NEOSHO RIVER BASIN TOTAL MAXIMUM DAILY LOAD

Water Body: Neosho Wildlife Management Area
Water Quality Impairment: Lead

1. INTRODUCTION AND PROBLEM IDENTIFICATION

Subbasin: Middle Neosho

County: Neosho and Crawford

HUC 8: 11070205 **HUC 11** (HUC 14)**:** **010** (090)

Ecoregion: Central Irregular Plains/Osage Cuestas (40b)

Drainage Area: Approximately 8.5 square miles.

Conservation Pool: Area = 608 acres
Maximum Depth = 1.0 meter (3.3 feet)
Mean Depth = 0.1 meters (0.3 feet)
Retention Time = 0.11 years (1.3 months)

Designated Uses: Secondary Contact Recreation; Special Aquatic Life Support; Food Procurement

Authority: State (Kansas Department of Wildlife and Parks)

2002 303(d) Listing: Neosho River Basin Lakes

Impaired Use: Chronic Aquatic Life Support

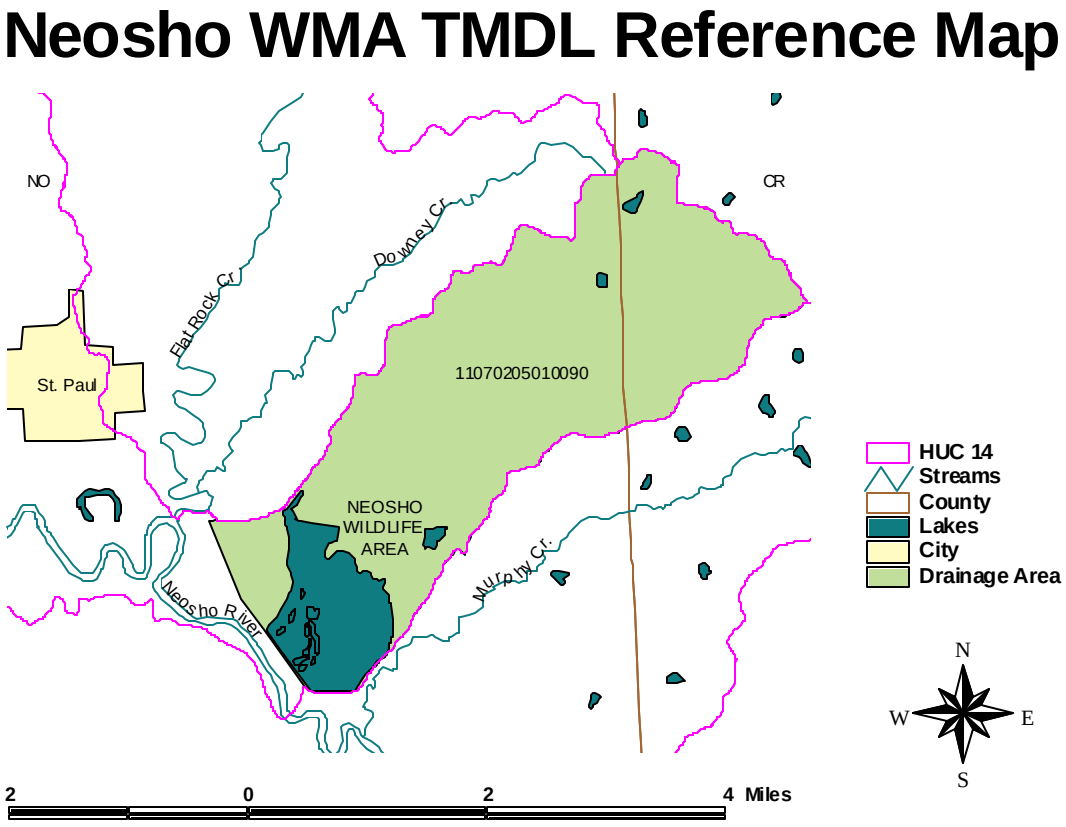
Water Quality Standard:

LEAD (ug/L):
acute criterion = WER[EXP[(1.273*(LN(hardness)))-1.460]]
chronic criterion = WER[EXP[(1.273*(LN(hardness)))-4.705]]

Formulae for calculation of hardness-dependent aquatic life support criteria for chromium III and total cadmium, total copper, total lead, total nickel, total silver and total zinc and pH dependent aquatic life support criteria for pentachlorophenol. A WER value of 1.0 is applied in the hardness-dependent equations for total metals unless a site-specific WER has been determined and adopted by the department in accordance with K.A.R. 28-16-28e(a) and

K.A.R. 28-16-28f(f). Hardness values in metal formulae are entered in units of mg/L as CaCO3. Pentachlorophenol formulae apply only over the pH range 6.5-8.5.

Figure 1



2. CURRENT WATER QUALITY CONDITION AND DESIRED ENDPOINT

Monitoring Sites: Station 053401 in Neosho WMA (Figure 1).

Period of Record Used: Eight surveys during 1990 - 2000.

Current Condition: The lead concentrations are over the chronic aquatic life criterion every year except 1993 when lead was not detected (Figure 2). The lead, in elemental form, is attached to the silt particles. Since the wetland is shallow and has high turbidity, the lead stays in suspension and eventually converts to the ionic form. There are enough lead ions in the water column to consistently stay above the criterion. The lead concentration is correlated with increased turbidity and total

suspended solids (Figures 3 & 4). The Neosho WMA Siltation TMDL further details the turbidity, total suspended solids concentrations, and average transparency of the wetland.

Lead Samples Taken by the KDHE Lake Monitoring Program

Date	Total Hardness (mg/L)	Lead (mg/L)	Chronic Aquatic Life Standard (mg/L)	Acute Aquatic Life Standard (mg/L)
7/31/1990	64.0	0.0070	0.0018	0.0463
8/1/1990	62.0	0.0090	0.0017	0.0444
6/10/1993	67.0	Not Detected	0.0019	0.0490
6/10/1993	71.0	Not Detected	0.0021	0.0528
7/16/1996	76.2	0.0065	0.0023	0.0578
7/16/1996	78.4	0.0051	0.0023	0.0599
8/18/1997	62.7	0.0065	0.0018	0.0450
8/18/1997	63.3	0.0044	0.0018	0.0457
8/10/1998	93.1	0.0103	0.0029	0.0746
8/10/1998	95.1	0.0101	0.0030	0.0765
8/9/1999	100.5	0.0125	0.0032	0.0821
8/9/1999	99.3	0.0098	0.0032	0.0809
8/7/2000	97.7	0.0056	0.0031	0.0793
8/7/2000	98.5	0.0059	0.0031	0.0801

Figure 2

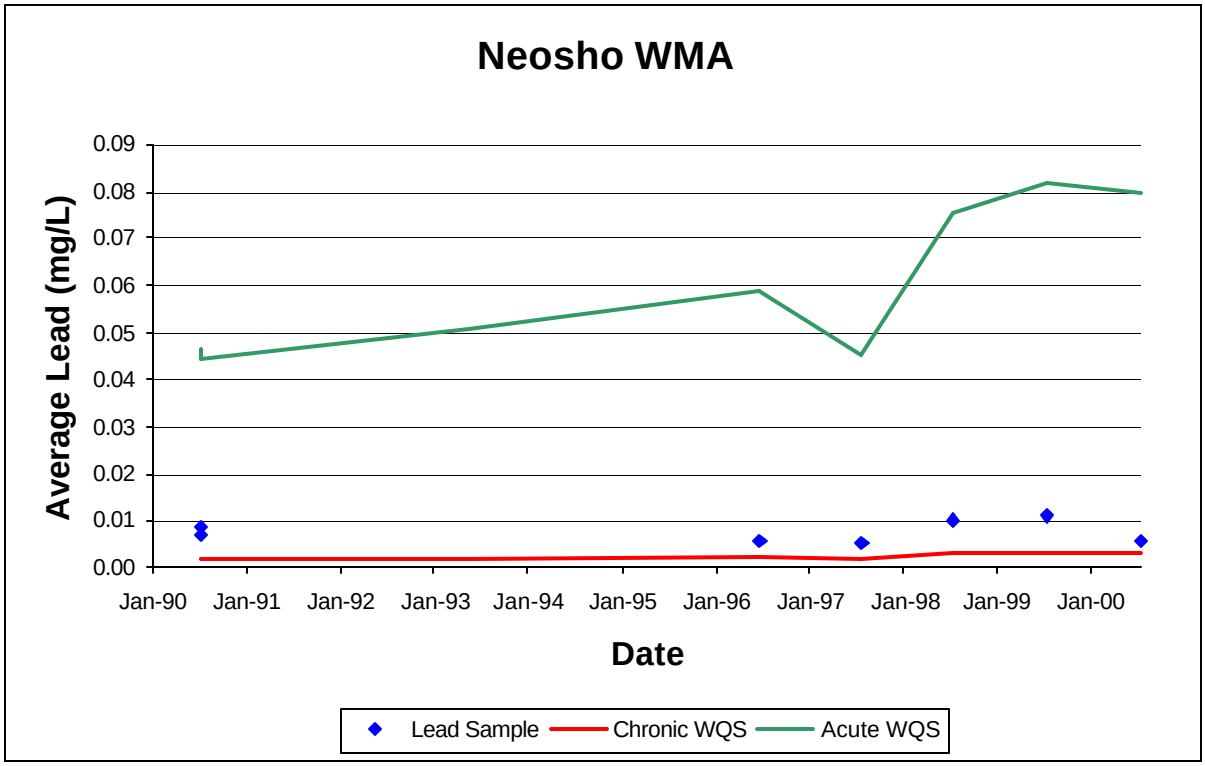


Figure 3

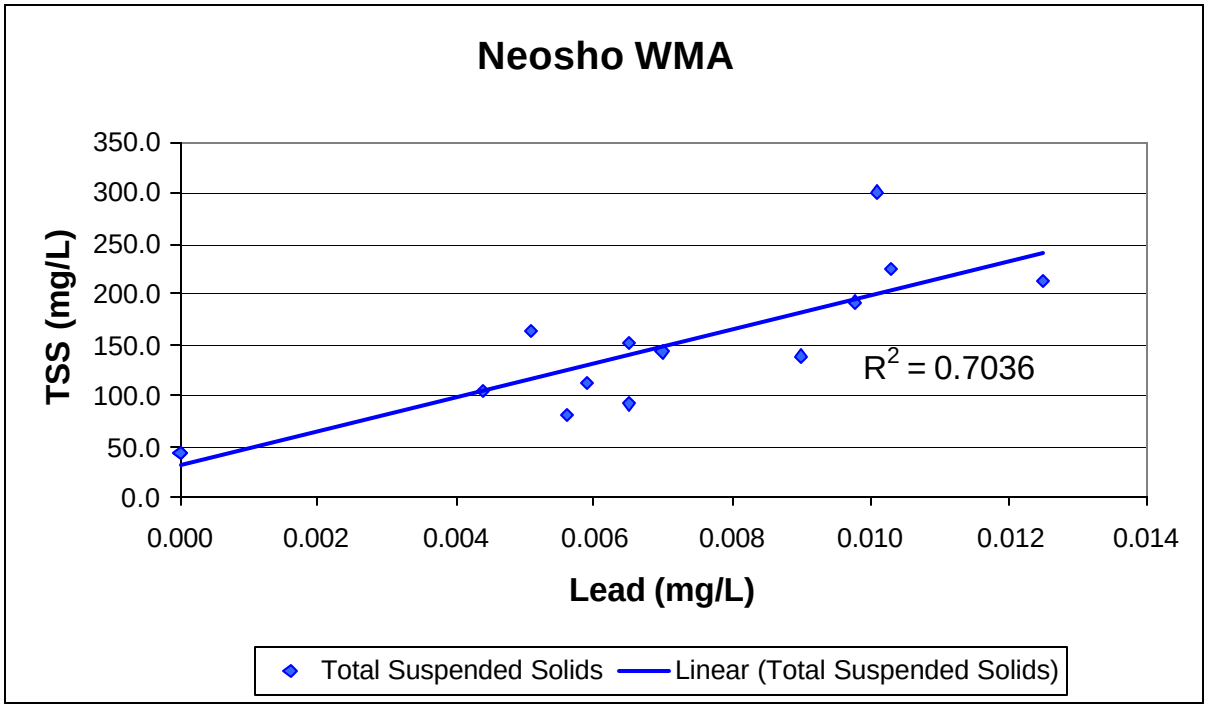
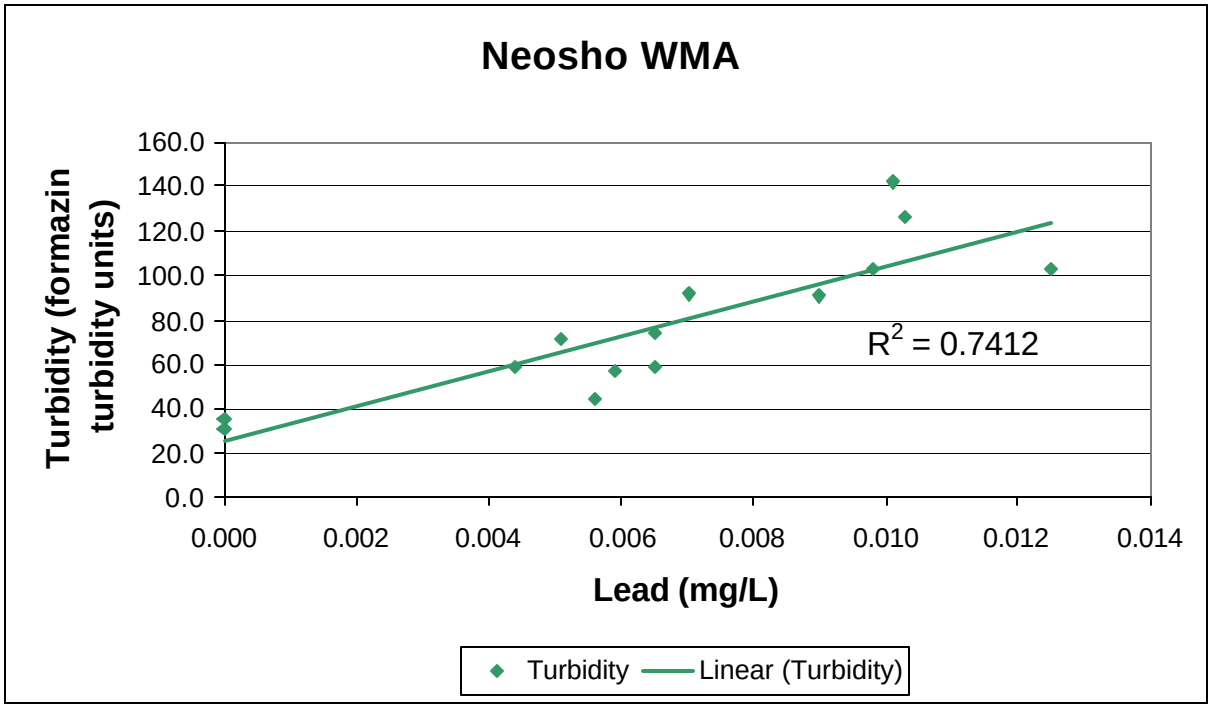


Figure 4



Interim Endpoints of Water Quality (Implied Load Capacity) at Neosho WMA over 2007 - 2011:

Parameter	Current Condition	TMDL	Percent Reduction
Lead (mg/L)*	**0.0125**	**< 0.0032**	**74 %**

* When the total hardness is equal to 100 mg/L.

In order to improve the quality of the water column, the endpoint for Neosho WMA will be to meet the chronic aquatic life criterion fully. However, a concomitant reduction in siltation loading must accompany any reduction in lead. The siltation load reductions are specified in the Neosho WMA Siltation TMDL. Much of the lead entering Neosho WMA is attached to silt. In reducing the siltation load, the associated lead loads should also be reduced, reflected in reduced total lead concentrations in the wetland.

This TMDL endpoint meets water quality standards as measured and determined by Kansas Water Quality Assessment protocols. These assessment protocols are similar to those used to cite the stream segments in this watershed as impaired on the Kansas 2002 Section 303(d) list.

Seasonal variation in the endpoint is not established by this TMDL. This endpoint can be reached as a result of expected reductions in 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 the endpoints indicates loads are within the loading capacity of the stream, water quality standards are attained and full support of the designated uses of the stream has been restored, therefore the narrative water quality standard pertaining to lead would be attained.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: The lead impairment is most likely due to erosion from cropland that is adjacent to the streams that drain into Neosho WMA. Soil from exposed land runs off into the wetland, increasing the turbidity and thus increasing the lead concentration. Land use coverage analysis indicates that 20.7% of the watershed is cropland, and 61.0% is grassland (Figure 5). More woodland and grassland are needed around the streams to prevent erosion.

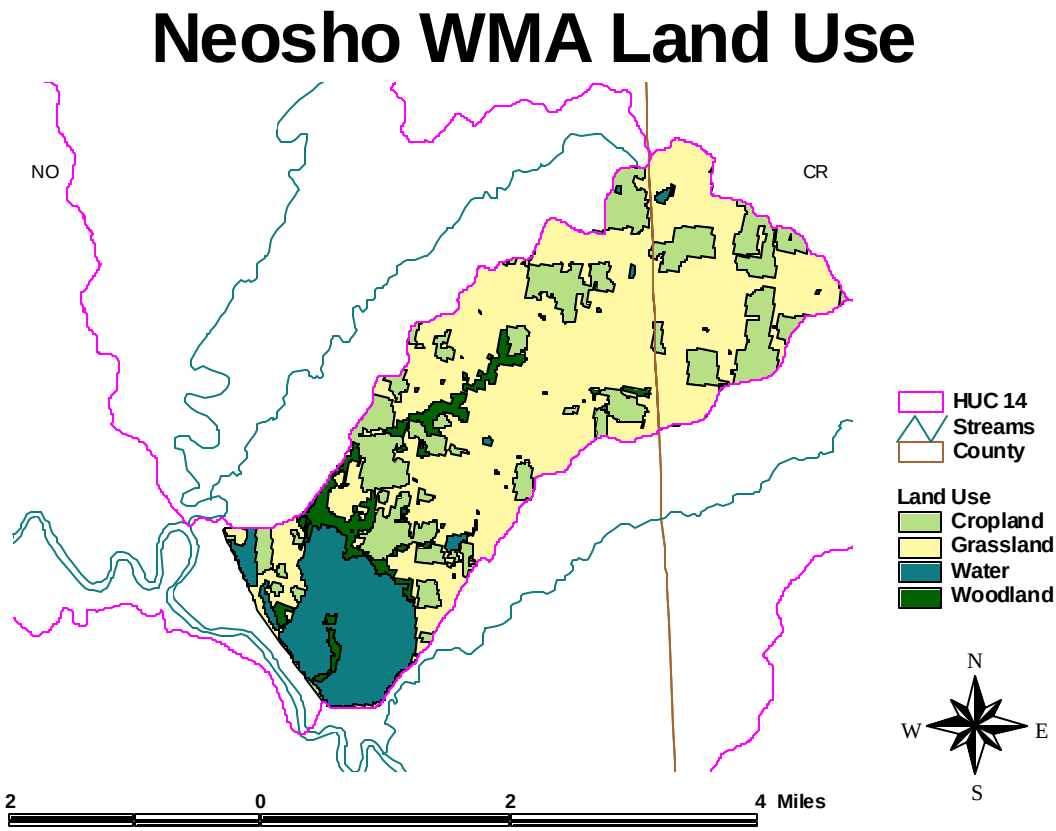
The population density within the watershed is 12.6 people per square mile. The City of St. Paul is near the watershed. Residents may have used lead-based paint prior to the ban in 1978.

Lead Shots: Hunters used lead shots for their hunting rifles before the phased ban between 1986 and 1991. In order for the lead from the shots to enter the water column, the water would need to be acidic. Over the period of record, the pH has near neutral averaging 8.1.

Mining: There is no mining or smelting activity in or near the watershed.

Background Levels: Carp may cause some resuspension of silt containing lead. Background levels of lead come from geological sources. Lead attached to silt becomes suspended during high flow events as soil along the banks is eroded. This silt may be transported from the Neosho River into the wetland during high flow events.

Figure 5



4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

The general inventory of sources within the drainage does provide some guidance as to areas of load reduction. The maximum, total hardness concentration over the period of record was 100 mg/L. Under that maximum condition, the Load Capacity is 0.0032 mg/L of lead.

Point Sources: A current Wasteload Allocation of zero is established by this TMDL because of the lack of point sources in the watershed. 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.

Nonpoint Sources: Lead loading comes predominantly from nonpoint source pollution. Given the runoff characteristics of the watershed, overland runoff can easily carry lead attached to silt into the streams. The Load Allocation within the wetland is chronic lead levels not to exceed 0.0029 mg/L.

Defined Margin of Safety: The margin of safety provides some hedge against the uncertainty of the lead endpoint. Therefore, the margin of safety will be 0.0003 mg/L (10%) taken from the load capacity to ensure that adequate load reduction occurs to meet the endpoint.

State Water Plan Implementation Priority: Because Neosho WMA is a state wildlife area, this TMDL will be a Medium Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Middle Neosho (HUC 8: 11070205) with a priority ranking of 24 (Medium Priority for restoration).

Priority HUC 11s: The watershed is within HUC 11 (010).

5. IMPLEMENTATION

Desired Implementation Activities

There is a very good potential that agricultural best management practices will improve the water quality in Neosho WMA. Some of the recommended agricultural practices are as follows:

1. Maintain conservation tillage and contour farming to minimize cropland erosion.
2. Install grass buffer strips along streams.
3. Reduce activities within riparian areas.

Implementation Programs Guidance

Fisheries Management - KDWP

a. Assist evaluation potential sources of lead to the wetland.

b. Advise counties on applicable wetland management techniques which may reduce sediment loading and cycling in wetland.

Nonpoint Source Pollution Technical Assistance - KDHE

a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities.

b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.

c. Evaluate any potential anthropogenic activities which might contribute lead to the wetland as part of an overall Watershed Restoration and Protection Strategy.

Water Resource Cost Share and Nonpoint Source Pollution Control Program - SCC

a. Apply conservation farming practices, including terraces and waterways, sediment control basins, and constructed wetlands.

b. Provide sediment control practices to minimize erosion and sediment transport.

Riparian Protection Program - SCC

a. Establish or reestablish natural riparian systems, including vegetative filter strips and streambank vegetation.

b. Develop riparian restoration projects.

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 agricultural producers on sediment management.

b. Provide technical assistance on buffer strip design and minimizing cropland runoff.

c. Continue to educate residents and landowners about nonpoint source pollution.

Time Frame for Implementation: Water quality improvement activities are encouraged at the local level prior to 2007. Funding for installing pollution reduction practices should be allocated within the wetland drainage after the year 2007. Evaluation of sediment sources to wetland and identification of potential management techniques should occur prior to 2007.

Targeted Participants: Primary participants for implementation will be agricultural producers within the drainage of the wetland. Initial work in 2007 should include local assessments by conservation district personnel and county extension agents to locate within the wetland drainage:

1. Total row crop acreage
2. Cultivation alongside wetland

Milestone for 2007: The year 2007 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, sampled data from Neosho WMA should indicate probable sources of sediment and lead and plans in place to initiate implementation.

Delivery Agents: The primary delivery agents for program participation will be the Kansas Department of Wildlife and Parks, 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 Extension.

Reasonable Assurances:

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

1. 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.

2. 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.

3. 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.

4. 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.

5. K.S.A. 82a-951 creates the State Water Plan Fund to finance the implementation of the *Kansas Water Plan.*

6. 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 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 to programs supporting water quality protection. This watershed and its TMDL are a Medium Priority consideration.

Effectiveness: Sediment control has been proven effective through conservation tillage, contour farming, and use of grass waterways and buffer strips. The key to success will be widespread utilization of conservation farming within the watersheds cited in this TMDL.

6. MONITORING

Additional data, to establish lead loading would be of value prior to 2007. Further sampling and evaluation should occur once before 2007 and once between 2007 and 2011.

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, March 4, and June 3, 2002.

Discussion with Interest Groups: Meetings to discuss TMDLs with interest groups include:
Kansas Farm Bureau: February 26 in Parsons and February 27 in Council Grove

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

Consideration for 303(d) Delisting: The wetland 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 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 2003-2007.

Bibliography

Liscek, Bonnie C. Methodology Used in Kansas Lake TMDLs [web page] Jul. 2001; http://www.kdhe.state.ks.us/tmdl/eutro.htm [Accessed 17 May 2002].

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