

Figure 1

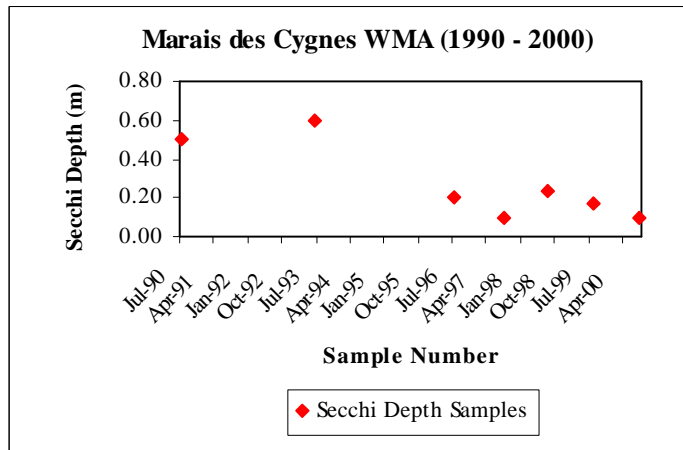


Figure 2

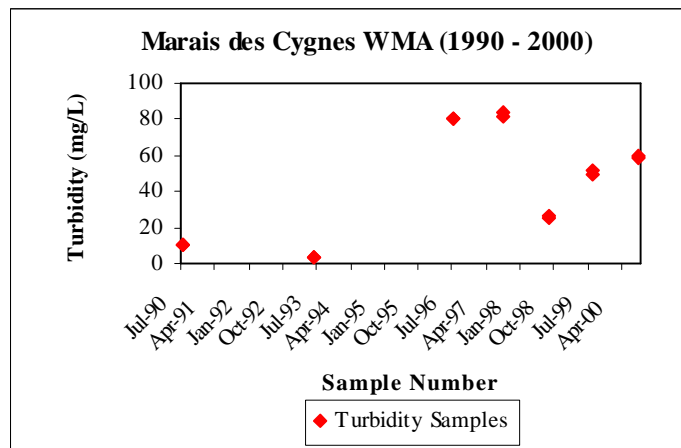
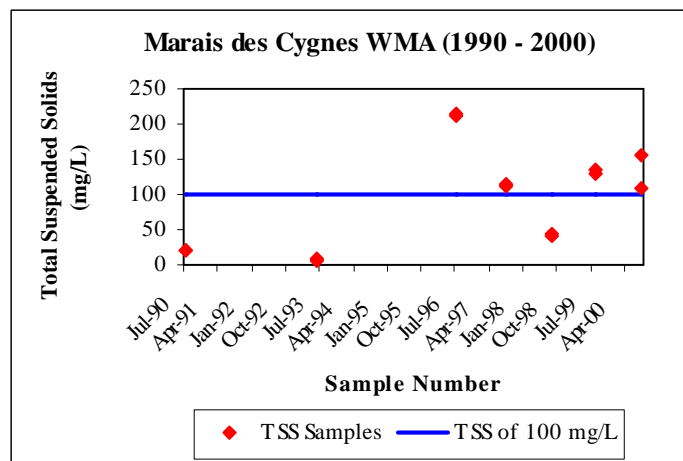
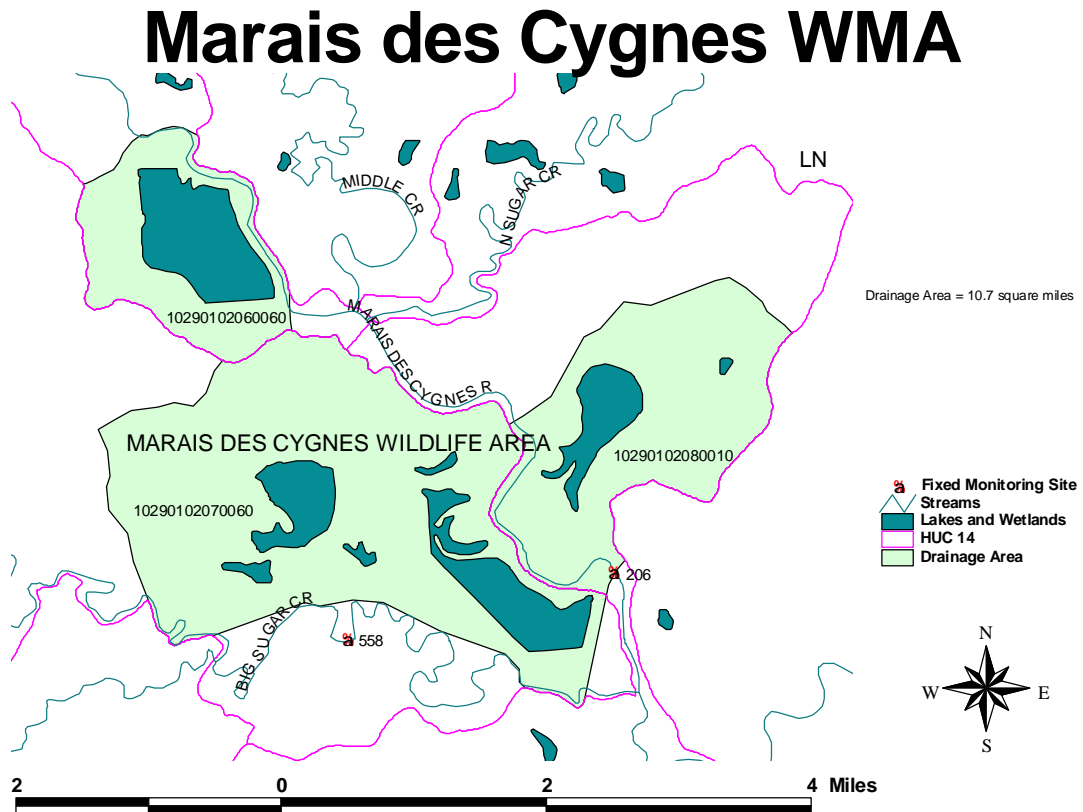


Figure 3



COLLECTION DATE	TOTAL SUSPENDED SOLIDS (mg/L)	TURBIDITY (formazin turbidity units)	SECCHI DEPTH (m)
7/31/90	20.00	10.60	0.50
7/31/90	20.00	10.60	
6/10/93	8.00	3.00	0.60
6/10/93	7.00	3.00	
7/15/96	216.00	81.00	0.20
7/15/96	212.00	80.00	
8/18/97	112.00	82.00	0.10
8/18/97	116.00	84.00	
8/11/98	42.00	27.00	0.24
8/11/98	44.00	25.00	
8/10/99	128.00	50.00	0.17
8/10/99	136.00	52.00	
8/8/00	108.00	60.00	0.10
8/8/00	156.00	59.00	

Figure 4



Interim Endpoints of Water Quality (Implied Load Capacity) at Marais des Cygnes WMA over 2005 - 2009:

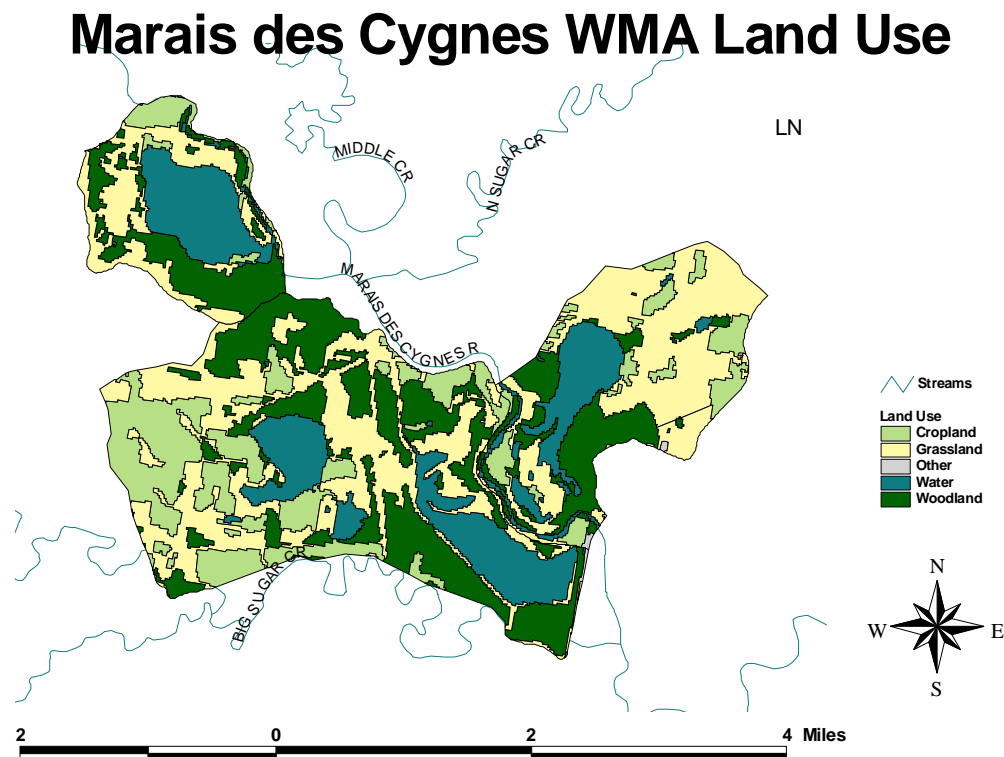
Ten percent or less of the samples taken from the wetland exceed 100 mg/l over 2005-2009. This TMDL endpoint meets water quality standards as measured and determined by Kansas Water Quality Assessment protocols. These assessment protocols are similar to those used to cite the stream segments in this watershed as impaired on the Kansas 1998 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 wetland, water quality standards are attained and full support of the designated uses of the wetland has been restored, therefore the narrative water quality standard pertaining to suspended solids would be attained.

3. SOURCE INVENTORY AND ASSESSMENT

Land Use: The cause of high concentrations of total suspended solids is partially due to cropland; land use coverage analysis indicates that 17.8% of the watershed is cropland (Figure 5). Soil from exposed land runs off into the wetland, increasing the concentration of total suspended solids.

Figure 5



Background Levels: There is great potential for carp to resuspend bottom sediments in this wetland. The carp gain access to the wetland when the Marais des Cygnes River floods. With the low water levels in the wetland, the activity of the carp effects the whole water column.

Sediment becomes suspended during high flow events as soil along the banks is eroded, and silt is transported from the Marais des Cygnes River into the wetland. Background levels of total suspended solids come from geological sources.

4. ALLOCATION OF POLLUTANT REDUCTION RESPONSIBILITY

More detailed assessment of sources and confirmation of the siltation impairment must be completed before detailed allocations can be made. The general inventory of sources within the drainage does provide some guidance as to areas of load reduction.

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: Siltation loading comes predominantly from nonpoint source pollution. The Load Allocation is total suspended solid concentrations not to exceed 90 mg/L.

Defined Margin of Safety: Because there will not be a traditional load allocation made for total suspended solids, the margin of safety will be framed around the desired endpoints of the total suspended solids standard. Therefore, evaluation of achieving the endpoints should use values set 10% less (10 mg/L) than the applicable criteria to mark full support of the aquatic life designated use of the lake in this watershed.

State Water Plan Implementation Priority: Because the Marais des Cygnes WMA is an outstanding national resource water, this TMDL will be a High Priority for implementation.

Unified Watershed Assessment Priority Ranking: This watershed lies within the Lower Marais des Cygnes (HUC 8: 10290102) with a priority ranking of 12 (High Priority for restoration).

Priority HUC 11s: The majority of the watershed is within HUC 11 (070).

5. IMPLEMENTATION

Desired Implementation Activities

A reduction in nonpoint source loads can be achieved. There is also a need to assess the fishery to ascertain its role in the chronic turbidity problems. 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. Advise county on applicable wetland management techniques which may reduce sediment cycling in lake.

Nonpoint Source Pollution Technical Assistance - KDHE

- a. Support Section 319 demonstration projects for reduction of sediment runoff from agricultural activities as well as nutrient management.
- b. Provide technical assistance on practices geared to establishment of vegetative buffer strips.

Water Resource Cost Share and Nonpoint Source Pollution Control Programs--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 and nutrient 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, nutrient and pasture management.
- b. Provide technical assistance on buffer strip design and minimizing cropland runoff.

Time Frame for Implementation: Pollutant reduction practices should be installed within the priority subwatersheds during the years 2002-2006, with minor follow up implementation, including other subwatersheds over 2006-2010.

Targeted Participants: Primary participants for implementation will be the Kansas Department

of Wildlife and Parks and agricultural producers within the drainage of the wetland. Initial work in 2006 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 2006: The year 2006 marks the midpoint of the ten-year implementation window for the watershed. At that point in time, sampled data from Marais des Cygnes WMA should indicate evidence of reduced phosphorus levels in the conservation pool elevations relative to the conditions seen over 1990-2000.

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 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 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 High 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 source loading and further determine mean summer wetland trophic condition, would be of value prior to 2005. Further sampling and evaluation should occur once before 2005 and twice between 2005 and 2009.

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 impairment which has occurred within the drainage and current condition of Marais des Cygnes WMA. Subsequent decisions will be made regarding implementation approach, follow up of additional implementation and implementation in the nonpriority subwatersheds.

Consideration for 303d Delisting: Marais des Cygnes WMA 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 criterion 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 during Fiscal Years 2002-2006.