UPPER ARKANSAS RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody / Assessment Unit (AU): Pawnee River

Water Quality Impairments: Atrazine

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Pawnee and Buckner

Counties: Pawnee, Hodgeman, Finney, Ford, Ness, Lane, Gary, Scott, Edwards

HUC8: 11030005 **HUC10 (HUC12)**:
01 (01, 02, 03, 04, 05)
02 (01, 02, 03, 04, 05)
03 (01, 02. 03, 04, 05, 06, 07)
04 (01, 02, 03, 04, 05, 06, 07, 08, 09, 10)
05 (01, 02, 03, 04)
06 (01, 02, 03, 04)
07 (01, 02, 03, 04, 05)

11030006
01 (01, 02, 03, 04, 05)
02 (01, 02, 03, 04, 05, 06, 07, 08)
03 (01, 02, 03, 04, 05, 06, 07)

Ecoregion: Central Great Plains, Rolling Plains and Breaks (27b) and Western High Plains-Flat to Rolling Cropland (25d)

Drainage Area: Approximately 2,410 square miles

Water Quality Limited Segments:

Main Stem	**Tributaries**		
Pawnee R (2)	Cocklebur Cr (12)		
	Buckner Cr (1)	Saw Log Cr (3, 4)	Elm Cr (5) Duck Cr (8)
	Buckner Cr (2)	Spring Cr (7) Buckner Cr S. Fk (6)	
Pawnee R (3)	Hackberry Cr (4)		
Pawnee R (5)			

Designated Uses: For Main Stem Pawnee River (2): Expected Aquatic Life, Primary Contact Recreation Class C, Domestic Water Supply Use, Food Procurement Use, Groundwater Recharge, Irrigation Watering Use, Industrial Water Supply Use, Livestock Watering Use.

Pawnee River (3, 5): Expected Aquatic Life, Secondary Contact Recreation Class b, Domestic Water Supply Use, Food Procurement Use, Groundwater Recharge, Irrigation Watering Use, Industrial Water Supply Use, Livestock Watering Use.

Buckner Cr (1): Expected Aquatic Life, Secondary Contact Recreation Class b, Food Procurement, and Groundwater Recharge.

Tributaries:
Buckner Cr (2) - Expected Aquatic Life Support, Secondary Contact Recreation Class a, Food Procurement, Groundwater Recharge.

Cocklebur Cr (12), Hackberry Cr (4), Elm Cr (5), Saw Log Cr (4), Spring Cr (7) – Expected Aquatic Life Support, Secondary Contact Recreation Class b.

Buckner Cr, S.Fk (6) – Expected Aquatic Life Support, Primary Contact Recreation Class B.

Saw Log Cr (3) – Expected Aquatic Life Support, Primary Contact Recreation Class C.

Duck Cr (8) - - Expected Aquatic Life Support, Secondary Contact Recreation Class b, Food Procurement, Irrigation Watering Use, Livestock Watering Use.

303(d) Listings: Kansas Stream segments monitored by Station SC585 (Pawnee River near Larned) cited as impaired by Atrazine in the 2010-303(d) list. Stream segments monitored by Station SC586 (Pawnee River near Burdett) cited as impaired by Atrazine in the 2002 and 2010-303(d) list.

Impaired Use: Expected Aquatic Life is impaired due to dissolved oxygen deficiencies and due to elevated atrazine, copper and lead concentrations. Water Supply Use is additionally impaired by atrazine

Water Quality Criteria:

Domestic Water Supply - Atrazine 3 µg/l (ppb) (annual average)
Aquatic Life Support – Atrazine Chronic: 3 µg/l (ppb)

2.0 CURRENT WATER QUALITY CONDITION AND DESIRED ENPOINT

Level of Support for Designated Uses under 2010-303(d): Not supporting Aquatic Life.

Stream Monitoring Sites: Active KDHE permanent Stream Chemistry sampling stations SC585 located on Pawnee River near Larned, and SC586 located on Pawnee River near Burdett.

Period of Record: SC585 and SC586: 1990-2011

Flow Record: USGS Gage 07140850 on Pawnee River near Burdett (1982-2011), USGS Gage 07141175 on Buckner Cr near Burdett (1995-2011) and USGS Gage 07141200 on Pawnee River at Rozel (1982-2011) were utilized to establish long term flow conditions for SC585 and SC586. Flow conditions for SC586 were established by the common period of flow conditions from USGS Gage 07140850 and Gage 07141175. For samples collected at SC586 prior to the common flow period for these gages the flow was estimated based on the USGS Gage 07140850. Flow conditions for SC585 were established based on the flow record from USGS Gage 07141200, with adjustments made based on the watershed size of the sampling station relative to this flow gage. There are low flow dams on the Pawnee River that do influence flow conditions during the lower flow periods. Average monthly flow values for the common flow period are detailed in Figure 1.

Table. 1. Long Term Flow Conditions.

Stream Location	Avg. Q	Percent of Time Flow Exceeded				
		75%	50%	25%	10%	5%
Pawnee River near Burdett at USGS Gage 07140850 (1982-2011)	9.6	0	0	0.6	7.6	19
Buckner Cr near Burdett at USGS Gage 07141175 (1995-2011)	14.8	0	0	5.3	22	38
Pawnee River at SC586 (1995-2011)	24.2	0	0	8.8	34	68
Pawnee River at Rozell at USGS Gage 07141200 (1982-2011)	28.3	0	0	5.3	32	80
Pawnee River at SC585 (1995-2011)	29.5	0	0	8.9	40.4	96.8

Precipitation: The average annual rainfall in the watershed is approximately 21.9 inches per year (weather.com). The average monthly precipitation for the watershed is observed in Figure 2.

Figure 1. Average Monthly Flow for common period on Pawnee River.

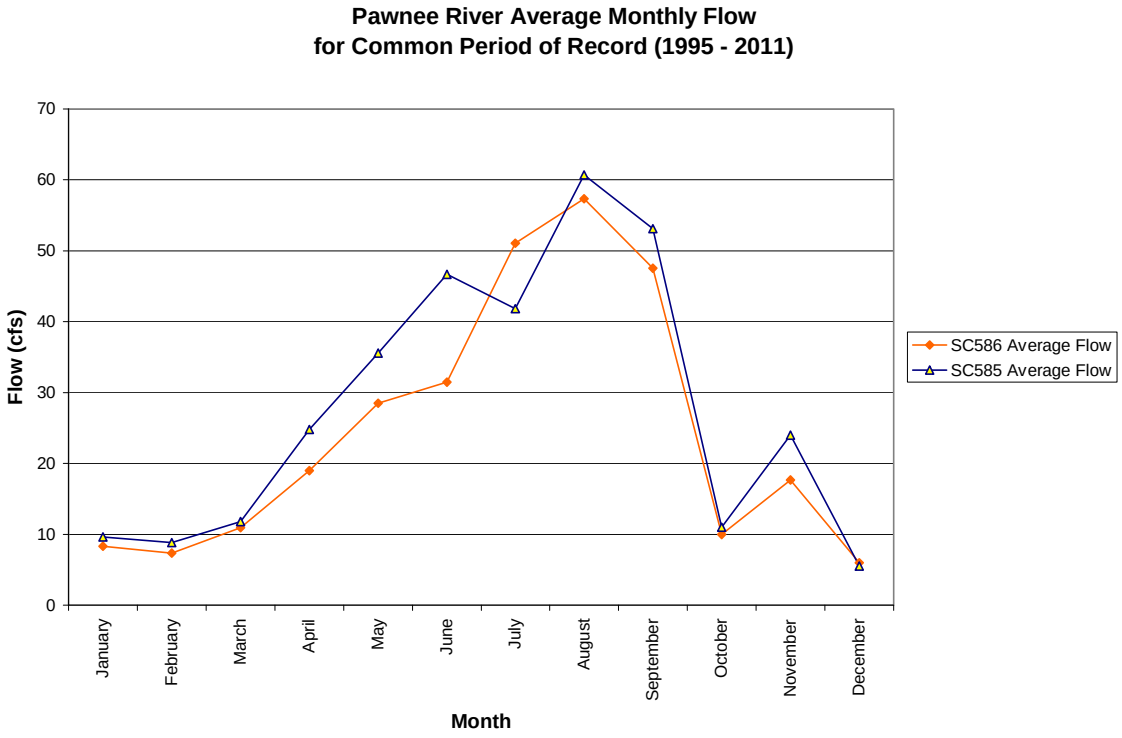


Figure 2. Average monthly precipitation as reported at Jetmore, KS on weather.com.

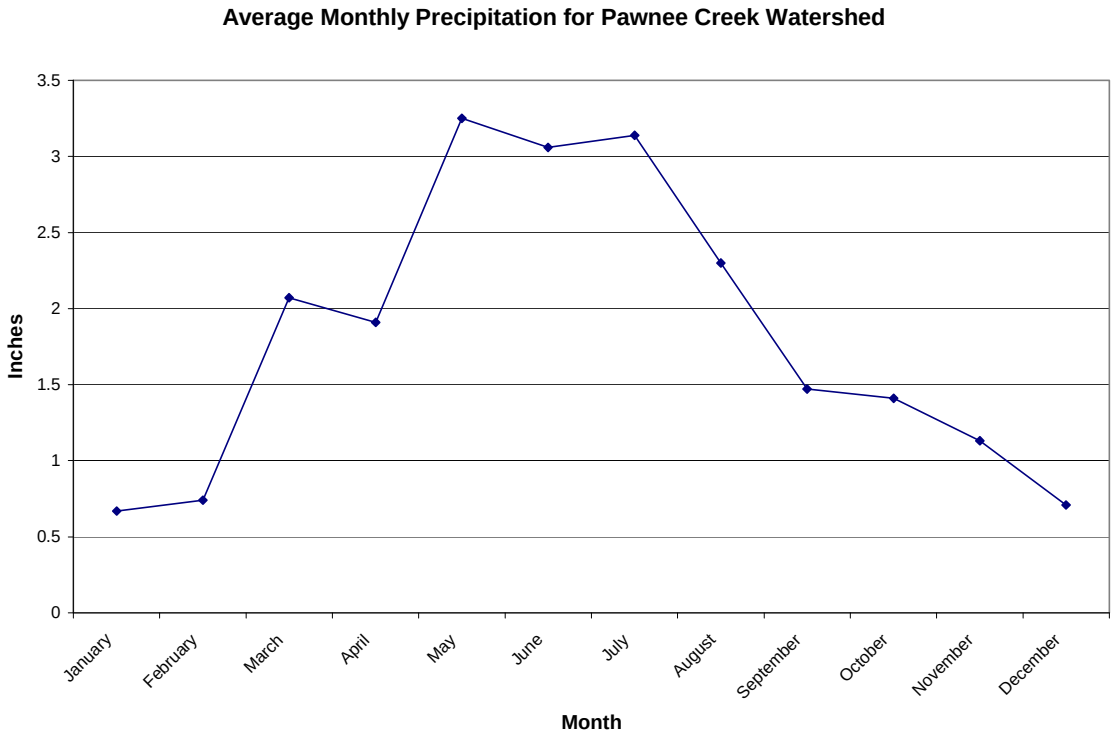
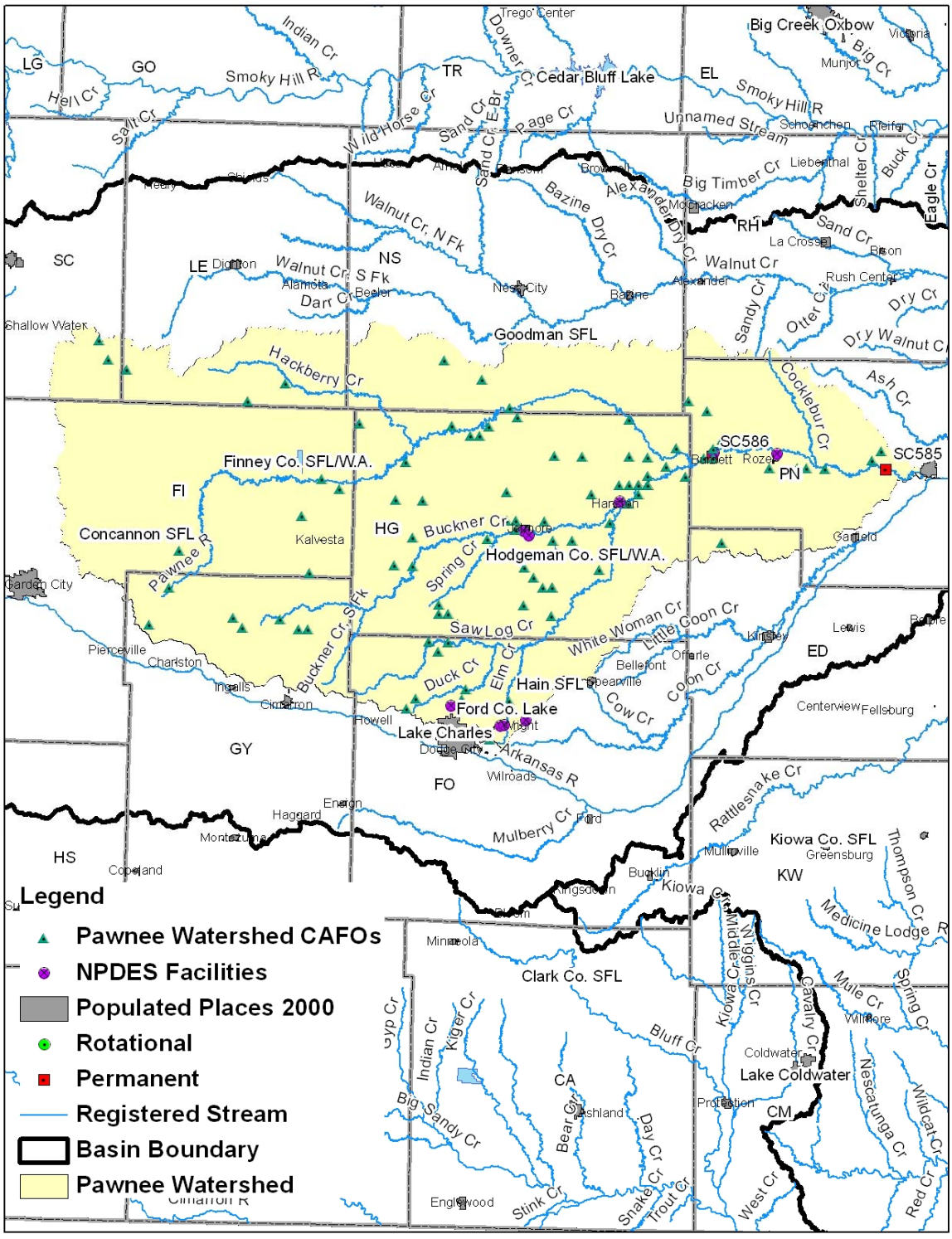


Figure 3. Pawnee River Watershed Base Map .

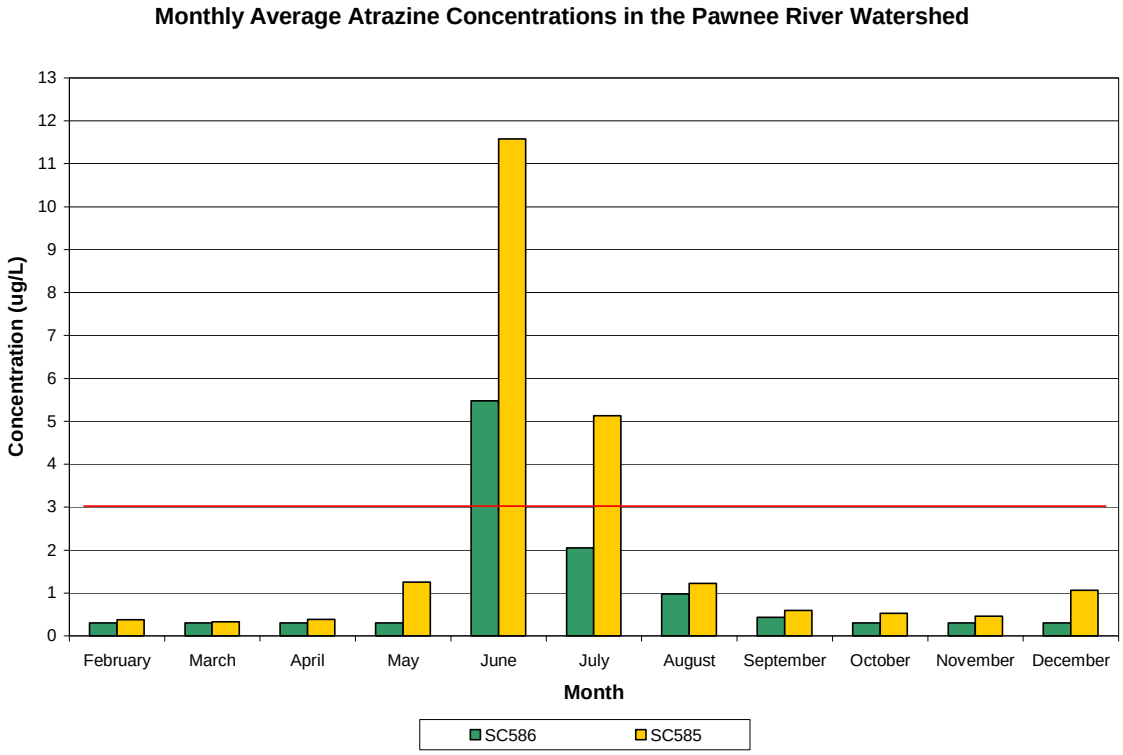


Current Conditions: Table 2 details the atrazine sampling results based on monthly concentration averages. Atrazine detections are generally observed during the months that atrazine is applied to the cropland, which also coincides with the months that are associated with spring storm events and/or more frequent precipitation. This period associated with atrazine use and higher monthly precipitation averages are considered the runoff period, which encompasses the months of April, May, June, and July. Atrazine violations in the Pawnee River watershed have been encountered only during the months of June and July. Of the eight samples collected at SC586 during these two months, there have been three violations observed. There are ten samples from SC585 during these two months, of which four of them have been over the criterion. There were a total of three samples collected from SC586 and six samples from SC585 during the months of April and May, all of which were below 3 ug/l.

Table 2. Summary of Monthly Atrazine samples at SC585 and SC586 (1990-2011).

Month	SC586 Atrazine Conc. Average (ug/L)	SC586 # of Samples > 3ug/L / Total Samples	SC586 Percent of Samples in Violation of Criterion	SC585 Atrazine Conc. Average (ug/L)	SC585 # of Samples > 3ug/L / Total Samples	SC585 Percent of Samples in Violation of Criterion
January	NA	0/0	0%	NA	0/0	0%
February	<0.3	0/2	0%	0.37	0/4	0%
March	<0.3	0/3	0%	0.33	0/5	0%
April	<0.3	0/2	0%	0.38	0/4	0%
May	<0.3	0/1	0%	1.25	0/2	0%
June	5.48	2/4	50%	11.58	3/5	60%
July	2.05	1/4	25%	5.13	1/5	20%
August	0.98	0/4	0%	1.22	0/5	0%
September	0.43	0/1	0%	0.59	0/1	0%
October	<0.3	0/2	0%	0.53	0/5	0%
November	<0.3	0/2	0%	0.46	0/3	0%
December	<0.3	0/1	0%	1.06	0/3	0%
Total	1.47	3/26	11.5%	2.49	4/42	9.5%

Figure 4. Monthly average atrazine concentrations at SC585 and SC586.



As seen in Figures 4 and 5, the atrazine concentrations during June and July are the highest. The maximum detection observed at station SC585 in June of 2010 is 26 ug/L and the maximum detection at SC586 is 15 ug/L from the June sample in 2009. Monthly concentration averages are higher at the downstream station, SC585. However, the data set for this station is more robust and some years with high levels of atrazine during the runoff season are not observed at both stations since one or the other may have only been sampled. The annual summary of the average atrazine concentrations at each station during the runoff period is illustrated in Figure 6. The recent trend indicates atrazine violations are becoming more frequent along with increasing concentrations.

Figure 5. Observed Atrazine concentrations by sampling month at SC585 and SC586.

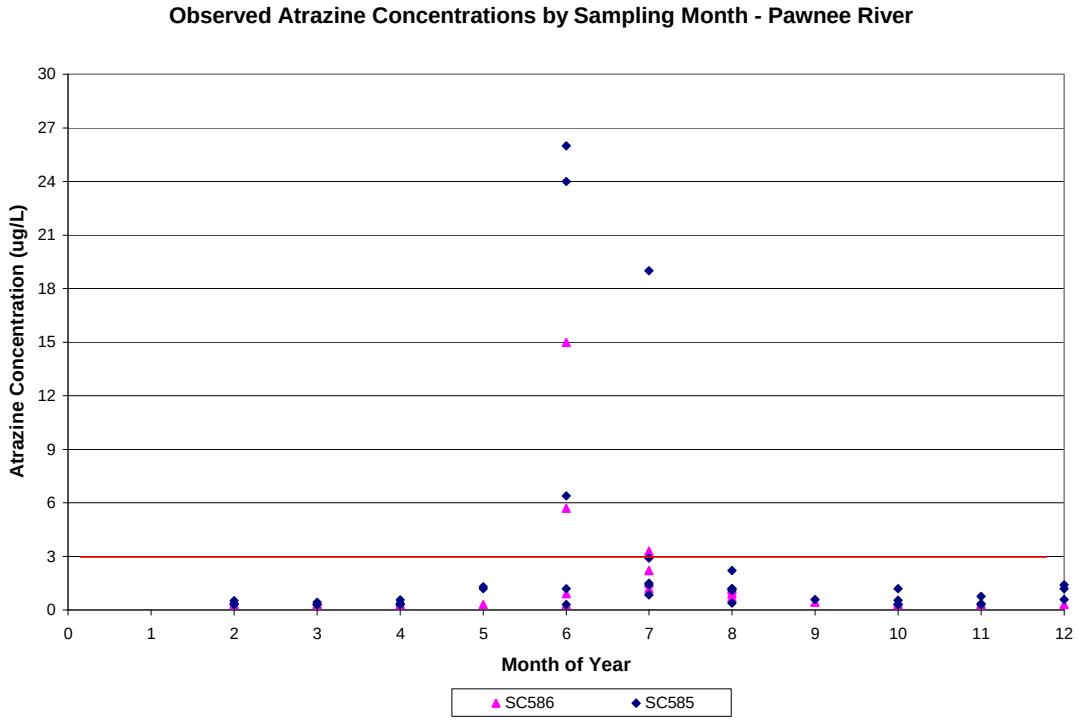


Figure 6. Atrazine concentrations for samples obtained in June and July at SC585 and SC586.

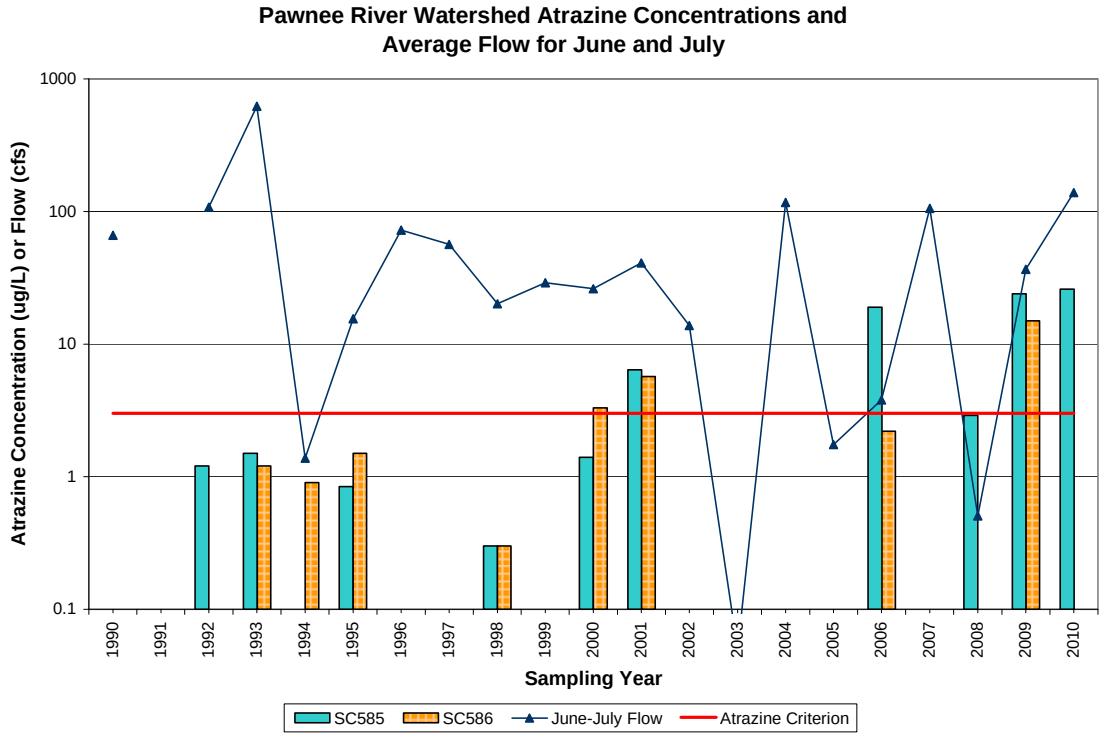
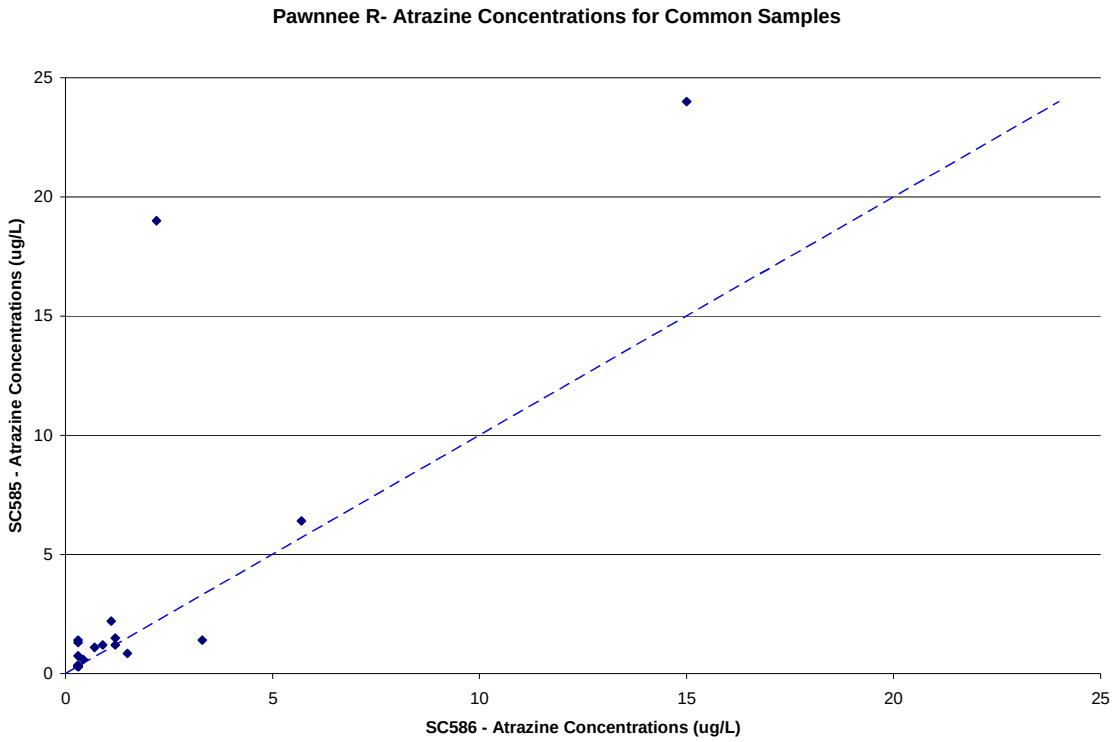


Figure 7 details the samples in the watershed that were collected on the same sampling date relative to a 1:1 ratio line. There are 25 common samples, of which ten of them are non-detect for both stations, 13 samples have higher concentrations at the downstream station SC585, and two samples have concentrations higher at the upstream station SC586. The average atrazine concentration of the common samples at SC585 is 2.65 ug/L and 1.5 ug/L at SC586.

Figure 7. Atrazine concentrations in the Pawnee River Watershed for samples collected on the same date at SC585 and SC586.



Desired Endpoints of Water Quality (Implied Load Capacity for Atrazine) in Pawnee River:

The ultimate endpoint for this TMDL will be to achieve the Kansas Water Quality Standards fully supporting aquatic life support and domestic water supply. The current standard of 3 *u*g/L for atrazine is the basis for this TMDL. Seasonal variation is considered by the TMDL by focusing on the elevated atrazine levels seen during the typical seasonal runoff period (June-July).

The following endpoints will define achievement of the water quality standards.

1. Atrazine concentrations will remain below 3 µg/L in the Pawnee River.
2. Peak atrazine concentrations will not exceed 170 *u*g/l.

3. Rolling annual average concentrations will remain below 3 *u*g/l along the Pawnee River.

The following milestones will determine interim progress toward achieving water quality standards along the river.

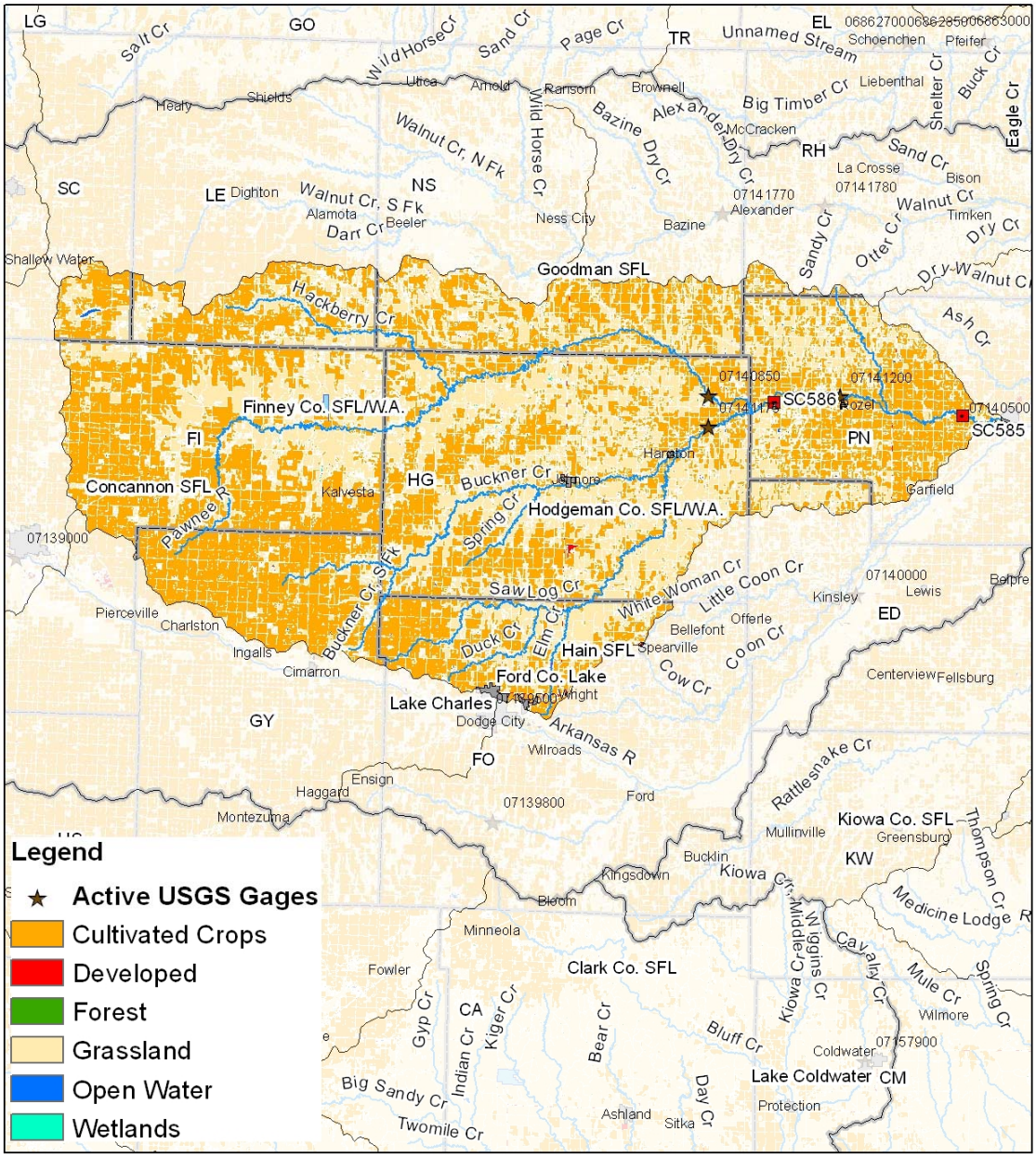
1. Any occasional digression of atrazine concentrations over 3 *u*g/l will be restricted to the June-July season.
2. Any occasional digression of atrazine concentration over 3 *u*g/l will be restricted to runoff conditions where flows exceed mean annual flow.

3.0 SOURCE INVENTORY AND ASSESSMENT:

The primary source of atrazine entering the Pawnee River watershed is attributed to the application of atrazine prior to rainfall events that lead to overland runoff of cropland during the months of April, May, June and July. Atrazine has been widely utilized since the 1960's for selective control of broadleaf and grass weeds in corn and grain sorghum. There is an economic value associated with the application of atrazine to specific crops. However, atrazine is highly soluble in water and is susceptible to removal from cropland during overland runoff events, which impacts water quality. The actual timing of atrazine application in each sub-watershed, the localized rainfall over each stream, the slope and soil conditions in each subwatershed and the impact of any pesticide Best Management Practice utilized by individual farmers complicates the true relation between rain and atrazine loading.

Land Use: The cover in the Pawnee River watershed includes 60% croplands, 36% grassland, 3% developed, and less than 1% of open water, wetlands, and forest. Landuse for Pawnee River watershed is detailed in Figure 8.

Figure 8. Landuse in the Pawnee River Watershed.



Point Sources: There are eight NPDES facilities within the Pawnee River watershed. Of these, three of them are permitted discharging facilities. Dodge City is the largest discharging facility, however this is a new facility that has not reported any discharge. This facility is also designed for effluent irrigation reuse. The facilities within the watershed are detailed in Table 3. Since atrazine is associated with agricultural nonpoint source pollution, point sources are not a source of impairment under this TMDL.

Table 3. NPDES facilities in the Pawnee River watershed.

Permit #	Federal NPDES #	Facility Name	Type	Receiving Stream	Design Flow (MGD)	Permit Expires
I-UA11-NP02	KSJ000481	Koch Nitrogen Co.	Non-Discharging	NA	NA	11/30/2012
I-UA11-NP04	KSJ000615	Darlings International	Non-Discharging	NA	NA	8/31/2015
M-UA06-NO01	KSJ000272	City of Burdett	Non-Discharging	NA	NA	5/31/2012
M-UA35-NO01	KSJ000255	City of Rozel	Non-Discharging	NA	NA	5/31/2012
M-UA43-NO01	KSJ000260	Wright Improvement District	Non-Discharging	NA	NA	7/31/2012
M-UA11-OO02	KS0099830	Dodge City	Mechanical, UV, Activated Sludge, Effluent Reuse	Duck Cr via Unnamed Trib	1.25	12/31/2014
M-UA17-OO01	KS0031143	City of Hanston	Mechanical	Buckner Cr	0.04	12/31/2011
M-UA21-OO02	KS0099562	City of Jemore	3-cell Lagoon	Buckner Cr	0.0942	12/31/2012

Livestock Waste Management Systems: There are 59 active certified or permitted confined animal feeding operations (CAFOs) within the Pawnee River watershed (see Appendix B). These facilities are designed to retain a 25-year, 24-hour rainfall/runoff event as well as an anticipated two weeks of normal wastewater from their operations. Typically, this rainfall event coincides with streamflow that occurs less than 1-5% of the time. Though the total potential number of animals is approximately 292,698 head in the watershed, the actual number of animals at the feedlot operations is typically less than the allowable permitted number. Livestock operations do not contribute to the atrazine impairment in the watershed.

According to the Kansas Agricultural Statistics, the estimated number of all cattle and cows for counties that are included within this watershed as of January 1, 2011 are as follows: 90,000 for Pawnee County; 84,000 for Hodgeman County; 260,000 for Finney County; 170,000 for Ford County; 31,000 for Ness County; 63,000 for Lane County; 250,000 for Gray County; 260,000 for Scott County; and 71,000 for Edwards County.

Contributing Runoff: The watershed of Pawnee River has a mean soil permeability value of 1.02 inches/hour according to the NRCS STATSGO database. According to a USGS open-file report (Juracek, 2000), the threshold soil-permeability values that represents very high, high, moderate, low, very low, and extremely low rainfall intensity, were set at 3.43, 2.86, 2.29, 1.71, 1.14, and 0.57"/hour, respectively. The lower rainfall intensities generally occur more frequently than the higher rainfall intensities. The higher soil-permeability thresholds imply a more intense storm during which areas with higher soil permeability potentially may contribute runoff. Runoff is chiefly generated as infiltration excess with rainfall intensities greater than the soil permeability As soil profiles become saturated, excess overland flow is produced. For the Pawnee River watershed, approximately 50% of the watershed will produce runoff with rainfall events that produce 1.14 inches/hour of rain. Over 93% of the entire watershed has a low soil permeability value that will produce runoff with rainfall events that produce 1.71 inches/hour of rain. Cropland runoff contributes to the atrazine impairment within the watershed.

County Agricultural Statistics: According to the United States Department of Agriculture National Agricultural Statistics Service, the number of acres that herbicides have been applied has significantly increased in Pawnee, Hodgeman, and Finney Counties since 1997. As seen in Figure 9, the acres that herbicides have been applied has increased 92% in Pawnee County, 161% in Hodgeman County, and 35% in Finney County from 1997 to 2007. In these counties, acres planted in corn have steadily increased as seen in Figure 10. As seen in Table 4, the acres planted in sorghum has remained relatively stable from 2004 through 2009 in the watershed and the acres planted in soybeans had a steady decline from 2004 through 2007 and then has increased in 2008 nearing the number of acres planted in 2004.

On-Site Waste Systems: Households outside of the municipalities that operate a wastewater treatment facility are presumably utilizing on-site septic systems. There are approximately 16,476 people living within the municipalities served by wastewater treatment facilities within the watershed, and therefore there are approximately 8,500 people within the watershed utilizing on-site septic systems. On-site septic systems are not a source contributing to the atrazine impairment within the Pawnee River watershed.

Figure 9. Number of acres where herbicides have been applied in the three primary counties within the watershed.

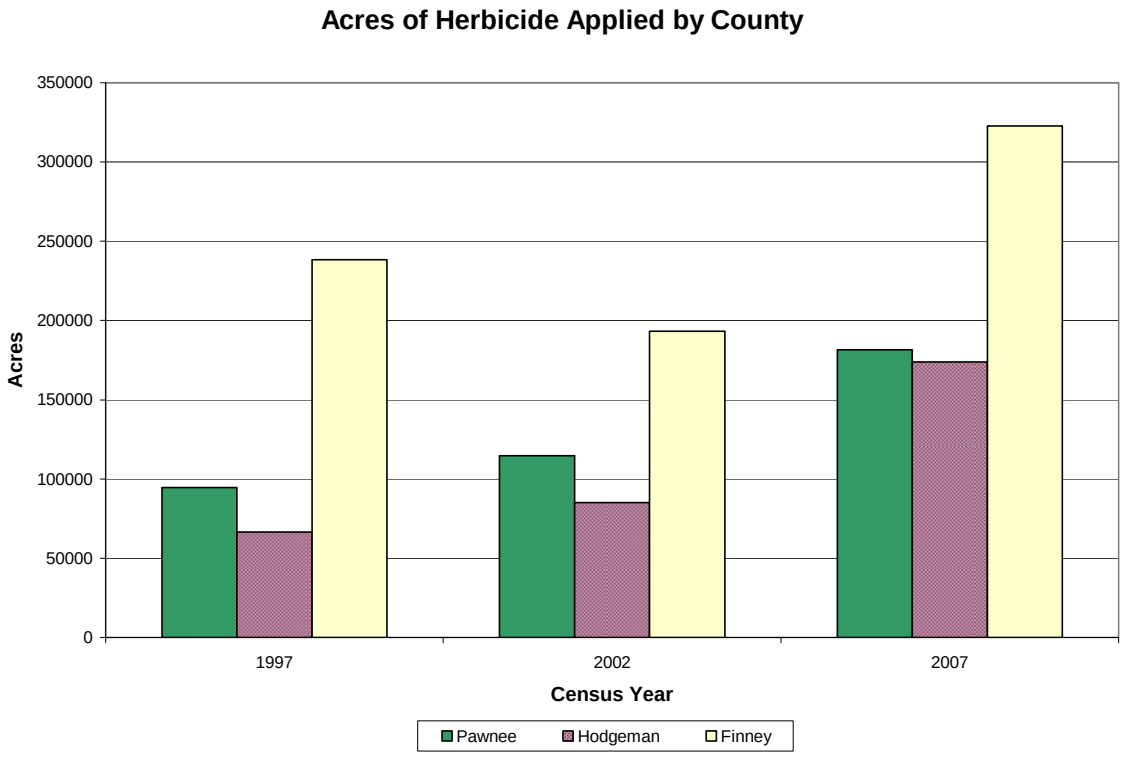


Figure 10. Corn Acres Planted in Pawnee, Hodgeman, and Finney Counties (USDA, 2006 through 2010).

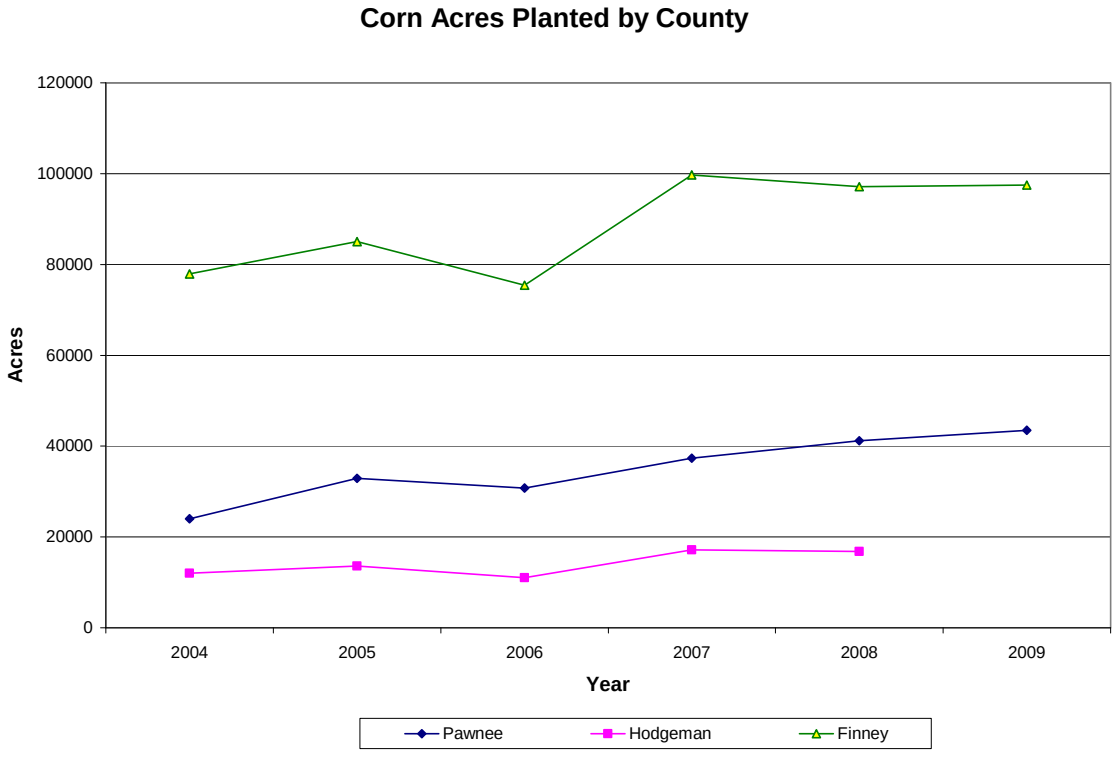


Table 4. Acres planted by year in Pawnee, Hodgeman, and Finney Counties (USDA, 2006 through 2010).

Survey Year	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Pawnee – Corn	24000	32900	30800	37400	41200	43500
Hodgeman- Corn	12000	13600	11000	17200	16800	
Finney- Corn	77900	85000	75400	99700	97100	97500
Pawnee – Sorghum	45300	45400	40500	49600	53400	50000
Hodgeman – Sorghum	20000	19400	28800	24400		
Finney – Sorghum	73300	68400	74400	75900	79200	74000
Pawnee – Soybeans	24500	19300	18800	14400	21400	21000
Hodgeman – Soybeans	2600	2000	2400	1100	NR	NR
Finney – Soybeans	20200	18500	16400	7600	NR	NR

NR = Not Reported

4.0 ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

The application and subsequent runoff of atrazine from cropland in the Pawnee River watershed is the primary factor for the elevated amounts of atrazine seen in the watershed, particularly in June and July.

Point Sources: Since this pollutant is associated with agricultural nonpoint source pollution, a Wasteload Allocation of zero will be assigned to point sources for atrazine under this TMDL.

Nonpoint Sources: The TMDL and load allocations are based on a load duration curve approach as seen in Figure 11 and 12. The estimated necessary average load reductions for the months of June and July are detailed in Table 5. Table 5 details the atrazine TMDL based on the monthly average streamflows over the period of record and compares these against the current monthly average atrazine concentrations and loads during the months within the runoff period. The months of June and July require reductions within this period for station SC585, along with the month of June for station SC586. The estimated necessary average load reduction for the combined June and July period is 64% for SC585 and 20% for SC586. Utilizing the flows for the months of June and July over the period of record, Figure 12 details the TMDL at the watershed outlet at SC585 for the critical period, in comparison to the annual TMDL.

Table 6 details the TMDL at the average annual flow conditions at SC585 and SC586 over the period of record, which applies to any give day annually. The Load Allocation at the average flow condition is 0.4301 lbs/day at SC585, which is located on the lower portion of Pawnee River segment 2. The Load Allocations under average flow conditions is 0.3528 lbs/day at SC586, which is located on the upper portion of Pawnee River

segment 2 with loads arriving from Pawnee River segment 3 and Buckner Creek segment 1.

Figure 11. Pawnee River Atrazine TMDL.

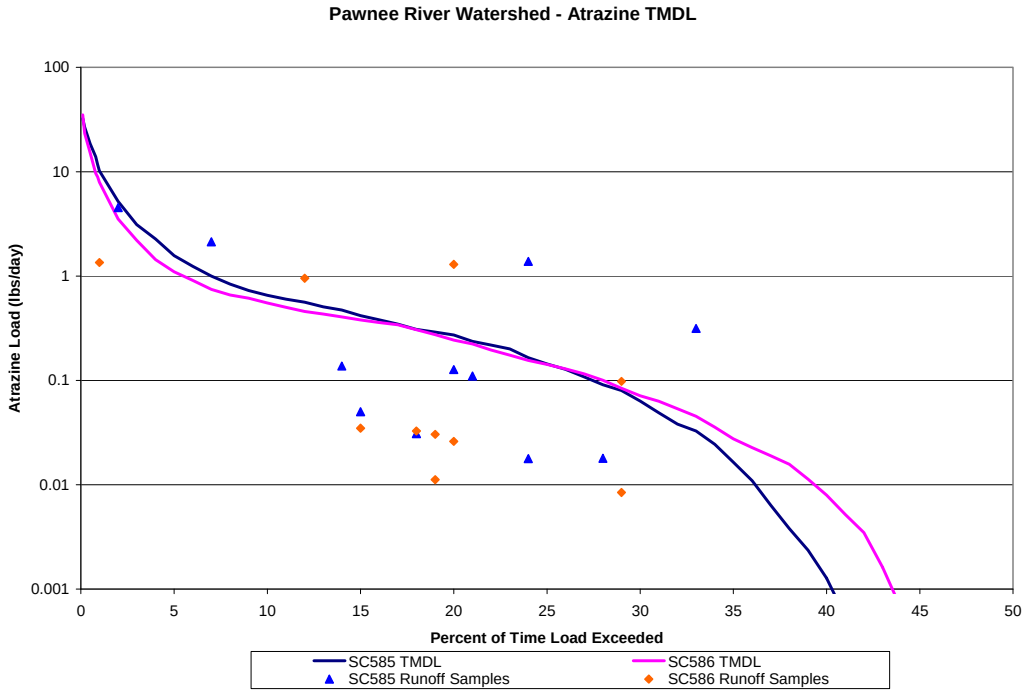


Figure 12. Pawnee River Atrazine TMDL at the watershed outle, SC585.

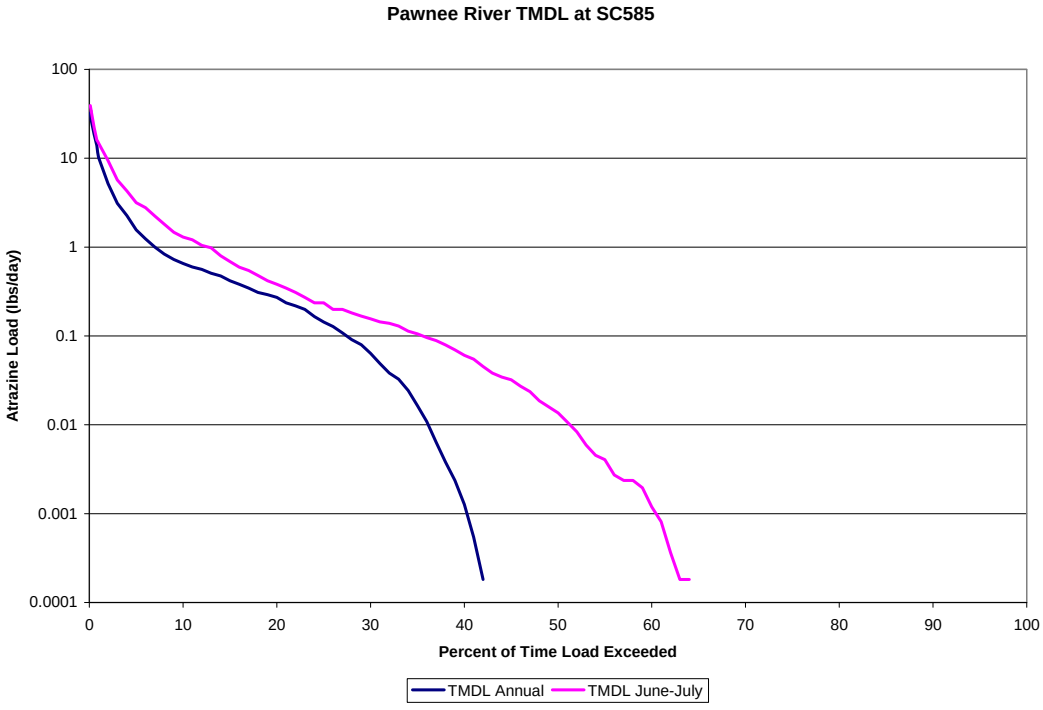


Table 5. Monthly Nonpoint source load reductions necessary to meet the atrazine TMDL (1995-2011).

Sampling Station	Month	Atrazine Average	Average Flow (cfs)	Avg. Load in lbs/day	TMDL (lbs/day)	Load Reduction (%)
SC585	June	11.58	50.5	3.16	0.82	74 %
	July	5.13	45.3	1.25	0.73	42 %
	June-July	**8.35**	**47.9**	**2.16**	**0.78**	**64%**
	Annual	**2.49**	**29.5**	**0.40**	**0.48**	**0%**
SC586	June	5.48	31.5	0.93	0.51	45 %
	July	2.05	51.1	0.57	0.83	0 %
	June-July	**3.76**	**41.5**	**0.84**	**0.67**	**20%**
	Annual	**1.47**	**24.2**	**0.19**	**0.39**	**0%**

Defined Margin of Safety: As detailed in Table 6, the margin of safety is 0.0478 lbs/day at SC585 and 0.0392 lbs/day at SC586 at average flows, which accounts for 10% of the respective atrazine loads at annual average flows.

Table 6. Pawnee River Atrazine TMDL (flow period 1995-2011).

Station / Percent Flow Exceedance	Flow (cfs)	Wasteload Allocation (lbs/day)	Load Allocation (lbs/day)	Margin of Safety (lbs/day)	TMDL (lbs/day)
SC585 – 40%	0.08	0	0.0011	0.0001	0.001
SC585 - 30%	3.93	0	0.0573	0.0064	0.064
SC585 – 20%	16.83	0	0.2454	0.0273	0.273
SC585 – 10%	40.39	0	0.5889	0.0654	0.654
SC585 - Average	29.50	0	0.4301	0.0478	0.478
SC586 – 40%	0.49	0	0.0072	0.0008	0.008
SC586 – 30%	4.40	0	0.0642	0.0071	0.071
SC586 – 20%	15.00	0	0.2187	0.0243	0.243
SC586 – 10%	34.03	0	0.4962	0.0551	0.551
SC586 - Average	24.2	0	0.3528	0.0392	0.392

State Water Plan Implementation Priority: The endpoints of this TMDL will likely be achieved if atrazine best management practices are implemented. Because of the recent trend of elevated atrazine concentrations seen in the Pawnee River watershed, this TMDL will be a **Medium** Priority for implementation.

Unified Watershed Assessment Priority Ranking: A portion of this watershed lies within the Buckner Subbasin with a priority ranking of 28 (Medium Priority for restoration work).

Priority Stream Segments: The priority focus should be the implementation within row crop adjacent to Pawnee River and its primary tributaries within the watershed.

5.0 IMPLEMENTATION

Desired Implementation Activities: The best way to reduce atrazine loading caused by agricultural practices is to ensure that Best Management Practices (BMPs) are being implemented within the watershed. In addition, it is important to educate the agricultural community on atrazine application rates, timing, alternatives, and label instructions. The Kansas State Extension Office has numerous publications available that will assist in the implementation of BMPs throughout the watershed.

1. Implement proper mix of pesticide application best management practices, including; soil incorporation, application timing and rates, split applications, reduced soil-applied rates, postemergence applications, band applications, alternative weed control methods and buffer zones.
2. Implement necessary best management practices at storage and handling sites.
3. Install necessary grass buffer strips along streams.
4. Ensure label compliance by applicators.

Implementation Programs Guidance

Nonpoint Source Pollution Technical Assistance-KDHE

a. Support Section 319 demonstration projects for reduction of atrazine runoff from corn and grain sorghum cropland.
b. Provide technical assistance on practices geared to the establishment of vegetative buffer strips.
c. Guide federal programs, such as the Environmental Quality Improvement Program & Conservation Security Program, to support installation of pesticide Best Management Practices to the cropland drained by the Pawnee River watershed.

Water Resource Cost Share & Nonpoint Source Pollution Control Programs- SCC:

a. Support installation of pesticide management sites for storage, mixing and handling of atrazine and other pesticides.
b. Support pesticide best management practices to minimize pesticide runoff.

Water Quality Standards – KDHE

a. Request EPA finalize its aquatic life criteria for atrazine.
b. Incorporate revised atrazine criteria into Kansas surface water quality standards once criteria are finalized by EPA.

Riparian Protection Program – SCC

a. Establish or re-establish natural riparian systems, including vegetative filter strips along small tributaries.
b. Develop riparian restoration projects in cropland areas.

Buffer Initiative Program – SCC

a. Install buffer strips along small streams.
b. Work in conjunction with Federal Conservation Reserve Enhancement Program and Conservation Security Program to hold marginal riparian land out of production.

Extension Outreach and Technical Assistance – Kansas State University

a. Educate corn and grain sorghum producers on pesticide management and effective BMPs that reduce atrazine runoff.
b. Provide technical assistance on buffer strip design, techniques to minimize cropland runoff and construction of pesticide handling pads.

Pesticide Management Program – Kansas Department of Agriculture

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) authorizes a State to regulate the sale or use of any federally registered pesticide in the State (FIFRA Section 24(a)). Under FIFRA, Kansas is authorized to initiate the process of making label changes on the use, application and provision of environmental protection of pesticides, if necessary to assure the attainment of the Water Quality Standard within this basin. The Kansas Department of Agriculture is the designated agency in Kansas that has pesticide management authority. Atrazine loads may be reduce through voluntary adoption of management practices. Among the activities promoted by the Kansas Department of Agriculture:

a. Implement pesticide bulk containment regulations.
b. Ensure label compliance by pesticide applicators
c. Harmonize product labels regarding use and protection measures
d. Implement any applicable provisions of the Atrazine Interim Reregistration Eligibility Decision by EPA
e. Continue basin pesticide education efforts through Kansas State and commodity associations.

Timeframe for Implementation: Pollutant reduction strategies and practices should be initiated by 2012 and continue through 2021.

Targeted Participants: The primary participants for implementation will be agricultural operations immediately adjacent to streams within the watershed that apply atrazine. Conservation district personnel and county extension agents should conduct a detailed assessment of sources adjacent to streams within the watershed over 2012. Implementation activities should target those areas with the corn and sorghum acreage that are located within a half mile of the streams within the watershed.

Milestone for 2016: In accordance with the TMDL development schedule for the State of Kansas, the year 2016 marks the next cycle of 303(d) activities in the Upper Arkansas Basin to review data from the Pawnee River watershed to assess improved conditions. Should the impairment continue, adjustments to source assessment, allocation, and implementation activities may occur.

Delivery Agents: The primary delivery agents for program participation will be the State Conservation Commission, the Kansas University Extension Service and the Kansas Department of Health and Environment. Ideally, implementation decisions and scheduling will be guided by planning documents prepared through WRAPS.

Reasonable Assurances:
Authorities: The following authorities may be used to direct activities in the watershed to reduce pollution.

1. K.S.A. 2-2439 empowers the Secretary of Agriculture to oversee pesticide management, registration and use in the state.

2. K.S.A. 2-2472 empowers the Secretary of Agriculture to establish Pesticide Management Areas to protect public health, safety, and welfare and the natural resources of the state from pesticide pollution.

3. K.S.A. 65-171d empowers the Secretary of KDHE to prevent water pollution and to protect the beneficial uses of the waters of the state through required treatment of sewage and established water quality standards and to require permits by persons having a potential to discharge pollutants into the waters of the state.

4. K.S.A. 2-1915 empowers the State Conservation Commission to develop programs to assist the protection, conservation and management of soil and water resources in the state, including riparian areas.

5. K.S.A. 75-5657 empowers the State Conservation Commission to provide financial assistance for local project work plans developed to control nonpoint source pollution.

6. K.S.A 82a-901, et seq. empowers the Kansas Water Office to develop a state water plan directing the protection and maintenance of surface water quality for the waters of the state.

7. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan*, including selected Watershed Restoration and Protection Strategies.

8. The *Kansas Water Plan* and the Upper Arkansas Basin Plan provide guidance to state agencies to coordinate programs intent on protecting water quality and

to target those programs to geographic areas of the state for high priority in implementation.

9. The Federal Insecticide, Fungicide and Rodenticide Act authorizes the state to initiate the process of making label changes on the use, application and provision of environmental protection of pesticides.

Funding: The State Water Plan Fund annually generates $16-18 million and is the primary funding mechanism for implementing water quality protection and pollutant reduction activities in the state through the *Kansas Water Plan*. The state water planning process, overseen by the Kansas Water Office, coordinates and directs programs and funding toward watersheds and water resources of highest priority. Typically, the state allocates at least 50% of the fund programs supporting water quality protection through the WRAPS program. This watershed and its TMDL are a Low Priority consideration.

Effectiveness: The key to effectiveness in reducing atrazine levels in the Pawnee River watershed will be determined by the participation of corn and grain sorghum producers in the watershed to reduce inputs, particularly during the application window of wet weather in June and July.

6.0 MONTITORING

KDHE will continue to collect samples through 2021 at the permanent stations SC585 and SC586 on the Pawnee River on a quarterly basis every year. To determine if atrazine is below the criterion the majority of the time, KDHE will assess data and determine if less than 10% of the samples taken in June and July are over 3 *u*g/l in Pawnee River.

7.0 FEEDBACK

Public Notice: An active internet website was established at http://www.kdheks.gov/tmdl/index.htm to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Upper Arkansas Basin.

Public Hearing: A Public Hearing on the Upper Arkansas River Basin TMDLs was held in Garden City on September 20, 2012 to receive comments. No comments were received at the hearing.

Basin Advisory Committee: The Upper Arkansas River Basin Advisory Committee met to discuss these TMDLs on April 4, 2012 in Jetmore and September 20, 2012 in Garden City.

Milestone Evaluation: In 2016, evaluation will be made as to the degree of impairment continuing to occur within the watershed. Subsequent decisions will be made regarding the implementation approach, priority of allotting resources for implementation and the

need for additional or follow up implementation in this watershed at the next TMDL cycle for this basin in 2016 with consultation from local stakeholders and the BAC.

Consideration for 303(d) Delisting: Pawnee River will be evaluated for delisting under section 303(d), based on the monitoring data over 2012-2021. Therefore, the decision for delisting will come about in the preparation of the 2022-303(d) list. Should modifications be made to the applicable water quality criteria during the implementation period consideration for delisting, desired endpoints of this TMDL and implementation activities might be adjusted accordingly.

Incorporation into Continuing Planning Process, Water Quality, Management Plan and the Kansas Water Planning Process: Under the current version of the Continuing Planning Process, the next anticipated revision would come in 2012, which will emphasize implementation of WRAPS activities. At that time, incorporation of this TMDL will be made into the WRAPS. Recommendation of this TMDL will be considered in the Kansas Water Plan implementation decisions under the State Water Planning Process for Fiscal Years 2012-2021.

Rev April 18,, 2013

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Appendix A. Permitted and Registered CAFO Facilities in Pawnee River Watershed.

Permit	Facility County	Animal Totals	Type	WLA
A-UAFI-BA03	Finney	999.0	Beef	0
A-UAFI-C010	Finney	7500.0	Beef	0
A-UAFO-C004	Ford	9950.0	Beef	0
A-UAFO-C011	Ford	13500.0	Beef	0
A-UAGY-C005	Gray	49000.0	Beef	0
A-UAHG-C010	Hodgeman	3500.0	Beef	0
A-UAHG-BA06	Hodgeman	700.0	Beef	0
A-UAHG-B018	Hodgeman	999.0	Beef	0
A-UAHG-M001	Hodgeman	120.0	Dairy	0
A-UAHG-BA02	Hodgeman	500.0	Beef	0
A-UAHG-D001	Hodgeman	3940.0	Dairy,Beef	0
A-UAHG-B008	Hodgeman	900.0	Beef	0
A-UAHG-C003	Hodgeman	17000.0	Beef	0
A-UAHG-B015	Hodgeman	900.0	Beef	0
A-UAHG-C005	Hodgeman	2000.0	Beef	0
A-UAHG-B005	Hodgeman	990.0	Beef	0
A-UAHG-C004	Hodgeman	4950.0	Beef	0
A-UAHG-B002	Hodgeman	900.0	Beef	0
A-UAHG-B003	Hodgeman	950.0	Beef	0
A-UAHG-C001	Hodgeman	22000.0	Beef	0
A-UAPN-B008	Pawnee	750.0	Beef	0
A-UALE-B002	Lane	400.0	Beef	0
A-UAPN-B002	Pawnee	950.0	Beef	0
A-UAPN-B001	Pawnee	600.0	Beef	0
A-UAFI-BA06	Finney	500.0	Beef	0
A-UAHG-B006	Hodgeman	0.0	Beef	0
A-UAPN-B010	Pawnee	990.0	Beef	0
A-UAHG-BA18	Hodgeman	500.0	Beef	0
A-UAHG-B017	Hodgeman	999.0	Beef	0
A-UAGY-C011	Gray	6750.0	Beef	0
A-UAHG-B010	Hodgeman	600.0	Beef	0
A-UAHG-C011	Hodgeman	1500.0	Beef	0
A-UASC-C020	Scott	3500.0	Beef	0
A-UAHG-BA17	Hodgeman	500.0	Beef	0
A-UAHG-B004	Hodgeman	500.0	Beef	0
A-UANS-B001	Ness	900.0	Beef	0
A-UAHG-BA14	Hodgeman	800.0	Beef	0
A-UAGY-D002	Gray	16650.0	Dairy,Beef	0
A-UAFO-B009	Ford	900.0	Beef	0
A-UAGY-H001	Gray	38400.0	Swine	0
A-UAHG-C009	Hodgeman	13000.0	Beef	0
A-UAPN-BA05	Pawnee	999.0	Beef	0
N-UAHG-5779	Hodgeman	975.0	Beef	0
A-UAHG-BA15	Hodgeman	900.0	Beef	0
A-UAHG-B016	Hodgeman	600.0	Beef	0
A-UAHG-BA19	Hodgeman	900.0	Beef	0
A-UAFO-B007	Ford	999.0	Beef	0
A-UAHG-B009	Hodgeman	800.0	Beef	0
A-UAHG-B012	Hodgeman	999.0	Beef	0
A-UAGY-D001	Gray	48000.0	Dairy,Beef	0
A-UAHG-BA13	Hodgeman	990.0	Beef	0
A-UAFO-BA01	Ford	600.0	Beef	0
A-UAHG-B011	Hodgeman	999.0	Beef	0
A-UAFI-BA07	Finney	900.0	Beef	0
713	Hodgeman	950.0	Beef	0
A-UAHG-BA16	Hodgeman	400.0	Beef	0
A-UAPN-B009	Pawnee	900.0	Beef	0
A-UANS-BA05	Ness	500.0	Beef	0
A-UAED-BA03	Edwards	300.0	Beef	0