NEOSHO BASIN TOTAL MAXIMUM DAILY LOAD

Waterbody: Shawnee Creek
Water Quality Impairment: Dissolved Oxygen

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Spring **County:** Cherokee

HUC 8: 11070207

HUC 11 (HUC 14s)**:** **160** (030)

Drainage Area: 60 square miles

Main Stem Segment: WQLS: 17 (Shawnee Creek) starting at confluence with the Spring River and traveling upstream to headwaters in north-central Cherokee County (**Figure 1**).

Tributary Segment: WQLS: Little Shawnee Creek (22)

Designated Uses: Expected Aquatic Life Support, Secondary Contact Recreation and Food Procurement for Main Stem Segment.

Expected Aquatic Life Support, Secondary Contact Recreation and Food Procurement on Little Shawnee Creek.

1998 303(d) Listing: Table 1 - Predominant Non-point Source and Point Source Impacts

Impaired Use: Expected Aquatic Life Support

Water Quality Standard: Dissolved Oxygen (DO): 5 mg/L (KAR 28-16-28e(c)(2)(A))

2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Level of Support for Designated Use under 1998 303(d): Not Supporting Aquatic Life

Monitoring Sites: Station 569 near Crestline

Period of Record Used: 1990, 1994 and 1998 for Station 569; 2000 and 2001 Kansas Biological Survey Data (**Figure 2**)

Flow Record: Lightning Creek near McCune (USGS Station 07184000) matched to Shawnee Creek watershed via estimated runoff from Cherry Creek near Chetopa (USGS 07184240).

Long Term Flow Conditions: 10% Exceedence Flows = 72 cfs**,** 95% = 0.23 cfs

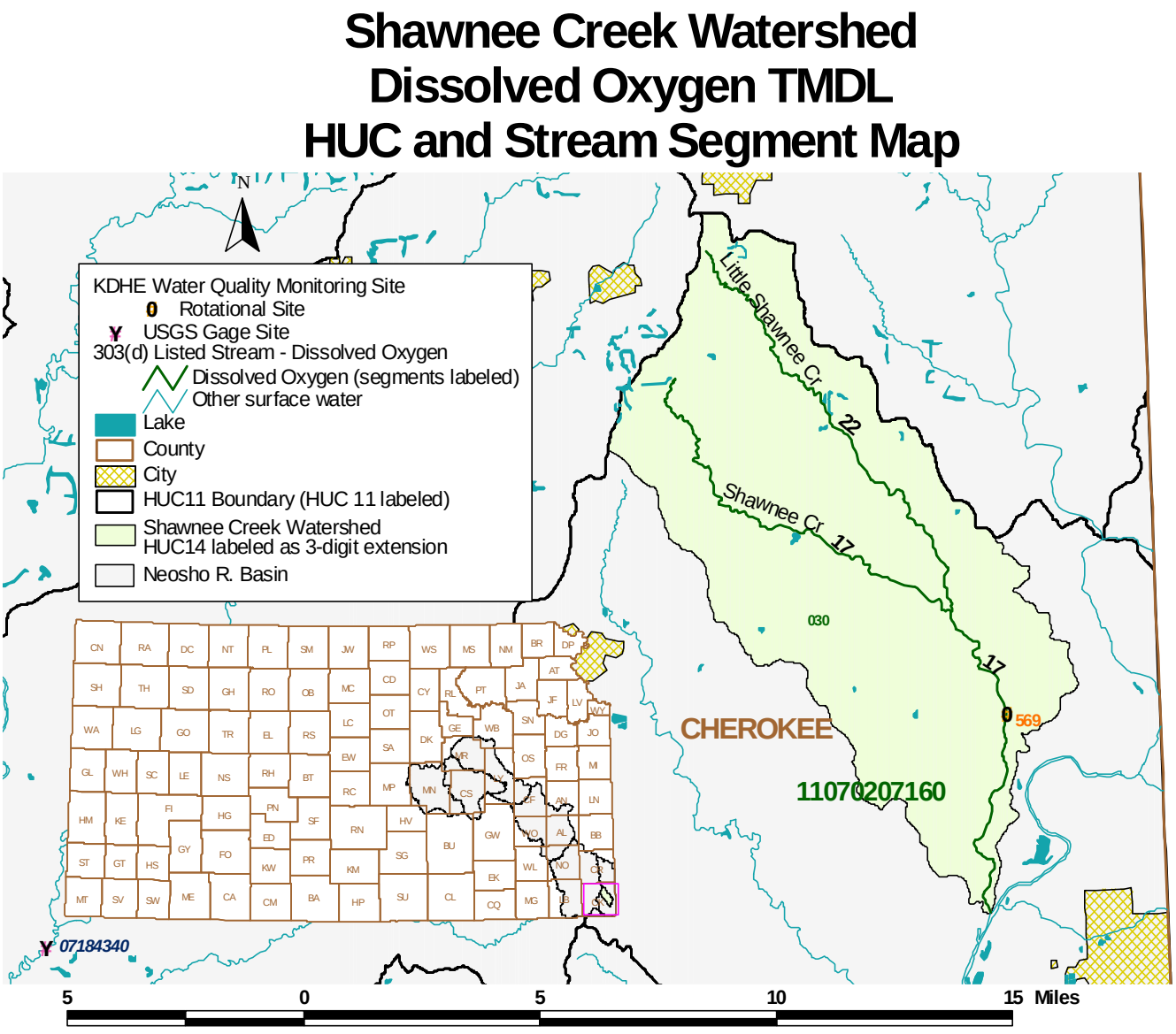


Figure 1

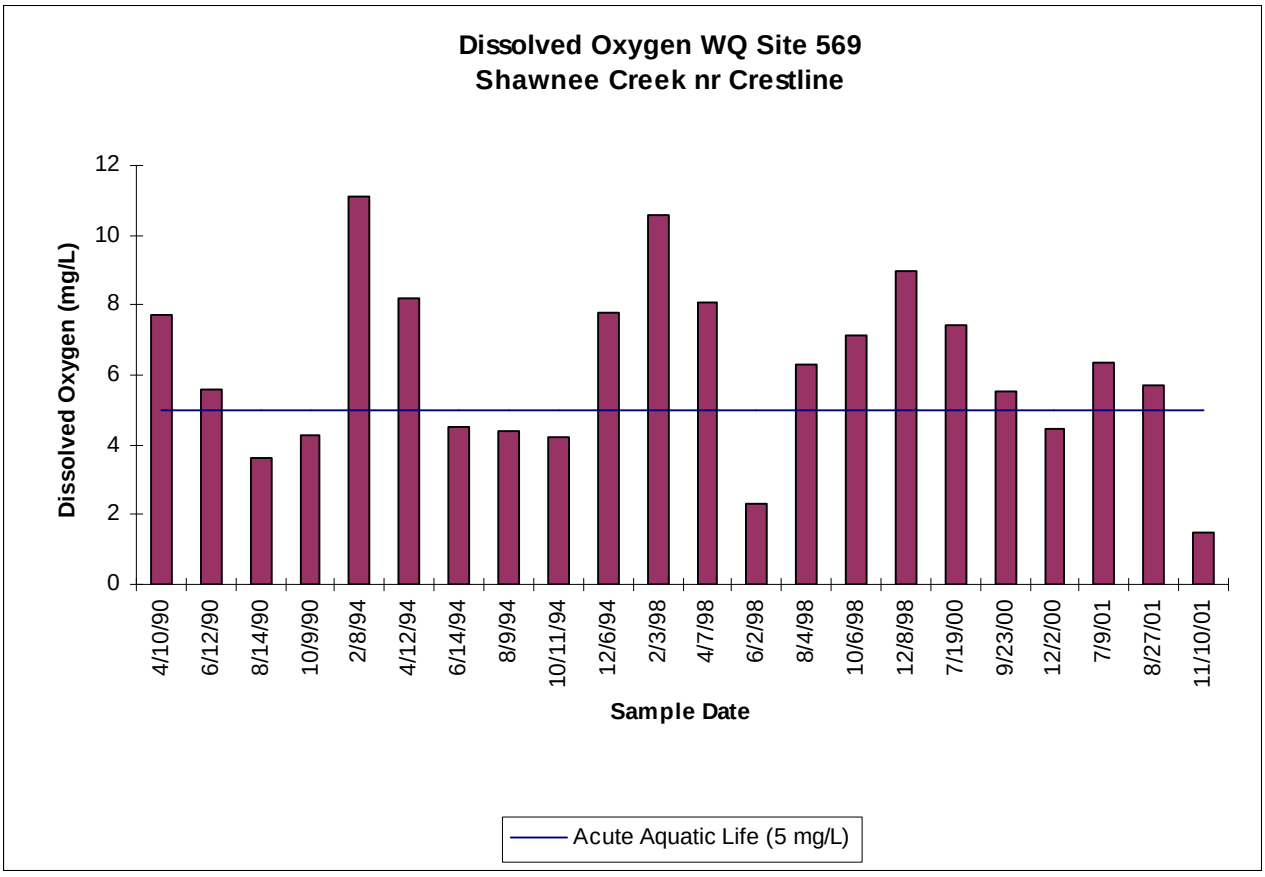


Figure 2

Current Conditions: Since loading capacity varies as a function of the flow present in the stream, this TMDL represents a continuum of desired loads over all flow conditions, rather than fixed at a single value. Sample data for the sampling site were categorized for each of the three defined seasons: Spring (Apr-Jul), Summer-Fall (Aug-Oct) and Winter (Nov-Mar). High flows and runoff equate to lower flow durations; baseflow and point source influences generally occur in the 75-99% range. Load curves were established for the Aquatic Life criterion by multiplying the flow values for Shawnee Creek near Crestline along the curve by the applicable water quality criterion and converting the units to derive a load duration curve of pounds of DO per day. This load curve graphically displays the TMDL since any point along the curve represents water quality at the standard at that flow. Historic excursions from water quality standards (WQS) are seen as plotted points *below* the load curves. Water quality standards are met for those points plotting *above* the applicable load duration curves (**Figure 3**).

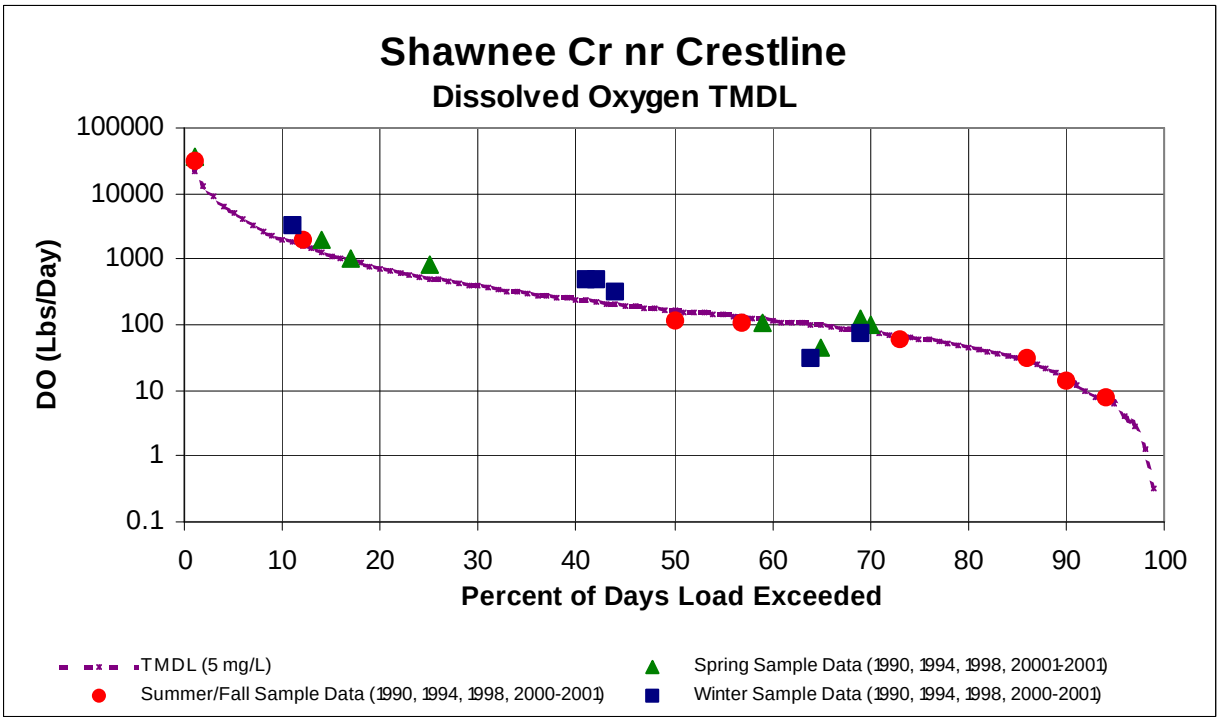


Figure 3

Excursions were seen in each of the three defined seasons and are outlined in **Table 1**. Fifty percent of the Summer-Fall samples and 25% of Spring samples were below the aquatic life criterion. Thirty three of the Winter samples were under the aquatic life criterion. Overall, 36% of the samples were under the criterion. This would represent a baseline condition of non-support of the impaired designated use.

No DO violations have been encountered at flows exceeding 6.0 cfs on Shawnee Creek near Crestline, therefore a critical low flow can be identified on Shawnee Creek as those flows of 6.0 cfs or less.

Table 1
NUMBER OF SAMPLES UNDER DISSOLVED OXYGEN STANDARD OF 5 mg/L BY FLOW

Station	Season	0 to 10%	10 to 25%	25 to 50%	50 to 75%	75 to 90%	90 to 100%	Cum Freq.
Shawnee Creek near Crestline (569)	Spring	0	0	0	2	0	0	2/8 = 25%
	Summer	0	0	0	3	0	1	4/8 = 50%
	Winter	0	0	0	2	0	0	2/6 = 33%

A watershed comparison approach was taken in developing this TMDL. The Lightning Creek watershed (Water Quality Sampling Site 565 in the watershed was not impaired by low DO) and

the Cow Creek watershed (Water Quality Site 567 in the watershed was also unimpaired by DO) have roughly similar land use characteristics (**see Table 2 in Appendix**) to the Shawnee Creek watershed, and are both located north of the Shawnee Creek watershed. The primary difference between Shawnee Creek and the reference watersheds is drainage area and resulting contributions to baseflow under extended periods of little precipitation. Both reference watersheds are almost four times as large as the Shawnee Creek watershed. Lightning Creek is not located in the mined land area but, like Shawnee Creek, does not have any large point sources contributing to it. Cow Creek, like Shawnee Creek, is located in the mined land area, but has a significant point source contributing to it.

The relationship of DO to ammonia, biochemical oxygen demand (BOD), fecal coliform bacteria (FCB), water temperature, turbidity, nitrate, phosphorus, pH and total suspended solids (TSS) were used in the comparison. **Table 3 in the Appendix** outlines those water quality data for the samples taken on the same date for all three sites. **Table 4 in the Appendix** is the subset of data from Table 3 for those sample dates when DO was below the aquatic life criterion for sample site 569. DO was not an issue for either reference site. From Table 4, comparing site 569 to reference site 565, the average ammonia and nitrate were higher than the reference site 565, while BOD, FCB, temperature, turbidity, phosphorus were similar. Comparing 569 to reference site 567 (Table 4), which has a significant point source contributing to it, the average ammonia, BOD, FCB, temperature, turbidity, phosphorus were about same. As expected, nitrate and phosphorus were lower at site 569. Average pH was consistently lower at site 569. From this it appears that it is most likely that low flow is the primary factor influencing DO violations in the Shawnee Creek watershed.

Desired Endpoints of Water Quality at Site 569 over 2007 - 2011

The ultimate endpoint for this TMDL will be to achieve the Kansas Water Quality Standard of 5 mg/l to fully support Aquatic Life.

Seasonal variation is accounted for by this TMDL, since the TMDL endpoint is sensitive to the low flow conditions, usually occurring in the Summer and Fall seasons.

This endpoint will be reached as a result of expected, though unspecified, improvements in tributary buffer strip conditions which will filter sediment before reaching the stream and stream morphology assessments which will be used to determine if enhancement to reaeriation of flow within the stream is needed. Improvements to buffer strip conditions will result from implementation of corrective actions and Best Management Practices, as directed by this TMDL. Achievement of this endpoint will provide full support of the aquatic life function of the creek and attain the dissolved oxygen water quality standard.

Since BOD is not considered a factor in the occasional DO excursion at this site, the BOD target will be to maintain the historical average in stream BOD of 3.3 mg/L or less at the sampling site.

3. SOURCE INVENTORY AND ASSESSMENT

NPDES: There are no NPDES permitted facilities in the watershed upstream of Site 569.

Livestock Waste Management Systems: Four operations are registered, certified or permitted within the watershed. These facility types are turkey or swine and are located on the west side of the watershed (**Figure 4**). All permitted livestock facilities have waste management systems designed to minimize runoff entering their operations or detaining runoff emanating from their areas. Such systems are designed for the 25 year, 24 hour rainfall/runoff event, which typically coincide with stream flows exceeded less than 1 - 5 % of the time. NPDES permits, also non-discharging, are issued for facilities with more than 1,000 animal units. None of the facilities in the watershed are of this size. Total potential animal units for all facilities in the watershed is 2,166. The actual number of animal units on site is variable, but typically less than potential numbers.

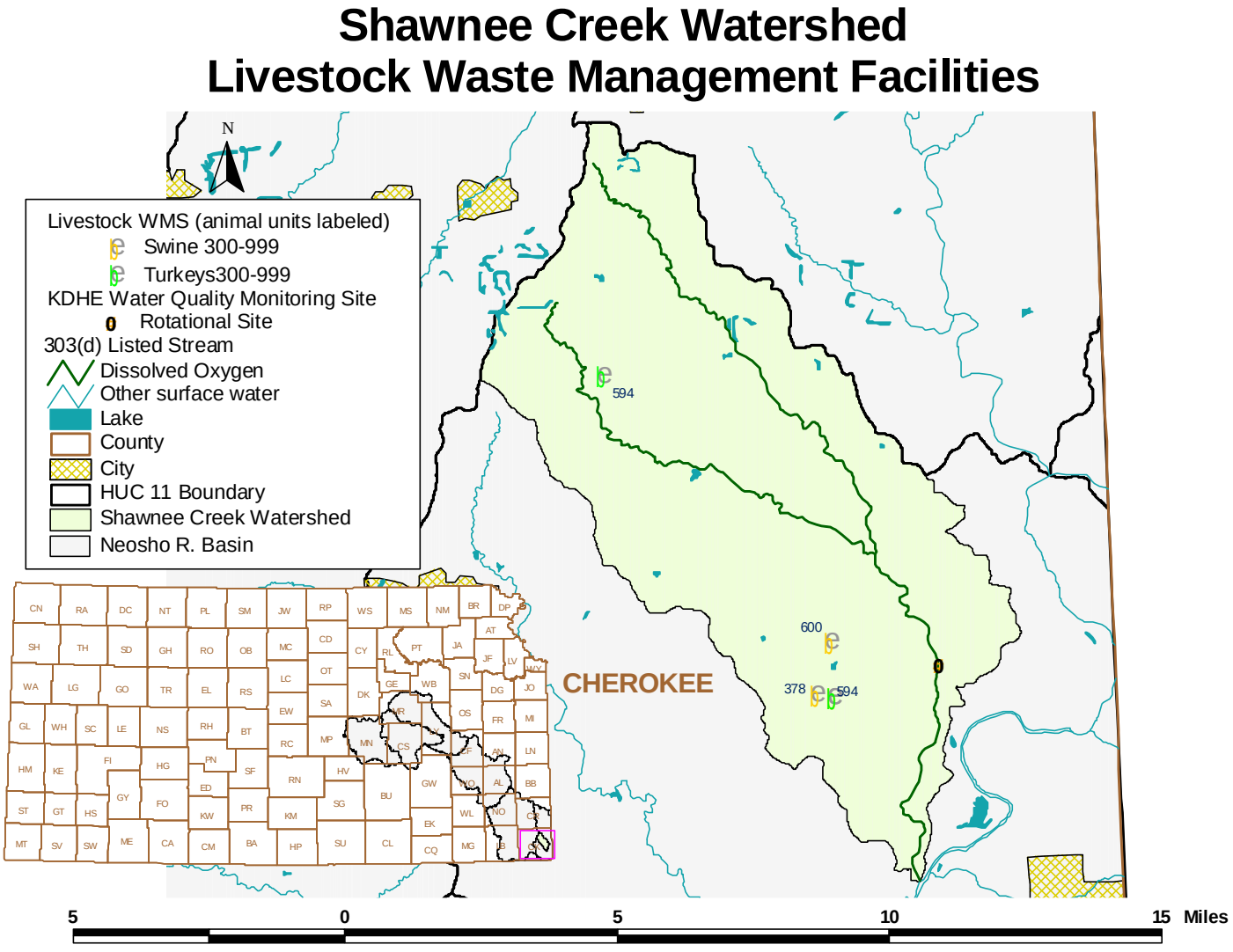
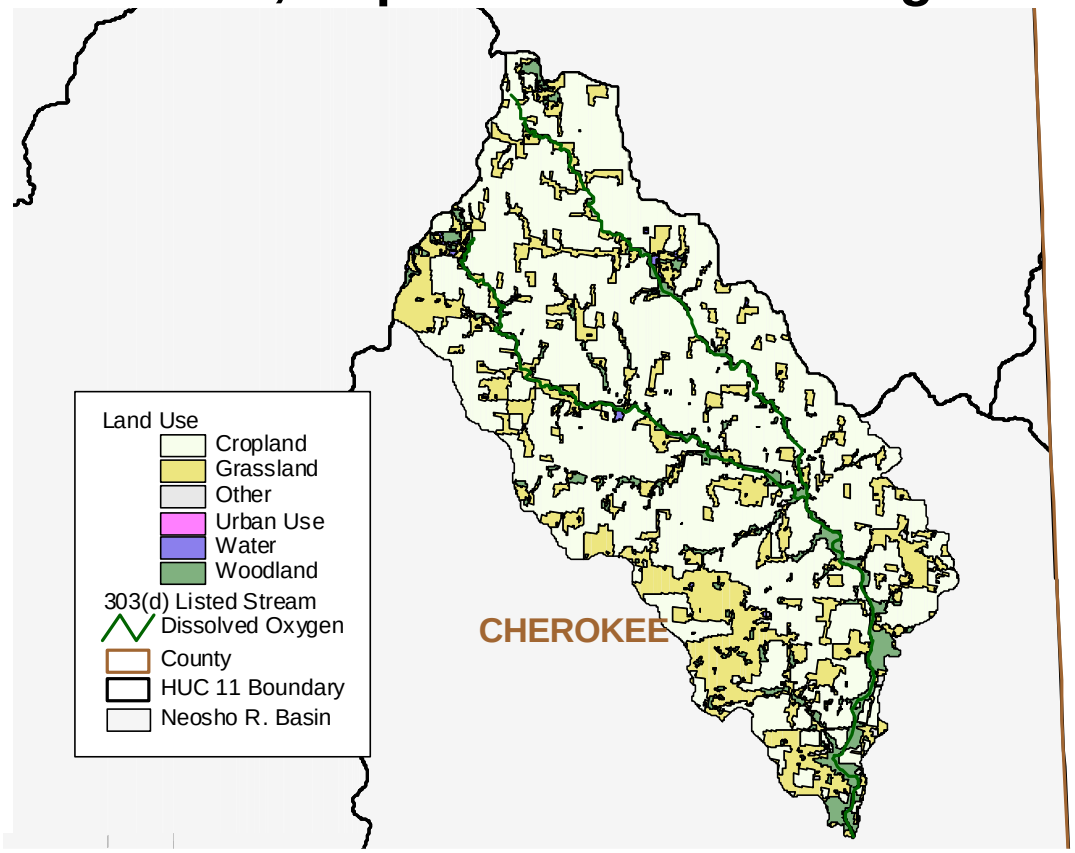
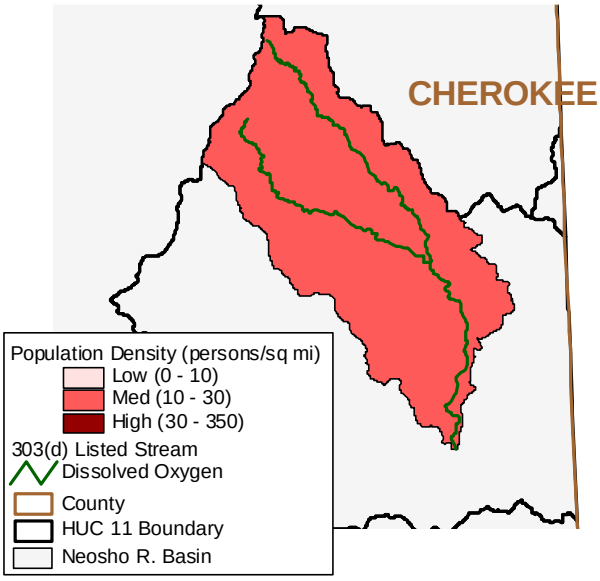


Figure 4

Shawnee Creek Watershed
Land Use, Population and Grazing Density





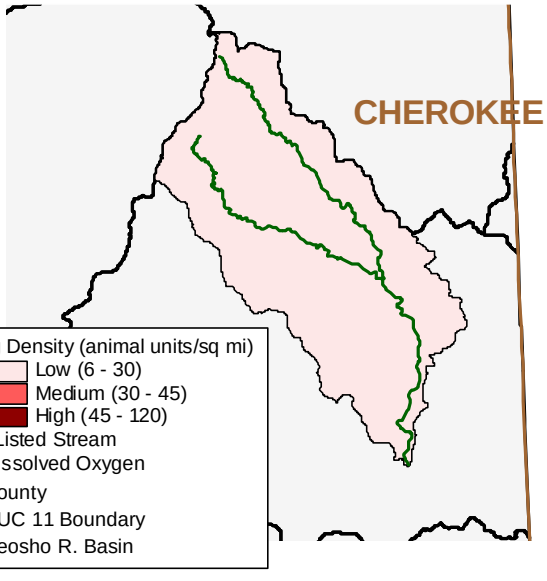


Figure 5

Land Use: Most of the watershed is cropland (70% of the area), grassland (23%), or woodland (7%). The grazing density estimate is fairly low for the watershed when compared to densities elsewhere in the Neosho Basin (28 animal units/mi^2) (**Figure 5 and Table 2 in Appendix**).

On-Site Waste Systems: The watershed's population density is average in the upper half for the watershed when compared to densities elsewhere in the Neosho Basin (25 person/mi^2) (**Figure 5**). The rural population projection for Cherokee County through 2020 shows slight to significant growth (27% increase). While failing on-site waste systems can contribute oxygen demanding substance loadings, their impact on the impaired segments is generally limited, given the small size of the rural population and magnitude of other sources in the watershed.

Background Levels: Some organic enrichment may be associated with environmental background levels, including contributions from wildlife and stream side vegetation, but it is likely that the density of animals such as deer is fairly dispersed across the watershed and that the loading of oxygen demanding material is constant along the stream. In the case of wildlife, this loading should result in minimal loading to the streams below the levels necessary to violate the water quality standards. In the case of stream side vegetation, the loading should be greater toward the middle third of the watershed with its larger proportion of woodland near the stream.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

BOD is a measure of the amount of oxygen required to stabilize organic matter in a stream. As such, BOD is used as a benchmark measure to anticipate DO levels while it measures the total concentration of DO that will be demanded as organic matter degrades in a stream. It is presumed that the maintenance of historical BOD loads with improvements to tributary buffers and any stream restoration projects cited by local assessments will reduce DO excursions under certain critical flow conditions. Therefore, any allocation of wasteloads and loads will be made in terms of BOD.

This is a phased TMDL. Additional monitoring over time will be needed to further ascertain the relationship between enhancements in stream restoration and tributary buffer strip conditions which should filter sediment before reaching the stream, reduce sediment oxygen demand and consequently improve DO levels during the critical flow periods of concern. In Phase One of this TMDL the following allocations apply:

Point Sources: A current Wasteload Allocation of zero is established by this TMDL because of the lack of point sources located upstream of monitoring site 569. Should future point sources be proposed in the watershed and discharge into the impaired segments, the current Wasteload Allocation will be revised by adjusting current load allocations to account for the presence and impact of these new point source dischargers (**Figure 6**).

Non-Point Sources: Again, because the indications that low flow is the driving factor causing the occasional excursion from the water quality standard rather than BOD, non-point sources are not seen as a significant source of DO excursion in the watershed. The Load Allocation assigns responsibility for maintaining the historical average in-stream BOD levels at site 569 to 3.3 mg/L

across all flow conditions (**Figure 6**).

To address any artificial sources factoring into the DO violations outlined in **Table 4 of the Appendix** at water quality sampling site569, buffer strips should be installed on directly contributing tributaries to filter sediment before reaching the stream.

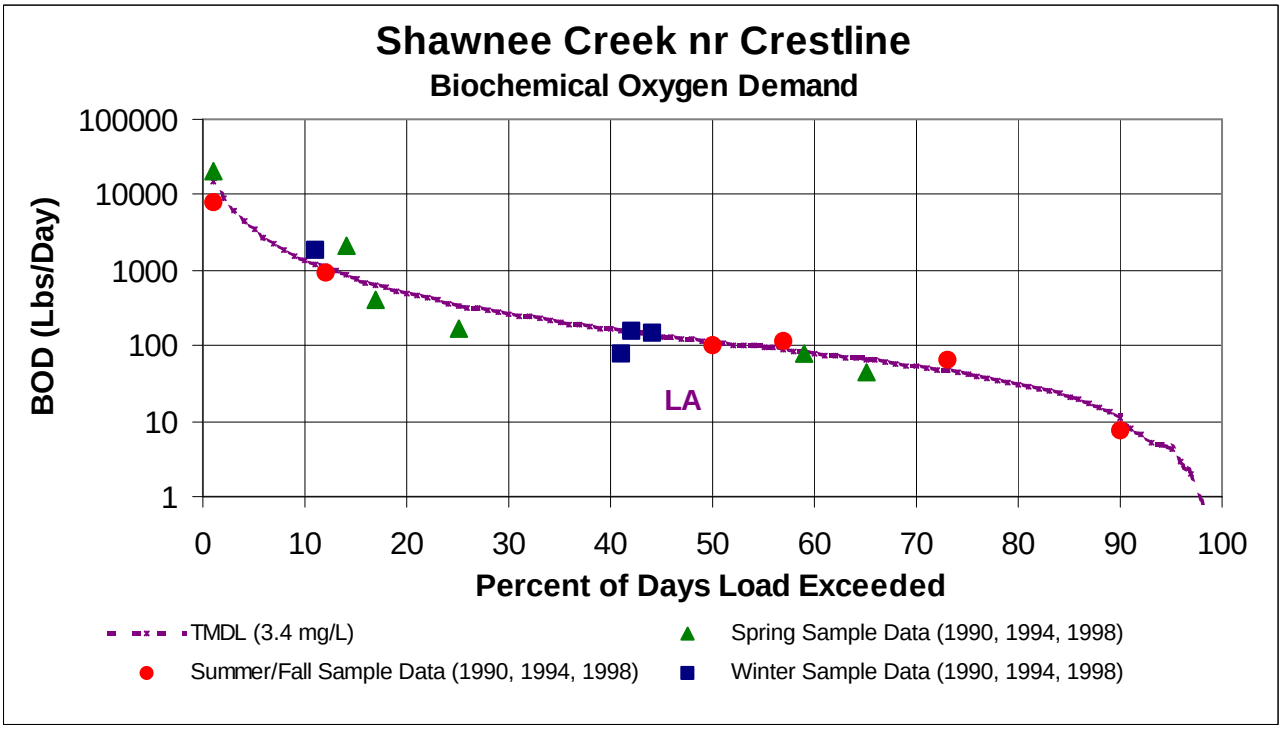


Figure 6

Defined Margin of Safety: The Margin of Safety will be implied based on conservative assumptions used to set the target BOD concentration, since sampling data indicates exceeding this value has seldom led to a dissolved oxygen violation.

State Water Plan Implementation Priority: Because this watershed has indicated some problem with dissolved oxygen which has short term and immediate consequences for aquatic life, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Spring River Basin (HUC 8: 11070207) with a priority ranking of 16 (High Priority for restoration work).

Priority HUC 11s and Stream Segments: Priority should be directed toward baseflow gaining stream segments along the main stem of Shawnee Creek (17) including tributary Little Shawnee Creek (22).

5. IMPLEMENTATION

Desired Implementation Activities

1. Conduct stream morphology review
2. Where needed, create/restore buffer strips along contributing tributaries.

Implementation Programs Guidance

Stream Restoration Program - SCC

a. Conduct a stream morphology evaluation along the stream reaches in the vicinity of the monitoring station.
b. Assess the degree to which sediment is altering stream flow patterns in the channel, including reducing slopes and aeration capability along the stream bed.
c. Ascertain probable sources of sediment deposition in stream, should it be a primary factor in influencing stream aeration or exerting oxygen demand.
d. Plan, design and install stream restoration measures which will restore stream flow conveyance and sediment transport capability to the target stream reaches.

Buffer Initiative Program - SCC

a. Install grass buffer strips near streams.

Timeframe for Implementation: Stream morphology assessments/restoration measures and buffer strips should be installed on main steam and directly contributing tributaries over the years 2003-2007.

Targeted Participants: Primary participants for implementation will be landowners immediately adjacent to the listed stream segments. Implemented activities should be targeted to those stream segments with greatest potential contribution to baseflow. Nominally, this would be most likely be :

1. Unbuffered cropland adjacent to contributing tributaries.
2. Unstable stream banks and modified channels.

Some inventory of local needs should be conducted in 2003 to identify such activities. Such an inventory would be done by local program managers with appropriate assistance by commodity representatives and state program staff in order to direct state assistance programs to the principal activities influencing the quality of the streams in the watershed during the implementation period of this TMDL.

Milestone for 2007: The year 2007 marks the mid-point of the ten year implementation window for the watershed. At that point in time, milestones should be reached which will have at least two-thirds of the landowners responsible for buffer strip restoration or stream restoration measures, cited in the local assessment, participating in the implementation programs provided by the state.

Delivery Agents: The primary delivery agents for program participation will be the conservation districts for programs of the State Conservation Commission and the Natural Resources Conservation Service. Producer outreach and awareness will be delivered by Kansas State County staff managing.

Reasonable Assurances:

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

1. K.S.A. 65-164 and 165 empowers the Secretary of KDHE to regulate the discharge of sewage into the waters of the state.

2. 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.

3. K.A.R. 28-16-69 to -71 implements water quality protection by KDHE through the establishment and administration of critical water quality management areas on a watershed basis.

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 non-point 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.*

8. The *Kansas Water Plan* and the Neosho Basin Plan provide the 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.

Funding: The State Water Plan Fund, annually generates $16-18 million and is the primary funding mechanism for implementing water quality protection and pollution 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 to programs

supporting water quality protection. This TMDL is a High Priority consideration.

Effectiveness: Buffer strips are touted as a means to filter sediment before it reaches a stream and riparian restoration projects have been acclaimed as a significant means of stream bank stabilization. The key to effectiveness is participation within a finite subwatershed to direct resources to the activities influencing water quality. The milestones established under this TMDL are intended to gauge the level of participation in those programs implementing this TMDL.

Should participation significantly lag below expectations over the next five years or monitoring indicates lack of progress in improving water quality conditions from those seen over 1990, 1994 and 1998 the state may employ more stringent conditions on agricultural producers and urban runoff in the watershed in order to meet the desired endpoints expressed in this TMDL. The state has the authority to impose conditions on activities with a significant potential to pollute the waters of the state under K.S.A. 65-171. If overall water quality conditions in the watershed deteriorate, a Critical Water Quality Management Area may be proposed for the watershed, in response.

6. MONITORING

KDHE will continue to collect bimonthly samples at rotational Station 569 in 2006 including dissolved oxygen samples, in order to assess progress and success in implementing this TMDL toward reaching its endpoint. Should impaired status remain, the desired endpoints under this TMDL will be refined and more intensive sampling may need to be conducted under specified lower flow conditions over the period 2007-2011. Use of the real time flow data available at the Lightning Creek near McCune stream gaging station can help direct these sampling efforts.

A stream restoration review will be conducted in 2004 by the State Conservation Commission to evaluate Shawnee Creek in terms of morphology and sediment impacts on stream flow patterns and its effect on aeration within the stream as outlined in the implementation guidance.

Local program management needs to identify its targeted participants of state assistance programs for implementing this TMDL. This information should be collected in 2003 in order to support appropriate implementation projects.

7. FEEDBACK

Public Meetings: Public meetings to discuss TMDLs in the Neosho Basin were held January 9, 2002 in Burlington and March 4, 2002 in Council Grove. An active Internet Web site was established at http://www.kdhe.state.ks.us/tmdl/ to convey information to the public on the general establishment of TMDLs and specific TMDLs for the Neosho Basin.

Public Hearing: Public Hearings on the TMDLs of the Neosho Basin were held in Burlington and Parsons on June 3, 2002.

Basin Advisory Committee: The Neosho Basin Advisory Committee met to discuss the TMDLs in the basin on October 2, 2001, January 9 and March 4, 2002.

Milestone Evaluation: In 2007, evaluation will be made as to the degree of implementation which has occurred within the watershed and current condition of Shawnee Creek. Subsequent decisions will be made regarding the implementation approach and follow up of additional implementation in the watershed.

Consideration for 303(d) Delisting: The creek will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2007-2011. Therefore, the decision for delisting will come about in the preparation of the 2012 303(d) list. Should modifications be made to the applicable water quality criteria during the ten year implementation period, consideration for delisting, desired endpoints of this TMDL and implementation activities may 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 will come in 2003 which will emphasize implementation of TMDLs. At that time, incorporation of this TMDL will be made into both documents. Recommendations of this TMDL will be considered in *Kansas Water Plan* implementation decisions under the State Water Planning Process for Fiscal Years 2003-2007.

Appendix (Shawnee Creek DO TMDL)

Table 2

Shawnee Cr Watershed (569)			Cow Creek Watershed (567)			Lightning Creek Wtrshd (565)		
Land Use	Acres	% of Total	Land Use	Acres	% of Total	Land Use	Acres	% of Total
Cropland	26729	69.5	Cropland	75305	50.6	Cropland	83779	56.1
Grassland	8880	23.1	Grassland	49512	33.3	Grassland	49647	33.2
Urban Use	64	0.2	Urban Use	3120	2.1	Urban Use	1626	1.1
Water	170	0.4	Water	2878	1.9	Water	3174	2.1
Woodland	2604	6.8	Woodland	17865	12.0	Woodland	11168	7.5
Total	38448	100	Total	148681	100	Total	149393	100

Table 3

COL_DATE	DISOXY			AMMONIA			BOD			FECCOLI			NITRATE			PHFIELD			TEMP_CENT			PHOSPHU			TSS			TURBIDITY			FLOW
	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569
4/10/90	7.7	7.6	8.5	0.160	0.320	0.030	8.10	9.20	2.70	10000	8000	100	0.57	0.66	0.31	6.9	6.9	7.7	13	13	12	0.440	0.570	0.120	344	420	92	130	160	33	47.04
6/12/90	5.6	5.9	5.8	0.060	0.070	0.030	2.10	2.30	2.70	100	300	1300	0.39	0.62	0.47	6.7	7.1	7.6	23	22	23	0.130	0.120	0.210	44	66	120	45	178	61	35.04
8/14/90	**3.6**	7.2	9.9	0.080	0.080	0.020	3.10	4.00	2.20	600	130	110	0.03	0.73	0.00	7.0	7.6	8.3	22	22	29	0.160	0.220	0.180	8	56	211	13.9	15.2	54	6.00
10/9/90	**4.3**	5.9	11.1	0.090	0.150	0.010	2.30	3.00	2.30	420	2900	80	0.14	0.81	0.03	6.9	7.2	8.3	13	13	9	0.040	0.330	0.060	19	30	25	13.9	20	17.5	0.60
2/8/94	11.1	11.5	11.8	0.190	0.680	0.050	3.50	5.00	5.10	10	100	20	1.15	0.57	0.39	7.0	7.4	7.8	0	0	0	0.050	0.310	0.050	10	12	18	19.6	8	16.5	8.28
6/14/94	**4.5**	5.2	8.2	0.110	0.070	0.050	3.20	3.10	3.50	200	300	500	0.32	0.97	0.69	6.8	7.4	8.1	22	18	26	0.080	0.090	0.120	14	46	62	22	27	34	4.45
8/9/94	**4.4**	5.2	8.4	0.040	0.020	0.010	4.70	5.10	5.60	1800	500	2000	0.06	0.45	0.01	7.1	7.3	8.4	23	23	27	0.056	0.200	0.077	18	44	35	10	21	10	2.52
10/11/94	**4.2**	6.8	8.7	0.040	0.090	0.010	4.40	3.00	2.80	1100	1400	1700	0.37	0.98	0.01	6.7	7.2	7.8	12	12	15	0.150	0.320	0.060	33	25	35	24	9	10	4.84
12/6/94	7.8	8.5	10.3	0.090	0.470	0.050	3.70	4.00	4.00	200	5300	100	1.11	0.79	0.36	6.8	7.2	7.8	7	7	6	0.060	0.260	0.050	25	27	13	20	7	6	7.56
2/3/98	10.6	11.1	13.0	0.020	0.020	0.020	1.71	1.83	2.61	80	130	60	0.43	1.09	0.38	7.1	7.5	7.9	5	6	5	0.047	0.426	0.050	15	12	17	12	6.9	10	8.64
4/7/98	8.1	9.0	9.4	1.517	0.316	0.512	1.65	1.80	2.37	260	320	300	0.53	0.61	0.51	6.8	7.3	7.5	16	15	15	0.110	0.180	0.170	29	28	52	26	15	47	18.60
6/2/98	**2.3**	6.1	10.5	0.140	0.070	0.030	2.31	1.50	3.90	210	210	50	0.43	0.88	0.05	6.7	7.2	8.3	26	27	32	0.140	0.170	0.120	28	41	59	12	14	17	3.60
8/4/98	6.3	6.3	6.8	0.143	0.020	0.022	2.82	1.71	2.43	4500	5600	11000	0.40	0.44	0.50	6.8	6.9	7.4	25	25	27	0.100	0.220	0.320	60	64	144	47	44	93	59.52
12/8/98	9.0	9.2	9.1	0.026	0.020	0.020	5.31	5.58	6.27	11000	21000	23000	0.43	0.40	0.34	7.1	7.3	7.5	8	9	10	0.200	0.240	0.290	34	50	88	47	39	63	65.76
Avg	6.4	7.5	9.4	0.193	0.171	0.062	3.49	3.65	3.46	2177	3299	2880	0.45	0.71	0.29	6.9	7.3	7.9	15	15	17	0.126	0.261	0.134	48.6	65.8	69.4	32	40	34	19.46

Table 4

COL_DATE	DISOXY			AMMONIA			BOD			FECCOLI			NITRATE			PHFIELD			TEMP_CENT			PHOSPHU			TSS			TURBIDITY			FLOW
	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569	567	565	569
8/14/90	**3.6**	7.2	9.9	0.080	0.080	0.020	3.10	4.00	2.20	600	130	110	0.03	0.73	0.00	7.0	7.6	8.3	22	22	29	0.160	0.220	0.180	8	56	211	13.9	15.2	54	6.00
10/9/90	**4.3**	5.9	11.1	0.090	0.150	0.010	2.30	3.00	2.30	420	2900	80	0.14	0.81	0.03	6.9	7.2	8.3	13	13	9	0.040	0.330	0.060	19	30	25	13.9	20	17.5	0.60
6/14/94	**4.5**	5.2	8.2	0.110	0.070	0.050	3.20	3.10	3.50	200	300	500	0.32	0.97	0.69	6.8	7.4	8.1	22	18	26	0.080	0.090	0.120	14	46	62	22	27	34	4.45
8/9/94	**4.4**	5.2	8.4	0.040	0.020	0.010	4.70	5.10	5.60	1800	500	2000	0.06	0.45	0.01	7.1	7.3	8.4	23	23	27	0.056	0.200	0.077	18	44	35	10	21	10	2.52
10/11/94	**4.2**	6.8	8.7	0.040	0.090	0.010	4.40	3.00	2.80	1100	1400	1700	0.37	0.98	0.01	6.7	7.2	7.8	12	12	15	0.150	0.320	0.060	33	25	35	24	9	10	4.84
6/2/98	**2.3**	6.1	10.5	0.140	0.070	0.030	2.31	1.50	3.90	210	210	50	0.43	0.88	0.05	6.7	7.2	8.3	26	27	32	0.140	0.170	0.120	28	41	59	12	14	17	3.60
Avg	3.9	6.1	9.5	0.083	0.080	0.022	3.34	3.28	3.38	722	907	740	0.23	0.80	0.13	6.9	7.3	8.2	20	19	23	0.104	0.222	0.103	20.0	40.3	71.2	16.0	17.7	23.8	3.67