,000
2042 (D)	-17,000	-560	-17,000
2043 (C)	-19,000	-480	-19,000
2044 (C)	-19,000	-440	-19,000
2045 (C)	-21,000	-400	-21,000
2046 (AN)	-16,000	-530	-16,000
2047 (C)	-19,000	-450	-19,000
2048 (W)	-15,000	-830	-16,000
2049 (W)	-17,000	-860	-18,000
2050 (W)	-17,000	-920	-18,000
2051 (W)	-12,000	-1,400	-13,000
2052 (W)	-17,000	-960	-18,000
2053 (AN)	-15,000	-1,000	-16,000
2054 (D)	-18,000	-650	-19,000
2055 (D)	-20,000	-650	-20,000
2056 (AN)	-16,000	-750	-17,000
2057 (BN)	-19,000	-960	-20,000
2058 (AN)	-14,000	-640	-15,000
2059 (W)	-14,000	-1,600	-16,000

Water Year (Type)		Groundwater Pumping	Groundwater Uptake	Total
2060 (D)		-17,000	-710	-18,000
2061 (C)		-22,000	-640	-23,000
2062 (D)		-19,000	-510	-19,000
2063 (BN)		-15,000	-530	-16,000
2064 (W)		-12,000	-700	-13,000
2065 (BN)		-18,000	-570	-18,000
2066 (D)		-21,000	-520	-22,000
2067 (C)		-21,000	-440	-21,000
2068 (C)		-26,000	-370	-26,000
2069 (BN)		-19,000	-420	-19,000
2070 (W)		-18,000	-800	-19,000
2071 (BN)		-21,000	-470	-21,000
2072 (W)		-16,000	-660	-17,000
Average (2022-2072)		-18,000	-810	-18,000
2022-2072	W	-16,000	-1,200	-17,000
	AN	-15,000	-740	-16,000
	BN	-19,000	-600	-19,000
	D	-19,000	-630	-19,000
	C	-21,000	-500	-21,000

4.2.5 Vertical Subsurface Flows within the Groundwater System

Vertical subsurface flows within the GWS occur between the Upper and Lower Aquifers and represent an internal flow of water within the GWS. These exchanges between the principal aquifers do not directly affect the total volume of groundwater in storage but do highlight the net vertical movement of water within the GWS. Projected vertical flows between the Upper Aquifer and Lower Aquifer are summarized in **Figure 94** and **Table 90** and show consistent net overall upward vertical flow from the Lower Aquifer to the Upper Aquifer. On average, vertical flows from the Lower Aquifer to the Upper Aquifer total about 22 taf per year over the projected water budget period. There is considerable year-to-year variability in the magnitude of these flows, which appear to correlate with water year conditions, although they are always in an upward direction. The magnitude of upward flows is generally greatest during drier years and decreases during wet periods. The net upward vertical flow between the two principal aquifers in the Subbasin is consistent with the large groundwater outflows (e.g., groundwater extractions, groundwater discharge to SWS) that occur from the Upper Aquifer in the Subbasin that result in upward movement of groundwater from the Lower Aquifer.

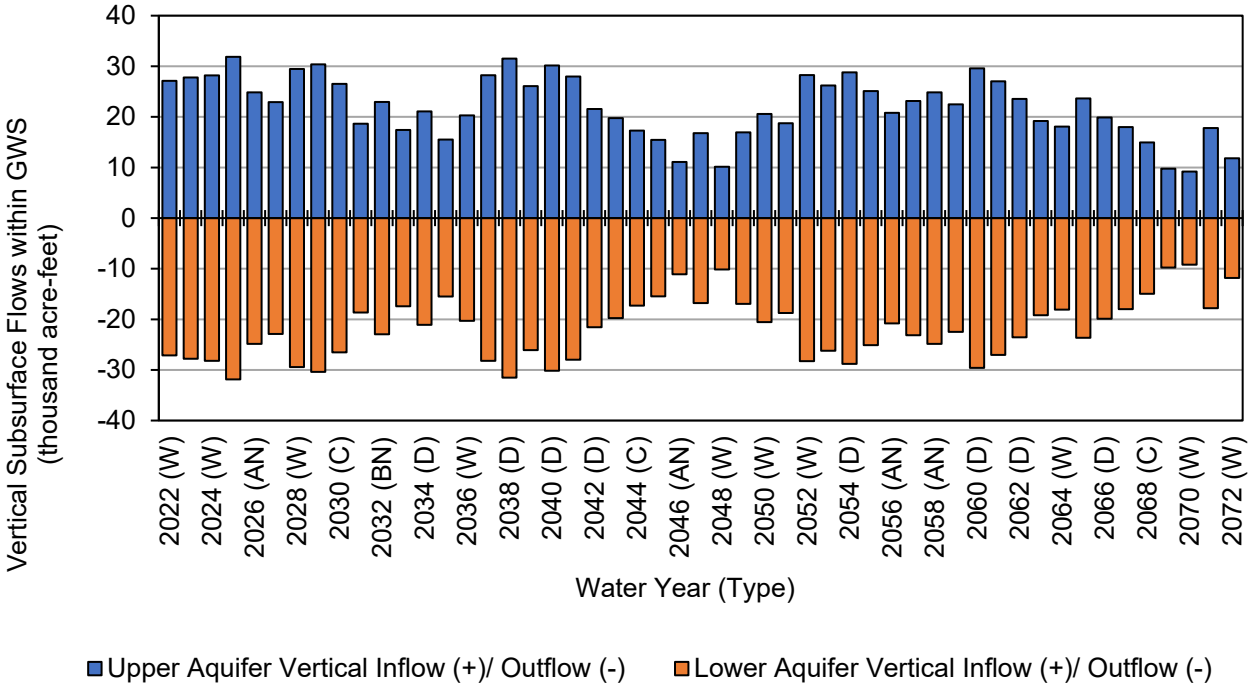


Figure 94. Antelope Subbasin Projected (Future Land Use with Climate Change) Vertical Subsurface Flow within the GWS

Table 90. Antelope Subbasin Projected (Future Land Use with Climate Change) Vertical Subsurface Flows within the GWS (acre-feet)

Water Year (Type)	Upper Aquifer to (-) / from (+) Lower Aquifer
2022 (W)	27,100
2023 (W)	27,800
2024 (W)	28,200
2025 (BN)	31,900
2026 (AN)	24,900
2027 (W)	22,900
2028 (W)	29,400
2029 (C)	30,400
2030 (C)	26,500
2031 (AN)	18,700
2032 (BN)	22,900
2033 (AN)	17,400
2034 (D)	21,100
2035 (W)	15,500
2036 (W)	20,300
2037 (W)	28,200
2038 (D)	31,500
2039 (W)	26,100
2040 (D)	30,200
2041 (C)	28,000
2042 (D)	21,600
2043 (C)	19,800
2044 (C)	17,300
2045 (C)	15,400
2046 (AN)	11,100
2047 (C)	16,800
2048 (W)	10,200
2049 (W)	16,900
2050 (W)	20,600
2051 (W)	18,700
2052 (W)	28,300
2053 (AN)	26,200
2054 (D)	28,800
2055 (D)	25,100
2056 (AN)	20,800
2057 (BN)	23,100
2058 (AN)	24,900
2059 (W)	22,500

Water Year (Type)		Upper Aquifer to (-) / from (+) Lower Aquifer
2060 (D)		29,600
2061 (C)		27,000
2062 (D)		23,500
2063 (BN)		19,200
2064 (W)		18,100
2065 (BN)		23,600
2066 (D)		19,900
2067 (C)		18,000
2068 (C)		15,000
2069 (BN)		9,800
2070 (W)		9,200
2071 (BN)		17,800
2072 (W)		11,800
Average (2022-2072)		22,000
2022-2072	W	21,000
	AN	21,000
	BN	21,000
	D	26,000
	C	21,000

4.2.6 Change in Groundwater Storage

Projected change in groundwater storage values for the Antelope Subbasin are summarized in **Figure 95** and **Figure 96,** and **Table 90**. Values for total change in storage in the GWS and cumulative change in storage over the projected water budget period are presented in conjunction with the volumes of groundwater storage change within each of the two principal aquifers present in the Subbasin. Over the projected period, the average total annual change in groundwater storage is about -0.390 taf per year, representing a decrease in groundwater storage. The corresponding cumulative total change in storage over the projected period is about -20 taf. The annual change in storage numbers generally reflect the effects of the water year type with increase in storage occurring during wetter years and decreases in storage occurring during dry years. Within the GWS, the magnitudes of average annual changes in storage are generally the same in the Lower Aquifer (average -0.200 taf per year) compared to the Upper Aquifer (average -0.200 taf per year).

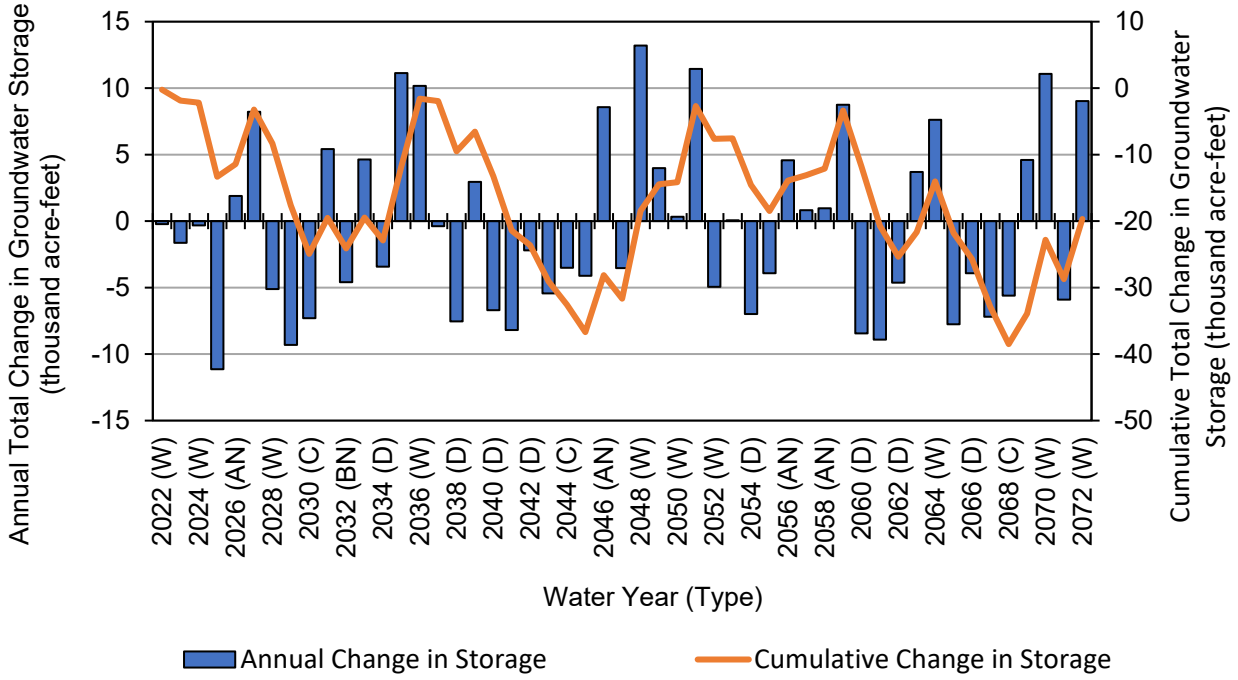


Figure 95. Antelope Subbasin Projected (Future Land Use with Climate Change) Total Change in Storage within the GWS

Table 90. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Groundwater Storage (acre-feet)

Water Year (Type)	Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2022 (W)	-180	-49	-230	-230
2023 (W)	-1,300	-370	-1,600	-1,900
2024 (W)	-280	-42	-320	-2,200
2025 (BN)	-6,800	-4,400	-11,000	-13,000
2026 (AN)	1,400	540	1,900	-11,000
2027 (W)	5,000	3,200	8,200	-3,200
2028 (W)	-3,300	-1,800	-5,100	-8,300
2029 (C)	-5,700	-3,700	-9,300	-18,000
2030 (C)	-3,800	-3,500	-7,300	-25,000
2031 (AN)	3,400	2,000	5,400	-20,000
2032 (BN)	-2,700	-1,900	-4,600	-24,000
2033 (AN)	3,000	1,600	4,600	-19,000
2034 (D)	-2,100	-1,300	-3,400	-23,000
2035 (W)	6,900	4,300	11,000	-12,000
2036 (W)	5,900	4,300	10,000	-1,600
2037 (W)	-630	250	-380	-2,000
2038 (D)	-4,800	-2,800	-7,500	-9,500
2039 (W)	2,000	980	2,900	-6,500
2040 (D)	-4,100	-2,600	-6,700	-13,000
2041 (C)	-4,800	-3,300	-8,200	-21,000
2042 (D)	-780	-1,400	-2,200	-24,000
2043 (C)	-3,300	-2,100	-5,400	-29,000
2044 (C)	-1,900	-1,600	-3,500	-33,000
2045 (C)	-2,400	-1,700	-4,100	-37,000
2046 (AN)	5,600	3,000	8,600	-28,000
2047 (C)	-2,200	-1,300	-3,500	-32,000
2048 (W)	8,100	5,100	13,000	-18,000
2049 (W)	2,200	1,800	4,000	-14,000
2050 (W)	-140	480	330	-14,000
2051 (W)	6,800	4,600	11,000	-2,700
2052 (W)	-3,500	-1,400	-4,900	-7,600
2053 (AN)	51	9	60	-7,600
2054 (D)	-4,300	-2,700	-7,000	-15,000
2055 (D)	-2,300	-1,600	-3,900	-18,000
2056 (AN)	2,900	1,700	4,600	-14,000
2057 (BN)	420	410	830	-13,000
2058 (AN)	580	380	970	-12,000

Water Year (Type)		Upper Aquifer	Lower Aquifer	Total Annual Change	Total Cumulative Change
2059 (W)		5,200	3,500	8,700	-3,400
2060 (D)		-5,100	-3,300	-8,400	-12,000
2061 (C)		-5,500	-3,400	-8,900	-21,000
2062 (D)		-2,400	-2,200	-4,600	-25,000
2063 (BN)		2,500	1,200	3,700	-22,000
2064 (W)		4,900	2,700	7,600	-14,000
2065 (BN)		-5,000	-2,800	-7,800	-22,000
2066 (D)		-2,100	-1,800	-3,900	-26,000
2067 (C)		-4,000	-3,200	-7,200	-33,000
2068 (C)		-3,400	-2,200	-5,600	-38,000
2069 (BN)		3,100	1,500	4,600	-34,000
2070 (W)		6,500	4,500	11,000	-23,000
2071 (BN)		-3,600	-2,300	-5,900	-29,000
2072 (W)		5,700	3,400	9,000	-20,000
Average (2022-2072)		-200	-180	-390	
2022-2072	W	2,800	2,000	4,700	-8,600
	AN	2,400	1,300	3,700	-16,000
	BN	-1,700	-1,200	-2,900	-22,000
	D	-3,100	-2,200	-5,300	-18,000
	C	-3,700	-2,600	-6,300	-29,000

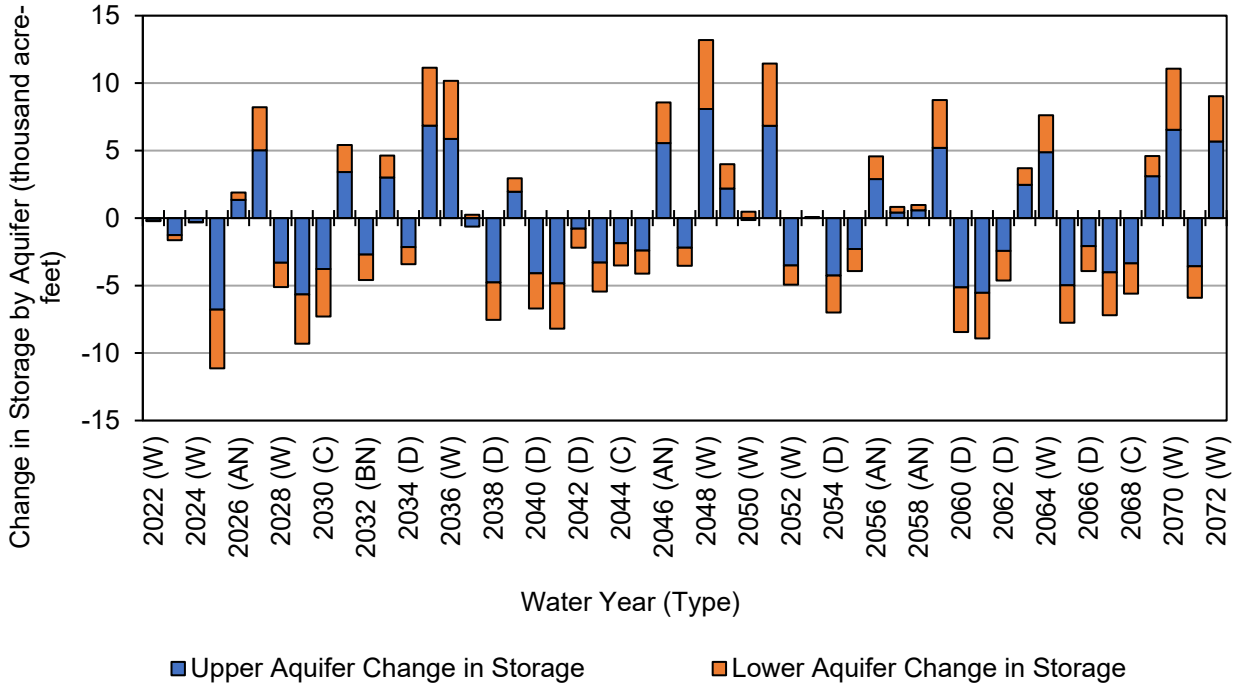


Figure 96. Antelope Subbasin Projected (Future Land Use with Climate Change) Change in Groundwater Storage by Aquifer