# Rattlesnake Creek

## 2007 Field Analysis Summary

Subbasin Water Resource Management Program

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**Table of Contents**



**Figures**



**Tables**

# 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.

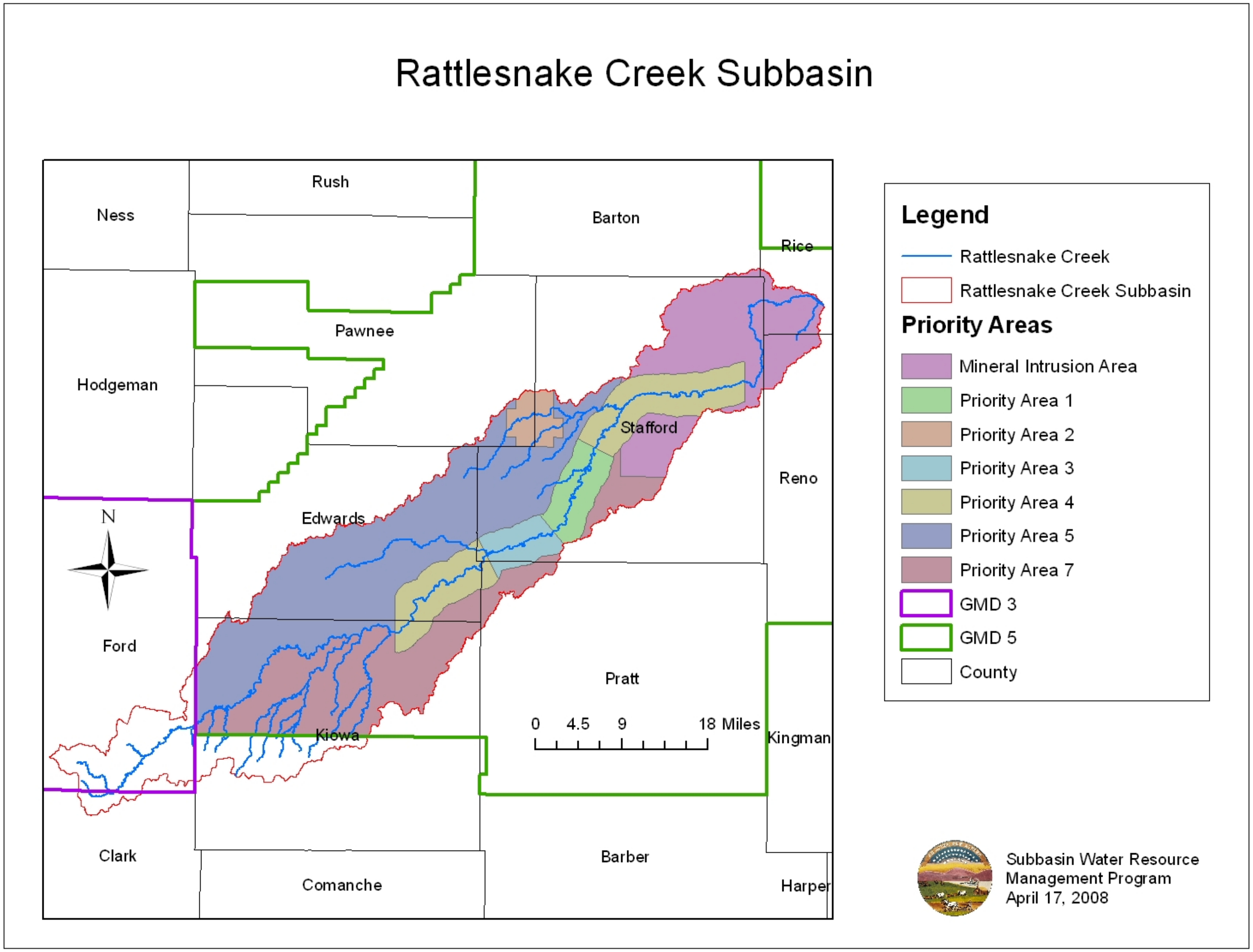


**Figure 1: Rattlesnake Creek Subbasin with Priority Areas**

## II. Precipitation

Precipitation in the Rattlesnake Creek subbasin averages 24.6 inches (in.) per year based on four precipitation stations. Figure 2 shows the annual variation in precipitation. This chart was derived from National Climatic Data Center (NCDC) stations located at: Bucklin in Ford County, Greensburg in Kiowa County, Trousdale 1NE in Edwards County and Hudson in Stafford County. The data is downloaded then averaged to create the following chart. The chart shows that parts of the 1950s were a substantially dry period. Since the 1950s other years have had low precipitation but not at the same magnitude. The highest precipitation total occurred in 1973 with over 40 in. The 1990s had several years of above average precipitation. Annual precipitation data for these NCDC stations is currently available through 2006.

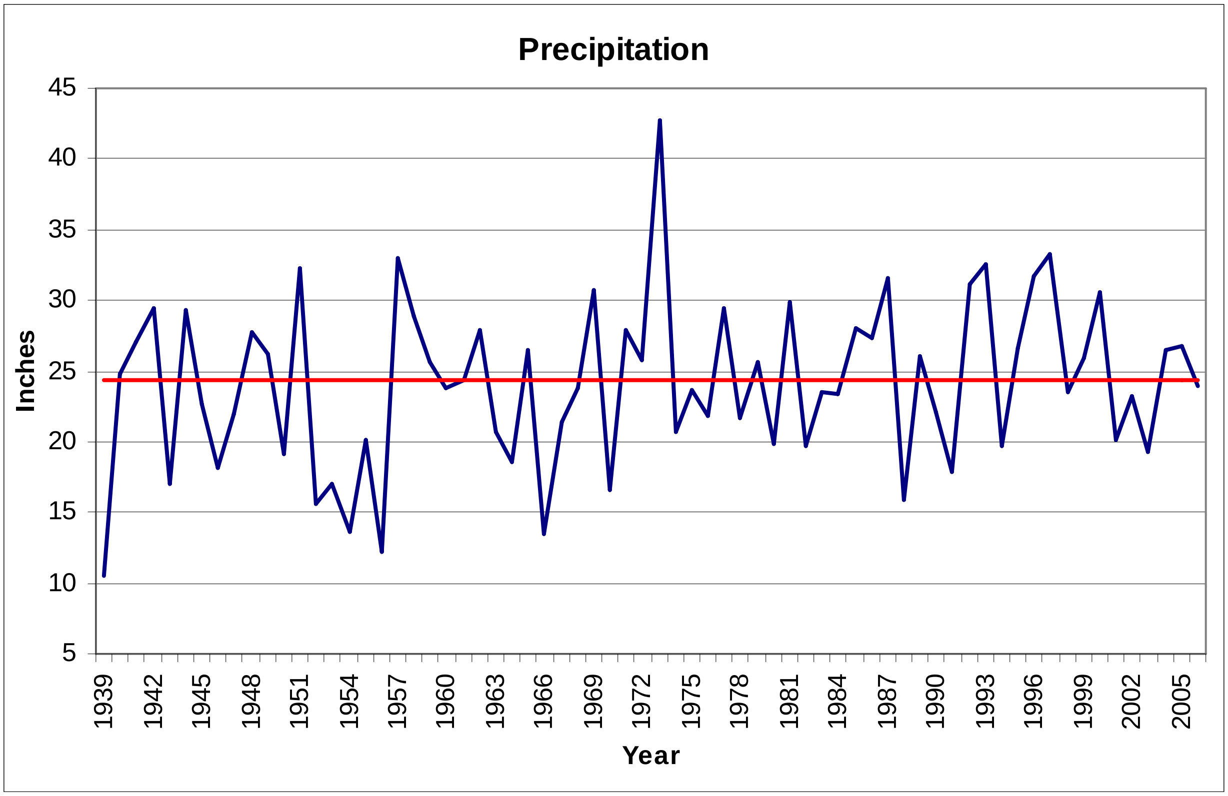


**Figure 2: Rattlesnake Creek Precipitation 1939-2006**

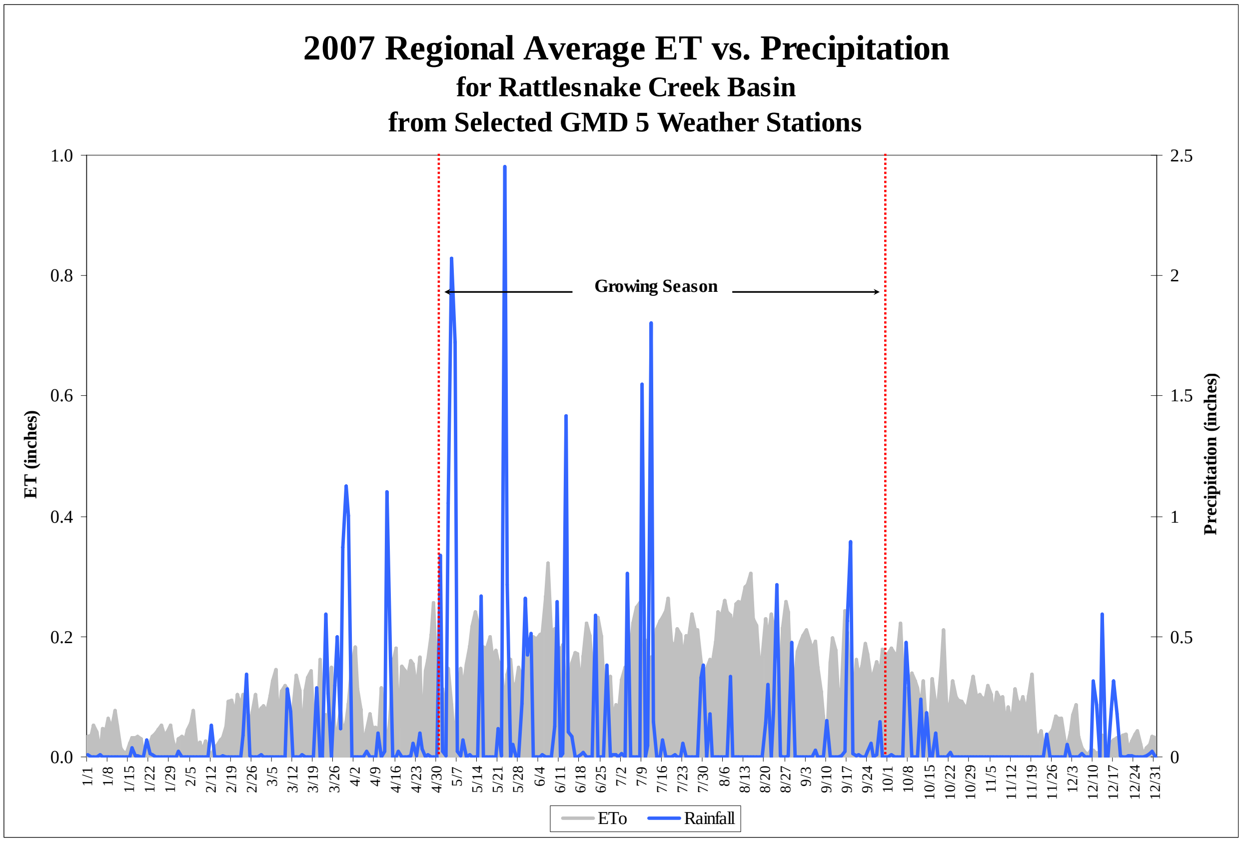


**Figure 3: Precipitation and Evapotranspiration for 2007**

Figure 3 graphs the 2007 evapotranspiration and precipitation conditions in the Rattlesnake Creek subbasin. This information comes from six GMD #5 weather stations including Greensburg, Lewis, Macksville, Radium, Stafford and Sterling. The six stations received an average 36.1 in. of precipitation during 2007. This figure is significantly above the average 24.6 in. of precipitation documented over the period of record for this subbasin. Even with the above average precipitation, the subbasin still had a deficit of moisture because evapotranspiration totaling 41.73 in.

# 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 and it 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 is used to measure inflow to Quivira.

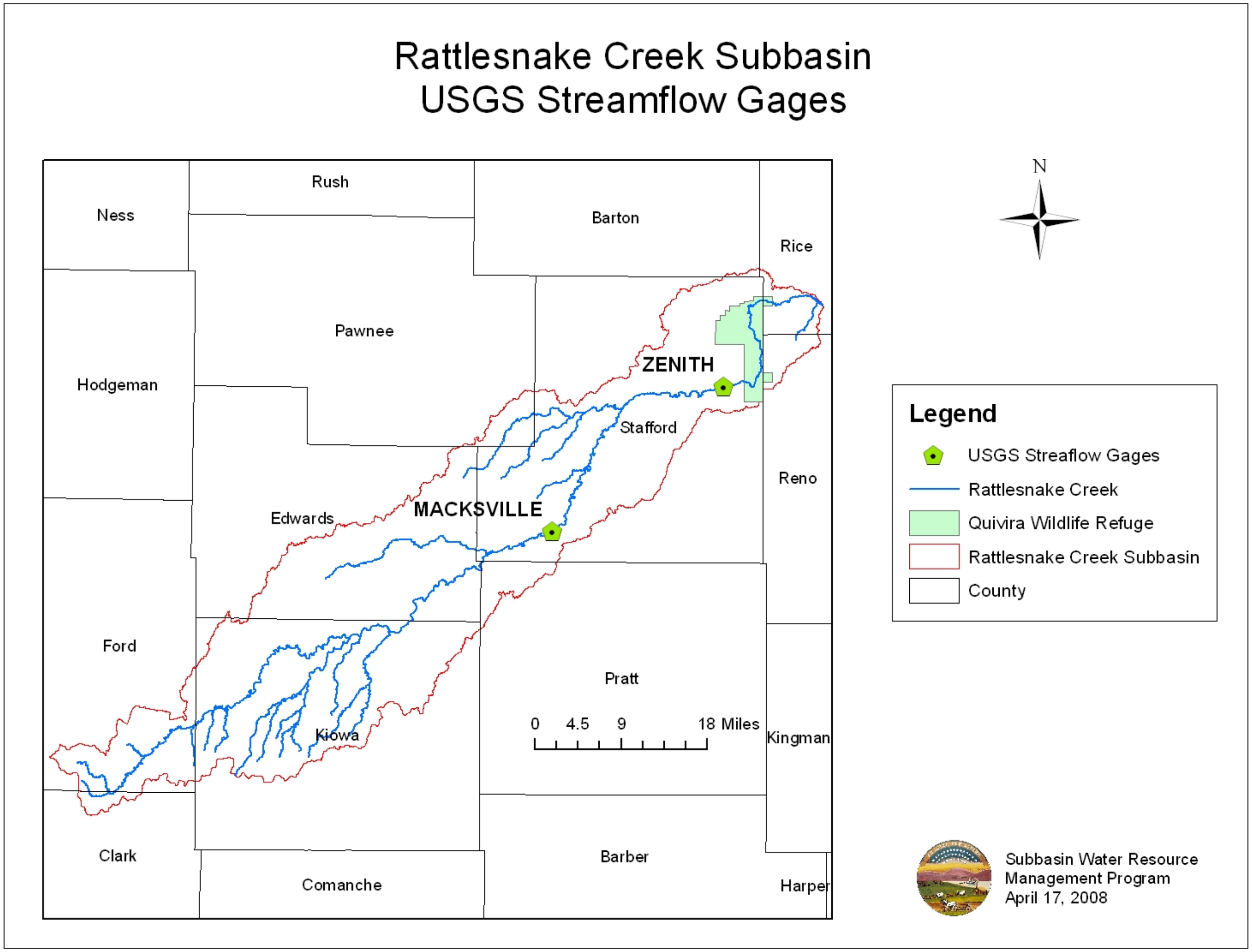


**Figure 4: Rattlesnake Creek USGS Streamflow Gages**

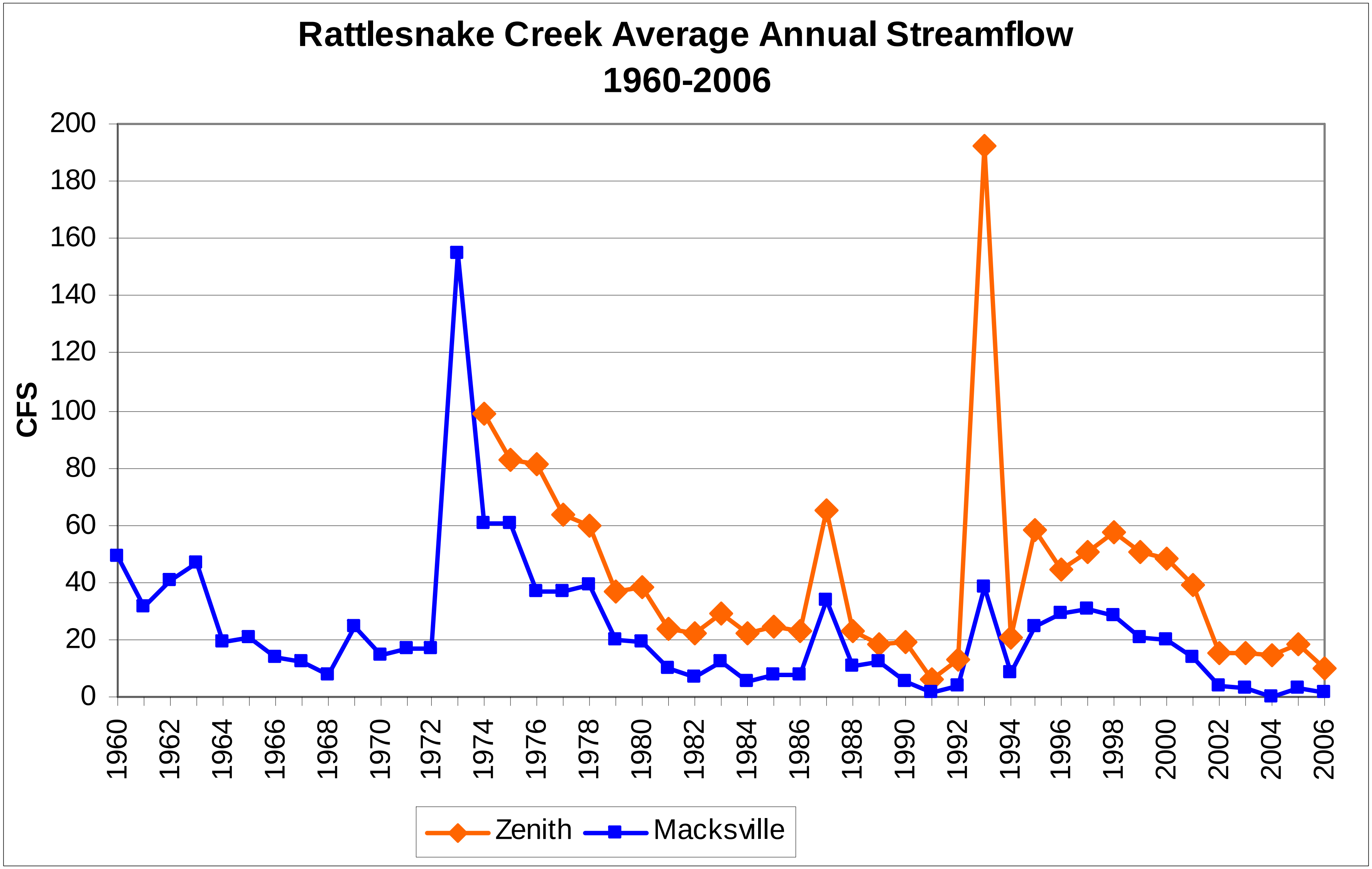


**Figure 5: Streamflow at USGS Gages 1960-2006**

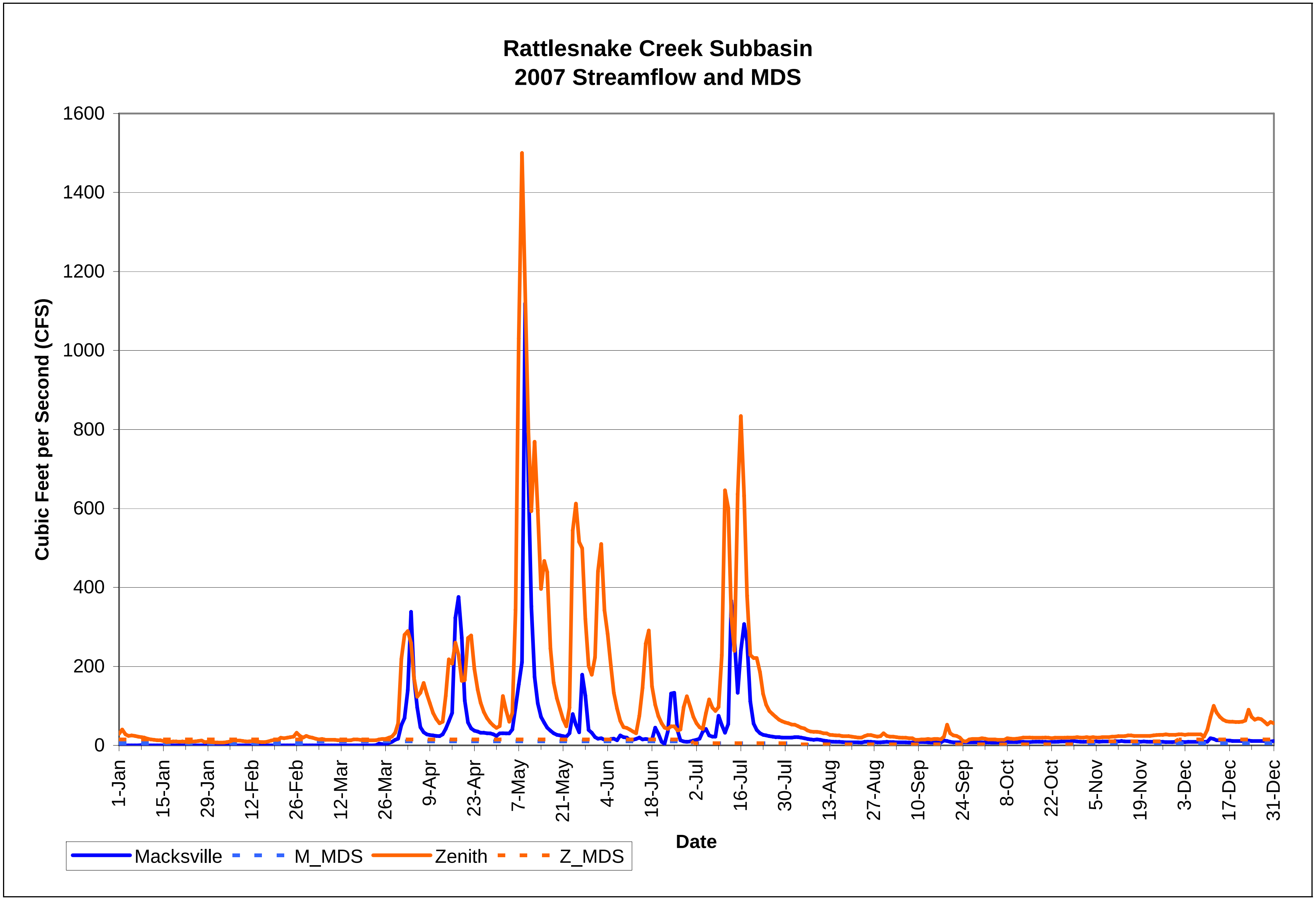


**Figure 6: Daily Streamflow and MDS for 2007**

The Macksville gage is located near where baseflow typically begins for the Rattlesnake Creek, resulting in a lower baseflow than at Zenith. Macksville has a longer record dating back to 1960 while recording at the Zenith streamflow gage started in 1974 (Figure 5). Over the periods of record, the average stream flow at Zenith was 46.05 cfs and 23.29 cfs at Macksville. During the 1990s, the Zenith gage had higher flows and averaged 50.73 cfs. On the other hand, the Macksville gage only averaged 118.25 cfs during the 1990s. Both streamflow gages had reduced streamflows averaging 31.40 cfs at Zenith and 9.55 cfs at Macksville from 2000 to 2007.

**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 2007. Zenith started the year by meeting the MDS levels, but the streamflow dropped below the MDS levels on January 10th. Macksville was at 0 cfs or extremely low flow to start the year. By April 12, 2007 streamflow was higher and met the levels for MDS at both gages. In fact, Rattlesnake Creek had strong flows the rest of the year due to the high precipitation events starting in April 2007 and continuing through July 2007.

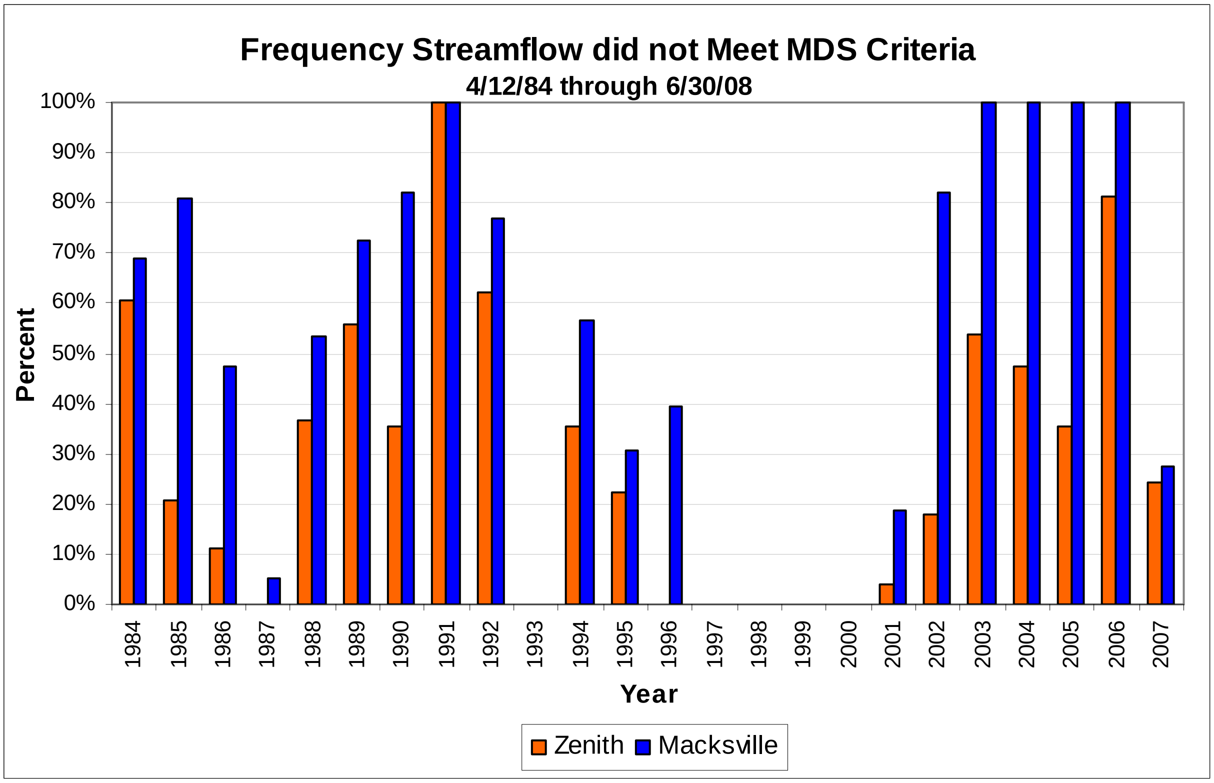


**Figure 7: Streamflow and MDS Criteria**

Since MDS was established in 1984, the streamflow at the Zenith gage has met the frequencies for MDS as set forth by regulations more often than at the Macksville gage. (Figure 7). When streamflow at a USGS gage station records streamflow for seven consecutive days below the MDS value set by the legislature, administration can begin. It will not cease 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.

Streamflow at both gaging stations did not meet MDS criteria as set forth by the regulations for the entire year in 1991. During 1993 and 1997-2000, streamflow at both of the gages met MDS criteria. From 2001-2007, streamflow at both gages was did not meet MDS frequency requirements for all or part of each year. Most notably, the Macksville gage did not meet MDS criteria during the entire years of 2003-2006. As of the end of June 2007, streamflow is currently higher than the MDS value at Zenith and streamflow has been below the MDS value for five consecutive days at Macksville.

## 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.

The Kansas Geological Survey (KGS), GMD #5 and the Subbasin Water Resource Management Program (SWRMP) measure water levels in the subbasin. GMD #5, KGS in cooperation with KDA-DWR and SWRMP combine efforts to measure 161 wells annually (Figure 8). SWRMP collects additional water level measurements tri-annually in the winter, spring and fall.

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

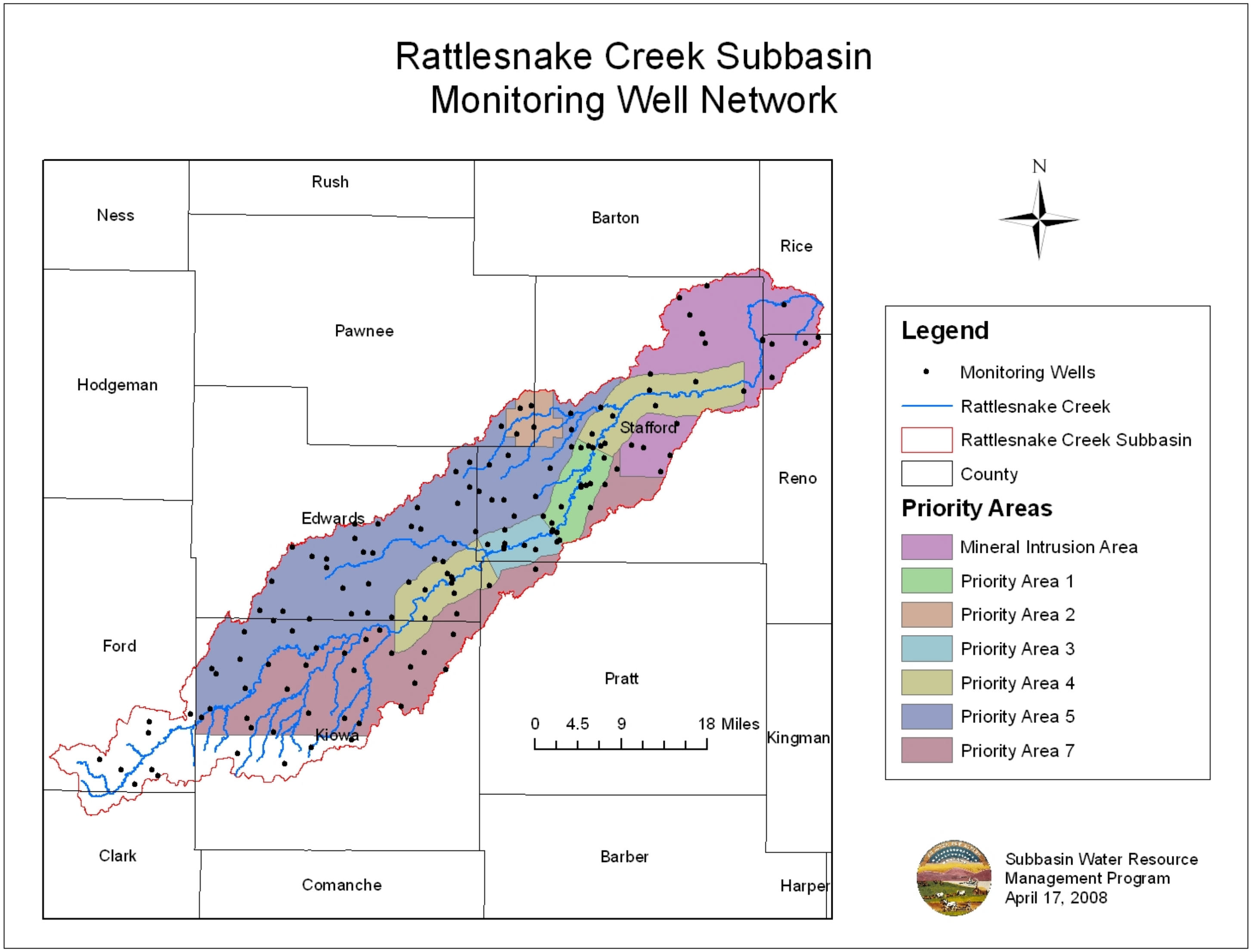


**Figure 8: KGS, GMD 5 and DWR Monitoring Wells**

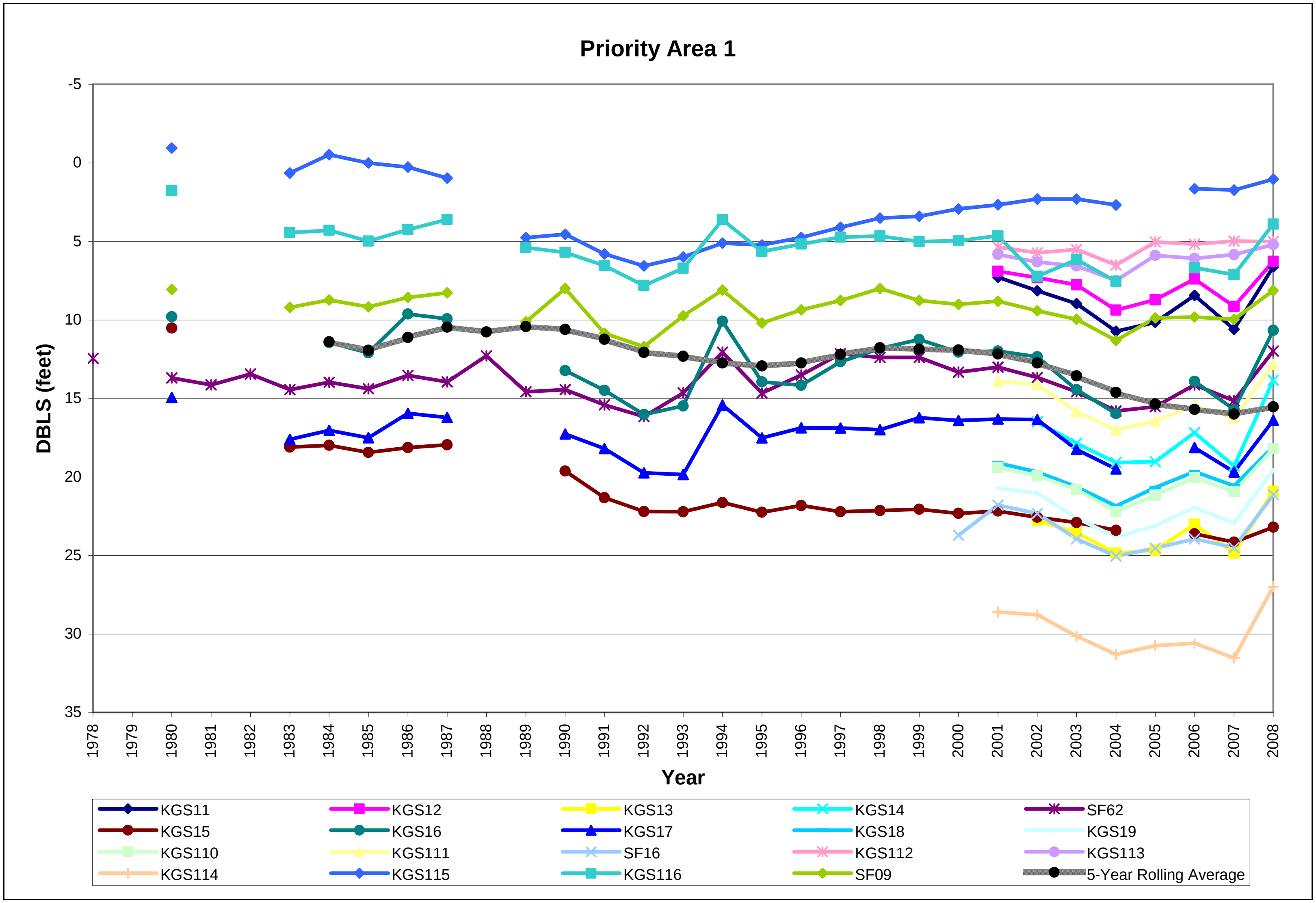


**Figure 9: Monitoring well levels in Priority Area 1**

Priority Area 1 has 19 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. The five-year rolling average increased 0.45 ft unlike the previous years where it had a declining trend (Figure 9). The five-year rolling average exhibits a net decline of 4.15 ft since 1984.

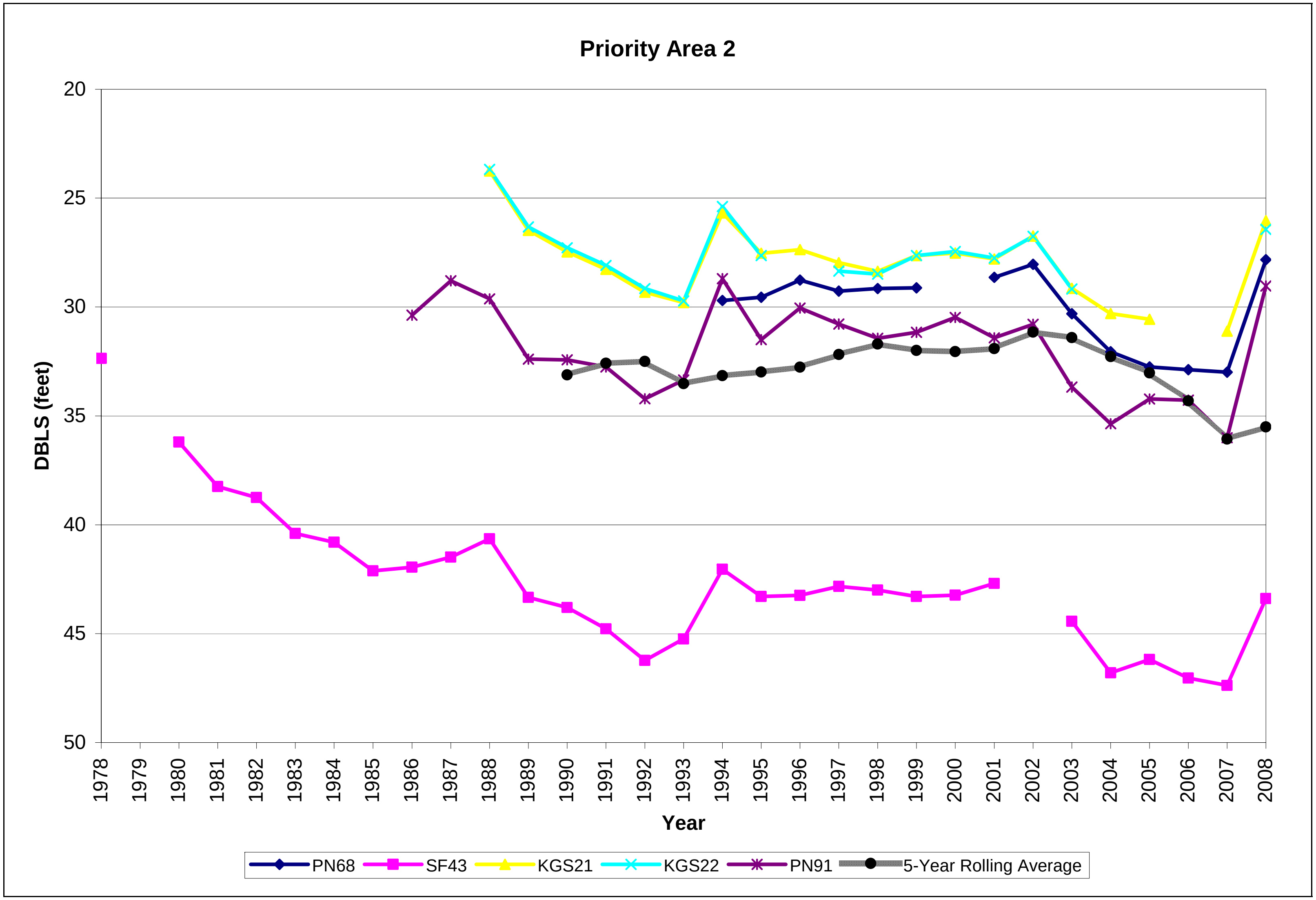


**Figure 10: Monitoring well levels in Priority Area 2**

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 11.03 ft since 1978 despite an increase of 3.99 ft in 2008. PN91 had the largest increase in 2008 with 6.96 ft. The five-year rolling average exhibits a net decline of 2.39 ft since 1990 (Figure 10).

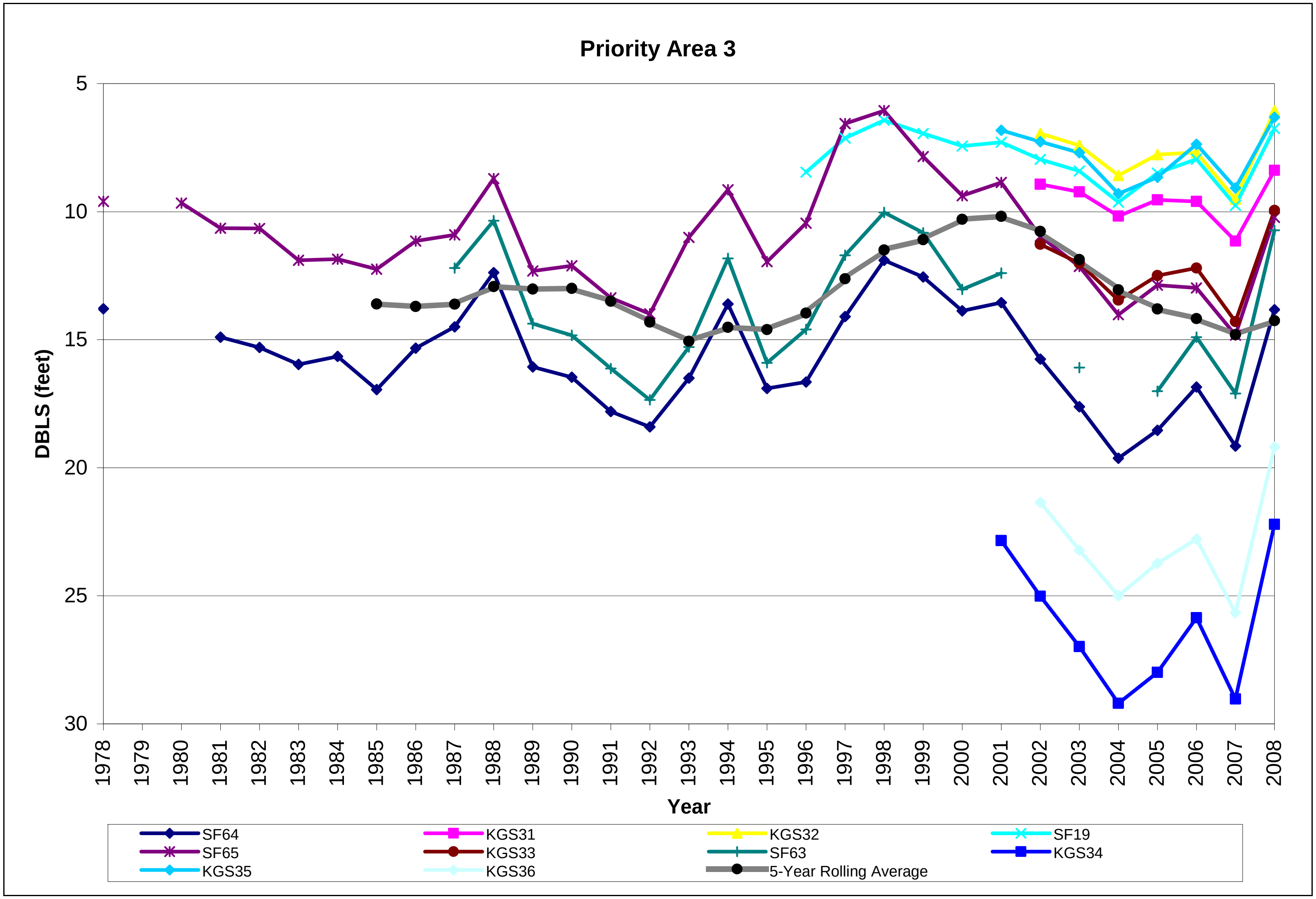


**Figure 11: Monitoring well levels in Priority Area 3**

Priority Area 3 has 10 monitoring wells. Water levels were down in 2007 but increased in all the wells in 2008. Three wells, SF63, KGS34 and KGS36, saw a rise in water levels over 6 ft. The five-year rolling average also saw a rise in 2008 but has experienced a net decrease of 0.65 ft since 1985 (Figure 11).

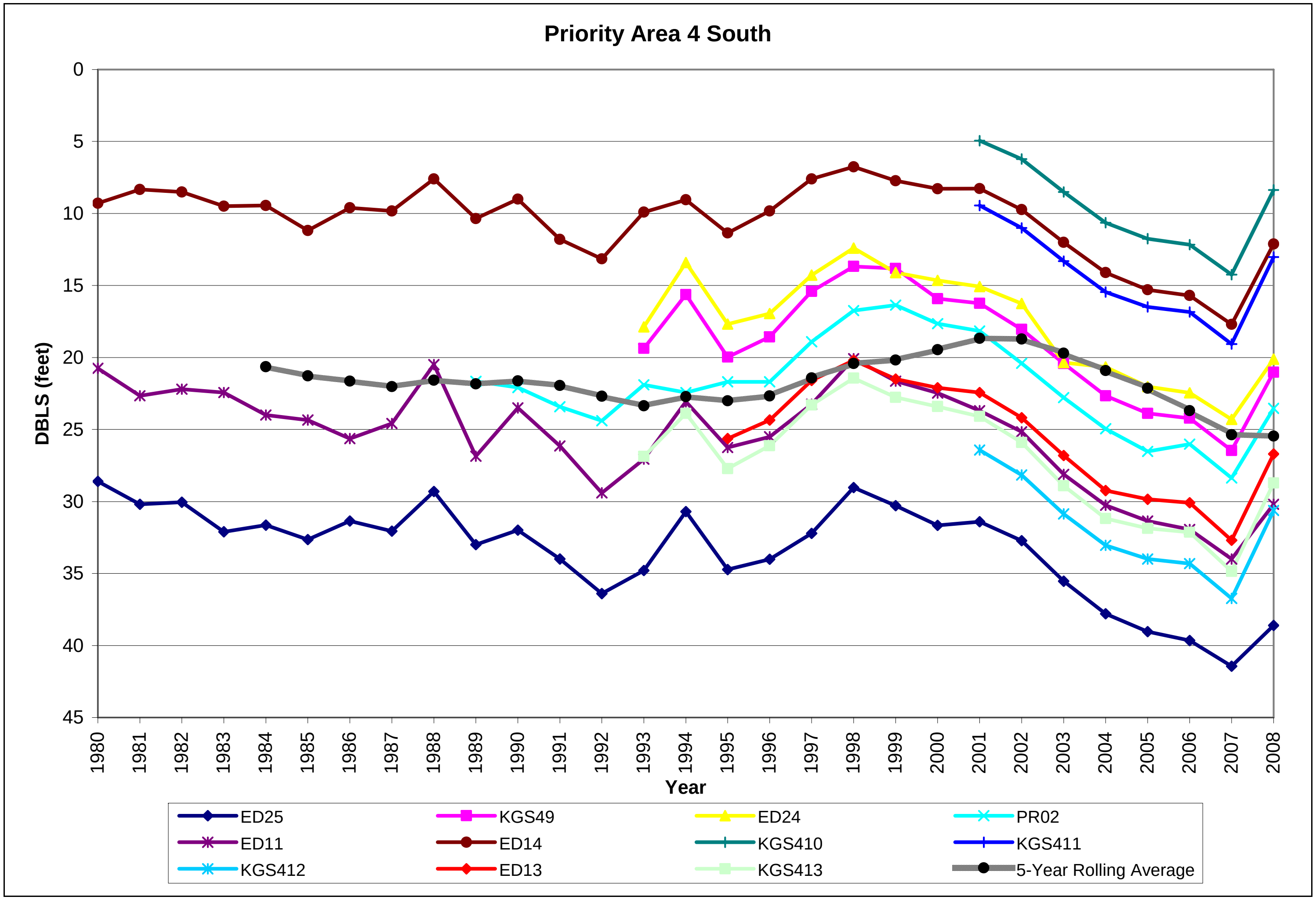


**Figure 12: Monitoring well levels in Priority Area 4 South**

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 11 monitoring wells. The water levels had a declining trend from the late-1990s to 2007. In 2008, the water levels improved but did not rise above previous high recharge years. The five-year rolling average leveled off between 2007 and 2008 but exhibits a net decrease of 4.81 ft since 1984 (Figure 12). Three wells, ED14, ED11 and ED25, have measurements dating back to 1980. The net declines in these wells since 1980 are 2.83 ft, 9.44 ft and 10 ft respectively.

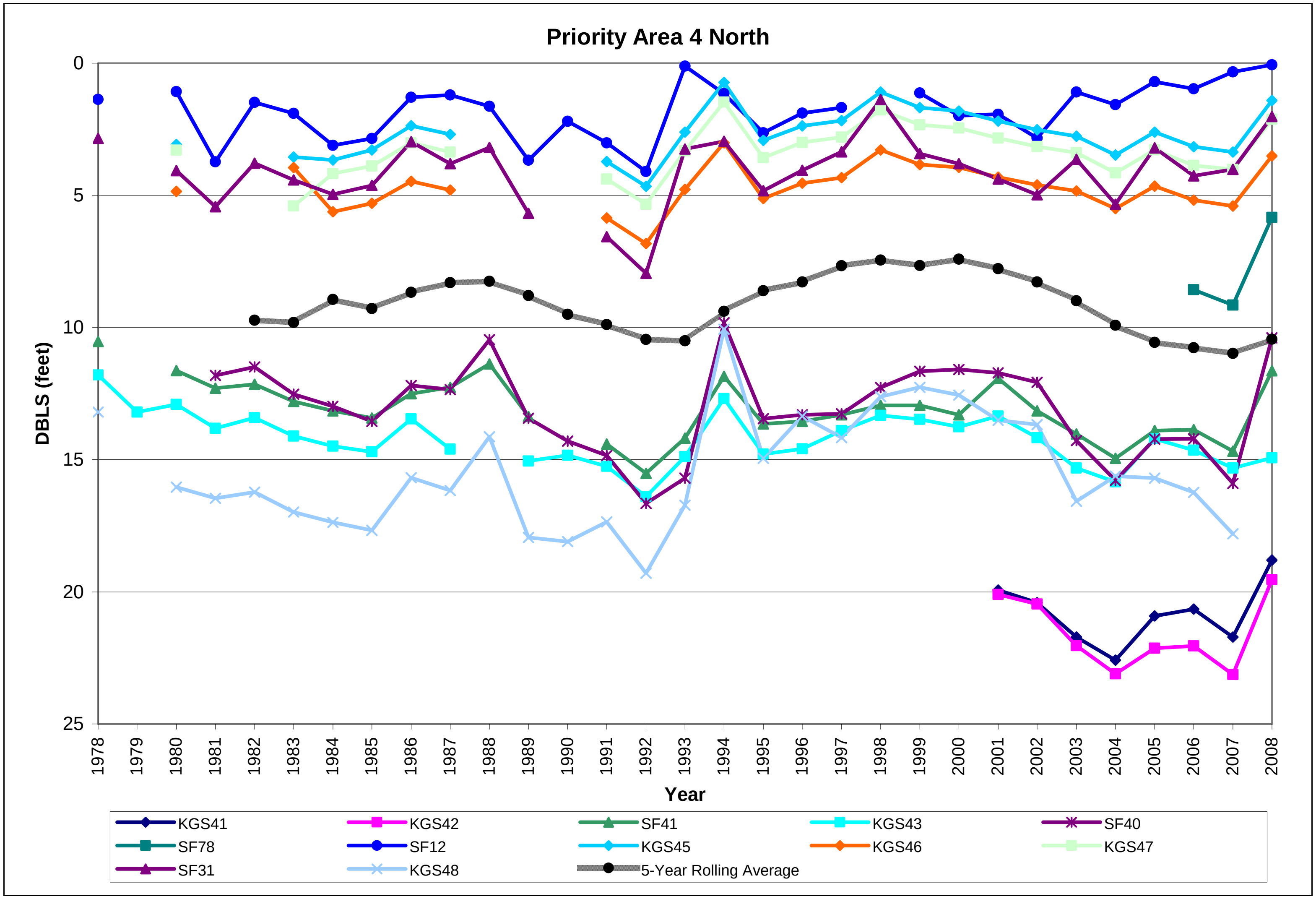


**Figure 13: Monitoring well levels in Priority Area 4 North**

Priority Area 4 North has 12 monitoring wells and is located primarily in Stafford County. The water levels were down for 2007 but as seen elsewhere in the subbasin the water levels increased in 2008. This increase in water levels in 2008 brought many shallow wells up to or higher than their initial measurements in 1980 (Figure 13). The five-year rolling average experienced a net decline of 0.72 feet since 1982.

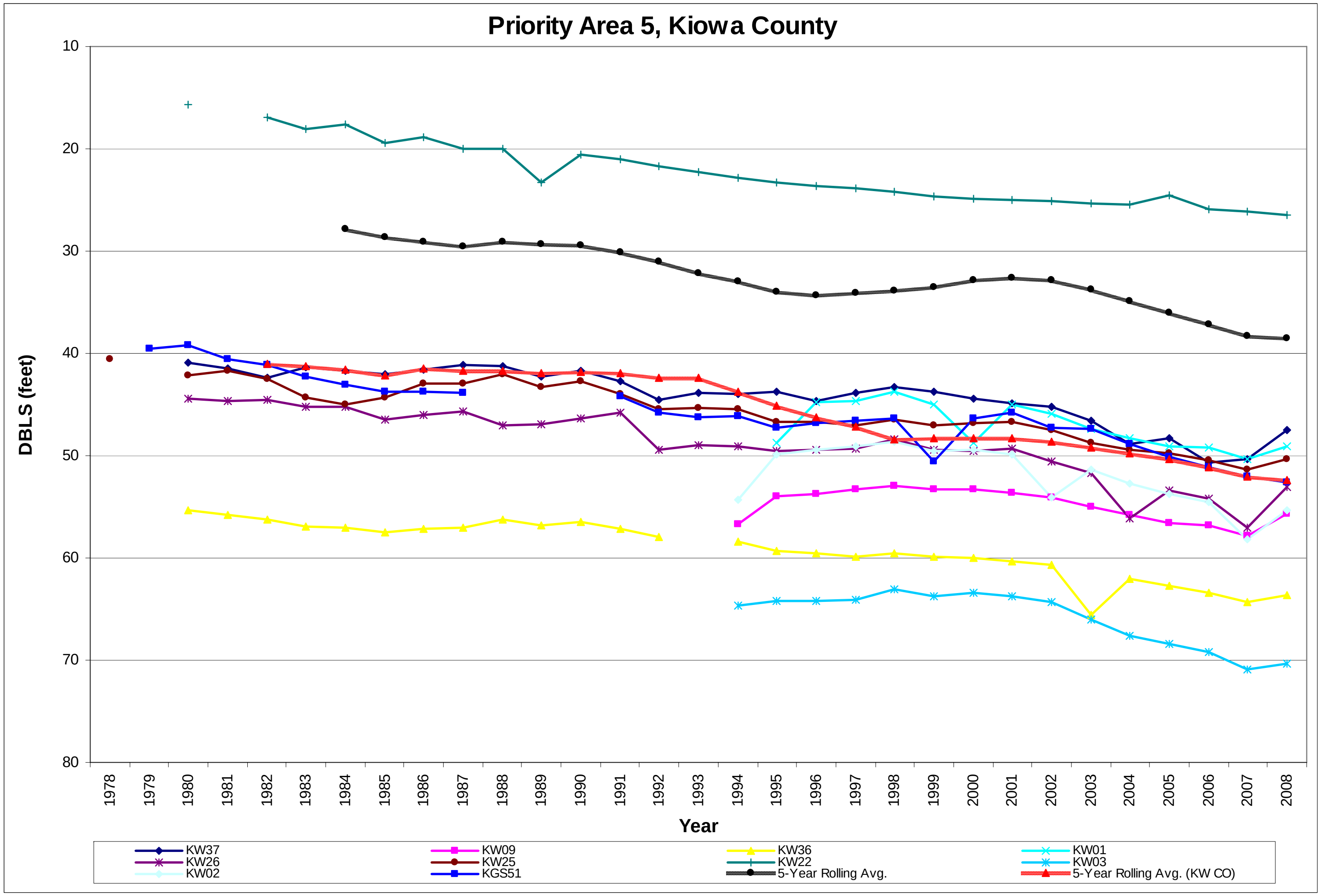


**Figure 14: Monitoring well levels in Priority Area 5, Kiowa County**

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 except for moderate increases in groundwater levels in 2008. Each of the Priority Area 5 charts has two five-year rolling averages, since the priority area is so large and to compare the local area to the overall area. . The red line is for that county only while the black line is for the entire Priority Area 5. The Kiowa County five-year rolling average declined a net 11.36 ft since 1982. The Priority Area 5 five-year rolling average has declined a net 10.73 ft since 1984 (Figure 14).

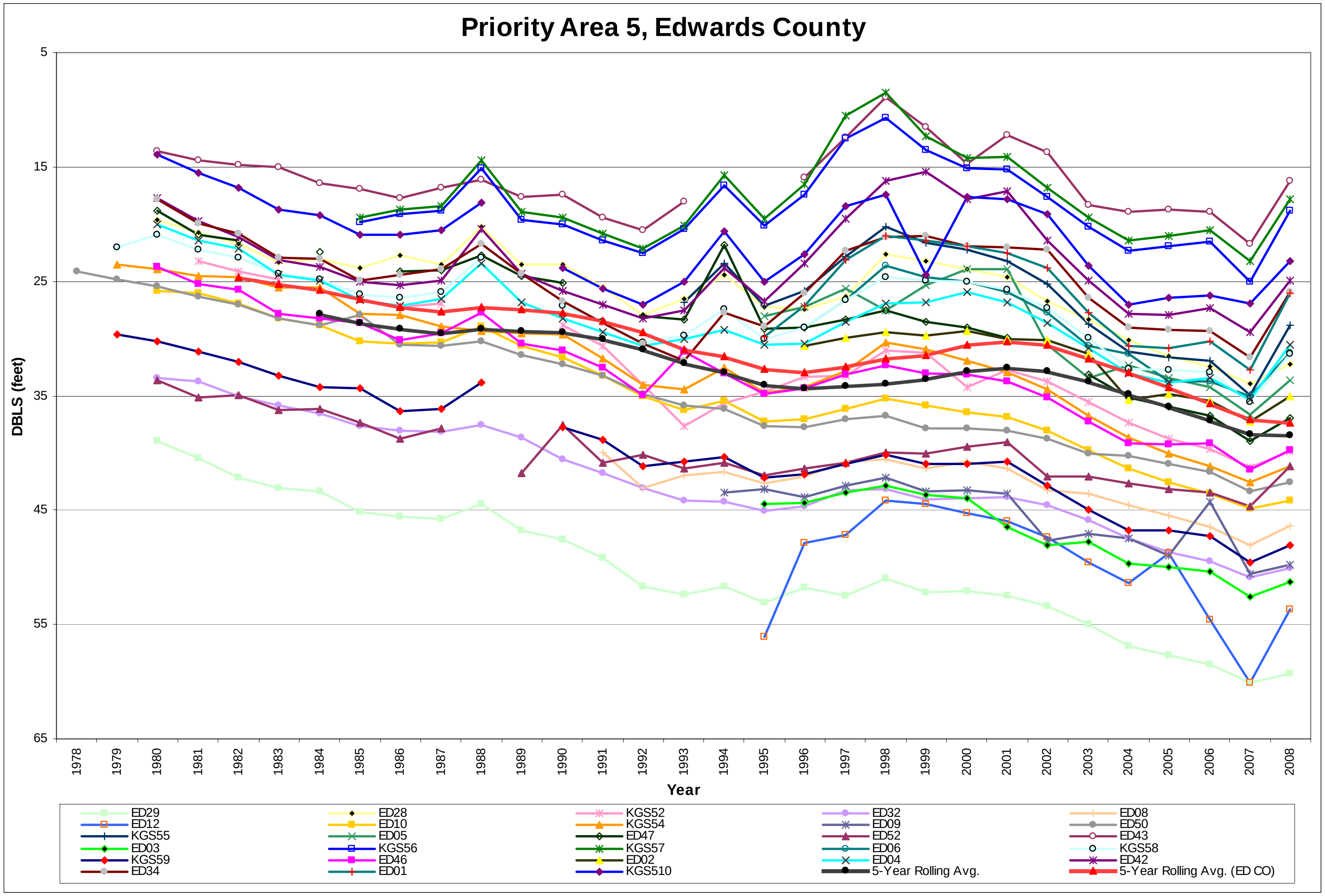


**Figure 15: Monitoring well levels in Priority Area 5, Edwards County**

Priority Area 5 in Edwards County has 28 monitoring wells. Many of the measurements began in 1980. The water level trend is declining with a few increases during recharge years. All the wells in Edwards County saw several feet of increase in water levels in 2008. ED50 has the longest record dating back to 1978. Since 1978, water levels have declined a net 18.39 ft. Even with the increases in water levels in 2008, the water table remains lower than in 1980 especially in the deeper wells (Figure 15). The Edwards County (red line) five-year rolling average exhibits a net decline of 12.75 ft since 1982.

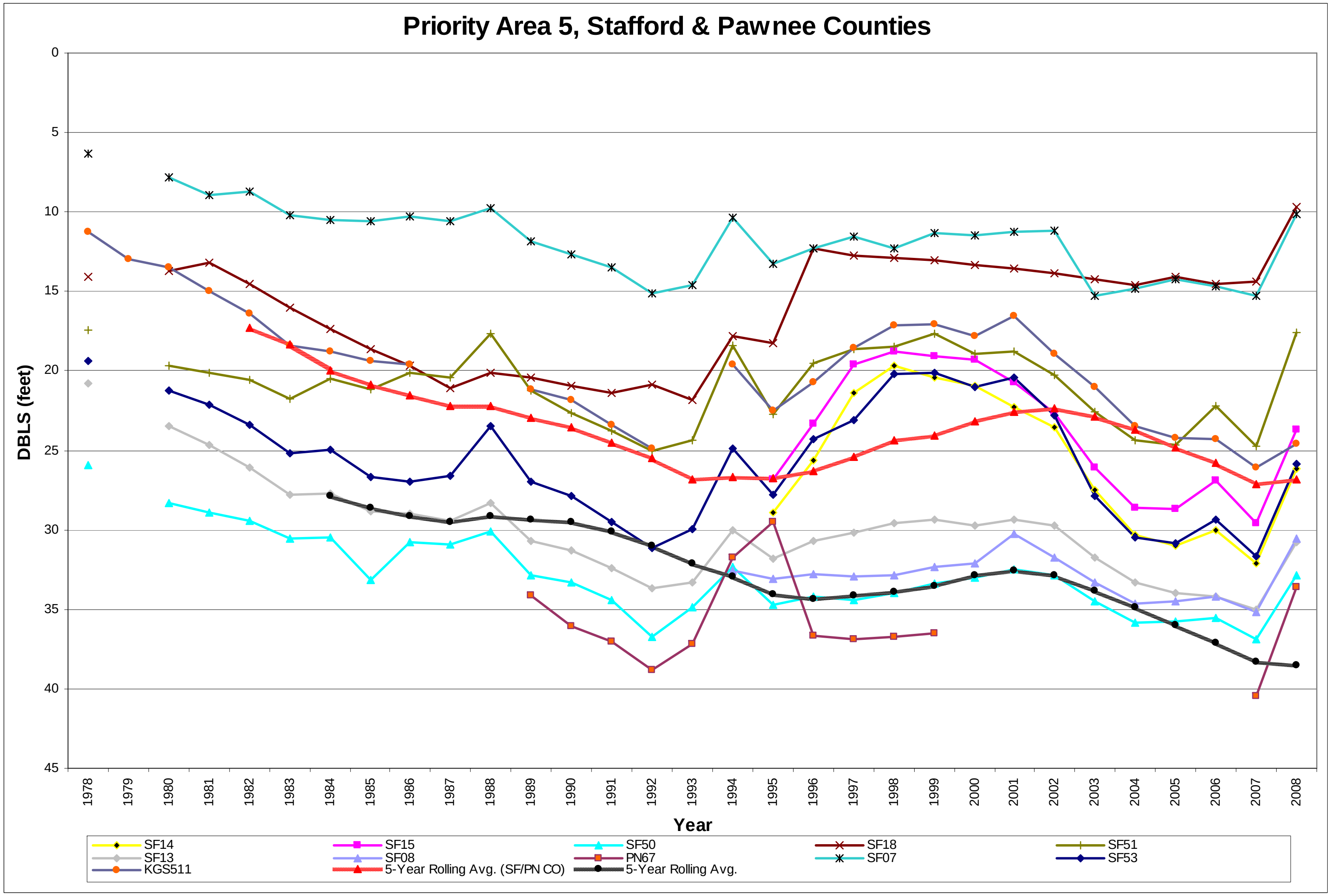


**Figure 16: Monitoring well levels in Priority Area 5, Stafford and Pawnee Counties**

Priority Area 5 in Stafford and Pawnee counties includes 11 monitoring wells. Six wells were first measured in 1978. Only one well out of the six wells, SF51, had a net increase in water levels (0.19 ft) since 1978. KGS511 had the biggest overall net decline of 13.38 ft (Figure 16). The Stafford/Pawnee County five-year rolling average (red line) declined a net 9.52 ft since 1982.

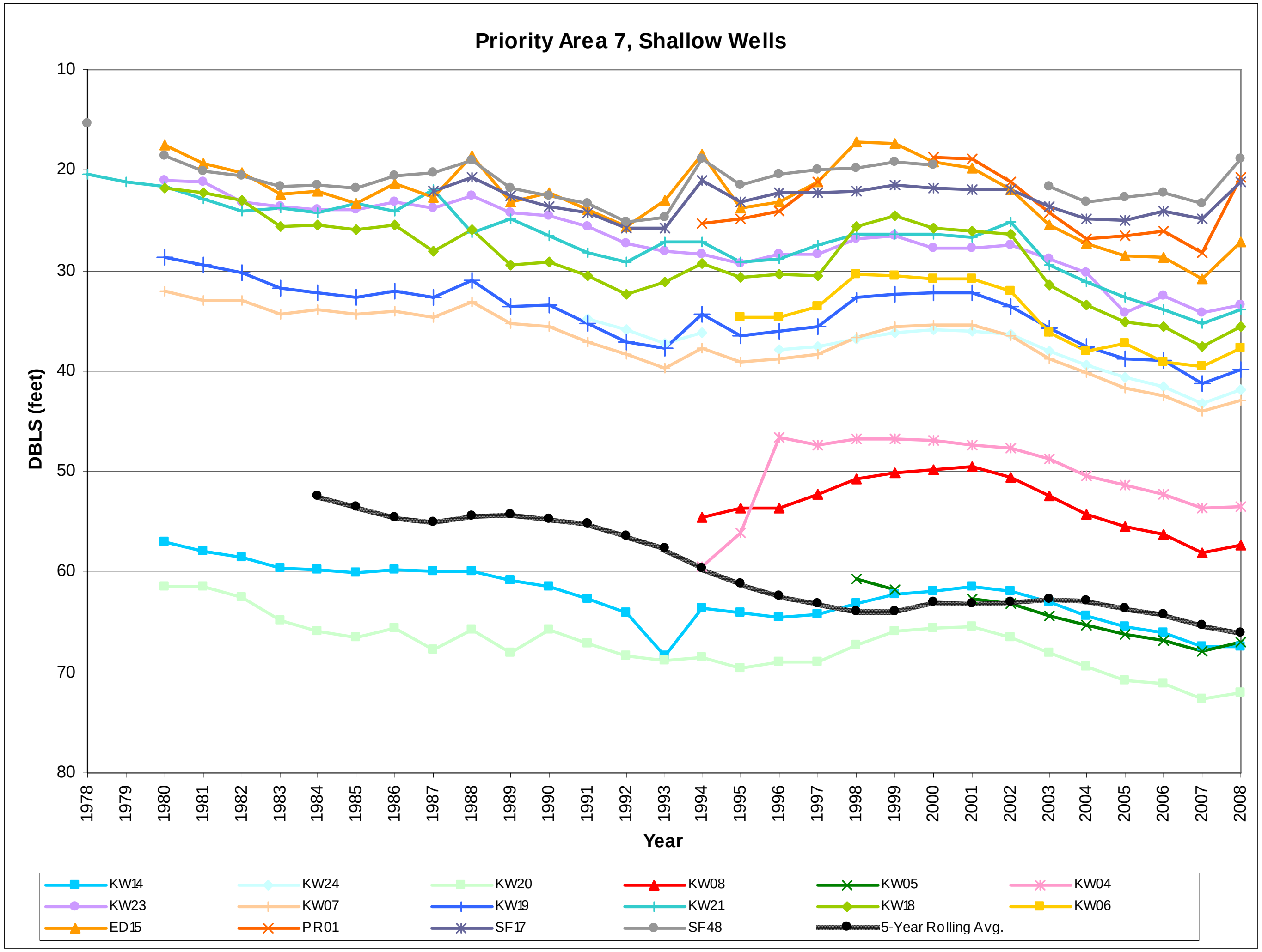


**Figure 17: Monitoring well levels in Priority Area 7, Shallow Wells (Note: Rolling Average includes ALL wells in the Priority Area)**

Priority Area 7 has 24 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 wells drilled at a greater depth. Only three wells, PR01, SF17 and KW04, have experienced a net increase in water levels since their inception. KW18 had the largest net decline with 13.68 ft since 1980. KW21 has the longest record and shows a net decline of 13.55 ft since 1978 (Figure 17).

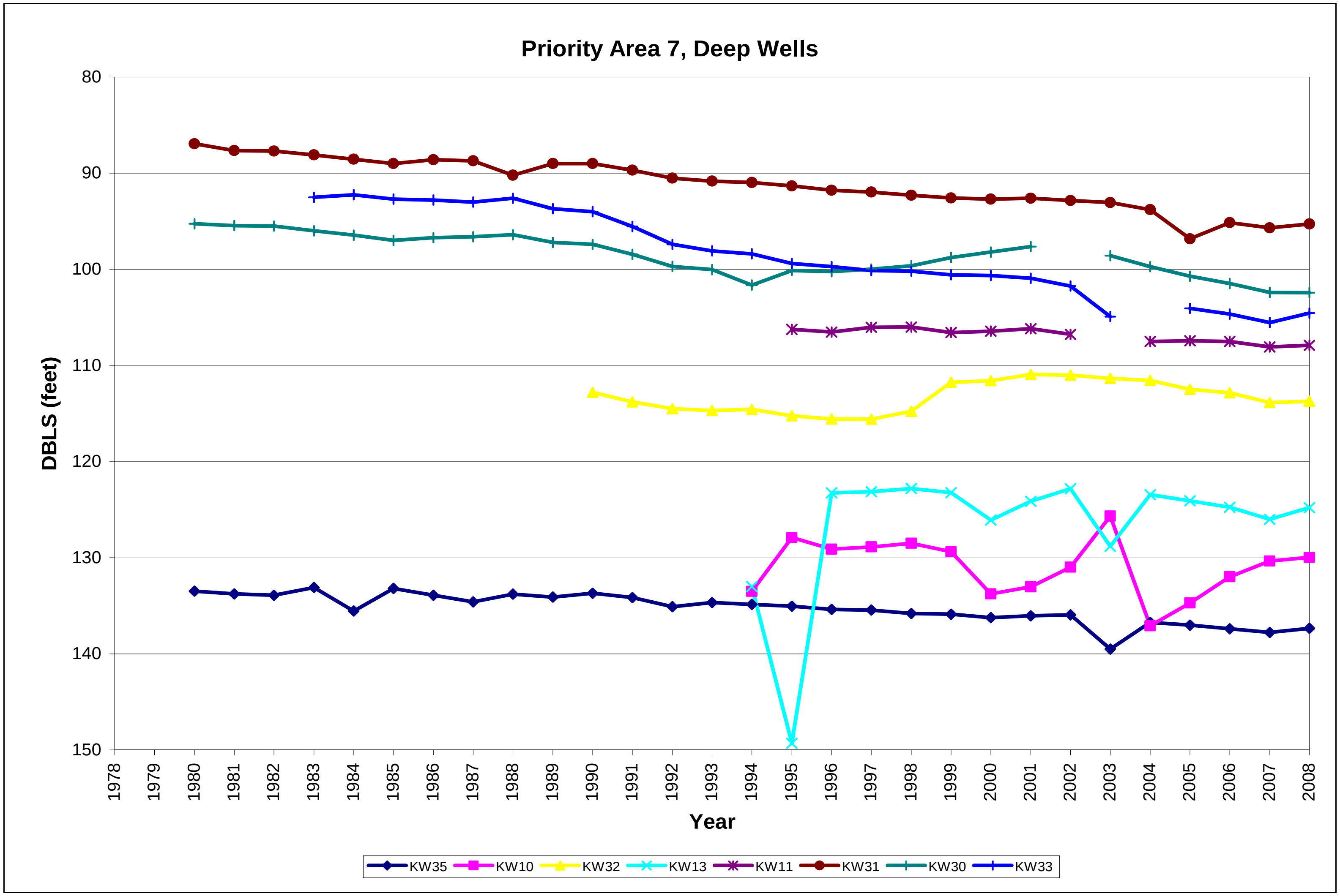


**Figure 18: Monitoring well levels in Priority Area 7, Non-Alluvial Wells**

Three wells' (KW31, KW35 and KW30) records began in 1980. All three have experienced declining groundwater trends over the 28-year record ranging from 3.88 ft to 8.35 ft (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. The five-year rolling average declined a net 13.66 ft since 1984.

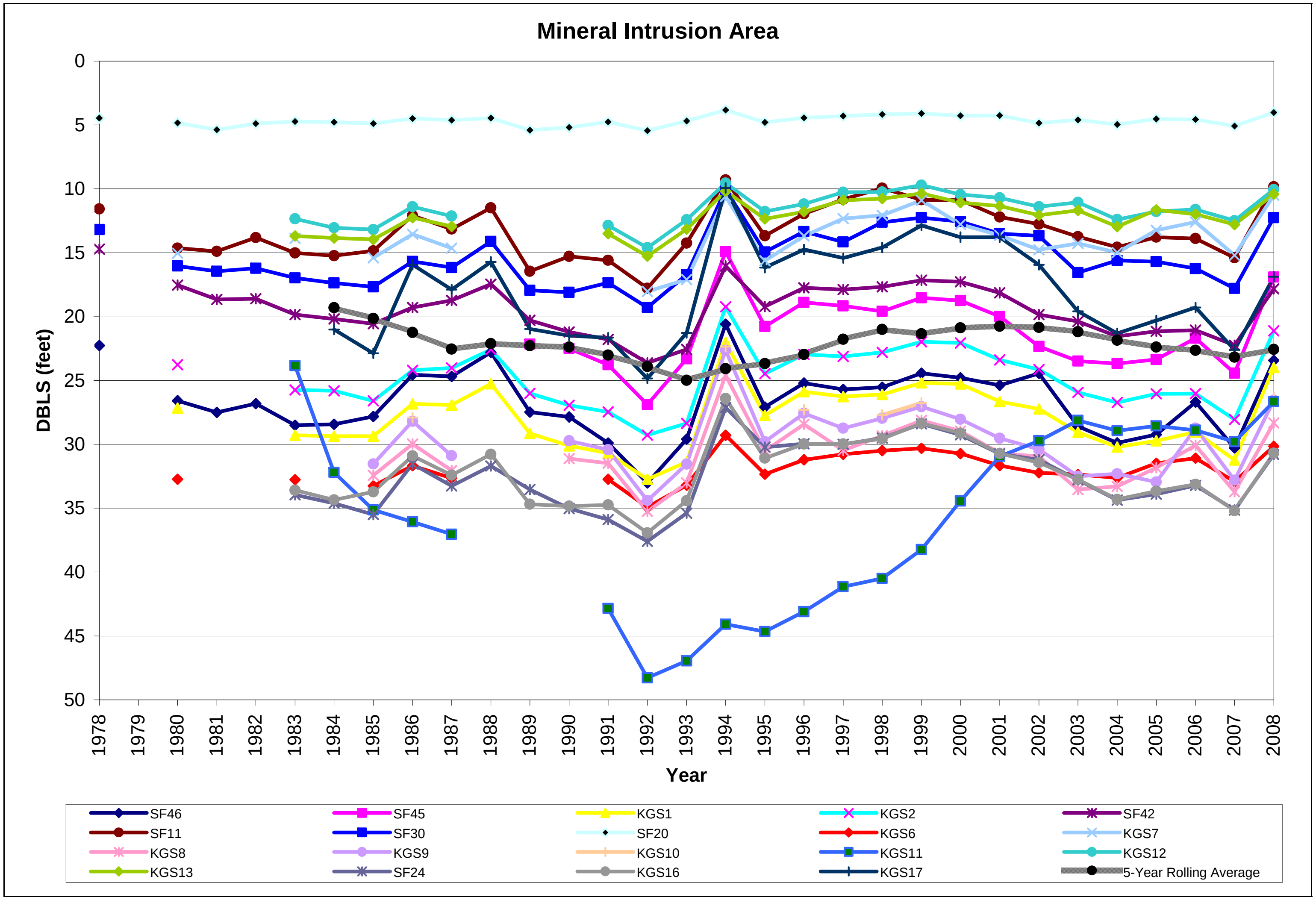


**Figure 19: Monitoring well levels in Mineral Intrusion Area**

The Mineral Intrusion Priority Area has 19 monitoring wells. With increases in water levels in 2008 many wells are now at or higher than their initial measurement. KGS11 has a unique trend in which it declined steadily until 1992 (24.43 ft) and then increased by a net 21.62 ft through 2008. The five-year rolling average saw a net decline of 3.26 ft since 1983 (Figure 19).

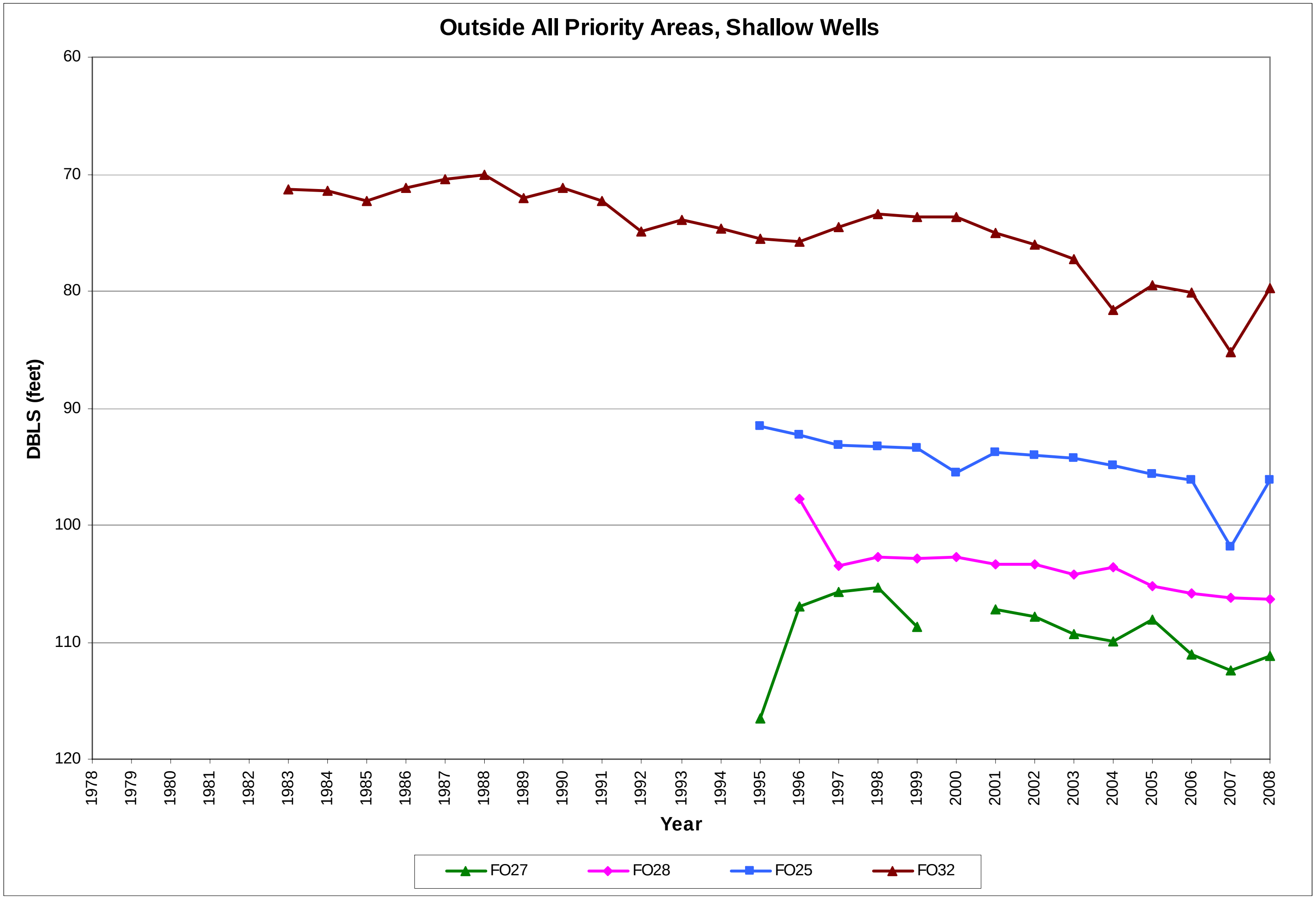


**Figure 20: Monitoring well levels outside all Priority Areas, More Shallow Wells**

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. FO32 has declined a net 8.49 ft since 1983 (Figure 20). The five-year rolling average for all of the wells outside the defined priority areas is shown on Figure 21.

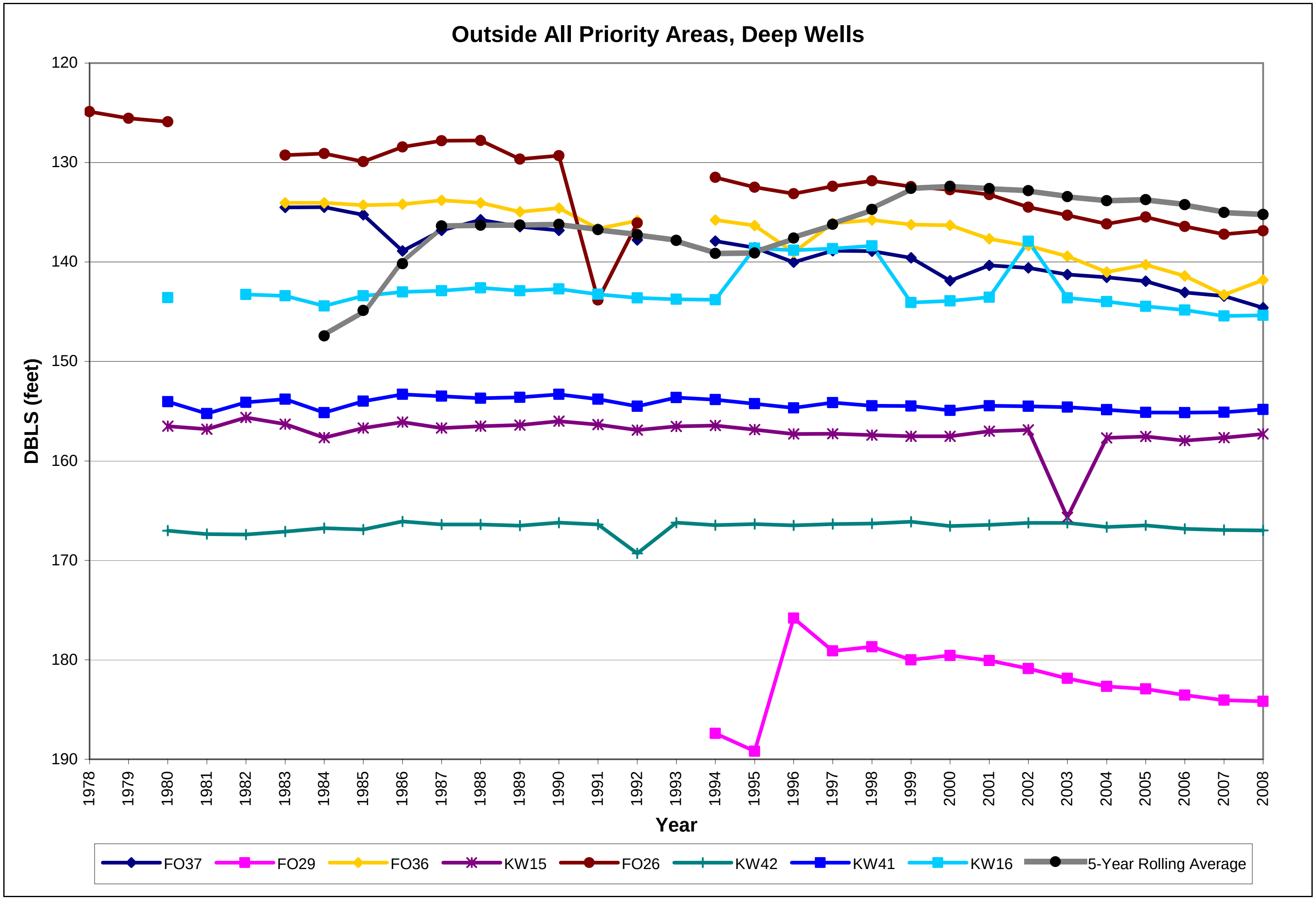


**Figure 21: Monitoring well levels outside all Priority Areas, Deeper Wells**

FO26 has declined a net 11.99 ft since 1978 while other wells, KW41, KW15 and KW42, maintained their water levels over the nearly 30-year time span. The five-year rolling average may be affected by the shallow wells added in the 1990s but since 1999 water levels have declined 2.63 ft (Figure 21).

# V. Water Use

The Rattlesnake Creek subbasin has a total of 1,275 water rights with an authorized quantity of 249,009 acre-feet. The subbasin has very few vested water rights compared to appropriated rights (
Table 2). Water use includes irrigation, municipal, domestic, stock, recreation and industrial water rights.

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

| Type | Source | Number of Rights | Authorized Quantity |
|---|---|---|---|
| Vested | Surface Water | 2 | 222 |
| Appropriated | Surface Water | 3 | 14,721 |
| Vested | Groundwater | 11 | 3,073 |
| Appropriated | Groundwater | 1,259 | 230,993 |

The water use ranges from 209,637 acre-feet in 1991 to 120,181 acre-feet in 1997. The average water use over the twenty-year span was 170,642 acre-feet. Water use in 2006 (the most recent year for which complete records are available) was 185,128 acre-feet. This was up from 2005 and above the average for the subbasin (Figure 22).

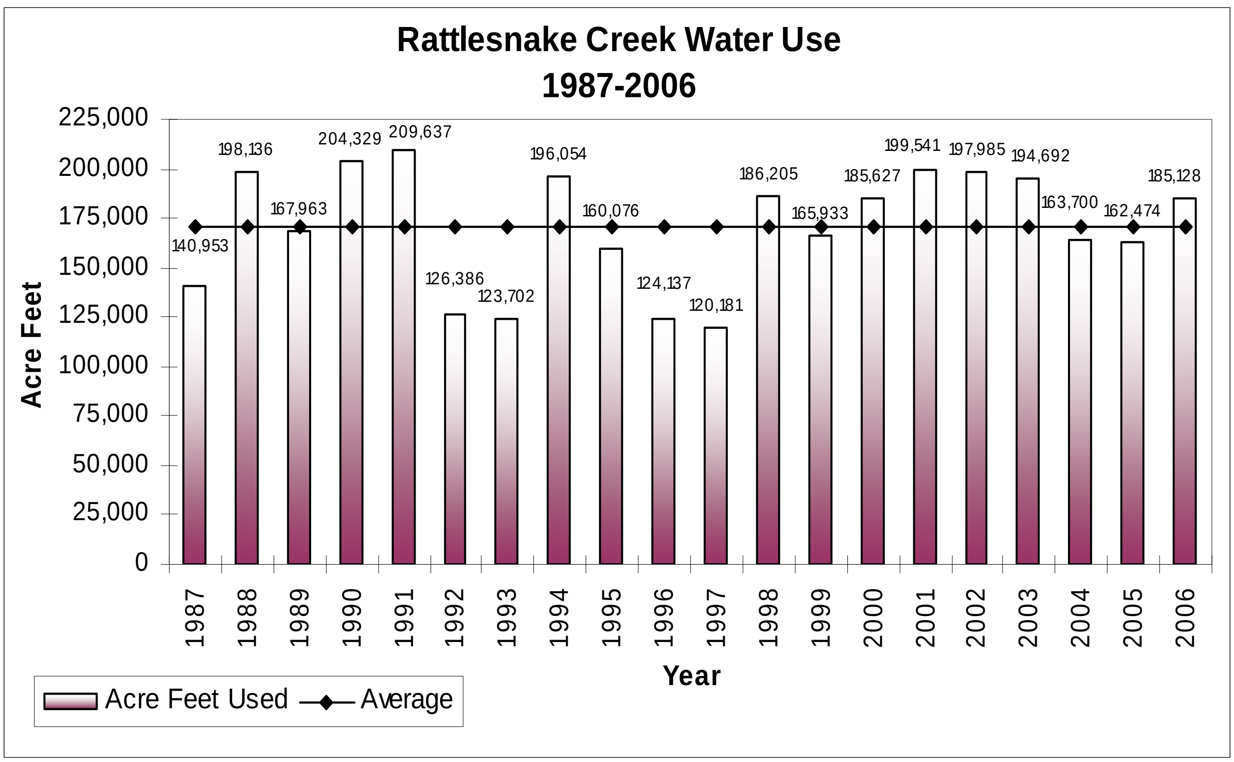


**Figure 22: Groundwater and Surface Water use by year**

# VI. Conclusions

The year 2007 appears to have been an above-average year for precipitation. After a year of above-average precipitation, streamflows were above MDS criteria for most of the year. Water levels in the alluvial aquifer increased within each of the Rattlesnake Creek subbasin priority areas, in some cases by several feet. 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. Continued monitoring of hydrologic conditions and their response to climate variations is important for evaluating the long-term effects of water usage on this subbasin and protection of property rights. It is equally important to understand how fast the system recovers after recharge events as it is to understand the impacts of pumping and other factors on the hydrologic system.

# 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 |
| KW15 | 373038099230801 | 29S19W22NWNENE01 | Outside |
| FO26 | 373054099441601 | 29S22W17SENESE01 | Outside |
| KW42 | 373131099283501 | 29S20W11SWSESE01 | Outside |
| KW41 | 373220099200801 | 29S18W07NWNWSE01 | Outside |
| KW16 | 373258099152101 | 29S18W02NESWSW | Outside |
| FO28 | 373309099384901 | 29S21W05NWNWNW01 | Outside |
| FO25 | 373426099383801 | 28S21W29SWSWNE01 | Outside |
| FO32 | 373510099335801 | 28S21W25NENWNW01 | Outside |
| KGS11 | 375211098505601 | 25S14W16SWSESE01 | 1 |
| KGS12 | 375224098522701 | 25S14W16SWNWSW01 | 1 |
| KGS13 | 375257098523601 | 25S14W17NENENE01 | 1 |
| KGS14 | 375337098533301 | 25S14W08NWSWNW01 | 1 |
| SF62 | 375428098513101 | 25S14W04NENESE01 | 1 |

| | | | |
|---|---|---|---|
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| KGS18 | 375619098491001 | 24S14W25NWNWSW01 | 1 |
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| SF09 | 380003098482103 | 23S14W36SESESW03 | 1 |
| PN68 | 380101098563901 | 23S15W26SW01 | 2 |
| SF43 | 380136098544001 | 23S14W30NWNWNW01 | 2 |
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| 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 |

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| 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 |
| 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 |
| ED09 | 374844099183101 | 26S18W05SENENW01 | 5 |
| 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 |

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| SF13 | 375859098574001 | 24S15W10NWNENW01 | 5 |
| SF07 | 375957098502501 | 24S14W03NENENE01 | 5 |
| SF08 | 380129098502501 | 23S14W27NENESE01 | 5 |
| PN67 | 380143098583001 | 23S15W21SESWSW01 | 5 |
| SF07 | 380301098502501 | 23S14W15NESESE01 | 5 |
| ED02 | 384944099201401 | 25S18W31SESENW01 | 5 |
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| KW10 | 373417099265201 | 28S20W36NESESE01 | 7 |
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| KW11 | 373455099272501 | 28S20W25NESWNW01 | 7 |
| KW31 | 373517099201701 | 28S18W19SWSWNW01 | 7 |
| KW30 | 373612099093801 | 28S17W15SESENW01 | 7 |
| KW33 | 373729099224501 | 28S19W10NENESW01 | 7 |
| KW14 | 373809099080001 | 28S17W01SWNENW01 | 7 |
| KW24 | 373917099140101 | 27S18W35NENESW01 | 7 |
| KW20 | 373938099043601 | 27S16W28SWSESE01 | 7 |
| KW08 | 373941099083301 | 27S17W26SESENW01 | 7 |
| KW05 | 373948099250101 | 27S19W29SESENW01 | 7 |
| KW04 | 373950099204101 | 27S19W25SENESW01 | 7 |
| KW23 | 374050099161301 | 27S18W22NESESW01 | 7 |
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| KW21 | 374201099135401 | 27S18W13NENENE01 | 7 |
| KW18 | 374255099033901 | 27S16W10NWNESW01 | 7 |
| KW06 | 374307099121601 | 27S17W08NWNENE01 | 7 |
| ED15 | 374440099032401 | 26S16W24NENWSW01 | 7 |
| PR01 | 348560985420401 | 26S15W01NESESW01 | 7 |
| SF17 | 375625098463401 | 24S13W20SWSESE01 | 7 |
| SF48 | 375750098451101 | 24S13W16NESWNE01 | 7 |