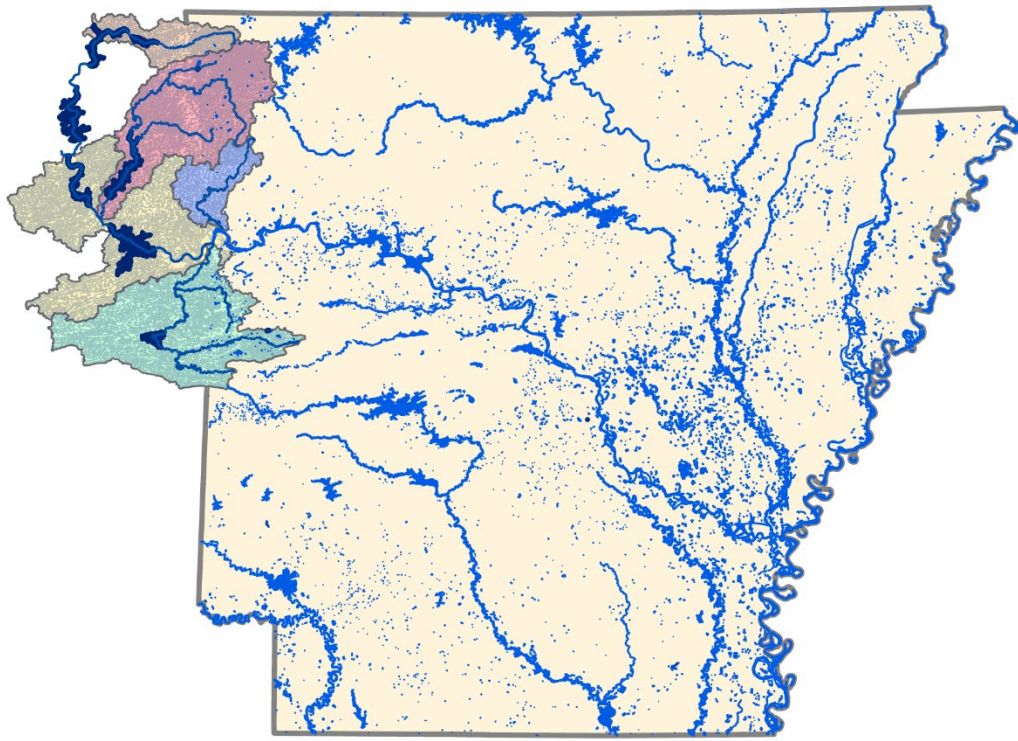


Arkansas-Oklahoma Arkansas River Compact Commission

State of Arkansas Environmental Committee Report



September 24, 2020

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Arkansas 303(d) List

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2019 Climate Summary Illinois River Basin

Climate data is presented to identify factors which might have bearings on monitoring results for the Illinois River Basin. The monitoring station at Drake Field in Fayetteville, Arkansas, was chosen to represent the climate totals for the Illinois River watershed. The data is available for download from the Nation Weather Service at:

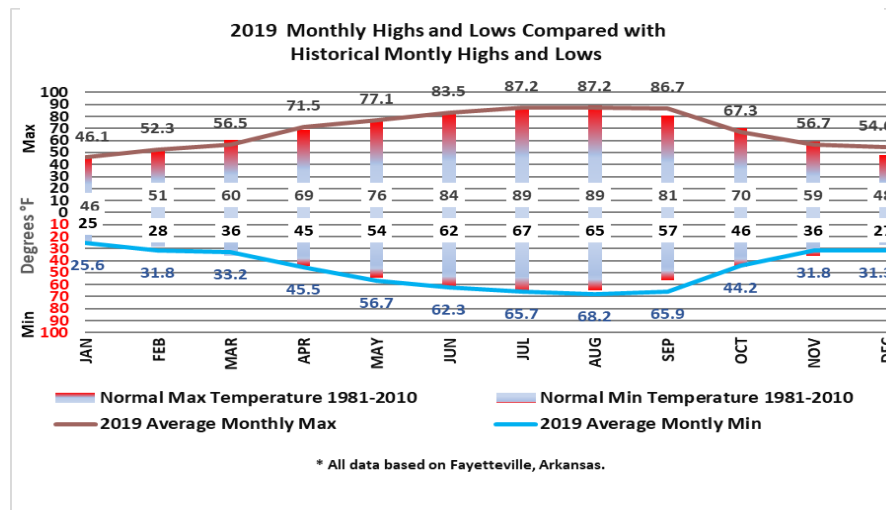
<https://w2.weather.gov/climate/getclimate.php?wfo=LZK&sid=FYV&pil=CF6&specdate=2019-01-31+11%3A11%3A11>

The actual mean, normal means, precipitation, and outliers are listed in table 1. Overall, 2019 was close to normal for temperatures with a 1.0° F difference in the daily mean temperature. This is further illustrated in figure 1 which also shows the monthly mean maximum (max) and minimum (min) compared to the normal monthly maximum (max) and minimum (min).

TABLE 1 - 2019 CLIMATE DATA

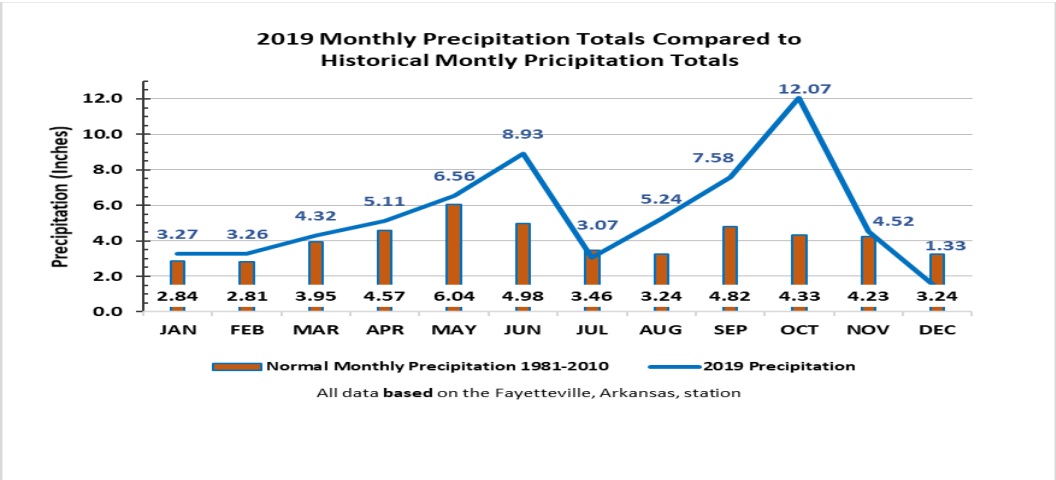
Daily Mean Temp 2019 (F°)	57.2 °	Normal	58.2 °
Daily Mean Max Temp 2019 (F°)	68.9 °	Normal	68.6 °
Mean Min Temp 2019 (F°)	46.9 °	Normal	47.7 °
Total Precipitation (In) 2019	65.26 "	Normal	45.53 "
Extreme Max Temp 2019 (F°)	95 °	August 20, 2019	
Extreme Min Temp (F°) 2019	7 °	March 4, 2019	
Extreme Precipitation (in) 2019	4.57 "	24 hours on Sept 24, 2019	

FIGURE 1 - 2019 MONTHLY TEMPERATURE AND HISTORICAL NORMALS



Precipitation for 2019 was well above normal. The year finished with an excess of 19.73 inches. The precipitation is illustrated in figure 2 which compares monthly normal totals to monthly recorded totals.

FIGURE 2 - 2019 MONTHLY TOTAL PRECIPITATION COMPARED TO HISTORICAL MONTHLY PRECIPITATION



The chart illustrates precipitation for two months (July and December) fell below normal and four months (June, August, September, and October) were well above normal. Knowing precipitation was above normal during these months is helpful in reviewing flow data and in understanding the total phosphorus sampling. Due to the higher overland flow and streamflow, higher phosphorus readings in the sampling are expected. The top six highest flows are discounted in the calculations for phosphorus loading. The top six flows for each of the four streams monitored by Arkansas are listed below in table 2.

TABLE 2 - 2019 TOP SIX FLOWS FOR EACH MONITORED STREAM

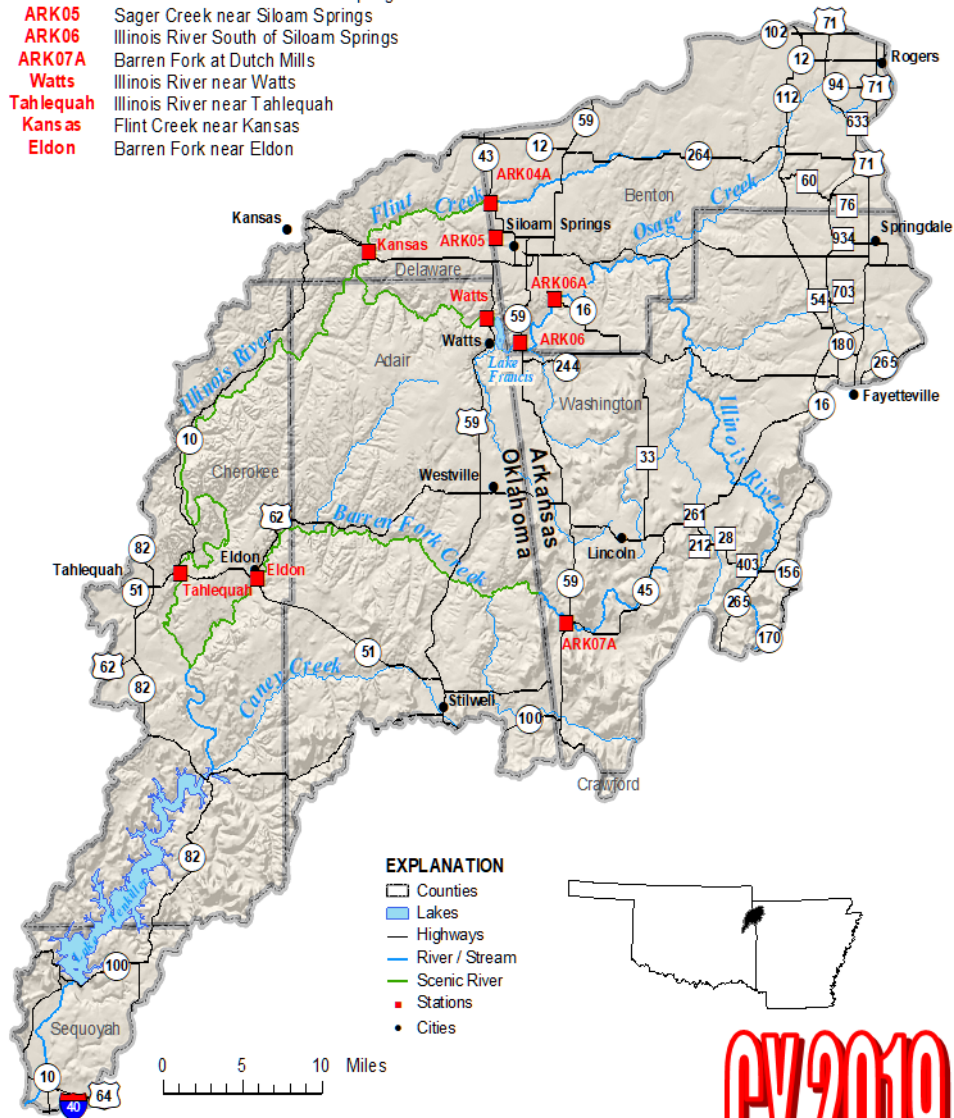
Flint Creek		Sager Creek		Illinois River		Baron Fork	
Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)	Date	Flow (cfs)
10/06/2019	2,960.00	06/23/2019	1,560.00	10/06/2019	18,600.00	06/23/2019	2,270.00
10/11/2019	1,430.00	10/06/2019	1,190.00	10/07/2019	12,400.00	10/24/2019	1,660.00
06/22/2019	1,260.00	05/01/2019	646.00	06/24/2019	11,100.00	11/07/2019	1,300.00
10/07/2019	711.00	11/30/2019	643.00	06/07/2019	9,940.00	10/11/2019	1,1170.00
11/07/2019	697.00	10/11/2019	597.00	10/11/2019	9,590.00	05/01/2019	1,100.00
05/01/2019	259.00	11/07/2019	578.00	05/01/2019	8,950.00	01/04/2019	972.00

Water Quality Monitoring Report

Illinois River Basin

Arkansas-Oklahoma Compact

- ARK04A** Flint Creek near West Siloam Springs
- ARK05** Sager Creek near Siloam Springs
- ARK06** Illinois River South of Siloam Springs
- ARK07A** Barren Fork at Dutch Mills
- Watts** Illinois River near Watts
- Tahlequah** Illinois River near Tahlequah
- Kansas** Flint Creek near Kansas
- Eldon** Barren Fork near Eldon



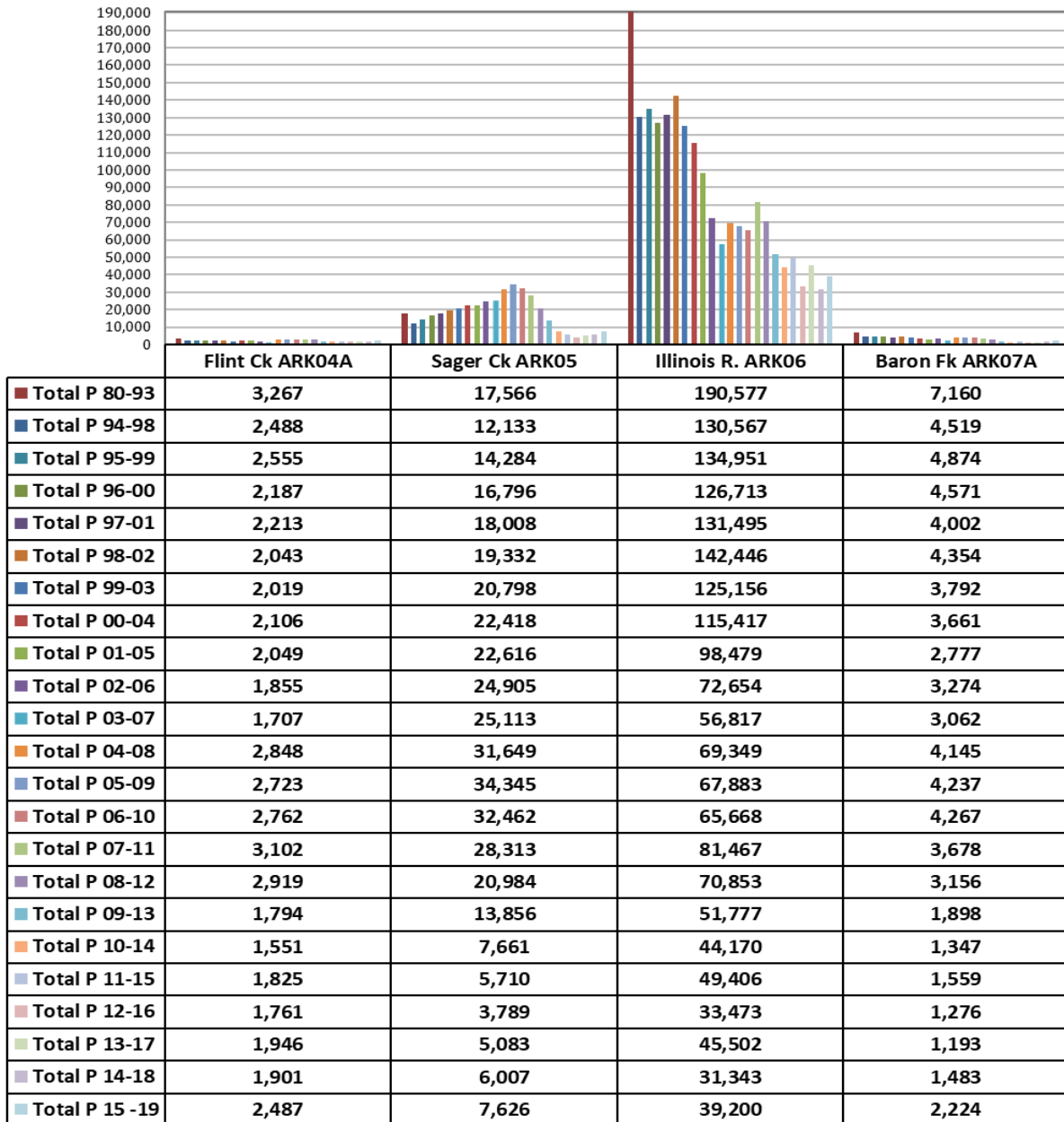
CV 2019

TABLE 3 - ARKANSAS 5-YEAR ROLLING AVERAGE TOTAL PHOSPHORUS LOADING

Arkansas

5-Year Rolling Average Total Phosphorus Loading

(excluding targeted high flows)



MONITORING STATION: FLINT CREEK NORTHWEST OF WEST SILOAM SPRINGS, OKLAHOMA

TABLE 4 -ANNUAL PHOSPHORUS
LOADINGS

ARK04A Year	Flow (cfs)	Total P (mg/L)	Total P (kg/yr)
1981	19.8	0.149	2,635
1982	29.9	0.171	4,566
1983	19.0	0.073	1,239
1984	53.5	0.112	5,351
1985	91.3	0.063	5,137
1986	78.4	0.067	4,691
1987	58.3	0.049	2,551
1988	41.8	0.031	1,157
1989	38.0	0.050	1,697
1990	71.3	0.060	3,821
1991	51.6	0.054	2,489
1992	56.1	0.047	2,355
1993	88.2	0.045	3,545
1994	53.0	0.051	2,414
1995	61.3	0.075	4,106
1996	33.5	0.050	1,496
1997	37.3	0.074	2,448
1998	42.9	0.056	2,142
1999	63.5	0.045	2,578
2000	55.6	0.038	1,893
2001	39.4	0.047	1,636
2002	44.6	0.047	1,850
2003	21.4	0.075	1,438
2004	64.6	0.055	3,173
2005	43.0	0.046	1,772
2006	12.6	0.056	630
2007	22.4	0.059	1,180
2008	76.9	0.147	10,096
2009	55.6	0.054	2,681
2010	44.3	0.049	1,939
2011	48.5	0.042	1,798
2012	19.2	0.043	732
2013	45.1	0.049	1,973
2014	30.7	0.049	1,343
2015	78.5	0.048	3,365
2016	32.2	0.051	1,467
2017	39.9	0.044	1,554
2018	45.6	0.043	1,750
2019	99.3	0.050	4,433
Avg.	48.9	0.062	2,702

TABLE 5 -FIVE-YEAR ROLLING AVERAGE
PHOSPHORUS LOADINGS

Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
91-95	0.054	62.0	3,014	7.7%
92-96	0.054	58.4	2,797	14.4%
93-97	0.059	54.7	2,875	12.0%
94-98	0.061	45.6	2,488	23.9%
95-99	0.060	47.7	2,555	21.8%
96-00	0.053	46.6	2,187	33.1%
97-01	0.052	47.7	2,213	32.3%
98-02	0.046	49.2	2,043	37.5%
99-03	0.050	44.9	2,019	38.2%
00-04	0.052	45.1	2,106	35.5%
01-05	0.054	42.6	2,049	37.3%
02-06	0.056	37.2	1,855	43.2%
03-07	0.058	32.8	1,707	47.7%
04-08	0.073	43.9	2,848	12.8%
05-09	0.072	42.1	2,723	16.6%
06-10	0.073	42.4	2,762	15.5%
07-11	0.070	49.5	3,102	5.1%
08-12	0.067	48.9	2,919	10.7%
09-13	0.047	42.5	1,794	45.1%
10-14	0.046	37.6	1,551	52.5%
11-15	0.046	44.4	1,825	44.1%
12-16	0.048	41.1	1,761	46.1%
13-17	0.048	45.3	1,946	40.4%
14-18	0.047	45.4	1,901	41.8%
15-19	0.047	59.1	2,487	23.9%

FIGURE 3 – FIVE-YEAR ROLLING AVERAGEPHOSPHORUS LOADINGS CHART

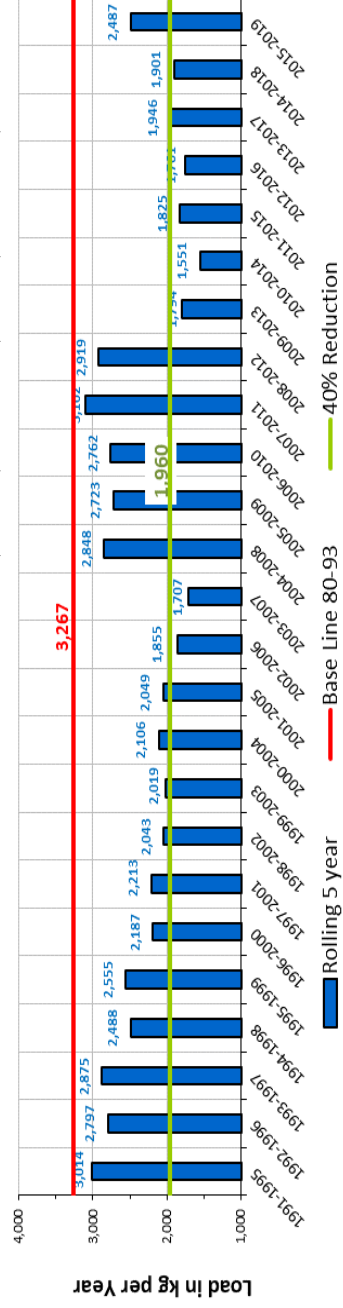


FIGURE 4 - FLINT CREEK TOTAL PHOSPHORUS VS 3 MONTH ROLLING MEAN

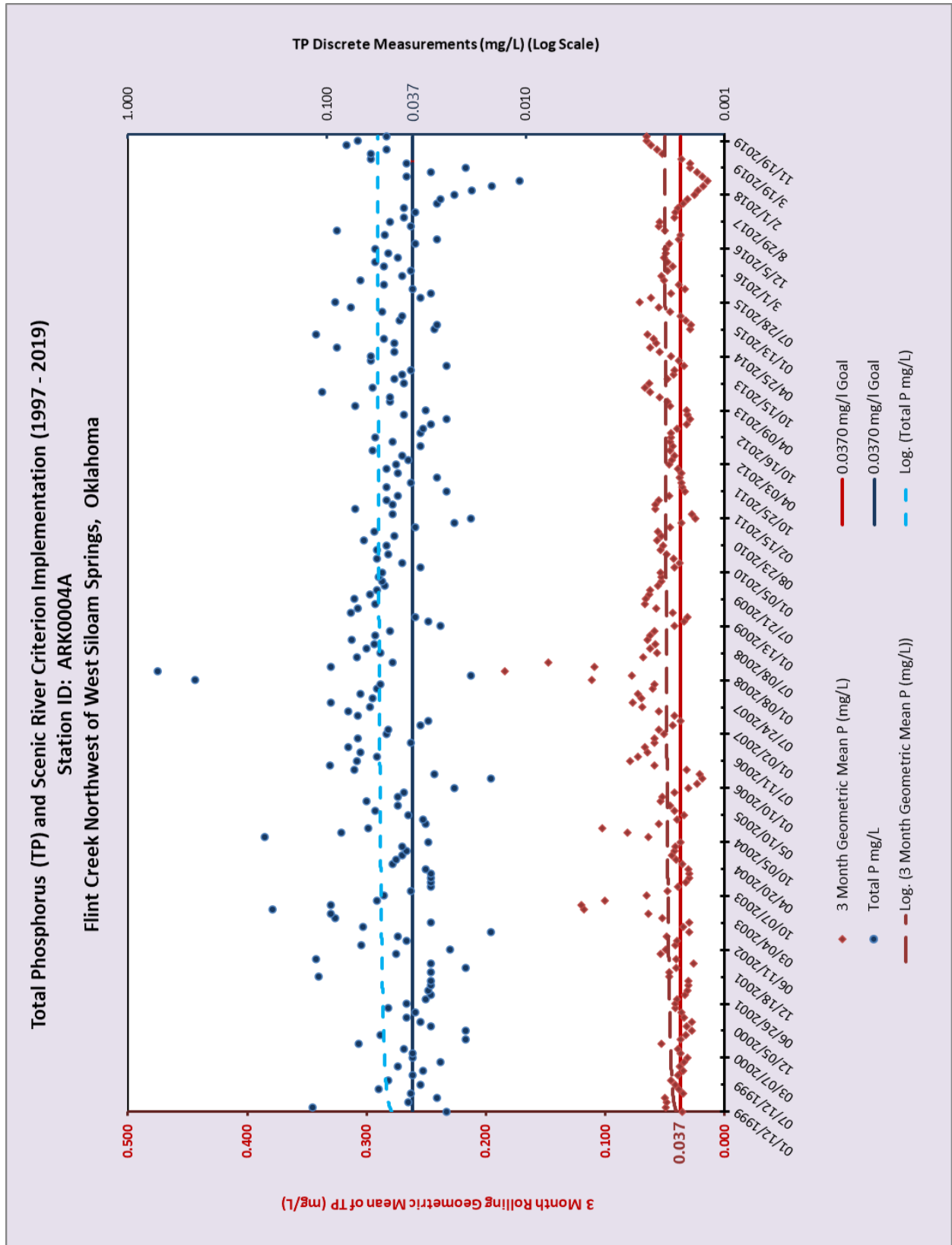


TABLE 6 - ANNUAL PHOSPHORUS LOADINGS

ARK05 Year	Flow (cfs)	Total P (mg/L)	Total P (kg/yr)
1981	6.5	2.125	12,336
1982	9.0	2.025	16,277
1983	6.3	1.964	11,050
1984	15.4	0.950	13,066
1985	24.8	1.736	38,450
1986	21.1	0.834	15,716
1987	16.7	0.948	14,136
1988	12.6	1.154	12,986
1989	11.7	1.227	12,821
1990	20.2	0.860	15,515
1991	15.5	0.914	12,653
1992	16.5	1.284	18,921
1993	24.6	0.637	13,995
1994	15.7	0.721	10,110
1995	17.8	0.697	11,080
1996	11.0	0.919	9,028
1997	17.8	1.029	16,354
1998	18.1	0.858	13,876
1999	24.5	0.979	21,429
2000	30.7	0.820	22,469
2001	21.2	0.803	15,201
2002	21.8	1.192	23,231
2003	11.7	1.503	15,700
2004	34.5	0.916	28,224
2005	18.5	1.461	24,200
2006	14.9	1.799	23,940
2007	21.0	1.306	24,494
2008	48.9	0.945	41,271
2009	38.1	1.286	43,759
2010	22.9	0.897	18,335
2011	27.4	0.573	14,027
2012	11.4	0.250	2,540
2013	20.2	0.228	4,105
2014	18.2	0.196	3,193
2015	39.1	0.128	4,470
2016	16.3	0.207	3,013
2017	21.7	0.473	9,179
2018	22.2	0.427	8,454
2019	46.4	0.230	9,531
Avg.	20.8	0.962	17,900

MONITORING STATION:
SAGER CREEK
NEAR WEST SILOAM SPRINGS,
ARKANSAS

TABLE 7 - FIVE - YEAR ROLLING AVERAGE
PHOSPHORUS LOADINGS

Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
80-93	1.363	14.7	17,566	0.0%
91-95	0.851	18.0	13,689	22.1%
92-96	0.852	17.1	13,021	25.9%
93-97	0.801	17.4	12,426	29.3%
94-98	0.845	16.1	12,133	30.9%
95-99	0.896	17.8	14,284	18.7%
96-00	0.921	20.4	16,796	4.4%
97-01	0.898	22.5	18,008	-2.5%
98-02	0.930	23.3	19,332	-10.1%
99-03	1.059	22.0	20,798	-18.4%
00-04	1.047	24.0	22,418	-27.6%
01-05	1.175	21.6	22,616	-28.7%
02-06	1.374	20.3	24,905	-41.8%
03-07	1.397	20.1	25,113	-43.0%
04-08	1.285	27.6	31,649	-80.2%
05-09	1.359	28.3	34,345	-95.5%
06-10	1.247	29.2	32,462	-84.8%
07-11	1.001	31.7	28,313	-61.2%
08-12	0.790	29.7	20,984	-19.5%
09-13	0.647	24.0	13,856	21.1%
10-14	0.429	20.0	7,661	56.4%
11-15	0.275	23.3	5,710	67.5%
12-16	0.202	21.0	3,789	78.4%
13-17	0.246	23.1	5,083	71.1%
14-18	0.286	23.5	6,007	65.8%
15-19	0.293	29.1	7,626	56.6%

FIGURE 5 – FIVE-YEAR ROLLING AVERAGE PHOSPHORUS LOADING CHART

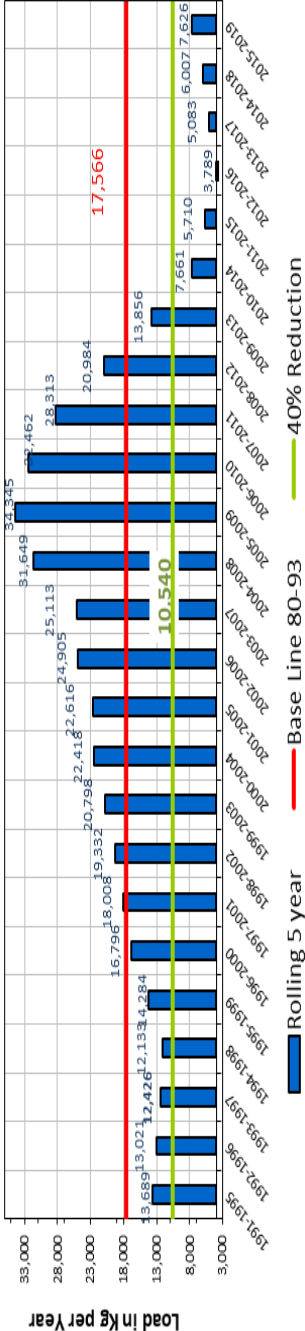


FIGURE 6 - SAGER CREEK TOTAL PHOSPHORUS VS 3 MONTH ROLLING MEAN

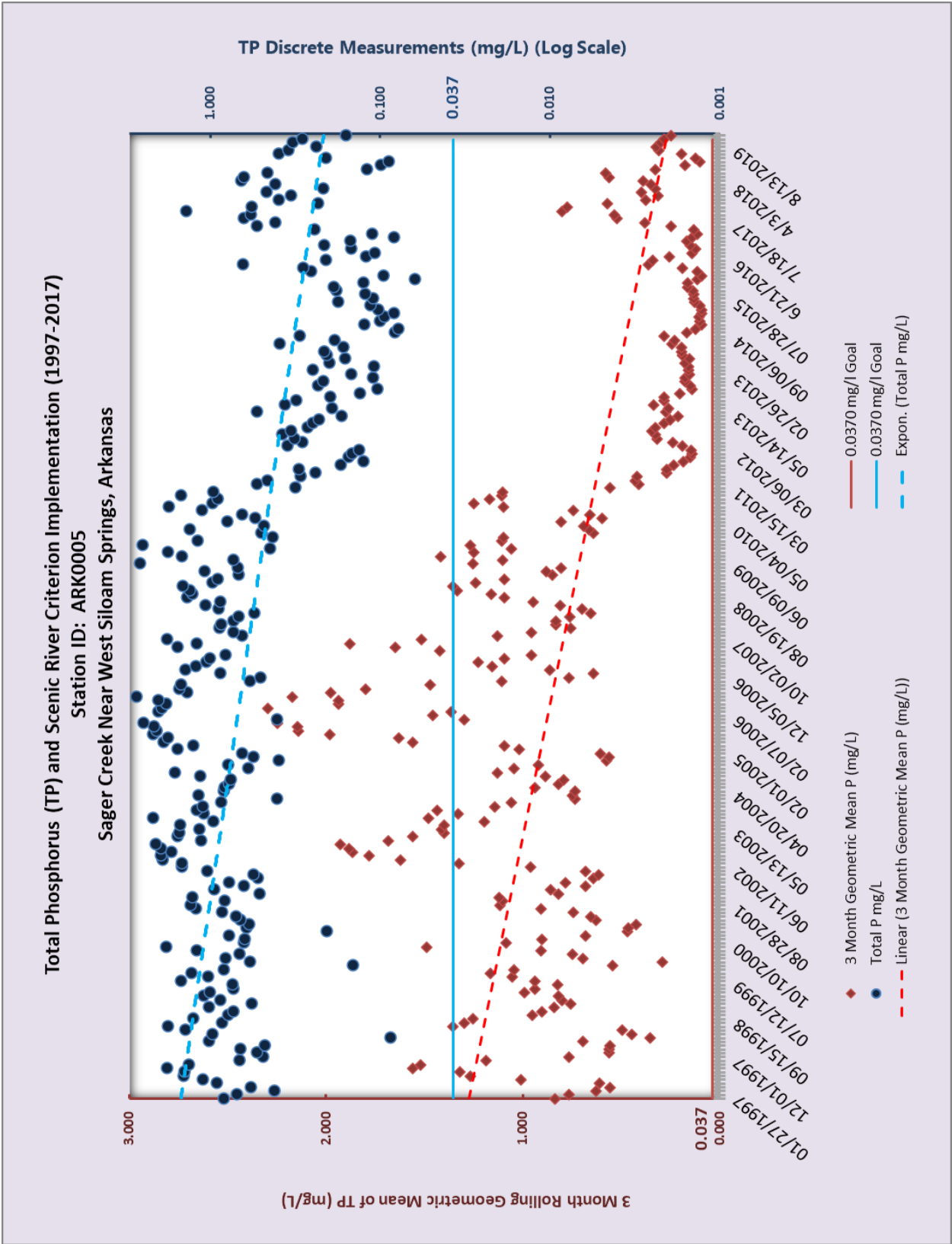


TABLE 8 - ANNUAL PHOSPHORUS LOADINGS

ARK05 Year	Flow (cfs)	Total P (mg/L)	Total P (kg/yr)
1981	6.5	2.125	12,336
1982	9.0	2.025	16,277
1983	6.3	1.964	11,050
1984	15.4	0.950	13,066
1985	24.8	1.736	38,450
1986	21.1	0.834	15,716
1987	16.7	0.948	14,136
1988	12.6	1.154	12,986
1989	11.7	1.227	12,821
1990	20.2	0.860	15,515
1991	15.5	0.914	12,653
1992	16.5	1.284	18,921
1993	24.6	0.637	13,995
1994	15.7	0.721	10,110
1995	17.8	0.697	11,080
1996	11.0	0.919	9,028
1997	17.8	1.029	16,354
1998	18.1	0.858	13,876
1999	24.5	0.979	21,429
2000	30.7	0.820	22,469
2001	21.2	0.803	15,201
2002	21.8	1.192	23,231
2003	11.7	1.503	15,700
2004	34.5	0.916	28,224
2005	18.5	1.461	24,200
2006	14.9	1.799	23,940
2007	21.0	1.306	24,494
2008	48.9	0.945	41,271
2009	38.1	1.286	43,759
2010	22.9	0.897	18,335
2011	27.4	0.573	14,027
2012	11.4	0.250	2,540
2013	20.2	0.228	4,105
2014	18.2	0.196	3,193
2015	39.1	0.128	4,470
2016	16.3	0.207	3,013
2017	21.7	0.473	9,179
2018	22.2	0.427	8,454
2019	46.4	0.230	9,531
Avg.	20.8	0.962	17,900

MONITORING STATION: ILLINOIS RIVER SOUTH OF SILOAM SPRINGS, ARKANSAS

TABLE 9 - FIVE-YEAR ROLLING AVERAGE PHOSPHORUS LOADINGS

91-95	0.210	821	153,942	19.2%
92-96	0.211	809	152,527	20.0%
93-97	0.209	757	141,386	25.8%
94-98	0.222	658	130,567	31.5%
95-99	0.225	670	134,951	29.2%
96-00	0.224	633	126,713	33.5%
97-01	0.238	619	131,495	31.0%
98-02	0.252	634	142,446	25.3%
99-03	0.246	569	125,156	34.3%
00-04	0.236	548	115,417	39.4%
01-05	0.214	516	98,479	48.3%
02-06	0.179	455	72,654	61.9%
03-07	0.149	428	56,817	70.2%
04-08	0.136	569	69,349	63.6%
05-09	0.122	624	67,883	64.4%
06-10	0.110	668	65,668	65.5%
07-11	0.110	830	81,467	57.3%
08-12	0.098	811	70,853	62.8%
09-13	0.081	718	51,777	72.8%
10-14	0.080	621	44,170	76.8%
11-15	0.081	686	49,406	74.1%
12-16	0.068	551	33,473	82.4%
13-17	0.080	591	42,442	77.7%
14-18	0.061	734	39,724	79.2%
15-19	0.060	734	39,200	79.4%

FIGURE 7 - FIVE-YEAR ROLLING AVERAGE PHOSPHORUS LOADINGS CHART

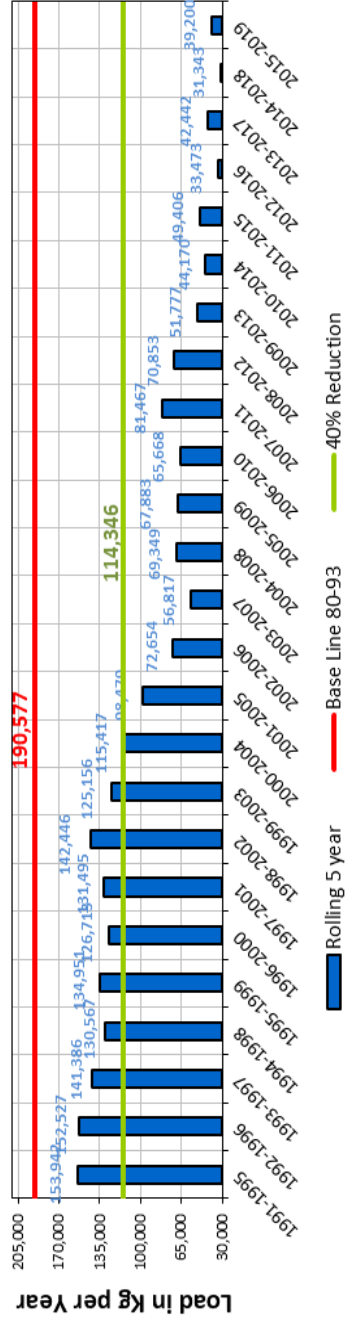


FIGURE 8 - ILLINOIS RIVER TOTAL PHOSPHORUS VS 3 MONTH ROLLING MEAN

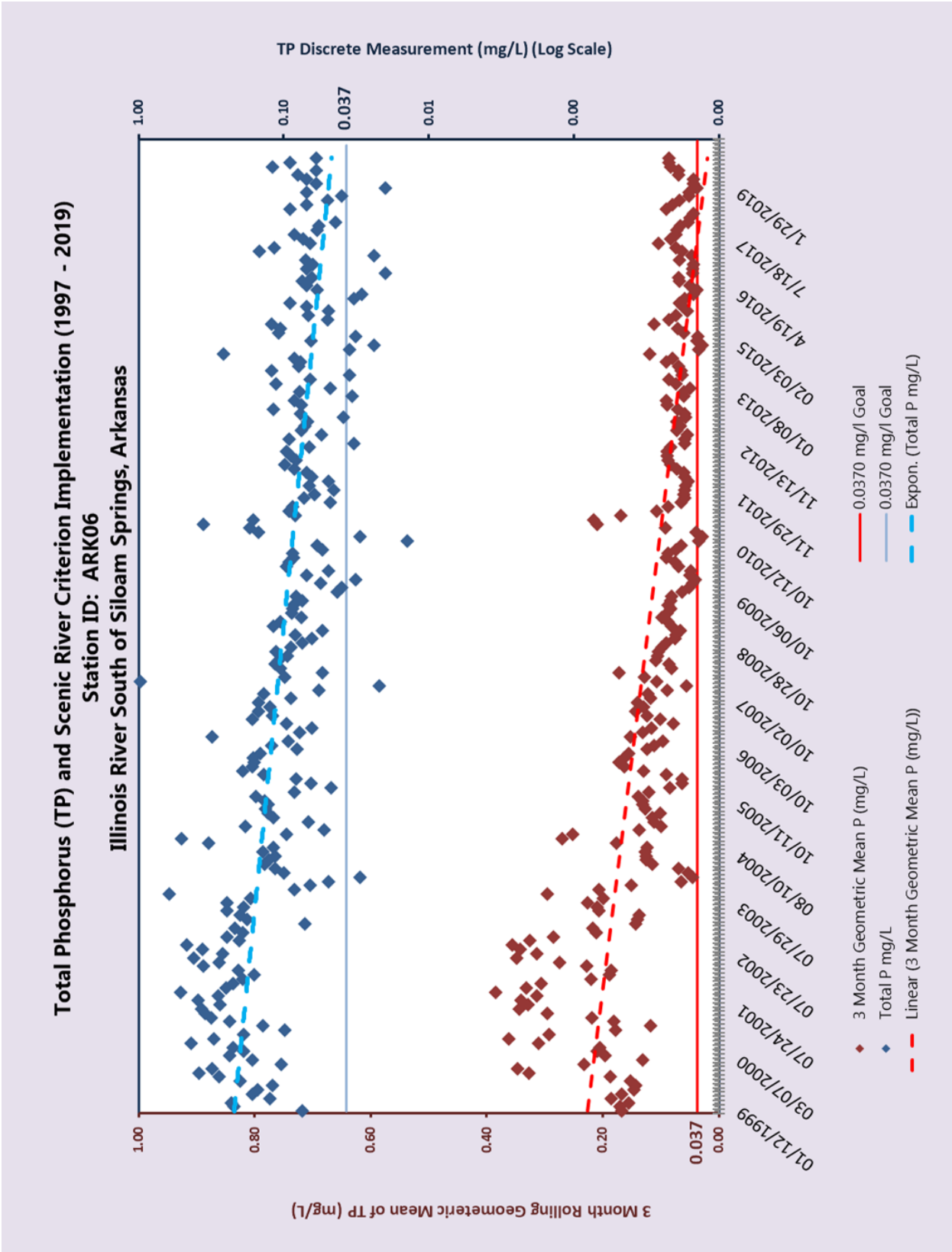


TABLE 10 - ANNUAL PHOSPHORUS
LOADING

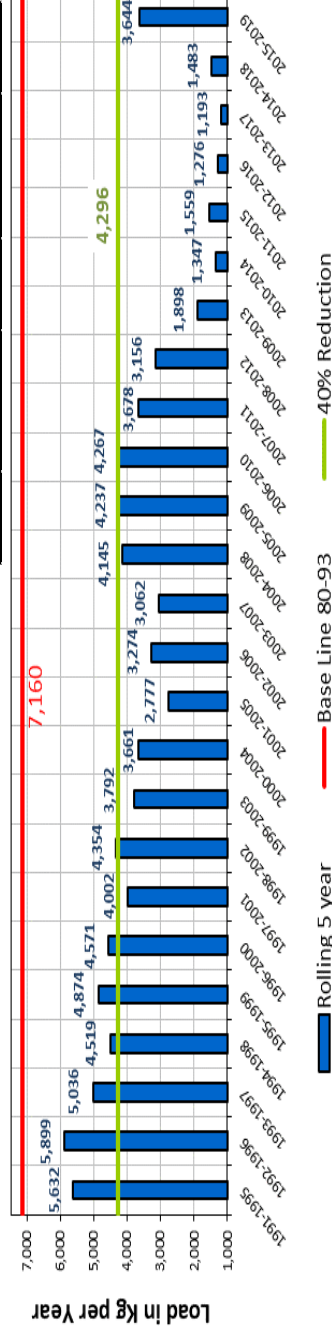
ARK06 Year	Flow (cfs)	Total P (mg/L)	Total P (kg/yr)
1981	197	0.420	73,895
1982	591	0.370	195,294
1983	352	0.386	121,347
1984	706	0.442	278,693
1985	947	0.289	244,426
1986	879	0.305	239,436
1987	815	0.294	213,996
1988	531	0.253	119,982
1989	558	0.291	145,020
1990	1127	0.204	205,331
1991	724	0.220	142,253
1992	760	0.222	150,684
1993	1163	0.181	188,000
1994	674	0.190	114,370
1995	783	0.237	165,733
1996	667	0.225	134,032
1997	497	0.213	94,504
1998	668	0.246	146,960
1999	737	0.206	135,413
2000	597	0.230	122,831
2001	598	0.293	156,581
2002	570	0.282	143,700
2003	344	0.219	67,422
2004	633	0.153	86,496
2005	436	0.120	46,785
2006	290	0.120	31,048
2007	436	0.131	51,022
2008	1,051	0.158	148,306
2009	907	0.080	64,782
2010	659	0.061	35,885
2011	1,097	0.120	117,154
2012	343	0.070	21,547
2013	583	0.073	37,984
2014	426	0.074	28,014
2015	984	0.066	57,990
2016	418	0.057	21,264
2017	547	0.043	21,003
2018	521	0.063	29,333
2019	1,200	0.070	75,030
Avg.	667	0.197	117,281

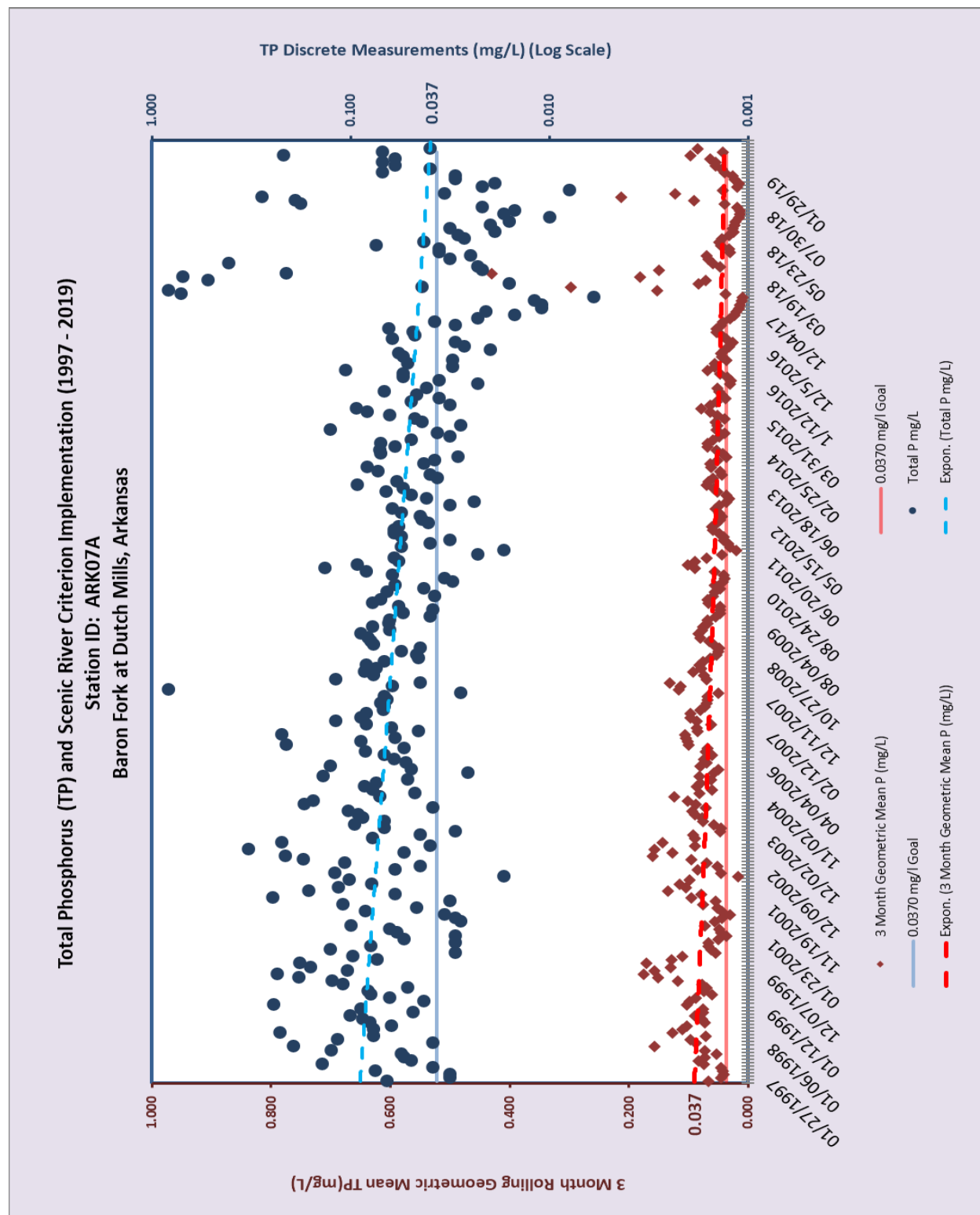
MONITORING STATION: BARON FORK AT DUTCH MILLS, ARKANSAS

TABLE 11 - FIVE-YEAR ROLLING AVERAGE
PHOSPHORUS LOADINGS

Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
80-93	0.153	52.6	7,160	0.0%
91-95	0.108	58.5	5,632	21.3%
92-96	0.107	61.5	5,899	17.6%
93-97	0.095	59.1	5,036	29.7%
94-98	0.100	50.5	4,519	36.9%
95-99	0.104	52.3	4,874	31.9%
96-00	0.099	52.0	4,571	36.2%
97-01	0.095	47.4	4,002	44.1%
98-02	0.102	47.8	4,354	39.2%
99-03	0.107	39.6	3,792	47.0%
00-04	0.104	39.3	3,661	48.9%
01-05	0.091	34.0	2,777	61.2%
02-06	0.096	38.1	3,274	54.3%
03-07	0.093	37.0	3,062	57.2%
04-08	0.093	50.2	4,145	42.1%
05-09	0.088	53.7	4,237	40.8%
06-10	0.085	55.9	4,267	40.4%
07-11	0.080	51.6	3,678	48.6%
08-12	0.072	49.1	3,156	55.9%
09-13	0.057	37.1	1,898	73.5%
10-14	0.053	28.2	1,347	81.2%
11-15	0.052	33.4	1,559	78.2%
12-16	0.050	28.5	1,276	82.2%
13-17	0.048	27.6	1,193	83.3%
14-18	0.061	27.0	1,483	79.3%
15-19	0.108	37.8	3,644	49.1%

FIGURE 9 - FIVE-YEAR ROLLING AVERAGE PHOSPHORUS LOADING CHART





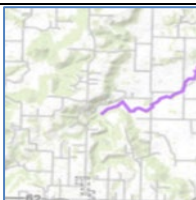
Arkansas 303 (d) List

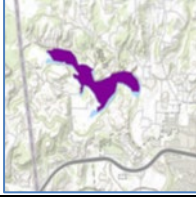
The 2018 303 (d) list has been submitted to the U.S. Environmental Protection Agency (EPA). Correspondence to Arkansas Division of Environmental Quality dated May 15, 2020, EPA approved all impairments identified by the State of Arkansas but is taking no action and is requesting additional information from Arkansas regarding the development and application of water quality standards on the State's waterbodies subject to minerals Ecoregional Reference values as to those pollutants. In addition, EPA is requesting additional information on a number of waterbody/pollutant combinations for which the State's evaluation of data and information or application of water quality standards and assessment methodology is unclear. None of these areas are located within the Compact boundary. The final recommendation in the correspondence states that Arkansas's 2018 Section 303(d) list meets the requirements of Section 303 (d) of the Clean Water Act (CWA) and the EPA's implementing regulations with regard to all the waterbody-pollutant combinations listed by the State. As a result, the EPA approves Arkansas's 2018 Section 303 (d) list with further action pending. As a review of the waterbodies listed in the 2018 list, table 12 on the following page is provided.

In keeping with the two-year rotation for producing the 303 (d) list, preparations have begun for the 2020 303 (d) list. The "2020 Assessment Methodology" is available for review online. The program is housed at the Department of Environmental Quality. Data, documents, and documentation for the program is available at the website listed below

<https://www.adeg.state.ar.us/water/planning/integrated/303d/list.aspx>

TABLE 12 - 2018 303 (D) LIST

2018 Impaired Waters within the Illinois River Basin			
Locater Map	ADEQ Assessment Unit	Waterbody Name	Parameter(s)
	AR_11110103_020	Illinois River	Chloride, Sulfate
	AR_11110103_024	Illinois River	Chloride, Sulfate
	AR_11110103_026	Moores Creek	Sulfate
	AR_11110103_027	Illinois River, Muddy Fork	Sulfate
	AR_11110103_4080	Fayetteville (Lake)	pH
	AR_11110105_001	Poteau River	Dissolved Oxygen
	AR_11110105_031	Poteau River	Turbidity, Sulfate
	AR_11110105_831	Unnamed Tributary to Poteau	Chloride, Total Dissolved Solids

	AR_11110104_4020	Lee Creek (Lake)	pH
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