



# **Rattlesnake Creek**

## **2008 Field Analysis Summary**

Subbasin Water Resource Management Program

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Division of Water Resources  
Kansas Department of Agriculture  
109 SW Ninth Street - 2<sup>nd</sup> Floor  
Topeka, KS 66612-1283  
785-296-6087

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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](http://www.ksda.gov/includes/document_center/subbasin/Rattlesnake/RSC_Management.pdf).

# Rattlesnake Creek Subbasin

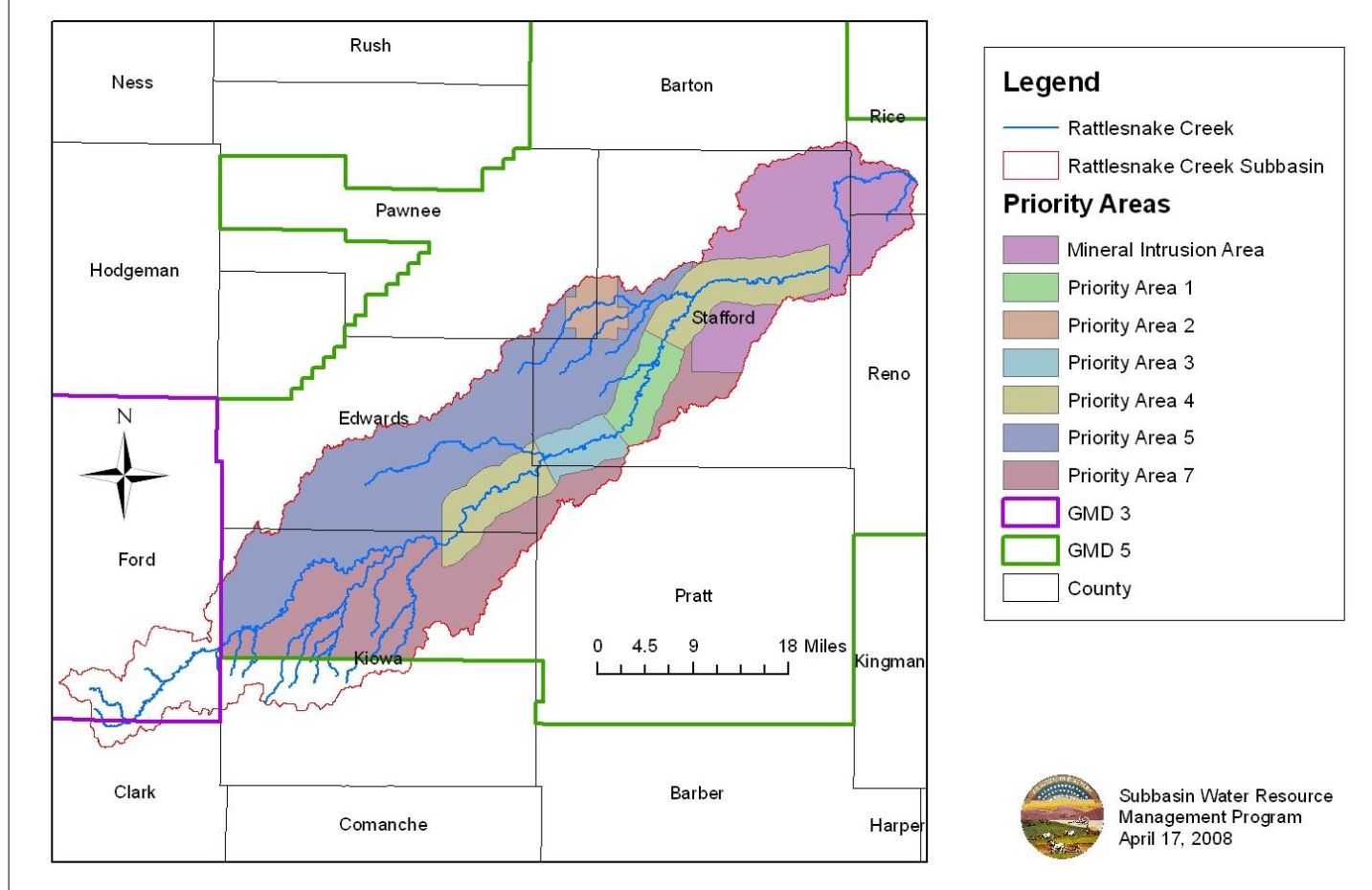


Figure 1: Rattlesnake Creek Subbasin with Priority Areas

## 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 2007.

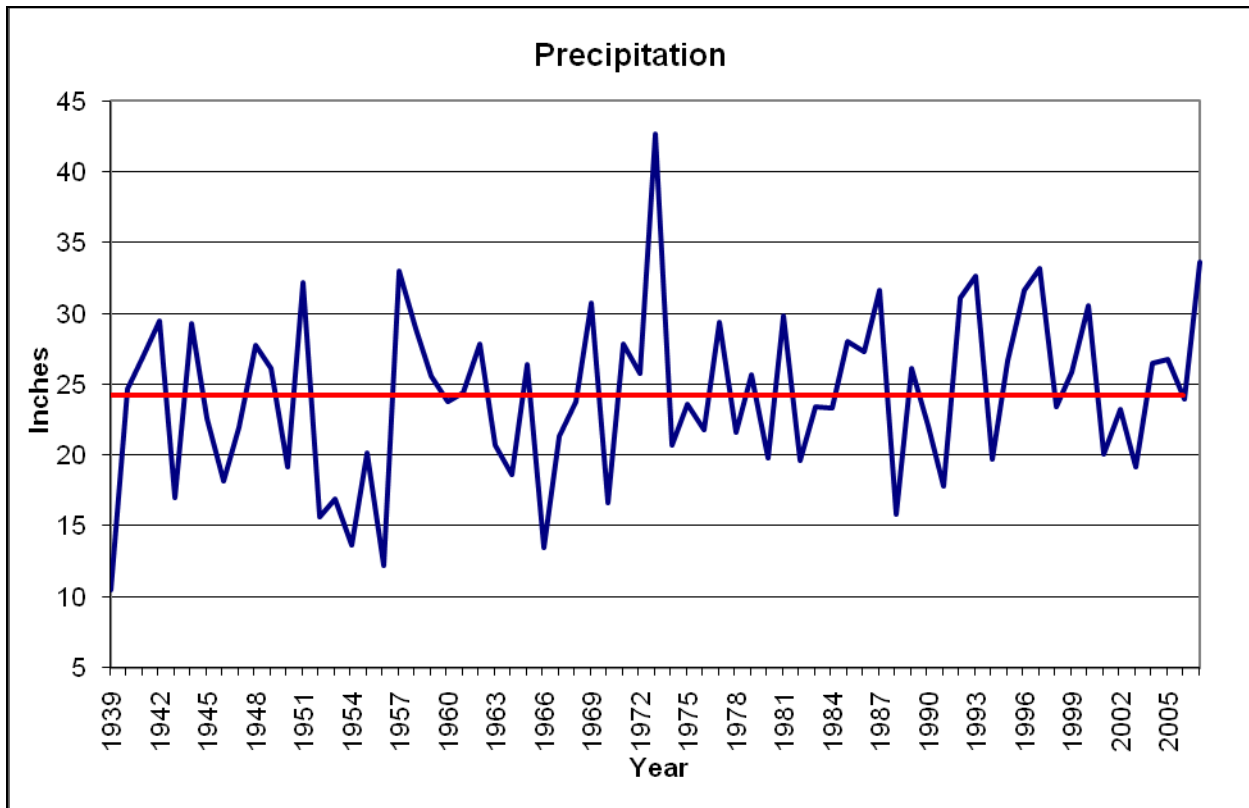


Figure 2: Rattlesnake Creek Precipitation 1939-2007

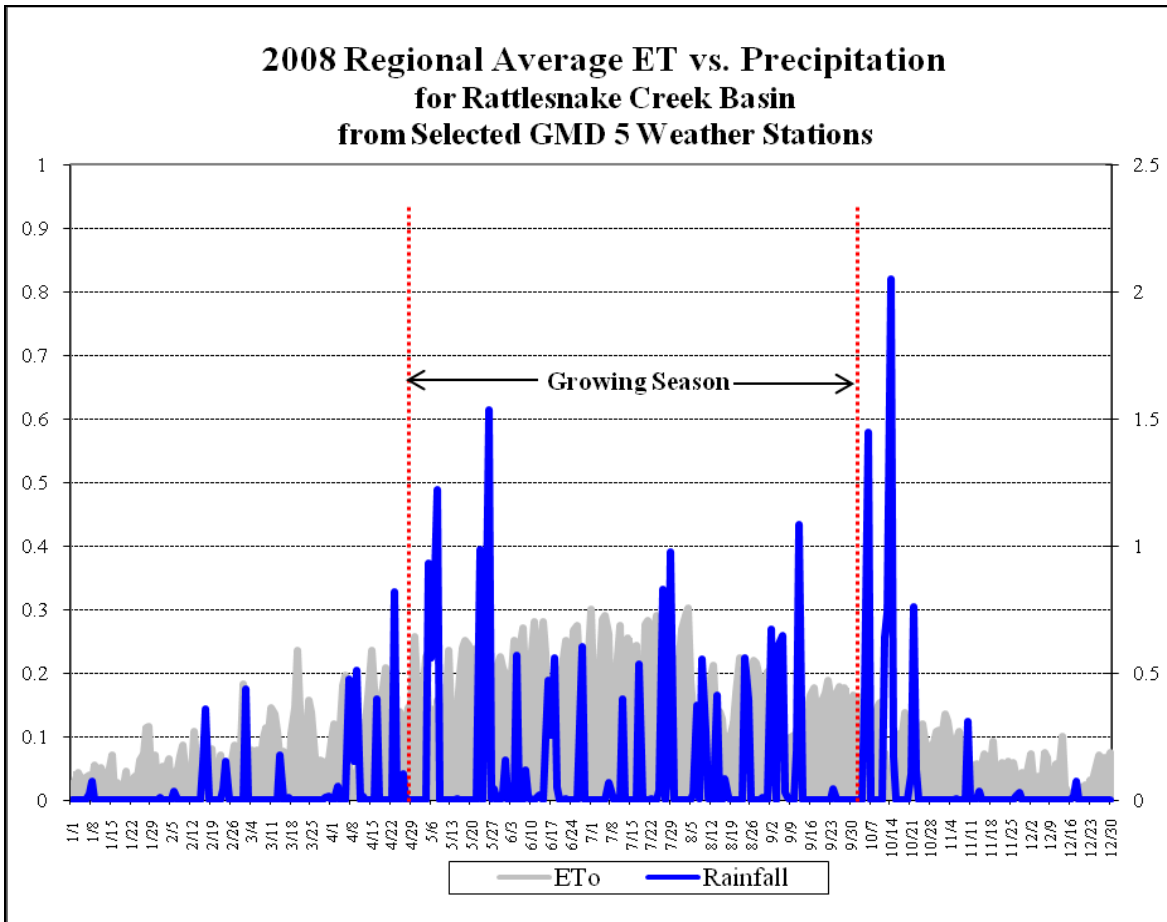
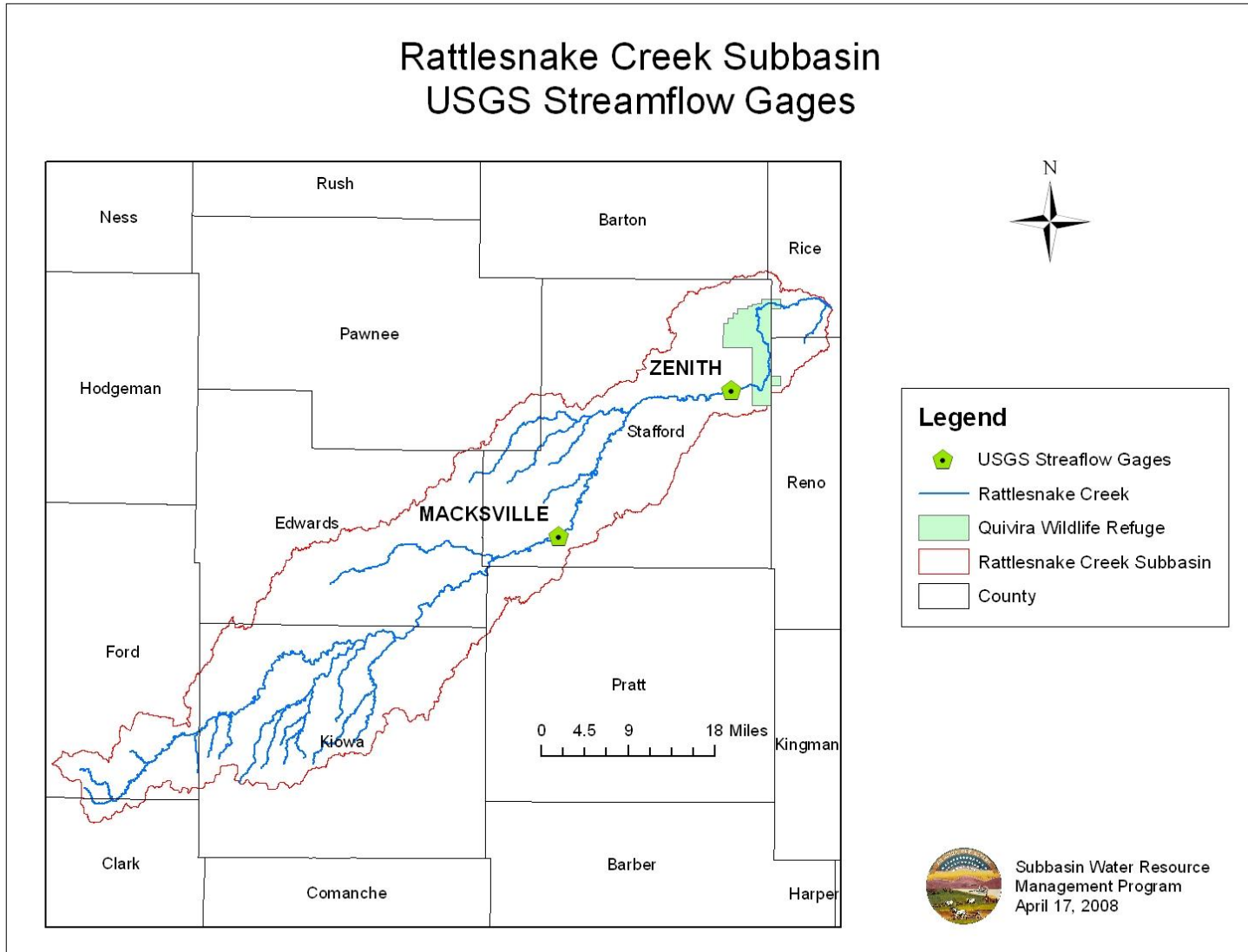


Figure 3: Precipitation and Evapotranspiration for 2008

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 30.36 in. of precipitation during 2008. 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 41.96 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**

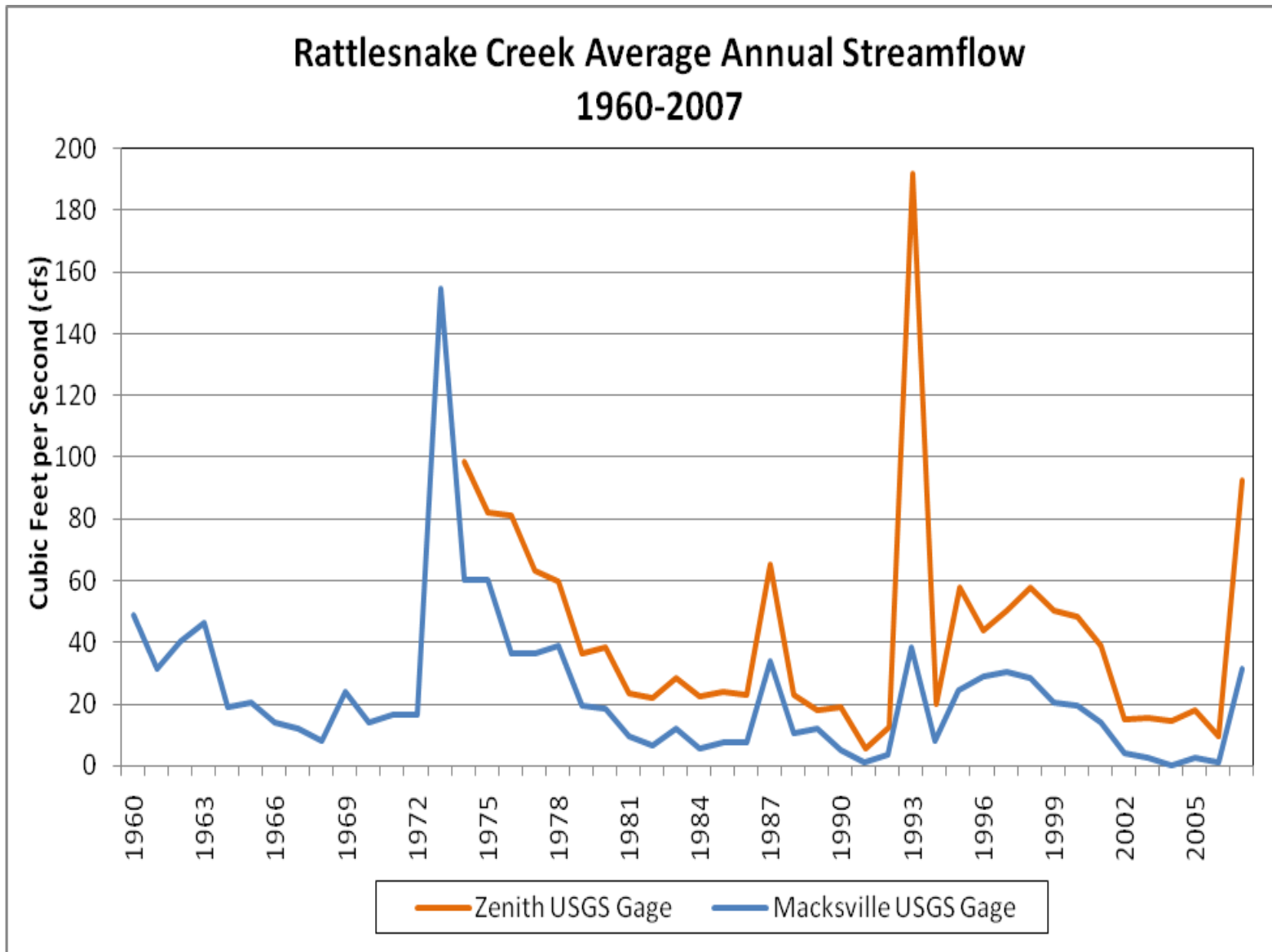
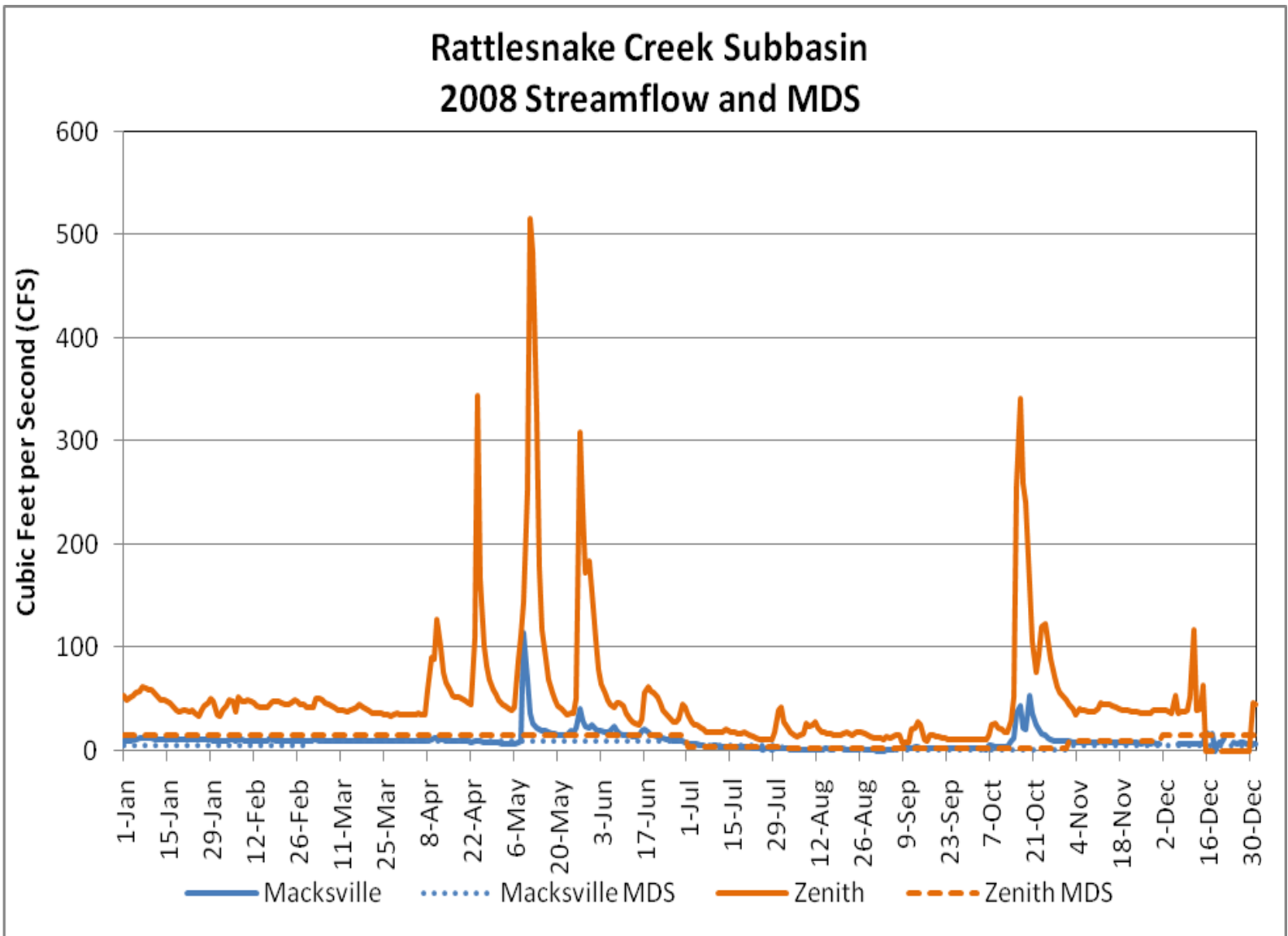


Figure 5: Streamflow at USGS Gages 1960-2007





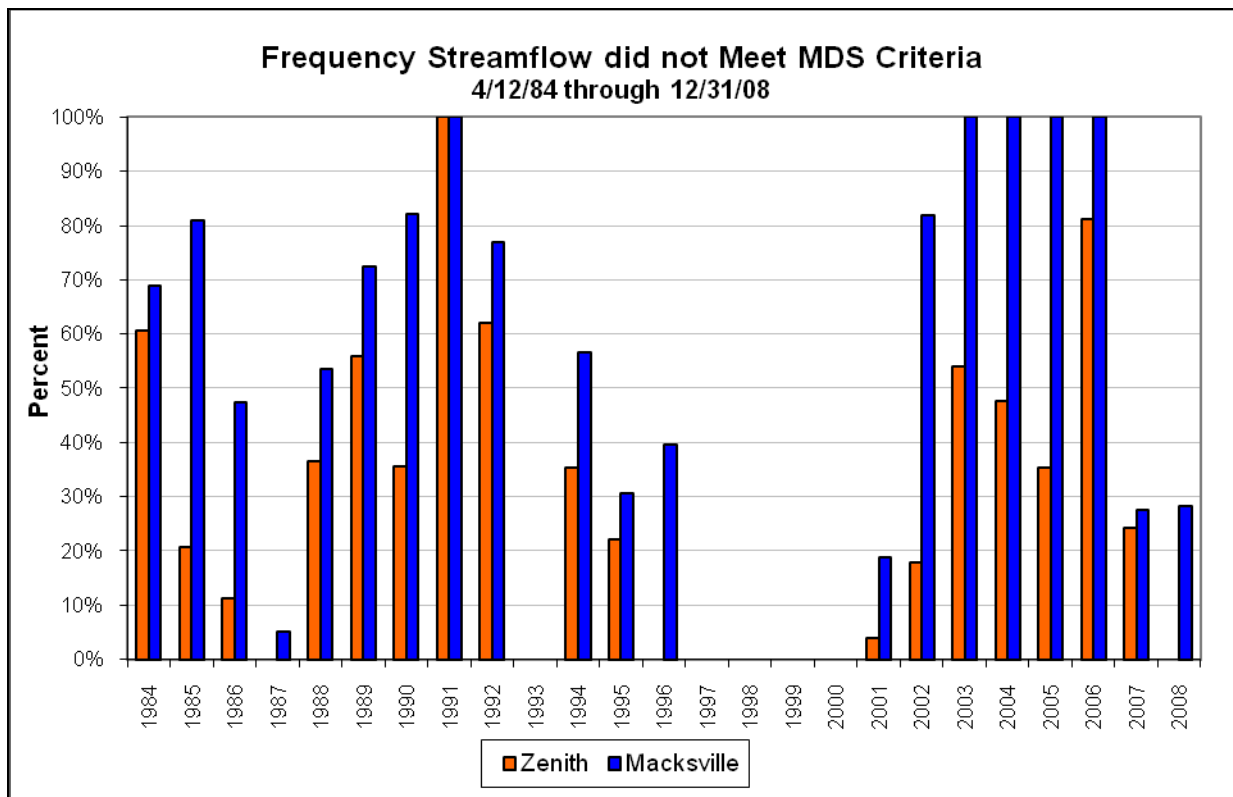
**Figure 6: Daily Streamflow and MDS for 2008**

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 43.43 cfs and 23.13 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 31.67 cfs at Zenith and 9.51 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 2008. Both Zenith and Macksville started the year by meeting the MDS levels. While the streamflow had spikes of high flow, Macksville was not meeting MDS several times during the year especially during the Spring and Summer. Zenith streamflow stayed above the MDS criteria all of 2008.



**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.

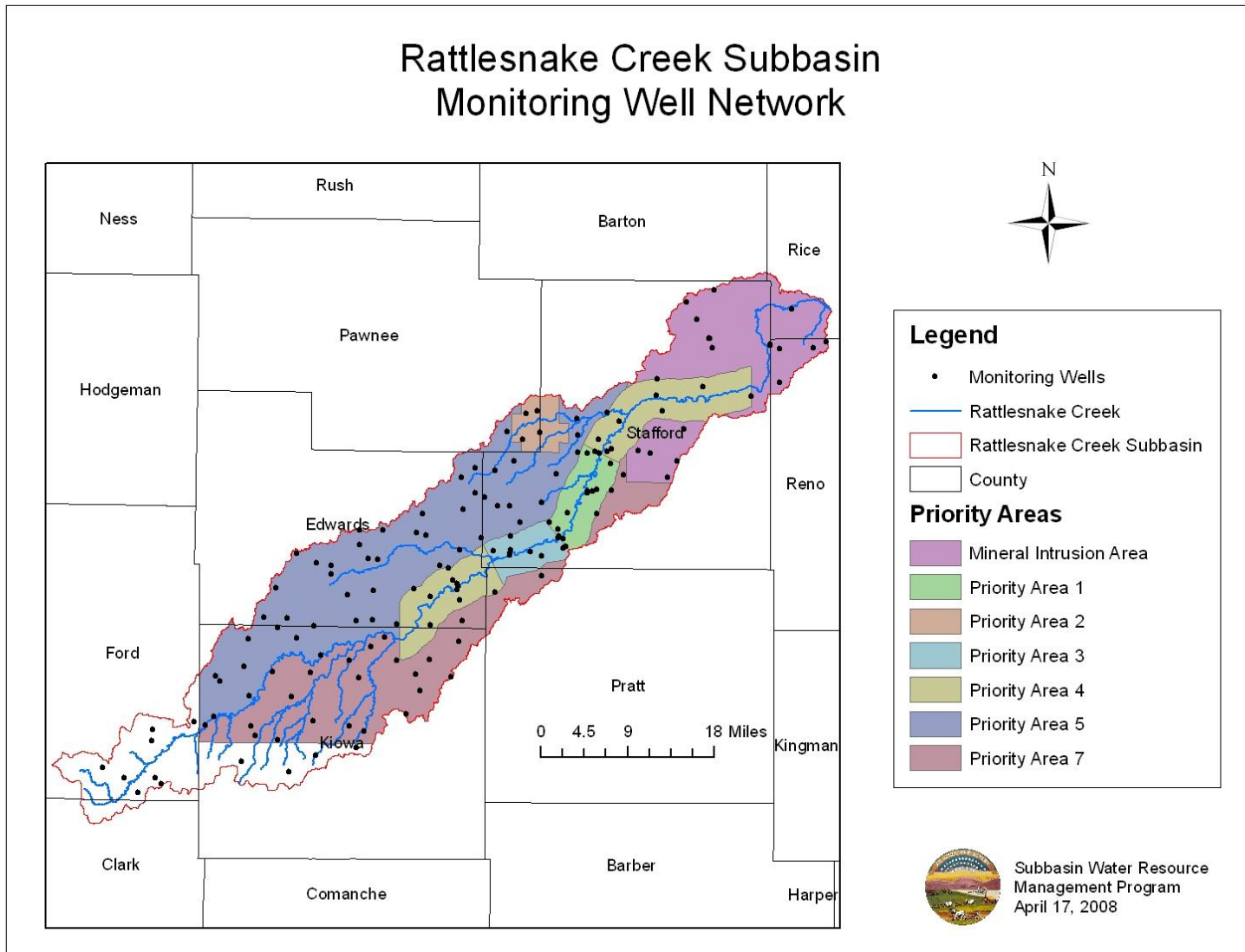
Streamflow at both gaging stations did not meet MDS criteria as set forth by the regulations for the entire year in 1991. During 1993 and 1997-2000, streamflow at both of the gages met MDS criteria. From 2001-2007, streamflow at both gages was did not meet MDS frequency requirements for all or part of each year. Most notably, the Macksville gage did not meet MDS criteria during the entire years of 2003-2006. The beginning of 2007 both streamflow gages did not meet MDS criteria, but by the end of the year both were well above. In 2008, Zenith maintained above MDS streamflows while Macksville met MDS criteria just above 70% of the year.

#### **IV. Groundwater**

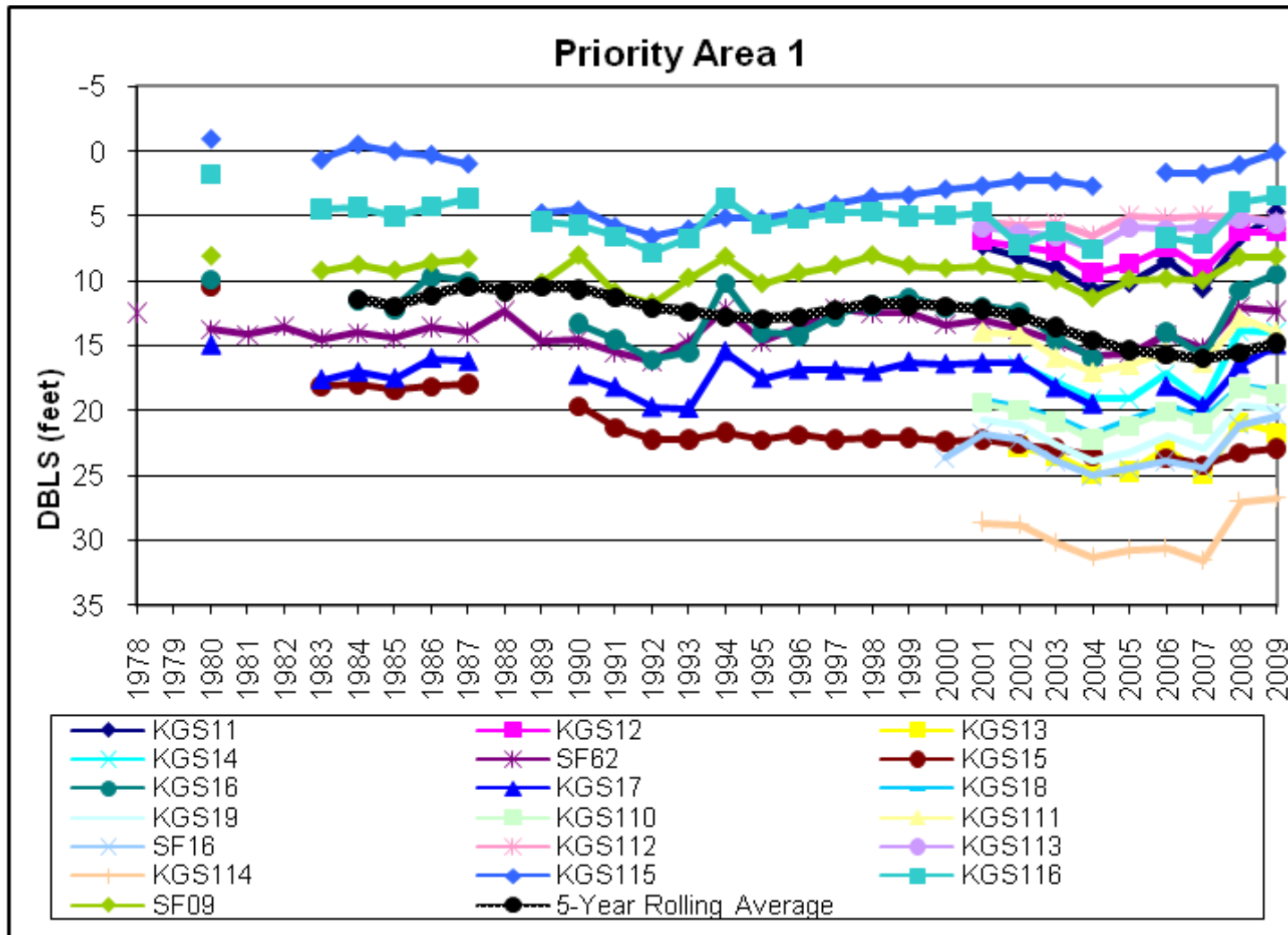
The majority of the Rattlesnake Creek subbasin overlies the Great Bend Prairie portion of the High Plains aquifer. However, the headwaters begin in the Ogallala portion of the High Plains aquifer. Approximately 80 percent of the southwest portion of the Rattlesnake Creek subbasin is underlain by unconfined 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 168 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.

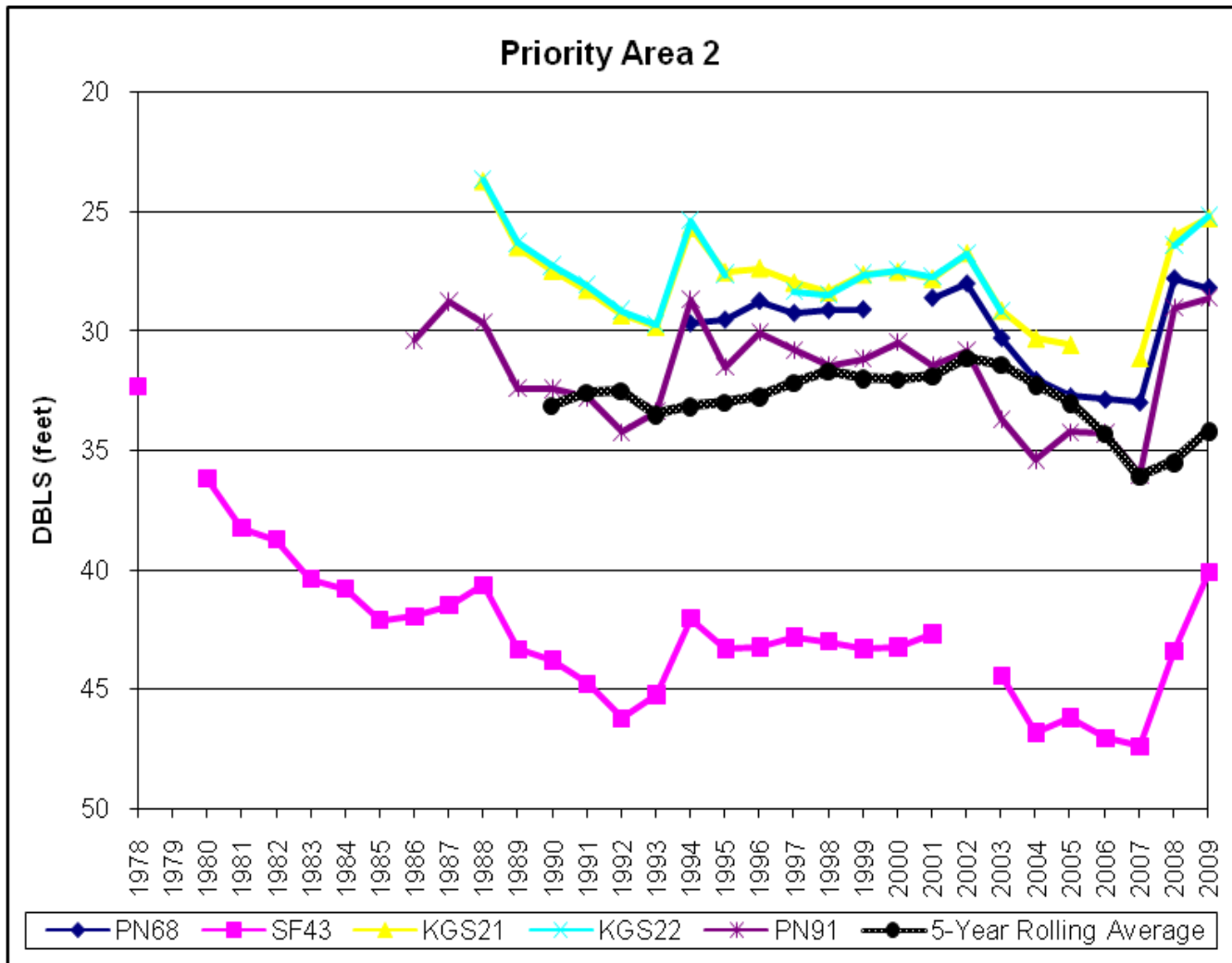


**Figure 8: KGS, GMD 5 and DWR Monitoring Wells**



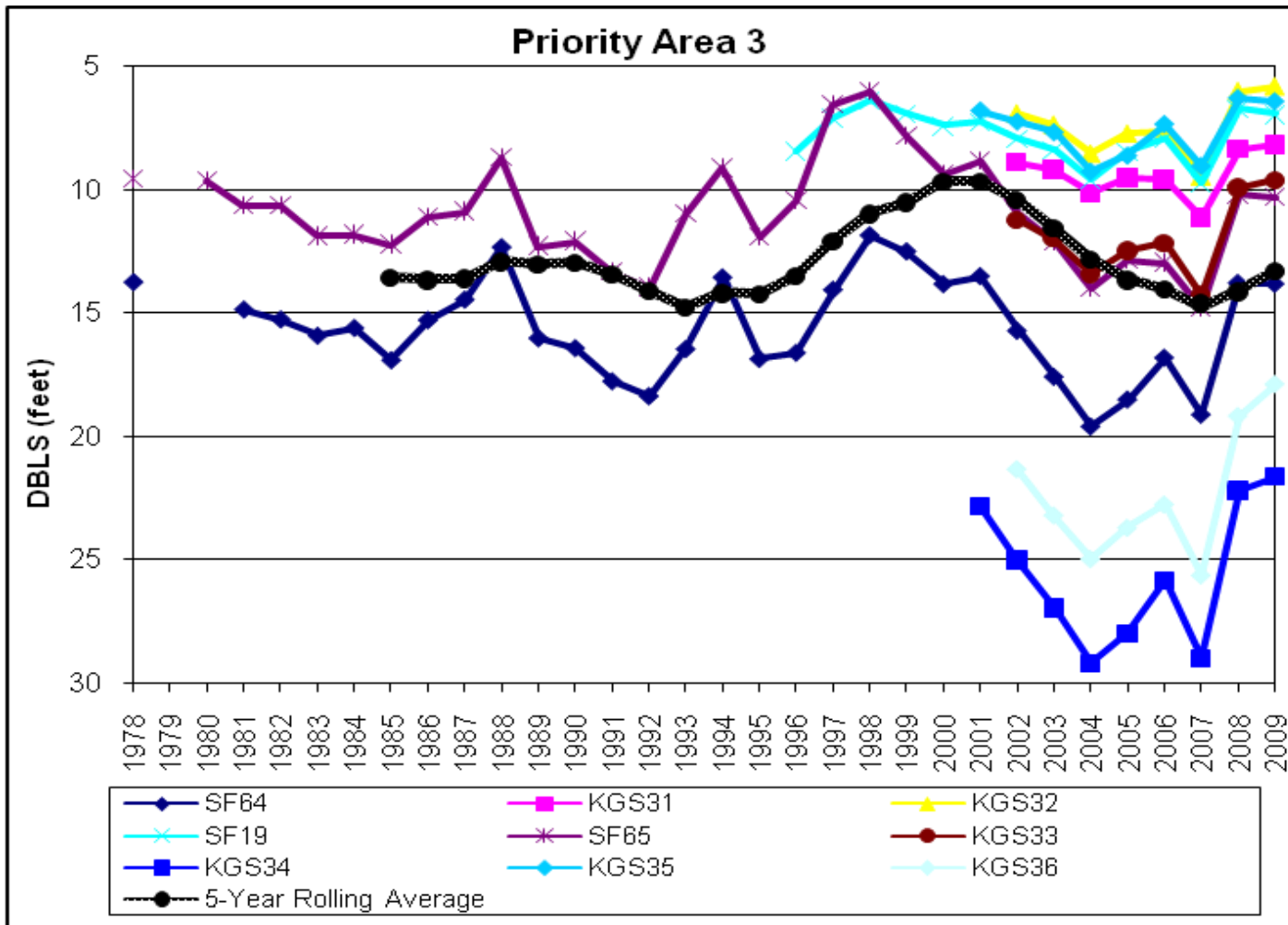
**Figure 9: Monitoring well levels in Priority Area 1**

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. In 2009 water levels varied including some that leveled off, rose and others that declined. The five-year rolling average continued to increase in 2009 (0.73 ft)(Figure 9). The five-year rolling average exhibits a net decline of 3.42 ft since 1984.



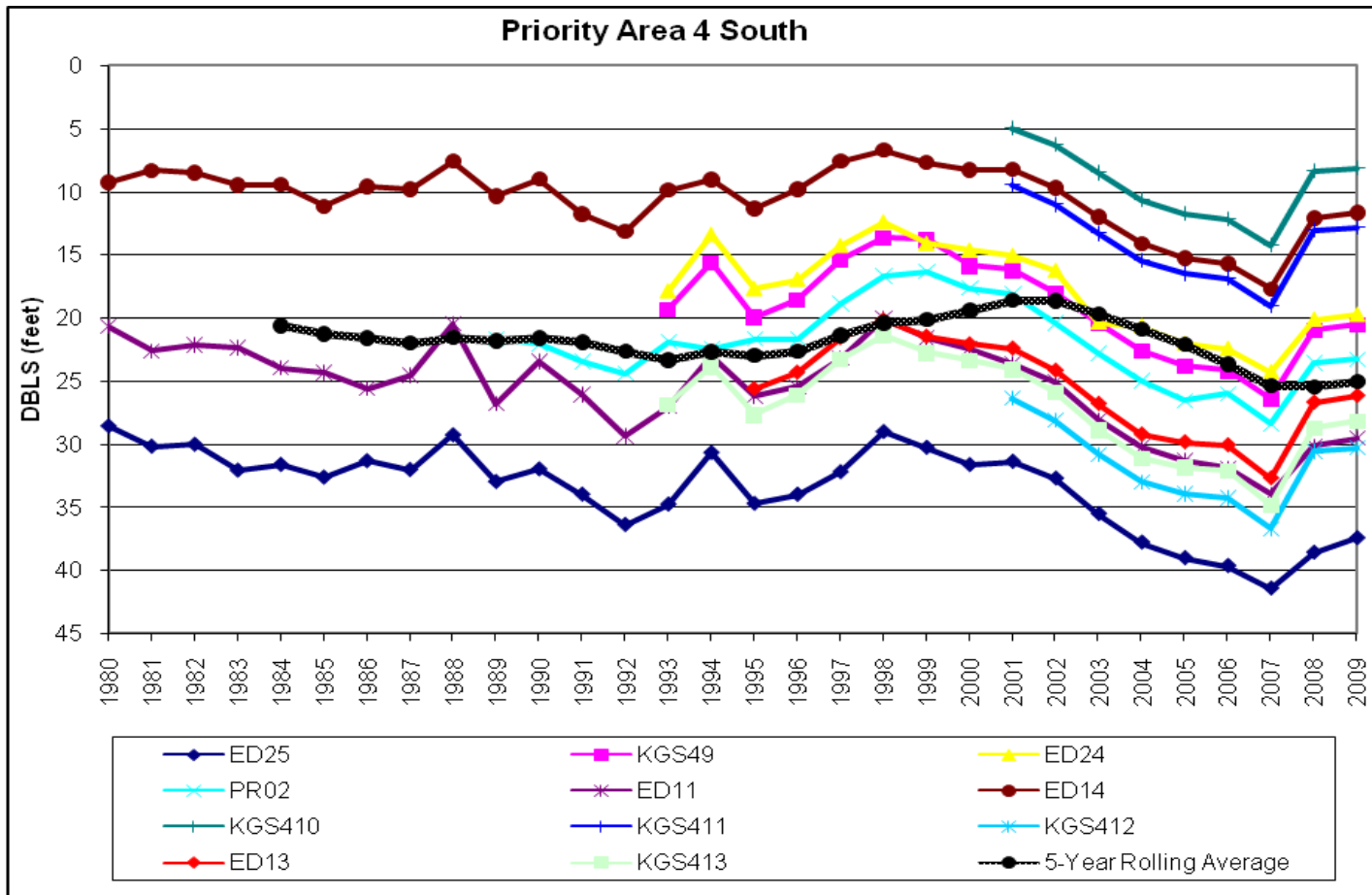
**Figure 10: Monitoring well levels in Priority Area 2**

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 7.75 ft since 1978 despite an increase of 3.99 ft in 2008 and 3.28 ft in 2009. Three of the other four wells also had an increase in water levels. PN68 declined 0.38 ft. The five-year rolling average exhibits a net decline of 1.06 ft since 1990 (Figure 10).



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

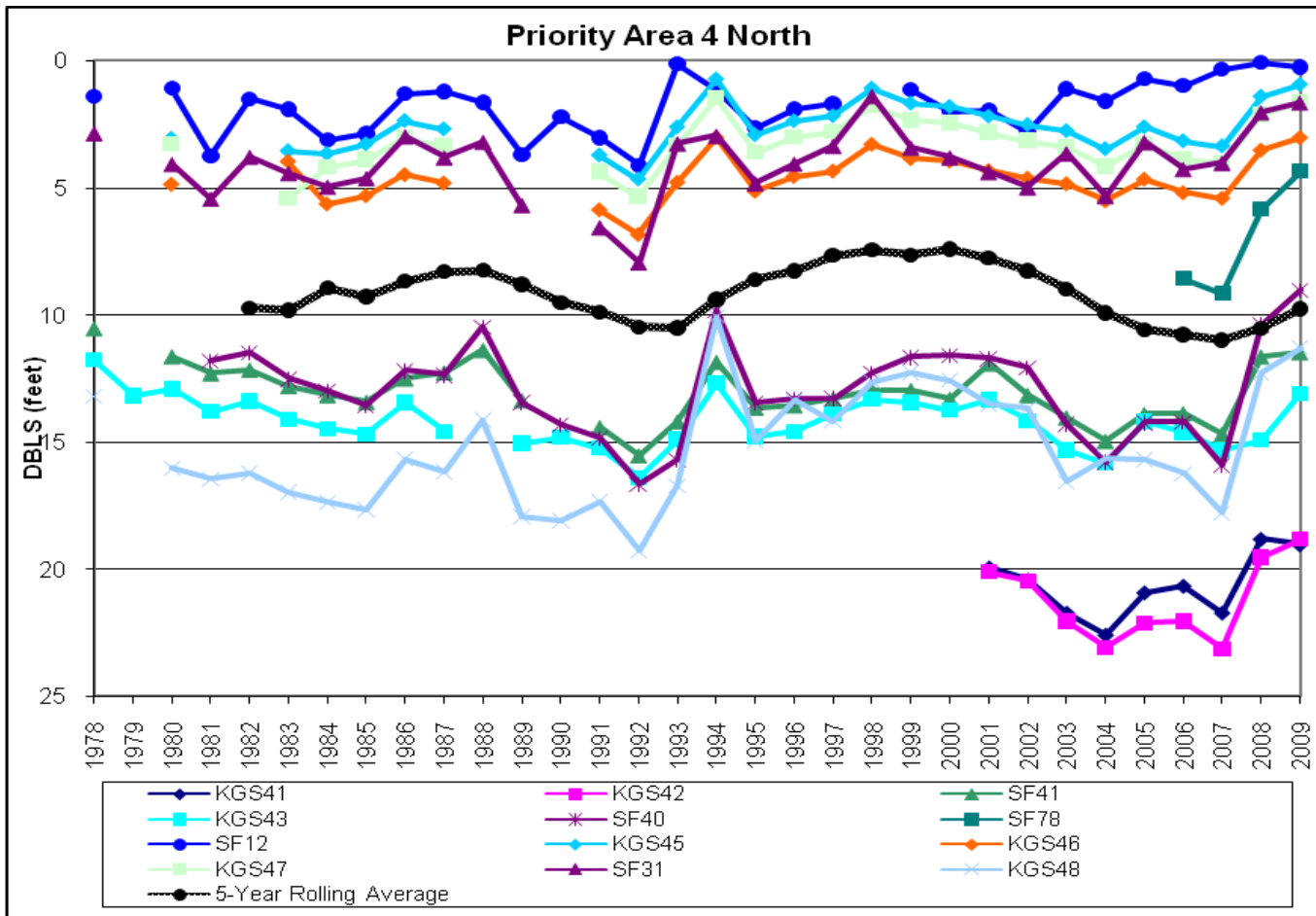
Priority Area 3 has 9 monitoring wells. Water levels were down in 2007 but increased in all the wells in 2008. Four monitoring wells had declines in 2009 (SF64, SF19, SF65 and KGS35). The five-year rolling average also saw another rise in 2009 and now has a net increase of 0.29 ft (Figure 11).



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

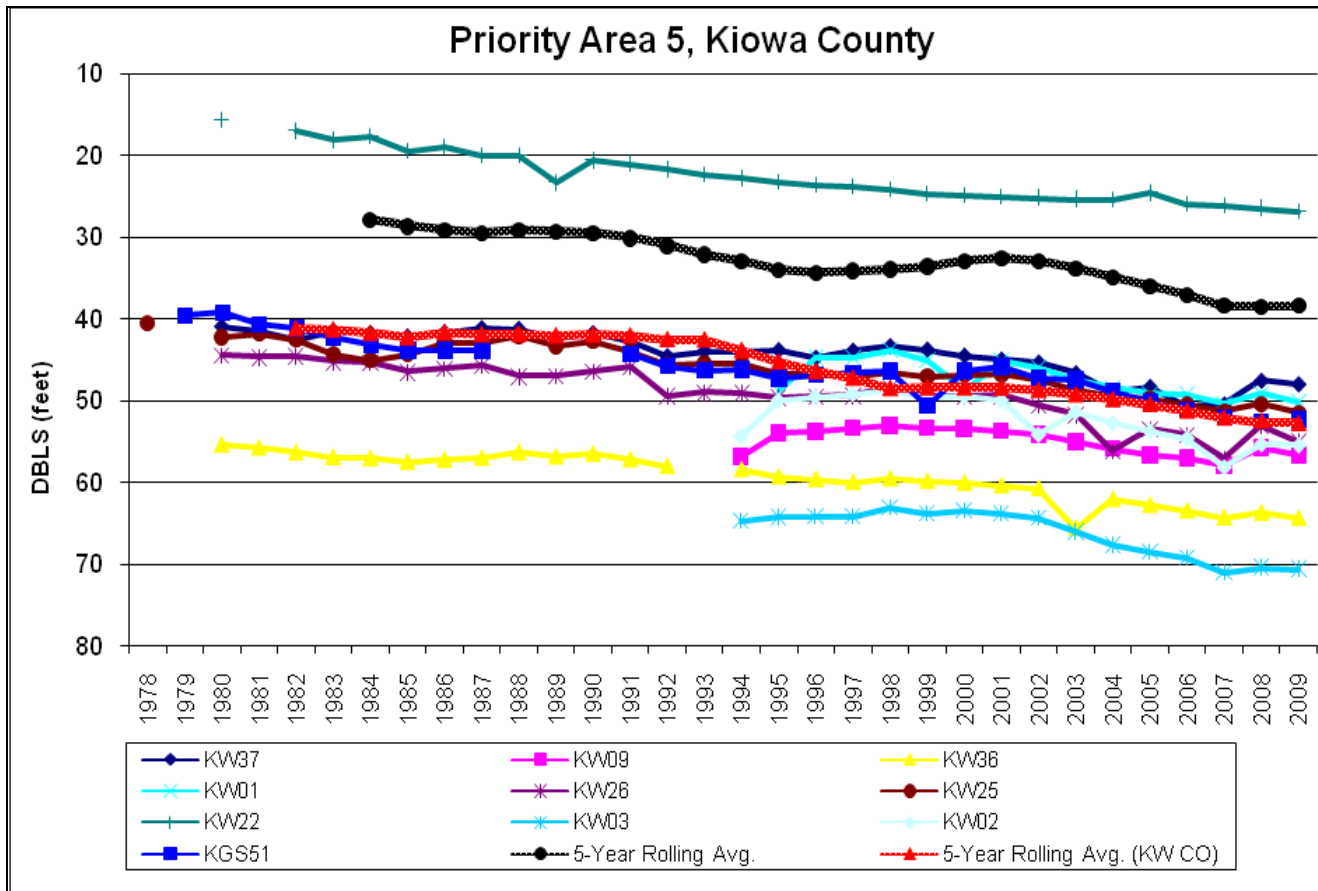
Priority Area 4 is divided into two areas along the main stem corridor, South and North. South is upstream located primarily in Edwards County and has 11 monitoring wells. The water levels had a declining trend from the late-1990s to 2007. In 2009, the water levels leveled off or had a slight increase. The five-year rolling average slightly increased (0.4 ft) between 2008 and 2009 but exhibits a net decrease of 4.41 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 2.38 ft, 8.82 ft and 8.85 ft respectively.





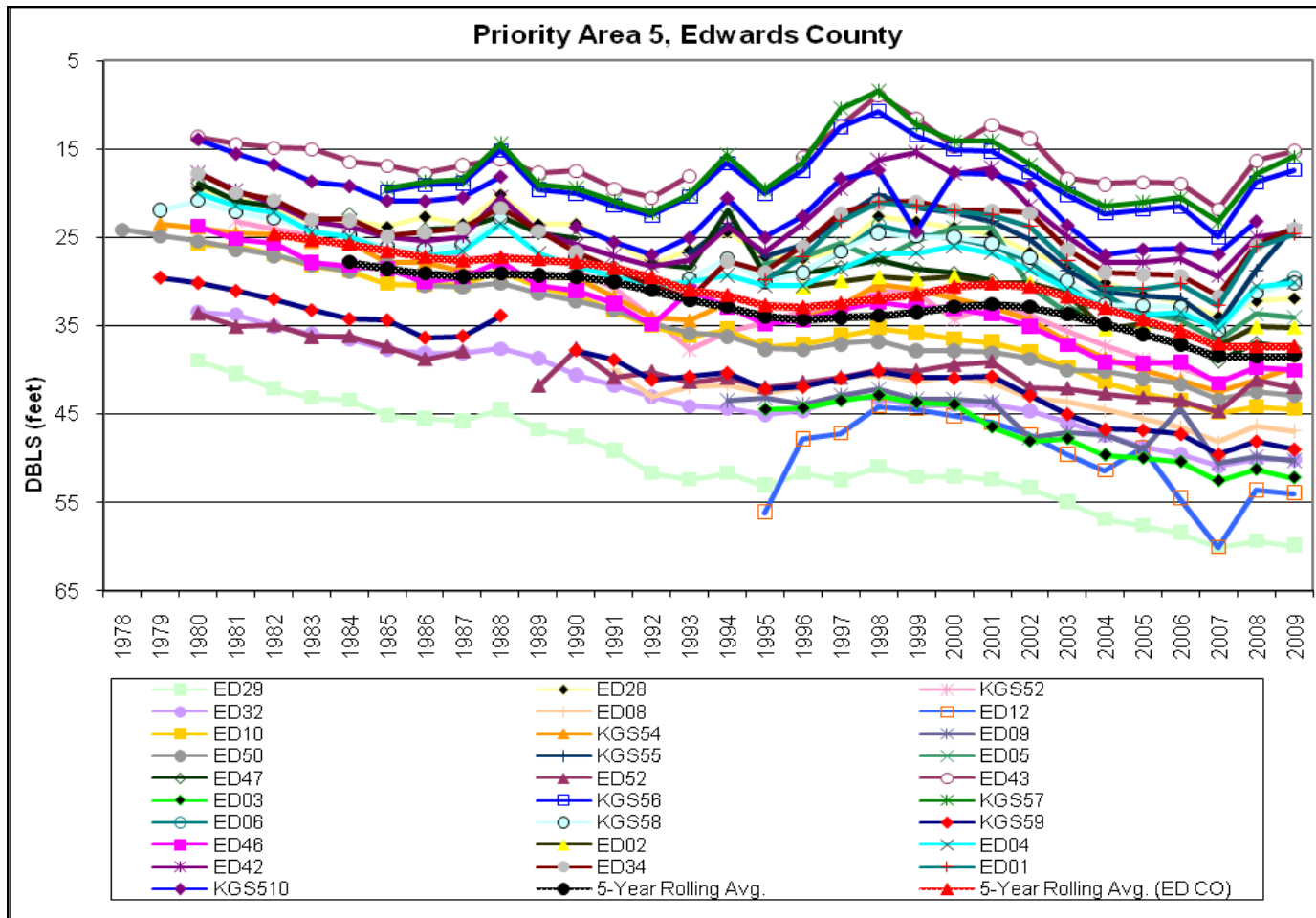
**Figure 13: Monitoring well levels in Priority Area 4 North**

Priority Area 4 North has 12 monitoring wells and is located primarily in Stafford County. Most of the water levels continued to increase in 2009 (Figure 13). The five-year rolling average increased in 2009 0.75 ft and has reached the same level as 1982.



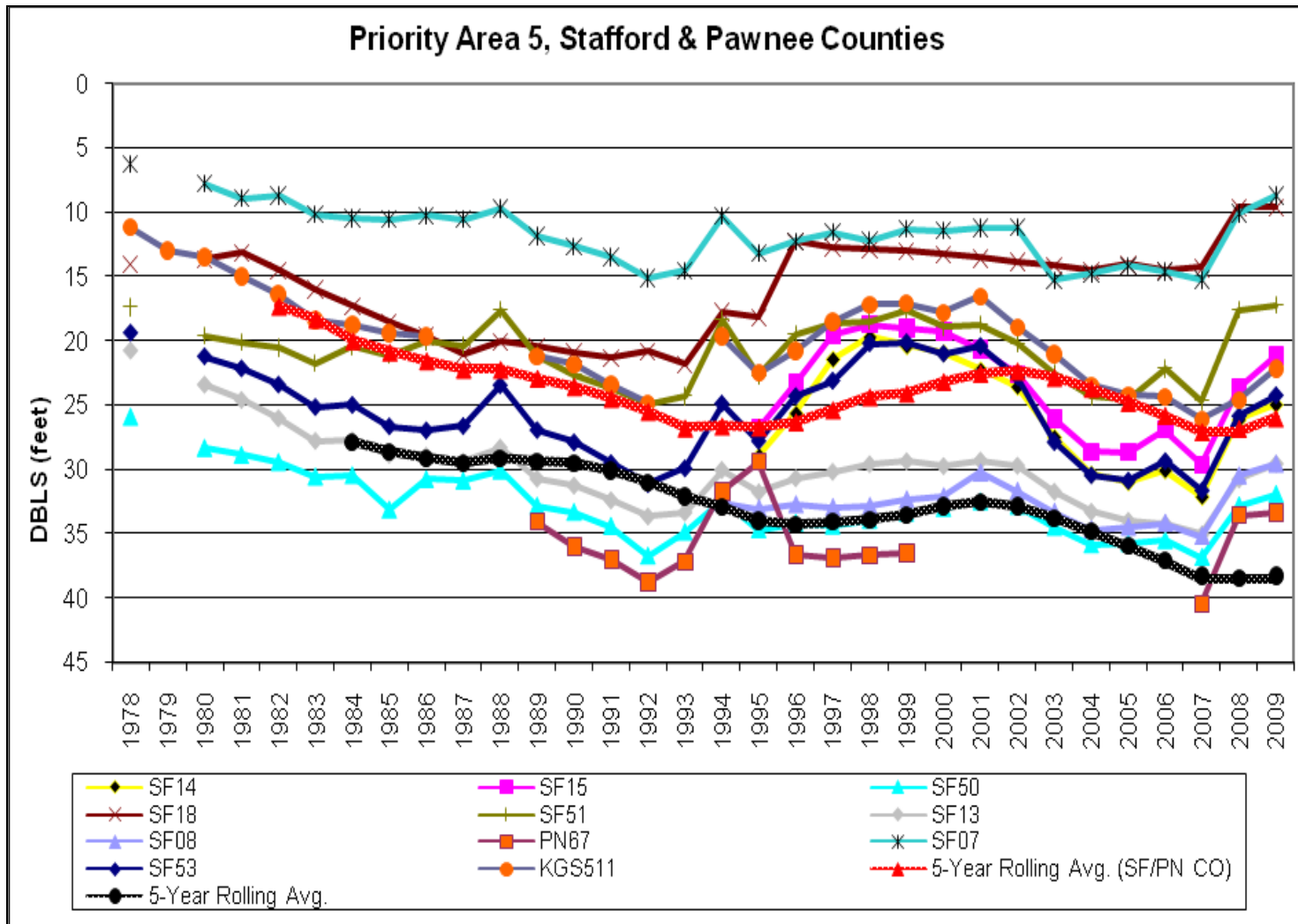
**Figure 14: Monitoring well levels in Priority Area 5, Kiowa County**

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 11.67 ft since 1982. The Priority Area 5 five-year rolling average has declined a net 10.46 ft since 1984 (Figure 14).



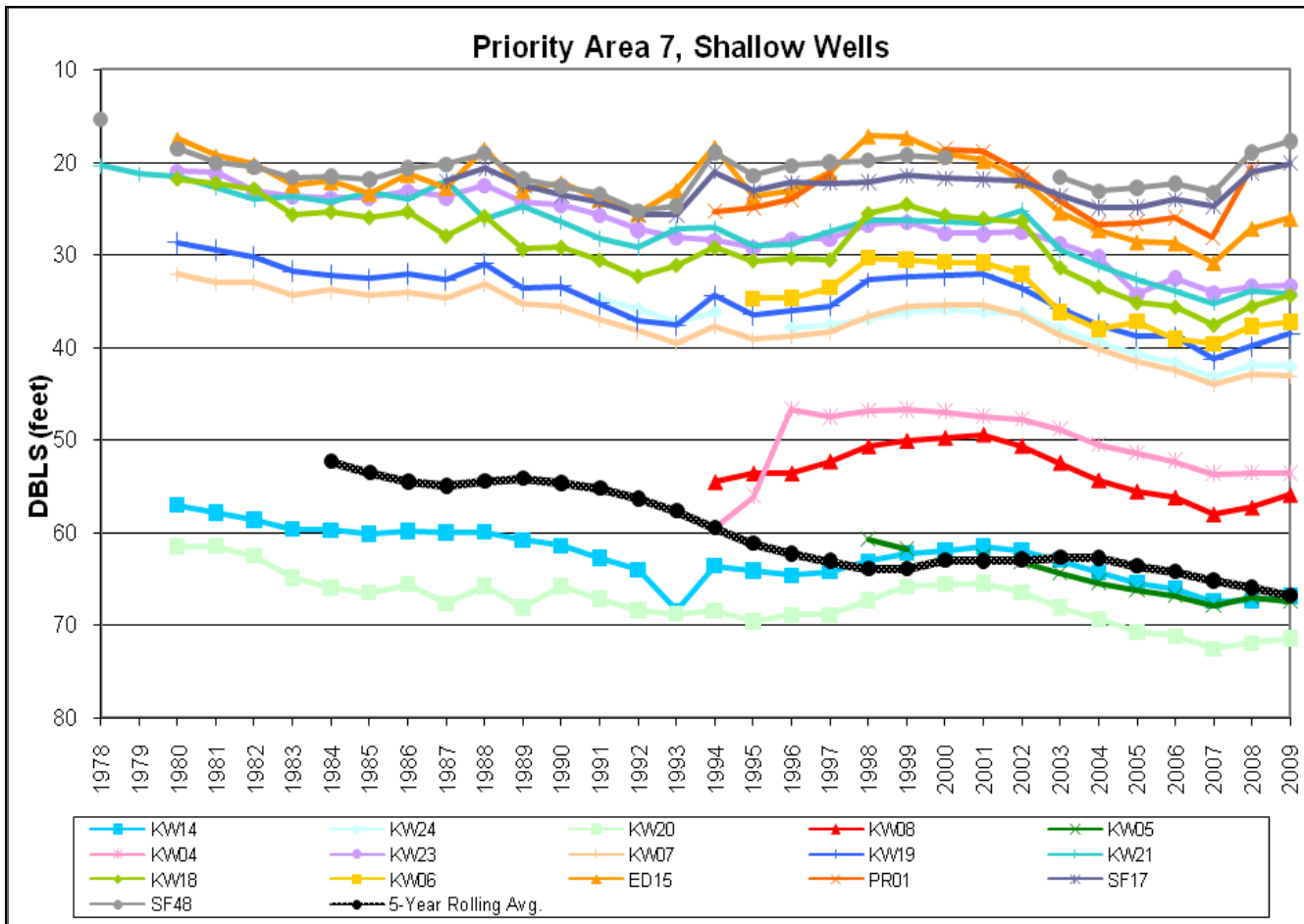
**Figure 15: Monitoring well levels in Priority Area 5, Edwards County**

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 18.74 ft. Some water levels continued to increase but many of the deeper wells declined in 2009(Figure 15). The Edwards County (red line) five-year rolling average exhibits a net decline of 12.75 ft since 1982.



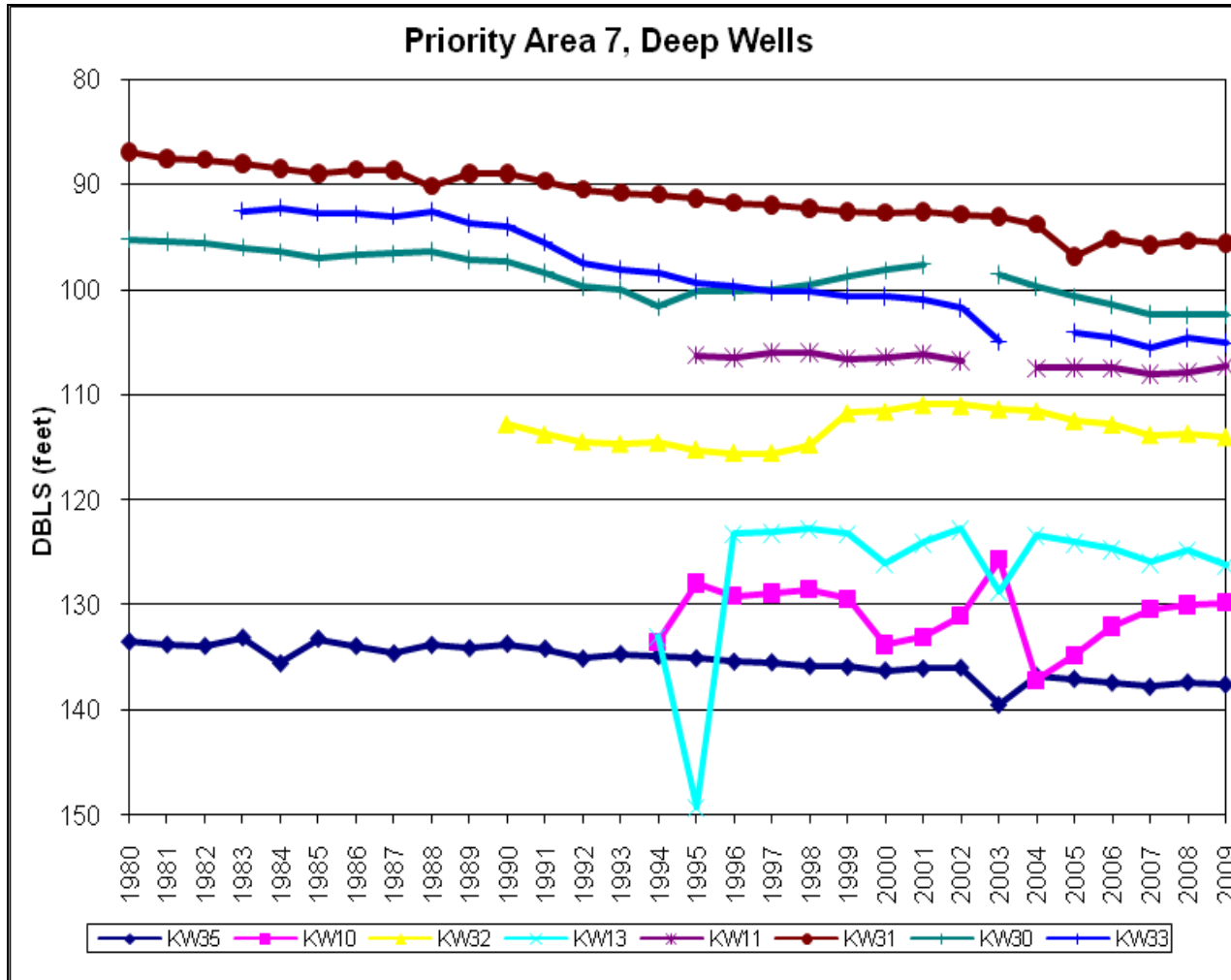
**Figure 16: Monitoring well levels in Priority Area 5, Stafford and Pawnee Counties**

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 (0.15 ft) since 1978. KGS511 had the biggest overall net decline of 10.95 ft (Figure 16). The Stafford/Pawnee County five-year rolling average (red line) declined a net 8.71 ft since 1982.



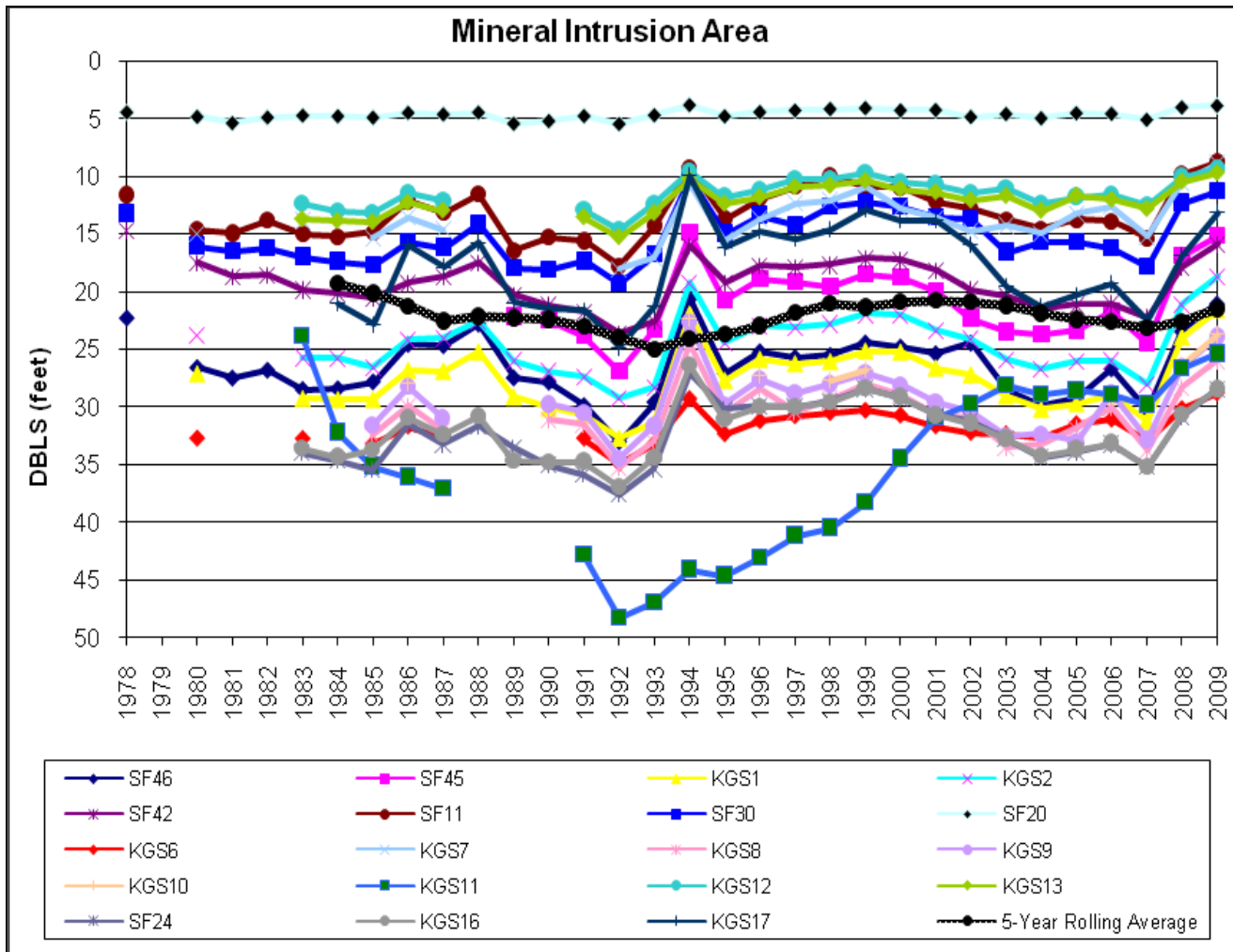
**Figure 17: Monitoring well levels in Priority Area 7, Shallow Wells (Note: Rolling Average includes ALL wells in the Priority Area)**

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 13.81 ft since 1978 (Figure 17).



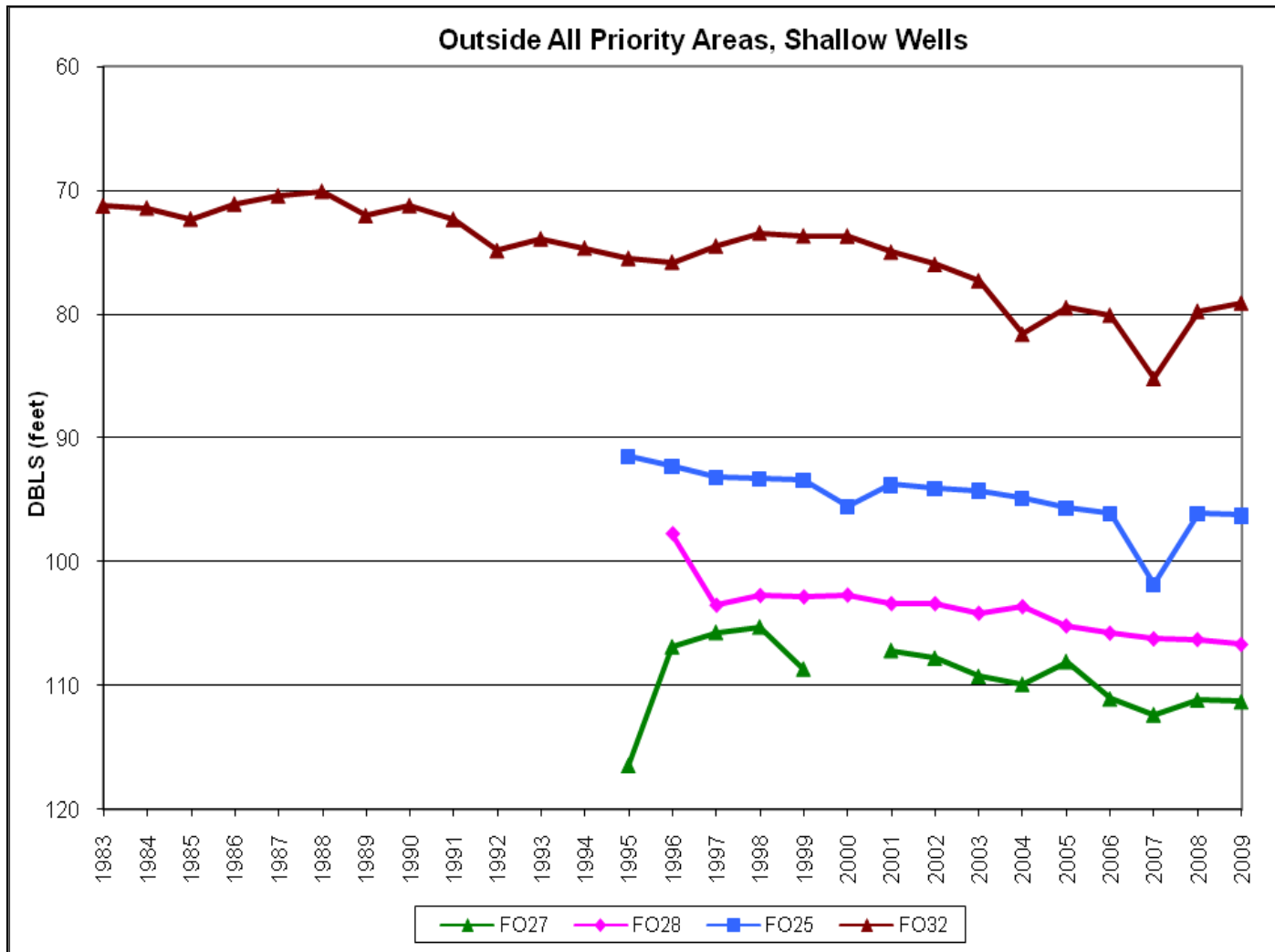
**Figure 18: Monitoring well levels in Priority Area 7, Non-Alluvial Wells**

Three wells' (KW31, KW35 and KW30) records began in 1980. All three have experienced declining groundwater trends over the 28-year record ranging from 4.08 ft to 8.6 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 14.48 ft since 1984.



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

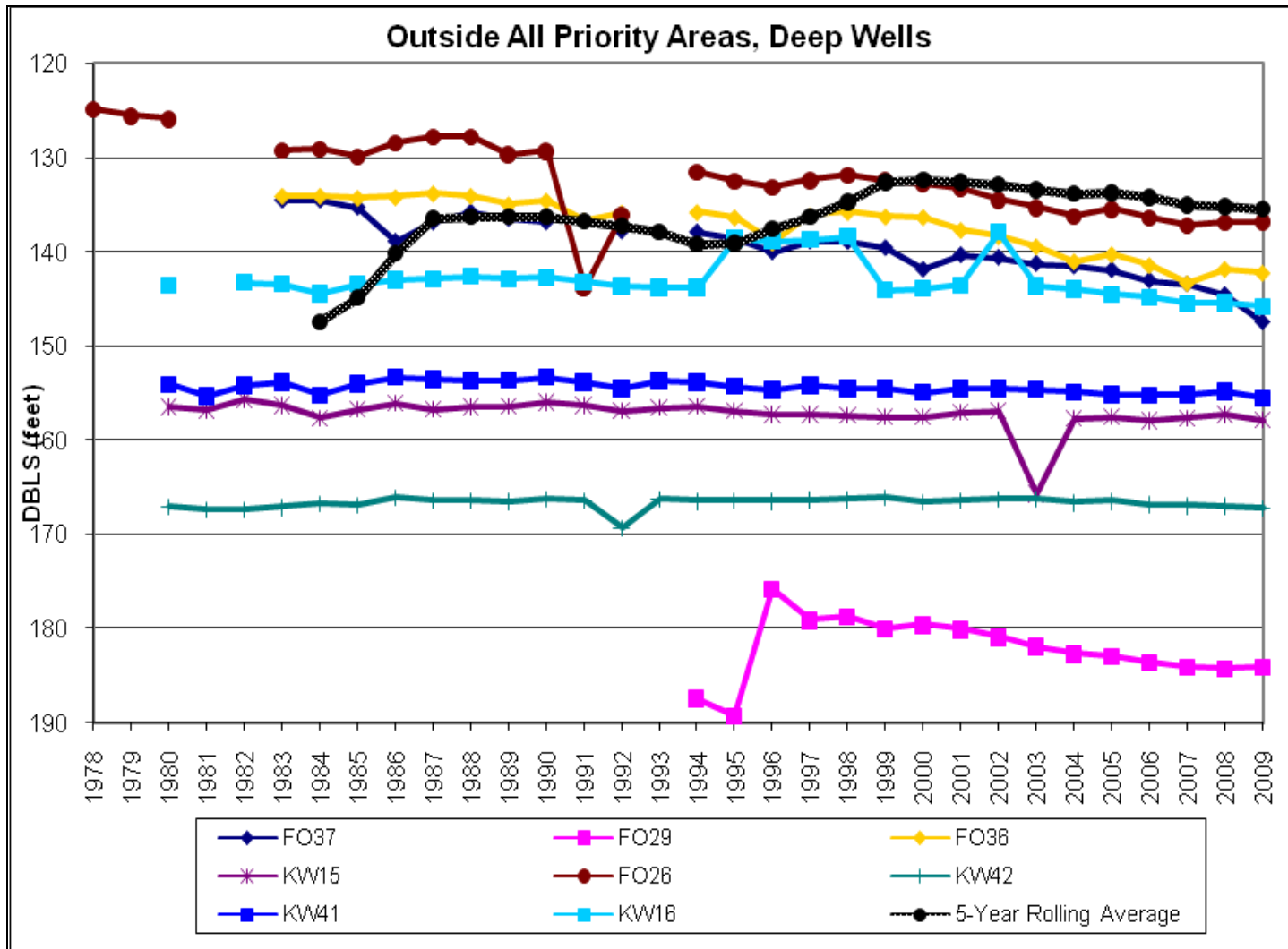
The Mineral Intrusion Priority Area has 19 monitoring wells. Water levels continued to increase in 2009. KGS11 has a unique trend in which it declined steadily until 1992 (24.43 ft) and then increased by a net 22.92 ft through 2008. The five-year rolling average saw a net decline of 2.15 ft since 1983 (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 7.82 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 11.92 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 2.89 ft (Figure 21).

## V. Water Use

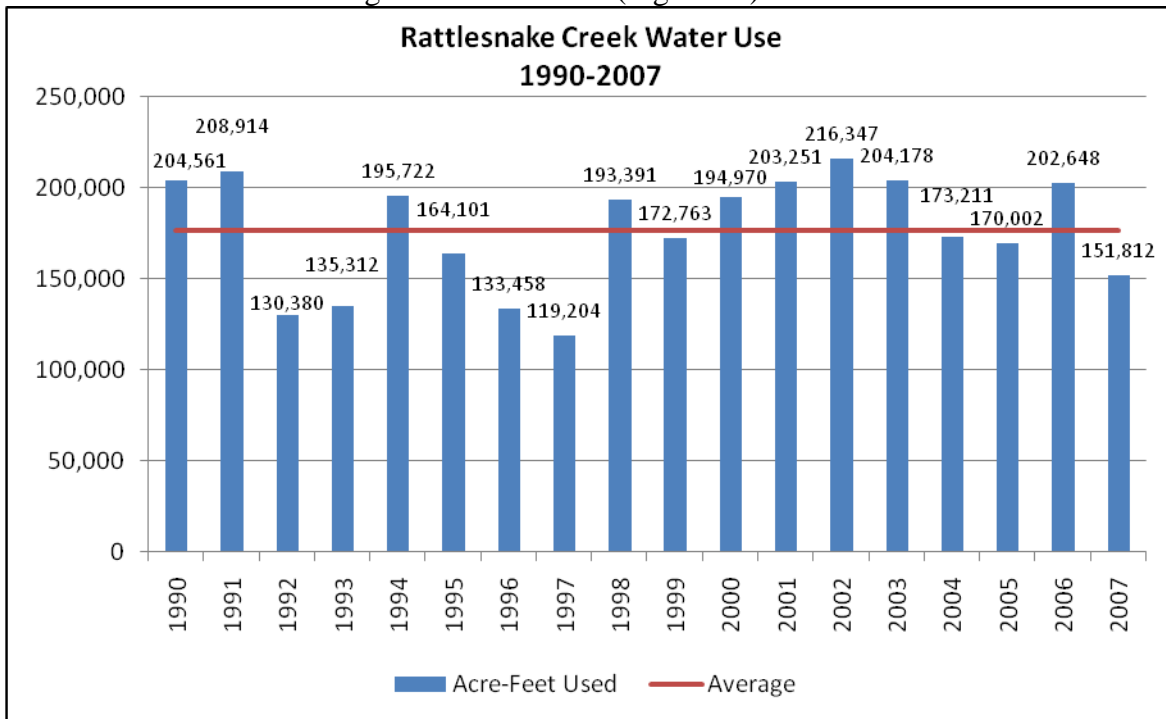
The Rattlesnake Creek subbasin has a total of 1,376 water rights with an authorized quantity of 252,898.38 acre-feet. The subbasin has very few vested water rights compared to appropriated rights (

Table 2). Water use includes irrigation, municipal, domestic, stock, recreation and industrial water rights (Figure 23).

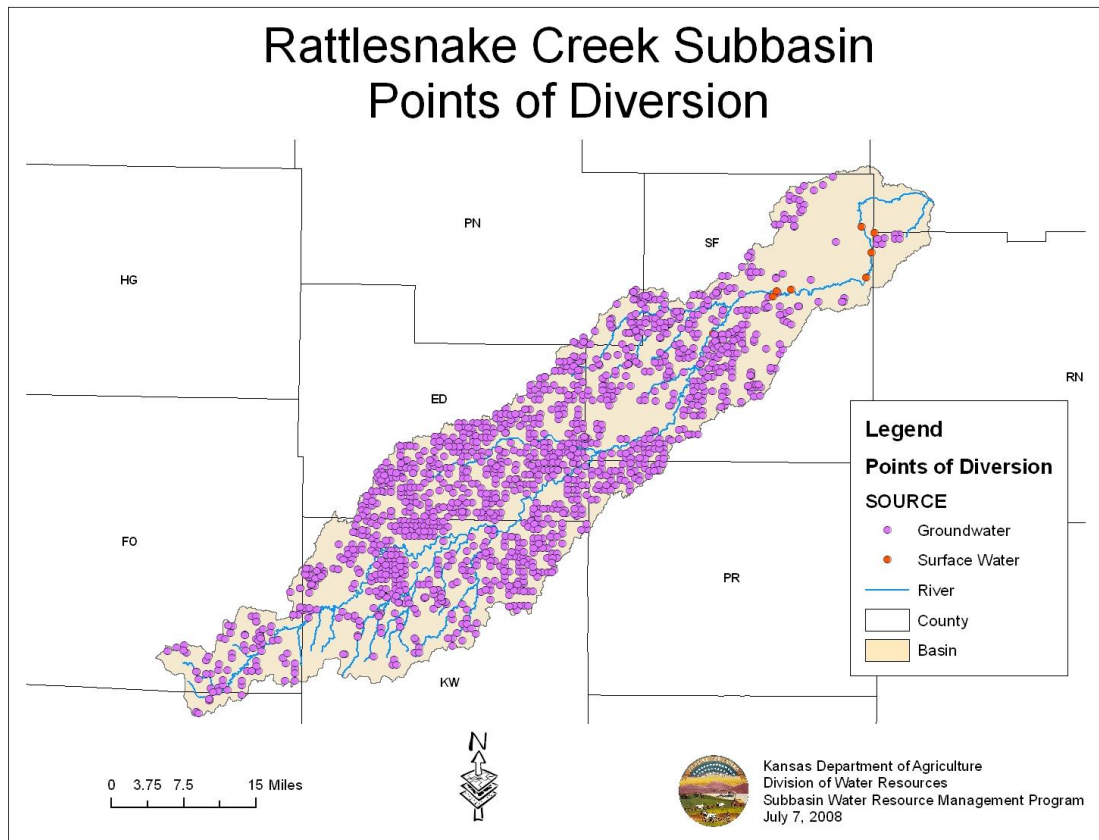
**Table 2: Water Rights in the Rattlesnake Creek Subbasin**

Source	Number of Rights	Authorized Quantity
Groundwater	1,376	252,898.38
Surface Water	5	14,902.00

The water use ranges from 216,347 acre-feet in 2002 to 119,204 acre-feet in 1997. The average water use over the seventeen-year span was 176,375.84 acre-feet. Water use in 2007 (the most recent year for which complete records are available) was 151,812 acre-feet. This was up down from 2006 and below the average for the subbasin (Figure 22).



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



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

## VI. Conclusions

The year 2008 appears to have been an above-average year for precipitation. After two 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. 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	22S10W01NESEW01	Mineral Intrusion
KGS9	381009098215602	22S10W01NESEW02	Mineral Intrusion
KGS10	381009098215603	22S10W01NESEW03	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
KGS15	375429098480401	25S13W06NWSWNW01	1
KGS16	375429098480402	25S13W06NWSWNW02	1
KGS17	375429098480403	25S13W06NWSWNW03	1
KGS18	375619098491001	24S14W25NWNWSW01	1
KGS19	375633098483701	24S14W24SESWSW01	1
KGS110	375633098491001	24S14W24SWSWSW01	1
KGS111	375639098481201	24S14W24SESENE01	1
SF16	375849098465001	24S13W08NWNWSE01	1
KGS112	375955098475601	24S13W06NWNWNE01	1
KGS113	375955098475602	24S13W06NWNWNE02	1
KGS114	375956098491001	24S14W01NWNWNW01	1
KGS115	380003098482101	23S14W36SESESW01	1
KGS116	380003098482102	23S14W36SESESW02	1
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	25S15W28SENESE01	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	26S16W04SEWSE	4S
KGS413	374926099050701	26S16W04NWNWNW01	4S
KGS41	380002098470601	23S13W31SESESE01	4N
KGS42	380021098463300	23S13W32SWNESE01	4N
SF41	380108098480501	23S13W30SWNWNW01	4N
KGS43	380240098454401	23S13W16SWSWNE01	4N
SF40	380333098465901	23S13W08SWSWNW01	4N
SF78	380340098404602	23S12W07SEWSE02	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
KW37	373442099324101	28S20W30NESWNE	5
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	26S18W05SEENW01	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	25S17W01SEENW01	5
ED42	375436099032701	25S16W02NWNWNW01	5
SF53	375456098593401	24S15W32SENWSW01	5
SF15	375507098581101	24S15W33SEENW01	5
SF51	375521098543201	24S14W31NWNWSE01	5
SF14	375551099010301	24S15W30SWSENW	5
ED01	375615099021301	24S16W25NWNWSE01	5
KGS510	375733099034401	24S16W15SEENESW01	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
PN67	380143098583001	23S15W21SESWSW01	5
SF07	380301098502501	23S14W15NESESE01	5
ED02	384944099201401	25S18W31SESENW01	5
KW35	373334099243001	28S19W33SWNWSE	7
KW10	373417099265201	28S20W36NESESE01	7
KW32	373429099143301	28S18W25SWNESW01	7
KW13	373453099161501	28S18W27NE01	7
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	27S17W26SESEW01	7
KW05	373948099250101	27S19W29SESEW01	7
KW04	373950099204101	27S19W25SENESW01	7
KW23	374050099161301	27S18W22NESESW01	7
KW07	374054099104501	27S17W21NESESW01	7
KW19	374111099070401	27S16W19NWNWSE01	7
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KW18	374255099033901	27S16W10NWNESW01	7
KW06	374307099121601	27S17W08NWNENE01	7
ED15	374440099032401	26S16W24NENWSW01	7
PR01	348560985420401	26S15W01NESESW01	7
SF17	375625098463401	24S13W20SWSESE01	7
SF48	375750098451101	24S13W16NESWNE01	7