



Rattlesnake Creek

2010 Field Analysis Summary

May 16, 2011

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.

Rattlesnake Creek Subbasin

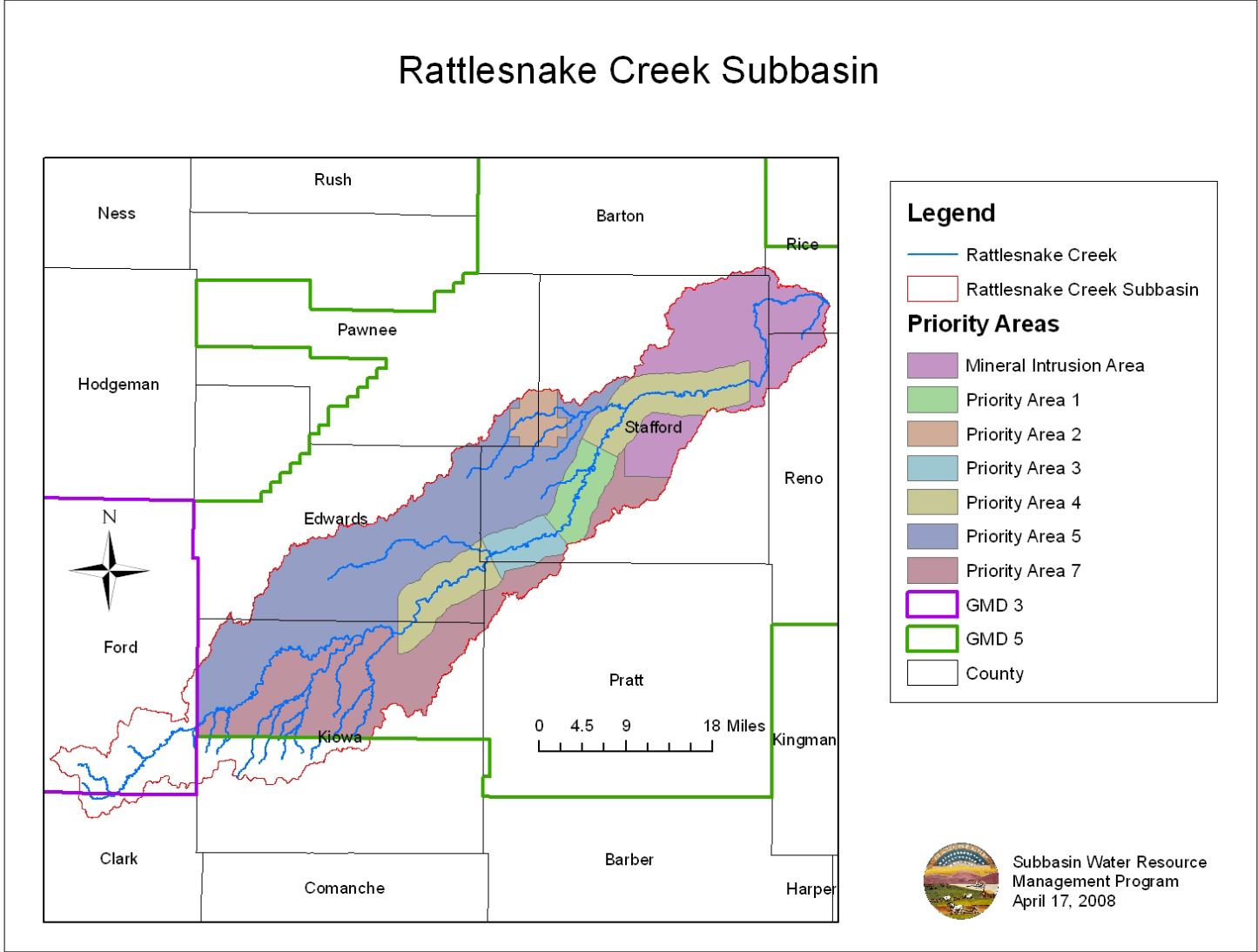


Figure 1: Rattlesnake Creek Subbasin with Priority Areas

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 2009.

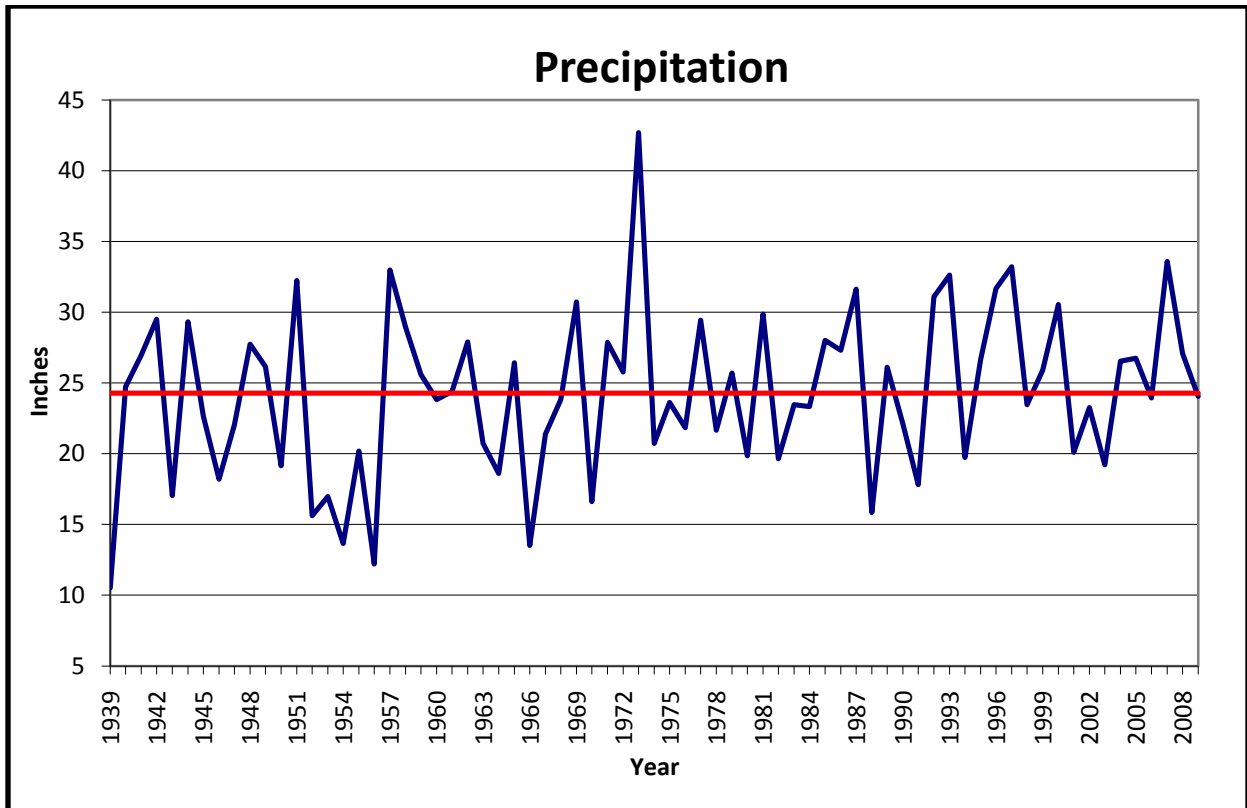


Figure 2: Rattlesnake Creek Precipitation 1939-2009

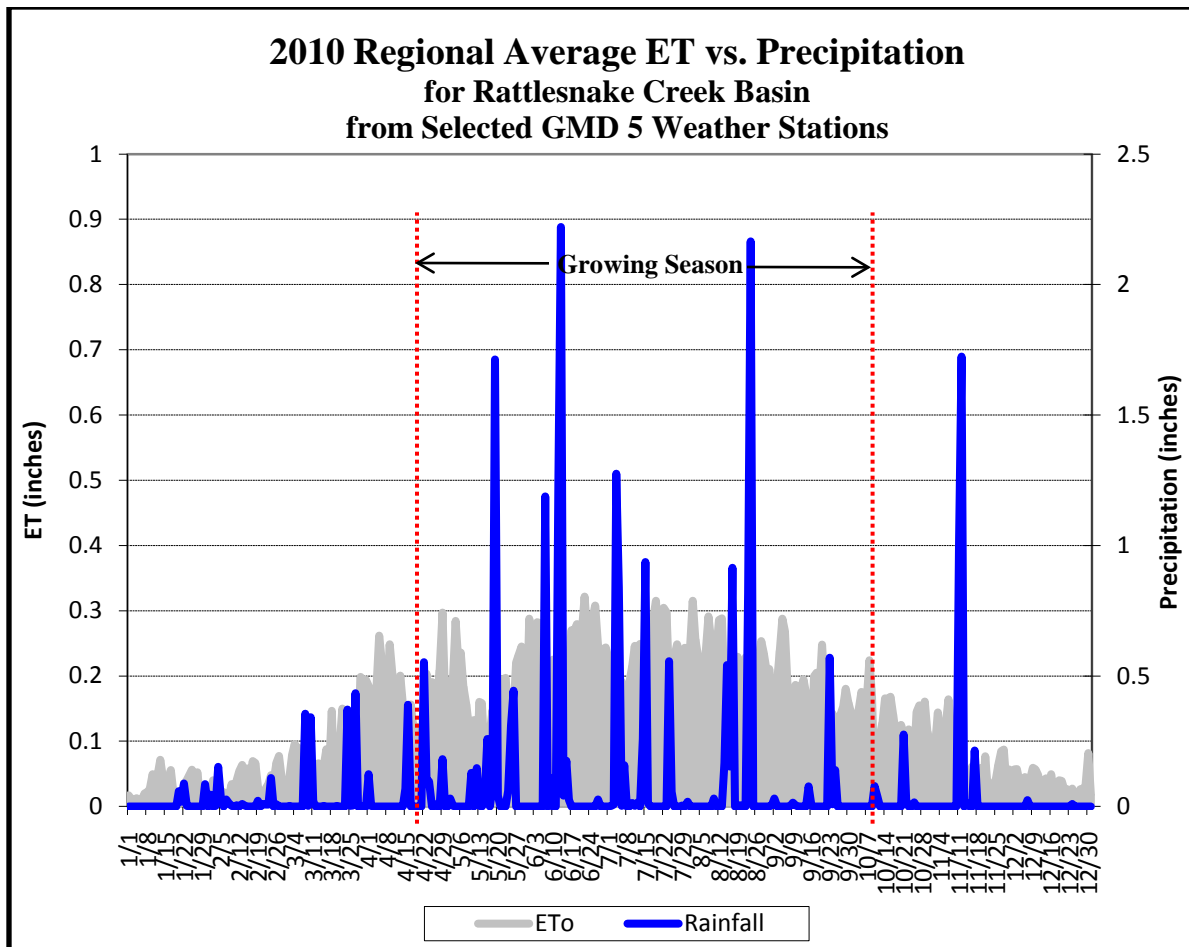


Figure 3: Precipitation and Evapotranspiration for 2010

Figure 3 graphs the 2010 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 25.2 inches of precipitation during 2010. This is slightly 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 46.1 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.

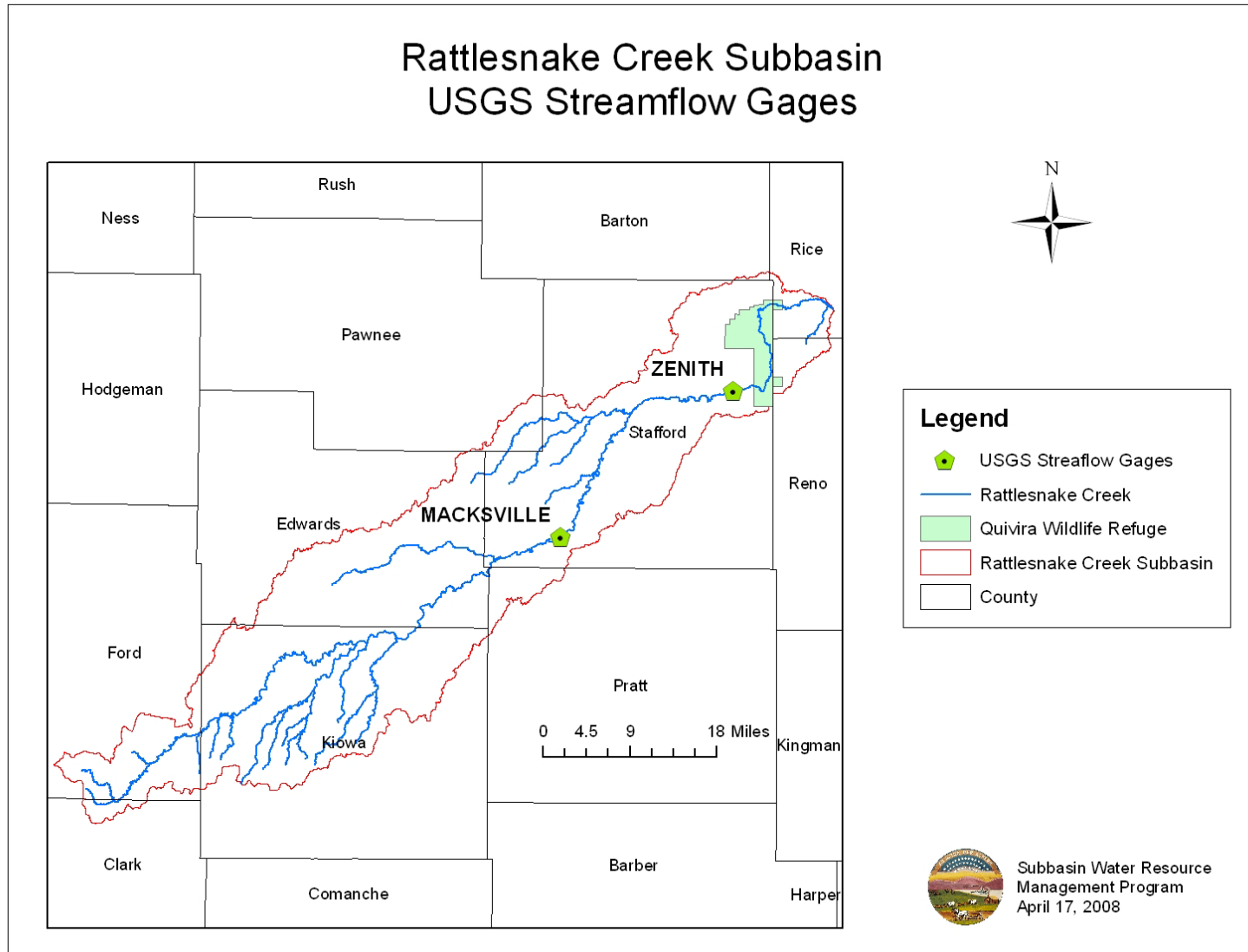


Figure 4: Rattlesnake Creek USGS Streamflow Gages

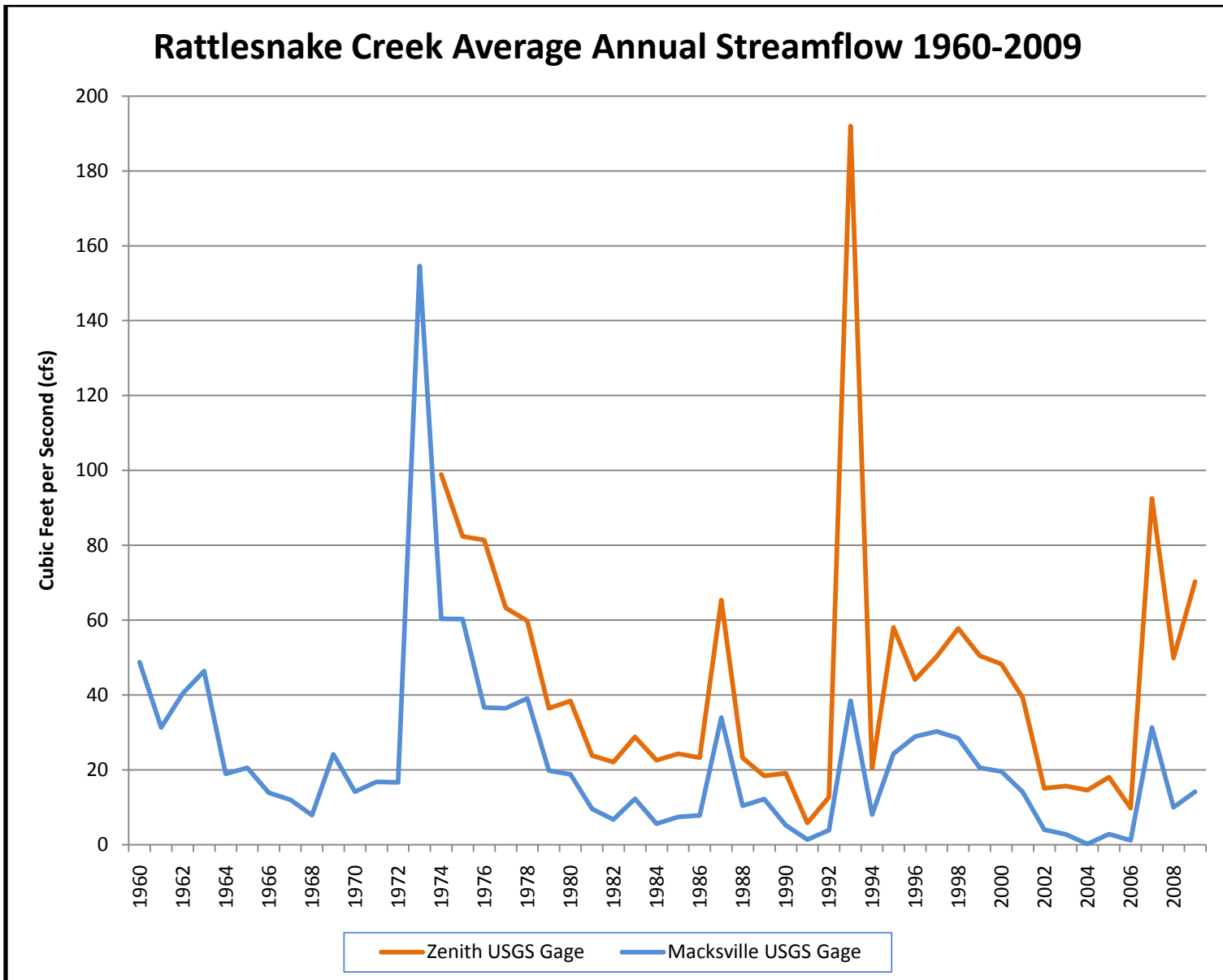


Figure 5: Streamflow at USGS Gages 1960-2009

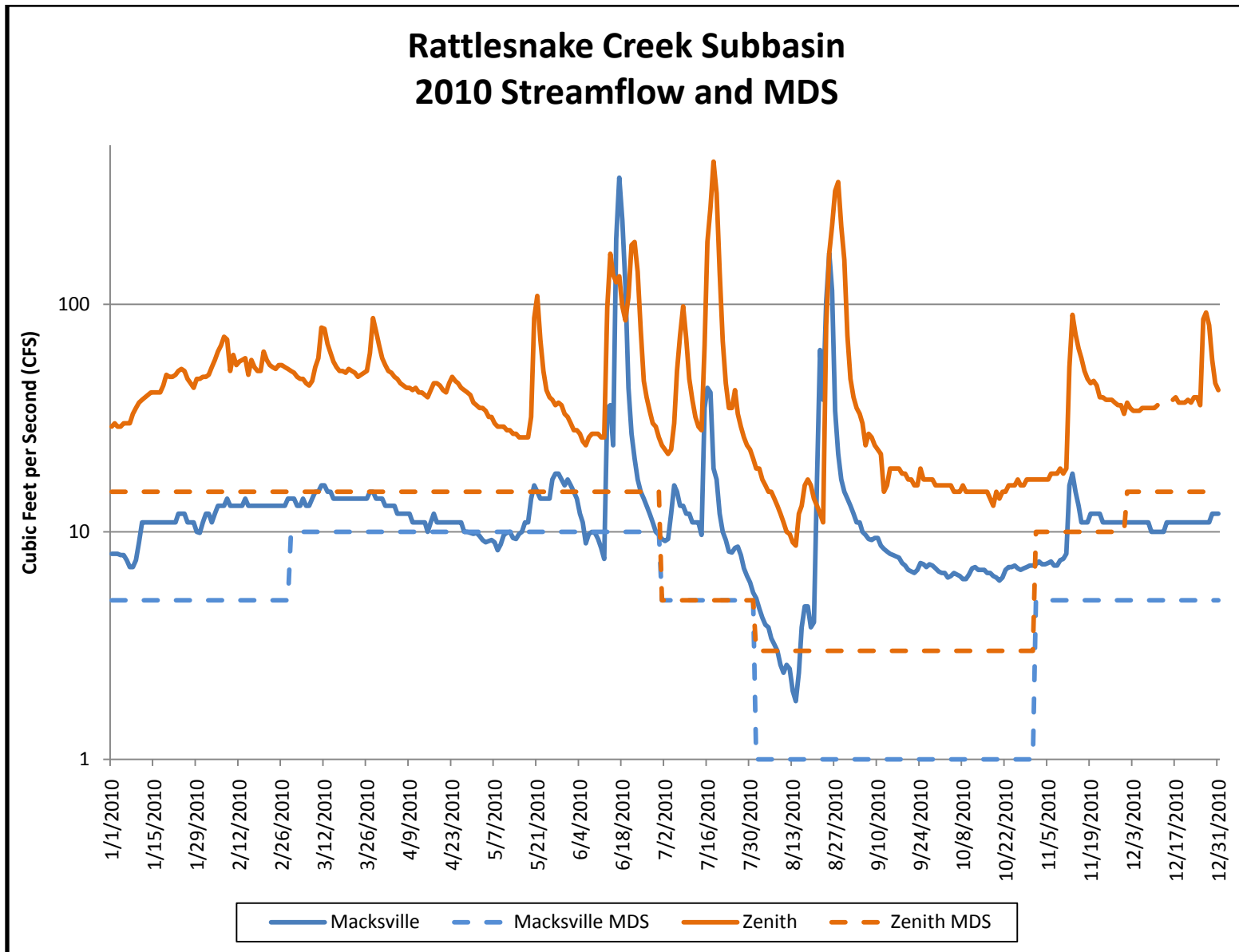


Figure 6: Daily Streamflow and MDS for 2010

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 44.36 cfs and 22.69 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 2009, averaging 37.36 cfs at Zenith and 10.03 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 2010. Both Zenith and Macksville started the year above the MDS levels. In the late spring and early summer of 2010, flows at Macksville dipped below MDS for the only time during the year. Zenith streamflow stayed above MDS for all of 2010.

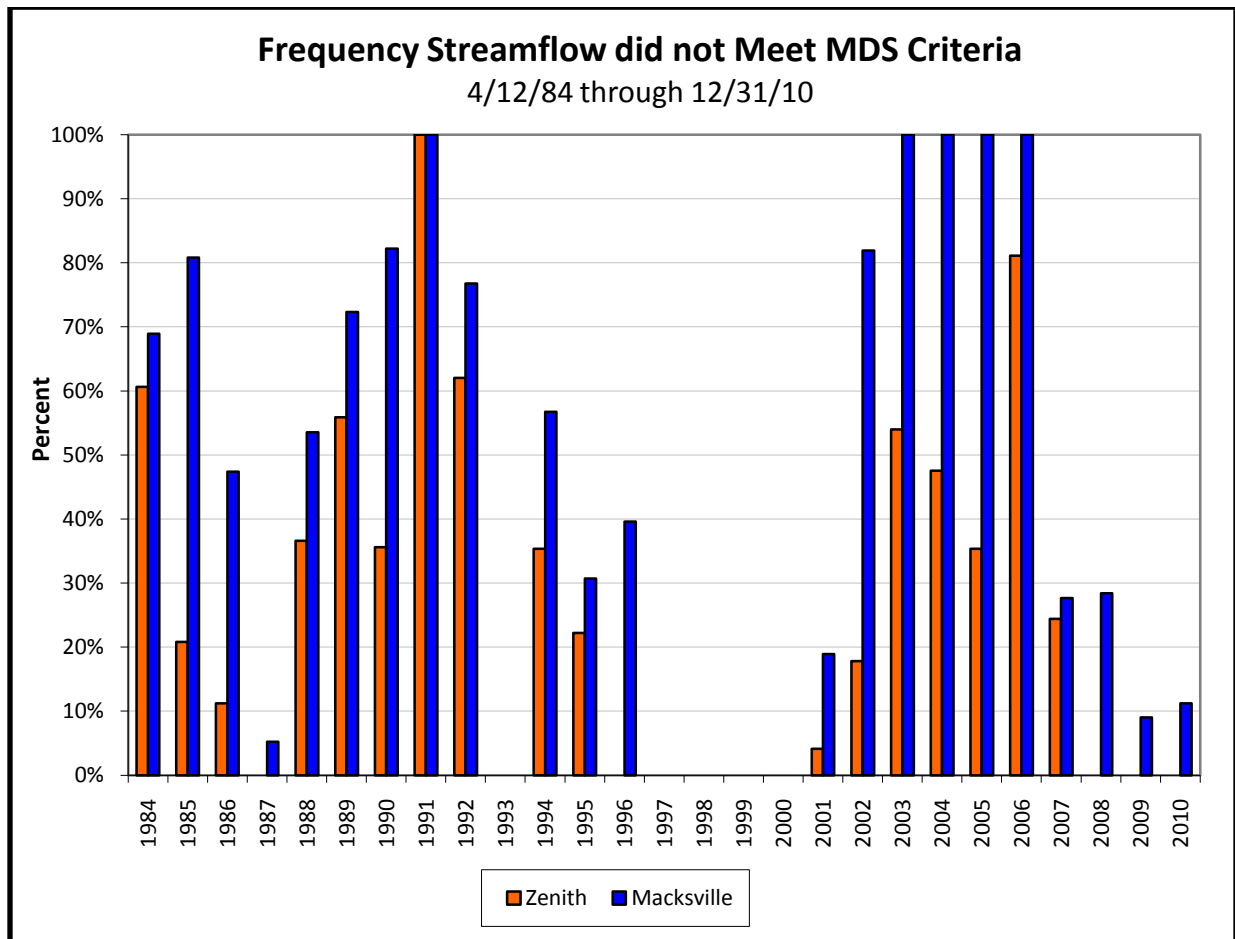


Figure 7: Streamflow and MDS Criteria

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. Three monitoring wells have been abandoned and replaced. ED09 was replaced by ED 76, ED31 was replaced by ED77 and KW25 was replaced by KW45. 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.

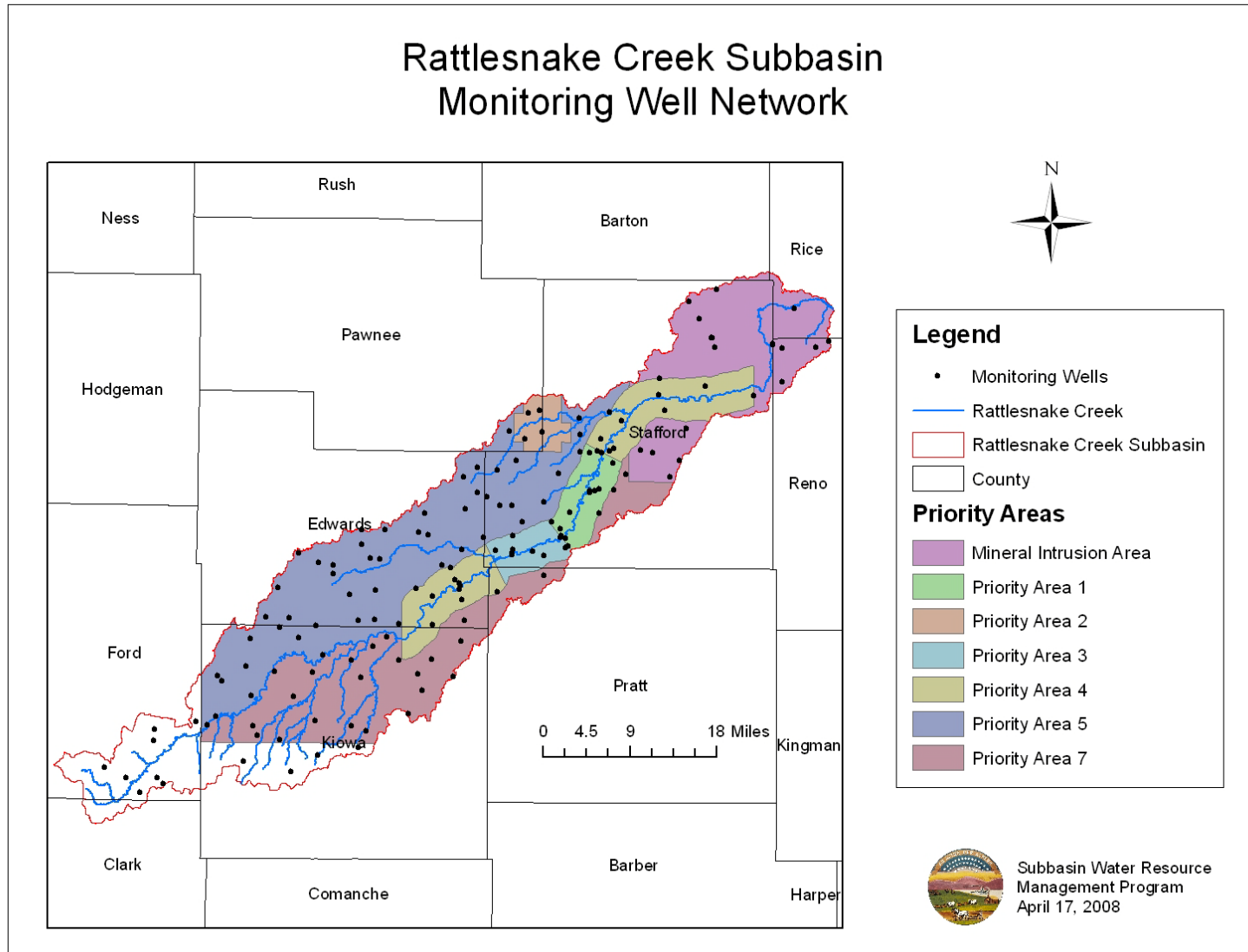


Figure 8: KGS, GMD 5 and DWR Monitoring Wells

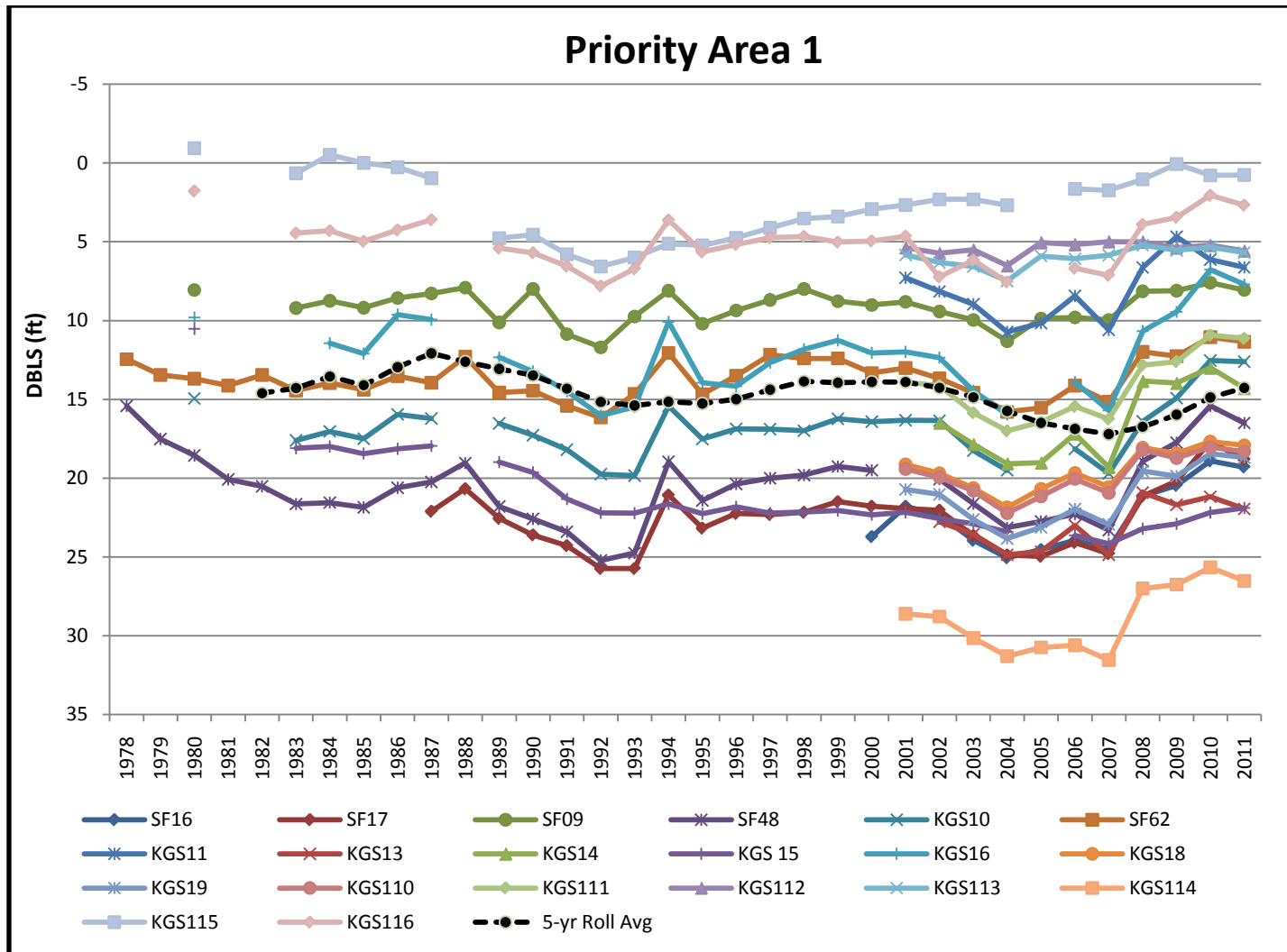


Figure 9: Monitoring well levels in Priority Area 1

Priority Area 1 has 20 monitoring wells. KGS115 recorded water level measurements above land surface as this used to be an artesian well. In 2011, most monitoring wells had a decline in water levels. The average decline was 0.49 inches, but the five-year rolling average increased by 0.60 feet in 2011 (Figure 9).

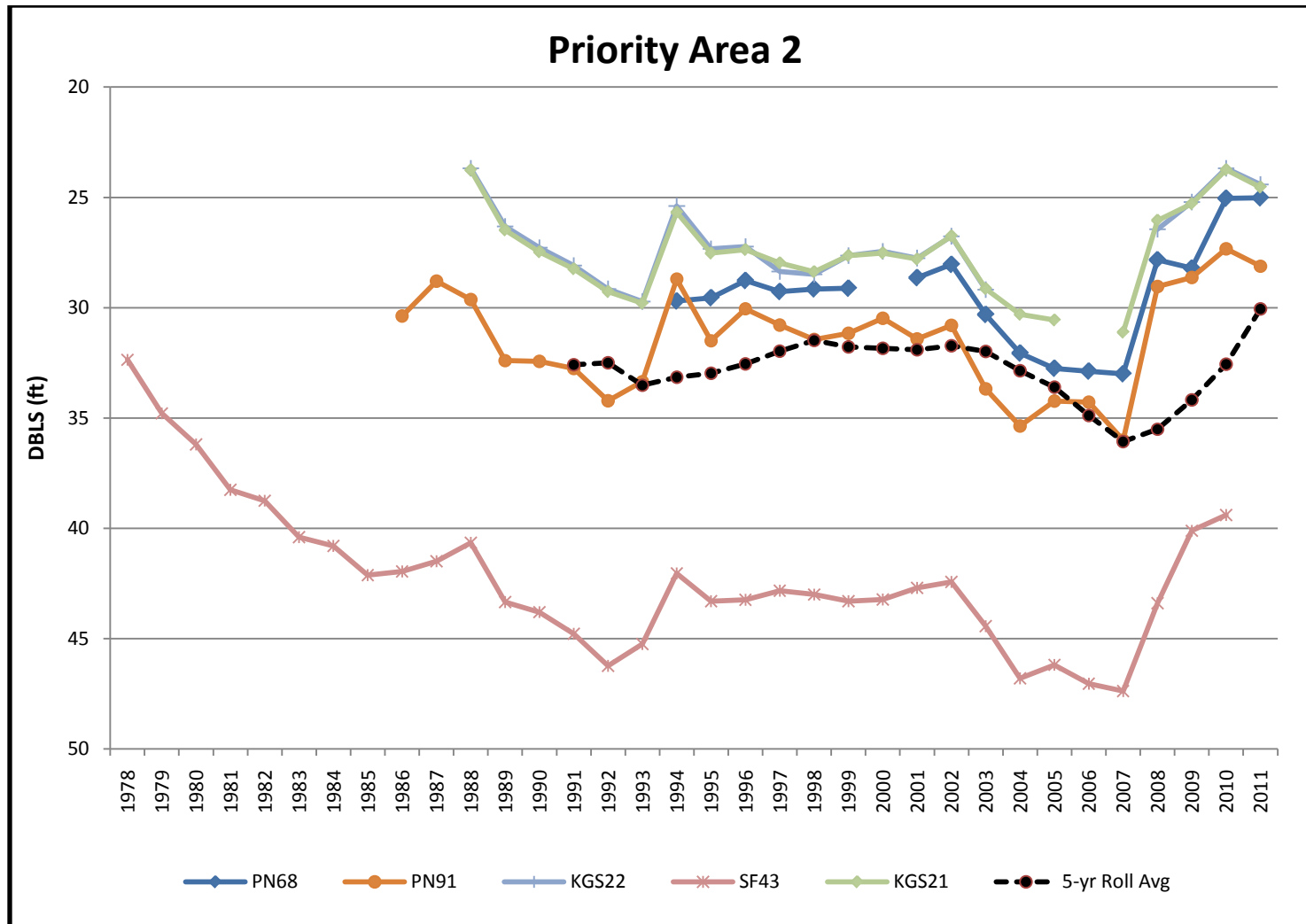


Figure 10: Monitoring well levels in Priority Area 2

Priority Area 2 has only five monitoring wells. SF43 has the longest record starting in 1978, but is no longer being measure because the well has been destroyed. Water levels in SF43 have experienced a net decline of 7.04 feet since 1978 despite an increase of 7.98 feet since 2007. Three of the remaining four wells had a decline in water levels for an average decline of 0.58 feet. The five-year rolling average continued to increase, but may be influenced by lack of a measurement at SF43 (Figure 10).

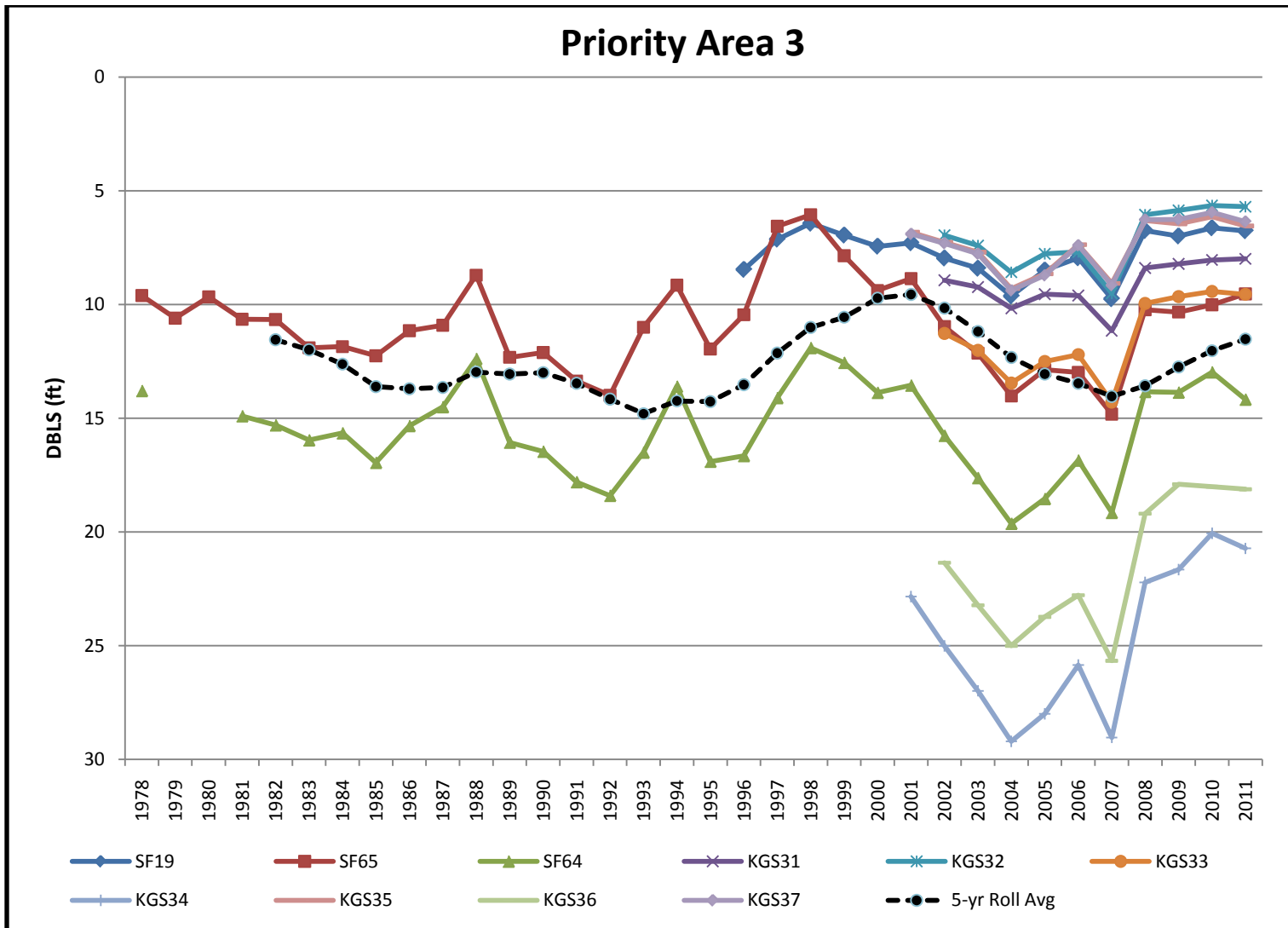


Figure 11: Monitoring well levels in Priority Area 3

Priority Area 3 has 10 monitoring wells. Eight of the monitoring wells had a decline in water levels in 2011. Only SF65 and KGS31 had a rise. The average change in water levels was a decline of 0.26 feet in 2011. The five-year rolling average saw another rise in 2011 (Figure 11).

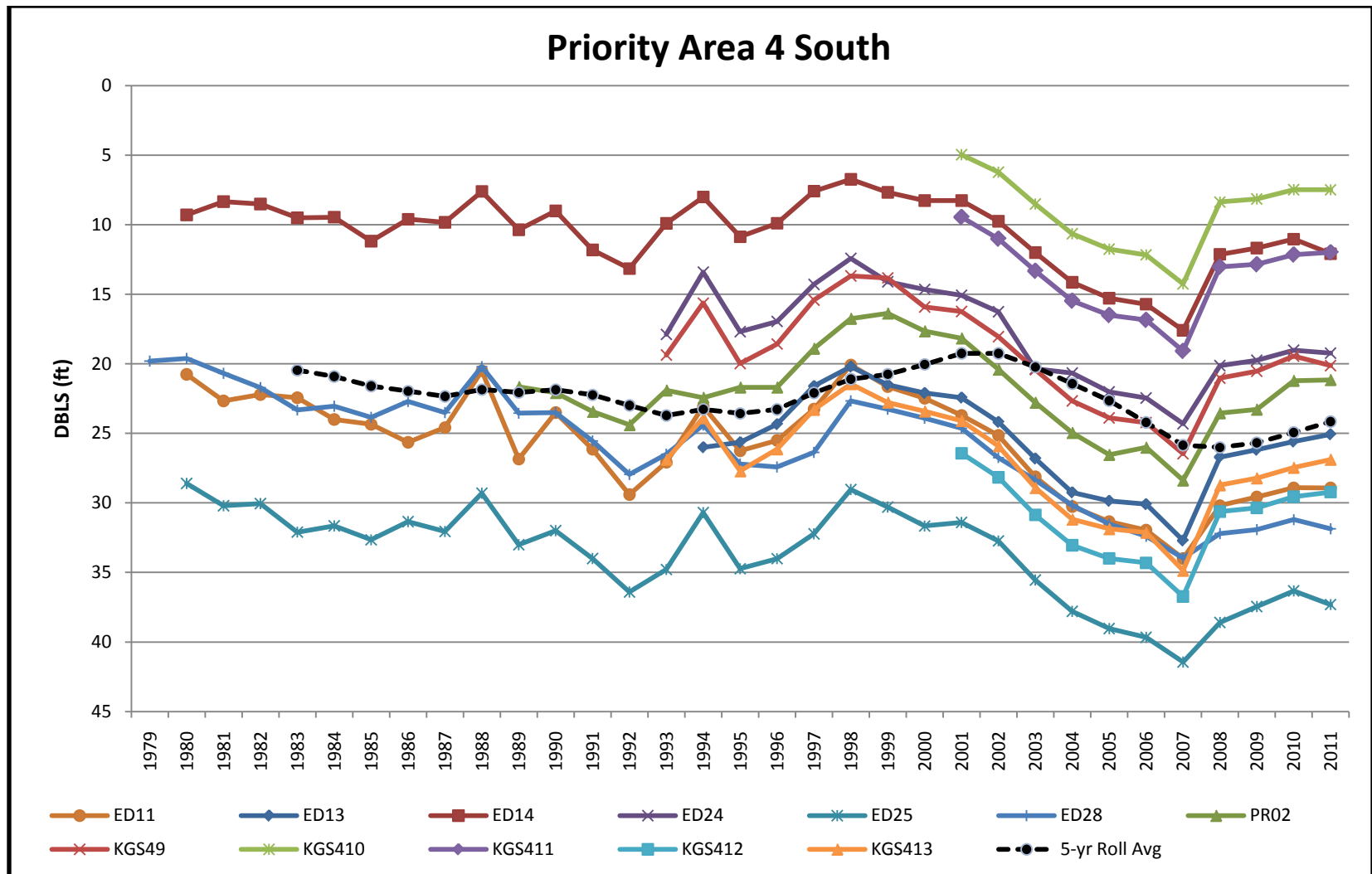


Figure 12: Monitoring well levels in Priority Area 4 South

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. Seven monitoring wells had a decline in water levels while the other five had a rise. The average change in water levels is a decline of 0.16 feet in 2011. The five-year rolling average slightly increased (0.78 feet) between 2010 and 2011 but exhibits a net decrease of 3.7 feet since 1983 (Figure 12).

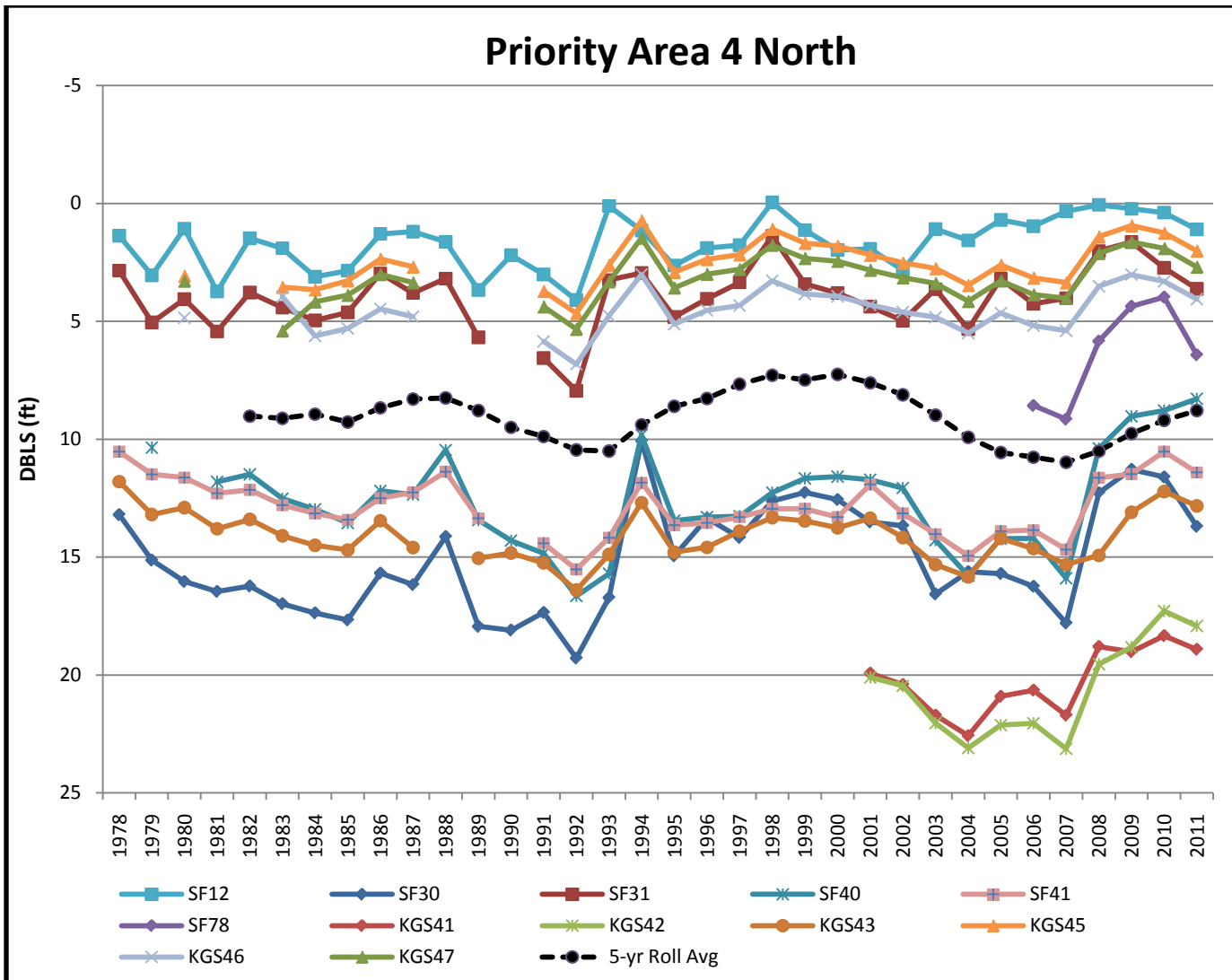


Figure 13: Monitoring well levels in Priority Area 4 North

Priority Area 4 North has 12 monitoring wells and is located primarily in Stafford County. Eleven of the twelve monitoring wells had a decline in water levels for an average loss of 0.89 feet (Figure 13). SF78 had the biggest decline with 2.45 feet. The five-year rolling average continued to increase.

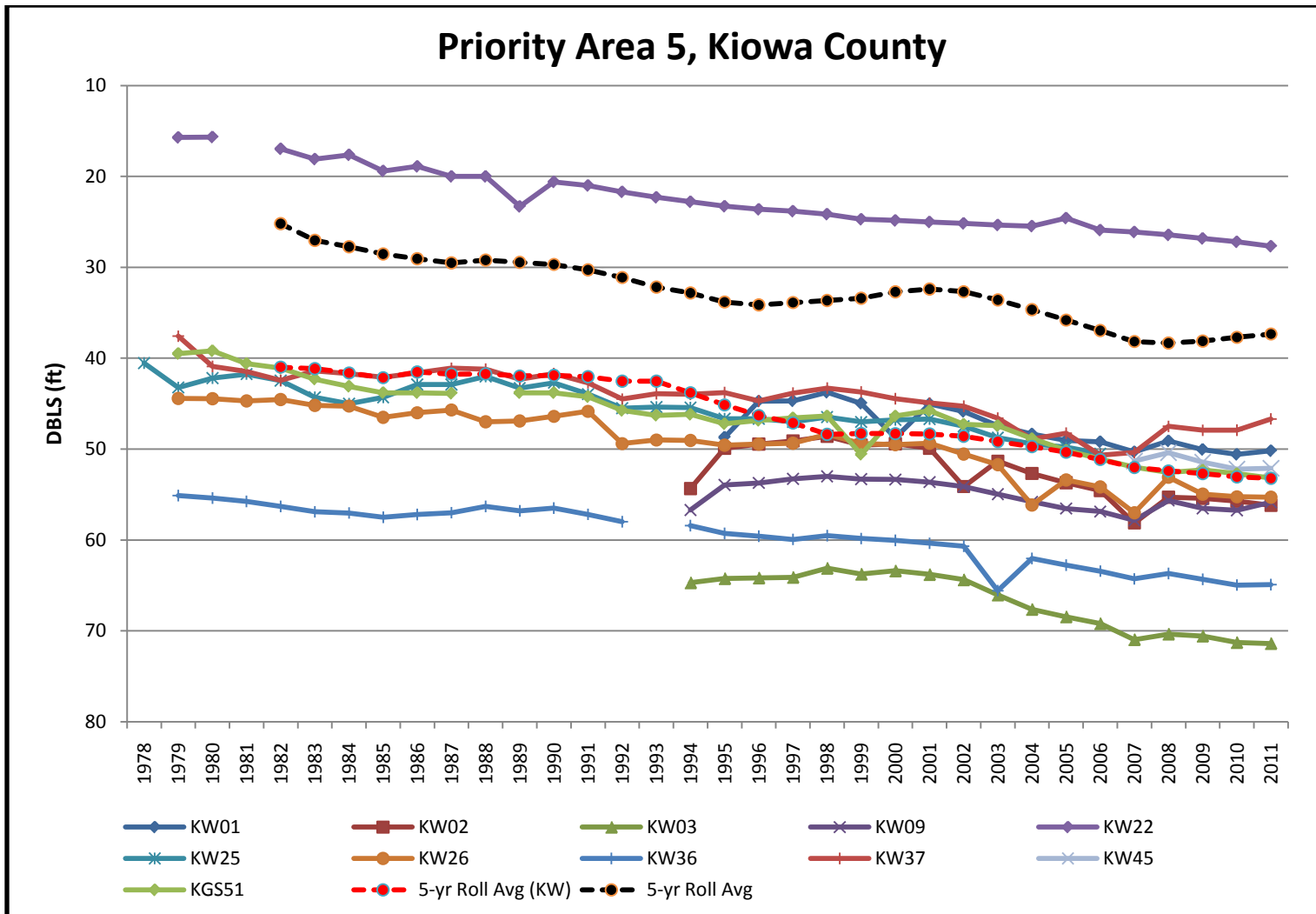


Figure 14: Monitoring well levels in Priority Area 5, Kiowa County

Because of its size and hydrologic variability, Priority Area 5 is charted on three separate graphs separated by county. Kiowa County has 11 monitoring wells, but only 10 are measured since KW25 has been replaced by KW45. Half the monitoring wells increased in water levels and the other half had declines. The Kiowa County five-year rolling average continued to decline in 2011. The Priority Area 5 five-year rolling average had a small rise in 2011 (Figure 14).

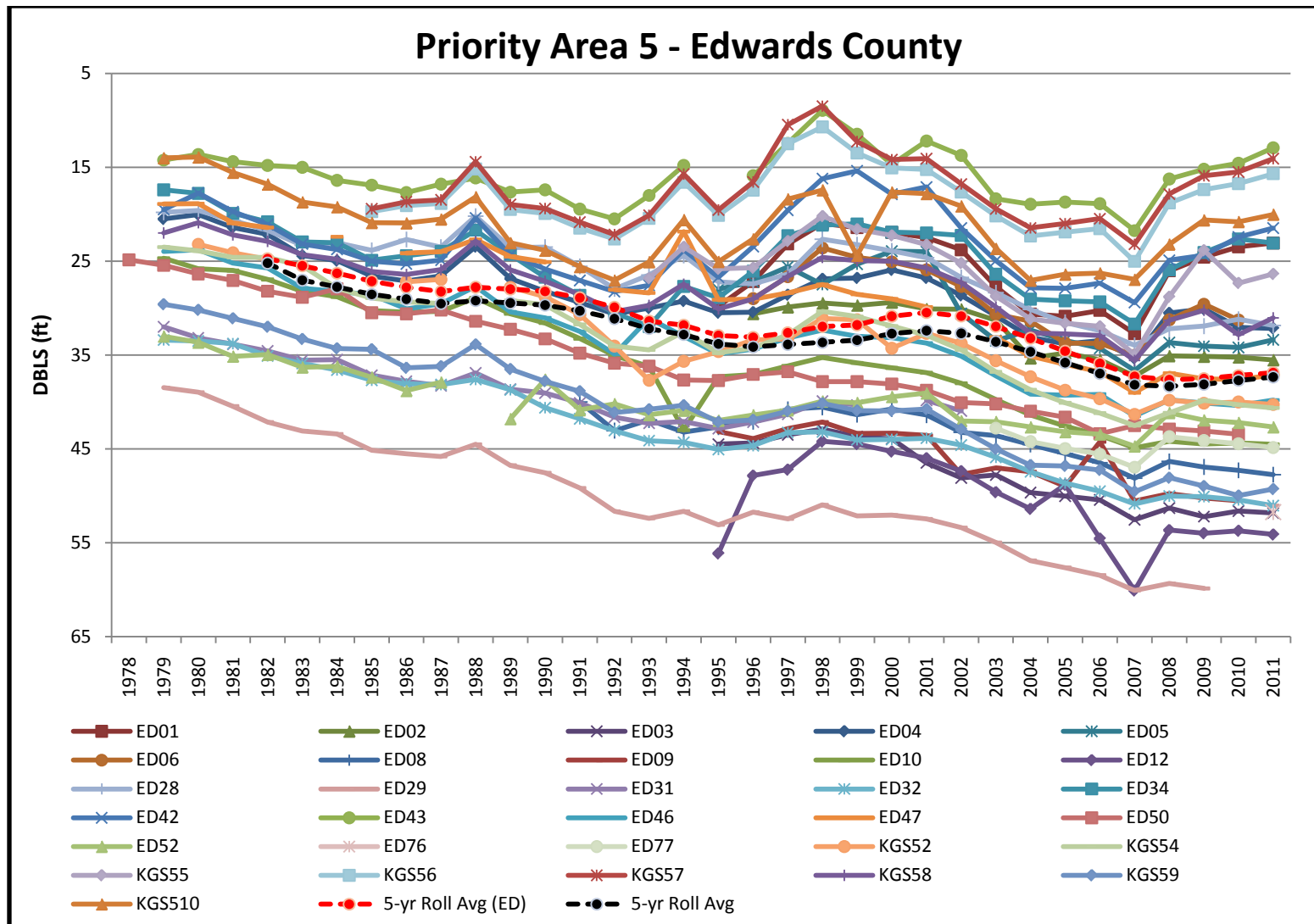


Figure 15: Monitoring well levels in Priority Area 5, Edwards County

Priority Area 5 in Edwards County has 29 measured monitoring wells and two wells previously measured. Many of the measurements began in 1979. Fourteen of the 29 monitoring wells had declines in water levels and the average change in water levels was a decline of 0.52 feet (Figure 15). The Edwards County (red line) five-year rolling average exhibits a net decline, but a small rise in 2011.

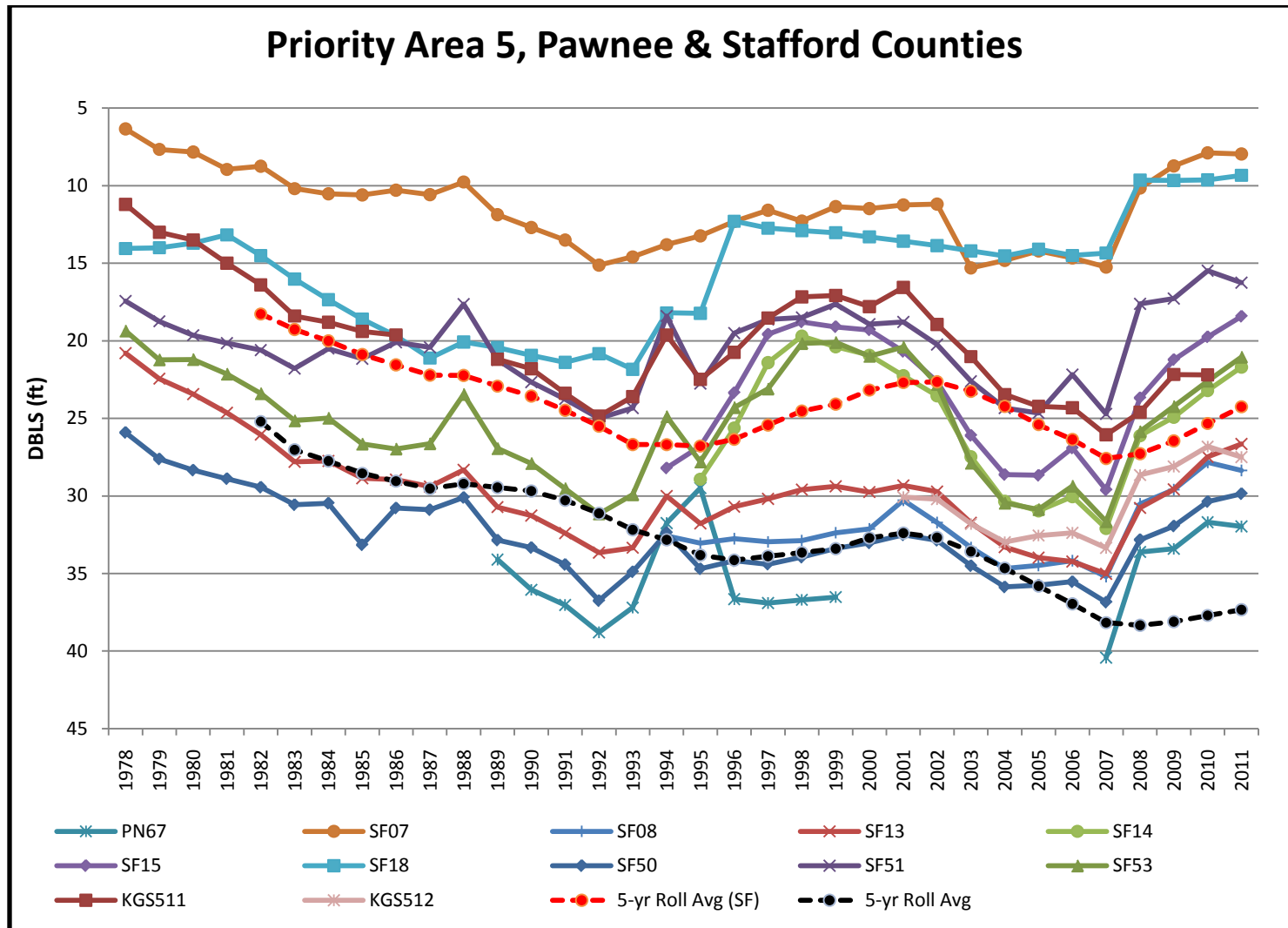


Figure 16: Monitoring well levels in Priority Area 5, Stafford and Pawnee Counties

Priority Area 5 in Stafford and Pawnee counties includes 12 monitoring wells. Seven wells were first measured in 1978. Five monitoring wells had a decline in water levels, six had an increase and one was not measured (Figure 16). The average change in water levels was an increase of 0.35 feet. The Stafford/Pawnee County five-year rolling average (red line) has a net decline even with the recent rise in trend.

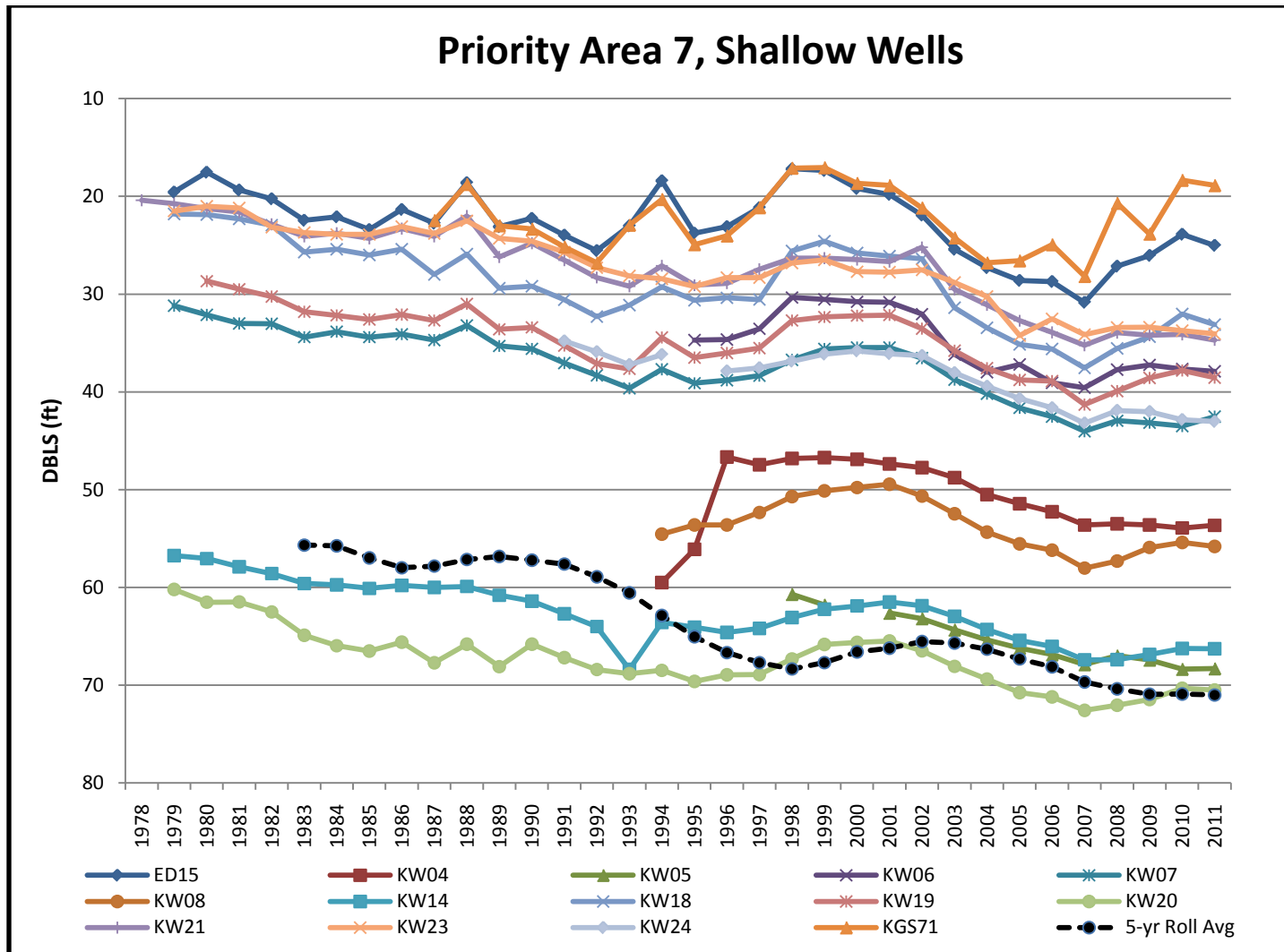


Figure 17: Monitoring well levels in Priority Area 7, Shallow Wells (Note: Rolling Average includes ALL wells in the Priority Area)
 Priority Area 7 has 23 monitoring wells. The monitoring wells were charted separately based on depth to water. Figure 17 charts the shallow depth to water wells whereas Figure 18 charts the deeper wells. Twelve of the fourteen shallow wells had declining water levels in 2011. The 5-year rolling average for all the wells has a net decline and continues to decline in 2011 (Figure 17).

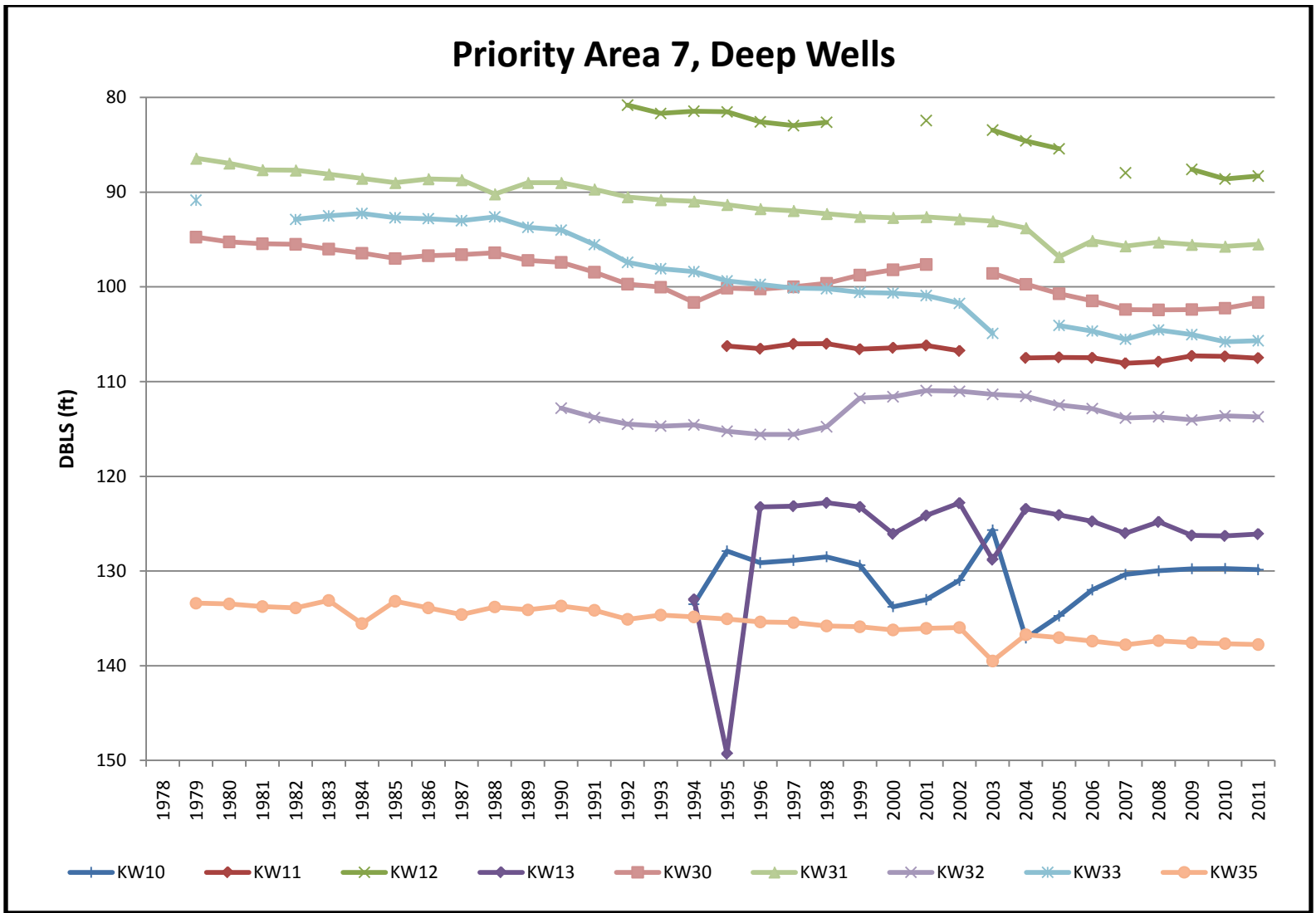


Figure 18: Monitoring well levels in Priority Area 7, Non-Alluvial Wells

Records for wells KW31, KW35 and KW30 began in 1979. In 2010, the five monitoring 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.

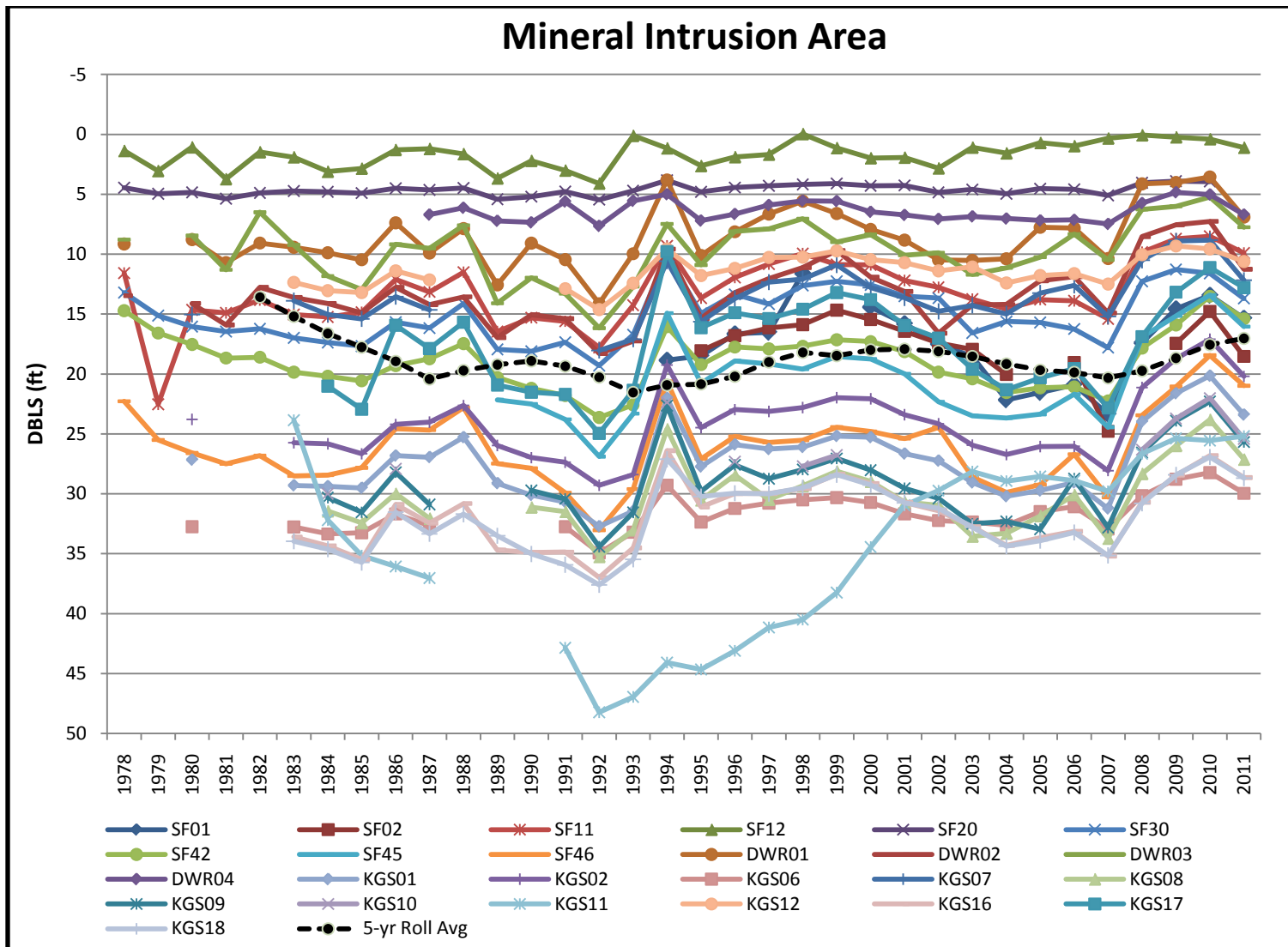


Figure 19: Monitoring well levels in Mineral Intrusion Area

The Mineral Intrusion Priority Area has 25 monitoring wells. All but one monitoring well (KGS11) had a decline in water levels in 2011. The average change in water levels was a decline of 2.25 feet. The five-year rolling average increased in 2011, but still has a net decline (Figure 19).

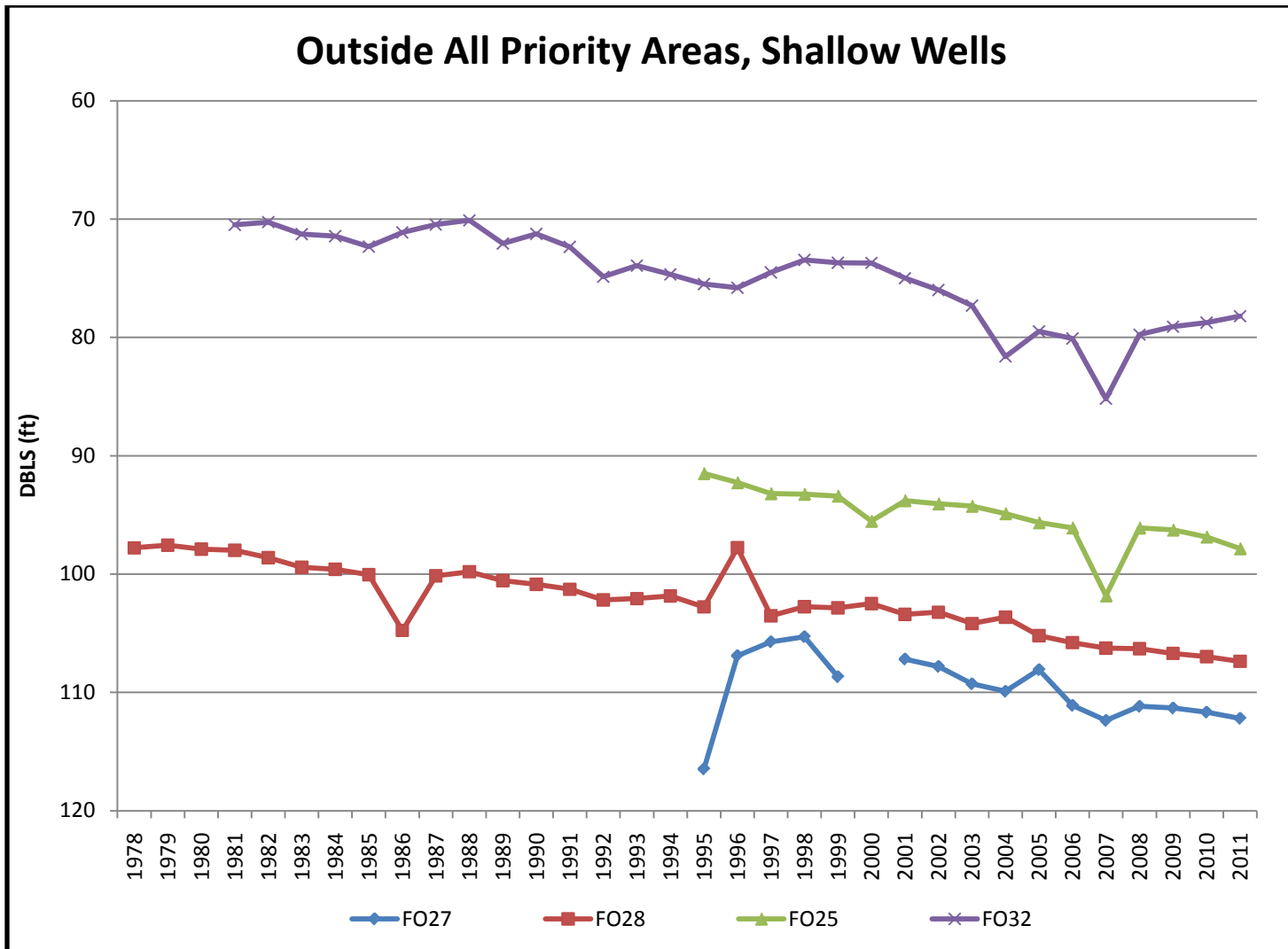


Figure 20: Monitoring well levels outside all Priority Areas, More Shallow Wells

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 2011, 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.

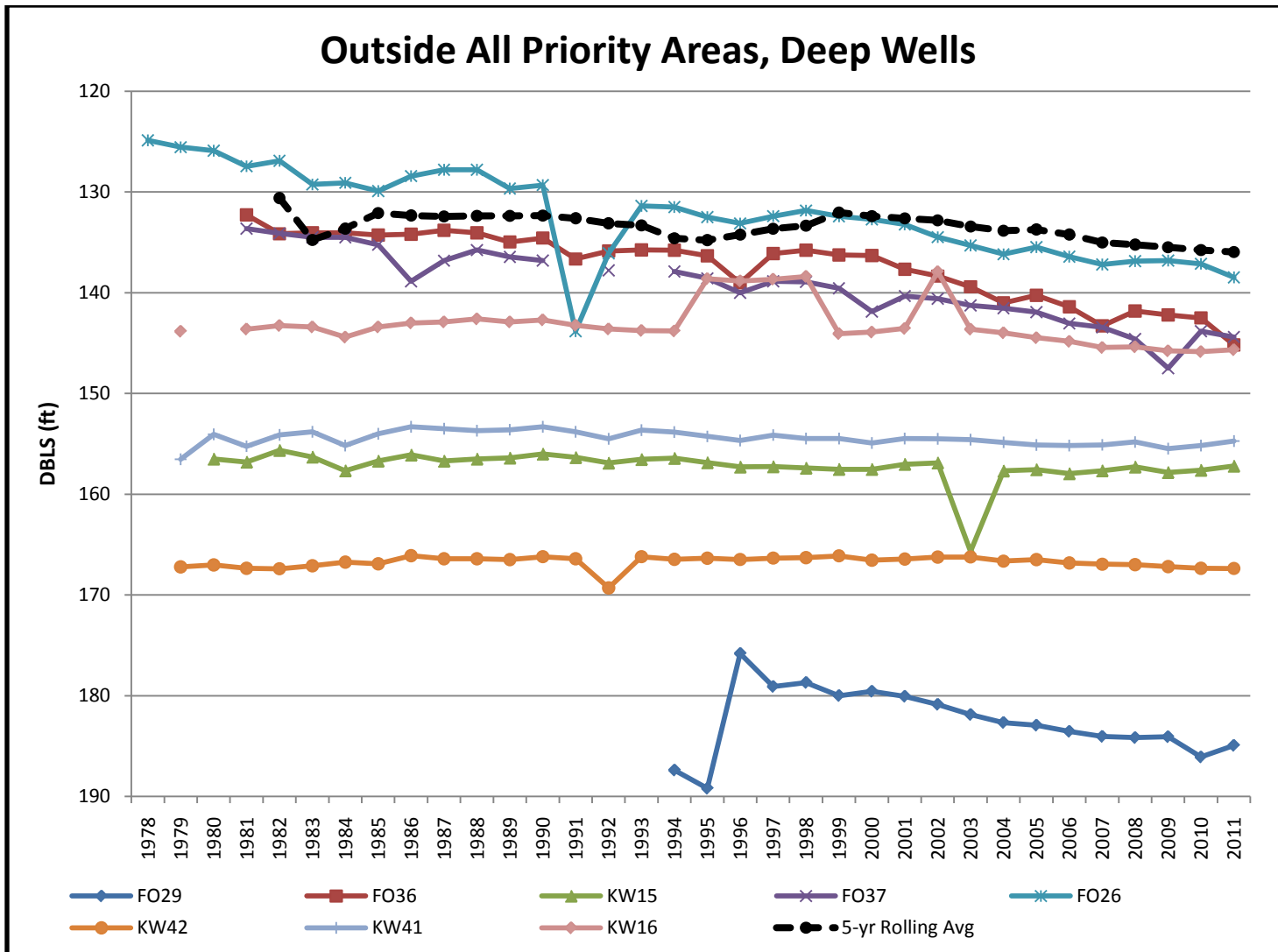


Figure 21: Monitoring well levels outside all Priority Areas, Deeper Wells

FO26 has a net decline since 1978 while other wells, KW41, KW15 and KW42, maintained their water levels over the nearly 30-year time span. Four of the eight deep wells had a decline in water levels in 2011. The five-year rolling average may be affected by the shallow wells added in the 1990s but since 1999, the trend is declining (Figure 21).

V. Water Use

The Rattlesnake Creek subbasin has a total of 1,377 water rights with an authorized quantity of 266,726 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

Type	Source	Number of Rights	Authorized Quantity
Vested	Groundwater	12	1,181
Vested	Surface Water	2	222
Appropriated	Groundwater	1,360	250,643
Appropriated	Surface Water	3	14,680

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 175,656 acre-feet. Water use in 2009, the most recent year for which complete records are available was 170,599 acre-feet. This is a decrease from 2008 and also below the average for the subbasin (Figure 22).

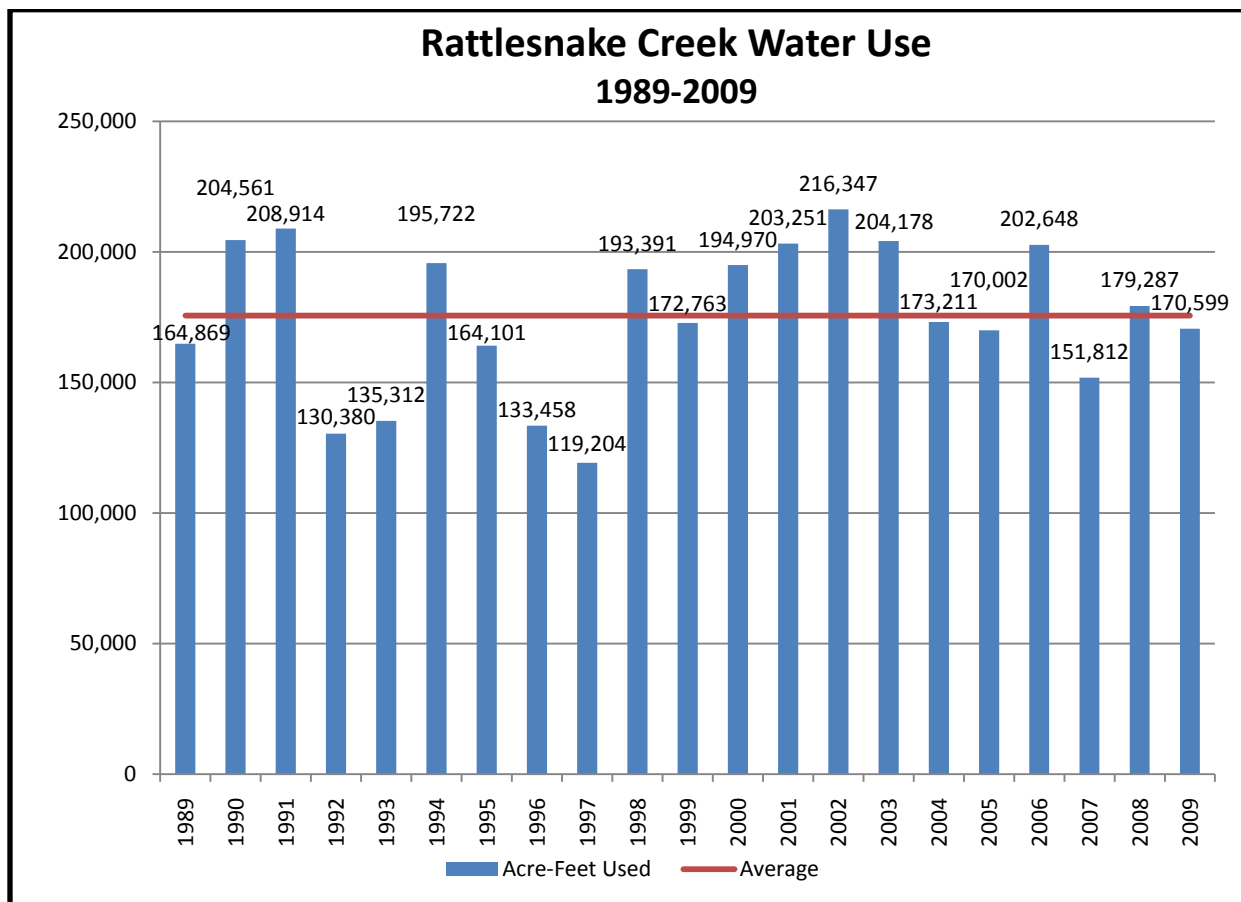


Figure 22: Groundwater and Surface Water use by year

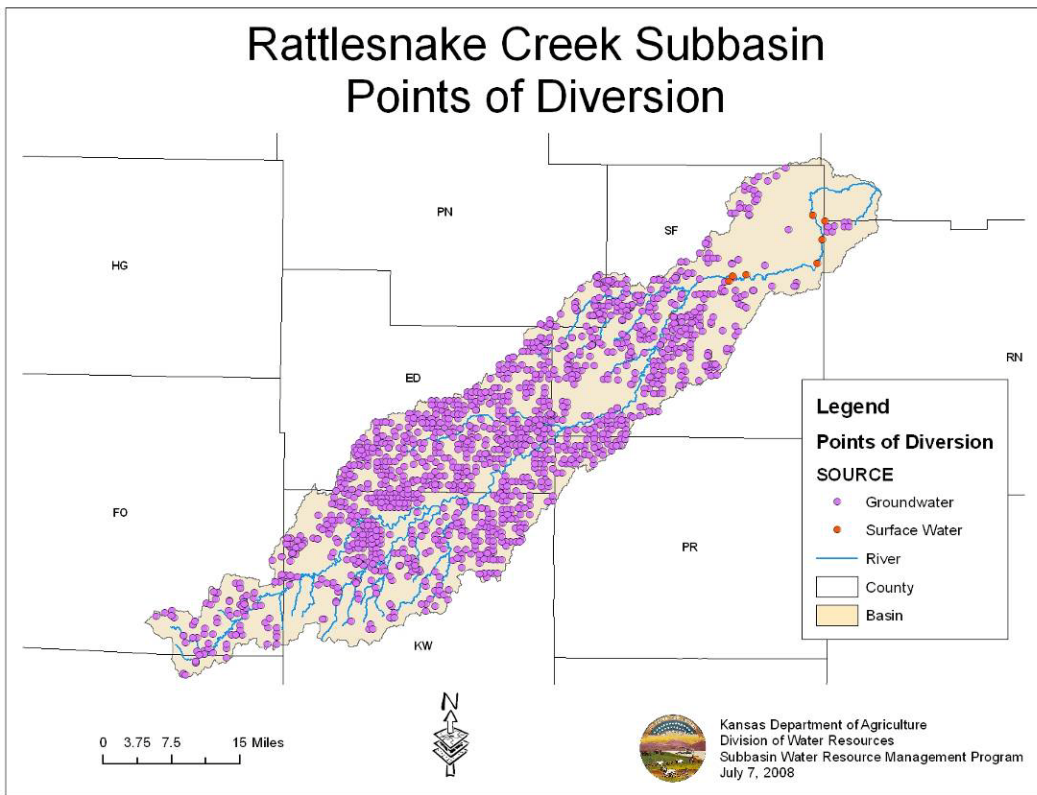


Figure 23: Rattlesnake Creek Points of Diversion

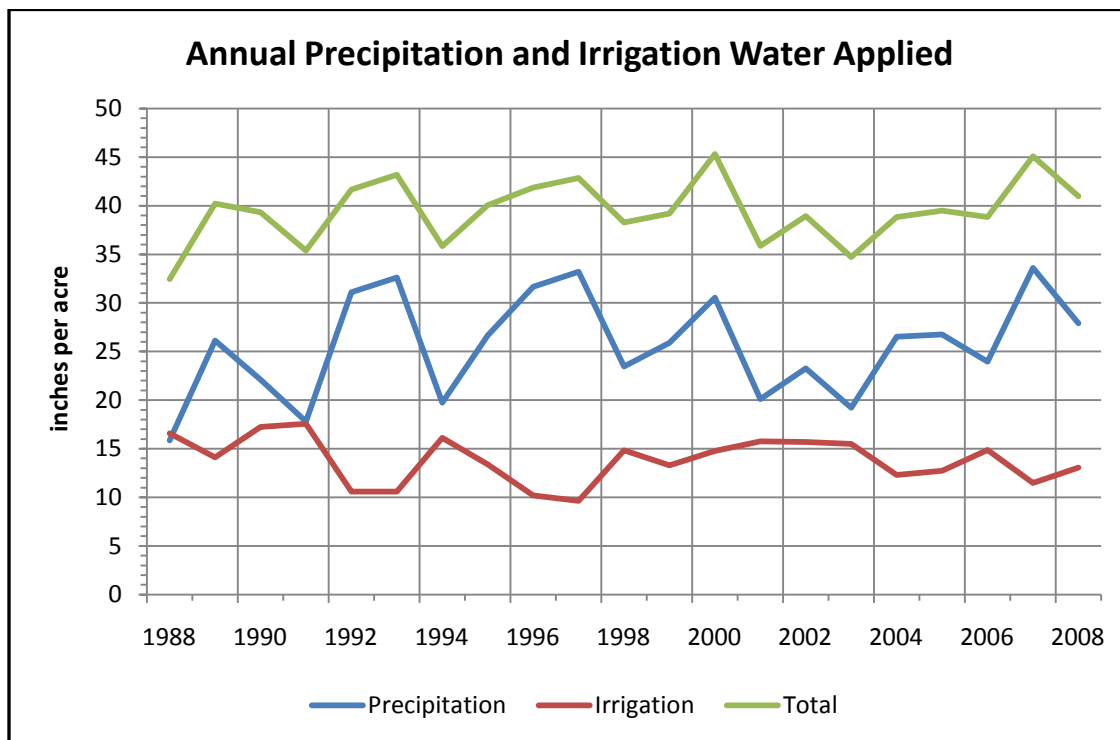


Figure 24: Annual Precipitation and Irrigation (inches per acre) 1989-2009

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, 1989 to 2009 Rattlesnake Creek subbasin received an average of 26.01 inches of precipitation while water users applied an average of 13.63 inches per year of water for irrigation. The year 2009 had 24.05 inches of precipitation and 12.6 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.

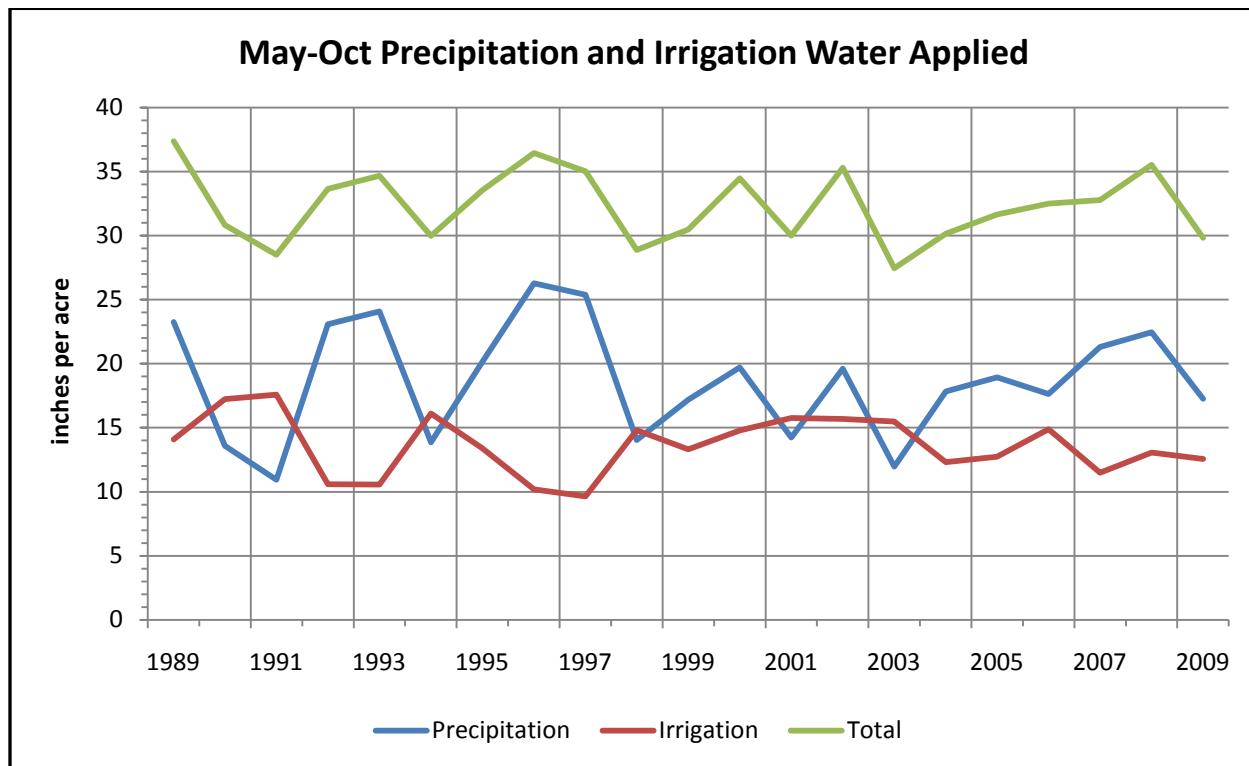


Figure 25: May-October Precipitation and Irrigation (inches per acre) 1989-2009

VI. Conclusions

The year 2010 appears to have been slightly above-average year for precipitation. Streamflows were above MDS criteria for most of the year at Macksville and all year at Zenith. Water levels in the alluvial aquifer declined within each of the Rattlesnake Creek subbasin priority areas. The change in the five-year rolling averages varied across the subbasin. The 2009 water use was below 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
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	25S14W30SWSESW01	3
KGS31	375039098580501	25S15W28SENESE01	3
KGS32	375046098580501	25S15W28SENESE01	3
SF19	375053098554601	25S15W25NESWNNW01	3
SF65	375059098595801	25S15W29NWNWSE01	3
KGS33	375105098575701	25S15W27NWNWSW01	3
SF63	375118098513901	25S14W21SESESW01	3
KGS34	375119098515401	25S14W21SESWSW01	3
KGS35	375217098522701	25S14W16SWSWNNW01	3
KGS36	375218098575701	25S15W15SWSWNNW01	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	26S16W04SESWSE	4S
KGS413	374926099050701	26S16W04NWNWNW01	4S
KGS41	380002098470601	23S13W31SESESE01	4N
KGS42	380021098463300	23S13W32SWNENE01	4N
SF41	380108098480501	23S13W30SWNWNW01	4N
KGS43	380240098454401	23S13W16SWSWNE01	4N
SF40	380333098465901	23S13W08SWSWNNW01	4N
SF78	380340098404602	23S12W07SESWSE02	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	28S20W20NESWNNW01	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	26S17W33SESESW01	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	25S19W26SESESW01	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	25S18W13NWSWSE01	5
ED46	375245099123501	25S17W17NENESW01	5
SF18	375330098565101	25S15W11NWSWNW01	5
ED04	375411099080701	25S17W01SEENW01	5
ED42	375436099032701	25S16W02NWNWNW01	5
SF53	375456098593401	24S15W32SESWSW01	5
SF15	375507098581101	24S15W33SEENW01	5
SF51	375521098543201	24S14W31NWNWSE01	5
SF14	375551099010301	24S15W30SWSESW	5
ED01	375615099021301	24S16W25NWNWSE01	5
KGS510	375733099034401	24S16W15SEENW01	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	25S18W31SESESW01	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	27S17W26SESENW01	7
KW05	373948099250101	27S19W29SESENW01	7
KW04	373950099204101	27S19W25SESESW01	7
KW23	374050099161301	27S18W22NESESW01	7
KW07	374054099104501	27S17W21NESESW01	7
KW19	374111099070401	27S16W19NWNWSE01	7
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
ED76	374844099183102	26S18W05NC SE	5
ED77	374658099244302	26S19W16NWSWNW02	5
KW45	374001099282202	27S20W26SESWNE02	5