7.0 NATURAL RESOURCES

Natural resources are an important element of the Eureka County economy and the quality of life enjoyed by local residence. Natural resources support many critical economic sectors, provide for community development, enhance the quality of life by supporting recreational activities enjoyed by local residents and visitors. One of the most important natural resources in the County is water. In the arid west, water is precious and limited.

Water Resources

Throughout the region, precipitation varies widely between seasons and years as well as within elevation. Annual precipitation ranges from 11 to 13 inches and results mostly from winter storms although summer thunderstorms can produce large amounts of precipitation as rain but contributes little to annual precipitation. Higher amounts of precipitation generally occur as elevation increases. Above 6,000 feet it is not uncommon for areas in central Nevada to receive 14 inches of precipitation or more.
Precipitation supports groundwater recharge. Table 7-1 shows major groundwater hydrographic basins in Eureka County including the active duty groundwater rights and perennial yield of each basin.

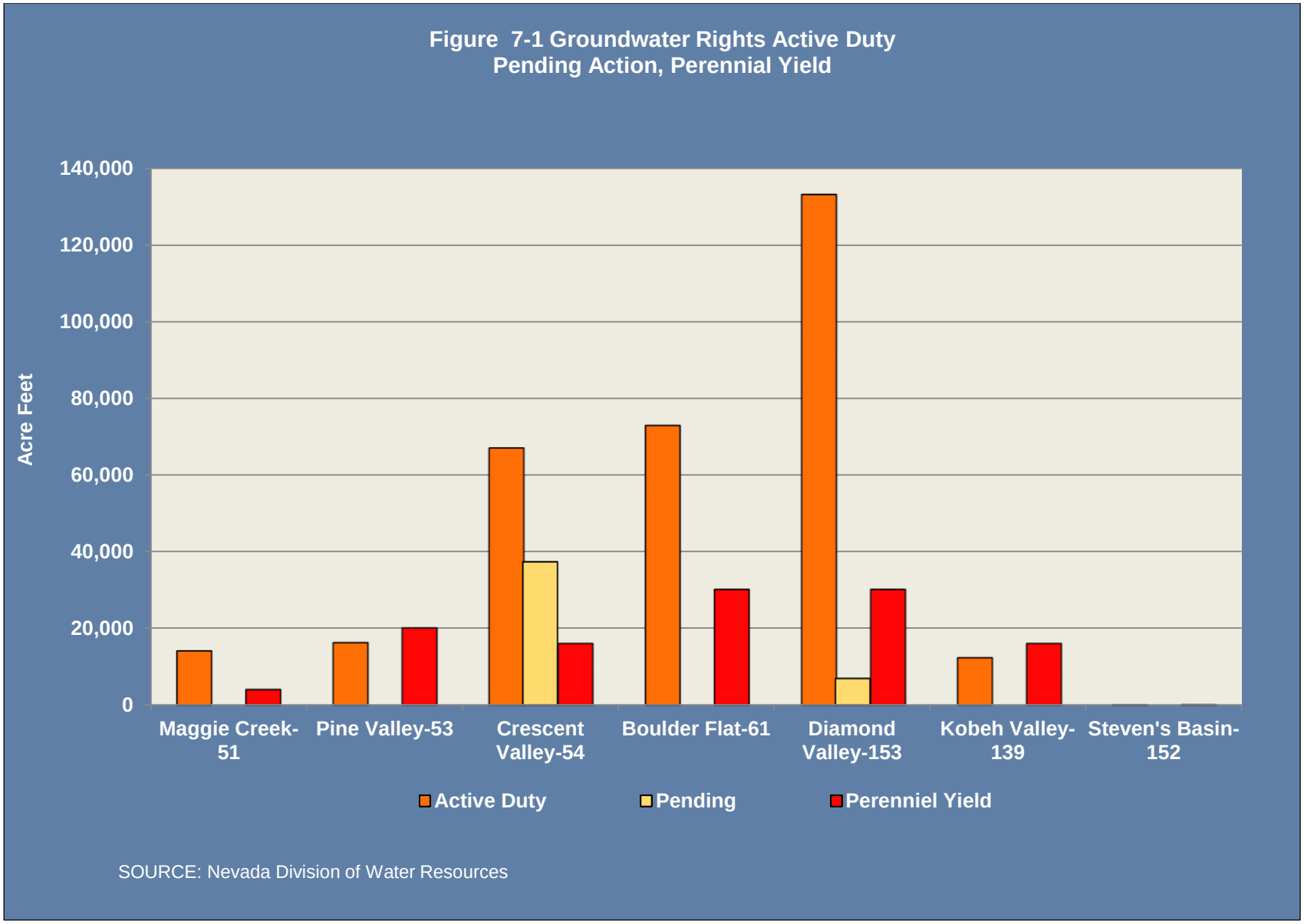
Table 7-1 Eureka County Groundwater Rights-2012 (In Acre-Feet)

Basin	Active Duty	Pending	Perennial Yield	Balance
Maggie Creek-51	14,263.30	-	4,000.00	(10,263.30)
Pine Valley-53	16,473.07	-	20,000.00	3,526.93
Crescent Valley-54	67,298.25	37,139.01	16,000.00	(51,298.25)
Boulder Flat-61	73,117.14	-	30,000.00	(43,117.14)
Diamond Valley-153	133,235.98	6,924.76	30,000.00	(103,235.98)
Kobeh Valley-139	12,478.78	-	16,000.00	3,521.22
Steven's Basin-152	19.27	-	100.00	80.73
Total	316,885.79	44,063.77	116,100.00	(200,785.79)

Source: Nevada Division of Water Resources.

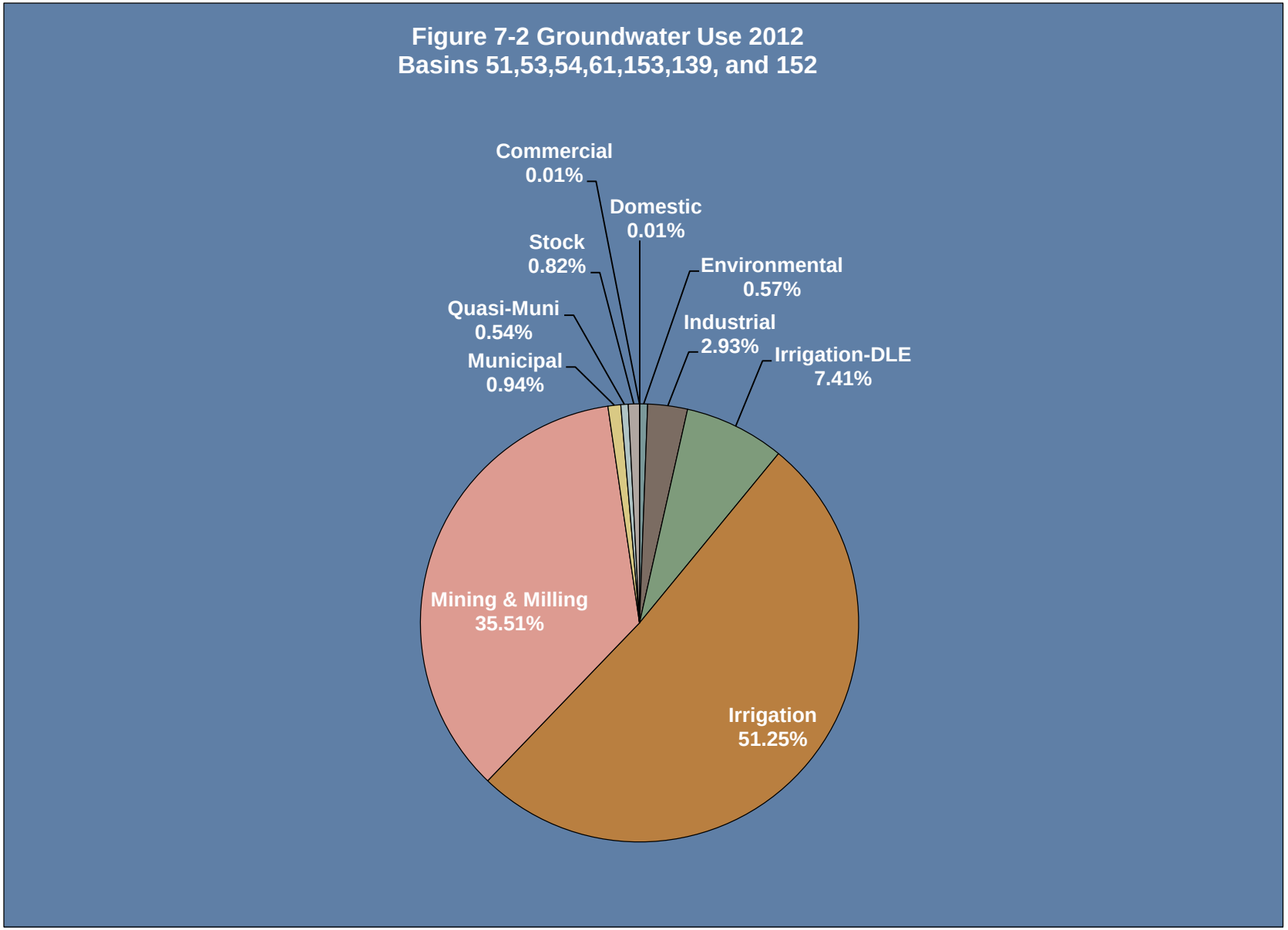
Figure 7-1 provides a comparison of active duty water rights, perennial yield and pending actions by the State Engineer. A distinctive feature is the groundwater basins where active duty groundwater rights exceed the perennial yield. Diamond Valley is one of the more extreme cases in Eureka County. Table 7-2 shows groundwater rights by type of use in Eureka County hydrographic basins. As shown in Figure 7-2, agriculture followed by mining and milling account for about 95 percent of groundwater right usage in Eureka County.

Figure 7-1 Groundwater Rights Active Duty Pending Action, Perennial Yield



SOURCE: Nevada Division of Water Resources

Figure 7-2 Groundwater Use 2012
Basins 51,53,54,61,153,139, and 152



Source: Nevada Division of Water Resources, DLE-Desert Land Entry

Table 7-2 Groundwater Use in Eureka County: Selected Basins: 2012		
Use	Active Duty	Pending
Commercial	37.16	-
Domestic	33.6	
Environmental	1,813.59	-
Industrial	9,286.22	-
Irrigation-DLE	23,496.05	
Irrigation	162,389.42	6,924.76
Mining & Milling	112,513.07	37,134.01
Municipal	2,993.90	-
Quasi-Muni	1,723.27	-
Stock	2,597.60	5.00
Total	316,883.88	44,063.77

Source: Nevada Division of Water Resources

Groundwater Wells and Groundwater Depth

Table 7-3 shows the number of estimated groundwater wells by type of well in each basin. There are nearly 3,200 wells in the Eureka County. The largest category of wells is irrigation and mining. The total number of domestic wells is 220.

Groundwater in Eureka County also supports municipal and domestic water demands. There are three municipal systems operated by Eureka County. One is located in the Town of Eureka, another in Devil's Gate, and a third in the Town of Crescent Valley. The water systems in Eureka County currently meet all drinking water standards. Arsenic treatment was recently added to the Town of Crescent Valley water system. Overall, the systems in Eureka County are in excellent condition meeting all municipal operating standards. Figure 7-3 shows the number of water customers in each system. Since 2010, there has been limited growth in the number of municipal customers served by the systems, although the Town of Eureka is trending higher.

Table 7-3
Groundwater Wells By Basin in Eureka County 2012

Groundwater Basin	Public water supply (1)		Domestic		Irrigation		Stock		Mining (2)	
	Entire basin	Eureka County	Entire Basin	Eureka County	Entire basin	Eureka County	Entire basin	Eureka County	Entire basin	Eureka County
49-Elko Segment	45	0	1135	0	24	0	37	1		0
51-Maggie Creek	0	0	13	1	7	2	17	9	124	122
52-Mary's Creek	3	0	16	5	4	0	3	0	0	0
53-Pine Valley	0	0	18	18	24	24	14	14	1	0
54-Crescent Valley	4	3	72	56	45	22	15	13	103	1
59-Lower Reese River Valley	4	0	334	0	38	0	5	0	48	0
60-Whirlwind Valley	0	0	4	3	4	4	3	3	5	1
61-Boulder Flat	1	1	15	10	35	30	31	24	459	442
62-Rock Creek	0	0	1	0	0	0	5	2	12	0
138-Grass Valley	1	0	2	1	8	3	5	0	3	0
139-Kobeh Valley	0	0	7	6	24	12	9	8	3	3
140A-Monitor Valley (North)	0	0	4	0	1	0	7	0	0	0
151-Antelope Valley	0	0	1	1	4	4	9	9	0	0
152-Stevens Basin	0	0	0	0	0	0	1	1	0	0
153-Diamond Valley	12	12	117	117	437	437	21	21	10	10
155-L. Smoky Valley (North)	0	0	12	2	11	1	10	9	0	0
Total (by use)	70	16	1,751	220	666	539	192	114	768	579

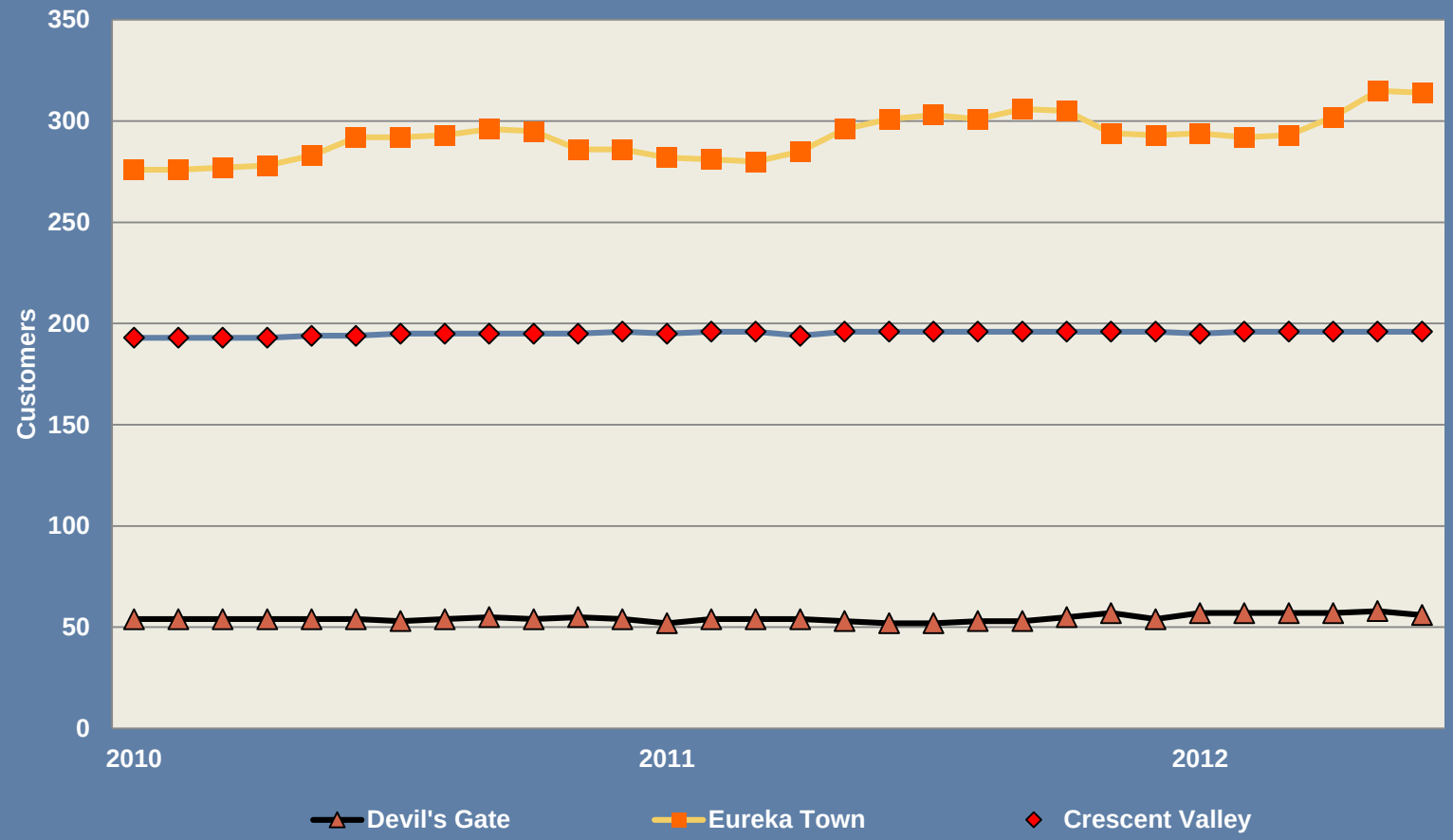
Source: Data from the Nevada Division of Water Resources

Table 7-3
Groundwater Wells By Basin in Eureka County, 2012

Groundwater Basin	Industrial (3)		Monitoring		Other (4)		unused		Test		Total (by basin)	
	Entire basin	Eureka County	Entire basin	Eureka County	Entire basin	Eureka County	Entire basin	Eureka County	Entire basin	Eureka County	Study Area	Eureka County
49-Elko Segment	17	0	179	0	38	0	4	0	72	0	1551	1
51-Maggie Creek	36	34	310	290	25	16	17	13	84	76	633	563
52-Mary's Creek	5	3	98	8	2	1	4	0	3	0	138	17
53-Pine Valley	20	20	123	105	16	5	5	5	38	12	259	203
54-Crescent Valley	87	1	544	25	8	3	3	1	49	19	930	144
59-Lower Reese River Valley	16	2	302	0	8	0	8	0	18	0	781	2
60-Whirlwind Valley	1		46	8	16	12	0	0	14	2	93	33
61-Boulder Flat	84	70	842	612	20	12	33	31	126	115	1,646	1,347
62-Rock Creek	7	0	83	4	3	2	0	0	8	0	119	8
138-Grass Valley	3	0	49	11	1	1	0	0	3	0	75	16
139-Kobeh Valley	7	7	38	38	0	0	1	1	24	24	113	99
140A-Monitor Valley (North)	0	0	0	0	0	0	0	0	0	0	12	0
151-Antelope Valley	1	1	0	0	0	0	0	0	0	0	15	15
152-Stevens Basin	0	0	0	0	0	0	0	0	0	0	1	1
153-Diamond Valley	1	1	70	70	14	13	5	5	24	24	711	710
155-L. Smoky Valley (North)	0	0	12	12	1	1	0	0	1	0	47	25
Total (by use)	285	139	2,696	1,183	152	66	80	56	464	272	7,124	3,184

Source: Data from the Nevada Division of Water Resources

Figure 7-3 Municipal Water Customers



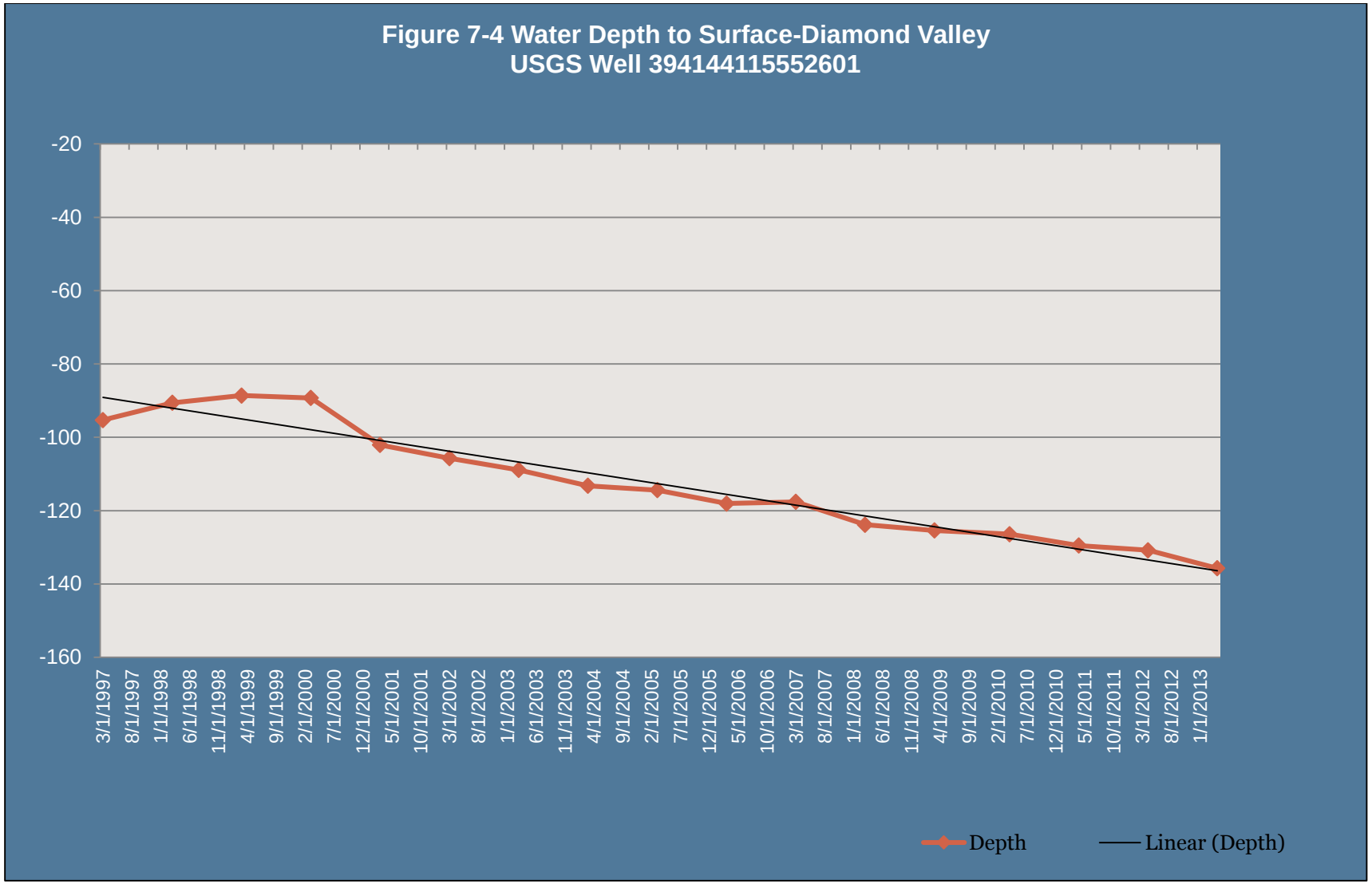
SOURCE: Eureka County Public Works

Historic Water-Level Changes

Water levels in the Diamond Valley Flow system have changed over time as a result of withdrawals for irrigation, municipal, domestic, and mining uses and as a result of annual long-term variations in precipitation. Most withdrawals have been for irrigation in southern Diamond Valley where the irrigated area expanded from 3,200 acres in 1961 to 22,200 acres in 1990. Water level declines from the 1960s to 2005 in southern Diamond Valley ranged from 26 to 90 feet at 67 wells. The large area of water-level decline that has been developed in the basin-fill aquifer of southern Diamond Valley underlies an area about 10 miles wide and 20 miles long.

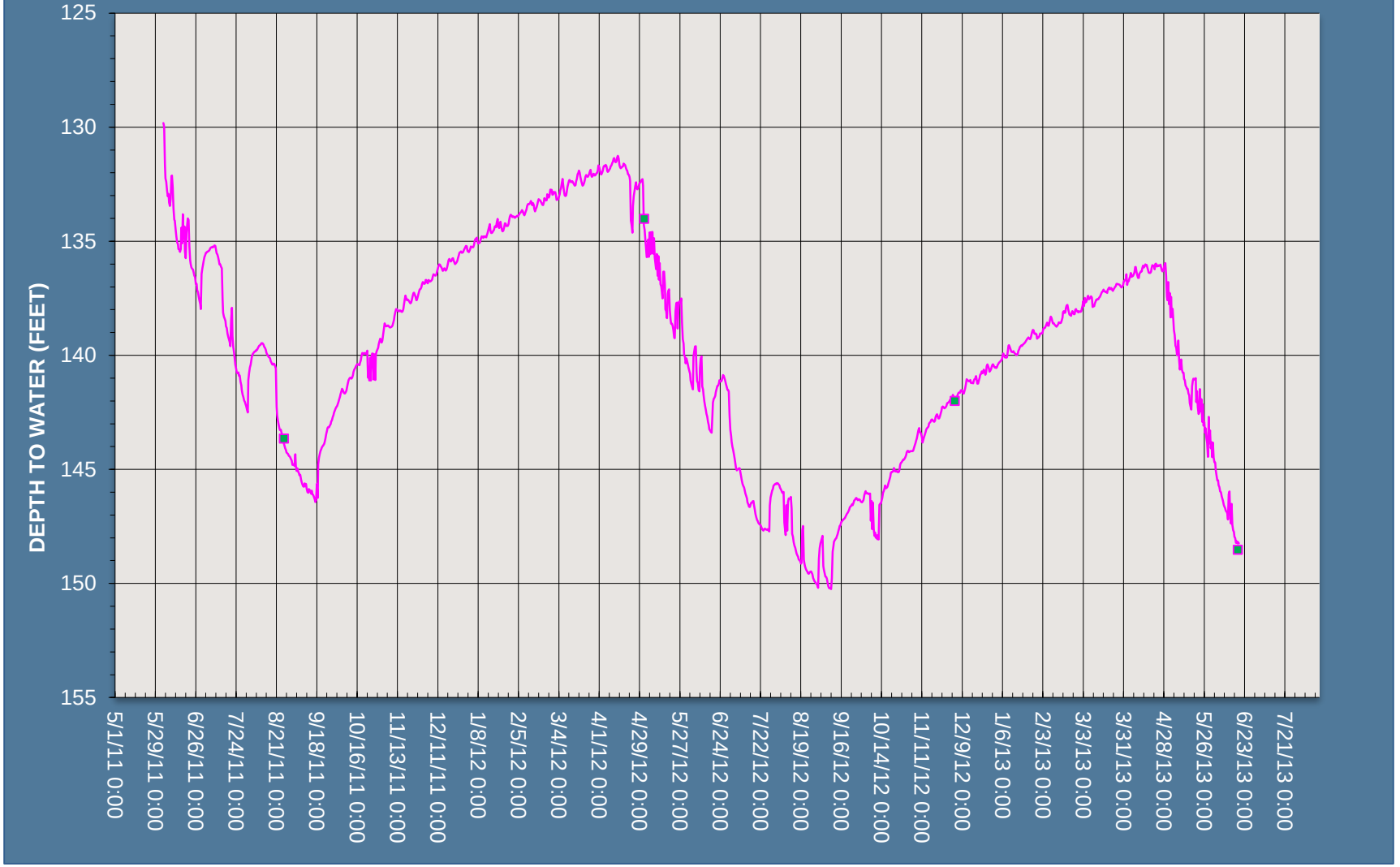
Long-term water level records are available for only a few wells in Kobeh, Monitor, and Antelope Valleys. Kobeh Valley water levels ranged from 35-46 feet below the land surface with minor annual fluctuations generally 2-4 feet. In Monitor Valley water levels ranged from 48 to 56 feet below the land surface with limited annual fluctuations and response to short-term changes in precipitation. In northern Antelope Valley water levels ranged from 94 to 98 feet below the land surface with annual fluctuations of less than 1 foot (USGS Scientific Investigations Report 2006-5249).

Figure 7-4 shows changes in depth of groundwater since 1997 for a USGS monitoring well in Diamond Valley. Overall declines of about 45 feet have occurred since 1997. This trend is consistent with a number of wells in the area. Figures 7-5 and 7-6 shows recent trends in wells being measured by Eureka County.



Source: Nevada Division of Water Resources, Water Level Data

Figure 7-5 EUREKA COUNTY DATA LOGGERS
Burnham Monitoring Well



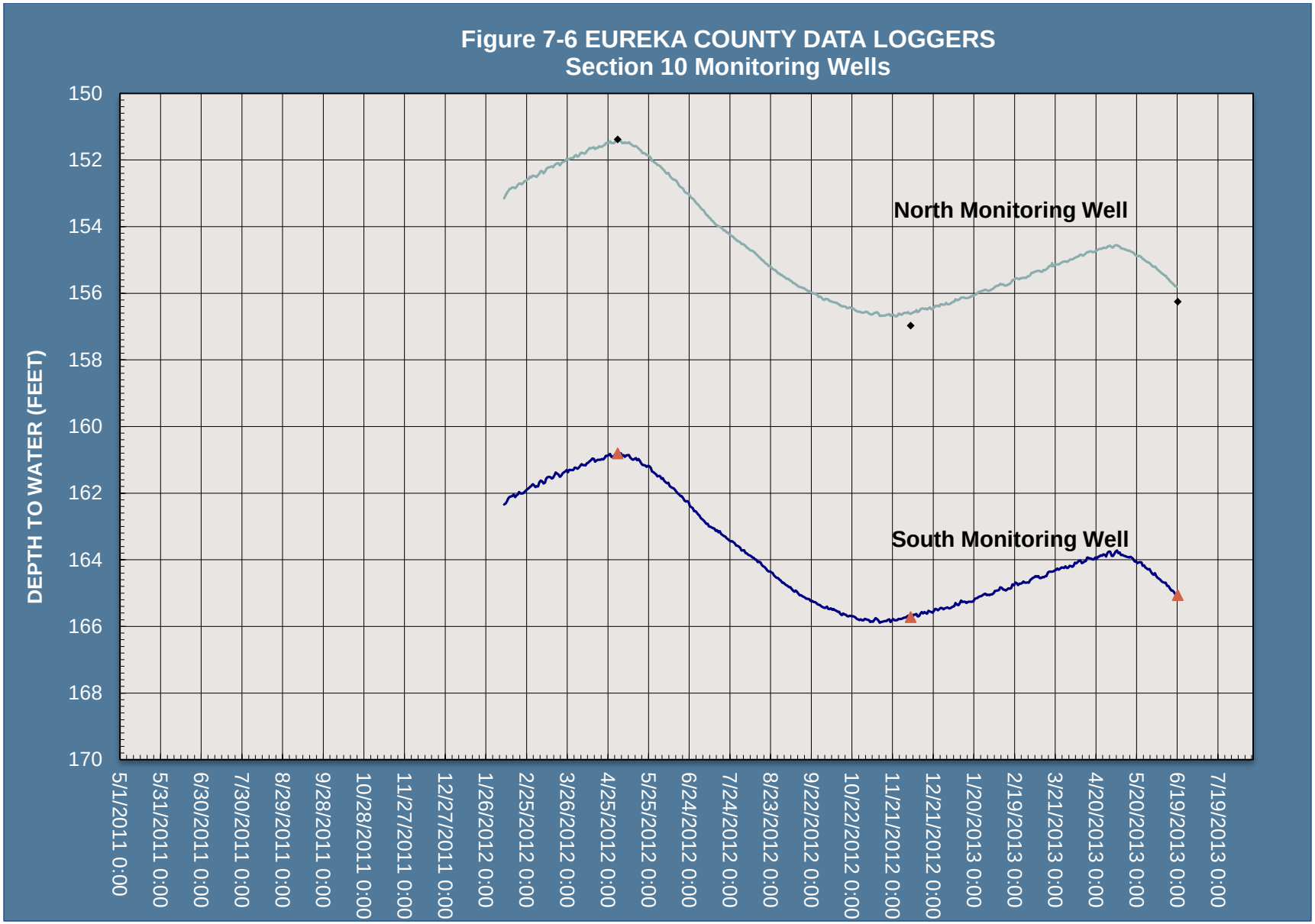
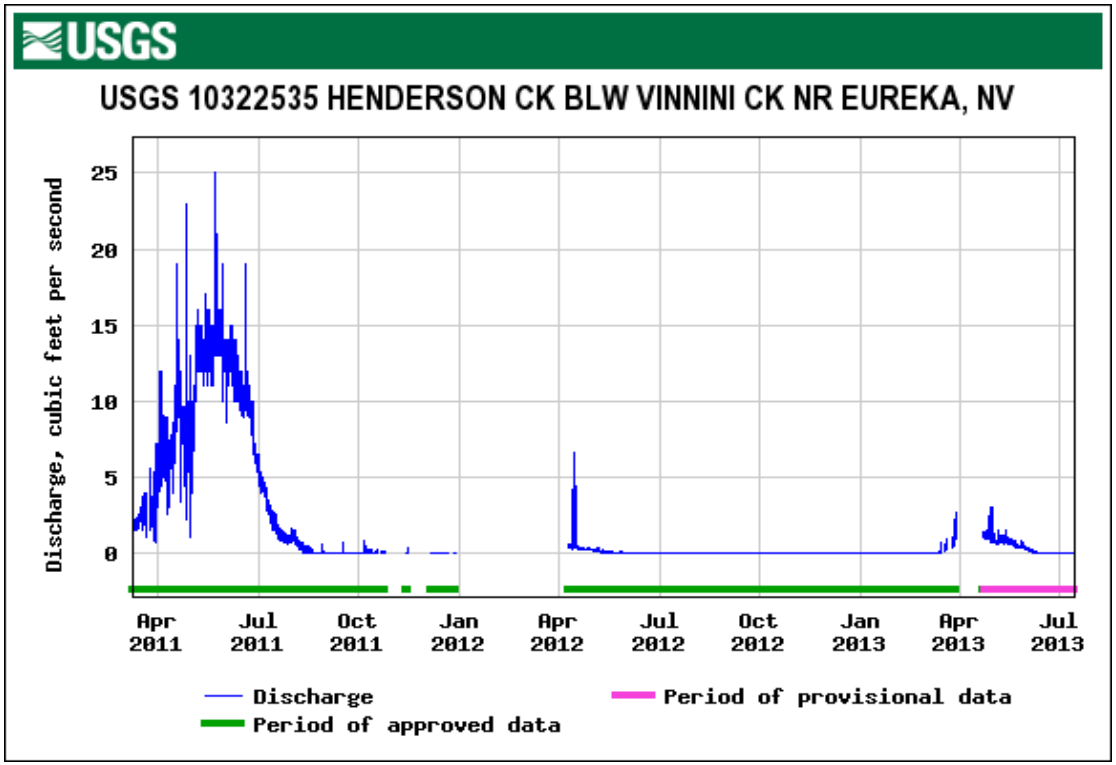
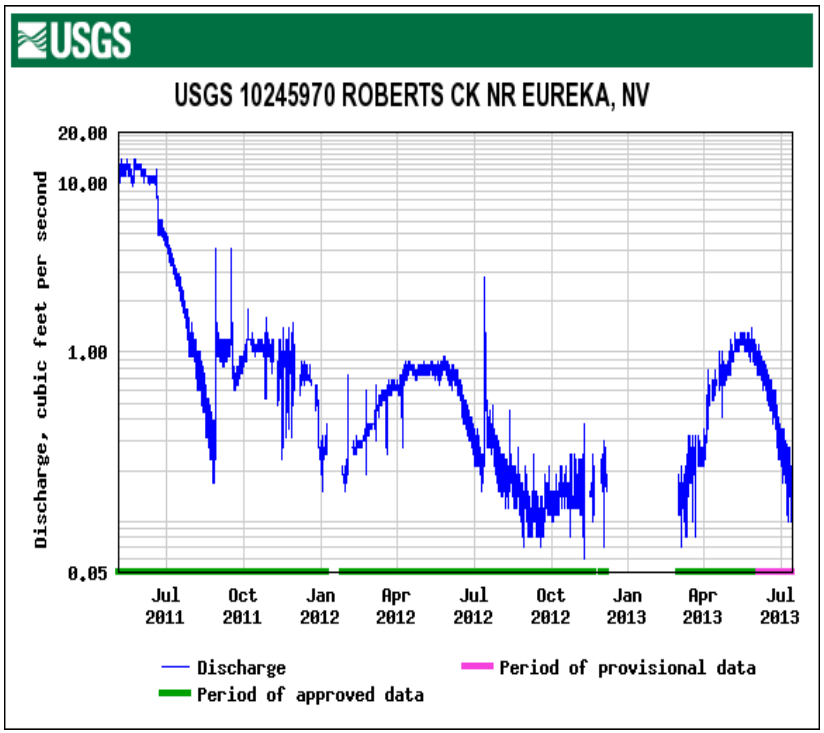


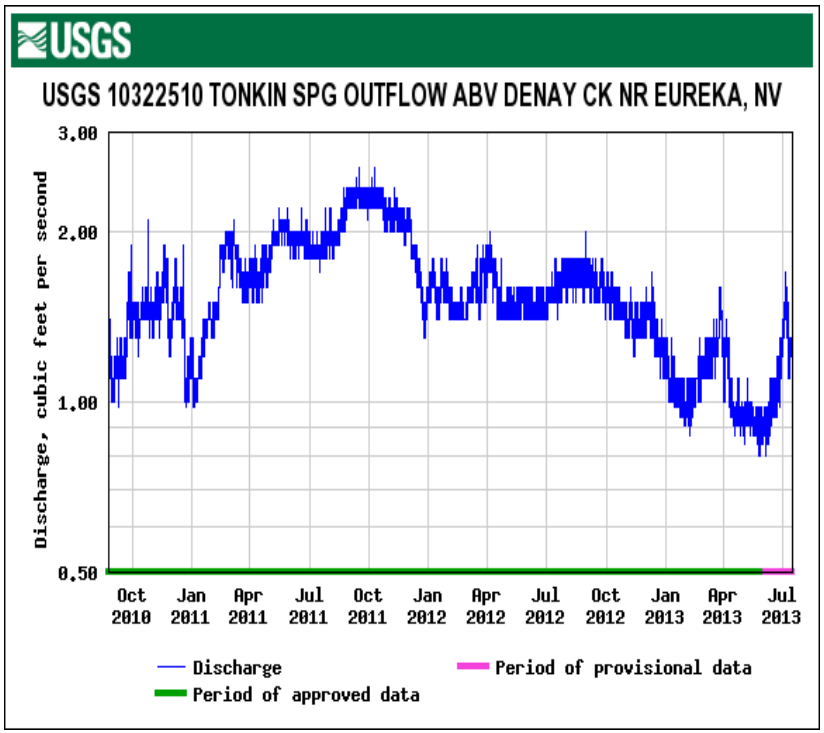
Figure 7-6 EUREKA COUNTY DATA LOGGERS
Section 10 Monitoring Wells
DEPTH TO WATER (FEET)
150
152
154
156
158
160
162
164
166
168
170
North Monitoring Well
South Monitoring Well
5/1/2011 0:00
5/31/2011 0:00
6/30/2011 0:00
7/30/2011 0:00
8/29/2011 0:00
9/28/2011 0:00
10/28/2011 0:00
11/27/2011 0:00
12/27/2011 0:00
1/26/2012 0:00
2/25/2012 0:00
3/26/2012 0:00
4/25/2012 0:00
5/25/2012 0:00
6/24/2012 0:00
7/24/2012 0:00
8/23/2012 0:00
9/22/2012 0:00
10/22/2012 0:00
11/21/2012 0:00
12/21/2012 0:00
1/20/2013 0:00
2/19/2013 0:00
3/21/2013 0:00
4/20/2013 0:00
5/20/2013 0:00
6/19/2013 0:00
7/19/2013 0:00

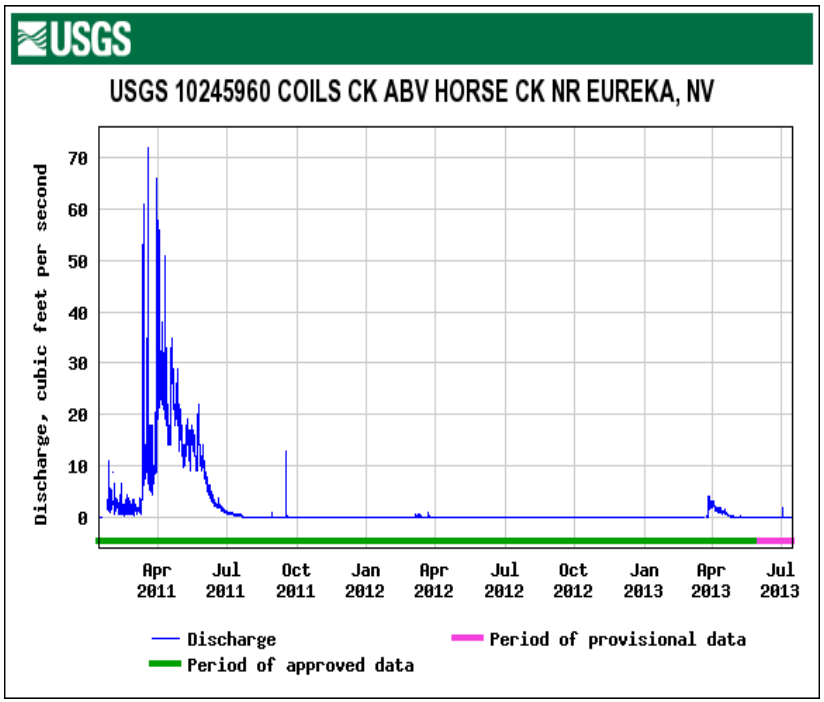
Surface Water

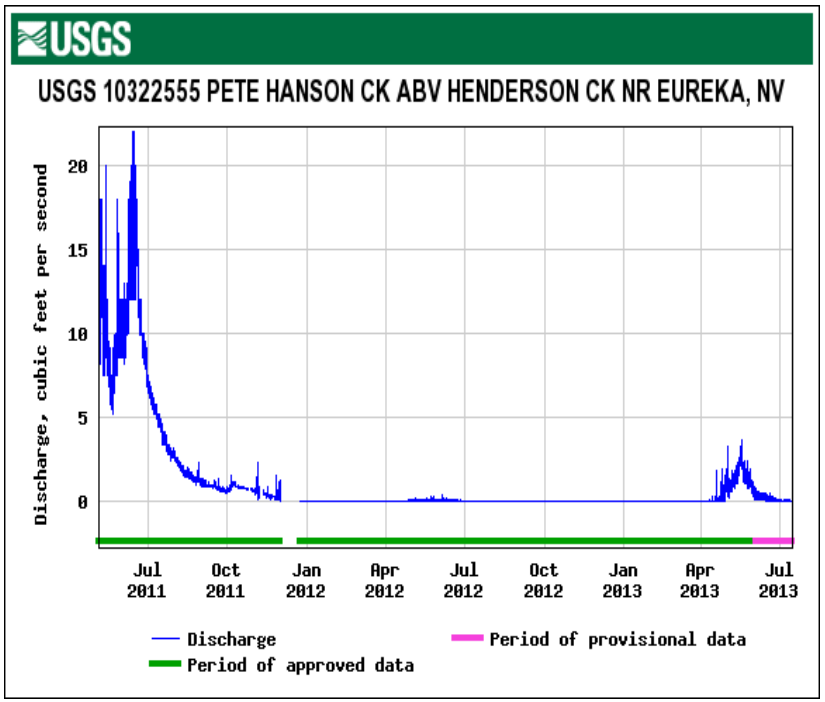
The major surface water feature in Eureka County is the Humboldt River which has an average annual discharge of approximately 218,000 acre-feet. Other major surface water features include Pine Creek and a series of smaller perennial streams originating in the Roberts Mountains, the Diamond Mountains, Cortez Range, and Monitor Range. Stream flow readings are limited in Eureka County. In recent years the United States Geologic Survey installed gauging stations at streams in the Roberts Mountains. The following graphs show real-time daily readings for Roberts Creek, Henderson Creek, Pete Hanson Creek, Tonkin Springs and Colis Creek through July 2013. Drought conditions over the last 2 winters have reduced stream flows.




USGS
USGS 10245970 ROBERTS CK NR EUREKA, NV
Discharge, cubic feet per second
20.00
10.00
1.00
0.05
Jul 2011
Oct 2011
Jan 2012
Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013
Jul 2013
Discharge
Period of provisional data
Period of approved data


USGS
USGS 10322510 TONKIN SPG OUTFLOW ABV DENAY CK NR EUREKA, NV
Discharge, cubic feet per second
3.00
2.00
1.00
0.50
Oct 2010
Jan 2011
Apr 2011
Jul 2011
Oct 2011
Jan 2012
Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013
Jul 2013
Discharge
Period of provisional data
Period of approved data


USGS
USGS 10245960 COILS CK ABV HORSE CK NR EUREKA, NV
Discharge, cubic feet per second
70
60
50
40
30
20
10
0
Apr 2011
Jul 2011
Oct 2011
Jan 2012
Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013
Jul 2013
Discharge
Period of provisional data
Period of approved data


USGS
USGS 10322555 PETE HANSON CK ABV HENDERSON CK NR EUREKA, NV
Discharge, cubic feet per second
20
15
10
5
0
Jul 2011
Oct 2011
Jan 2012
Apr 2012
Jul 2012
Oct 2012
Jan 2013
Apr 2013
Jul 2013
Discharge
Period of provisional data
Period of approved data

Precipitation

Precipitation in Eureka County (Antelope Valley) is shown in Figure 7-7. The average annual precipitation as measured at Antelope Valley between 1955 and 2012 is 12.74 inches. The wettest ten year period was 1980 to 1990 followed by 1990 to 2000 averaging 13.1 and 12.8 inches respectively.

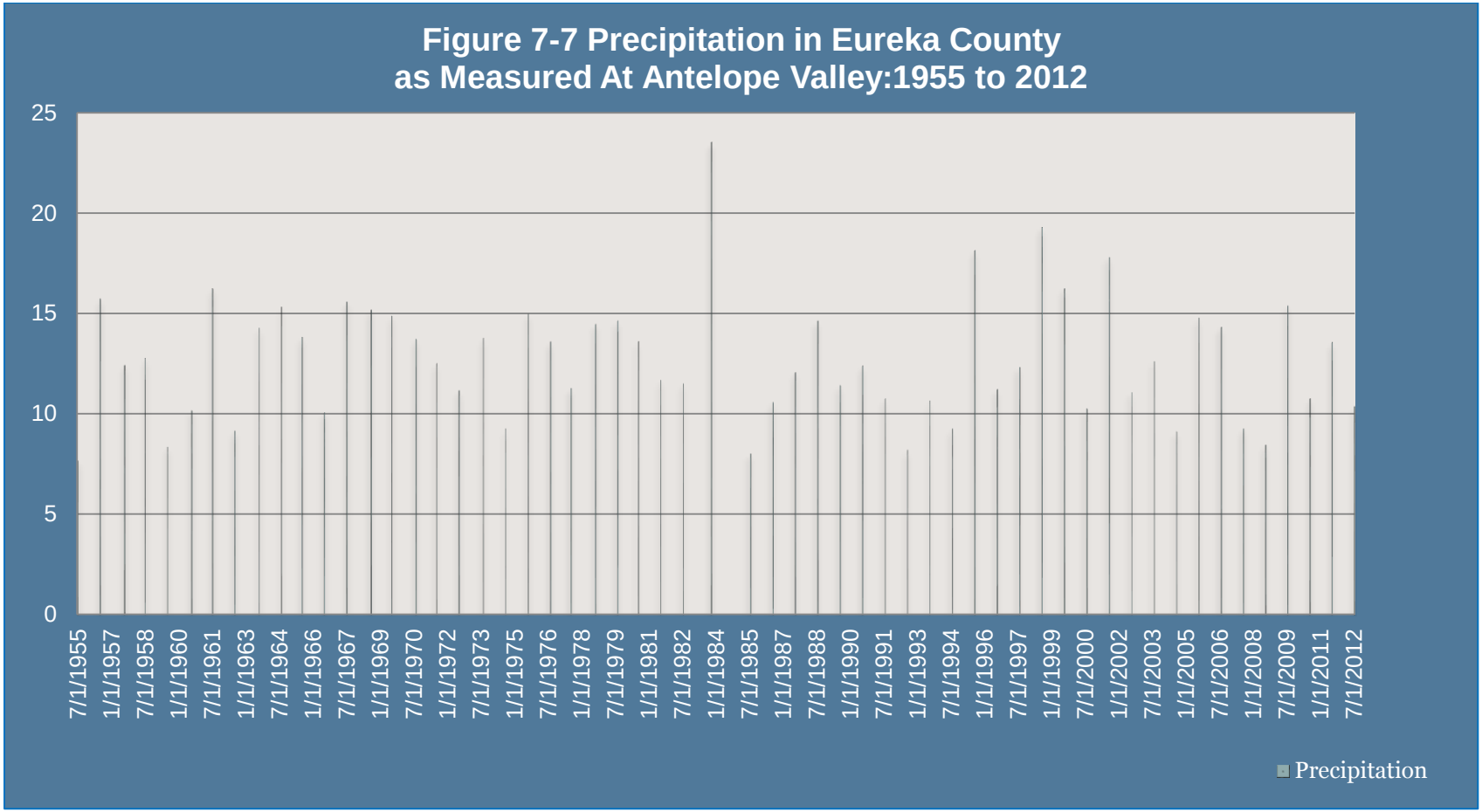
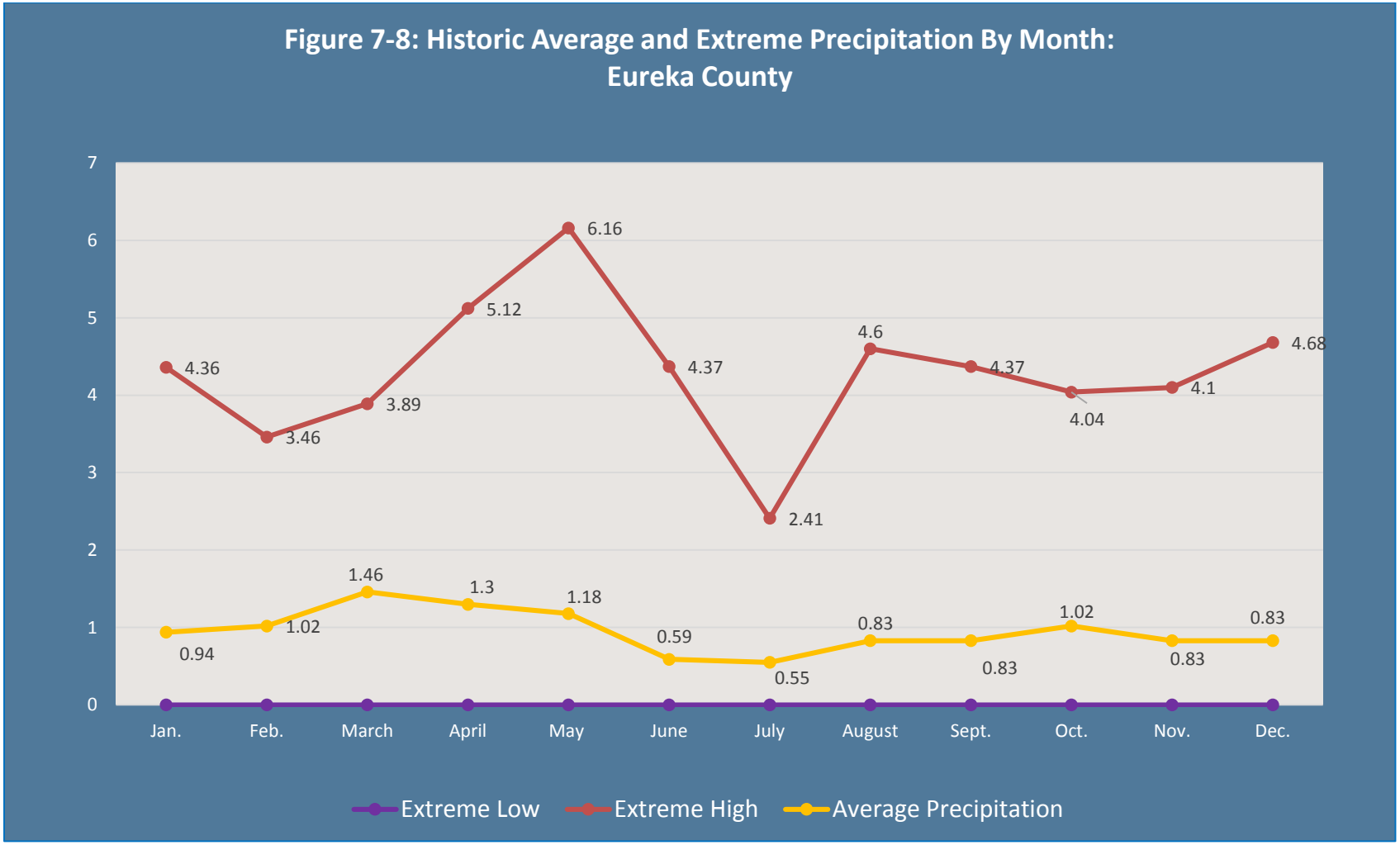
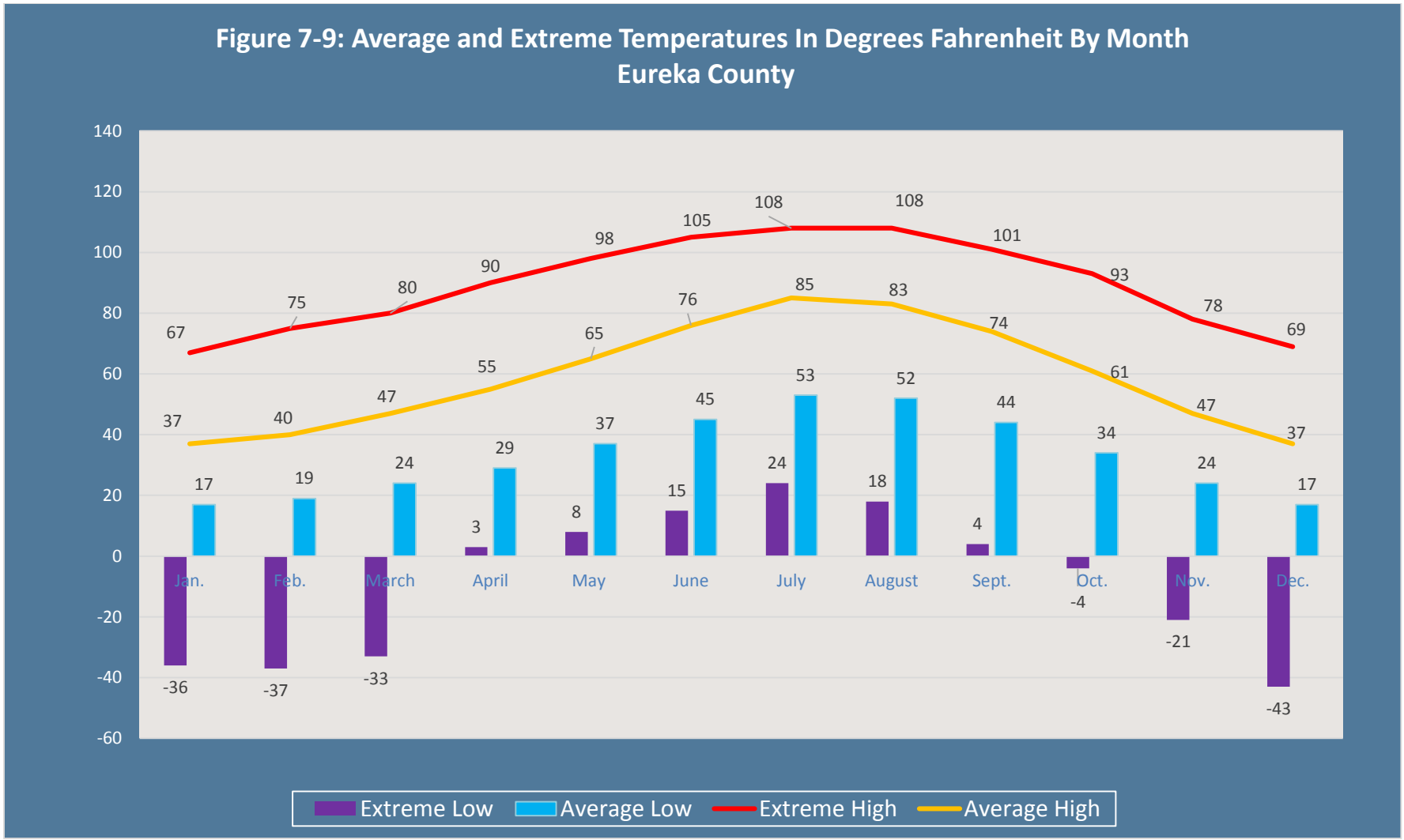


Figure 7-8 shows the historic average precipitation and the extreme recorded precipitation by month. The spring months of March, April, and May have the highest average precipitation and extreme high precipitation amounts.



Source: NOAA

Figure 7-9 shows average high and low temperature as well as the highest and lowest extreme temperatures recorded since 1931. Temperature in Eureka County have large variations from highs to low creating average temperatures which appear to be somewhat moderate. The extreme recorded temperatures show a 151 degree range.



Source: NOAA, National Centers for Environmental Information

Recreation

A variety of outdoor recreation is available in Eureka County. The vast areas of public lands are open to uses such as hunting, fishing, camping, day use, hiking, among others. Due to the dispersed nature of outdoor recreation use, there are few available measures to gauge the level of recreation activity in Eureka County. Hunting and fishing license purchases and hunting activity are two reliable measures available. Table 7-4 shows fishing and hunting licenses purchased in Eureka County. Figure 7-10 and Figure 7-11 provide data on annual mule deer and pronghorn antelope harvest in Eureka County hunt units. In recent years, deer and antelope populations in key Eureka County hunt areas have increased.

Table 7-4 Fishing and Hunting Licenses

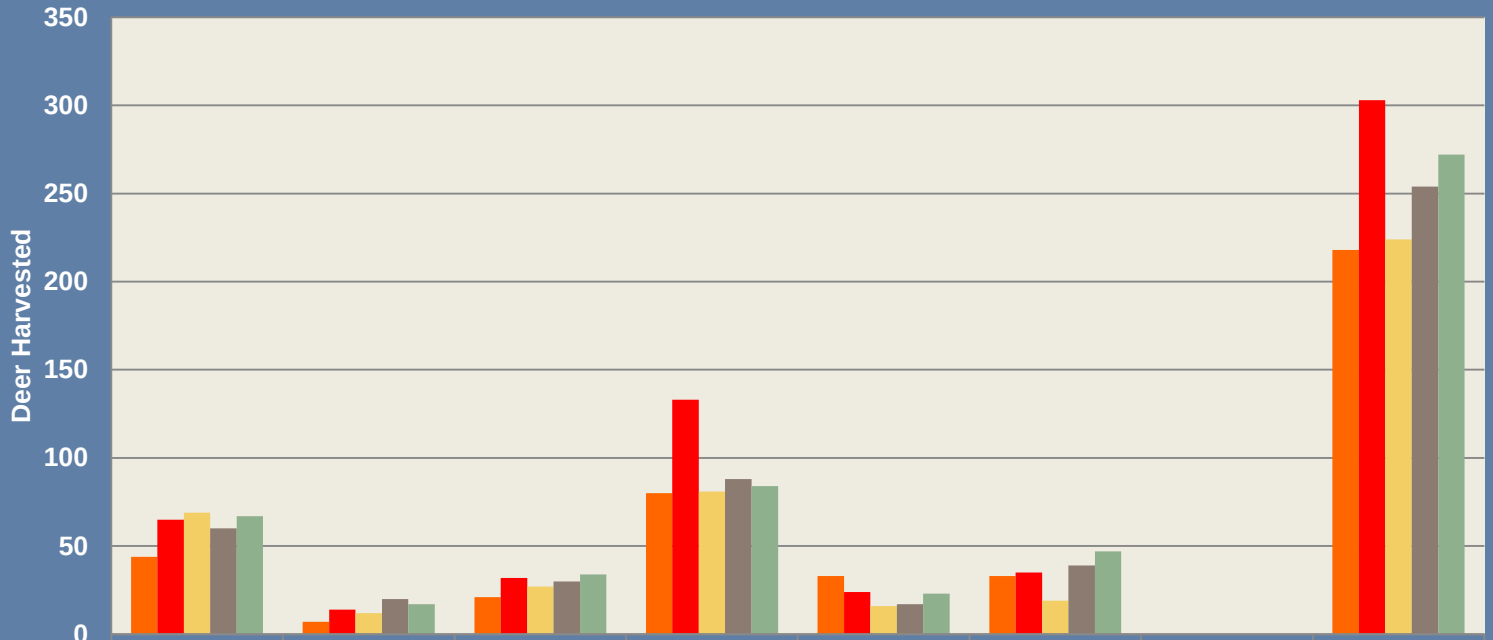
Eureka County Fishing and Hunting Licenses	1995	1996	1997	1998	1999	2000	2001	2003	2004	2005	2006	2007	2008	2009	2010	2011
Residential Fishing	159	105	26	29	185	134	67	60	5	9	72	69	153	145	419	366
Non-residential Fishing	149	97	29	25	178	122	71	66	1	2	72	68	164	122	432	331
Total Fishing Licensing	187	120	65	26	252	146	73	58	11	15	84	73	183	119	537	356
Total Residential Hunting	171	146	45	27	216	173	68	66	8	8	76	74	183	115	487	287
Total Non-residential Hunting	264	153	67	41	331	194	66	56	10	2	76	58	180	122	597	394
Total Hunting	211	151	83	37	294	188	56	42	2	9	58	51	188	103	554	359
Total Hunt/Fishing Combo	191	152	44	45	235	197	67	43	14	6	81	49	183	97	508	357
Total Licensing	132	156	34	47	166	203	55	46	6	4	61	50	171	106	414	377

Source: NDOW

Table 7-5 Fish Stocking Activity in Eureka County			
Stream Name			Date Last Stocking
Roberts Creek	550	RBT	May-10
Tonkin Springs	1,000	RBT	May-10

NDOW also collect information on recreational fishing on various streams in the County.

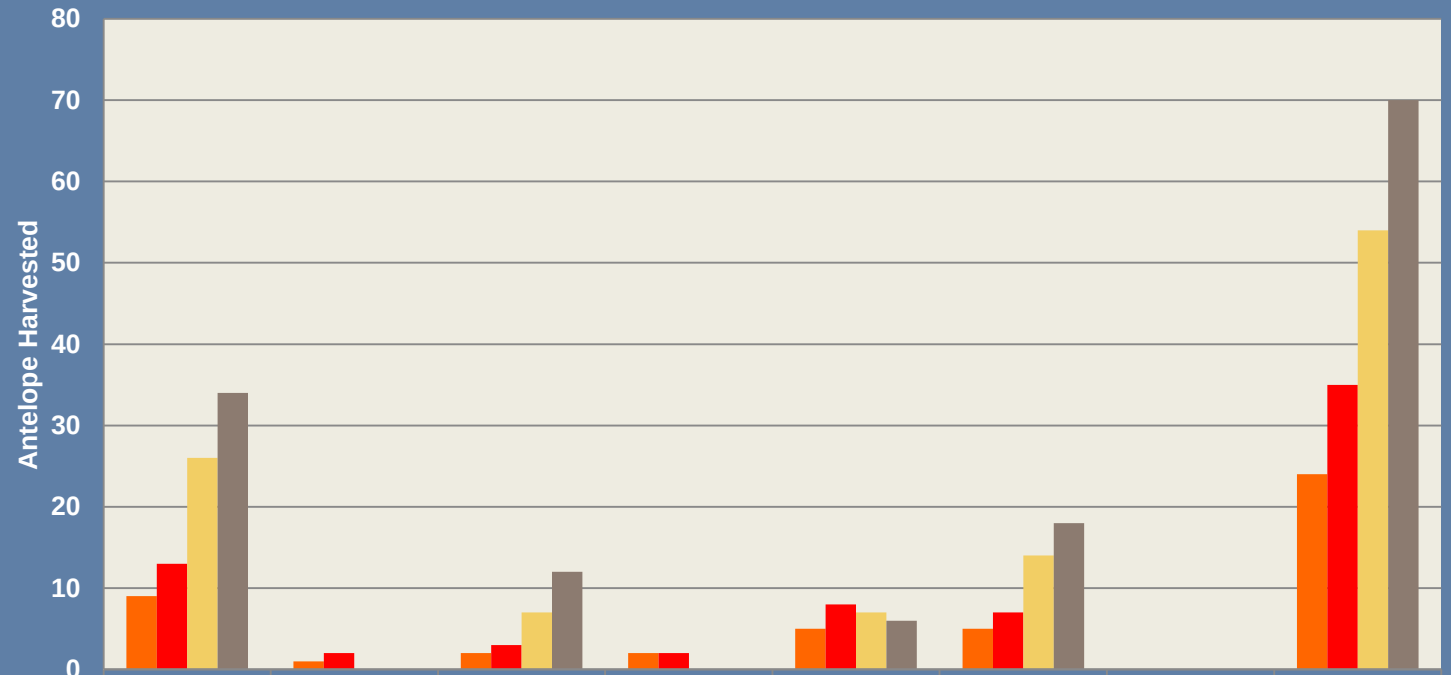
Figure 7-10 Annual Deer Harvest in Eureka County Hunt Units: 2005-2011



	Unit 141	Unit 142	Unit 143	Unit 144	Unit 145	Unit 155		Total
2005	44	7	21	80	33	33		218
2008	65	14	32	133	24	35		303
2009	69	12	27	81	16	19		224
2010	60	20	30	88	17	39		254
2011	67	17	34	84	23	47		272

SOURCE: Nevada Dept. of Wildlife

Figure 7-11 Eureka County Antelope Harvest: 2008-2011

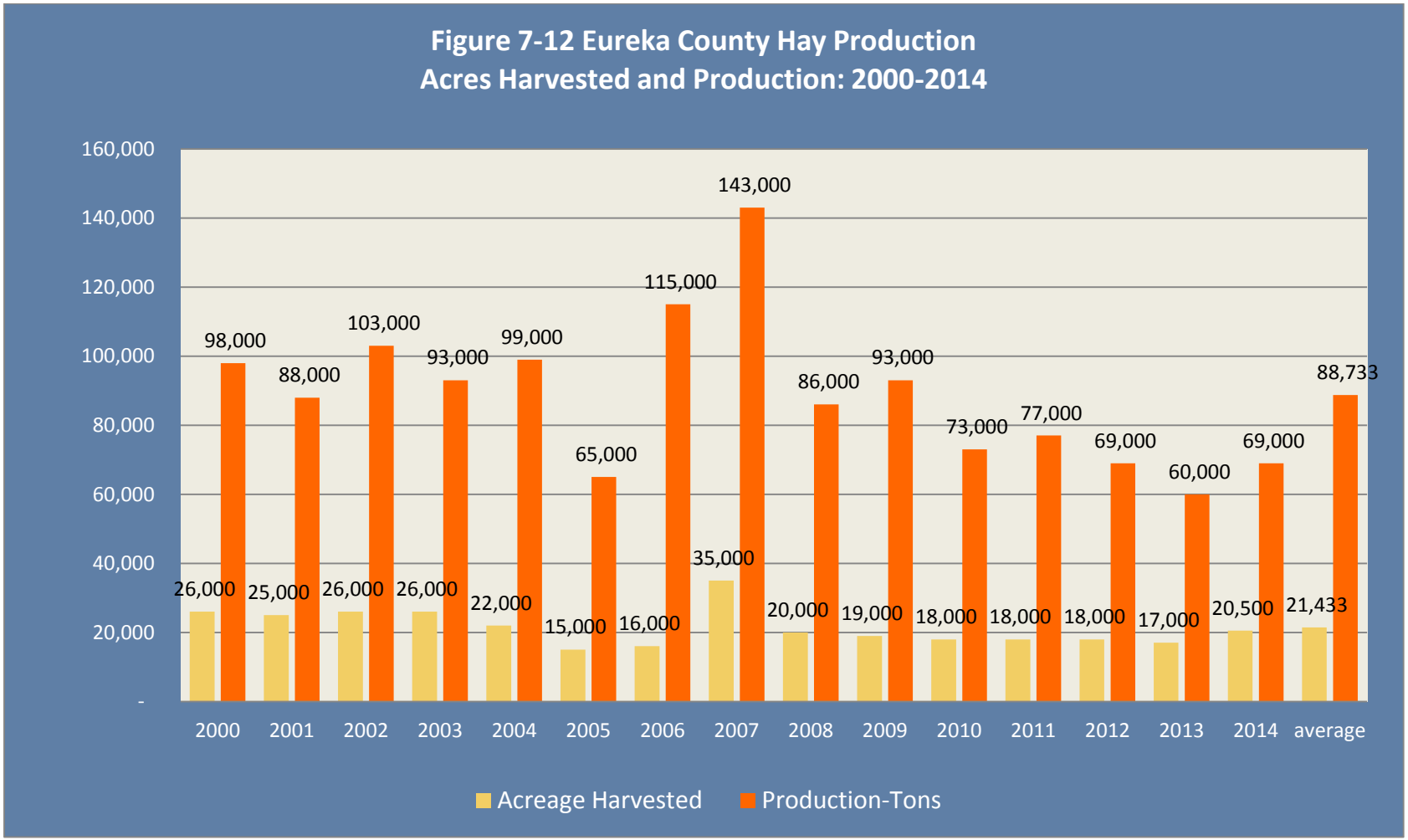


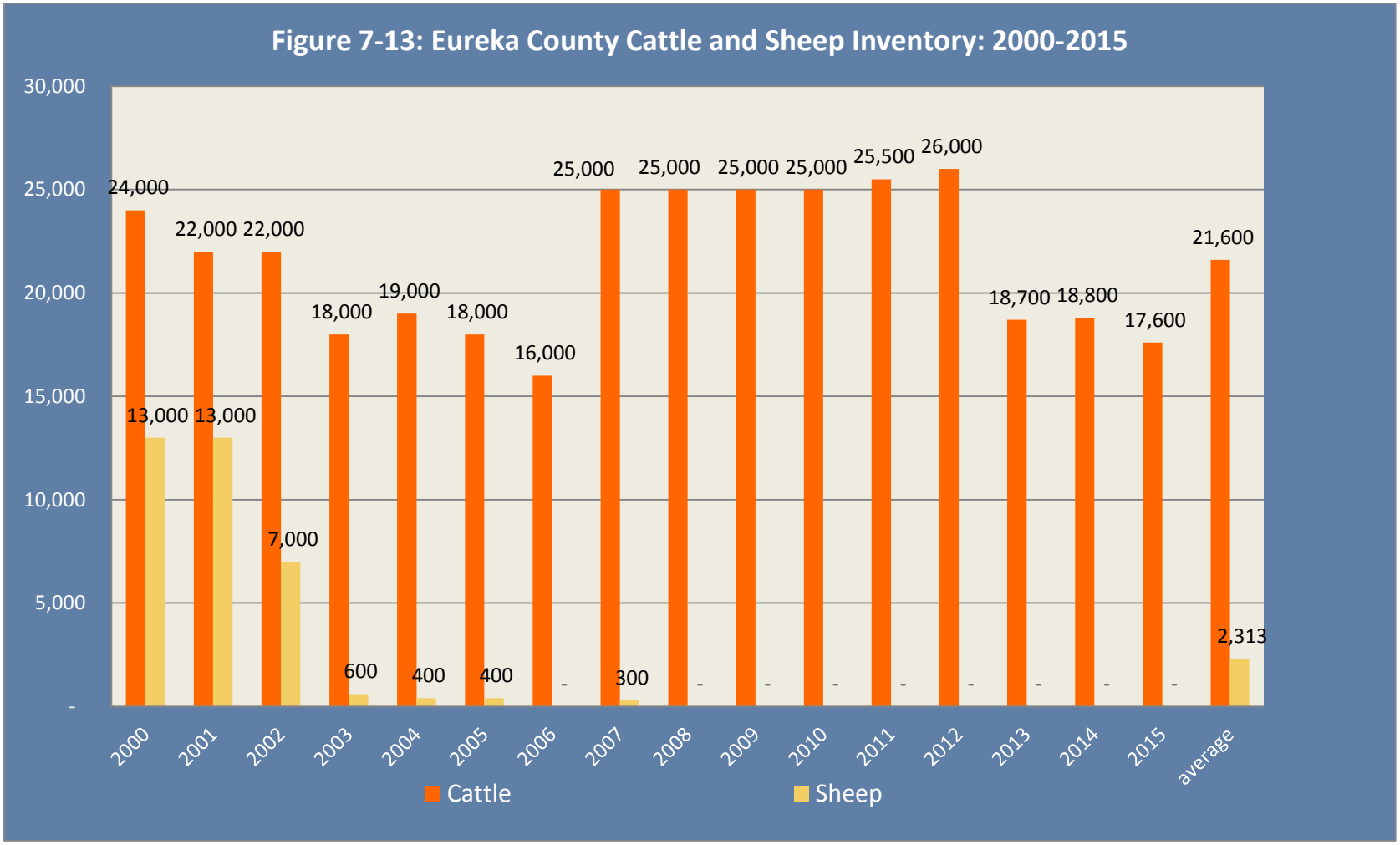
	Unit 141	Unit 142	Unit 143	Unit 144	Unit 145	Unit 155		Total
2008	9	1	2	2	5	5		24
2009	13	2	3	2	8	7		35
2010	26	0	7	0	7	14		54
2011	34	0	12	0	6	18		70

SOURCE: Nevada Dept. of Wildlife

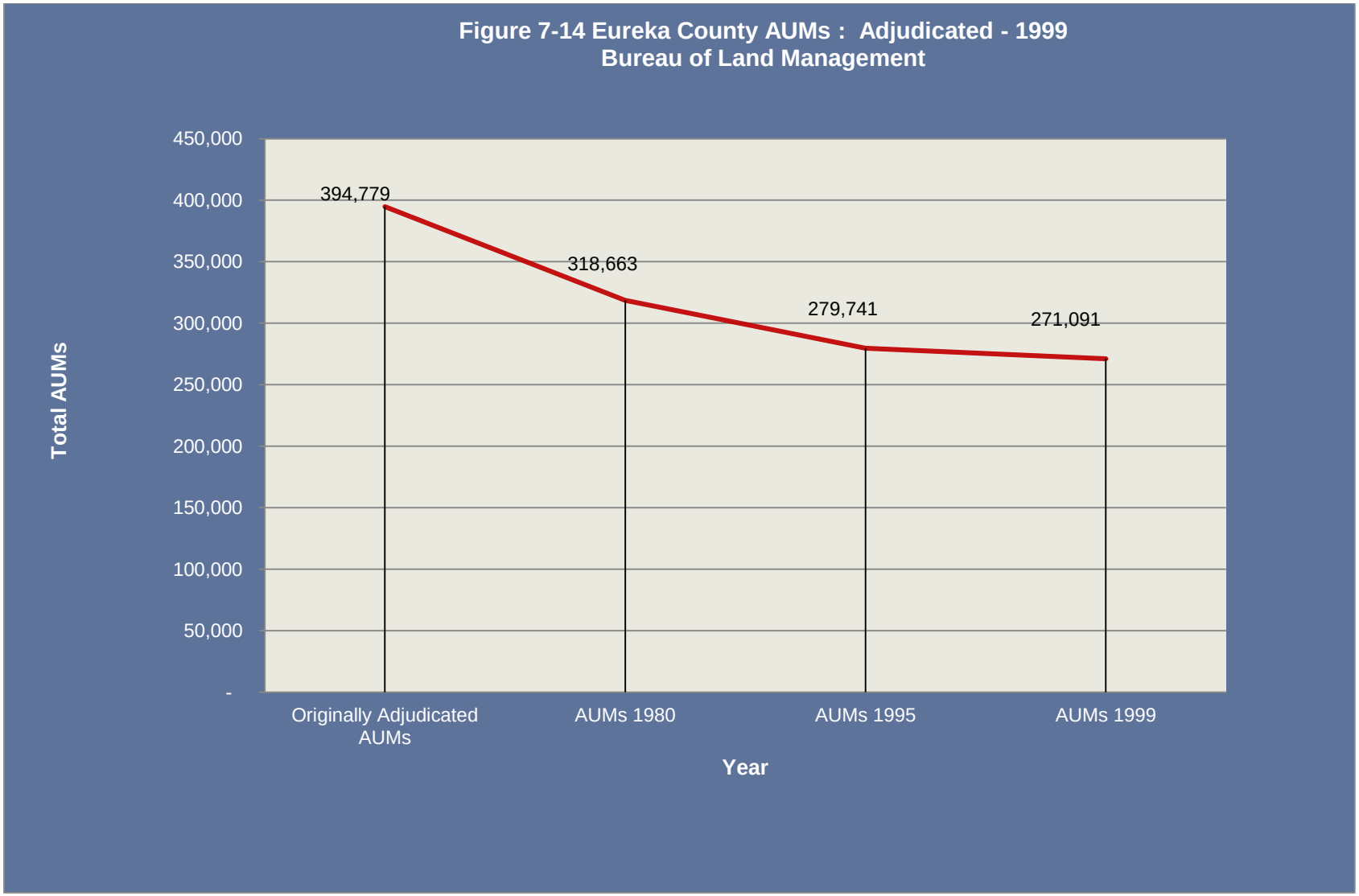
Agriculture

Figure 7-12 shows Eureka County hay production and acreage harvested from 2000-2011. On average Eureka County produces between 80,000 and 100,000 tons of hay with an average of proximately 20,000 acres harvested. Figure 7-13 shows Eureka County cattle and calves inventory. The average inventory is approximately 22,000 head and has remained relatively stable over the last 5 years. Public land grazing supports cattle herds in Eureka County. Figure 7-14 shows the number of animal unit months permitted for grazing allotments in Eureka County. Total AUMs active continue in a downward trend.





Source: USDA NASS



Source: Bureau of Land Management, Battle Mountain District Office

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   http://www.nass.usda.gov/Statistics_by_State/Nevada/index.asp

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   http://water.nv.gov/data/hydrographic/
   http://water.nv.gov/data/precipitation/?COUNTY=7

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   http://waterdata.usgs.gov/nwis/nwisman/?site_no=10245960
   http://waterdata.usgs.gov/nv/nwis/nwisman/?site_no=10322510
   http://waterdata.usgs.gov/nwis/nwisman/?site_no=103225535
   http://waterdata.usgs.gov/nv/nwis/nwisman/?site_no=10322555

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   http://ndow.org/law/sales/Eureka_sales.pdf

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6. Municipal Water Users for the Town of Eureka, Crescent Valley and Devils Gate GID, Eureka County Public Works, Ron Damele.

7. Bureau of Land Management, Animal Unit Months, Battle Mountain District Office.