

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 577 near Burlingame (Dragoon Creek) and Station 687 near Burlingame (Switzler Creek)

Period of Record Used: 1990-2000 for Station 577 (Figure 2); 1994 and 1998-2000 for Station 687 (Figure 3).

Flow Record: Dragoon Creek near Burlingame (USGS Station 06911900); 1970 to 1999.

Long Term Flow Conditions: Dragoon Creek: 10% Exceedence Flows = 101 cfs, 7Q10 = 1 cfs
Switzler Creek: 10% Exceedence Flows = 16 cfs, 7Q10 = 1 cfs

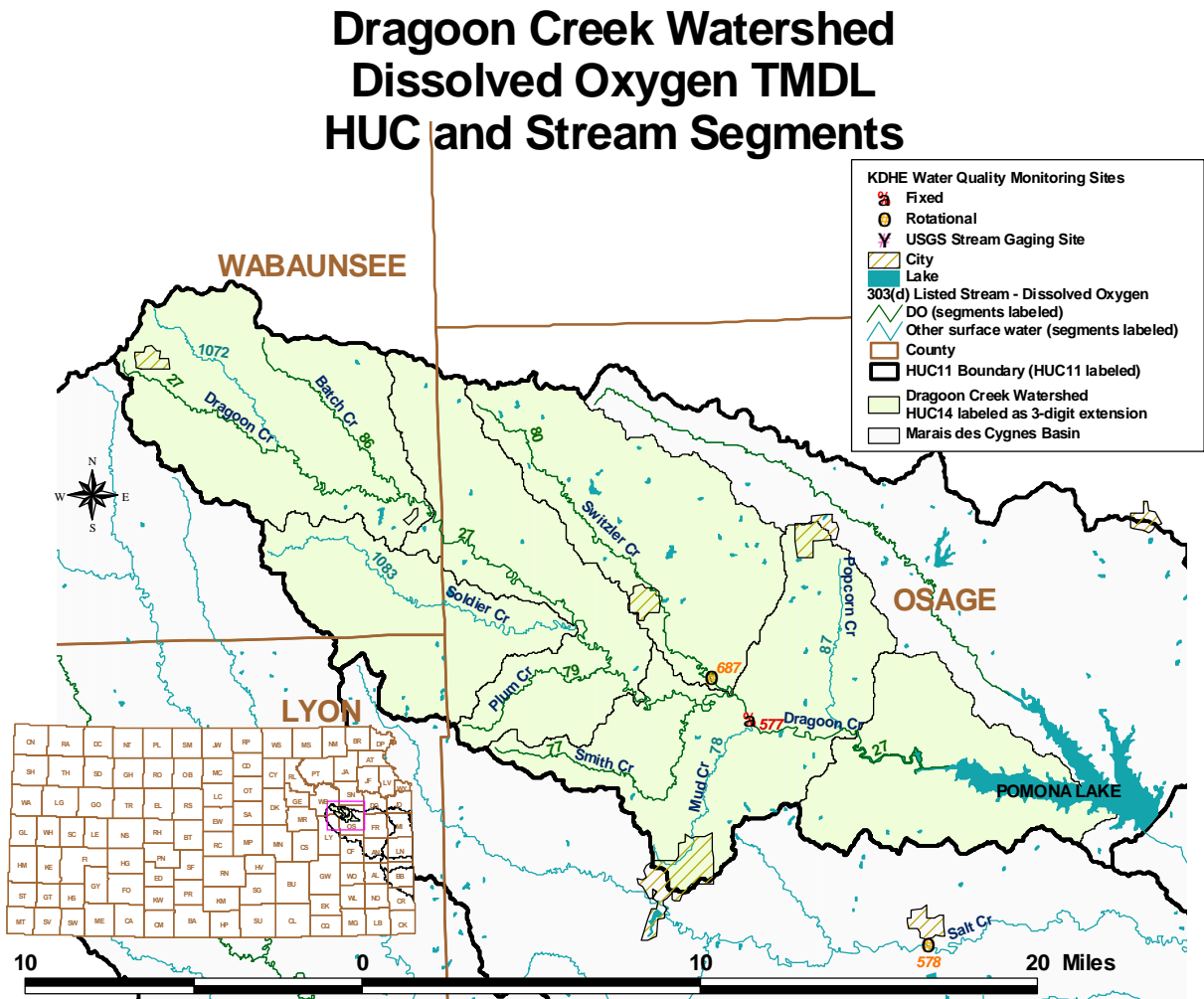


Figure 1

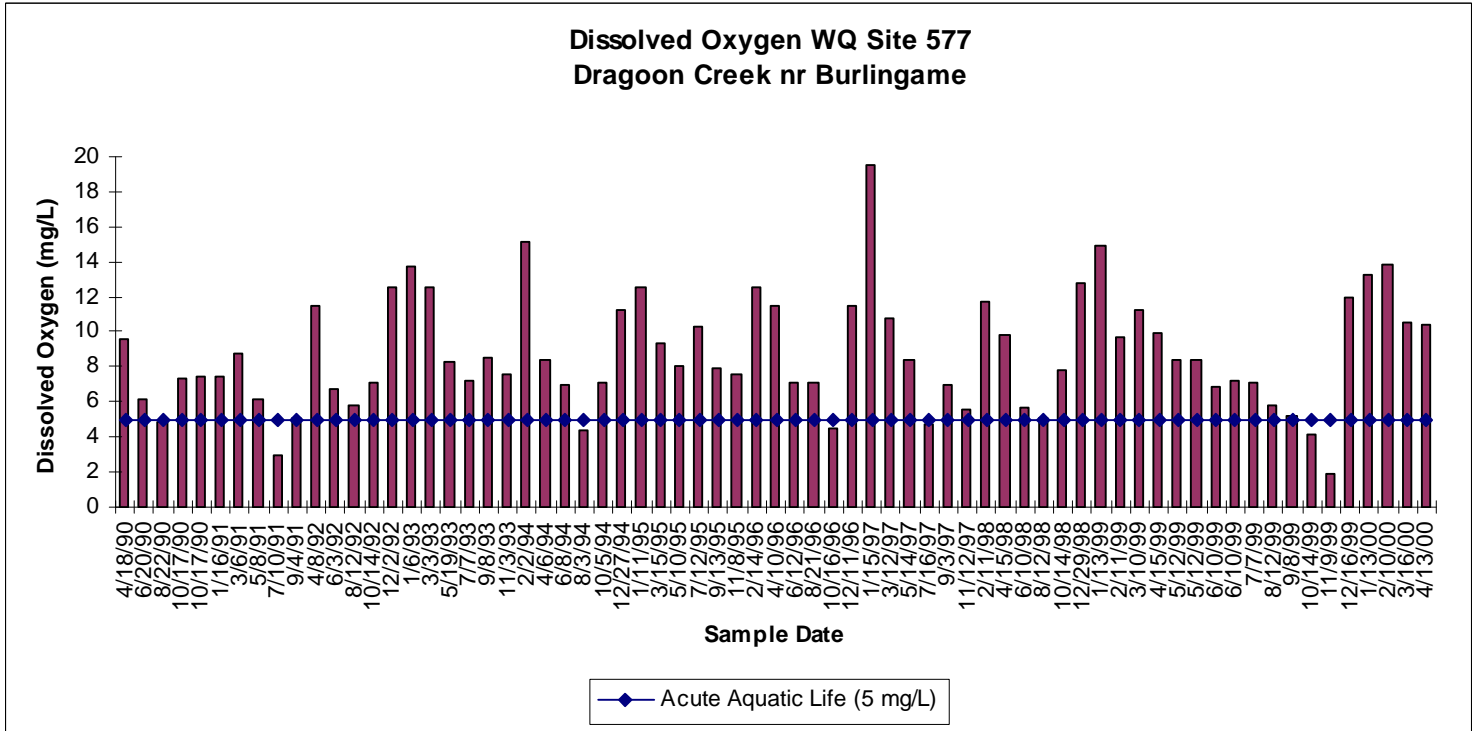


Figure 2

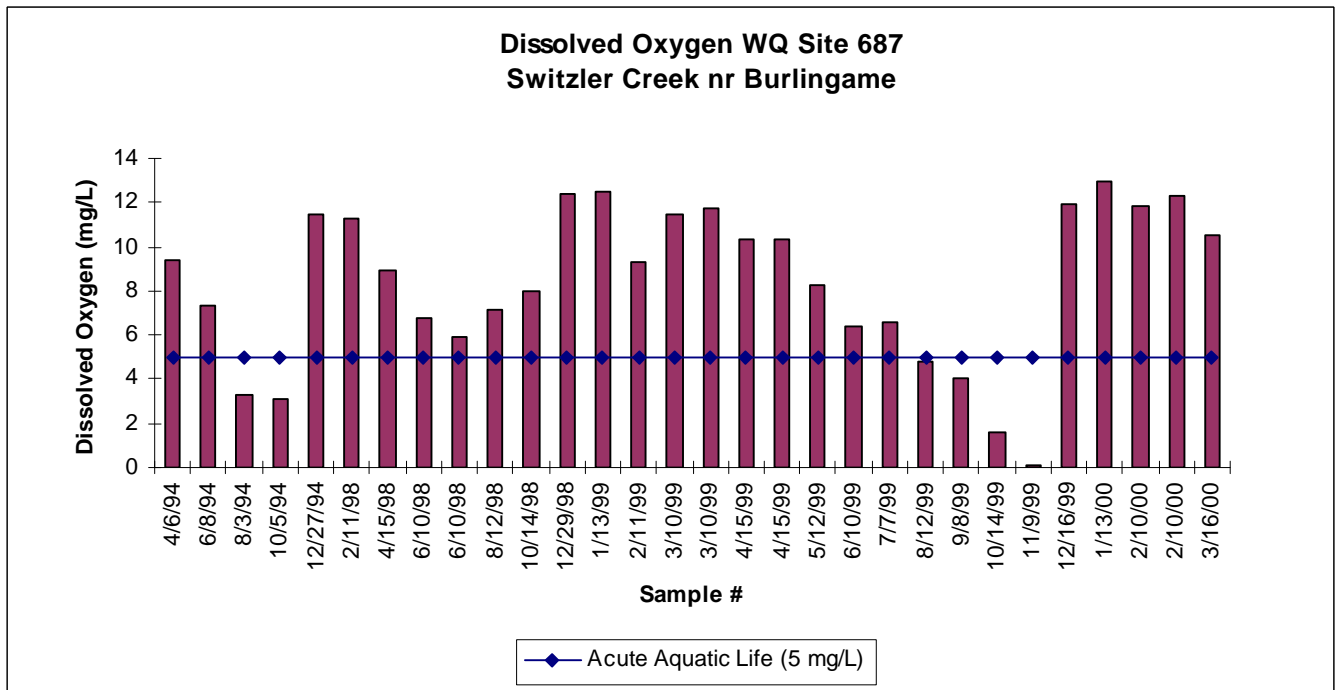


Figure 3

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 each sampling site were categorized for each of the three defined seasons: Spring (Mar-Jul), Summer-Fall (Aug-Oct) and Winter (Nov-Feb). 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 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 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 4** (Site 577) and **Figure 5** (Site 687)).

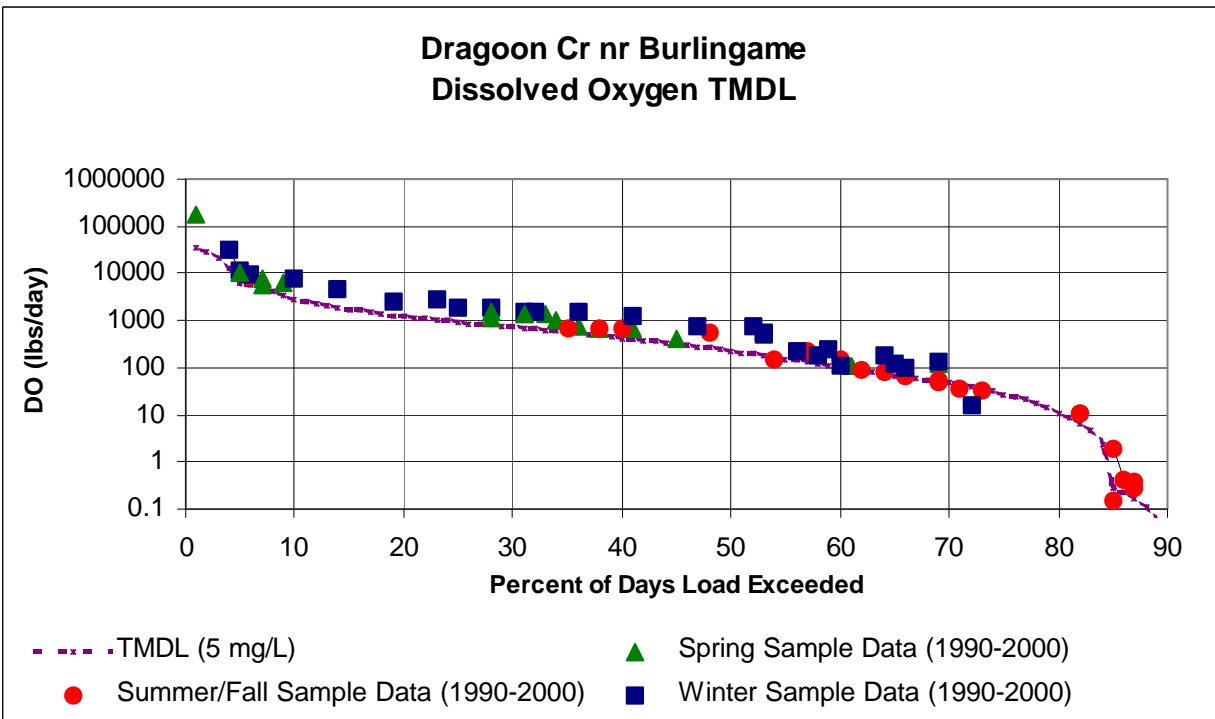


Figure 4

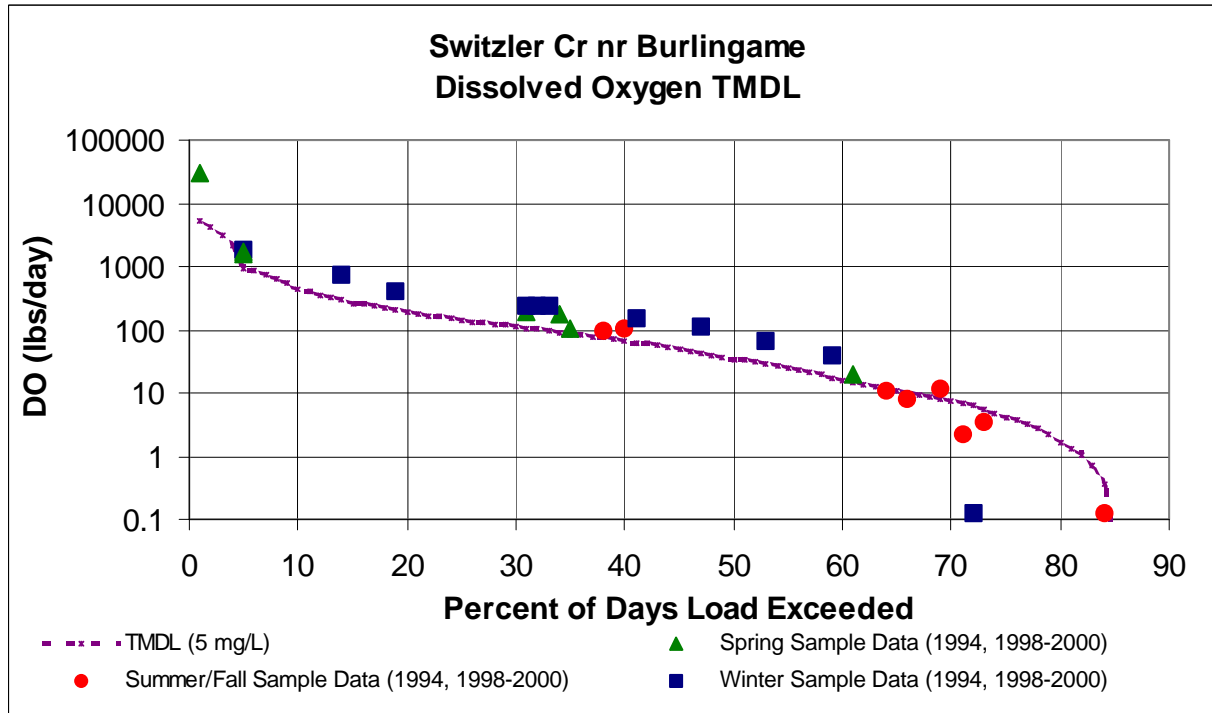


Figure 5

Water Quality Site 577: Excursions were seen in two of the three defined seasons and are outlined in Table 1. None of Spring samples were below the aquatic life criterion. Twenty seven of Summer-Fall samples and four percent of Winter samples were under the aquatic life criterion. Overall, 11% of the samples were under the criterion. This would represent a baseline condition of partial support of the impaired designated use.

Water Quality Site 687: Excursions were seen in two of the three seasons and are also outlined in Table 1. None of the Spring samples were below the aquatic life criterion. Sixty three percent of the Summer-Fall and 8% percent of Winter samples were under the aquatic life criterion. Overall, 23% of the samples were under the criterion. This would represent a baseline condition of partial support of the impaired designated use.

No DO violations have been encountered at flows exceeding 6 cfs on Dragoon Creek, therefore a critical low flow can be identified on Dragoon Creek as those flows of 6 cfs or less.

No DO violations have been encountered at calculated flows exceeding 0.5 cfs on Switzler Creek, therefore a critical low flow can be identified on Switzler Creek as those flows of 0.5 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.
Dragoon Cr near Burlingame (577)	Spring	0	0	0	0	0	0	0/18 = 0%
	Summer	0	0	0	5	1	0	6/22 = 27%
	Winter	0	0	0	1	0	0	1/26 = 4%
Switzler Cr. near Burlingame (687)	Spring	0	0	0	0	0	0	0/7 = 0%
	Summer	0	0	0	4	1	0	5/8 = 63%
	Winter	0	0	0	1	0	1	1/11 = 8%

A watershed comparison approach was taken in developing this TMDL. The Salt Creek watershed (Water Quality Sampling Site 578 in the watershed was not impaired by low DO) is of similar size, has similar land use characteristics and is located immediately south of the Dragoon Creek watershed. Not only were these two watersheds compared, but also the Switzler Creek reach (Site 687) and site 577 on Dragoon Creek were compared. The relationship of DO to Biochemical Oxygen Demand (BOD), water temperature, turbidity, nitrate, phosphorus and stream flow were used in the comparisons.

Table 2a outlines those water quality data for the samples taken on the same date for all three sites of interest between 1990 and 2000 when DO was below the aquatic life criterion for sample site 577.

For Table 2a at site 687 the average BOD concentration for the samples was more than twice that of the comparison site (578) while average nitrate, temperature, turbidity and flow were much the same. Phosphorus concentrations at site 687, while relatively low, were still higher than that of the comparison site (578). At site 577 the average BOD concentration for the samples was also higher than that of comparison site 578, although not to the same extent as seen at site 687. Average temperature, turbidity, and nitrate were much the same as comparison site 578. Again, phosphorus concentrations at site 577, while relatively low, were still higher than that of the comparison site (578). This indicates a organic load is being added to Dragoon and Switzler Creek upstream of site 577 and, under certain conditions, is likely a driving factor causing DO violations at this site.

Table 2b outlines those water quality data for the samples taken on the same date for all three sites of interest between 1990 and 2000 when DO was *below* the aquatic life criterion for sample site 687 and *above* the DO aquatic life criterion for site 577.

In Table 2b all sites had similar average BOD, nitrate, temperature, turbidity, phosphorus and flow values. This indicates that, under certain conditions, climatically driven factors triggering extremely low flow and high water temperature can be considered a primary cause driving the occasional DO excursion in Switzler Creek subbasin.

Table 2a

COL DATE	DO (mg/L)			BOD (mg/L)			TEMP Degrees C			TURBIDITY (FTU)			NITRATE (mg/L)			TPHOS (mg/L)			Flow (cfs)	
	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	USGS 0691-7380	USGS 0691-7000	
	687	577	578	687	577	578	687	577	578	687	577	578	687	577	578	687	577	578	687, 577	578
8/3/94	3.3	4.4	5.2	5	4.5	4.1	21	23	23	27	21	6	0.13	0.01	0.01	0.15	0.11	0.08	1.3	0.6
10/14/99	1.6	4.2	6.2	5.76	3.8	2.8	14	15	16	11.5	10	9.3	0.12	0.14	0.2	0.18	0.16	0.12	1.6	0.7
11/9/99	0.1	1.9	5.3	13.3	5.4	2.8	14	24	14	4.8	5.3	7.3	0.01	0.08	0.08	0.56	0.32	0.17	1.5	6.3
AVERAGE	1.67	3.5	5.6	8	4.6	3.2	16.3	17.3	17.7	14.4	12.1	7.5	0.09	0.08	0.10	0.30	0.20	0.12	1.5	2.5

Table 2b

COL DATE	DO (mg/L)			BOD (mg/L)			TEMP Degrees C			TURBIDITY (FTU)			NITRATE (mg/L)			TPHOS (mg/L)			Flow (cfs)	
	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	WQ Site	USGS 0691-7380	USGS 0691-7000	
	687	577	578	687	577	578	687	577	578	687	577	578	687	577	578	687	577	578	687, 577	578
10/5/94	3.1	7.1	5.2	4.7	4.3	4.2	15	16	17	22	13	7	0.96	0.01	0.01	0.11	0.08	0.04	0.05	0.25
8/12/99	4.8	5.8	5.9	1.3	2.8	1.9	25	27	27	10.8	16	30	0.36	0.12	1.56	0.1	0.08	0.18	2.7	2.2
9/8/99	4	5.2	2.9	1	1	1	21	24	24	37	20	13	0.29	0.19	0.33	0.19	0.12	0.09	2.4	0.4
AVERAGE	4	6	4.7	2.3	2.7	2.4	20.3	22.3	22.7	23.3	16.3	16.7	0.54	0.11	0.63	0.13	0.09	0.10	1.72	0.95

Desired Endpoints of Water Quality at Site 577 and 687 over 2005 - 2009

The desired endpoint will be reduced biochemical oxygen demand from artificial sources such that average BOD concentrations remain below 3.2 mg/l in the stream which results in no excursions below 5 mg/l of DO detected between 2005 - 2009.

This desired endpoint should improve DO concentrations in the creek at the critical lower flows (0 - 6 cfs for Dragoon Creek and 0 - 0.5 cfs on Switzler Creek) in the warmer months of the year (July-November). Seasonal variation is accounted for by this TMDL, since the TMDL endpoint is sensitive to the low flow and/or higher temperature conditions, generally occurring in the specified months.

This endpoint will be reached as a result of expected, though unspecified, reductions in organic loading from the various sources in the watershed resulting 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.

3. SOURCE INVENTORY AND ASSESSMENT

NPDES: There are four NPDES permitted wastewater dischargers within the watershed. These systems are outlined in Table 3. The city of Scranton, although located within the watershed, discharges to School Creek whose confluence is downstream of water quality monitoring site 577 and, therefore, cannot contribute to the impairment listed at the monitoring sites (**Figure 6**).

Table 3

DISCHARGING FACILITY	STREAM REACH	SEGMENT	DESIGN FLOW	TYPE
Burlingame MWWF	Dragoon Creek via Switzler Creek	80	0.125 mgd	Lagoon
Harveyville MWWF	Dragoon Creek	27	0.034 mgd	Lagoon
Eskridge MWWF	Dragoon Creek	27	0.05 mgd	Lagoon
Scranton MWWF	Dragoon Creek via School Creek	27	0.08 mgd	Lagoon

Population projections for Burlingame, Eskridge and Scranton to the year 2020 indicate modest growth. Projections for Harveyville to the year 2020 indicate slight declines. Projections of future water use and resulting wastewater appear to be within design flows for Burlingame and Harveyville. The city of Eskridge will approach its design flow by 2020 based on projections of future water use. Since 1997, Burlingame, Harveyville, and Eskridge quarterly effluent monitoring indicates BOD concentrations have been within permit limits for samples take during the identified critical period (July - November).

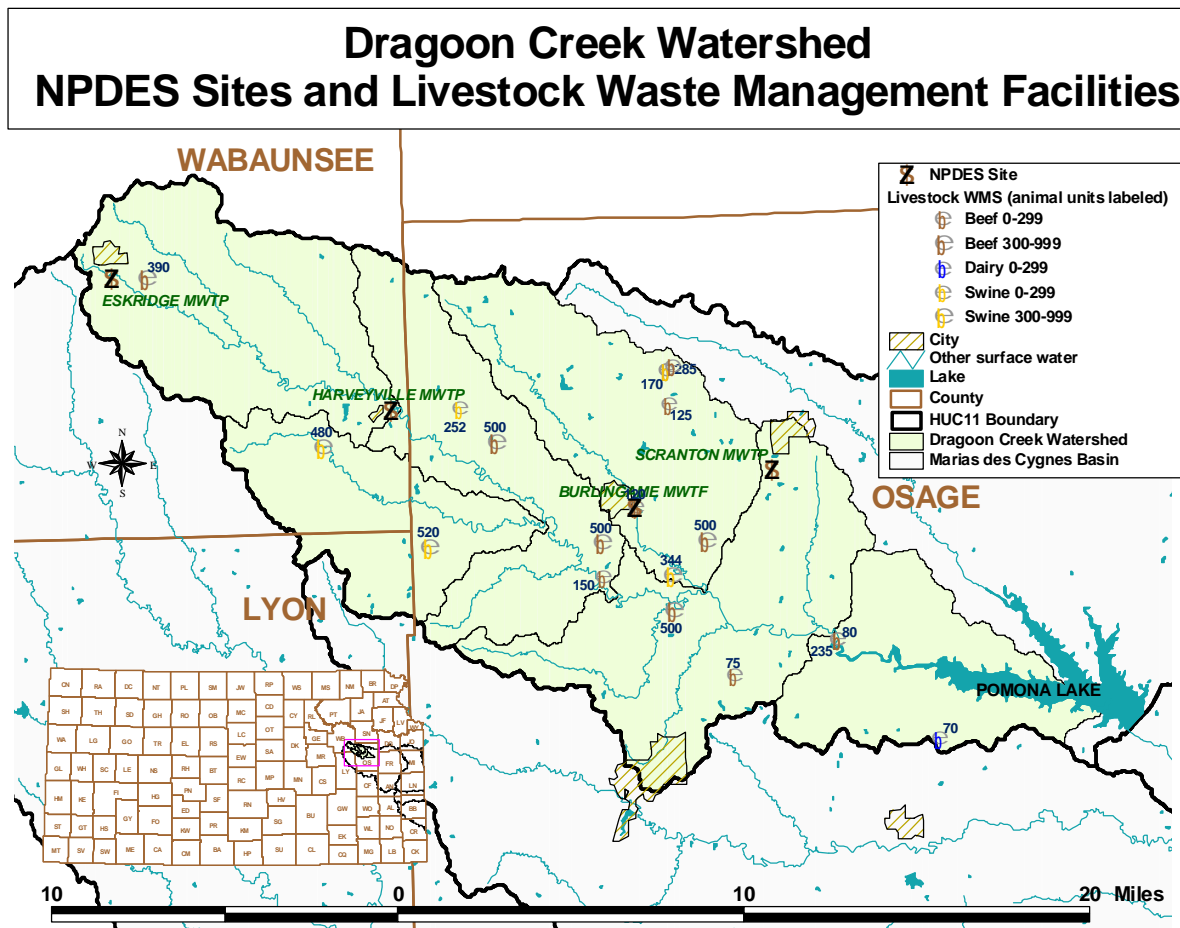


Figure 6

Livestock Waste Management Systems: Eighteen operations are registered, certified or permitted within the watershed. These facilities are either beef, swine or dairy. Most of these facilities are located in the middle of the watershed along the main stem reach. Potential animal units for all facilities in the watershed total 5,296. The actual number of animal units on site is variable, but typically less than potential numbers (**Figure 6**).

Land Use: Most of the watershed is grassland (59% of the area), cropland (34%), woodland (4%) or urban use (1%). Most of the grassland is located in the upper half and around the perimeter (higher elevations) of the watershed. Based on 1998 water use reports, less than one tenth of 1% of the cropland in the watershed is irrigated. The grazing density estimate is low for the Marais des Cygnes and Missouri Basins (23-30 animal units/mi²) (**Figure 7**).

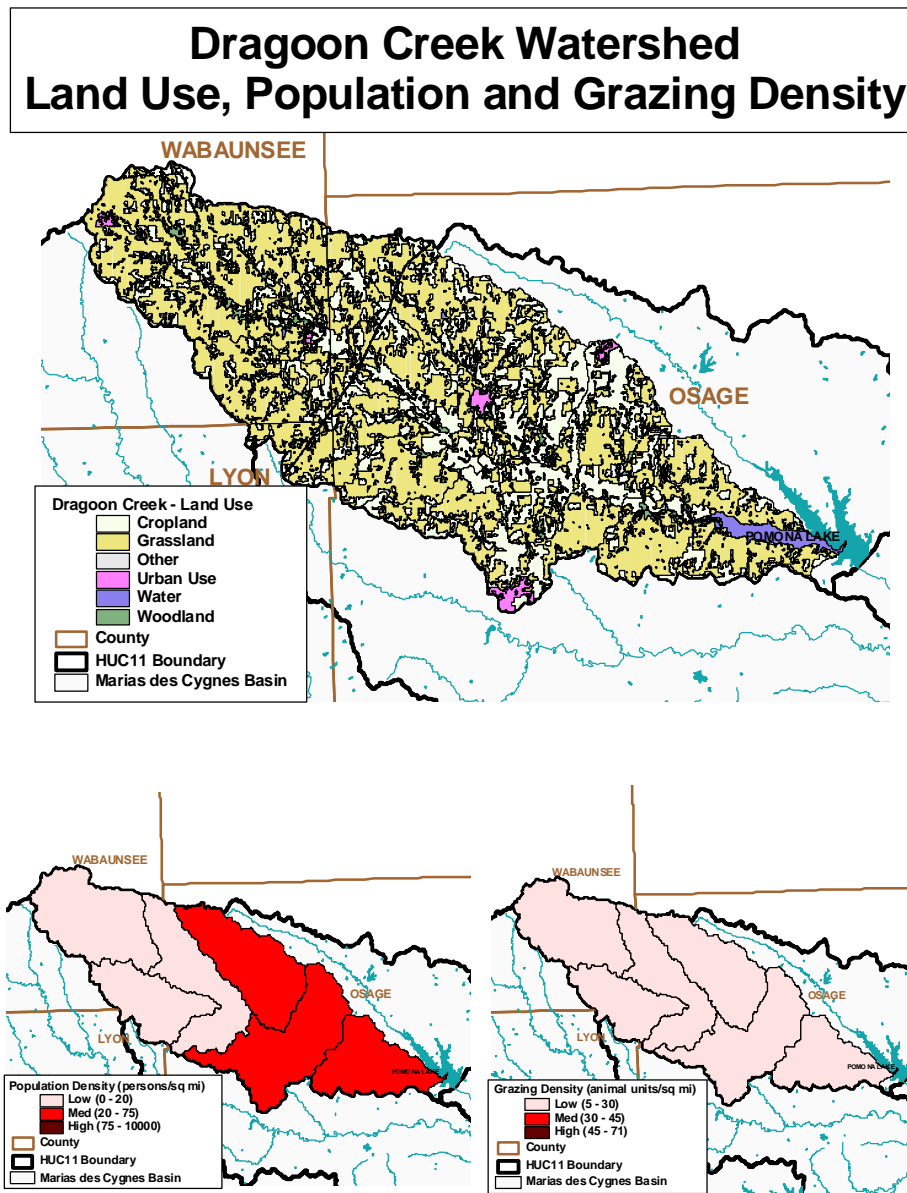


Figure 7

On-Site Waste Systems: The upper half of the watershed's population density is low (9 - 19 persons/mi²) and the lower half is average (22 - 39 persons/mi²) when compared to the rest of Marais des Cygnes and Missouri Basin (**Figure 7**). The rural population projections for Osage County through 2020 show significant growth (64% increase). The rural population projections for Lyon and Wabaunsee County show slight declines (<10% decrease).

Contributing Runoff: The watershed's average soil permeability is 0.5 inches/hour according to NRCS STATSGO data base. The entire watershed produces runoff even under relative low (1.71"/hr) potential runoff conditions. Under very low (1.14"/hr) potential conditions, this potential contributing area is slightly reduced (91%). Runoff is chiefly generated as infiltration excess with rainfall intensities greater than soil permeabilities. As the watersheds' soil profiles become saturated, excess overland flow is produced. Generally, storms producing less than 0.57"/hr of rain will still generate runoff from 75% of this watershed, chiefly from the upper two thirds of the watershed and along the stream channels.

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, based on the fairly even distribution of woodland along the main stem and tributary segments, the loading should be relatively constant along the stream.

4. ALLOCATION OF POLLUTION REDUCTION RESPONSIBILITY

It is presumed that reductions in BOD loads will reduce DO excursions under certain critical flow conditions. Therefore, the allocation of wasteloads and loads will be made in terms of BOD reductions. Yet, because DO is a manifestation of multiple factors, the initial pollution load reduction responsibility will be to decrease the BOD over the critical range of flows encountered on either Dragoon or Switzler Creek. These reductions have been based on the relationship between DO and BOD for the samples taken at Water Quality Monitoring sites 577 and 687 as compared to the relatively unimpaired Salt Creek watershed and its water quality monitoring site 578 (Table 2a). Allocations relate to the BOD levels seen in Dragoon Creek at site 577 or Switzler Creek at site 687 relative to site 578 for the critical lower flow conditions. Based on this relationship (Table 2a), BOD concentrations at site 577 need to be reduced by 30% and at site 687 by 60% (so that in stream average BOD is 3.2 mg/L). Additional monitoring over time will be needed to further ascertain the relationship between BOD reductions of point and non-point sources, flow conditions, water temperatures and DO levels along the stream.

For this phase of the TMDL, the average condition is considered across the seasons, to establish goals of the endpoint and desired reductions. Therefore, the target average BOD level was multiplied by the average daily flow estimated for either Dragoon or Switzler Creek across all hydrologic conditions. This is represented graphically by the integrated area under each BOD load duration curve established by this TMDL. The area is segregated into allocated areas

assigned to point sources (WLA) and nonpoint sources (LA). Future growth in wasteloads should be offset by reductions in the loads contributed by nonpoint sources. This offset along with appropriate limitations should eliminate the impairment. This TMDL represents the “Best Professional Judgment” as to the expected relationship between physical factors, organic matter and DO.

Point Sources: The point sources are responsible for maintaining their systems in proper working condition and appropriate capacity to handle anticipated wasteloads of their respective populations. All cities contributing oxygen demanding substances upstream of site 577 appear to be within their respective design flows for their populations through 2020. The State and NPDES permits will continue to be issued on 5 year intervals, with inspection and monitoring requirements and conditional limits on the quality of effluent released from this facility. Ongoing inspections and monitoring of the systems will be made to ensure that minimal contributions have been made by this source.

Based upon the preceding assessment, only those point sources (Eskridge, Harveyville, and Burlingame) contributing a BOD load in the Dragoon Creek Watershed upstream of site 577 will be considered in its Wasteload Allocation. Streeter-Phelps analysis indicates the present BOD permit limit for each point source maintains DO levels above 5 mg/L for flows greater than or equal to the 7Q10 of 1 cfs and, until additional in stream monitoring can further define the DO/BOD relationship, is therefore assumed to correspond to maintaining an average of BOD of less than 3.2 mg/L at the sampling site across this flow condition and achieves the Kansas Water Quality Standard for DO of 5 mg/L.

By K.A.R. 28-16-28c(c)(1) for flows less than 1 cfs, classified streams may be excluded from the application of some or all of the requirements of K.A.R. 28-16-28e(c). The sum of the design flows of the point sources (0.323 cfs) redefines the lowest flow seen at site 577 (81-99% exceedence), and the WLA equals the TMDL curve across this flow condition (**Figure 8**).

From this, the WLA for the city of Eskridge defined at sample site 577 is 1.33 lbs/day BOD, the WLA for the city of Burlingame is 3.34 lbs/day BOD and the WLA for the city of Harveyville is 0.92 lbs/day BOD across all flow conditions (**Figure 8**).

The only point source contributing to Site 687 on Switzler Creek is Burlingame. Streeter-Phelps analysis indicates the present BOD permit limit for this point source maintains DO levels above 5 mg/L for flows greater than or equal to the 7Q10 of 1 cfs and is therefore assumed to correspond to maintaining an average of BOD of less than 3.2 mg/L at the sampling site across this flow condition and achieves the Kansas Water Quality Standard for DO of 5 mg/L.

By K.A.R. 28-16-28c(c)(1) for flows less than 1 cfs, classified streams may be excluded from the application of some or all of the requirements of K.A.R. 28-16-28e(c). The design flow of the point source (0.194 cfs) redefines the lowest flow seen at site 687 (74-99% exceedence), and the WLA equals the TMDL curve across this flow condition. The WLA at sampling site 687 for the Burlingame is 3.34 lbs/day BOD across all flow conditions (**Figure 9**).

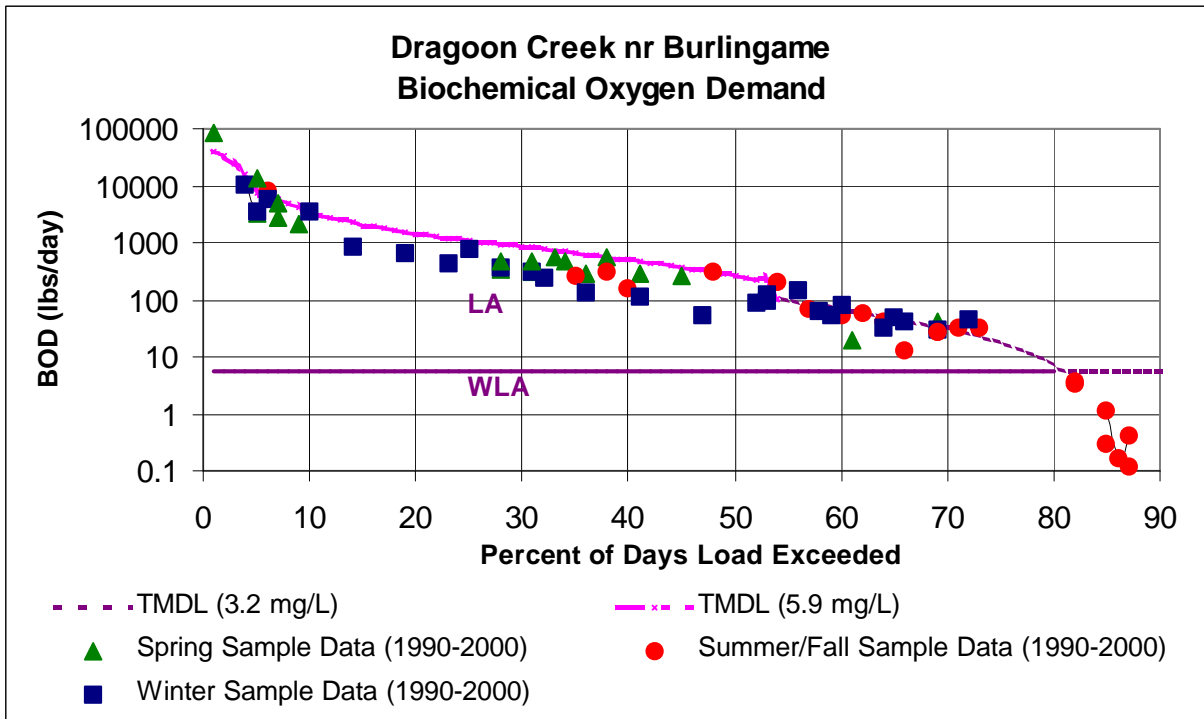


Figure 8

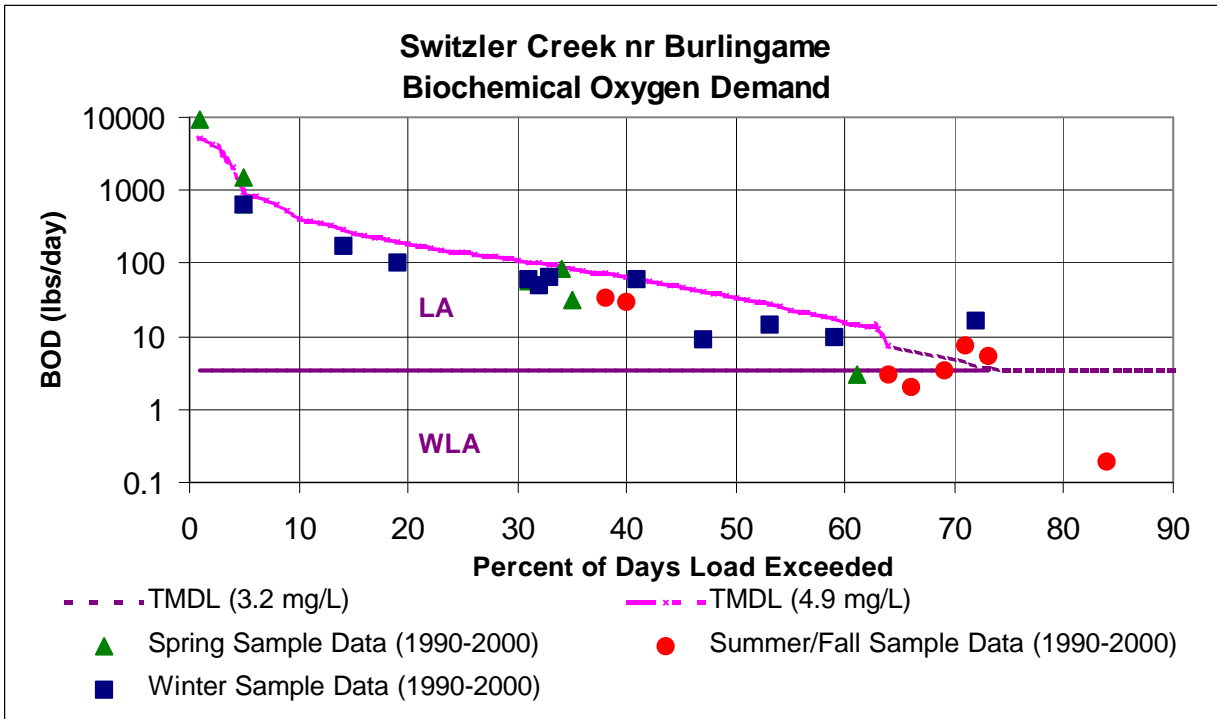


Figure 9

Non-Point Sources: Based on the prior assessment of sources, the distribution of excursions from water quality standards at site 577 and the relationship of those excursions to runoff conditions and seasons, non-point sources are also seen as a contributing factor to the occasional DO excursions in the watershed.

The samples from Dragoon Creek watershed show there were no DO violations at flows in excess of 6 cfs. The Load Allocation assigns responsibility for reducing the in stream BOD levels at site 577 to 3.2 mg/L across the 0.323 - 6 cfs range of the critical flow condition and maintaining the in stream BOD levels at site 577 to the historical levels of 5.9 mg/L for flows in excess of 6 cfs (which is 90th percentile of BOD samples for flows in Dragoon Creek above 6 cfs near Burlingame). The LA equals zero for flows from 0 - 0.323 cfs (81 - 99 % exceedence), since the flow at this condition is entirely effluent created, and then increases to the TMDL curve with increasing flow beyond 0.3 cfs (**Figure 8**). Sediment control practices such as buffer strips and grassed waterways should help reduce the non-point source BOD load under higher flows as well as reduce the oxygen demand exerted by the sediment transported to the stream that may occur during the critical flow period.

The samples from Switzler Creek watershed show there were no DO violations at flows in excess of 0.5 cfs. The Load Allocation assigns responsibility for reducing the in stream BOD levels at site 687 to 3.2 mg/L across the 0.194 - 0.5 cfs range of the critical flow condition and maintaining the in stream BOD levels at site 687 to the historical levels of 4.9 mg/L for flows in excess of 0.5 cfs (which is 90th percentile of BOD samples for calculated flows in Switzler Creek above 0.5 cfs near Burlingame). The LA equals zero for flows from 0 - 0.194 cfs (74 - 99 % exceedence), since the flow at this condition is entirely effluent created, and then increases to the TMDL curve with increasing flow beyond 0.194 cfs (**Figure 9**). Sediment control practices such as buffer strips and grassed waterways should help reduce the non-point source BOD load under higher flows as well as reduce the oxygen demand exerted by the sediment transported to the stream that may occur during the critical flow period.

Additionally, to address the DO violations outlined in Table 2b at water quality sampling site 687, riparian vegetation restoration should occur adjacent to Switzler Creek to provide shade for the stream and generally reduce surface water temperatures during the seasons of concern.

Defined Margin of Safety: The Margin of Safety will be implied based on conservative assumptions used in the permitting of the point source discharges including coincidence of low flow with maximum discharge from the treatment plant, associated CBOD content and temperature of the effluent, and the better than permitted performance of the treatment plant in producing effluent with BOD well below permit limits under critical seasonal conditions.

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 Upper Marais des Cygnes River Subbasin (HUC 8: 10290101) with a priority ranking of 5 (High

Priority for restoration work).

Priority HUC 11s and Stream Segments: Because of the location of the water quality sampling site in the watershed, priority should be directed toward baseflow generating and conducting stream segments; the main stem of Dragoon Creek (segment 27) and Switzler Creek (segment 80) of HUC14s 050, 040, 030, 020, 010 in HUC11 10290101030 given greatest priority and then with diminishing priority for the listed tributaries in those same HUC14s (segments 77, 79, 1083 and 86) upstream of water quality monitoring site 577.

5. IMPLEMENTATION

Desired Implementation Activities

1. Where needed, restore riparian vegetation along targeted stream segments.
2. Install grass buffer strips where needed along streams.
3. Renew state and federal permits and inspect permitted facilities for permit compliance
4. Install proper manure and livestock waste storage.
5. Insure proper on-site waste system operations in proximity to main streams.
6. Insure that labeled application rates of chemical fertilizers are being followed.

Implementation Programs Guidance

NPDES and State Permits - KDHE

- a. Municipal permits for facilities in the watershed will be renewed after 2002 with continuation of DO and BOD monitoring and permit limits preventing excursions in these criteria.
- b. Livestock permitted facilities will be inspected for integrity of applied pollution prevention technologies.
- c. Registered livestock facilities with less than 300 animal units will apply pollution prevention technologies.
- d. Manure management plans will be implemented.

Non-Point Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for pollution reduction from livestock operations in watershed.
- b. Provide technical assistance on practices geared to small livestock operations which minimize impact to stream resources.
- c. Provide technical assistance in urban and agricultural setting on practices geared to minimize chemical fertilizer impact to stream resources.
- d. Guide federal programs such as the Environmental Quality Improvement Program, which are dedicated to priority subbasins through the Unified Watershed Assessment, to priority watersheds and stream segments within those subbasins identified by this TMDL.

Water Resource Cost Share & Non-Point Source Pollution Control Programs - SCC

- a. Provide alternative water supplies to small livestock operations
- b. Develop improved grazing management plans
- c. Reduce grazing density on pasturelands
- d. Install livestock waste management systems for manure storage
- e. Implement manure management plans
- f. Install replacement on-site waste systems
- g. Coordinate with USDA/NRCS Environmental Quality Improvement Program in providing educational, technical and financial assistance to agricultural producers.

Riparian Protection Program - SCC

- a. Develop riparian restoration projects along main stem especially those areas with baseflow.
- b. Design winter feeding areas away from streams.

Buffer Initiative Program - SCC

- a. Install grass buffer strips near streams.
- b. Leverage Conservation Reserve Enhancement Program to hold riparian land out of production.

Extension Outreach and Technical Assistance - Kansas State University

- a. Educate livestock producers on riparian and waste management techniques.
- b. Educate chemical fertilizer users on proper application rates and timing.
- c. Provide technical assistance on livestock waste management design.
- d. Continue Section 319 demonstration projects on livestock management.

Agricultural Outreach - KDA

- a. Provide information on livestock management to commodity advocacy groups.
- b. Support Kansas State outreach efforts.

Local Environmental Protection Program - KDHE

- a. Inspect on-site waste systems within one mile of priority stream segments (27 on the main stem and tributary segments 80 and then, as needed, on segments 77, 79, 1083 and 86).

Timeframe for Implementation: Pollution reduction practices should be installed along the main stem and Switzler Creek within the priority subwatersheds over the years 2002-2006, with follow up implementation thereafter.

Targeted Participants: Primary participants for implementation will be the identified point sources and landowners immediately adjacent to the priority 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. Areas of denuded riparian vegetation along Switzler Creek, the targeted main stem and tributaries.
2. Facilities without water quality controls
3. Unbuffered cropland adjacent to stream
4. Sites where drainage runs through or adjacent livestock areas
5. Sites where livestock have full access to stream and stream is primary water supply
6. Poor riparian sites
7. Sites which have an urban runoff component
8. Failing on-site waste systems

Some inventory of local needs should be conducted in 2002 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 2006: The year 2006 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 riparian restoration or buffer strips, cited in the local assessment, participating in the implementation programs provided by the state. Additionally, sampled data from site 577 and 687 should indicate evidence of improved dissolved oxygen levels at the critical flow conditions relative to the conditions seen over 1990-2000. At this early stage of implementation it is recognized that in the case of the establishment of riparian vegetation, it may take 20 years and beyond to provide a shade canopy over the stream.

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. On-site waste system inspections will be performed by Local Environmental Protection Program personnel for Osage, Lyon and Wabaunsee counties.

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 Marais des Cygnes 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: Riparian restoration projects are being touted as a significant means for water temperature buffers of streams. Non-point source controls for livestock waste have been shown to be effective in reducing pollution in locales such as the Herrington Lake watershed. 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 1990-2000, 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 on a four year rotation at Station 687 and bimonthly at Station 577 including dissolved oxygen samples. Should impaired status remain, the desired endpoints under this TMDL will be refined and more intensive sampling will need to be conducted under specified seasonal flow conditions over the period 2005-2009.

Monitoring of BOD levels in effluent will continue to be a condition of NPDES and state permits for facilities. This monitoring will continually assess the functionality of the systems in reducing organic levels in the effluent released to the streams.

Local program management needs to identify its targeted participants of state assistance programs for implementing this TMDL. This information should be collected in 2002 in order to support appropriate implementation projects.

7. FEEDBACK

Public Meeting: The public meeting to discuss TMDLs in the Marais des Cygnes Basin was held February 28, 2001 in Ottawa. 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 Marais des Cygnes Basin.

Public Hearings: Public Hearings on the TMDLs of the Marais des Cygnes Basin were held in Fort Scott on May 30 and Ottawa on May 31, 2001.

Basin Advisory Committee: The Marais des Cygnes Basin Advisory Committee met to discuss the TMDLs in the basin on October 4, 2000, February 28 and May 30, 2001.

Milestone Evaluation: In 2006, evaluation will be made as to the degree of implementation which has occurred within the watershed and current condition of Dragoon and Switzler 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 Dragoon and Switzler Creek will be evaluated for delisting under Section 303(d), based on the monitoring data over the period 2005-2009. Therefore, the decision for delisting will come about in the preparation of the 2010 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 2002 which will emphasize revision of the Water Quality Management Plan. 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 2002-2006.