SD Department of Environment & Natural Resources
Watershed Protection Program
Total Maximum Daily Load

Lake Byron Watershed, Beadle County South Dakota
March, 1999

These TMDLs were developed in accordance with Section 303(d) of the federal Clean Water Act and guidance developed by the US Environmental Protection Agency. The 1998 303(d) Waterbody List identified Lake Byron as impaired by a measure of Trophic State Index (TSI) which serves as an indicator of the trophic condition of the lake. Individual TMDLs for accumulated sediment and total phosphorus have been developed and are supported below. The recommended restoration alternatives have already been implemented for this project.

TMDL Summary for Total Phosphorus

Waterbody Name	**Lake Byron**
Hydrologic Unit Code (HUC)	10160006
TMDL Pollutant	**Total Phosphorus**
Water Quality Target	Inlake total phosphorus TSI of 70 (yearly average)
TMDL Goal	50% reduction in total phosphorus input
303(d) Status	1998 303(d) Waterbody List, Priority 1, Pages 21, 29, 33
Impaired Beneficial Uses	Warmwater marginal fish life propagation, immersion recreation, limited contact recreation
Reference Document	Lake Assessment Project Report Lake; Final Report Lake Byron Watershed Project

TMDL Summary for Accumulated Sediment

Waterbody Name	**Lake Byron**
Hydrologic Unit Code (HUC)	10160006
TMDL Pollutant	**Accumulated Sediment**
Water Quality Target	Decrease annual inlake sediment accumulation by 1200 tons/year
TMDL Goal	50% reduction in sediment loading
303(d) Status	1998 303(d) Waterbody List, Priority 1, Pages 21, 29, 33
Impaired Beneficial Uses	Warmwater marginal fish life propagation, immersion recreation, limited contact recreation
Reference Document	Lake Assessment Project Report; Final Report Lake Byron Watershed Project

I. Executive Summary:

• Waterbody Description and Impairments

Lake Byron is a comparatively large prairie pothole lake located in Beadle County, South Dakota (Figure 1). Lake Byron is a meandered lake. Water levels fluctuate widely with the amount of annual rainfall. Lake acreage varies from 1250 acres at low water mark to slightly more than 1900 acres at full capacity.

A USGS survey completed in 1992 established a water surface elevation of 1247.5 feet MSL, a lake capacity of 10,645 acre-feet and a surface area of 1907 acres. At that time average lake depth was determined to be 5.6 feet with a maximum measured depth of 7.0 feet.

The contributing watershed of Lake Byron is approximately 116,140 acres located in Beadle, Spink, and Clark counties, South Dakota (Figure 2). The Foster Creek drainage, which was diverted to the lake in the late 1930's, includes approximately 80 percent of the watershed. Approximately 63 percent of the land in the watershed is cropland with most of the remainder left to grassland and pasture.

Studies completed by DENR during 1979 to 1982 determined that Lake Byron was nutrient enriched. Data collected from the three lake tributaries indicated high concentrations of phosphorus and nitrogen entered Lake Byron (Lake Byron WQSA Report, 1985).

The goal of these TMDLs is to restore the water quality of Lake Bryon to a level that allows the lake to meet its beneficial uses of warmwater marginal fish life propagation, immersion recreation and limited contact recreation.

Stakeholders

Beadle, Spink, Clark Conservation Districts	City of Huron
Lake Byron Development Association	SDGFP
Lake Byron Watershed District	SDDENR
James River Water Development District	NRCS
Beadle County Sportsman's Club	USFWS

Intent to Submit as a Clean Water Act Section 303(d) TMDL

In accordance with Section 303(d) of the Clean Water Act, the South Dakota Department of Environment and Natural Resources submits for EPA, Region VIII review and approval, the total phosphorus and accumulated sediment Total Maximum Daily Loads (TMDLs) for Lake Byron as provided in this summary and attached documents. These TMDLs have been established at a level necessary to meet the applicable water quality standards for nutrients and sediment with consideration of seasonal variation and a margin of safety. By significantly reducing the inflow of sediment and nutrients to Lake Byron, the following designated use classifications will be protected through

implementation of this TMDL: immersion recreation, limited contact recreation, and warmwater marginal fish life propagation.

II. Problem Characterization:

Maps

Maps are included that show Lake Byron, Beadle County, South Dakota (Figure 1) and the Lake Byron Watershed (Figure 2).

Waters Covered by TMDL

Lake Byron is the benefactor of this TMDL.

Rational for Geographic Coverage

The contributing watershed of Lake Byron consists primarily of the Foster Creek drainage that was diverted to the lake in the late 1930's to provide supplemental water and stabilize lake levels. The present watershed encompasses approximately 116,140 acres in northeastern South Dakota. Approximately three-fourths of the watershed lies in the James River Basin, a gently undulating plain at elevations of 1240 to 1500 feet msl. Most of the Foster Creek drainage occupies lower watershed elevations (1247 to 1310 feet msl). The area drains south to the James River. Drainage is generally poorly developed in the basin. Much of the precipitation collects in glacier-formed depressions until it evaporates or percolates into the ground. Lake Byron has a history of high in-lake phosphorus and nitrogen concentrations dating back at least 30 years. Much of this nutrient enrichment was probably derived from the watershed that is largely overlain with erodible glacial loams with high organic and nutrient content, and the effects of various agricultural activities on these soils. The main soil in the Foster Creek drainage is Great Bend Silt Loam. According to 1991 data, 63 percent of the watershed acreage is used for crop production with only 28 percent left to grassland. The remaining 9 percent include farmsteads and miscellaneous land uses. These conditions reemphasize the importance of preventing soil erosion in this drainage to reduce the large nutrient loads presently impacting Lake Byron.

Pollutants of Concern

Total Phosphorus
Accumulated Sediment

Use Impairments or Threats

The beneficial uses impaired by excessive loads of total phosphorus and accumulated sediment include warmwater marginal fish life propagation, immersion recreation and limited contact recreation.

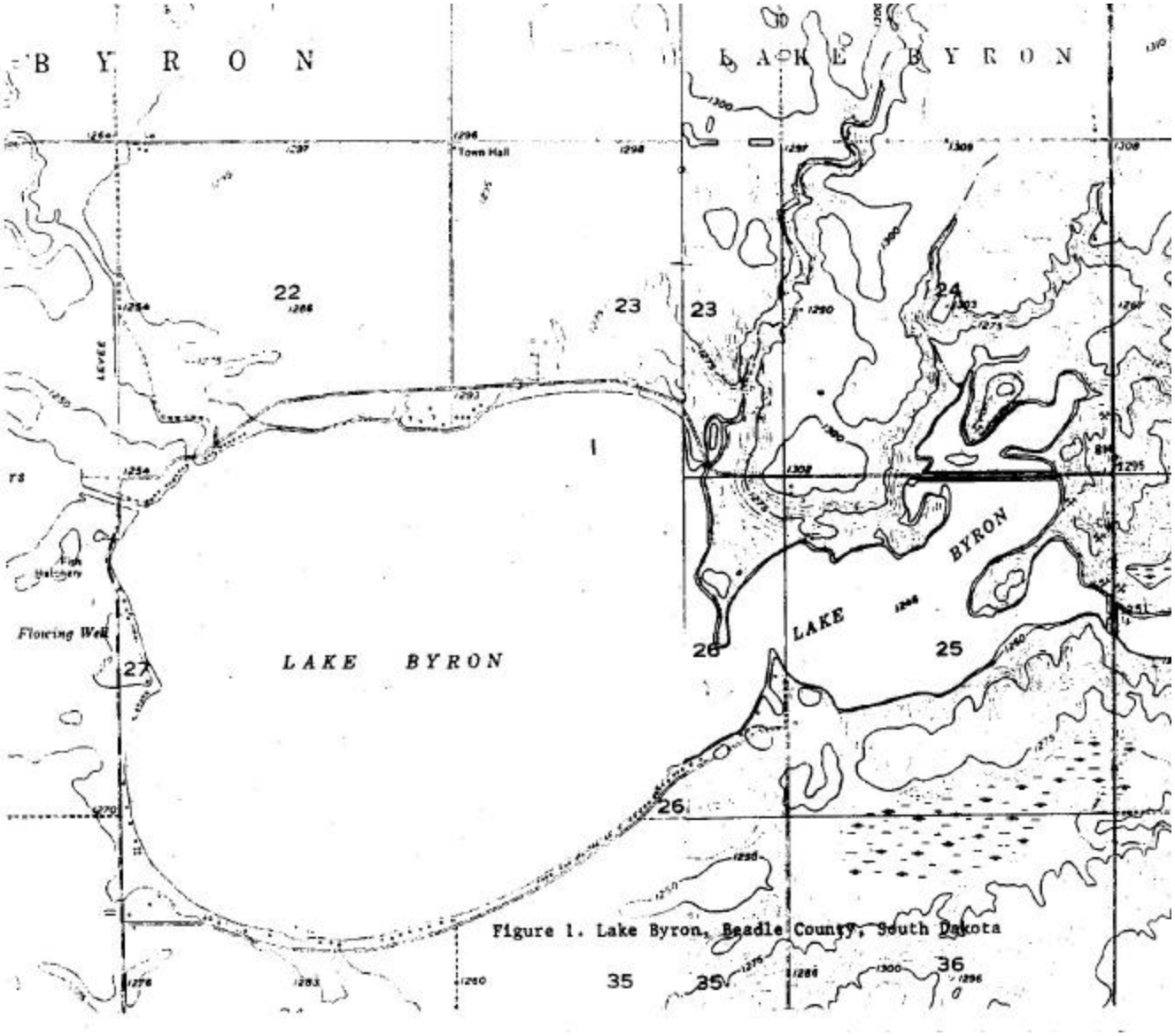

Figure 1. Lake Byron

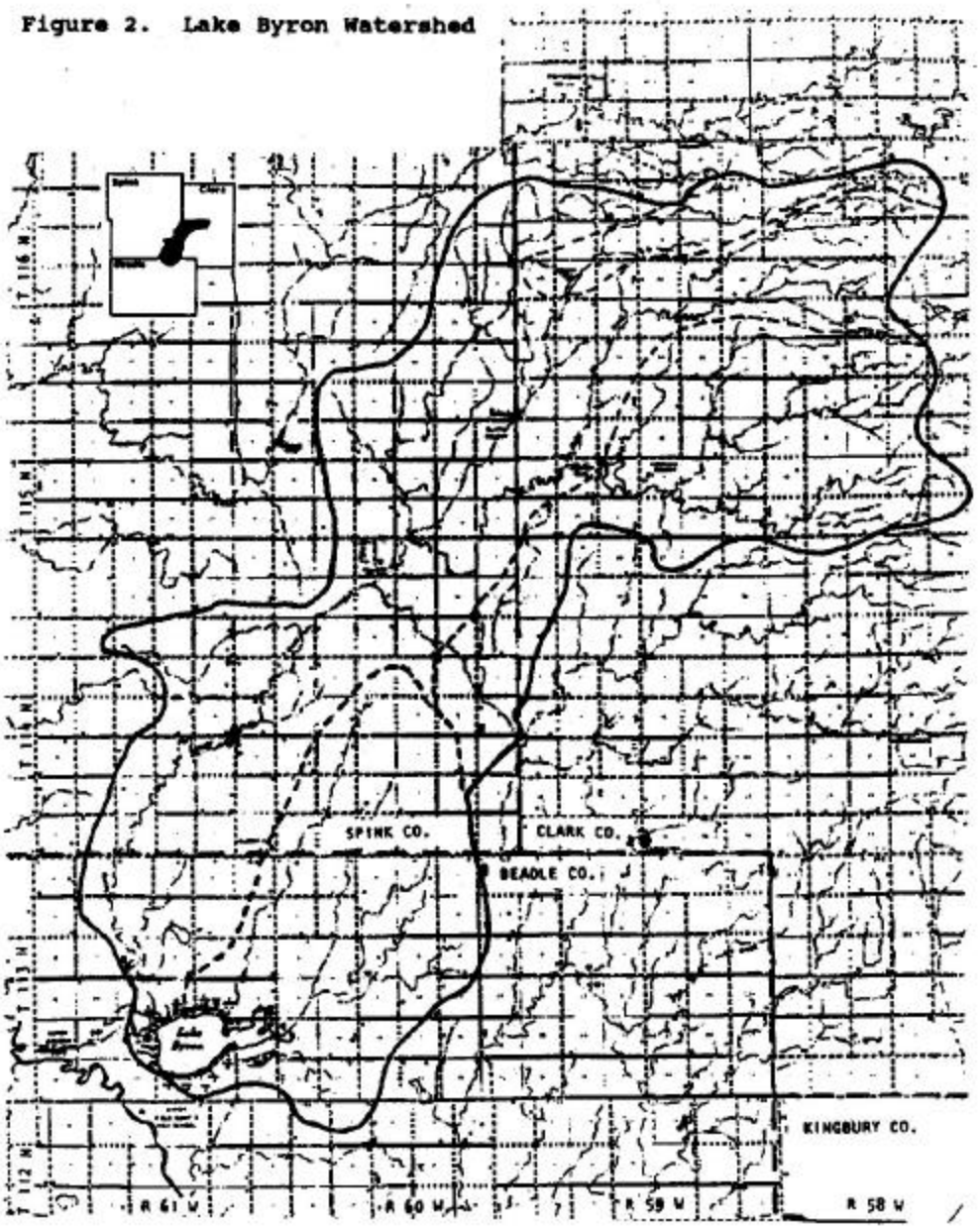

Figure 2 Lake Byron Watershed

Excessive nutrients stimulate aquatic plant growth, especially the blue-green algae *Aphanizomenon flos-aquae*. Accumulated sediment decreases water depth and often covers bottom structures that hold and attract game fish. Shallow water will warm more rapidly than deep water and will hold less oxygen. A shallow warmwater lake with overabundant algae growth will tend to favor rough fish over game fish and the quality of the fishery will decline. Excessive algae growth and in-lake sediment detracts from recreational uses such as swimming and boating. Few people will swim or boat in a green and muddy lake.

A watershed and lakeshore restoration project was initiated by local concerns and funded by a combination of federal, state, and local sources.

Probable sources

The source of sediment has been identified as sheet and rill erosion from cropland, grassland, and woodland, and from gully, streambank, and lakeshore erosion. Watershed nutrients are deposited in the lake along with the sediment. Several animal feeding operations also contribute nutrient loadings to the lake.

III. TMDL Endpoint

Description

The TMDL for this waterbody is a 50 percent decrease in total phosphorus input and a 50 percent decrease in sediment deposition into Lake Byron.

Endpoint Link to Surface Water Quality Standards

Total phosphorus

For the years 1989 through 1994, TSI total phosphorus values ranged between 83.75 and 90.21. It is estimated that a 50% decrease in total phosphorus inlake will reduce the TSI to at least 73.8. Based on this estimate, the target endpoint has been adjusted to a total phosphorus TSI of 70 as a yearly average.

Accumulated Sediment

The TMDL endpoint shall be a decrease in annual inlake sediment accumulation by 1200 tons / year. The pre-project inlake accumulated sediment was estimated to be 2,400 tons per year (350 tons from tributaries and 2,050 tons from shoreline erosion).

Reducing inflow of sediment and nutrients should lead to better water quality, less enrichment, greater clarity, and should have a positive effect on the fishery of Lake Byron. Reducing nutrients should, over time, reduce the amount and extent of algal blooms and other aquatic vegetation in the lake. Reducing sediment deposition should stabilize lake-bottom habitat in favor of a healthier fishery.

IV. TMDL Analysis and Development

Data Sources

Much of the Lake Byron TMDL is based on the DENR 1992 Lake Assessment Project Report. Implementation activities are based on the Final Report for the Lake Byron Watershed Project prepared by the Beadle Conservation District, 1997.

Analysis Techniques or Models

The Lake Assessment Project, conducted from April, 1991 to late summer of 1992, included water quality monitoring of Lake Byron, Foster Creek, and one of the lake's two minor tributaries. Results of the lake assessment project and follow-up monitoring performed after implementation indicate that the high phosphorus concentrations recorded in the past appear to be decreasing (from 0.437 mg/l, 1991-1992 to 0.234 mg/l, 1998). This improving trend represents a 46 percent reduction in phosphorus. However, additional sampling is recommended to confirm actual improvements.

The mean total phosphorus TSI was 87.1. A 50% decrease in total phosphorus to meet the TMDL goal would reduce the TSI value to 73.8. The TSI measured in early winter 1998 for total phosphorus and Secchi depth was 68.7; however, this reading probably represents minimal phosphorus releases during winter. Again, additional sampling is recommended to establish true values to represent yearly readings.

The Lake Assessment Study indicated that the tributaries were contributing approximately 350 tons of sediment per year to the lake while lakeshore erosion was estimated by NRCS at approximately 2,050 tons per year. A 50% reduction in sediment would cut the sediment load to 1,200 tons per year from both sources combined. Most of the lakeshore erosion was identified from critical areas amounting to 3,410 linear feet of shoreline. A time allowance is required for recent watershed implementation activities to take full effect in reducing sediment delivery to the lake.

The U. S. Geological Survey in Cooperation with DENR and the Beadle Conservation District (BCD) conducted a sediment depth survey. The results of that investigation showed 72.6 million cubic yards of sediment had accumulated in the lake basin to an average depth of approximately 25 feet (7.6m) over the life span of the lake. That volume of sediment represents the loss of approximately ¾ of the lake's water capacity since the basin was formed 8,000 to 10,000 years ago. Sediment removal through dredging may be a considered alternative to the sediment problem if the recommended BMPs do not meet the TMDL goal, but funding for a multi-year dredging project may be a significant challenge. However, it is anticipated that activities implemented in the watershed and along critical shoreline erosion sites will be sufficient to meet the TMDL goal.

A lakeshore inspection was conducted around the periphery of Lake Byron during 1991 by BCD to verify the conclusions made by an earlier shoreline erosion survey conducted by the Soil Conservation Service, and to note any recent changes in the intensity and pattern of lakeshore erosion. Probable sources of additional lake

sediments as well as the high nutrient levels found in Lake Byron were investigated by means of a watershed land-use survey conducted by BCD during 1991. This survey located livestock operations, eroding croplands, and other potential sources of nutrients and sediment. A 1985 WQSA study indicated that failing septic tank systems of some lakeshore residences also might be significant contributors of nutrients to the lake.

The lake assessment study concluded that the major sources of nutrients to the lake are likely to be watershed livestock operations and possible dumping of animal waste material into tributary drainage channels. Secondarily, cropland runoff also contributes nutrients. The lake assessment study recommended the following restoration activities: 1) establish animal waste management systems and animal feeding areas; 2) implement Best Management Practices on crop lands and pastures; 3) stabilize stretches of eroding stream and lake banks; 4) plant grass and trees for cover and filter; 5) establish grazing management systems; and 6) construct sediment basins and other applicable measures to further restoration.

Seasonality

Seasonality was inherent in the Lake Byron TMDL since the assessment study evaluated the cumulative impacts of the various seasons on the waterbody. The assessment of the major tributary to Lake Byron (Foster Creek) was performed from spring through autumn. Some of the implementation practices are seasonal in nature, i.e. conservation tillage, fertilizer and pesticide management, and grazing management.

Margin of Safety

The margin of safety for the Lake Byron TMDL is that the implementation activities were developed with a high level of detail on a site-specific basis and were based on the technically accurate Lake Assessment Project Report. The report and subsequent implementation were done in a scientifically sound manner that involved on-site investigation, collaborative efforts with professional NRCS field personnel, and quality control data collection, analysis, and interpretation. Adjustments to watershed Best Management Practices will be made as conditions change and are warranted.

The margin of safety continues to be met by accomplishments of the individual implementation objectives as follows (See Implementation section for further explanation of recommendations):

> **Objective 1.** Dissemination of information continues through conservation district newsletters and personal contacts with area producers.
>
> **Objective 2.** The actual number of conservation tillage acres reported was 4,642; however more acres were planted using no-till or minimum till but not reported for documentation when it was discovered the cost-share for this practice was depleted.

Objective 3. In lieu of planting all 200 acres in filterstrips, the following activities were implemented to slow nutrients and sediment from entering the lake: 300 trees were planted and 7,500 feet of shoreline were fenced to exclude cattle from the riparian zone surrounding the lake and from the lake shore itself.

Objective 4. The streambank sites were stabilized and four ponds were constructed. Two other pond sites were identified; however, the watershed areas above the sites were too large for U. S. Fish and Wildlife technology. One dam was constructed which was not in the original work plan but serves as a sediment trap. It is recommended that these dams be maintained by periodic removal of accumulated sediment.

Objective 5 The assessment study recommended restoration of 3,410 feet of shoreline. A total of 5,000 feet was stabilized during the implementation activity.

Objective 6. Two of three animal waste management systems were installed. One is on hold (one went out of business). Four animal feeding areas were installed. It is hoped that livestock producers in the watershed will elect to have additional systems and areas installed in the future as these features continue to be incorporated into plans and specifications for their operations.

V. Allocation of TMDL Loads or Responsibilities:

Wasteload Allocation

There are no point sources of pollutants of concern in this watershed. Therefore, the "wasteload allocation" component of this TMDL is considered a zero value. The TMDL is considered wholly included within the "load allocation" component.

Load Allocation

Analysis of nutrient and sediment loading to Lake Byron during the Lake Assessment Study revealed that Foster Creek was contributing approximately 93 % of the total yearly phosphorus load and approximately 92 % of the total yearly sediment load to the lake.

Loadings from a monitored unnamed tributary fell within acceptable (permissible) limits during 1991 (Lake Assessment Study, 1992). Sediment from tributary sources is estimated at 350 tons per year. Additional sediment load to the lake is due to shoreline erosion, estimated at approximately 2,050 tons (Lake Assessment Study, 1992).

Allocation of Responsibility

During 1992, the Department of Environment and Natural Resources produced a report of a Lake Assessment Project on Lake Byron conducted from November, 1990 to the summer of 1992. Based upon information available at that time, recommendations

made for lake restoration included management of animal waste and animal feeding areas, implementing best management practices in the watershed, and stabilizing streambanks and lake shoreline to decrease sediment loading. During 1993, the Beadle Conservation District agreed to sponsor an implementation project to address the specific recommendations of the Lake Assessment Project. The implementation project began during October 1993, and was completed during December 1997. Total expenditures exceeded $850,000 with $211,150 expended from Section 319 EPA grant funds and over $323,000 raised in local match. The specific activities of the implementation project are found in the section VI of this document.

Some goals of the project were realized and exceeded while others were more difficult to attain. The Conservation Reserve Program greatly assisted in getting cropland planted to grass. Grass filterstrips were more difficult to implement. Tree shelterbelts were planted; however not to the degree originally planned. The conservation tillage program was a highly successful portion of the project. More shoreline stabilization was installed than originally planned. Cabin owners around the lake became involved in private stabilization. The SD Department of Game, Fish and Parks stabilized some of their shoreline also. Much was accomplished through the implementation project, but there is a need to stabilize more shoreline of Lake Byron. Many Best Management Practices were implemented in the watershed, but there are always opportunities to do more.

VI. Implementation:

The Section 319 implementation project goal was to restore full beneficial uses of Lake Byron by decreasing the amount of sediment and nutrients entering from the watershed by 50 percent and reducing the fecal coliform bacteria levels to within state standards. To accomplish the goal, six major objectives were developed. Following each objective is the actual work accomplished in implementing the 319 project.

Objective 1. *Implement a full watershed project by making use of the information gained from the Foster Creek Riparian Demonstration Project. To be accomplished by disseminating information gained through the Foster Creek Riparian Demonstration Project to operators in the watershed through news articles, tours, public meetings, existing newsletters and personal contacts.*

Accomplishment: A public meeting was held for operators at the Lake Byron Lodge. A tour was taken to various sites in the watershed as well as viewing of large sections of shoreline stabilization. District Supervisors, NRCS personnel, Department of Agriculture and DENR officials were invited. The district newsletter covered progress regularly. The project coordinator shared information as he made personal contact with operators throughout the watershed.

Objective 2. *Reduce sediment and nutrient loading from the watershed by 50 percent through installation of conservation tillage systems on 5,000 acres of cropland using conservation tillage, crop residue use, pesticide and fertilizer management, grass waterways, and windstrip cropping. Plant 150 acres of trees and 1,000 acres of grass.*

Accomplishment: The conservation tillage was implemented on 4,642 acres using no-till or minimum till. Grazing management plans were completed for 3,500 acres. Operators were instructed in proper use of pesticides and fertilizer. Grass was planted on 980.9 acres. Sixty-eight acres of trees were planted.

Objective 3 *Improve water quality sufficiently to support fish and other aquatic organisms through the restoration of riparian areas by planting 200 acres of grass bufferstrips to include field borders.*

Accomplishment: This was a difficult practice to sell to producers. Seventy acres were planted to filterstrips. Another 7,500 feet along the shoreline was fenced 30 to 50 feet back from the lake to keep cattle out of the lake. A total of 300 Bur Oak trees were planted to assist in stabilizing the shoreline and improve the riparian area.

Objective 4 *Decrease sediment carried by tributaries through the construction of 6 sediment basins and complete 3 streambank stabilization activities to reduce the amount of sediment entering the lake, create wildlife habitat, and provide water for livestock.*

Accomplishment: Four sediment ponds and three streambank stabilization sites were completed. The streambank stabilization activities consisted of planting approximately 100 Bur Oak trees at each of three different sites where beaver had destroyed the previously existing trees. One dam was constructed.

Objective 5 *Reduce sediment entering the lake from shoreline erosion by 50 percent by stabilizing 3,410 feet of the most critical area through complete excavation, rip-rap, grass seeding and fencing.*

Accomplishment: Stabilization of the lake and streambank shoreline was accomplished by the use of the Rosgen-type method of streambank stabilization with the use of native plants, trees, and rocks as much as possible. During the winter of 1994-1995, 1,920 feet of hard shoreline stabilization work was completed on the north shore of Lake Byron. Excavation was done and rip-rap placed. During the summer of 1996, another 800 feet was stabilized near the boat ramp and on the hogsback. Three hundred willow trees were planted on the hogsback area. During the winter of 1997 another 800 feet was stabilized in the northwest park area and along the east side of the south boat ramp. Nearly 40 cabin owners completed shoreline stabilization on private property. All activities resulted in over 5,000 feet of shoreline stabilized.

If the shoreline stabilization is successful in preventing lakeshore erosion, the amount sediment loading to the lake will be decreased by nearly 85% (2,400 tons/year to 350 tons/year) and the goal of the accumulated sediment TMDL will be met. Effectiveness will be measured by the level of success achieved in reducing or preventing future shoreline erosion in the previously identified critical areas.

Objective 6 *Reduce nutrient loading into the lake by constructing ten animal feeding areas and 4 animal waste management systems.*

Accomplishment: Two animal waste management systems were installed. One previously identified site is no longer in business and the other is on hold while the owner is investigating a large commercial hog business. Four animal feeding areas were installed; two of which were highly visible areas near the lake. Both previously had cattle standing in the lake during summer. By moving the feeding areas, the cattle are no longer in the lake.

It is the Best Professional Judgement of DENR that the goal of 50 percent reduction in sediment and nutrient will be accomplished through the implementation activities of the 319 program. The TMDL may be modified in the future after sufficient time for response has elapsed.

VII. Public Participation

Summary of Public Review

The Lake Byron Assessment Project was begun in November, 1990 under a contract/letter of agreement between DENR and the Beadle Conservation District (BCD). The Section 319 Implementation Project began October 1, 1993. Beadle Conservation District agreed to sponsor the project and secure the needed local match. The total budget for implementation was $864,925 with an EPA grant award of $245,275. Accrued local match totaled $323,263. In June, 1995, The project was awarded a South Dakota Consolidated Water Facilities Construction Program Grant in the amount of $30,000 to assist shoreline stabilization activities. The application was presented in public forum to the State Board of Water and Natural Resources for funding consideration.

In addition to EPA and DENR support, funds also were secured from the South Dakota Department of Game, Fish and Parks, the South Dakota Conservation Commission, the James River Water Development District, and the Lake Byron Association. A number of agencies and organizations were involved with various aspects of the implementation project, including:

Beadle, Spink and Clark Conservation Districts: Beadle Conservation District was the project sponsor. All district employees addressed all facets of the project, including

planning, information and education, monitoring and follow-up, and assistance with BMP implementation.

Lake Byron Development Association and Lake Byron Watershed District: Provided local direction and financial and administrative support.

Beadle County Commissioners and the City of Huron, South Dakota: Provided manpower, equipment as needed and in-kind financial support.

SD DENR: Provided technical assistance and grant administration.

SD GF&P: Provided technical expertise and in-kind financial support

USDA / NRCS: Provided technical assistance for BMP implementation and financial programs available to install conservation practices.

James River Water Development District: Provided technical and financial support.

Lake Byron landowners and operators: Provided cost share support to install conservation practices.

Beadle County Sportsman's Club: Provided financial and in-kind support.

U. S. Fish and Wildlife Service: Provided financial and in-kind support through the Pond Development Program.

- ***Summary of Public Review***

A record of the public involvement in the review of this TMDL as submitted is summarized below:

Electronic media	***Mailings***	***Public Comments Received***
December 1998 Assessment summary added to department website **March 1999** TMDL Summary posted on department website	**Interested Parties** March 10, 199 **Stakeholders** March 10, 1999 **Daily Newspaper** March 8, 1999	Comments received during project meetings and review of the draft report and findings were considered

VIII. Supporting Development Documents (attached)

Lake Assessment Project Report Lake Byron Beadle County, South Dakota. South Dakota Lake Assessment Program, Division of Water Resources Management, South Dakota Department of Environment and Natural Resources, December, 1992.

Lake Byron Watershed Project, Section 319 Project Implementation Plan. Sponsor: Beadle Conservation District. South Dakota Department of Environment and Natural Resources, July, 1993.

Section 319 Nonpoint Source Control Program Watershed Project Final Report. Lake Byron Watershed Project. Beadle Conservation District, December, 1997.

Lake Byron. 1995 South Dakota Lakes Assessment Final Report. South Dakota Department of Environment and Natural Resources, August, 1996.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 500
DENVER, CO 80202-2466

APR 13 1999

Ref: Ref: 8EPR-EP

Nettie Myers, Secretary
Department of Environment and Natural Resources
Joe Foss Building
523 East Capitol
Pierre, South Dakota 57501-3181

Re: TMDL Approvals
Lake Bryon
Elm Lake
Lake Faulkton
Lake Hendricks
Lake Hiddenwood
Lake Madison/Brant
McCook Lake
Ravine Lake
Redfield Lake
Swan Lake

Dear Ms. Myers:

We have completed our review of the total maximum daily loads (TMDLs) as submitted by your office for the subject waterbodies. In accordance with the Clean Water Act (33 U.S.C. 1251 et. seq.), we approve all aspects of the TMDLs as developed for these water quality limited waterbodies as described in Section 303(d)(1). We acknowledge that these particular TMDLs for the various lakes are based primarily on a voluntary and incentive-based approach to implementation.

Based on our review, we feel the separate TMDL elements listed in the enclosed checklists adequately address the pollutants of concern, taking into consideration seasonal variation and a margin of safety.

For years, the State has sponsored an extensive clean lakes program. Through the lakes assessment and monitoring efforts associated with this program, priority waterbodies have been identified for clean up. It is reasonable that these same priority waters have been a focus of the Section 319 nonpoint source projects as well as one of the priorities under the State's Section 303(d) TMDL efforts.

In the course of developing TMDLs for impaired waters, EPA has recognized that not all impairments are linked to water chemistry alone. Rather, EPA recognizes that "*Section 303(d) requires the States to identify all impaired waters regardless of whether the impairment is due to toxic pollutants, other chemical, heat, habitat, or other problems.*" (see 57 Fed. Reg.

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33040 for July 24, 1992). Further, EPA states that "*...in some situations water quality standards -- particularly designated uses and biocriteria -- can only be attained if nonchemical factors such as hydrology, channel morphology, and habitat are also addressed. EPA recognizes that it is appropriate to use the TMDL process to establish control measures for quantifiable non-chemical parameters that are preventing the attainment of water quality standards.*" (see Guidance for Water Quality-based Decisions: The TMDL Process; USEPA; EPA 440/4-91-001, April 1991; pg.4). We feel the State has developed TMDLs that are consistent with this guidance, taking a comprehensive view of the sources and causes of water quality impairment within each of the watersheds. For example, in several of the TMDLs, the State considered nonchemical factors such as lake depth and its relationship to the impaired uses. Further, we feel it is reasonable to use factors such as lake depth as surrogates to express the final endpoint of the TMDL.

Thank you for your submittal. If you have any questions concerning this approval, feel free to contact Bruce Zander of my staff at 303/312-6846.

Sincerely,

Max H. Dodson
Assistant Regional Administrator
Office of Ecosystems Protection and
Remediation

Enclosures

Enclosure

APPROVED TMDLS

Waterbody Name*	TMDL Parameter / Pollutant	Water Quality Goal/Endpoint	TMDL	Section 303(d)1 or (d)3 TMDL	Supporting Documentation
Lake Bryon*	phosphorus	TSI < 70	50% reduction in phosphorus loads	§303(d)(1)	Lake Assessment Project Report, (Lake Byron excerpt) (SD DENR, August 1996) Lake Assessment Project Report, Lake Byron, Beadle County, SD (SD DENR, December 1992) Section 319 Nonpoint Source Control Program Watershed Project Final Report, Lake Byron Watershed Project (Beadle CD, December 31, 1997) Lake Byron Watershed Project Section 319 Project Implementation Plan (SD DENR, July 1993)
	sediment	Decrease annual inlake sediment accumulation by 1200 tons/year	50% reduction in sediment loads	§303(d)(1)	
Elm Lake*	phosphorus	N:TDP ratio > 7.5 averaged over growing season	60% reduction in phosphorus loads	§303(d)(1)	Phase I Watershed Assessment Final Report, Elm Lake, Brown Country, South Dakota (SDDENR, September1998)
Lake Faulkton*	phosphorus	TSI < 90	35% reduction in phosphorus loads	§303(d)(1)	Lake Assessment Project, Lake Faulkton, Faulk County, South Dakota (SD DENR, 1996)
	sediment	Increased average lake depth by 6 feet over 15.5 acres	Remove 150,000 cubic yards of lake sediment	§303(d)(1)	
Lake Hendricks*	phosphorus	TSI < 65	50% reduction in phosphorus loads	§303(d)(1)	Diagnostic/Feasibility Study Report, Lake Hendricks/Deer Creek Watershed, Brookings County, South Dakota; Lincoln County, Minnesota (SD DENR, February 1993)
	sediment	Increased average lake depth by 6 feet over 100 acres	Remove 1 million cubic yards of lake sediment	§303(d)(1)	

Waterbody Name*	TMDL Parameter / Pollutant	Water Quality Goal/Endpoint	TMDL	Section 303(d)1 or (d)3 TMDL	Supporting Documentation
Lake Hiddenwood*	phosphorus	Decreased winter fish kills and increased visitor days	Maintenance of increased depth regime plus 2% decrease in phosphorus loads	§303(d)(1)	Lake Hiddenwood Restoration and Protection Project Preproposal (North Central RC&D; August 1993) Lake Hiddenwood Restoration and Protection Project Implementation Plan for FY 94 (1994) Preliminary Report; Hiddenwood Recreation Damsite and Reservoir, North Central RC&D (RC-050-WA), Walworth County, SD (USDA, SCS; August 1978)
	sediment	Increased depth corresponding to increasing volume by 53 acre-feet	Maintenance of increased depth regime plus 5% decrease in sediment loads	§303(d)(1)	
Lake Madison*	phosphorus	TSI < 50	50% reduction in phosphorus loads	§303(d)(1)	Phase I Watershed Assessment Final Report - Madison Lake/Brant Lake, Lake County South Dakota (SD DENR, October 1998)
Lake Brant*	phosphorus	TSI < 50	50% reduction in phosphorus loads	§303(d)(1)	
McCook Lake*	sediment	Increased average lake depth by 4.5 feet over 183 acres	Remove 1.7 million cubic yards of lake sediment	§303(d)(1)	Diagnostic/Feasibility Study Report McCook Lake, Union County, South Dakota (SD DENR, March 1990)
Ravine Lake*	phosphorus	TSI of <84	70% reduction in phosphorus loads	§303(d)(1)	Diagnostic\Feasibility Study Report, Ravine Lake, Beadle County, SD (SD DENR, July 1990) AGNPS Modeling of the Ravine Lake Watershed, Huron, SD (SD DENR, July 1988)
	fecal coliform	< 400/100 mL fecal coliform counts	< 400/100 mL fecal coliform counts	§303(d)(1)	
Redfield Lake*	phosphorus	TSI < 90	45% reduction in total phosphorus load	§303(d)(1)	Lake Assessment Project Report, Lake Redfield, Spink County, SD (SD DENR, May 1993)
	sediment	Increased average lake depth by 5 feet over 31 acres	Remove 250,000 cubic yards of lake sediment	§303(d)(1)	

Waterbody Name*	TMDL Parameter / Pollutant	Water Quality Goal/Endpoint	TMDL	Section 303(d)1 or (d)3 TMDL	Supporting Documentation
Swan Lake*	phosphorus	TSI < 65	60% reduction in phosphorus loads	§303(d)(1)	Diagnostic/Feasibility Study Swan Lake; Turner County, South Dakota (SD DENR, January 1993)
	sediment	TSI (secchi depth) < 65	50% increase in secchi depth	§303(d)(1)	

* An asterisk indicates the waterbody has been included on the State's Section 303(d) list of waterbodies in need of TMDLs.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Lake Bryon
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ TMDLs result in maintaining and attaining water quality standards	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ Water Quality Standards Target	X	Targets were established based on trophic status and sediment loading rate. These are reasonable indicators to use in expressing the TMDL targets since they are quantifiable and relate to the use impairments.
■ TMDL	X	The TMDLs are expressed in terms of annual phosphorus and sediment load reductions. This is a reasonable way to express the TMDL for lakes since it takes lakes a period of time to respond to pollutant reductions.
■ Significant sources identified	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ Technical analysis	X	Monitoring, empirical relationships, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ Margin of safety and Seasonality	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved, by a high level of detailed monitoring and assessment, by further educational efforts throughout the watershed, by conservative assumptions regarding no-till or minimum till acreage, application of additional nutrient BMPs, and stabilization of more shoreline than recommended through the assessment Study. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ Allocation	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas, shoreline areas, and croplands.
■ Public review	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Elm Lake
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ **TMDLs result in maintaining and attaining water quality standards**	X	The waterbody classification uses which are addressed by this TMDL are drinking water and recreation.
■ **Water Quality Standards Target**	X	Targets were established based on nitrogen:phosphorus ratios. This is a reasonable approach since it relates to the trophic status of the waterbody which, in turn, relates to the uses of concern.
■ **TMDL**	X	The TMDL is expressed in terms of annual phosphorus load reduction. This is a reasonable way to express the TMDL for lakes since it takes lakes a period of time to respond to pollutant reductions.
■ **Significant sources identified**	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ **Technical analysis**	X	Monitoring, empirical relationships, AGNPS modeling, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ **Margin of safety and Seasonality**	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved and by application of additional nonpoint source BMPs. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ **Allocation**	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas, shoreline areas, and croplands.
■ **Public review**	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Since part of the Elm Lake watershed is in North Dakota, the state of North Dakota as well as local entities in that State have participated in the development of the TMDL and will be participating in the future through implementation of BMPks within the watershed. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Lake Faulkton
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ TMDLs result in maintaining and attaining water quality standards	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ Water Quality Standards Target	X	Targets were established based on trophic status and lake depth. This is a reasonable approach since it relates to the trophic status of the waterbody as well as the physical nature of the lake which, in turn, relates to the uses of concern.
■ TMDL	X	The TMDL is expressed in terms of annual phosphorus load reduction and removal of lake sediment. This is a reasonable way to express the TMDL for this lake since it provides an effective surrogate reflective of both the aquatic life and recreational needs.
■ Significant sources identified	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ Technical analysis	X	Monitoring, empirical relationships, AGNPS modeling, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ Margin of safety and Seasonality	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved and by application of additional nonpoint source BMPs. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ Allocation	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas and croplands.
■ Public review	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Lake Hendricks
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ TMDLs result in maintaining and attaining water quality standards	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ Water Quality Standards Target	X	Targets were established based on trophic status and lake depth. This is a reasonable approach since it relates to the trophic status of the waterbody as well as the physical nature of the lake which, in turn, relates to the uses of concern.
■ TMDL	X	The TMDL is expressed in terms of annual phosphorus load reduction and removal of lake sediment. This is a reasonable way to express the TMDL for this lake since it provides an effective surrogate reflective of both the aquatic life and recreational needs.
■ Significant sources identified	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ Technical analysis	X	Monitoring, empirical relationships, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ Margin of safety and Seasonality	X	An appropriate margin of safety is included by augmenting the watershed land use controls with in-lake dredging. The in-lake dredging will further reduce the amount of available nutrients into the lake because of increased depth as well as provide further aquatic life habitat. Additional margin of safety could be provided through addressing the failing wastewater on-site systems near the lake. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ Allocation	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas and croplands.
■ Public review	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance. This TMDL involved cooperation between South Dakota and Minnesota since the watershed is in both states. Lincoln County, Minnesota participated in the process as a stakeholder.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Lake Hiddenwood
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ TMDLs result in maintaining and attaining water quality standards	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ Water Quality Standards Target	X	Targets were established based on lake depth, fish kill frequency, and visitor-days. These are reasonable targets for the TMDL since they relate to the impaired uses of concern.
■ TMDL	X	The TMDL are expressed in terms of annual phosphorus load reduction and removal of lake sediment. Also, the TMDL relates to the depth and volume of the Lake. Lake depth has a particularly important factor related to both the recreational use and fisheries use of the Lake. The emphasis at this point in time is to protect the improvements already made in the Lake as well as adding more controls on pollutant sources as a margin of safety.
■ Significant sources identified	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ Technical analysis	X	Monitoring, empirical relationships, AGNPS modeling, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ Margin of safety and Seasonality	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved and by application of additional nonpoint source BMPs. Additional BMPs include entrapment dams, construction of four agricultural waste systems, and cropland BMPs. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ Allocation	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas and croplands as well as to the bottom lake sediment.
■ Public review	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Lake Madison/Lake Brant
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ **TMDLs result in maintaining and attaining water quality standards**	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ **Water Quality Standards Target**	X	Targets were established based on trophic status. This is a reasonable approach since trophic status of the waterbody relates to the uses of concern.
■ **TMDL**	X	The TMDLs for each lake are expressed in terms of annual phosphorus load reduction. This is a reasonable way to express the TMDL for this lake since it takes a long period of time for a lake to respond to water quality controls, rather than on a daily basis.
■ **Significant sources identified**	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ **Technical analysis**	X	Monitoring, empirical relationships, AGNPS modeling, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ **Margin of safety and Seasonality**	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved, by increasing the target phosphorus reduction from 40% to 50%, and possibly by application of additional nonpoint source BMPs. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ **Allocation**	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas and croplands.
■ **Public review**	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: McCook Lake
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ **TMDLs result in maintaining and attaining water quality standards**	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ **Water Quality Standards Target**	X	Targets were established based on lake depth. This is a reasonable approach since it relates to the trophic status of the waterbody as well as the physical nature of the lake which, in turn, relates to the uses of concern.
■ **TMDL**	X	The TMDL is expressed in terms of removal of lake sediment. This is a reasonable way to express the TMDL for this lake since it provides an effective surrogate reflective of both the aquatic life and recreational needs.
■ **Significant sources identified**	X	There are no contemporary sources of sediment (the pollutant of concern). Rather, the current lake sediment that has been deposited over the years is the primary cause of impairment within the lake.
■ **Technical analysis**	X	Monitoring, empirical relationships, and best professional judgement were used in identifying acceptable levels of sediment removal from the Lake. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ **Margin of safety and Seasonality**	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved and by removal of more sediment than calculated to support inlake uses. Seasonality was adequately considered by evaluating the changes in lake conditions over the year, but seasonality has proven to be of very little concern related to the development of the TMDL and application of appropriate water quality controls.
■ **Allocation**	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to lake bottom sediments.
■ **Public review**	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Ravine Lake
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ TMDLs result in maintaining and attaining water quality standards	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ Water Quality Standards Target	X	Targets were established based on trophic status and fecal coliform concentration. This is a reasonable approach since these factors relate to the uses of concern.
■ TMDL	X	The TMDL is expressed in terms of annual phosphorus load reduction and fecal coliform concentration. This is a reasonable way to express the TMDLs for this lake since it provides an effective surrogate reflective of both the aquatic life and recreational needs and reflects the long response time of lakes of this type to pollutant controls within the watershed.
■ Significant sources identified	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ Technical analysis	X	Monitoring, empirical relationships, AGNPS modeling, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ Margin of safety and Seasonality	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved and by application of additional nonpoint source BMPs including the stabilization of more shoreline than calculated and removal of more lake sediments than calculated. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ Allocation	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas and croplands.
■ Public review	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Redfield Lake
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ TMDLs result in maintaining and attaining water quality standards	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ Water Quality Standards Target	X	Targets were established based on trophic status and lake depth. This is a reasonable approach since it relates to the trophic status of the waterbody as well as the physical nature of the lake which, in turn, relates to the uses of concern.
■ TMDL	X	The TMDL is expressed in terms of annual phosphorus load reduction and removal of lake sediment. This is a reasonable way to express the TMDL for this lake since it provides an effective surrogate reflective of both the aquatic life and recreational needs.
■ Significant sources identified	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ Technical analysis	X	Monitoring, empirical relationships, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ Margin of safety and Seasonality	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved, by application of additional nonpoint source BMPs, and by dredging more lake sediments than calculated. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ Allocation	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as animal feeding areas and bottom sediments.
■ Public review	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.

■ TMDL Checklist ■

EPA Region VIII

State/Tribe: South Dakota
Waterbody Name: Swan Lake
Point Source-control TMDL: Nonpoint Source-control TMDL: X (check one or both)
Date Received: March 30, 1999 Date Review completed: April 9, 1999 BAZ

Review Criteria (All criteria must be met for approval.)	Approved (check if yes)	Comments
■ TMDLs result in maintaining and attaining water quality standards	X	The waterbody classification uses which are addressed by this TMDL are aquatic life and recreation.
■ Water Quality Standards Target	X	Targets were established based on trophic status and secchi depth. This is a reasonable approach since it relates to the trophic status of the waterbody as well as the physical nature of the lake which is, in turn, related to the uses of concern.
■ TMDL	X	The TMDL is expressed in terms of annual phosphorus load reduction and increase in clarity (e.g., secchi depth). This is a reasonable way to express the TMDL for this lake since it provides an effective surrogate reflective of both the aquatic life and recreational needs.
■ Significant sources identified	X	Significant sources were adequately identified in a categorical and/or individual source-by-source basis. All sources that need to be addressed through controls were identified (including the removal of lake bottom sediment, if needed.)
■ Technical analysis	X	Monitoring, empirical relationships, and best professional judgement were used in identifying pollutant sources and causes and in identifying acceptable levels of pollutant control, and in identifying appropriate levels of control. This level of technical analysis is reasonable and appropriate because of the character of the pollutants, the type of land use practices, and watershed type.
■ Margin of safety and Seasonality	X	An appropriate margin of safety is included by performing ongoing monitoring to assure water quality goals are achieved and by application of additional nonpoint source BMPs including selective dredging, bank stabilization, and elimination of inflow from Turkey Ridge Creek. Seasonality was adequately considered by evaluating the cumulative impacts of the various seasons on water quality and by tailoring the BMPs to seasonal needs.
■ Allocation	X	All the allocation for the TMDL was a "load allocation" attributed to nonpoint sources. Allocation was attributed to such sources as land uses in the Turkey Ridge Creek sub-watershed and in-lake sediments.
■ Public review	X	Public review and participation was conducted through meetings, electronic media, and mailings. The extent of public review is acceptable. Further, the review process sponsored by the State was adequate for purposes of developing a TMDL that will be implemented because of public acceptance.