# Rattlesnake Creek

## 2009 Field Analysis Summary

April 28, 2010

Basin Management Team

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# I. Introduction

The Rattlesnake Creek subbasin is located in south-central Kansas, adjacent to and paralleling the southwest-to-northeast reach of the Arkansas River basin. The subbasin covers 1,232 square miles of the Great Bend Prairie aquifer, a sub-region of the High Plains aquifer south of the Arkansas River. The Rattlesnake Creek subbasin is nearly 95 miles long and averages a width of 18 miles. Counties within the subbasin include Barton, Clark, Edwards, Ford, Kiowa, Pawnee, Pratt, Reno, Rice and Stafford.

The Rattlesnake Creek subbasin is situated partially within two Groundwater Management Districts (GMDs). Most of the subbasin is in Big Bend GMD #5. The portion of the subbasin in Ford County is in the Southwest Kansas GMD #3. A very small part of the subbasin, within portions of Clark and Kiowa counties, is not in a GMD.

The subbasin is also home to Quivira National Wildlife Refuge. The Refuge is managed by the Department of Interior, U.S. Fish and Wildlife Service (USFWS). Quivira's area includes 22,135 acres in Stafford, Rice and Reno counties. It is located near the confluence of Rattlesnake Creek and the Arkansas River. The Wildlife Refuge is dependent on surface water from Rattlesnake Creek.

In order to address the supply and use of water resources in the subbasin, the Rattlesnake Creek Subbasin Partnership was formed in 1993. The Partnership includes GMD #5, Water Protection Association of Central Kansas (Water PACK), Kansas Department of Agriculture – Division of Water Resources (KDA-DWR) and Department of Interior, U.S. Fish and Wildlife Service (USFWS). The partners agreed to use a community involvement approach as the guiding principle to address water resource concerns within the subbasin. A cooperative agreement was signed in June of 1994. The partnership designated priority areas within the Rattlesnake Creek subbasin in order to better manage the subbasin (Figure 1).

The Partnership designed a management program that was signed by the chief engineer in July, 2000. The program outlines strategies to reduce water use. It includes a twelve-year implementation schedule with a review of progress in 2004, 2008 and a final review in 2012. The management program is available on KDA-DWR's website at http://www.ksda.gov/includes/document_center/subbasin/Rattlesnake/RSC_Management.pdf.

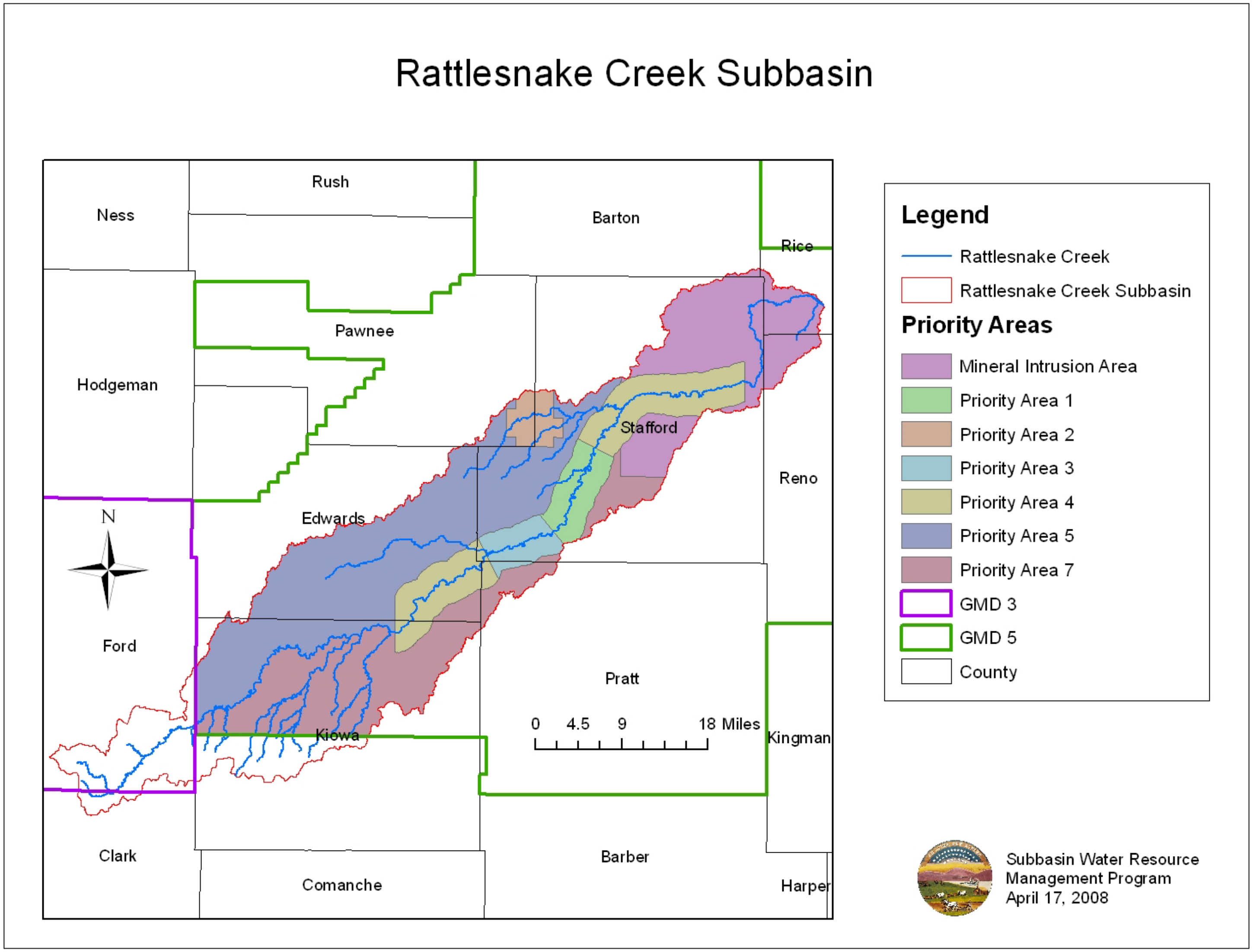


**Figure 1: Rattlesnake Creek Subbasin with Priority Areas**

## II. Precipitation

Precipitation in the Rattlesnake Creek subbasin historically averages 24.3 inches per year based on four precipitation stations. The chart in Figure 2 is based on averaged data from National Climatic Data Center (NCDC) stations: Bucklin in Ford County, Greensburg in Kiowa County, Trousdale 1NE in Edwards County and Hudson in Stafford County. The chart shows a dry period in the 1950s. Since the 1950s other years have had low precipitation but not in the consecutive years that characterized the drought of the 1950s. The highest annual precipitation occurred in 1973 with over 40 inches. The 1990s had several years of above average precipitation. Annual precipitation data for these NCDC stations is currently available through 2008.

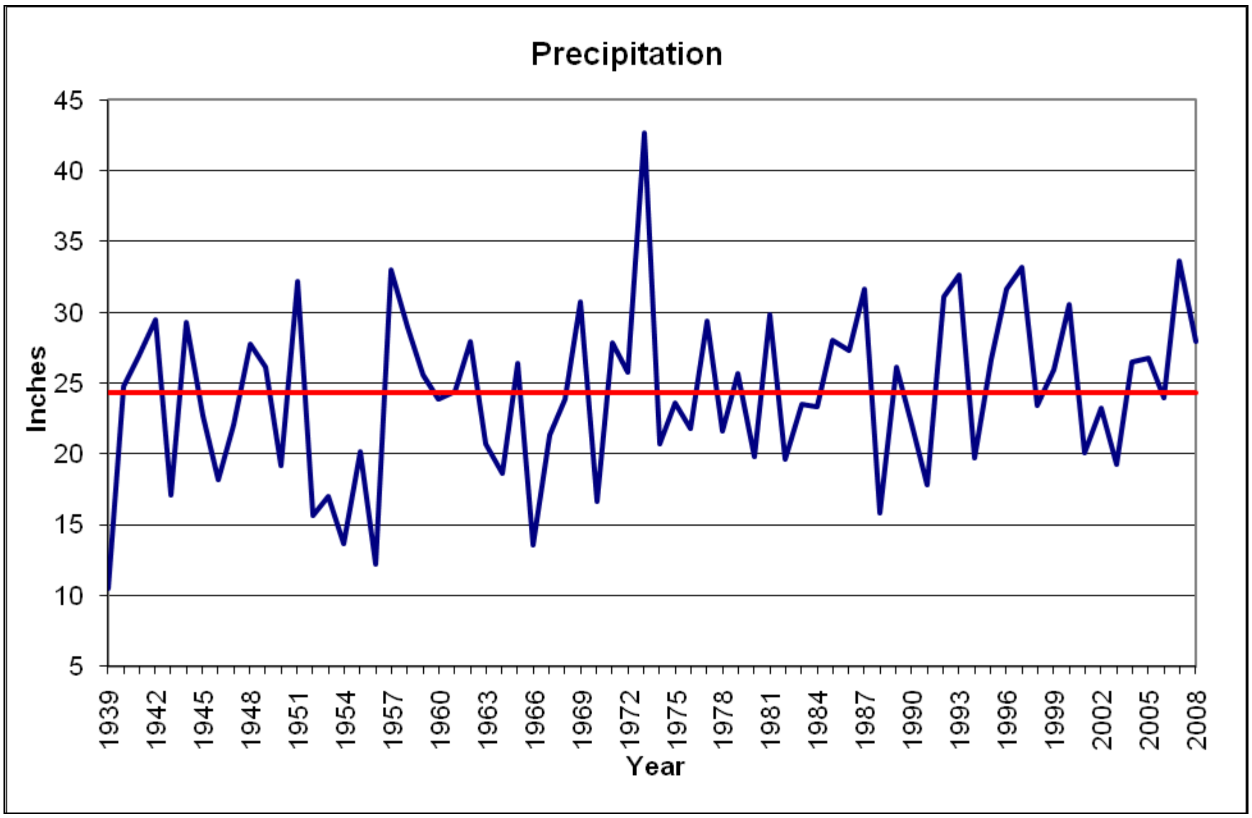


**Figure 2: Rattlesnake Creek Precipitation 1939-2008**

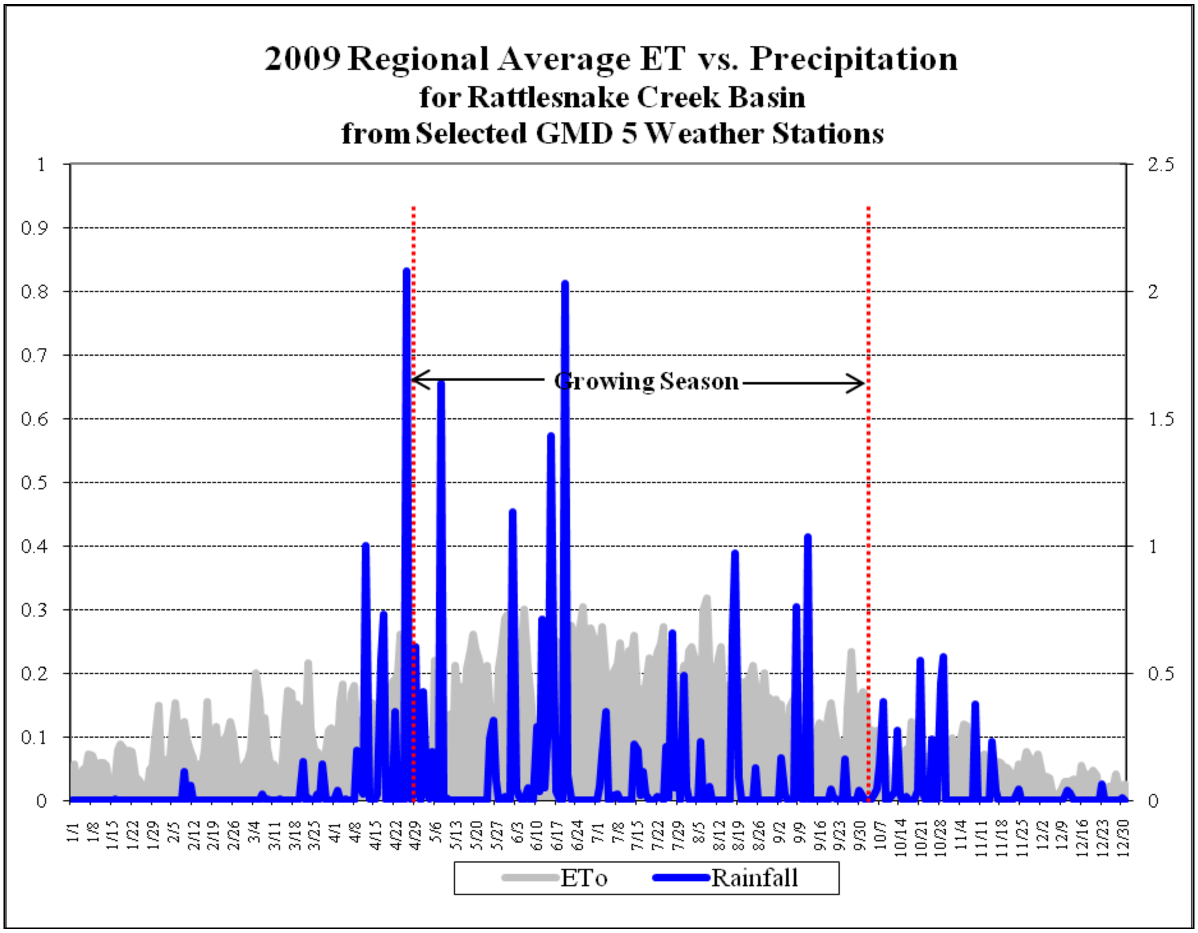


**Figure 3: Precipitation and Evapotranspiration for 2009**

Figure 3 graphs the 2009 evapotranspiration and precipitation conditions in the Rattlesnake Creek subbasin. This information comes from six GMD #5 weather stations: Greensburg, Lewis, Macksville, Radium, Stafford and Sterling. The six stations received an average 27.2 inches of precipitation during 2009. This is significantly greater than the average 24.3 inches of precipitation documented over the period of record for this subbasin. Even with the above average precipitation, the subbasin had a deficit of moisture due to the 41.4 inches of evapotranspiration.

## III. Surface Water

Rattlesnake Creek subbasin has several tributaries. The West Fork, South Fork and East Fork combine to establish the main channel in northern Kiowa County. From there the stream flows northeast. An unnamed ephemeral tributary joins Rattlesnake Creek in southwest Stafford County. Another tributary, Spring Creek, enters the main streambed south of St. John. The other tributary in the subbasin is Wildhorse Creek which joins Rattlesnake Creek north of St. John. Rattlesnake Creek is a perennial stream from just north of St. John to its northerly bend near Quivira National Wildlife Refuge. Otherwise, the stream is classified as intermittent. Rattlesnake Creek has two United States Geological Survey (USGS) streamflow gages, located at Macksville and Zenith (Figure 4). The Macksville gage is the upstream gage and Zenith measures inflow to Quivira.

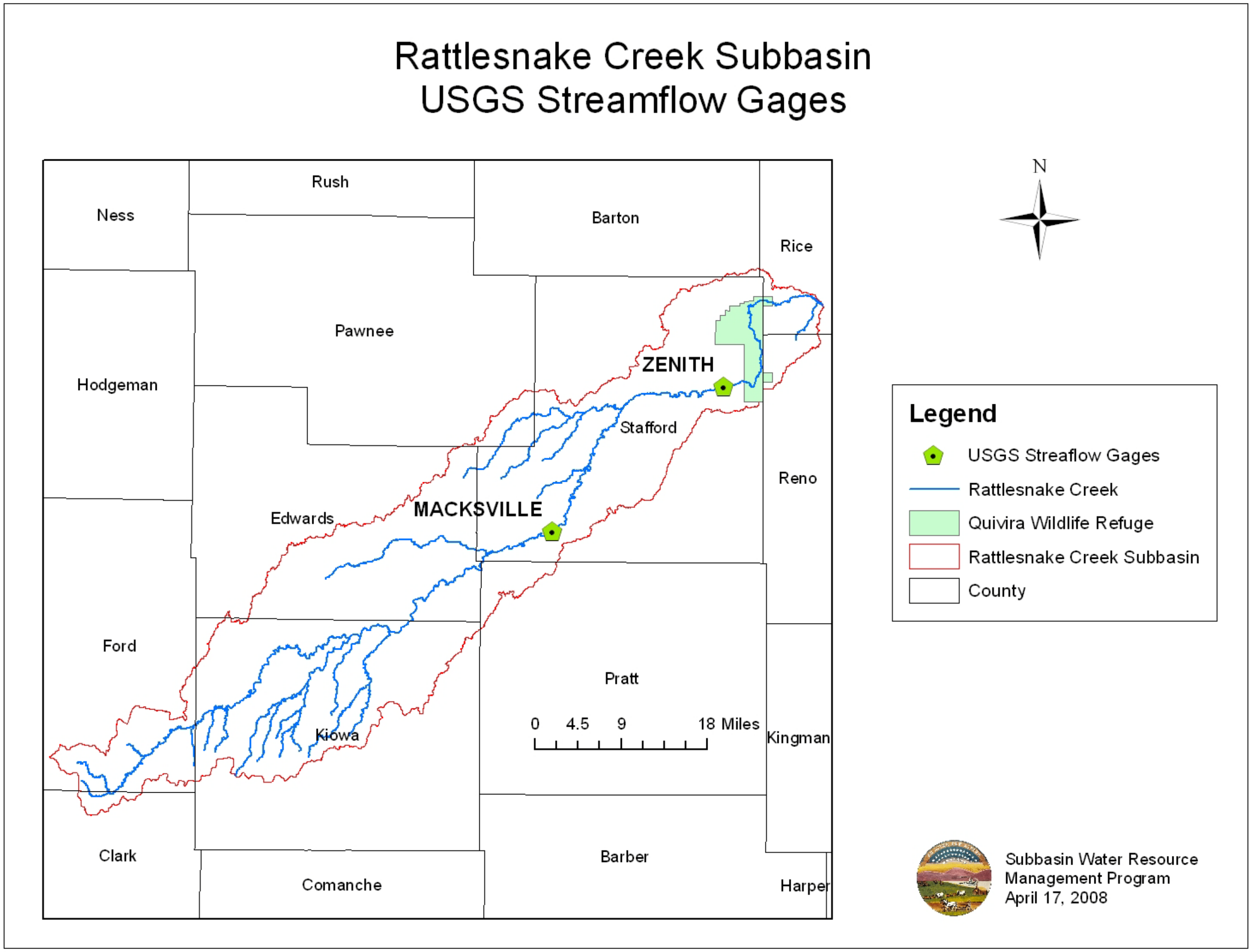


**Figure 4: Rattlesnake Creek USGS Streamflow Gages**

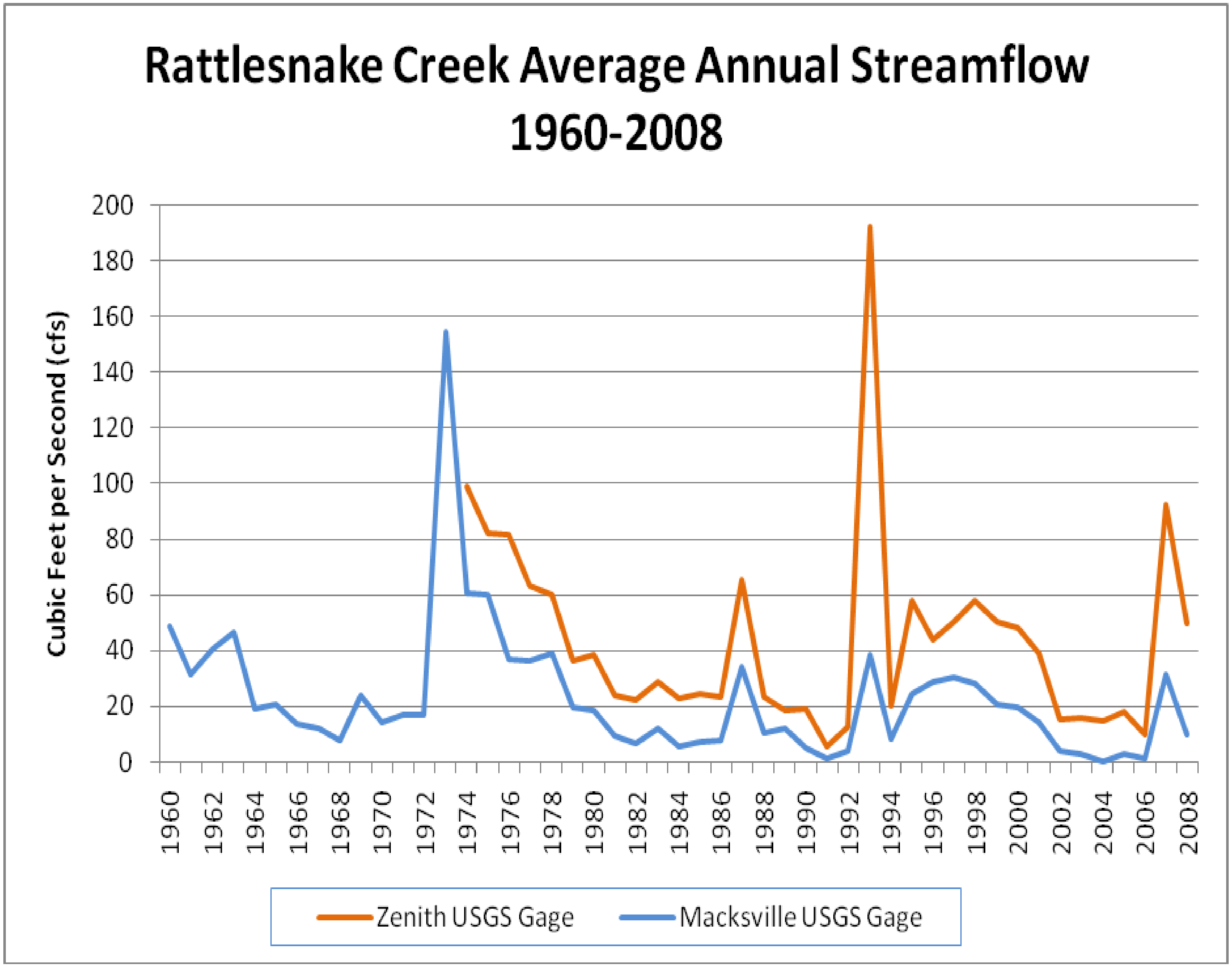


**Figure 5: Streamflow at USGS Gages 1960-2008**

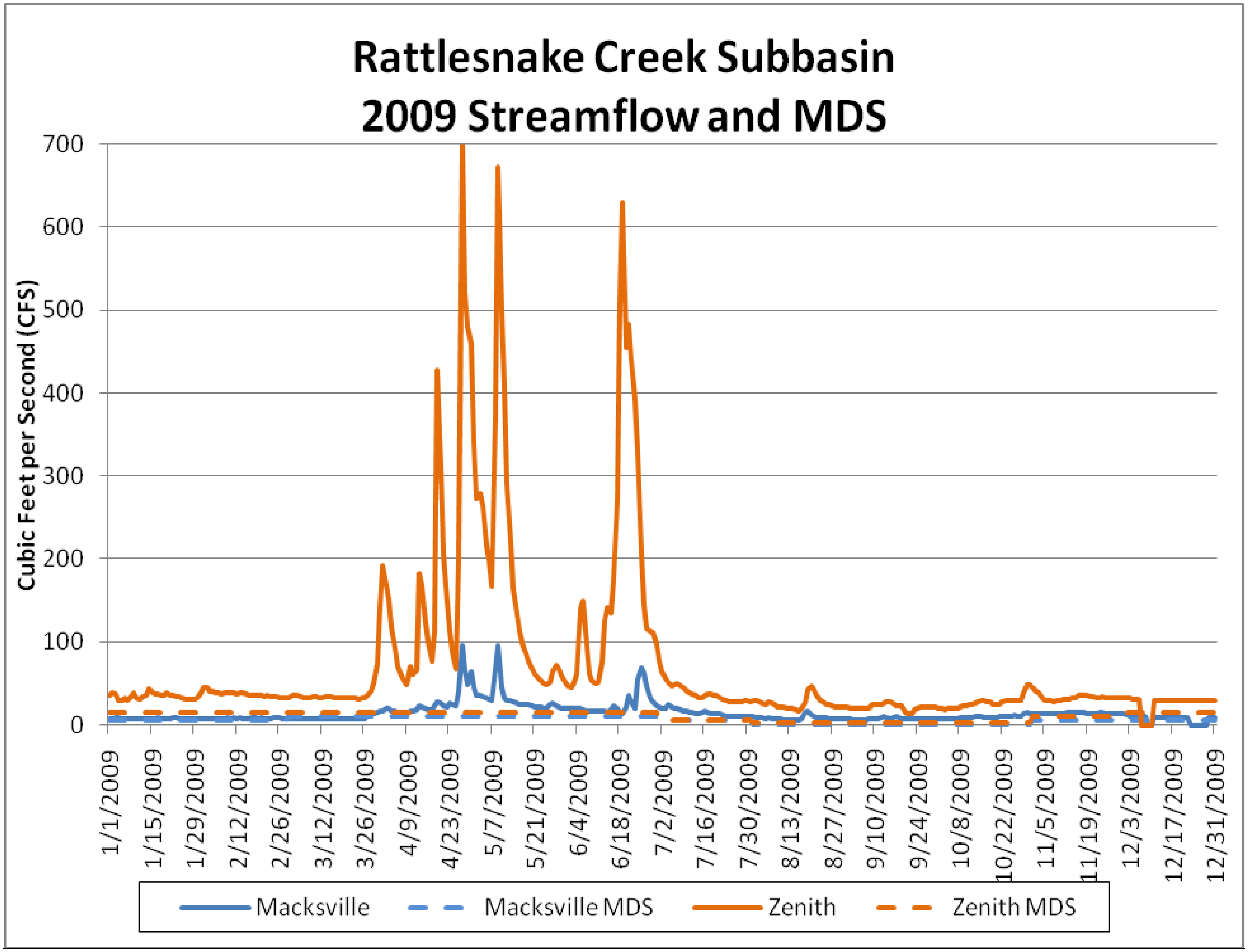


**Figure 6: Daily Streamflow and MDS for 2009**

The Macksville gage is located near where baseflow typically begins for the Rattlesnake Creek, and therefore reflects less baseflow than measurements at Zenith. The Macksville gage record dates to 1960 while recording at the Zenith streamflow gage began in 1974 (Figure 5). Over the periods of record, the average streamflow at Zenith was 43.62 cfs and 22.86 cfs at Macksville. During the 1990s, the Zenith gage had higher flows and averaged 51.08 cfs while the Macksville gage recorded an average 18.97 cfs. Both streamflow gages had reduced streamflows in the period 2000 to 2008, averaging 33.70 cfs at Zenith and 9.56 cfs at Macksville.

**Table 1: Minimum Desirable Streamflow (MDS)**

| Gage | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Macksville | 5 | 5 | 10 | 10 | 10 | 10 | 5 | 1 | 1 | 1 | 5 | 5 |
| Zenith | 15 | 15 | 15 | 15 | 15 | 15 | 5 | 3 | 3 | 3 | 10 | 15 |

In 1984, the Kansas Legislature amended the Kansas Water Appropriations Act to establish Minimum Desirable Streamflow for specific USGS streamflow gages. Table 1 shows MDS for both the Macksville and Zenith USGS streamflow gages. Figure 6 shows the streamflow measurements for 2009. Both Zenith and Macksville started the year above the MDS levels. In the spring of 2009, flows at Macksville dipped below MDS for the only time during the year. Zenith streamflow stayed above MDS for all of 2009.

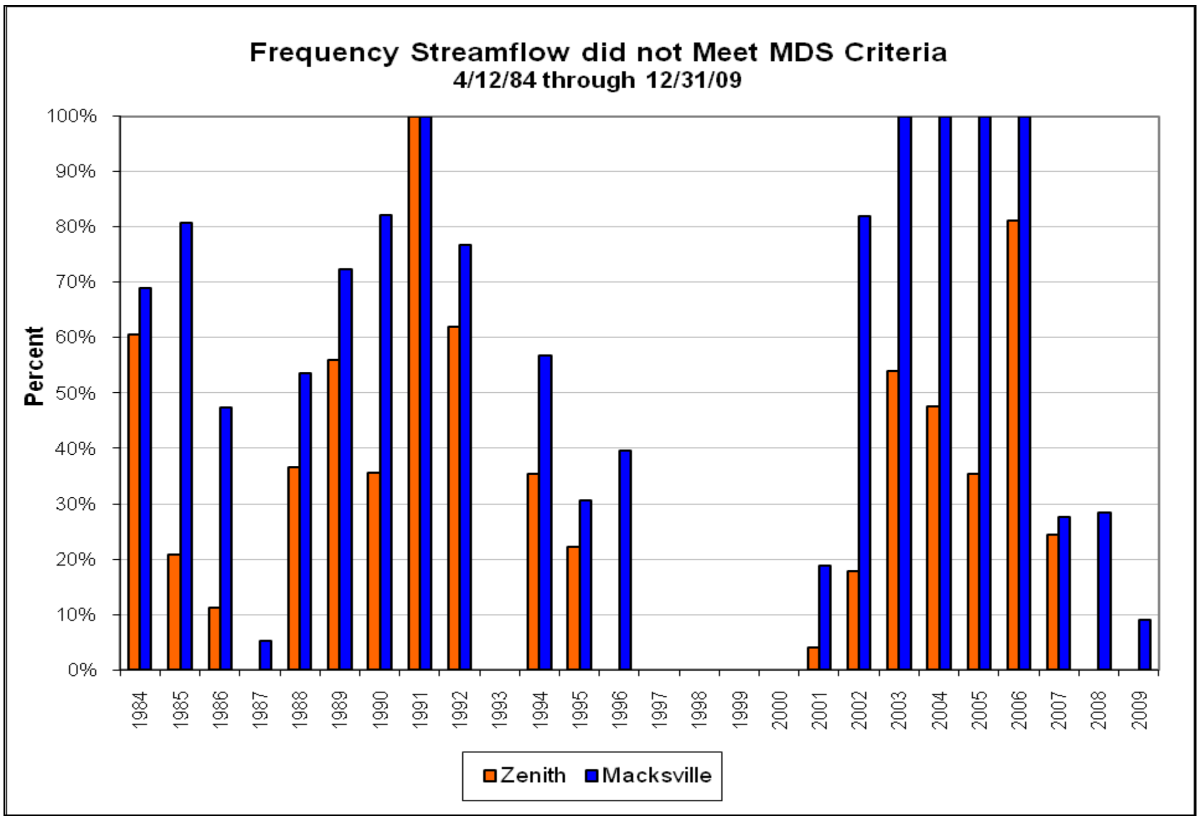


**Figure 7: Streamflow and MDS Criteria**

Since MDS was established in 1984, the streamflow at the Zenith gage has met MDS more often than at the Macksville gage (Figure 7). When a USGS gage station records streamflow for seven consecutive days below the MDS value, administration can begin. Once begun, administration continues until the gage has recorded fourteen consecutive days above the MDS value. The chief engineer can prohibit the use of certain diversions for this period if they are affecting streamflow.

## IV. Groundwater

The majority of the Rattlesnake Creek subbasin overlies the Great Bend Prairie portion of the High Plains aquifer. However, the headwaters begin in the Ogallala portion of the High Plains aquifer. Approximately 80 percent of the southwest portion of the Rattlesnake Creek subbasin is underlain by unconfined Dakota Aquifer. The Dakota Aquifer is considered hydraulically connected to the overlying High Plains aquifer.

GMD #5 and the Kansas Geological Survey in cooperation with KDA-DWR combine efforts to measure 168 wells in the basin annually (Figure 8). KDA-DWR collects additional water level measurements tri-annually in the winter, spring and fall.

Only winter measurements, taken in December, January or February, were used for the monitoring well water level charts, since those measurements are considered to be the least influenced by irrigation well pumping. Figure 9 through Figure 21 chart groundwater levels in all the monitoring wells and the five-year rolling averages. Legal descriptions of the well locations are available in the appendix. The y-axis on each chart is labeled as “DBLS (ft)”. DBLS stands for depth below land surface.

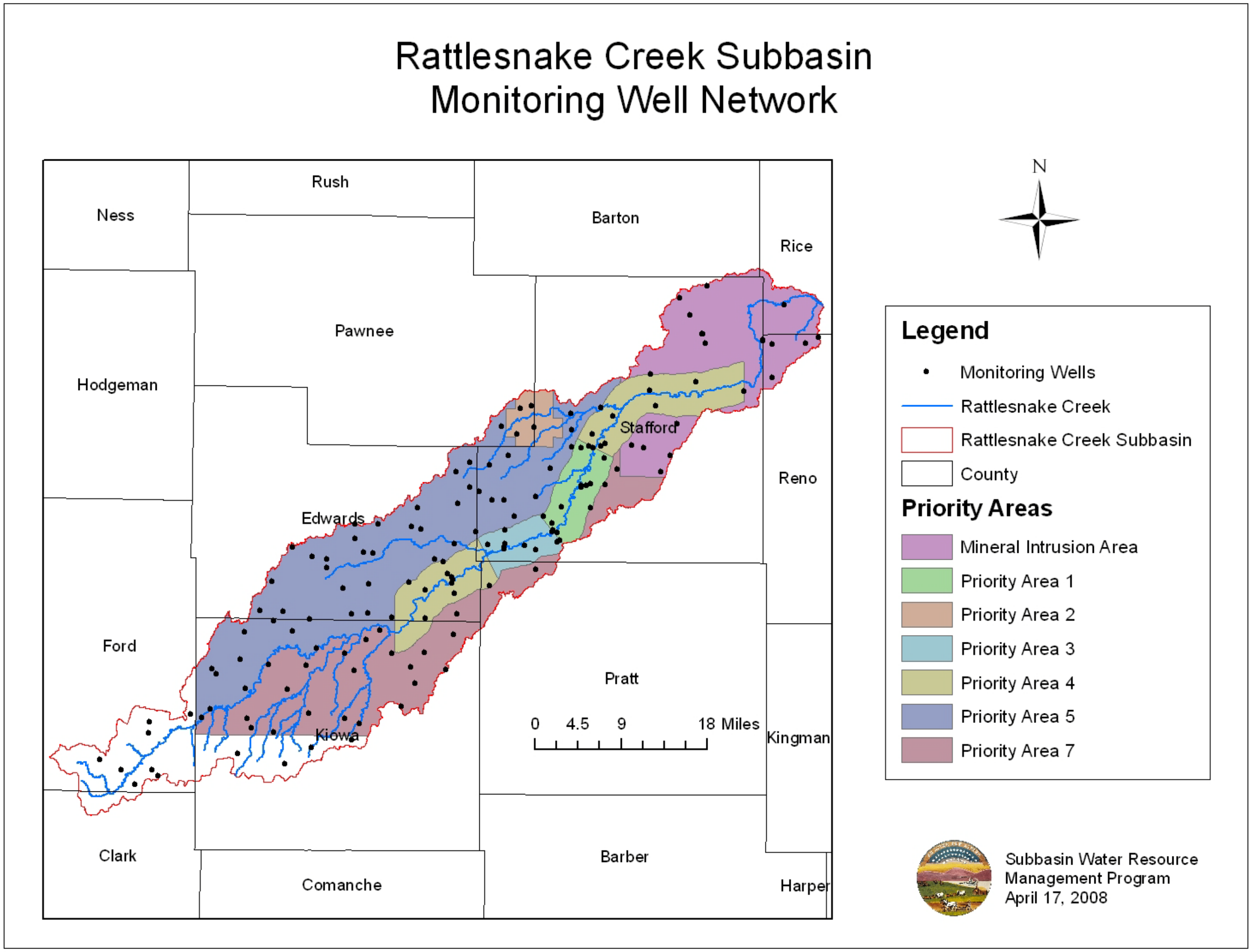


**Figure 8: KGS, GMD 5 and DWR Monitoring Wells**

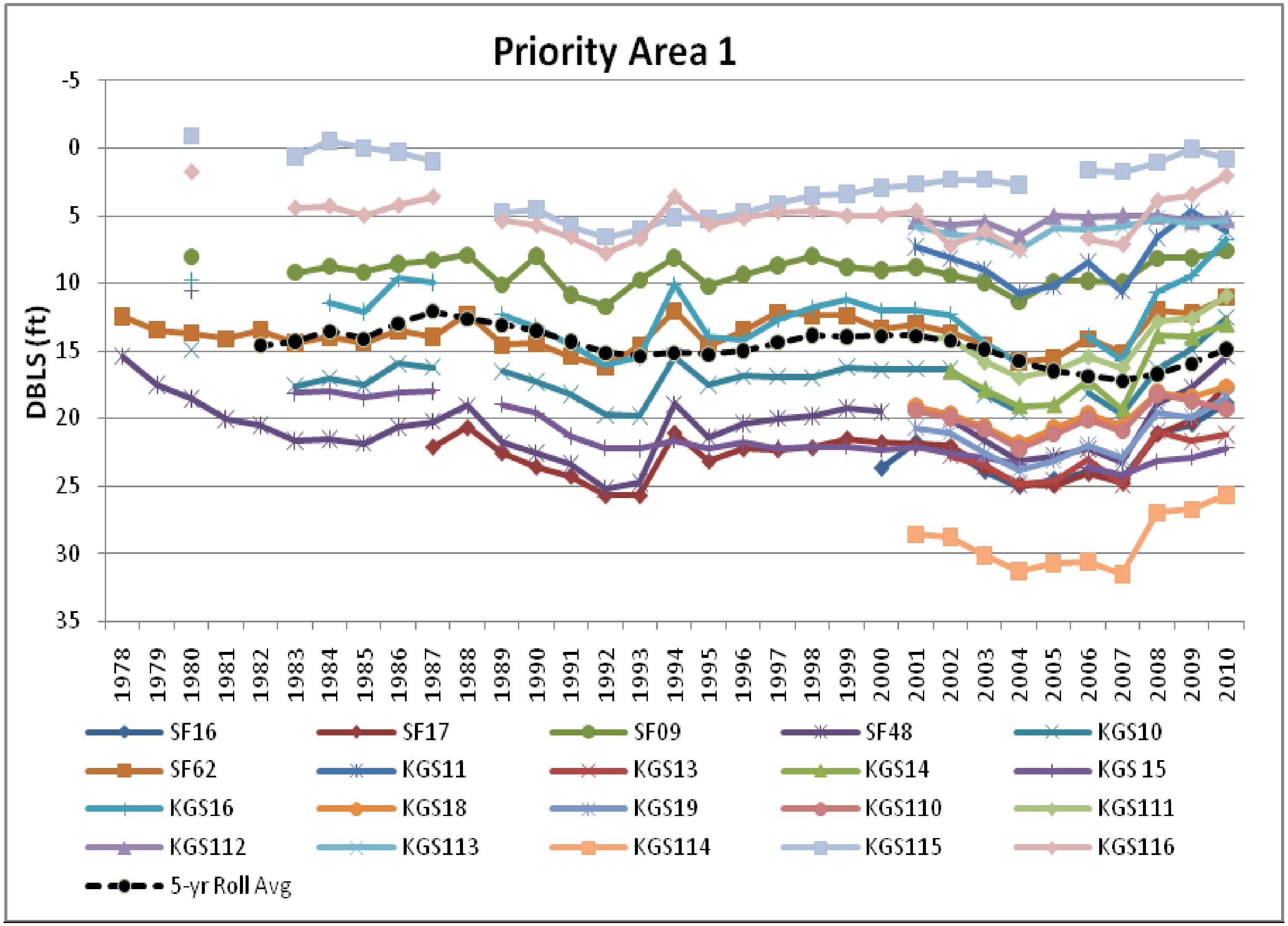


**Figure 9: Monitoring well levels in Priority Area 1**

Priority Area 1 has 20 monitoring wells. KGS115 recorded water level measurements above land surface as this used to be an artesian well. Most of the water levels were down in 2007 but rose in 2008. In 2009, water levels varied including some that leveled off, rose and others that declined. Most water levels continued to increase in 2010. The five-year rolling average increased by 1.08 feet in 2010 (Figure 9).

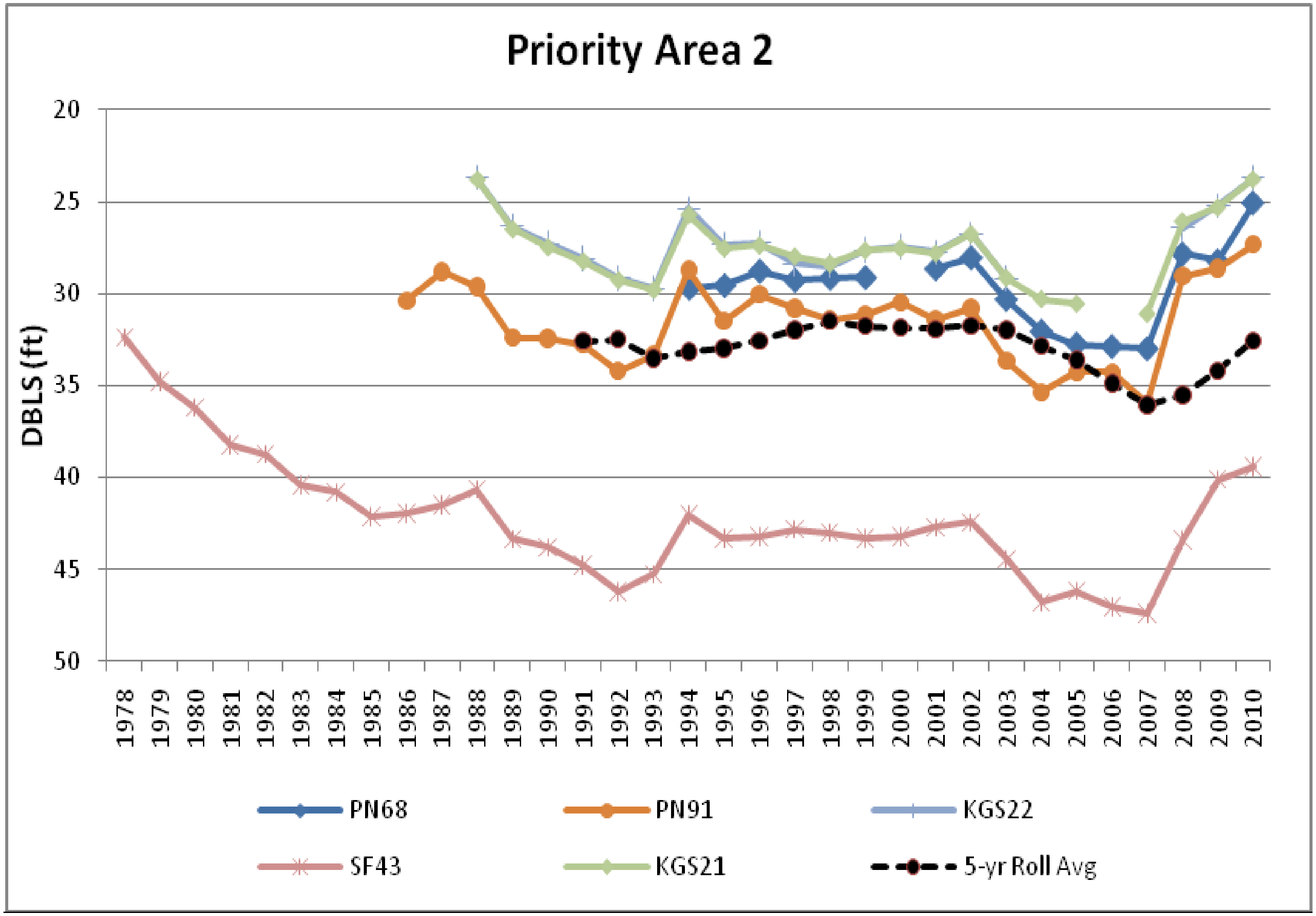


**Figure 10: Monitoring well levels in Priority Area 2**

Priority Area 2 has only five monitoring wells. SF43 has the longest record starting in 1978. Water levels in SF43 have experienced a net decline of 7.04 feet since 1978 despite an increase of 7.98 feet since 2007. All five monitoring wells had an increase in water levels in 2010. The largest was PN68 with 3.17 feet. After another rise in water levels, the 5-year rolling average is nearly level with 1991 water levels (Figure 10).

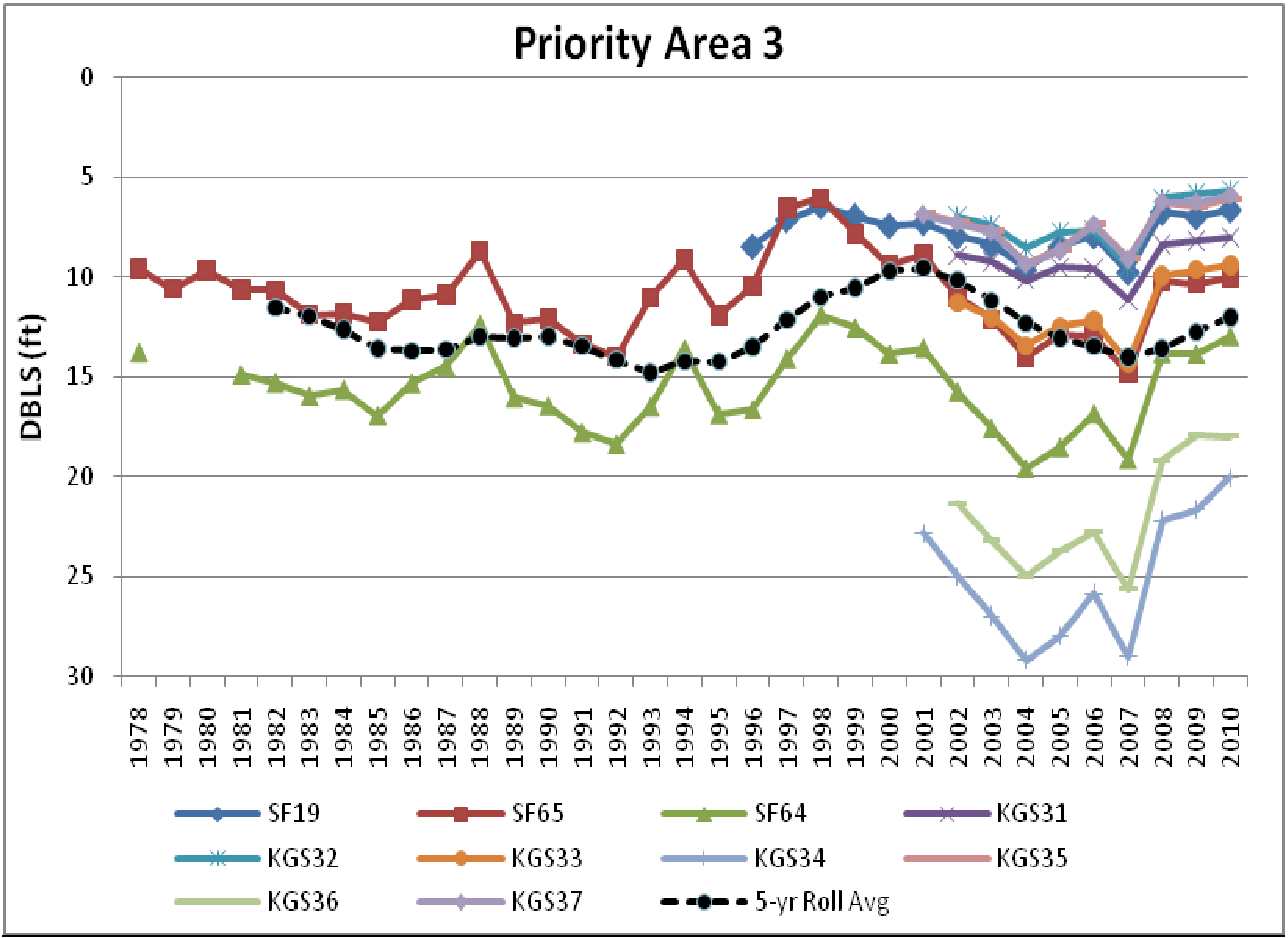


**Figure 11: Monitoring well levels in Priority Area 3**

Priority Area 3 has 10 monitoring wells. All the monitoring wells except for one had an increase in water levels in 2010. The largest increase was KGS 34 with 1.59 feet. KGS36 had the only declining water level. The five-year rolling average also saw another rise in 2010 and now has a net decline of 0.49 feet (Figure 11).

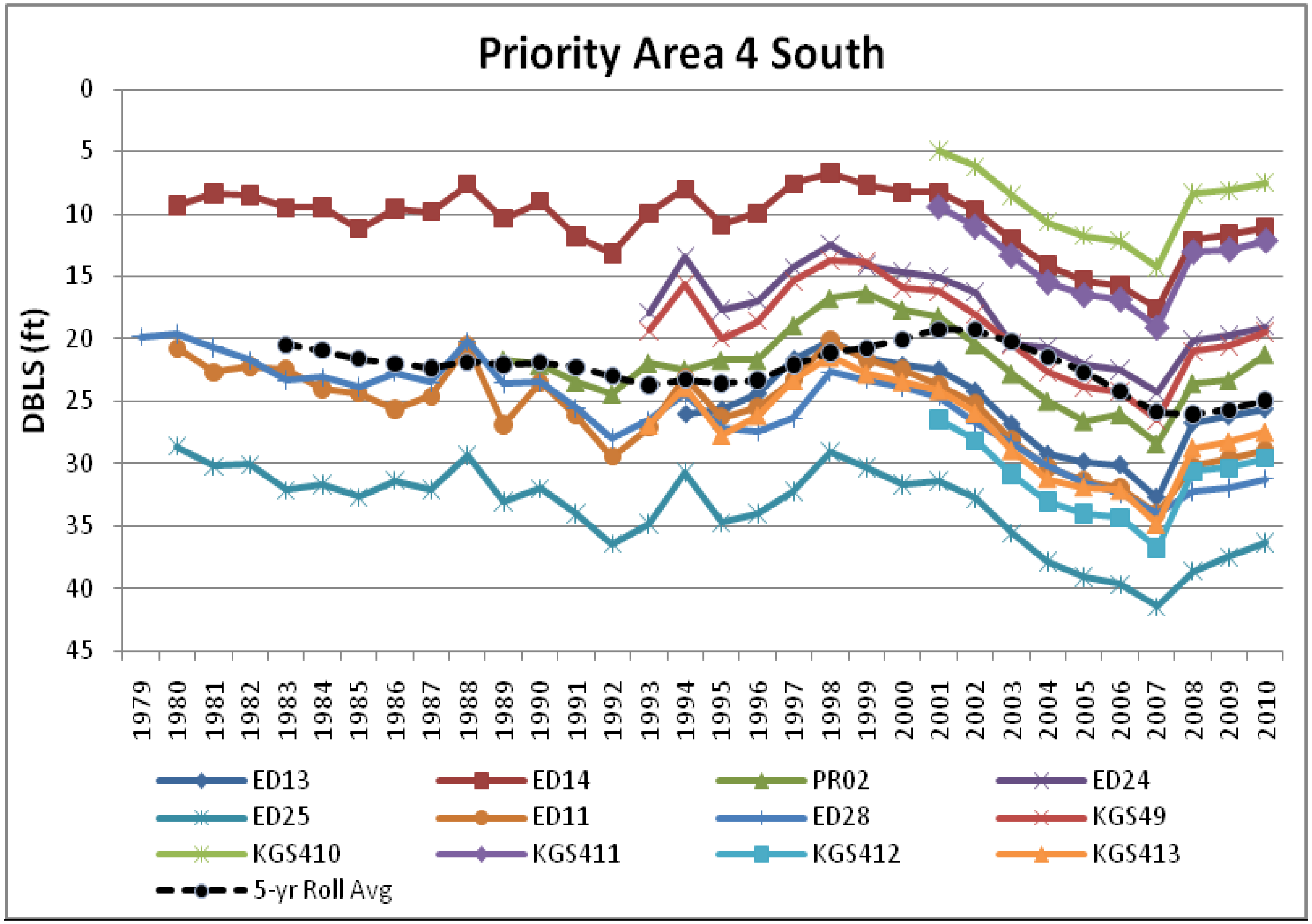


**Figure 12: Monitoring well levels in Priority Area 4 South**

Priority Area 4 is divided into two areas along the main stem corridor, South and North. South is upstream located primarily in Edwards County and has 12 monitoring wells. The water levels had a declining trend from the late-1990s to 2007. In 2009, the water levels leveled off or had a slight increase. That trend continued in 2010. The five-year rolling average slightly increased (0.74 feet) between 2009 and 2010 but exhibits a net decrease of 4.48 feet since 1983 (Figure 12). Three wells, ED14, ED11, ED25 and ED28 have measurements dating back to at least 1980. The net declines in these wells since 1980 are 2.38 feet, 8.82 feet, 8.85 feet and 11.4 feet respectively.

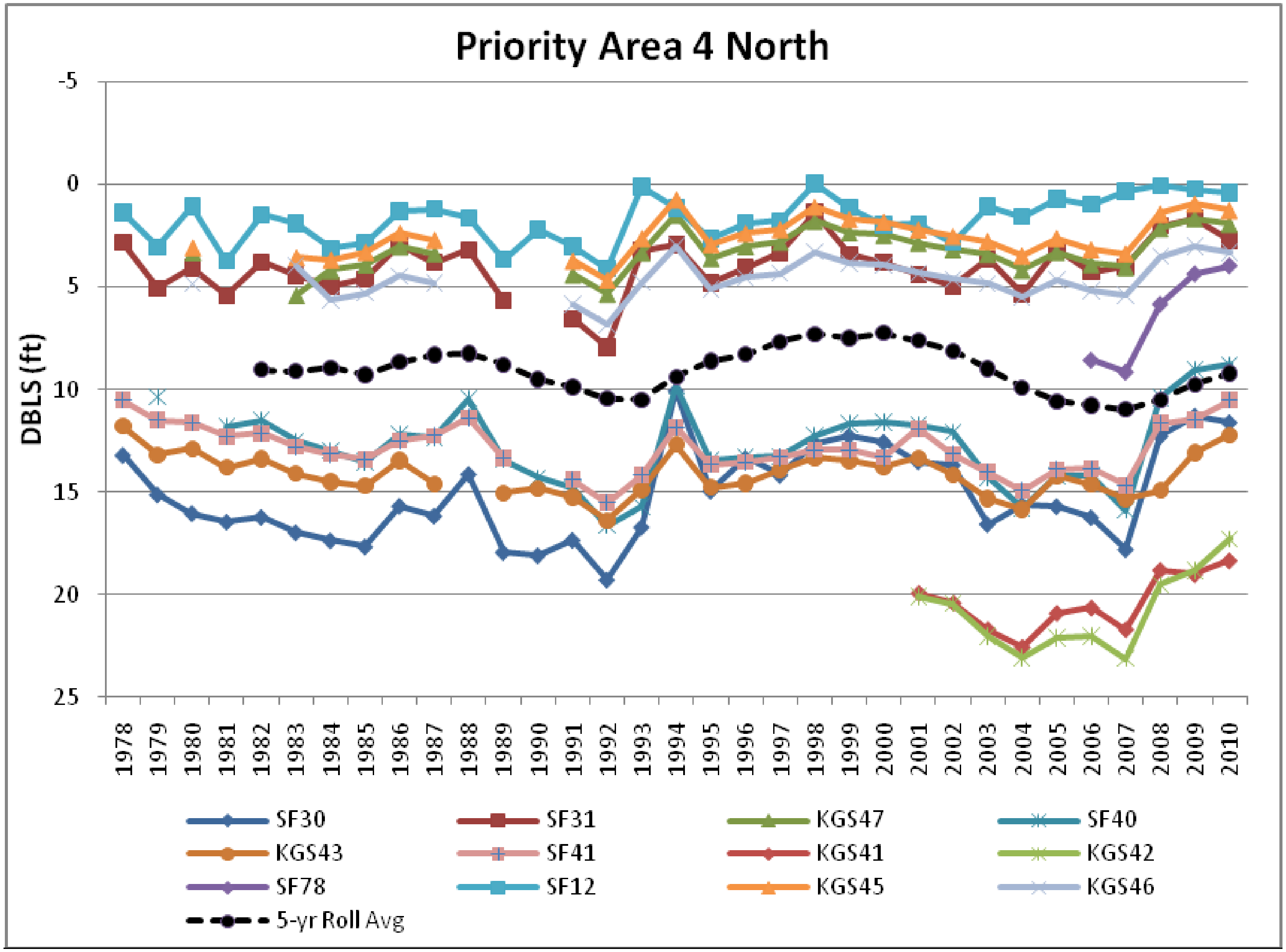


**Figure 13: Monitoring well levels in Priority Area 4 North**

Priority Area 4 North has 12 monitoring wells and is located primarily in Stafford County. Half of the monitoring wells saw increased water levels in 2010 (Figure 13). The biggest increase was in KGS42 (1.53 feet). The five-year rolling average increased in 2010 and has reached the same level as 1982.

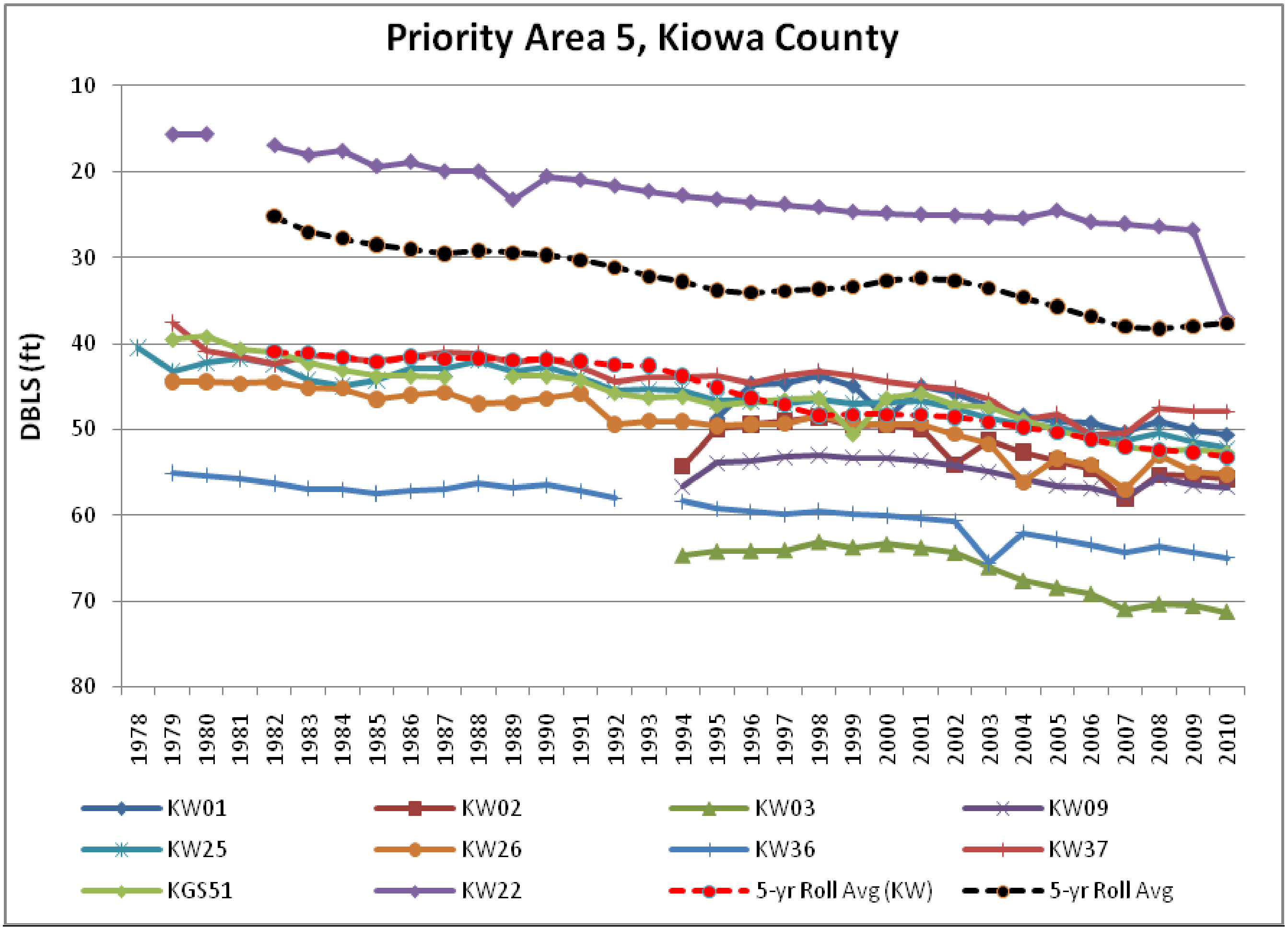


**Figure 14: Monitoring well levels in Priority Area 5, Kiowa County**

Because of its size and hydrologic variability, Priority Area 5 is charted on three separate graphs separated by county. Kiowa County has 10 monitoring wells. Each of the wells exhibits a long-term declining trend in water levels except for moderate increases in groundwater levels in 2008. The Kiowa County five-year rolling average declined a net 12.28 feet since 1982. The Priority Area 5 five-year rolling average has declined a net 12.45 feet since 1982 (Figure 14).

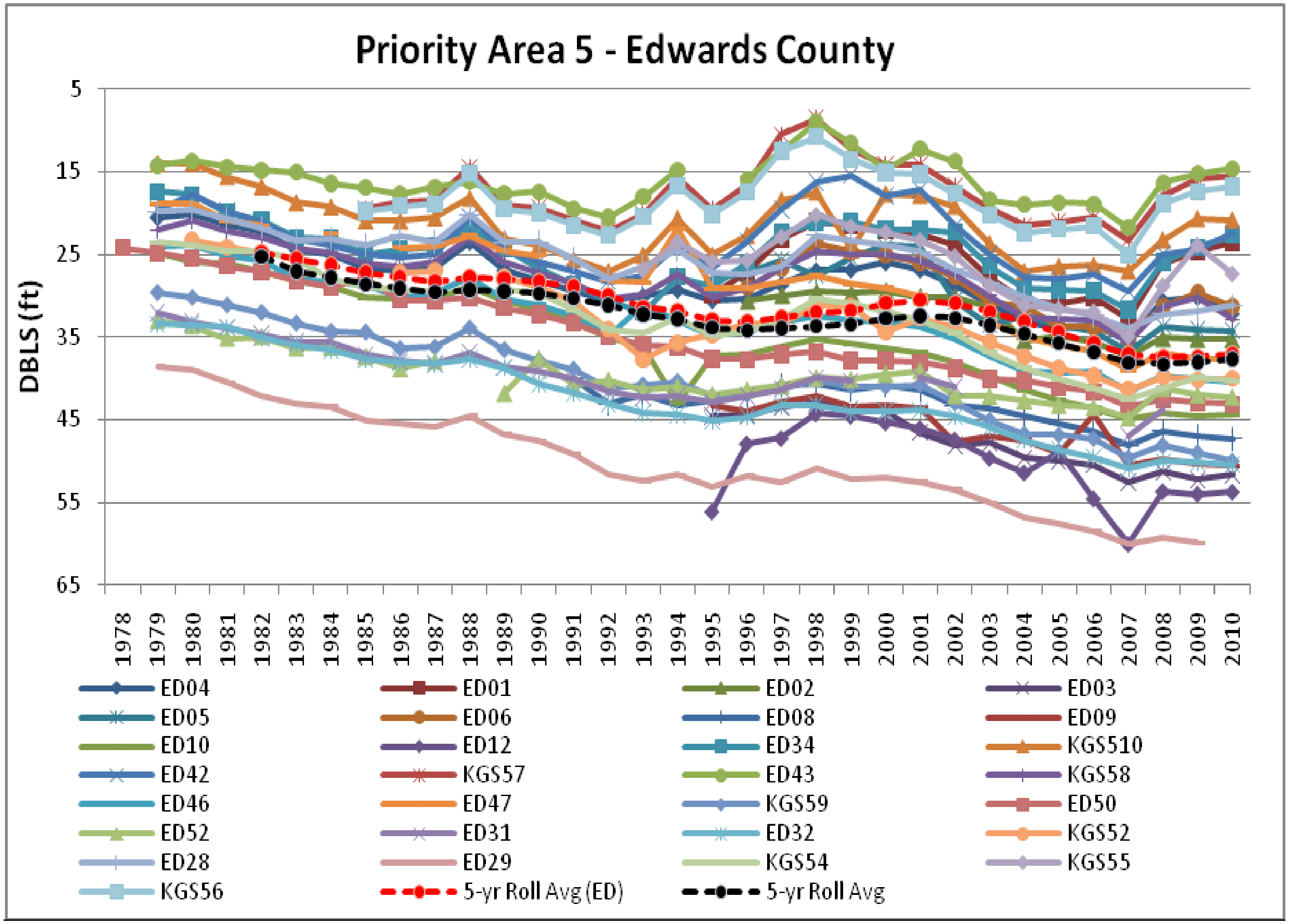


**Figure 15: Monitoring well levels in Priority Area 5, Edwards County**

Priority Area 5 in Edwards County has 29 monitoring wells. Many of the measurements began in 1979. The water level trend is declining with a few increases during recharge years. ED50 has the longest record dating back to 1978. Since 1978, water levels have declined a net 18.74 feet. Some water levels continued to increase but many of the deeper wells declined in 2009. In 2010, fourteen of the 29 wells had an increase in water levels (Figure 15). The Edwards County (red line) five-year rolling average exhibits a net decline of 12.25 feet since 1982.

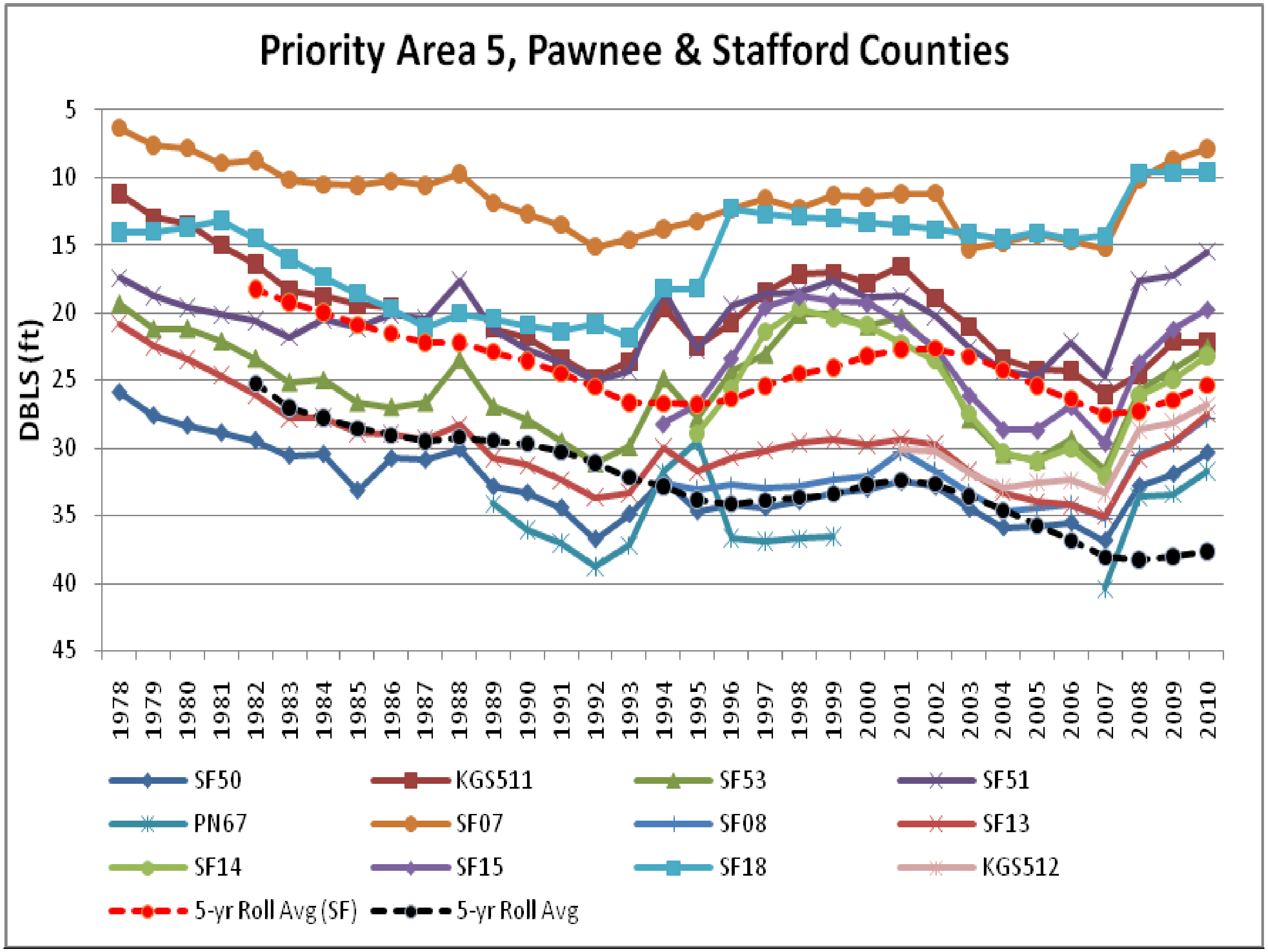


**Figure 16: Monitoring well levels in Priority Area 5, Stafford and Pawnee Counties**

Priority Area 5 in Stafford and Pawnee counties includes 12 monitoring wells. Seven wells were first measured in 1978. Eleven of the twelve wells had an increase in water levels in 2010(Figure 16). The Stafford/Pawnee County five-year rolling average (red line) declined a net 7.06 feet since 1982 even with slight increases in the 2008 through 2010 period.

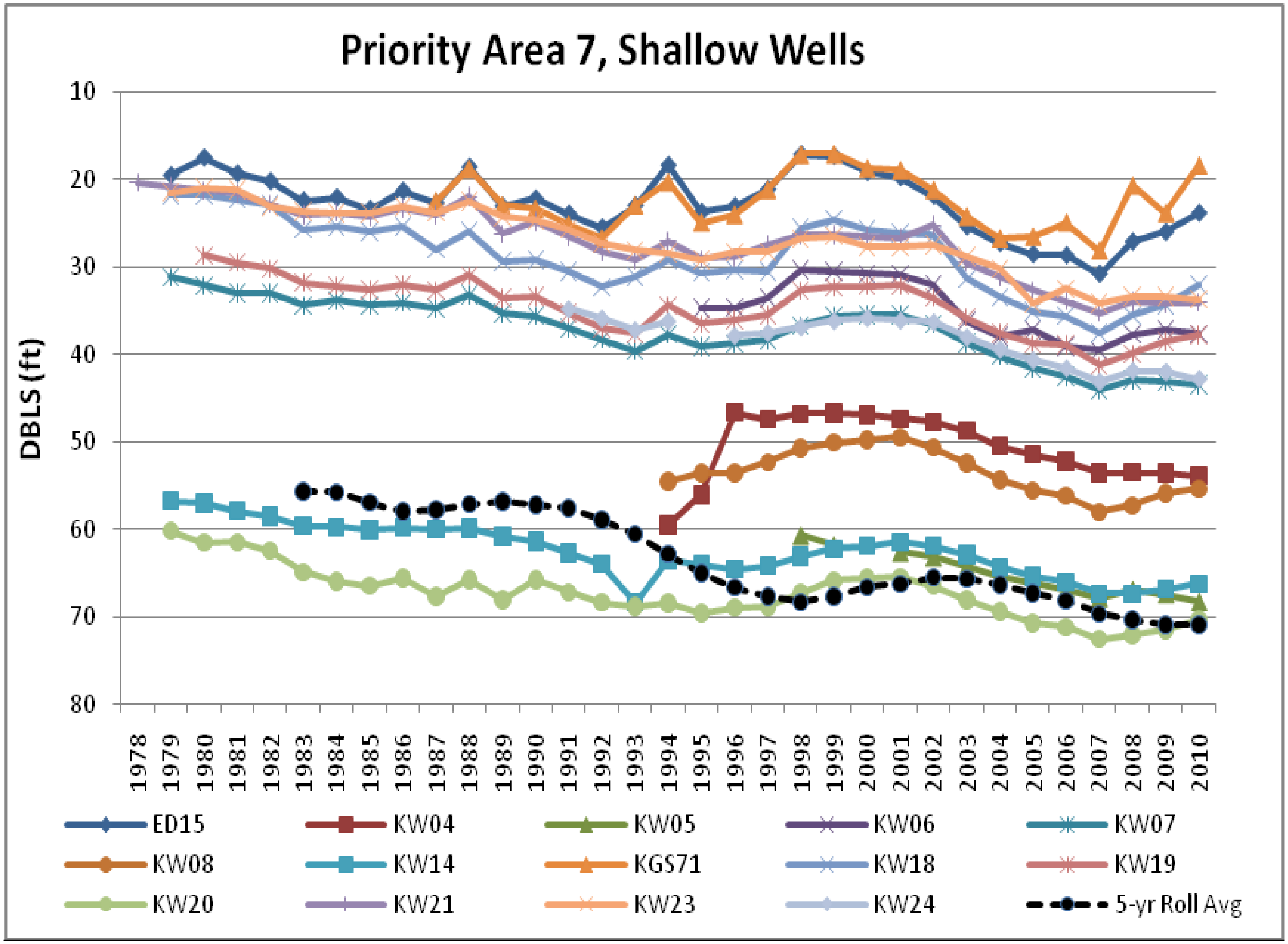


**Figure 17: Monitoring well levels in Priority Area 7, Shallow Wells (Note: Rolling Average includes ALL wells in the Priority Area)**

Priority Area 7 has 23 monitoring wells. The monitoring wells were charted separately based on depth to water. Figure 17 charts the shallow depth to water wells whereas Figure 18 charts the deeper wells. Eight of the fourteen shallow wells had increasing water levels in 2010. The 5-year rolling average for all the wells has a net decline of 15.23 feet (Figure 17).

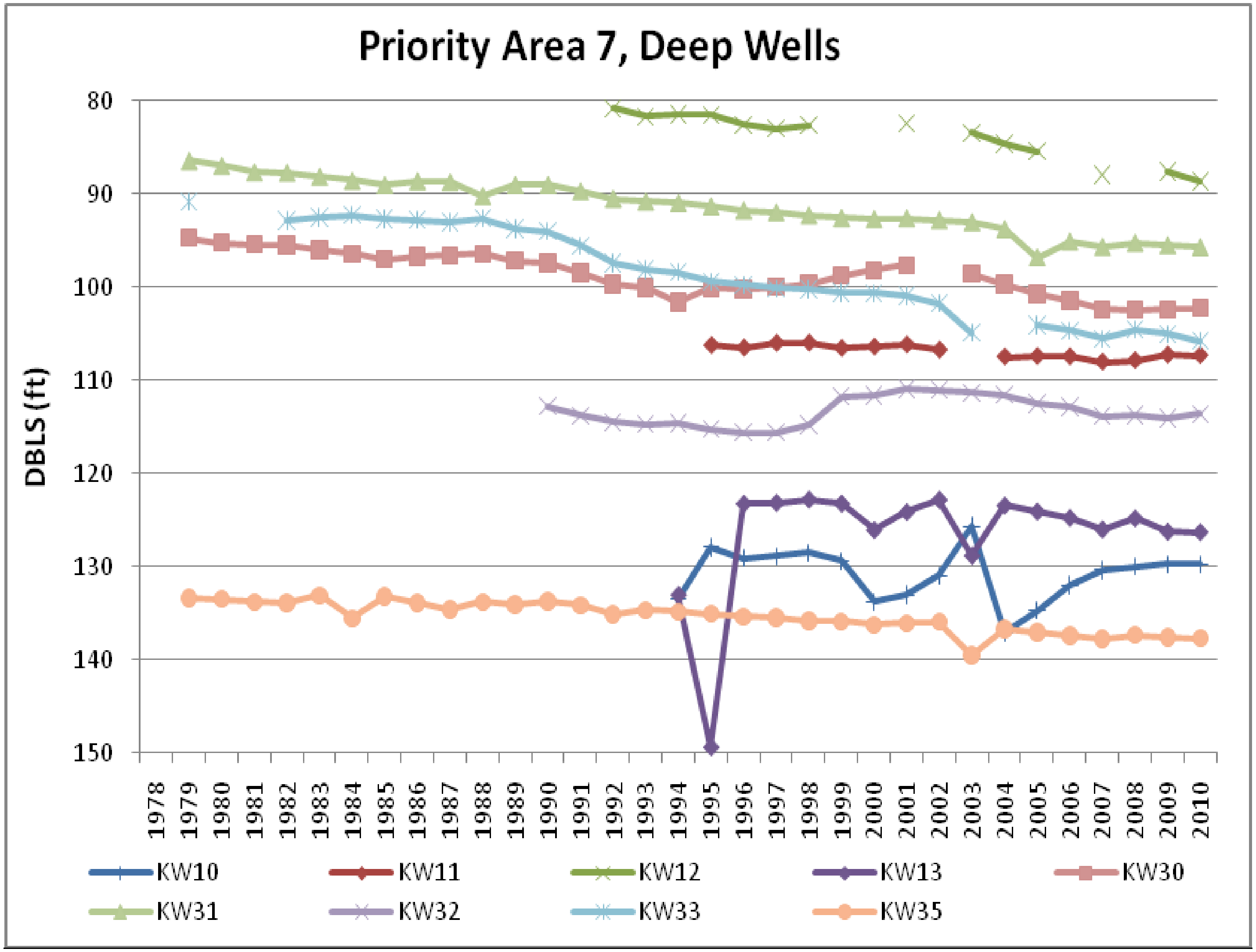


**Figure 18: Monitoring well levels in Priority Area 7, Non-Alluvial Wells**

Records for wells KW31, KW35 and KW30 began in 1979. All three have experienced declining groundwater trends over the 28-year record. In 2010, the wells saw an increasing trend in water levels (Figure 18). The five-year rolling average shown on Figure 17 includes all the wells within the priority area, including those plotted on Figure 18.

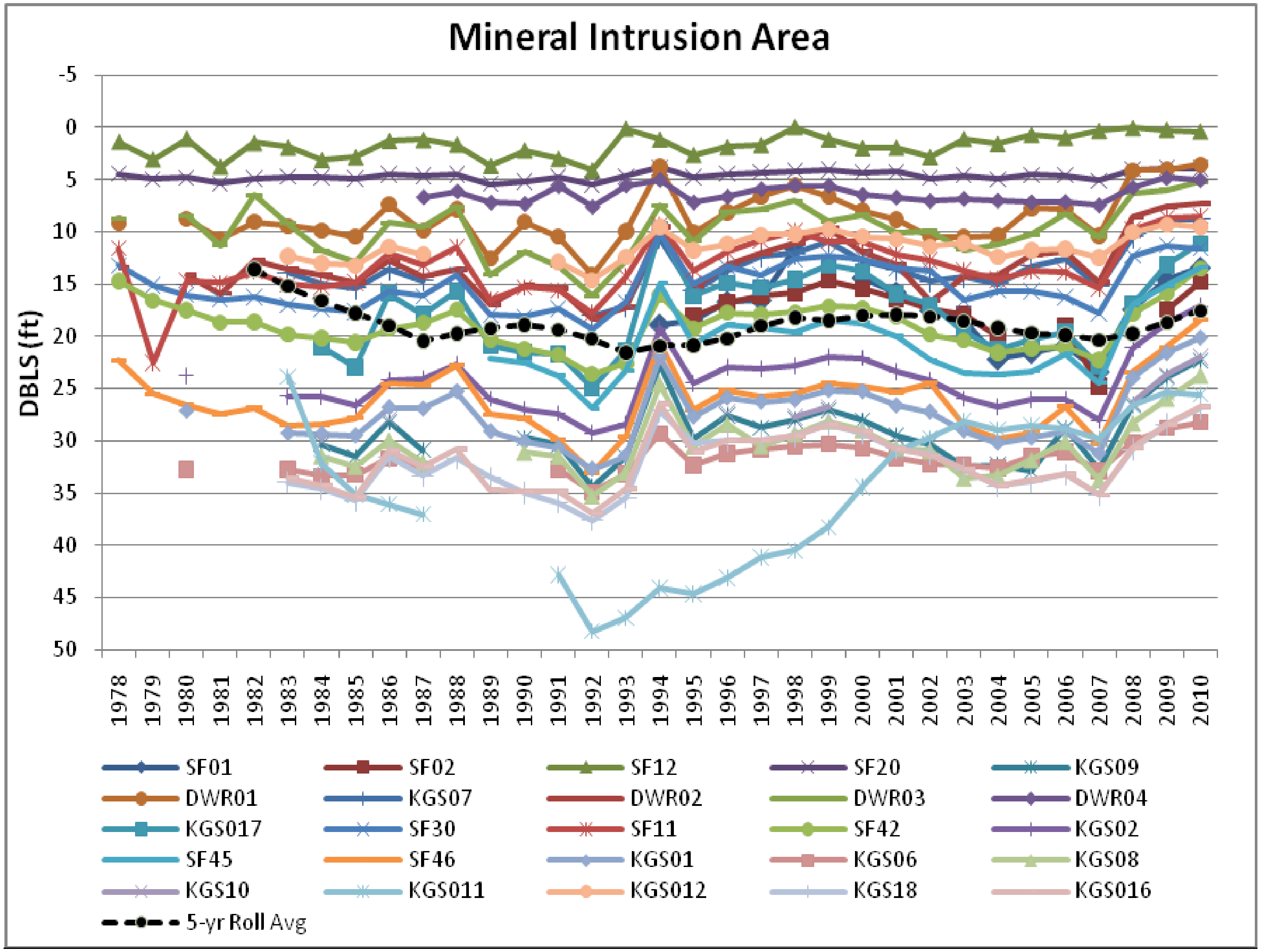


**Figure 19: Monitoring well levels in Mineral Intrusion Area**

The Mineral Intrusion Priority Area has 25 monitoring wells. All but six water levels continued to increase in 2010. KGS11 has a unique trend declining steadily until 1992 (24.43 feet) and then increasing by a net 22.67 feet through 2010. Even though the five-year rolling average increased in 2010 it still has net decline of 3.98 feet since 1982 (Figure 19).

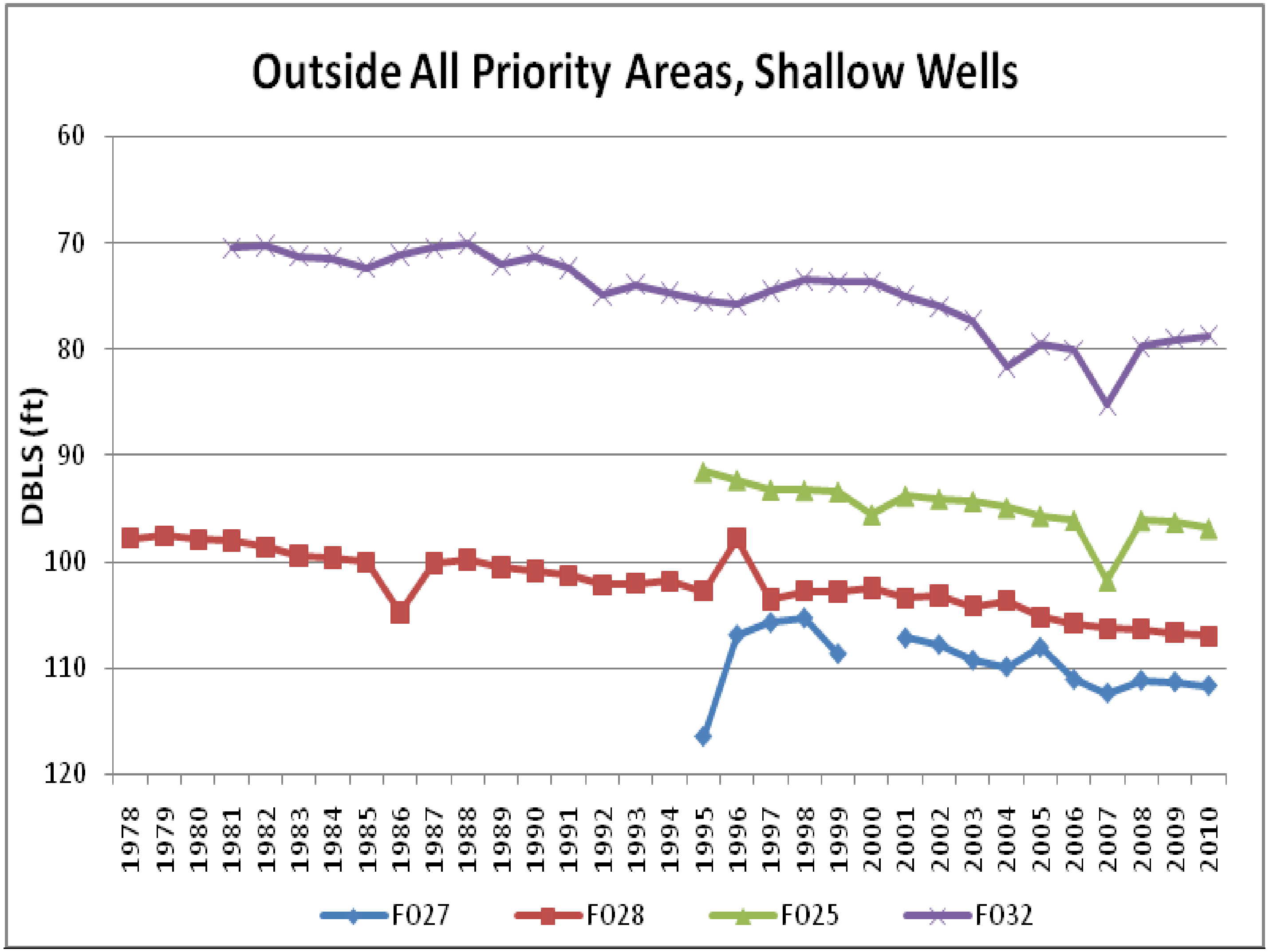


**Figure 20: Monitoring well levels outside all Priority Areas, More Shallow Wells**

Twelve monitoring wells fall outside the defined priority areas. They have been charted based on depth to water. Three of the four shallow wells have seen net declines. In 2010, all but FO32 had declining water levels (Figure 20). The five-year rolling average for all of the wells outside the defined priority areas is shown on Figure 21.

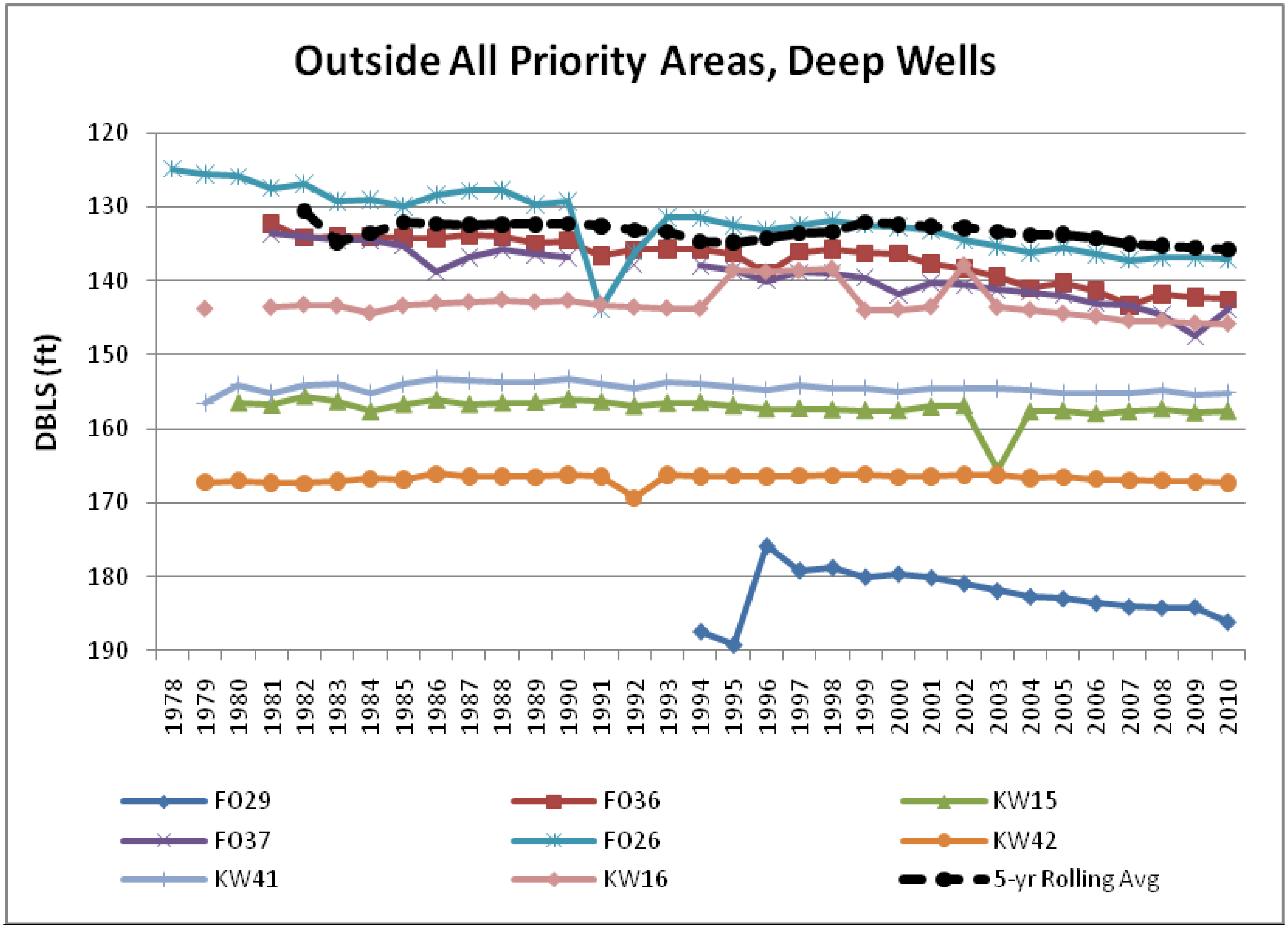


**Figure 21: Monitoring well levels outside all Priority Areas, Deeper Wells**

FO26 has declined a net 12.25 feet since 1978 while other wells, KW41, KW15 and KW42, maintained their water levels over the nearly 30-year time span. Seven deep wells had a decline in water levels in 2010. The five-year rolling average may be affected by the shallow wells added in the 1990s but since 1999 water levels have declined 3.73 feet (Figure 21).

# V. Water Use

The Rattlesnake Creek subbasin has a total of 1,381 water rights with an authorized quantity of 267,800 acre-feet (Table 2). A small percentage of the water rights in the basin are vested. Water uses considered in this report include: irrigation, municipal, domestic, stock, recreation and industrial (Figure 23).

**Table 2: Water Rights in the Rattlesnake Creek Subbasin**

| Source | Number of Rights | Authorized Quantity |
|---|---|---|
| Groundwater | 1,376 | 252,898 |
| Surface Water | 5 | 14,902 |

Water use ranges from 216,347 acre-feet in 2002 to 119,204 acre-feet in 1997. The average water use over the twenty-year span was about 176,809 acre-feet. Water use in 2008, the most recent year for which complete records are available was 179,287 acre-feet. This is an increase from 2007 and also slightly above the average for the subbasin (Figure 22).

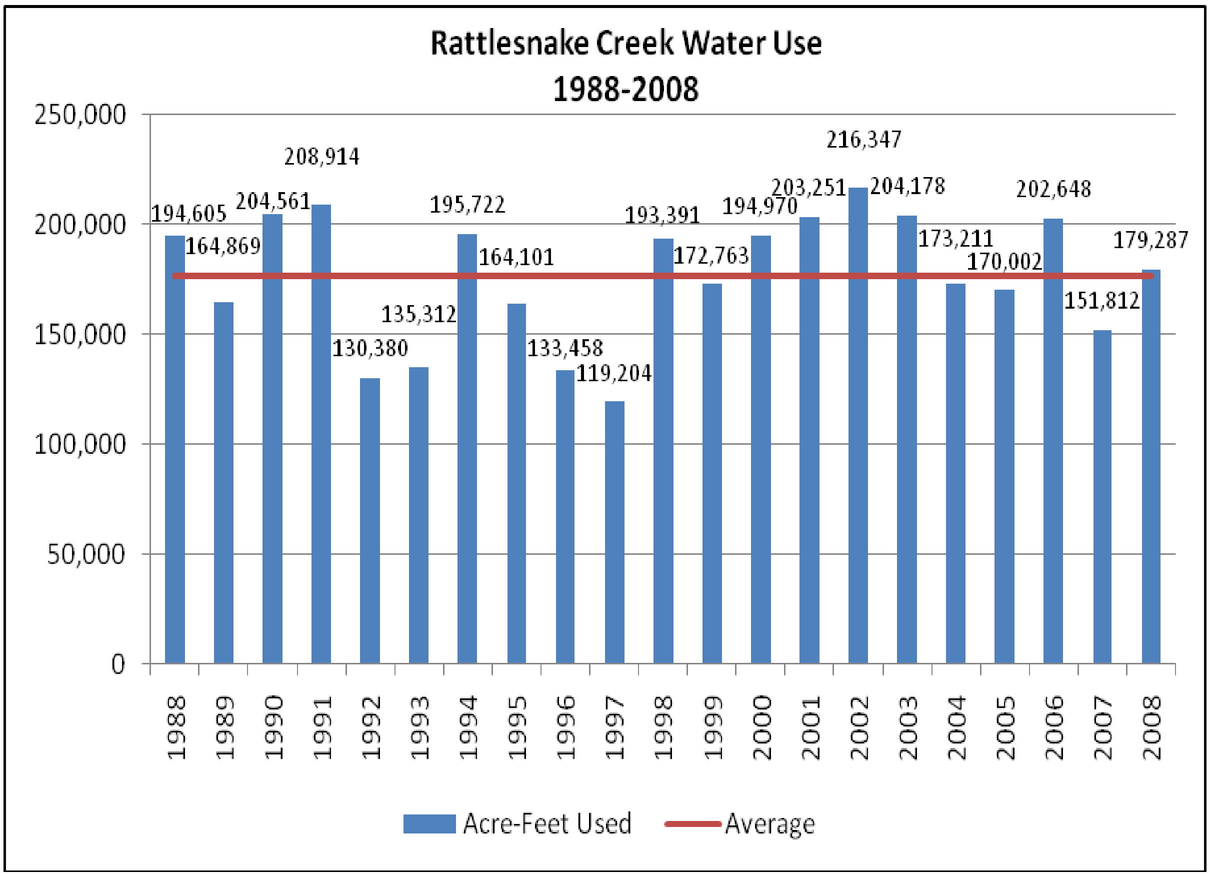


**Figure 22: Groundwater and Surface Water use by year**

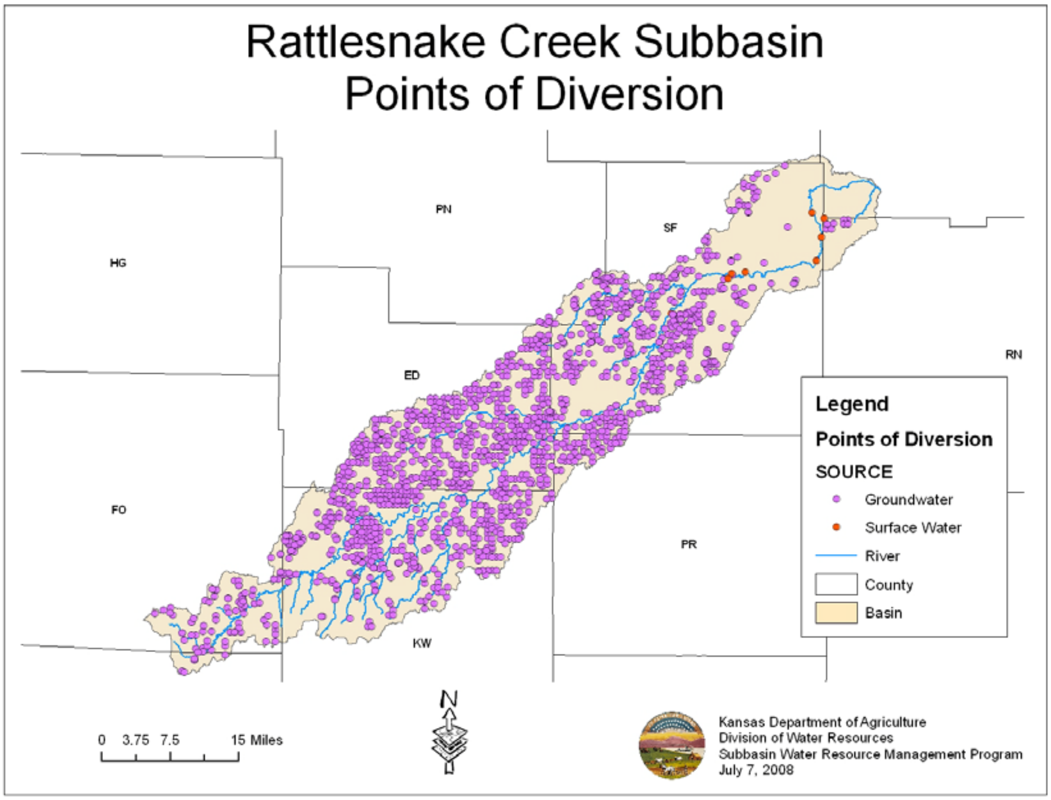


**Figure 23: Rattlesnake Creek Points of Diversion**

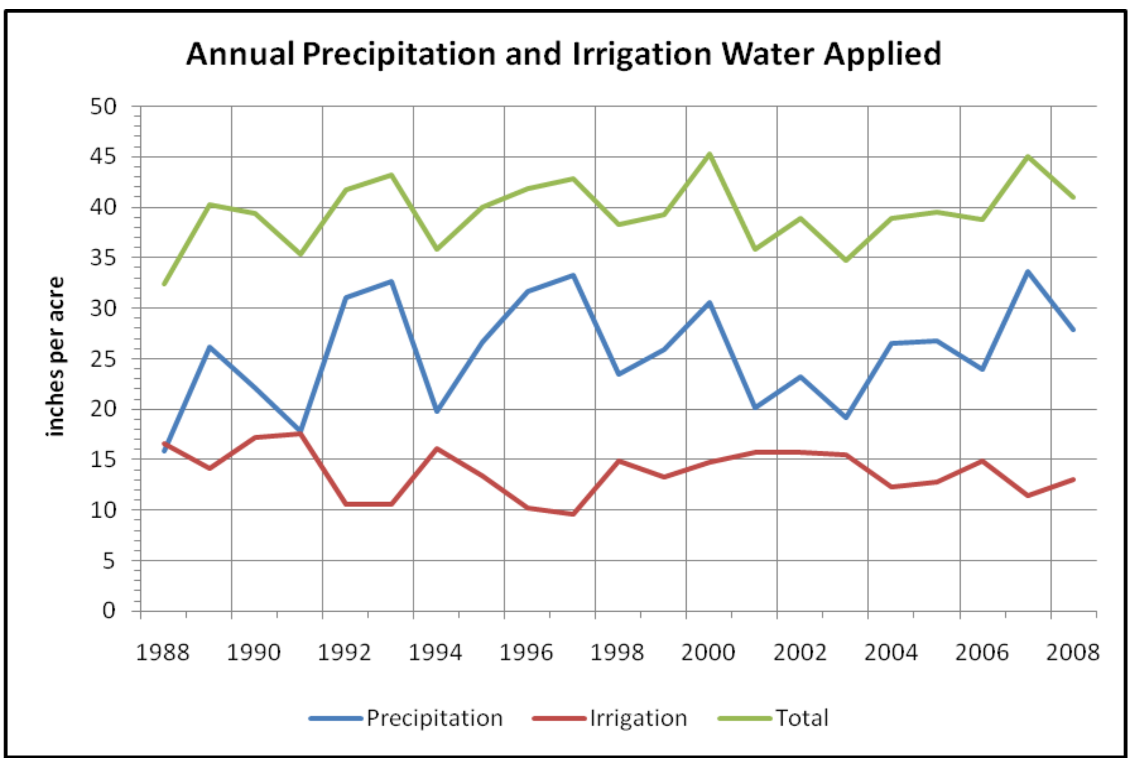


**Figure 24: Annual Precipitation and Irrigation (inches per acre) 1988-2008**

Irrigation pumping is the number of inches applied to an acre for that year. As more precipitation falls, irrigation pumping declines (Figure 24). For the period 1988 to 2008 Rattlesnake Creek subbasin received an average of 25.6 inches of precipitation while water users applied an average of 13.8 inches per year of water for irrigation. Every year with below average precipitation had above average irrigation. 2008 saw 27.9 inches of precipitation and 13.1 inches of irrigation water applied. The timeliness of precipitation affects the amount of irrigation water applied. Figure 25 compares irrigation season (May through October) precipitation with irrigation water applied.

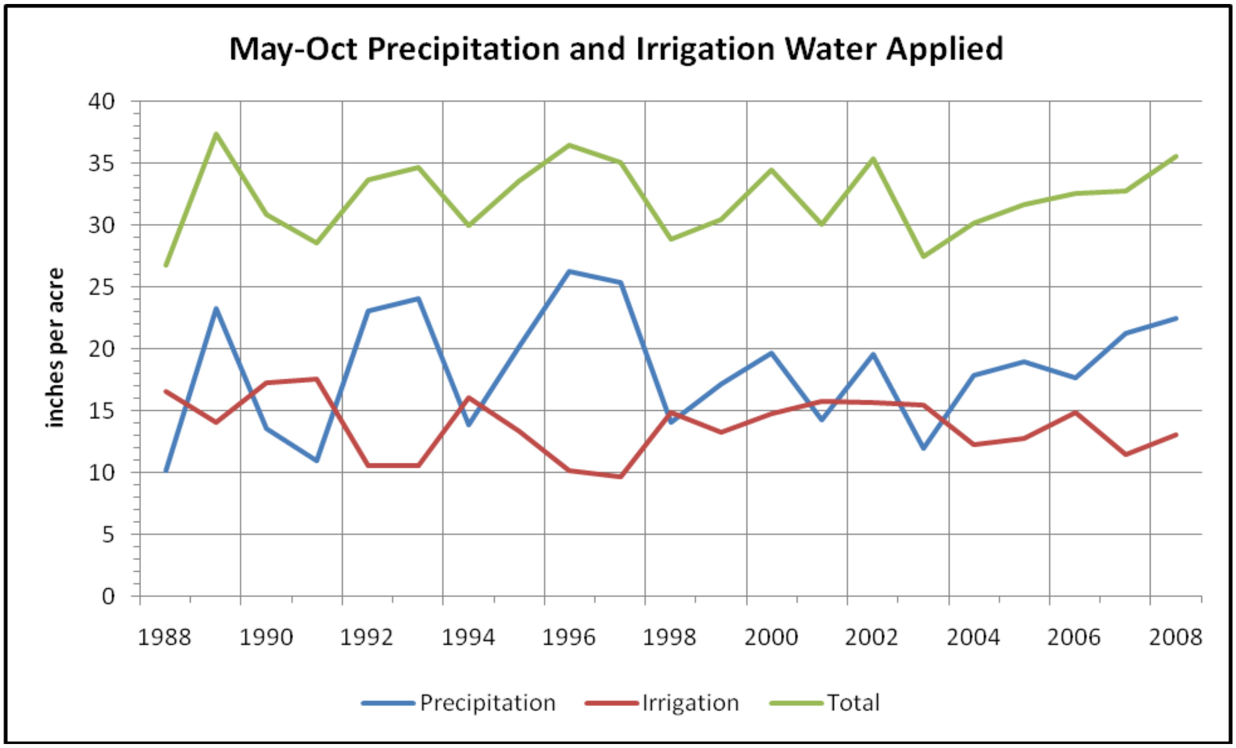


**Figure 25: May-October Precipitation and Irrigation (inches per acre) 1988-2008**

# VI. Conclusions

The year 2009 appears to have been an above-average year for precipitation. After three years of above-average precipitation, streamflows were above MDS criteria for most of the year at Macksville and all year at Zenith. Water levels in the alluvial aquifer continued to increase within each of the Rattlesnake Creek subbasin priority areas. The change in the five-year rolling averages varied across the subbasin. The above-average precipitation helped to recharge the aquifer and increase streamflow throughout the subbasin. The 2008 water use was near the historical average water use for the subbasin. It is important to continue to increase our understanding of the impacts of pumping, how fast the system recovers after recharge events, and other characteristics of the hydrologic system in order to evaluate the long-term effects of water usage on this subbasin, protect property rights, and ensure the benefits of these water resources to future generations.

# VII. Appendix

Monitoring Well Network Information

| Monitoring Well ID | USGS ID | Legal Description | Priority Area |
|---|---|---|---|
| SF46 | 375738098400601 | 24S12W17SWNENW01 | Mineral Intrusion |
| SF45 | 375910098385901 | 24S13W36SESWSW01 | Mineral Intrusion |
| KGS1 | 380000098415901 | 23S13W36SESWSW01 | Mineral Intrusion |
| KGS2 | 380000098415902 | 23S13W36SESWSW02 | Mineral Intrusion |
| SF42 | 380002098433201 | 23S13W35SWSWNE01 | Mineral Intrusion |
| SF11 | 380208098381001 | 23S12W22NWSWSW01 | Mineral Intrusion |
| SF30 | 380644098411901 | 22S12W30NWNWSE | Mineral Intrusion |
| SF20 | 380929098345101 | 22S11W07NWNW01 | Mineral Intrusion |
| KGS6 | 380952098281701 | 22S10W06SWNWNW01 | Mineral Intrusion |
| KGS7 | 380952098281702 | 22S10W06SWNWNW02 | Mineral Intrusion |
| KGS8 | 381009098215601 | 22S10W01NESENW01 | Mineral Intrusion |
| KGS9 | 381009098215602 | 22S10W01NESENW02 | Mineral Intrusion |
| KGS10 | 381009098215603 | 22S10W01NESENW03 | Mineral Intrusion |
| KGS11 | 381026098350201 | 21S12W36SESESE01 | Mineral Intrusion |
| KGS12 | 381026098350202 | 21S12W36SESESE02 | Mineral Intrusion |
| KGS13 | 381026098350203 | 21S12W36SESESE03 | Mineral Intrusion |
| SF02 | 381156098365101 | 21S12W26NW01 | Mineral Intrusion |
| SF24 | 381443098345101 | 21S11W07NWNWNW04 | Mineral Intrusion |
| KGS16 | 381443098345102 | 21S11W07NWNWNW02 | Mineral Intrusion |
| KGS17 | 381444098345101 | 21S11W07NWNWNW01 | Mineral Intrusion |
| FO37 | 372841099401201 | 29S22W36NESWNE01 | Outside |
| FO29 | 372934099373001 | 29S21W28NWSWNE01 | Outside |
| FO27 | 373003099415101 | 29S22W23SWNWSE01 | Outside |
| FO36 | 373005099381801 | 29S21W20SWNESE01 | Outside |
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| SF09 | 380003098482103 | 23S14W36SESESW03 | 1 |
| PN68 | 380101098563901 | 23S15W26SW01 | 2 |
| SF43 | 380136098544001 | 23S14W30NWNWNW01 | 2 |
| KGS21 | 380326098562001 | 23S15W14NENWNW01 | 2 |
| KGS22 | 380326098562002 | 23S15W14NENWNW02 | 2 |
| PN91 | 380338098550101 | 23S15W12SESENW | 2 |
| SF64 | 375025098542401 | 25S14W30SWSENW01 | 3 |
| KGS31 | 375039098580501 | 25S15W28SENESE01 | 3 |
| KGS32 | 375046098580501 | 25S15W28SENENE01 | 3 |
| SF19 | 375053098554601 | 25S15W25NESWNW01 | 3 |
| SF65 | 375059098595801 | 25S15W29NWNWSE01 | 3 |
| KGS33 | 375105098575701 | 25S15W27NWNWSW01 | 3 |
| SF63 | 375118098513901 | 25S14W21SESENW01 | 3 |
| KGS34 | 375119098515401 | 25S14W21SESWSW01 | 3 |
| KGS35 | 375217098522701 | 25S14W16SWSWNW01 | 3 |
| KGS36 | 375218098575701 | 25S15W15SWSWNW01 | 3 |
| ED25 | 374408099070401 | 26S16W31SWSWNE01 | 4S |
| KGS49 | 374633099034401 | 26S16W22NWNENW01 | 4S |
| ED24 | 374653099070201 | 26S16W18SWNESW01 | 4S |
| PR02 | 374717098593501 | 26S15W17NWNWSW01 | 4S |
| ED11 | 374720099090001 | 26S17W14NWNENE01 | 4S |
| ED14 | 374731099035701 | 26S16W10SWSWSW01 | 4S |
| KGS410 | 374745099040101 | 26S16W10SWNWSW01 | 4S |
| KGS411 | 374758099040101 | 26S16W10NWSWSW01 | 4S |
| KGS412 | 374825099043401 | 26S16W04SESWSW01 | 4S |
| ED13 | 374834099042201 | 26S16W04SENWSE | 4S |
| KGS413 | 374926099050701 | 26S16W04NWNWNW01 | 4S |
| KGS41 | 380002098470601 | 23S13W31SESESE01 | 4N |
| KGS42 | 380021098463300 | 23S13W32SWNENE01 | 4N |
| SF41 | 380108098480501 | 23S13W30SWNWNW01 | 4N |
| KGS43 | 380240098454401 | 23S13W16SWSWNE01 | 4N |
| SF40 | 380333098465901 | 23S13W08SWSWNW01 | 4N |
| SF78 | 380340098404602 | 23S12W07SENWSE02 | 4N |
| SF12 | 380506098302901 | 23S11W02NWNWNW01 | 4N |
| KGS45 | 380508098412701 | 23S12W06NWNWNW01 | 4N |
| KGS46 | 380508098412702 | 23S12W06NWNWNW02 | 4N |
| KGS47 | 380508098412703 | 23S12W06NWNWNW03 | 4N |
| SF31 | 380558098355802 | 22S12W36NWNWNW02 | 4N |
| KGS48 | 380644098411901 | 22S12W30NWNWSE01 | 4N |
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| KW09 | 373541099494401 | 28S20W20NESWNW01 | 5 |
| KW36 | 373724099274801 | 28S20W12NWNWSE01 | 5 |
| KW01 | 373857099310101 | 27S20W33SWSWNE01 | 5 |

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| KW26 | 373910099313701 | 27S20W32NENWSE01 | 5 |
| KW25 | 374001099282201 | 27S20W26NENWSE01 | 5 |
| KW22 | 374117099193001 | 27S18W18SESESW01 | 5 |
| KGS51 | 374225099275001 | 27S20W12NWSWSE01 | 5 |
| KW03 | 374254099222101 | 27S19W11NWNWSE01 | 5 |
| KW02 | 374322099243401 | 27S19W04NWSWSE01 | 5 |
| ED29 | 374354099202001 | 26S18W31SWSWSW01 | 5 |
| ED28 | 374404099104601 | 26S17W33SESENW01 | 5 |
| KGS52 | 374419099152501 | 26S18W35NESWSW01 | 5 |
| ED32 | 374427099232901 | 26S19W34NWNWSE01 | 5 |
| ED08 | 374428099260501 | 26S19W31NENESW01 | 5 |
| ED12 | 374434099133401 | 26S17W31NW01 | 5 |
| ED10 | 374637099163101 | 26S18W15SESWNW01 | 5 |
| KGS54 | 374715099133901 | 26S17W18NWNWSE01 | 5 |
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| ED50 | 374931099182901 | 25S18W33SWSESW01 | 5 |
| KGS55 | 374934099060501 | 25S16W32SESWSE01 | 5 |
| ED05 | 375008099131601 | 25S17W32NWNWSE01 | 5 |
| ED47 | 375008099141501 | 25S17W31NWNWSE01 | 5 |
| ED52 | 375032099222001 | 25S19W26SESENW01 | 5 |
| ED43 | 375059099034201 | 25S16W27NENESW01 | 5 |
| ED03 | 37512909915601 | 25S18W24SWSWNE01 | 5 |
| KGS56 | 375211099012401 | 25S16W13SESESE01 | 5 |
| KGS57 | 375211099012402 | 25S16W13SESESE02 | 5 |
| ED06 | 375217099074101 | 25S16W18SWNWSE01 | 5 |
| KGS58 | 375233099084801 | 25S17W13NWSWSE01 | 5 |
| KGS59 | 375241099151201 | 25S18W13NWSENW01 | 5 |
| ED46 | 375245099123501 | 25S17W17NENESW01 | 5 |
| SF18 | 375330098565101 | 25S15W11NWSWNW01 | 5 |
| ED04 | 375411099080701 | 25S17W01SENENW01 | 5 |
| ED42 | 375436099032701 | 25S16W02NWNWNW01 | 5 |
| SF53 | 375456098593401 | 24S15W32SENWSW01 | 5 |
| SF15 | 375507098581101 | 24S15W33SENENW01 | 5 |
| SF51 | 375521098543201 | 24S14W31NWNWSE01 | 5 |
| SF14 | 375551099010301 | 24S15W30SWSENW | 5 |
| ED01 | 375615099021301 | 24S16W25NWNWSE01 | 5 |
| KGS510 | 375733099034401 | 24S16W15SENESW01 | 5 |
| SF50 | 375759098524501 | 24S14W17NENESW01 | 5 |
| KGS511 | 375813098595101 | 24S15W08SWSESW01 | 5 |
| ED34 | 375826099022201 | 24S16W12SWNWSE01 | 5 |
| SF13 | 375859098574001 | 24S15W10NWNENW01 | 5 |
| SF07 | 375957098502501 | 24S14W03NENENE01 | 5 |
| SF08 | 380129098502501 | 23S14W27NENESE01 | 5 |
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| SF07 | 380301098502501 | 23S14W15NESESE01 | 5 |
| ED02 | 384944099201401 | 25S18W31SESENW01 | 5 |
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| KW20 | 373938099043601 | 27S16W28SWSESE01 | 7 |
| KW08 | 373941099083301 | 27S17W26SESENW01 | 7 |
| KW05 | 373948099250101 | 27S19W29SESENW01 | 7 |
| KW04 | 373950099204101 | 27S19W25SENESW01 | 7 |
| KW23 | 374050099161301 | 27S18W22NESESW01 | 7 |
| KW07 | 374054099104501 | 27S17W21NESESW01 | 7 |
| KW19 | 374111099070401 | 27S16W19NWNWSE01 | 7 |
| KW21 | 374201099135401 | 27S18W13NENENE01 | 7 |
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| KW06 | 374307099121601 | 27S17W08NWNENE01 | 7 |
| ED15 | 374440099032401 | 26S16W24NENWSW01 | 7 |
| PR01 | 348560985420401 | 26S15W01NESESW01 | 7 |
| SF17 | 375625098463401 | 24S13W20SWSESE01 | 7 |
| SF48 | 375750098451101 | 24S13W16NESWNE01 | 7 |