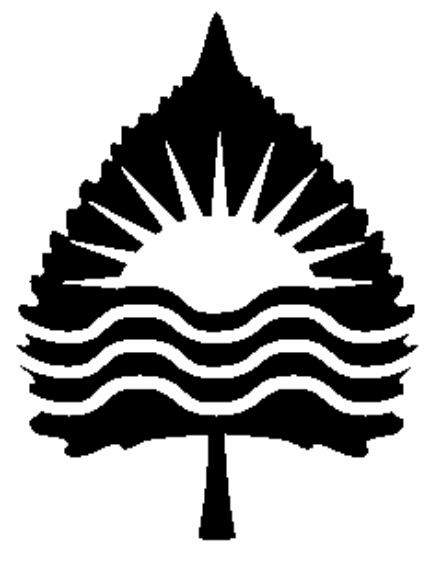

Total Maximum Daily Loads for the North Platte River

(Segments NP1-10000, NP1-20000, NP1-20500, NP2-10000, NP3-10000, NP3-20000, NP3-30000 and NP3-50000)

Parameters of Concern: Fecal coliform Bacteria

Nebraska Department of Environmental Quality
Planning Unit, Water Quality Division

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Executive Summary

Five segments in the North Platte River Basin were included on the 2002 Section 303(d) List of Impaired Waters (NDEQ 2002a) due to impairment by excessive fecal coliform. As such, total maximum daily loads must be developed for fecal coliform in accordance with the Clean Water Act. Additionally, three segments were identified as water quality concerns and included on Part 5 of the 2002 list. Based on the strategy of a basin wide approach as well as the hydrologic connections, TMDLs have also been developed for these three waterbodies and included. This document present TMDLs for fecal coliform that are designed to allow the North Platte River segments to fully support the primary contact recreation beneficial use. The information contained herein should be considered 8 TMDLs.

These TMDLs have been prepared to comply with the current (1992) regulations found at 40 CFR Part 130.7.

1. Name and geographic location of the impaired waterbody for which the TMDLs are being developed.
North Platte River: Segments NP1-10000, NP1-20000, NP1-20500, NP2-10000, NP3-10000, NP3-20000, NP3-30000 and NP3-50000.

2. Identification of the pollutant and applicable water quality standard
The pollutant causing the impairment(s) of the water quality standard and designated beneficial use is fecal coliform bacteria. Designated uses assigned to the above-identified segments include: primary contact recreation, aquatic life Warmwater class A, agriculture water supply class A and aesthetics (NDEQ 2002c). Excessive fecal coliform have been determined to be impairing the primary contact recreation beneficial uses. The applicable water quality standards are a seasonal geometric mean of 200/100 ml with <10% of the samples being greater that 400/100ml.

3. Quantification of the pollutant load that may be present in the waterbody and still allows attainment and maintenance of the water quality standards.
The allowable pollutant load is based upon the available stream flow volume. That is, loading capacities are developed for each flow by multiplying the water quality standard (WQS) by the selected stream flow and a conversion factor (C) with the equation being:

$$\text{Loading capacity} = \text{WQS} * \text{Flow} * \text{C}$$

4. Quantification of the amount or degree by which the current pollutant load in the waterbody, including upstream sources that is being accounted for as background loading deviates from the pollutant load needed to attain and maintain water quality standards.
For segments NP1-10000, NP1-20500, NP3-10000, NP3-20000 and NP3-30000, the seasonal geometric mean were monitored to be exceeded by: 202/100 ml, 30/100 ml, 170/100 ml, 265 and 135/100 ml respectively. The percentage (%) of samples from all included segments exceeding 400/100 ml ranged from 19-50%.

5. Identification of the pollutant source categories.
Both point and nonpoint sources (including natural sources) have been identified to be contributing to the pollutant loads being delivered to the North Platte River segments.

6. Wasteload allocations for pollutants from point sources.
The wasteload allocations for point source discharges will be equivalent to the water quality criteria associated with the primary contact recreation beneficial use. Therefore, the WLA is a monthly geometric mean of 200/100 ml and a daily maximum of 400/100 ml.

7. Load allocations for pollutants from nonpoint sources.

The load allocations assigned to these TMDLs will be based upon the stream flow volume and will be defined as:

$$LA_i = Q_i * 400/100 \text{ ml} * C$$

Where:
LA_i = load allocations at the i^{th} flow
Q_i = stream flow at the i^{th} flow
400/100 ml = applicable/target water quality criteria for fecal coliform from Title 117
C = conversion factor

8 A margin of safety.

These TMDLs contain an implicit margin of safety. Specifically, decay/die-off from the potential source to the recreational segment was not included in the pollutant source evaluation, all point sources were assumed to be discharging the expected concentration and the targeted reductions will result in seasonal geometric means well below the applicable water quality criteria.

9. Consideration for seasonal variation.

The water quality criteria are only applicable during the Title 117 defined recreation season that starts May 1 and ends September 30. Because of this, the water quality and stream volume data was limited to this time period.

10. Allowances for reasonably foreseeable increases in pollutant loads.

There was no allowance for future growth included in these TMDLs.

11. Implementation Plan

Implementation of the reductions for fecal coliform will be carried out through a combination of regulatory and non-regulatory activities. Point sources will be regulated under the auspice of the National Pollutant Discharge Elimination System and the Rules and Regulations Pertaining to Livestock Waste Control. Nonpoint source pollution will be addressed using available programs, technical advice, information and educations and financial incentives such as cost share.

The TMDLs included in the following text can be considered "phased TMDLs" and as such are an iterative approach to managing water quality based on the feedback mechanism of implementing a required monitoring plan that will determine the adequacy of load reductions to meet water quality standards and revision of the TMDL in the future if necessary. A description of the future monitoring (Section 4.0) that is planned has been included.

Monitoring is essential to all TMDLs in order to:

- Assess the future beneficial use status;
- Determine if the water quality is improving, degrading or remaining status quo;
- Evaluate the effectiveness of implemented best management practices.

The additional data collected should be used to determine if the implemented TMDLs and watershed management plan, have been or are effective in addressing the identified water quality impairments. As well the data and information can be used to determine if the TMDLs have accurately identified the required components (i.e. loading/assimilative capacity, load allocations, in lake response to pollutant loads, etc.) and if revisions are appropriate.

1.0 Introduction

Eight designated segments within the North Platte River basin were listed on the 1998 Section 303(d) list of impaired waters (NDEQ1998) as not supporting the primary contact recreation beneficial use with the pollutant of concern being pathogens (fecal coliform bacteria). Additional information was collected during the 2001 recreation season (May 1-September 30) as part of the rotating basin monitoring scheme, for additional beneficial use assessments and to support the development of total maximum daily loads (TMDLs). The new data indicated five of the waterbodies were not supporting the beneficial use and the data did not yield a conclusive decision on three of the segments. Therefore, the 2002 Section 303(d) list includes 5 waterbodies on part 1 and 3 waterbodies on Part 5 (NDEQ 2002a). Table 1.0 presents this information.

Table 1.0 Section 303 Listing Summary for the North Platte River Segments in 1998 and 2002

Segment	1998 303(d) List	2002 303(d) List
NP1-10000	Yes	Part 1
NP1-20000	Yes	Part 5
NP1-20500	Yes	Part 1
NP2-10000	Yes	Part 5
NP3-10000	Yes	Part 1
NP3-20000	Yes	Part 1
NP3-30000	Yes	Part 1
NP3-50000	Yes	Part 5

Based on the above, and as required by Section 303(d) of the Clean Water Act and 40 CFR Part 130, TMDLs have been developed for the impaired waters identified on the 2002 Section 303(d) List. The approach for these TMDLs will be to address all of the identified waterbodies simultaneously or as a watershed. Based upon this, the information contain herein should be considered 8 TMDLs.

1.1 Background Information

The North Platte River Basin, located in western Nebraska (Figure 1.1) extends from the Wyoming-Nebraska border to the confluence of the North and South Platte Rivers, where the basin gives way to the Middle Platte River Basin. Stream flow in the North Platte River Basin is heavily controlled by many irrigation withdrawals, returns and reservoirs. Impoundments offering control in the North Platte Basin, includes the state's largest – Lake McConaughy as well as 5 reservoirs (Guernsey, Grayrocks, Glendo, Pathfinder and Seminoe) in Wyoming. Demands for water and a lack of precipitation have resulted in the North Platte River going dry at the Nebraska-Wyoming state line. Several municipalities lie in the basin ranging from first class cities to villages.

1.1.1 Waterbody Information

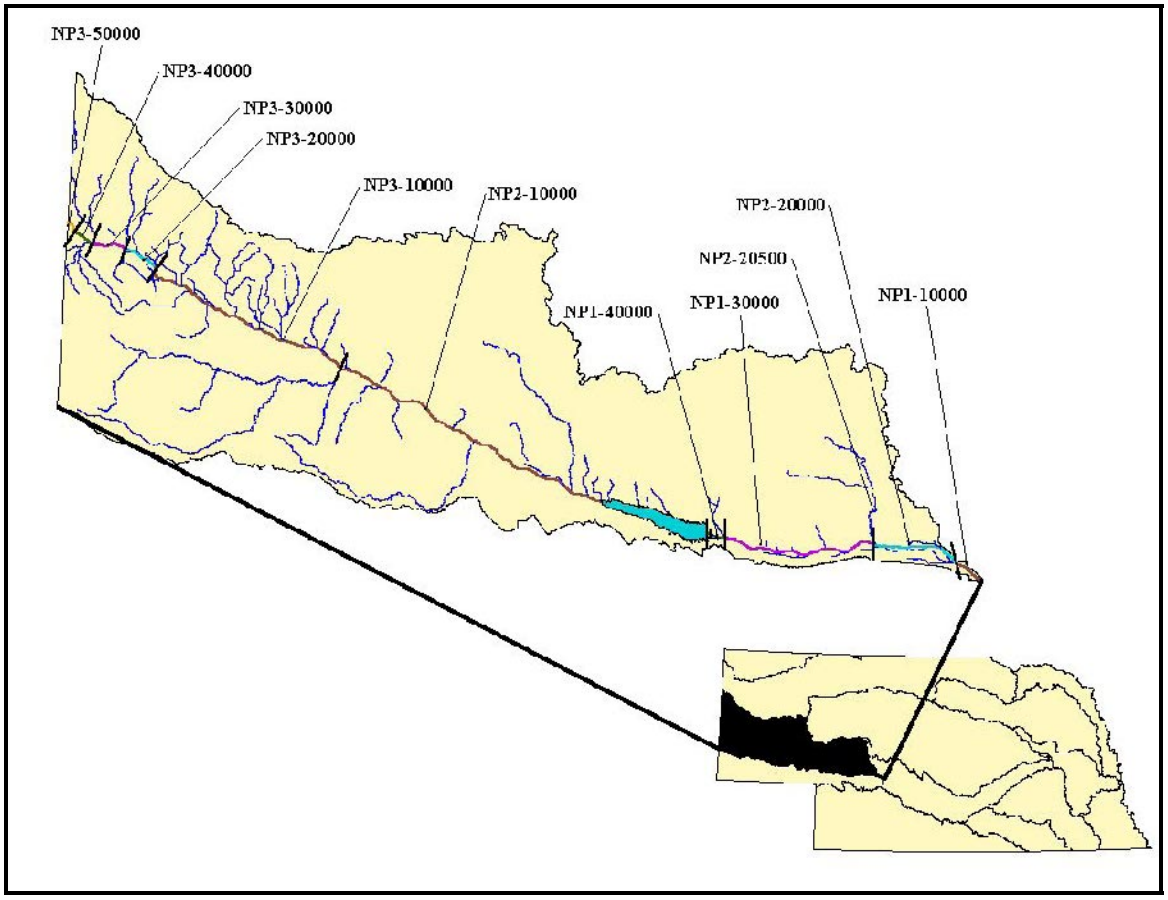
1.1.1.1 Waterbody Name(s): North Platte River and Birdwood Creek
Stream Identification Numbers: (NP1-10000, NP1-20000, NP1-20500, NP2-10000, NP3-10000, NP3-20000, NP3-30000 and NP3-50000.

1.1.1.2 Major River Basin: Missouri

1.1.1.3 Minor River Basin: North Platte

1.1.1.4 Hydrologic Unit Codes: 10180009, 10180012, 10180013 and 10180014

Figure 1.1 Location of North Platte River Basin



1.1.1.5 Assigned Beneficial Uses: Source: Title 117 Nebraska Surface Water Quality Standards

Segment	Primary Contact Recreation	Aquatic Life Use	Agriculture	Aesthetics
NP1-10000	Yes	Warmwater A	Ag A	Yes
NP1-20000	Yes	Coldwater B	Ag A	Yes
NP1-20500	Yes	Coldwater B	Ag A	Yes
NP2-10000	Yes	Warmwater A /Seasonal Coldwater B	Ag A	Yes
NP3-10000	Yes	Coldwater B	Ag A	Yes
NP3-20000	Yes	Coldwater B	Ag A	Yes
NP3-30000	Yes	Coldwater B	Ag A	Yes
NP3-50000	Yes	Coldwater B	Ag A	Yes

1.1.1.6 Major Tributaries: Birdwood Creek, Blue Creek, Pumpkin Creek, Horse Creek, Red Willow Creek and Ninemile Creek

Table 1.1 Physical Description of North Platte River Basin

Parameter	North Platte River
State	Nebraska
Counties (whole or in part)	Lincoln, McPherson, Keith, Arthur, Garden, Sheridan, Cheyenne, Morrill, Kimball, Banner, Scottsbluff, Sioux
Watershed Area	7,117 mi^2 (approximate)
Drainage	30,900 mi^2 (approximate)
Sub-basins	3
Designated Stream Segments	138
Stream Miles (designated)	942 miles

1.1.2 Watershed Characterization

1.1.2.1 Physical Features: The North Platte River watershed covers approximately 7,117 mi^2 and occupies the center portion of the Nebraska panhandle. The basin originates at the point where the North Platte River enters Nebraska from Wyoming and extends generally south and eastward towards the confluence with the South Platte River, near the City of North Platte. Approximately 50% of the basin lay in each the Western High Plains and Nebraska Sandhills ecoregion with a very small percentage of the lower basin lying in the Central Great Plains ecoregion (Chapman, et. al. 2001). Agriculture is the major land use in the basin with livestock being the dominant agricultural product. Approximately 75% of the basin is rangeland and 20% is cropland. Crop production varies due to soil conditions, topography and the availability of water – irrigation or natural (NDEQ 2002b).

The topography of the basin varies from the bluffs and buttes of the Wildcat Ridge to the sandhills and the flat valley plains. The river valley is broad in the upper and lower sections of the Basin but narrows through the middle reach. The Sandhills border the valley on the north side in all but the upper ¼ of the basin. Several soil associations are found in the North Platte Basin and range from the sandhills and soils developed from unconsolidated material to loamy soils that can be fertile and suitable for row crop production. Sand and gravel deposits have been extensively developed especially in Scottsbluff and Lincoln counties (NNRC 1975).

The seasonal flow of the North Platte River varies significantly based on snowmelt in the Rocky Mountains, the management up the Wyoming and Nebraska reservoirs and irrigation needs (NDEQ 2002b). In the past, the North Platte River at the point of crossing the Nebraska-Wyoming border has been dry.

As a result of the demands and competition for water in the North, South and Middle Platte River basins, in 1997 a cooperative agreement was entered into by the states of Colorado, Nebraska and Wyoming and the U.S. Fish and Wildlife Service. The agreement stipulates “sufficient water” will be provided to support and sustain four targeted threatened or endangered species – Piping Plover, Interior Least Tern, Whooping Crane and Pallid Sturgeon. Water allocated for these species is maintained in Lake McConaughy in an environmental account and released at the request of the account manager.

1.1.2.2 Climate: Precipitation ranges from an annual average of 15 inches in the western end of the basin to 20 inches at the eastern end. Typically, a majority of the precipitation occurs during the spring and early summer. Temperatures in the basin range from an average high in the upper 80’s during the summer to average lows in the 10’s during the winter (NRC Databank).

1.1.2.3 Demographics: Twenty-two municipal communities reside in the North Platte basin boundaries and range from first class cities to villages. Some of the larger communities include: North Platte – population 23,878, Scottsbluff – population 14,732, Gering – population 7,751, Mitchell – populations 1,831, Bridgeport – population 1,594 and Bayard – population 1,247.

1.1.2.4 Land Use: Land use consists of range, crop, pasture, lakes and wetlands, forest and other uses. Major agricultural products are cattle, corn, sugar beets, dry edible beans, alfalfa and wheat. Most crops require irrigation because annual average precipitation is 14 to 17 inches. The largest source of irrigation water is the North Platte River. A system of dams and canals in the river valley, operated by the U.S. Bureau of Reclamation since the early 1900s, diverts water from the river and stores it to irrigate about 300,000 acres. Some groundwater also is used to irrigate (North Platte Natural Resource District Internet Site).

2.0 Fecal coliform TMDL

2.1 Problem Identification

Segments NP1-10000, NP1-20500, NP3-10000, NP3-20000, and NP3-30000 were listed on the 2002 Section 303(d) list as having an impaired primary contact recreation beneficial use with the parameter of concern being fecal coliform. Segments NP1-20000, NP2-1000, and NP3-50000 were listed as water quality concerns due to elevated levels of fecal coliform (NDEQ 2002a). This section deals with the extent and nature of the water quality impairments caused by excessive fecal coliform in the North Platte River Basin.

2.1.1 Water Quality Criteria Violated and/or Beneficial Uses Impaired: The *Primary Contact Recreation* beneficial use has been deemed impaired or threatened on the above-identified eight segments. The *Primary Contact Recreation* beneficial use applies to surface waters which are used or have the potential to be used for primary contact recreation that includes activities where the body may come into prolonged or intimate contact with the water such that water may be accidentally ingested or sensitive body organs (e.g. eyes, ears, nose) may be exposed (NDEQ 2002c).

2.1.2 Data Sources: One of the surface water monitoring schemes, utilized by the Nebraska Department of Environmental Quality (NDEQ) is the rotating basin approach, whereby monitoring is limited to 2 or 3 river basins each year with all 13 basins being (partially) examined in a 5 year period. Under the auspice of the rotating basin plan, data was collected from the North Platte Basin in 1996 and 2001. The main focus of the 1996 data was to conduct beneficial use assessments for the Section 303(d) list and Section 305(b) report and because of this the corresponding flow information is lacking for the data collect from segment NP2-10000. The remainder of the sites monitored in 1996 and all of the sites monitored in 2001 included stream flow (volume) information. Stream flow data and information were obtained from the United States Geological Survey (USGS) and Nebraska Department of Natural Resources (NDNR) who operates the monitoring gages.

Usage of the data for TMDLs is based upon how the watershed in questions will be represented. Section 303(d) data assessment and listing methodologies require that the data be <5 years old whereas, the a defined data "age" has not been defined for TMDLs. Usage of data for TMDLs is based upon the how the watershed in question is represented. Therefore, the 2002 Section 303(d) list only considered the 2001 data and the TMDLs will consider both the 1996 and 2001 data and information. In regards to segment NP2-10000 only the 2001 data will be used for the TMDL.

2.1.3 Water Quality Assessment: Water quality data assessments were based upon the beneficial use assessment procedures used to identify impaired waters for the 2002 Section 303(d) list. The procedures are based on a two-tiered approach. The first approach being a screen based upon EPA's recommended 305(b) guidance. The second step is an application of the "binomial distribution" method that applies a confidence interval to the exceedance rate in an effort to determine the true exceedance of the waterbody versus the data set. A complete description of the water quality data assessment procedures can be found in the *Methodology for Waterbody Assessment and Developing the 2002 Section 303(d) List of Impaired Waterbodies for Nebraska* – December 2001.

The process used in assessing data to determine the use support of the *Primary Contact Recreation* beneficial use can be found in table 2.1.3.

Table 2.1.3: Assessment of the Primary Contact Recreation Beneficial Use Using Fecal coliform Bacteria data.

Minimum Samples	Full Support	Partially Supporting	Not Supporting	Water Quality Concern
10	Season geometric mean ≤200/100 ml and ≤10% of samples exceed 400/100 ml	Season geometric mean ≤200/100 ml but >10% of samples exceed 400/100ml	Season Geometric mean >200/100 ml	
4 –9	Not assessed for full support with <10 samples	Not assessed for partially supporting with <10 samples	Not assessed for not supporting with <10 samples	Season Geometric mean >200/100 ml and/or >10% exceedance 400/100 ml

2.1.4 Water Quality Conditions: Fecal coliform data collected during the 2001 recreation season (May through September) was assessed to determine the beneficial use support for primary contact recreation. Table 2.1.4 presents the results of the monitoring.

2.1.5 Potential Pollutant Sources

2.1.5.1 Point Sources: Point sources discharge or have the potential to discharge to waters in the North Platte River basin. Facility types include: municipal wastewater treatment facilities, confined animal feeding operations, aquaculture facilities and industrial facilities. The facilities that have been issued a National Pollutant Discharge Elimination System Permit (according to EPA's Permit Compliance System) in the North Platte River Basin are shown in Figure 2.1.5.1a.

Illicit connections, discharges, combined sewer overflows, sanitary sewer overflows failing septic tanks or other on-site wastewater systems can also be sources of fecal coliform.

Animal feeding operations that have been issued State of Nebraska permits, required for construction and operation of livestock waste control facilities (LWCF) if the operation has discharged, or has the potential to discharge, livestock waste to waters of the State are also considered potential sources. Figure 2.1.5.1b shows the facilities within the North Platte Basin. These facilities are designed to contain any run-off that is generated by storm events that are less in intensity than the 25 year, 24-hour rainfall.

Table 2.1.4 North Platte River – 2001 Fecal coliform Data and Assessments

Segment	Site Location	USGS/DNR Gage Associated with Site	Number of Samples	Season Geometric Mean (#/100 ml)	# Samples >400/100 ml	% Samples >400/100 ml
NP1-10000	North Platte River at North Platte	06693000	18	402	7	39%
NP1-20000	North Platte River at Hereshey	None	21	123.6	4	19%
NP1-20500	Birdwood Creek at Hereshey	06692000	21	229	4	19%
NP1-30000	North Platte River at Sutherland	06691000	21	101	2	9.5%
NP1-40000	North Platte River at Keystone	06690500	21	7	0	0%
NP2-10000	North Platte River at Lewellen	06687500	20	176	4	20%
NP3-10000	North Platte River at Bridgeport	06684500	20	370	9	45%
NP3-20000	North Platte River at Mitchell	06682000	20	465	10	50%
NP3-30000	North Platte River at Morrill	None	20	335	8	40%
NP3-50000	North Platte River at NE-WY Stateline	06674500	20	159	4	20%

2.1.5.2 Nonpoint Sources: Several nonpoint sources of fecal coliform exist in the North Platte River Basin. These sources include: run-off from livestock pastures, improper or over-application of biosolids (wastewater treatment facility sludge, septage or manure) and urban stormwater runoff not regulated by an NPDES permit.

2.1.5.3 Natural Sources: The primary natural source of fecal coliform is wildlife. Big game species found within the Basin include whitetail and mule deer, antelope and turkey. Upland game birds include pheasant, bobwhite quail, prairie chickens and sharp-tail grouse. Significant duck production occurs in the wetland areas and ducks and geese winter along the river. (NNRC 1975).

2.2 TMDL Endpoint

The endpoint for these TMDLs will be based on the numeric criteria associated with the *Primary Contact Recreation* beneficial use.

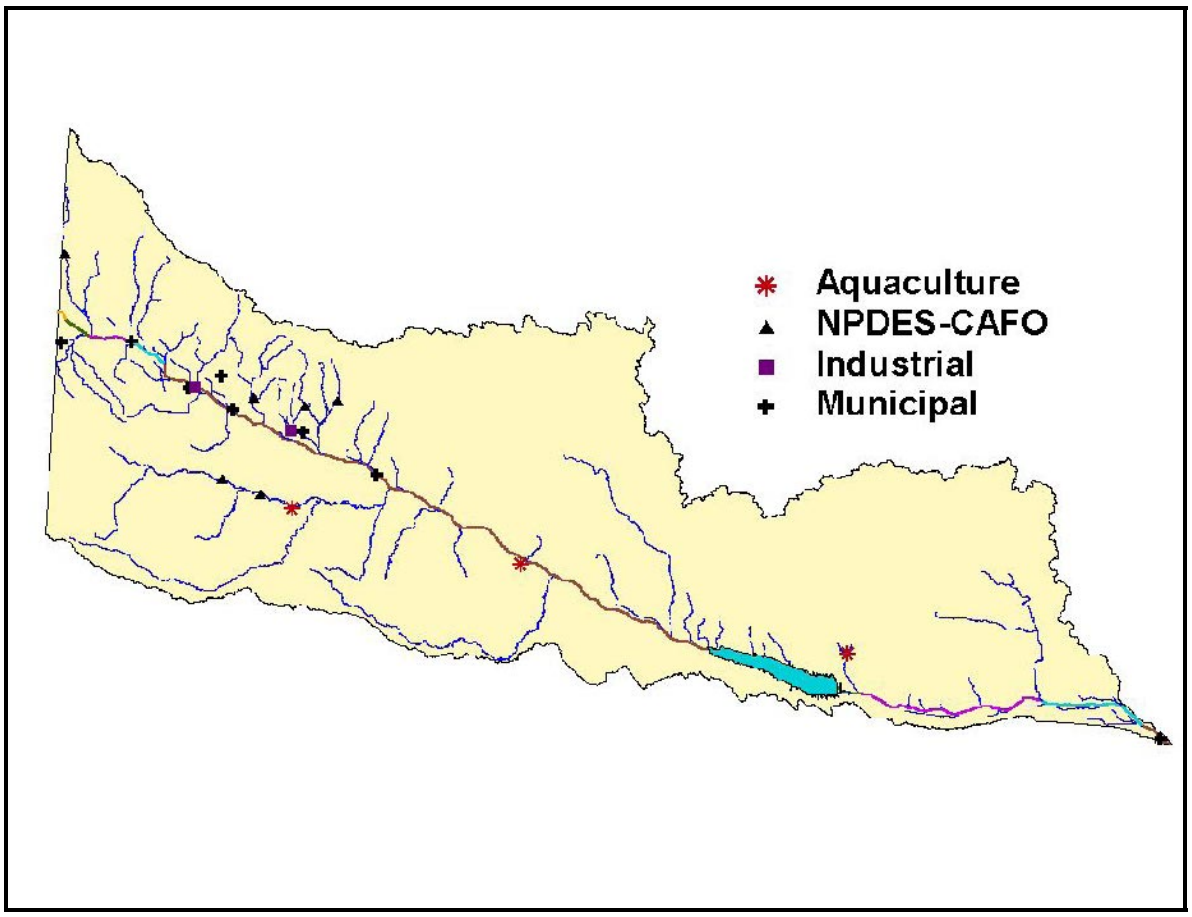
2.2.1 Numeric Water Quality Criteria

Water quality criteria established for the protection of the *Primary Contact Recreation* beneficial use can be found in Title 117, Chapter 5 and are as follows:

Bacteria of the Fecal coliform group shall not exceed a geometric mean of 200/100 ml, nor exceed 400/100 ml, in more than 10% of the samples. These criteria are based upon a minimum of 5 samples taken within a 30-day period. This does not preclude fecal coliform limitations based on effluent guidelines.

These criteria apply during the recreational period of May 1 through September 30.

Figure 2.1.5.1a NPDES Permitted Facilities in the North Platte River Basin



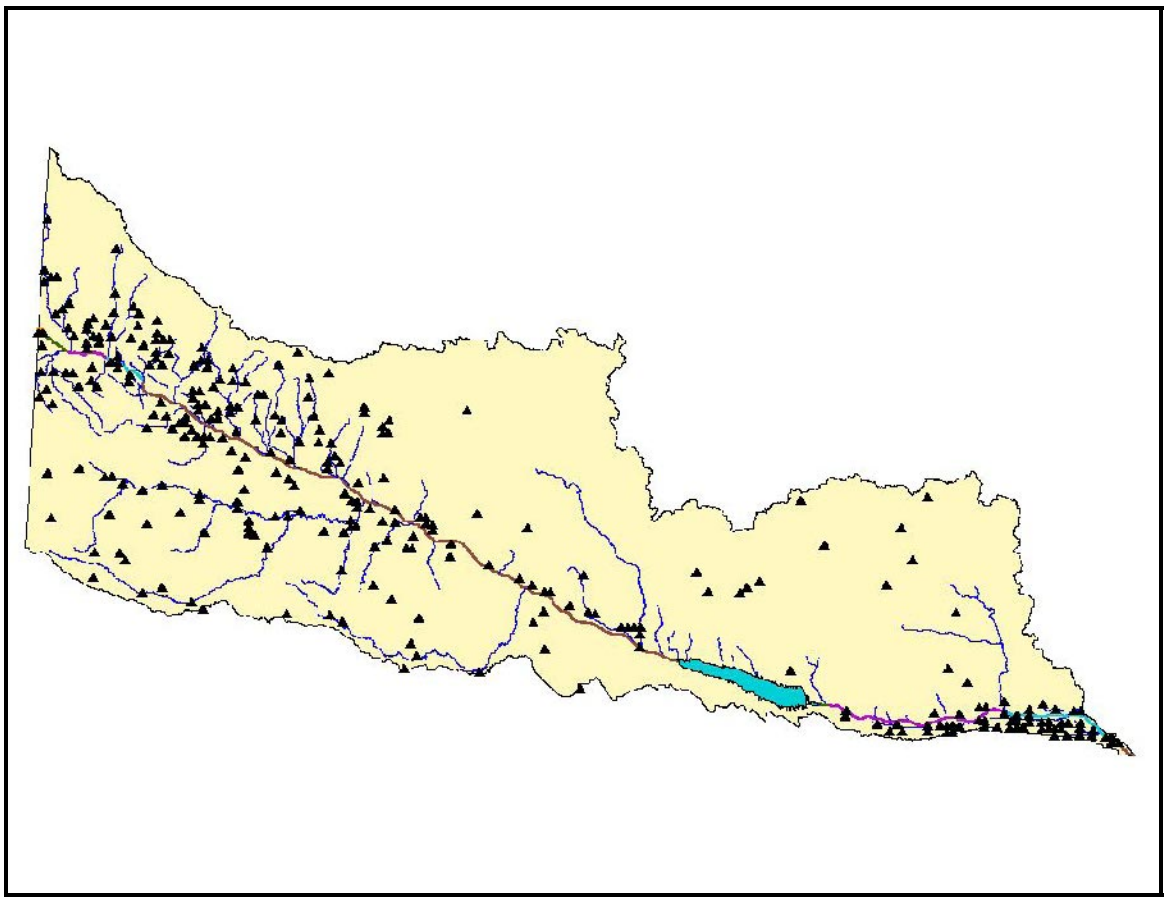
2.2.2 Selection of Critical Environmental Conditions

The water quality criteria associated with the *Primary Contact Recreation* beneficial use only applies from May 1 through September 30. Therefore, the critical conditions for these TMDLs will be those occurring from May 1 through September 30.

2.2.3 Waterbody Pollutant Loading Capacity

Defining waterbody pollutant loading capacity implies a steady state. The TMDL recognizes loadings are dynamic and can vary with stream flow. As well, the above section indicates a wide range of environmental conditions that must be accounted for.

Figure 2.1.5.1b Animal Feeding Operations in the North Platte River Basin Issued or Requesting a State Construction of Operating Permit or Requesting an Inspection



The method chosen to account for the variation in flow is based upon a load duration curve. Load duration curves are initiated by the development a stream's hydrograph using the long-term gage information. The flow information (curve) is then translated into a load curve by multiplying the flow values by the water quality standard (WQS) and a conversion factor (C). The acceptable "load" is then plotted graphically.

Therefore, the loading capacity for each of the segments will be defined by:

Loading capacity = WQS * Flow * C

2.3 Pollutant Source Assessment

For these TMDLs the source loading is based upon the position of the monitoring data points in relation to the boundary established on the load duration curve between point source and nonpoint source influences. This process for selecting the load point is described in the document entitled *Nebraska's Approach for Developing TMDLs for Streams Using the Load Duration Curve Methodology* (NDEQ 2002d). In the situation where a boundary has not been included on a load curve, the information indicates no point source facilities discharge to the contributing watershed. For these waterbodies, the pollutant will be considered derived from nonpoint and natural sources.

2.3.1 Existing Pollutant Conditions

The existing pollutant conditions are shown in the load duration curves (Figure 2.3.1a through 2.3.1h) provided for each of the segments where a TMDL has been developed. The points plotted above the acceptable loading indicate a deviance from the water quality sample.

Figure 2.3.1a. Load Duration Curve for NP1-10000

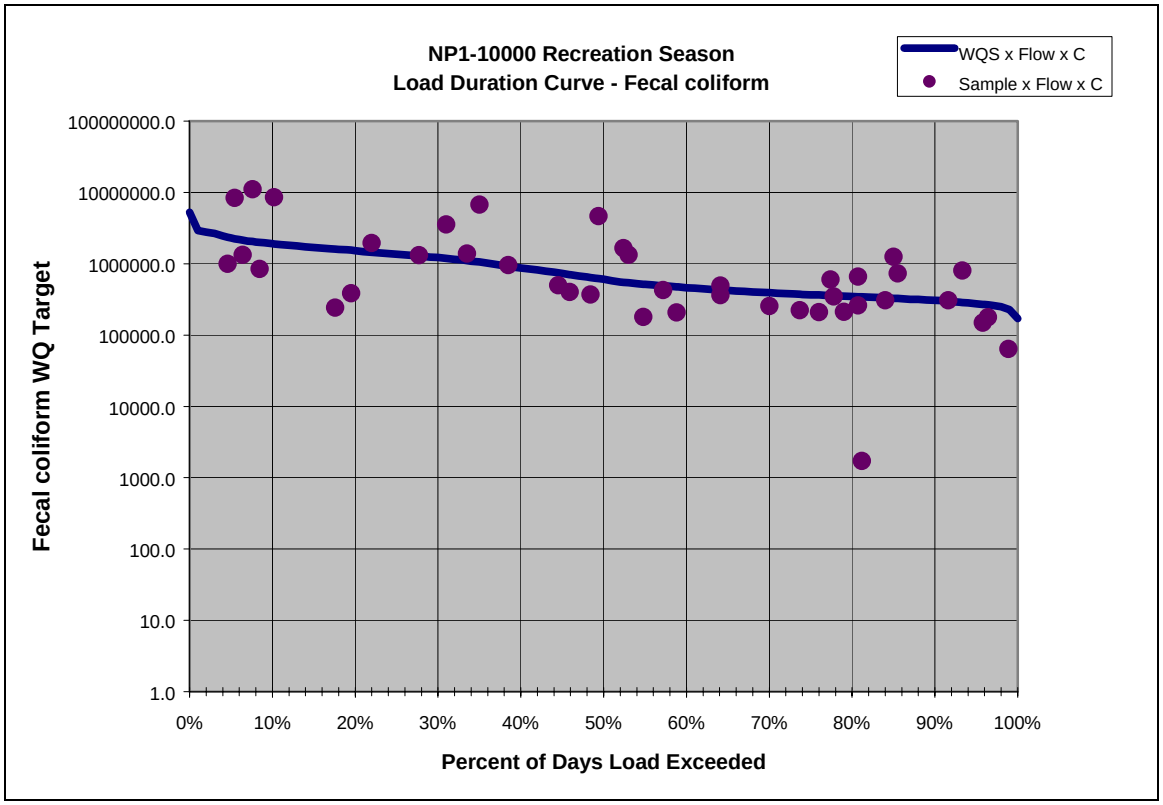


Figure 2.3.1b. Load Duration Curve for NP1-20000

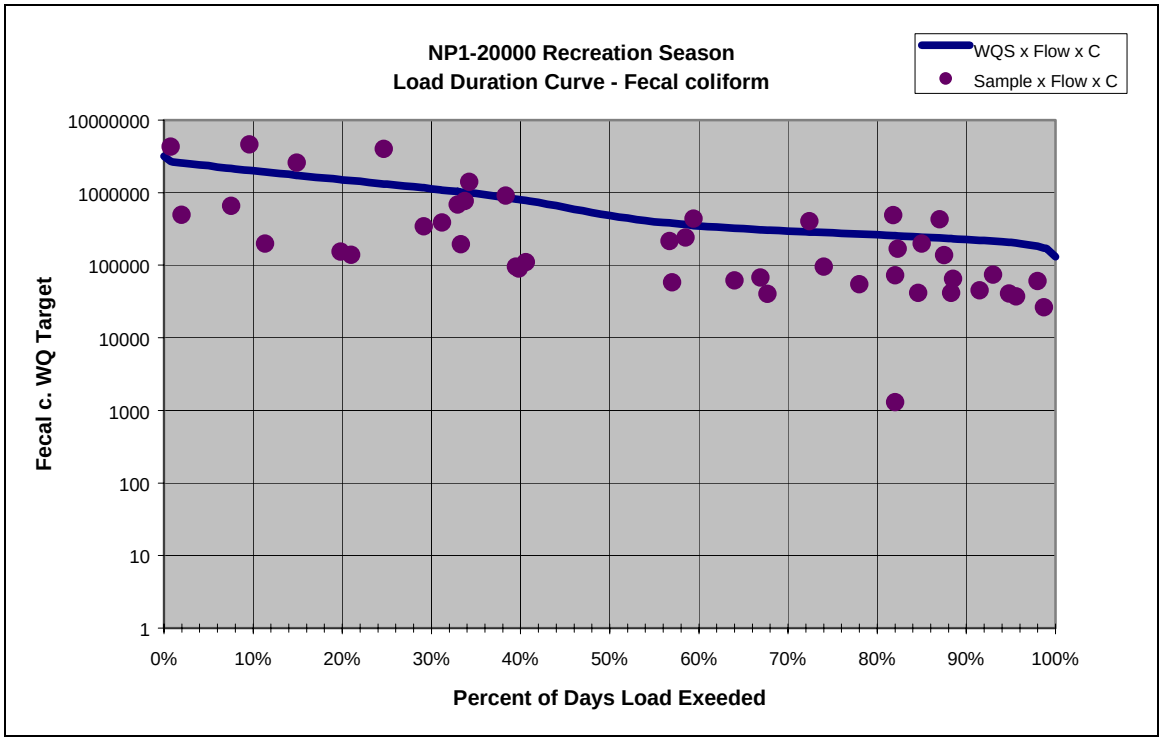


Figure 2.3.1c. Load Duration Curve for NP1-20500

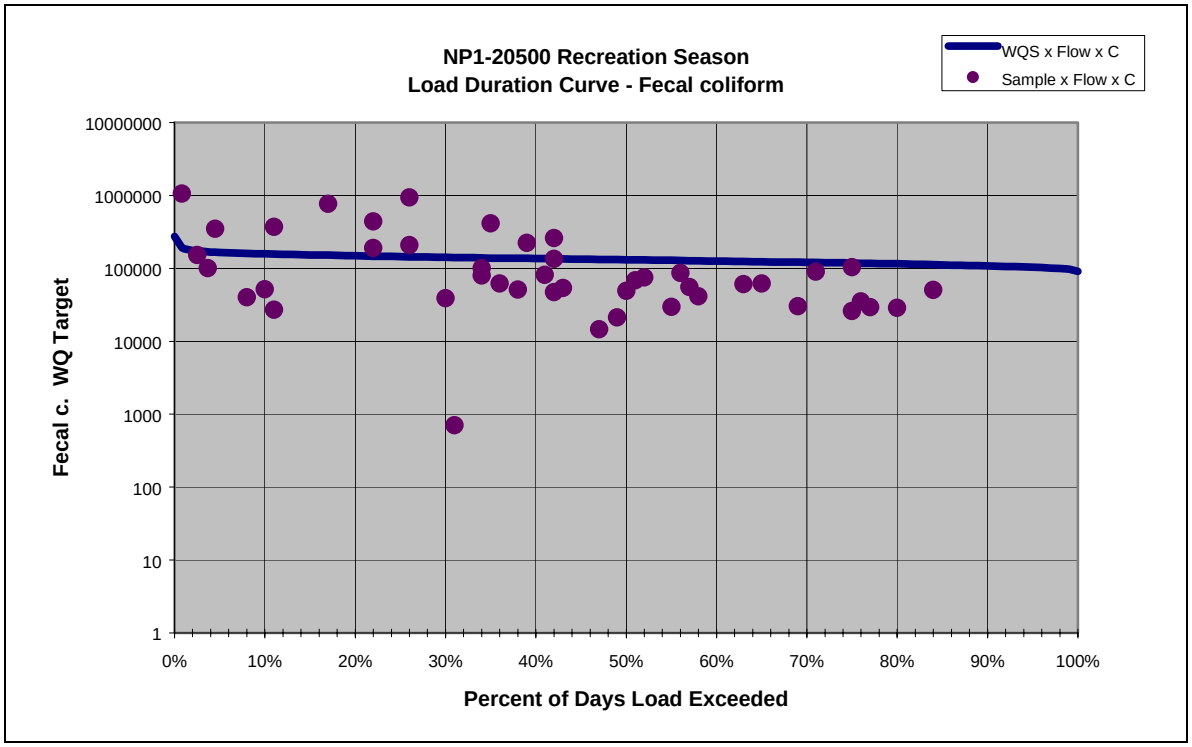


Figure 2.3.1d. Load Duration Curve for NP2-10000

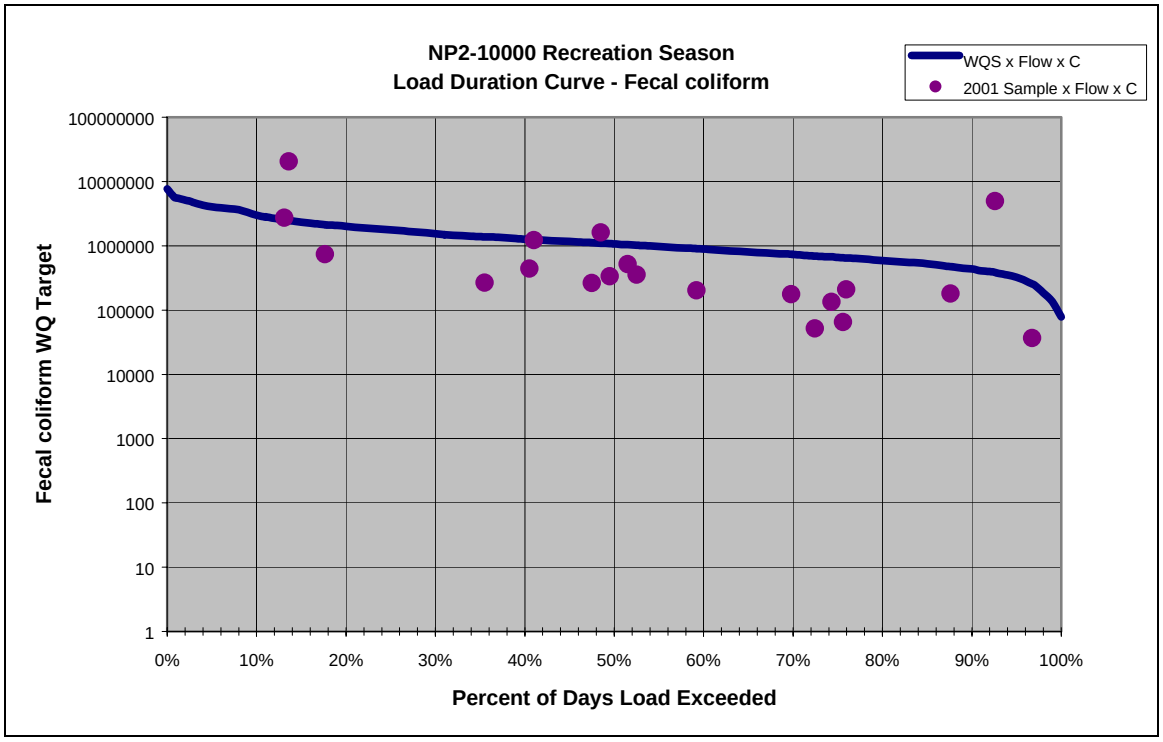


Figure 2.3.1e. Load Duration Curve for NP3-10000

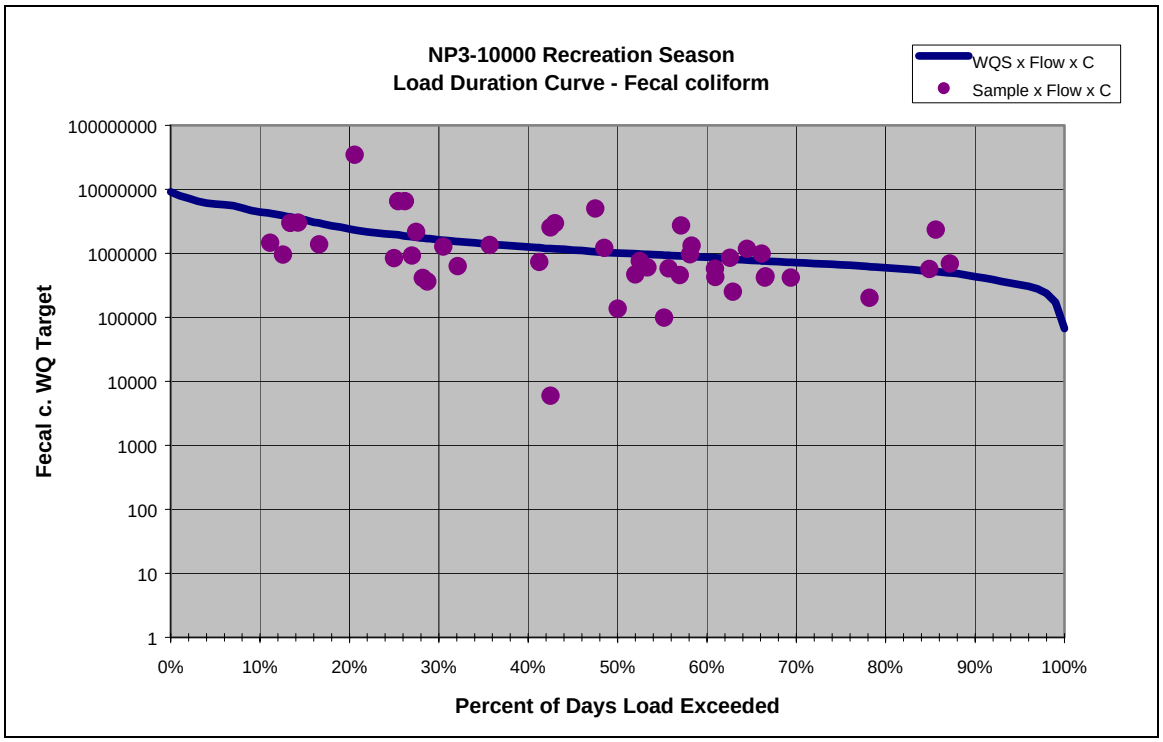


Figure 2.3.1f. Load Duration Curve for NP3-20000

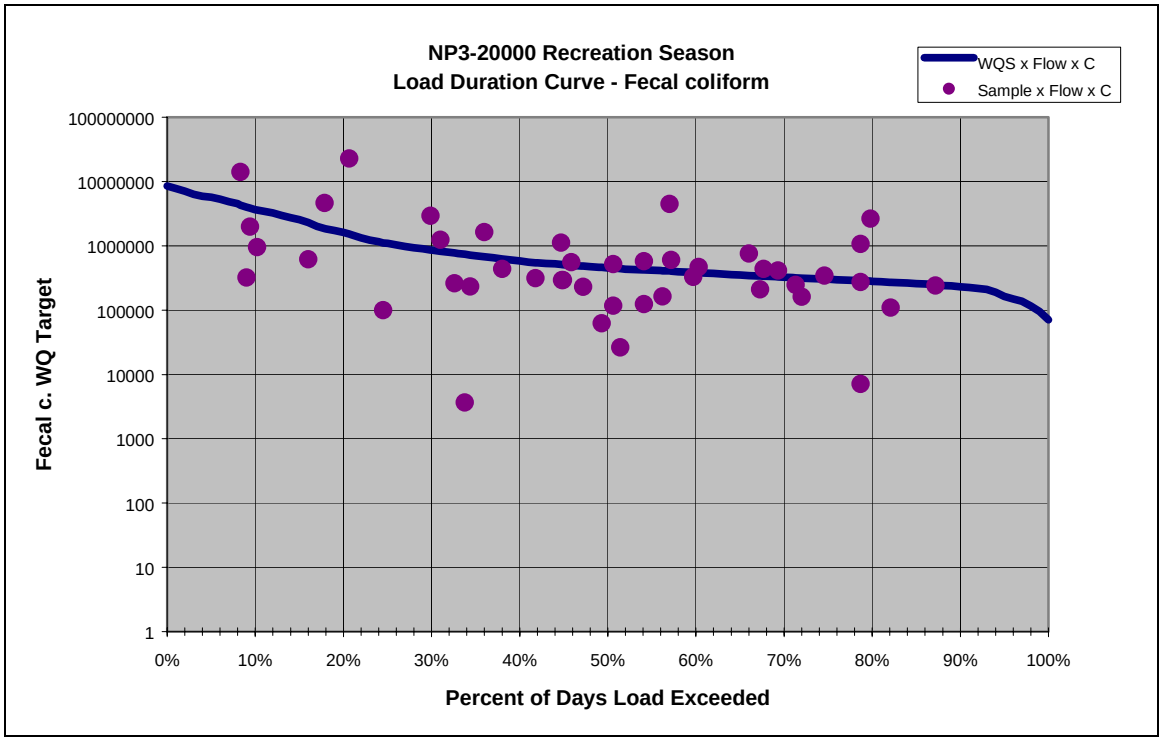


Figure 2.3.1g. Load Duration Curve for NP3-30000

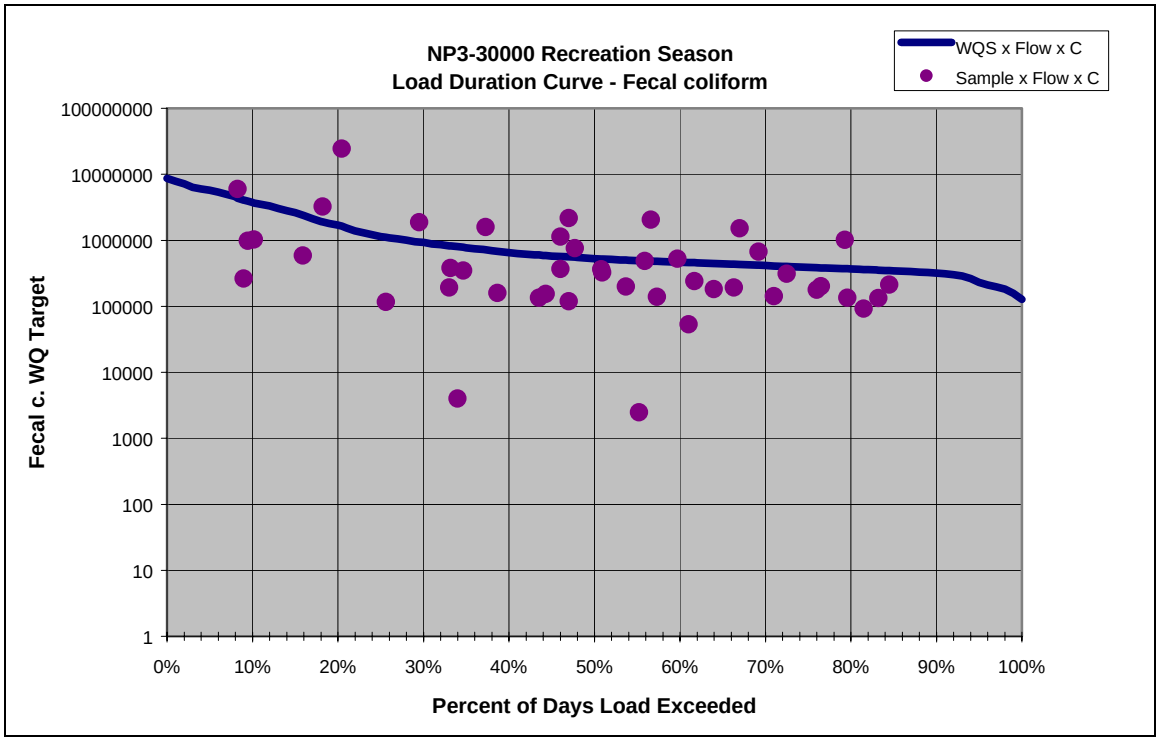
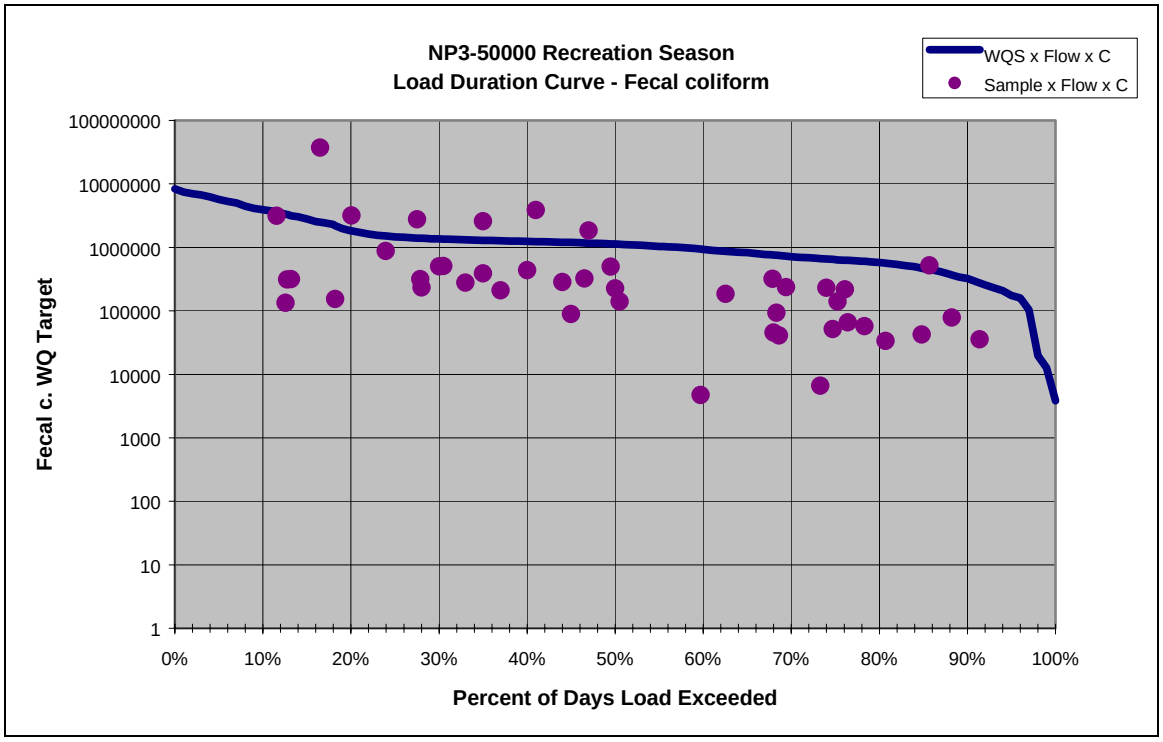


Figure 2.3.1h. Load Duration Curve for NP3-50000



2.3.2 Deviation from Acceptable Pollutant Loading Capacity

Table 2.3.2 describes the deviation from the acceptable water quality standards based upon the 2001 monitoring information.

Table 2.3.2 Deviation From the Applicable Water Quality Criteria

Segment	Observed Season Geometric Mean (#/100 ml)	#/100 ml Above WQS	# Samples >400/100 ml	# Of Samples Greater than allowed to meet WQS
NP1-10000	402	202	7	6
NP1-20000	124	0	4	2
NP2-20500	230	30	4	2
NP2-10000	176	0	4	2
NP3-10000	370	170	9	7
NP3-20000	465	265	10	8
NP3-30000	335	135	8	6
NP3-50000	159	0	4	2

2.3.3 Identification of Pollutant Sources

Both point and nonpoint sources are known to exist in 5 of 8 segments and contributing watersheds. Due to the size of the watersheds, the somewhat limited data, the delivery methods and the location of the potential sources in relation to the impaired waterbody it is difficult to definitively identify specific sources. It is important to note that all potential sources may not contribute to the water quality impairments and some sources may contribute at a greater degree than others.

The method utilized to determine the contributions of the sources will be based upon a demarcation where point source discharges are not expected to further impact the waterbody. That is, based on the concept of a continuous and relatively constant effluent volume, a dilution or flow value can be determined where point sources are no longer expected to contribute to water quality excursions. The process is explained in the document entitled *Nebraska's Approach for Developing TMDLs for Streams Using the Load Duration Curve Methodology*.

As explained in the above-cited document, an "expected pollutant concentration" must be selected. Fecal coliform concentrations in wastewater can vary greatly, depending upon treatment technology, wastewater strength, industrial contributions, treatment efficiency and season. The selection of an all-encompassing effluent density value must then account for these and other variables. To that end, the NDEQ has collected effluent fecal coliform information from several facilities not providing disinfection of the wastewater discharge. The data was collected from 24 facilities that include both mechanical and lagoon facilities and as seen in Figure 2.3.3a, exhibits a normal distribution. The median value was selected as the input for the "expected pollutant concentration". The equation to determine the point source/nonpoint source boundary then becomes:

$$Q_s = (10{,}200/100 \text{ ml} * \Sigma Q_e)/400/100 \text{ ml}$$

Where:

Q_s	= stream flow volume necessary to meet water quality standards
10,200/100 ml	= expected fecal coliform density from point sources
ΣQ_e	= sum of **all** design flows from point sources discharging to the segment (direct or via tributaries)
400/100 ml	= water quality standard

The values for ΣQ_e can be found in Table 2.3.3 as can the boundary flows. For these TMDLs the "not to exceed " value was chosen as the applied water quality standard rather than the seasonal geometric mean. The reason for this selection is two fold: 1) the TMDL/load duration process evaluates compliance based on individual points and 2) the reductions necessary to achieve compliance with the not to exceed criteria result in compliance with the seasonal geometric mean.

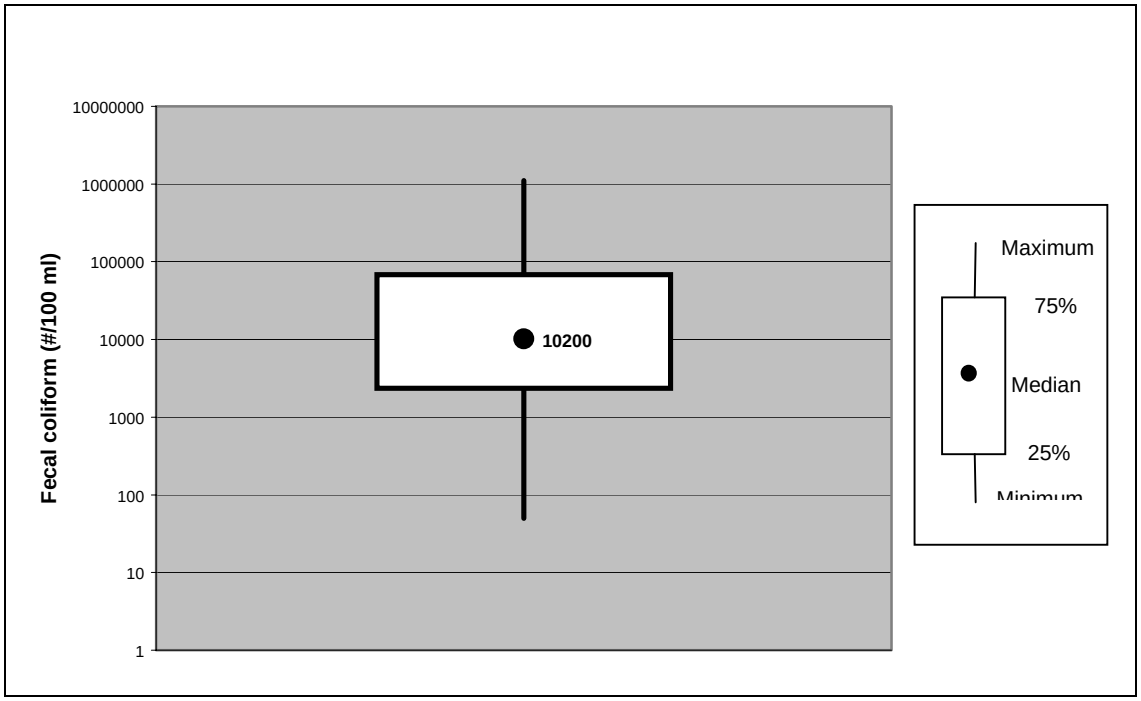
Table 2.3.3 Sum of Wastewater Treatment Facility Design Flows in the North Platte Basin

Segment	Total Number of Facilities	Sum of Contributing Facility Design Flows	Flow Value for Point vs. Nonpoint Boundary
NP1-10000	1	10.8 cfs	276 cfs
NP1-20000	0		
NP1-20500	0		
NP2-10000	2	27.8 cfs	710 cfs
NP3-10000	7	31.2 cfs	797 cfs
NP3-20000	1	0.5 cfs	110 cfs*
NP3-30000	1	0.1 cfs	171 cfs*
NP3-50000	0		

*7q10 Values

The identification of pollutant sources and impacts are shown in figures 2.3.3b through 2.3.3.f.

Figure 2.3.3a. Fecal coliform Data from 24 Wastewater Treatment Facilities



Where no point sources have been identified to exist in the remaining three watersheds, the source of fecal coliform will be considered to have originated entirely from nonpoint sources.

Figure 2.3.3b. Identification of Pollutant Sources Using the Load Curve for NP1-10000

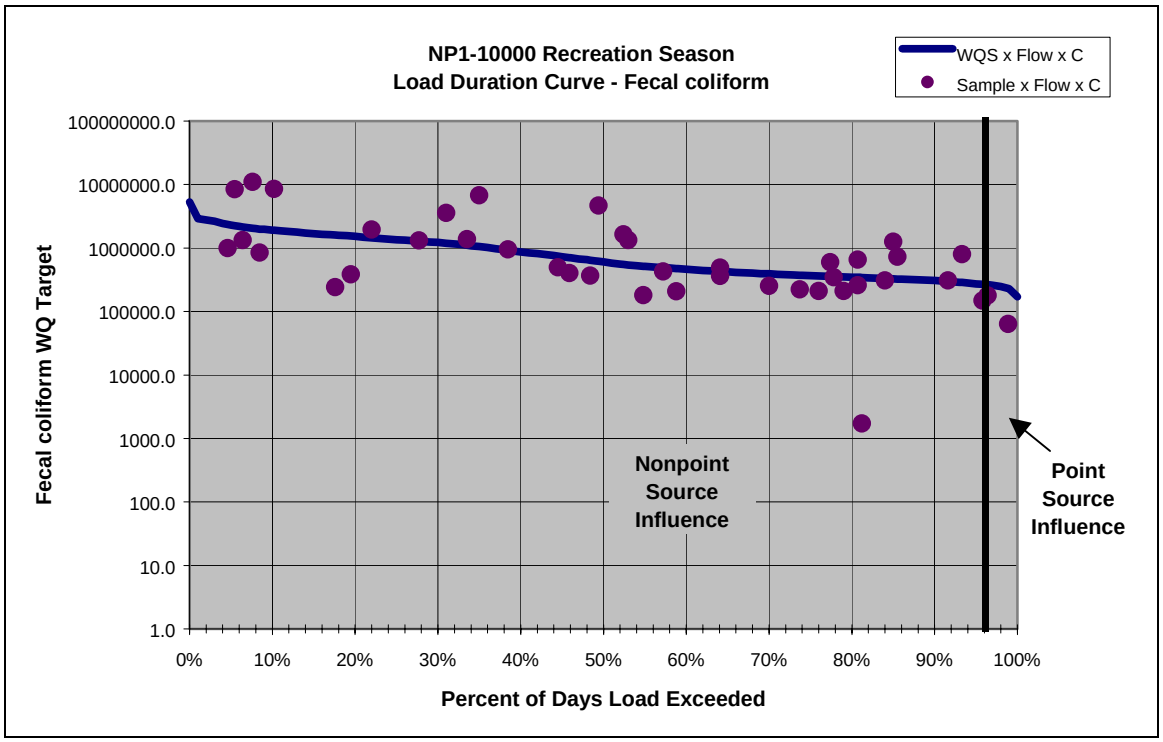


Figure 2.3.3c. Identification of Pollutant Sources Using the Load Curve for NP2-10000

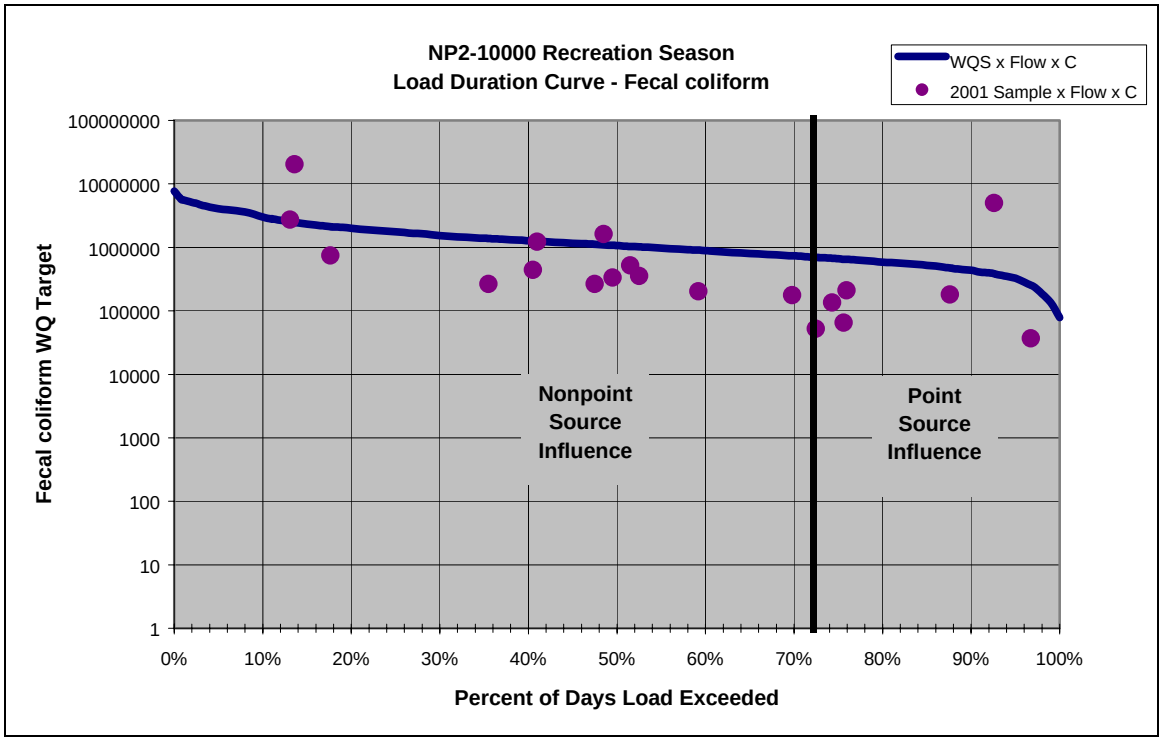


Figure 2.3.3d. Identification of Pollutant Sources Using the Load Curve for NP3-10000

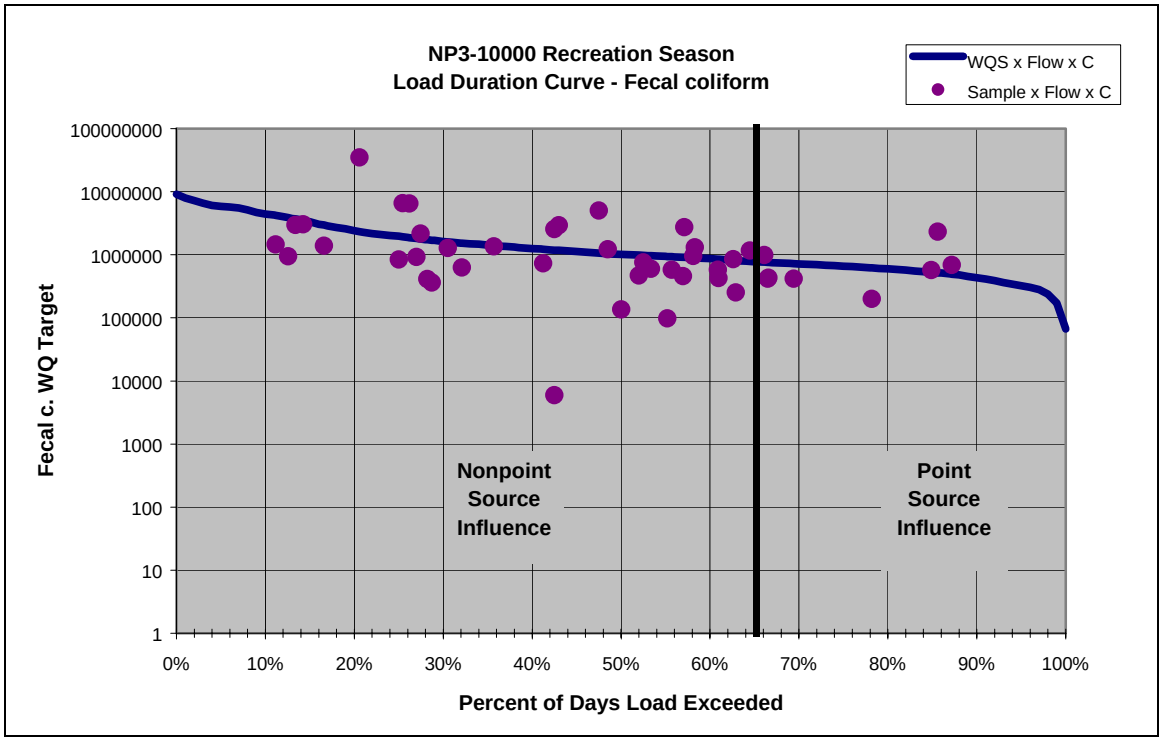


Figure 2.3.3e. Identification of Pollutant Sources Using the Load Curve for NP3-20000

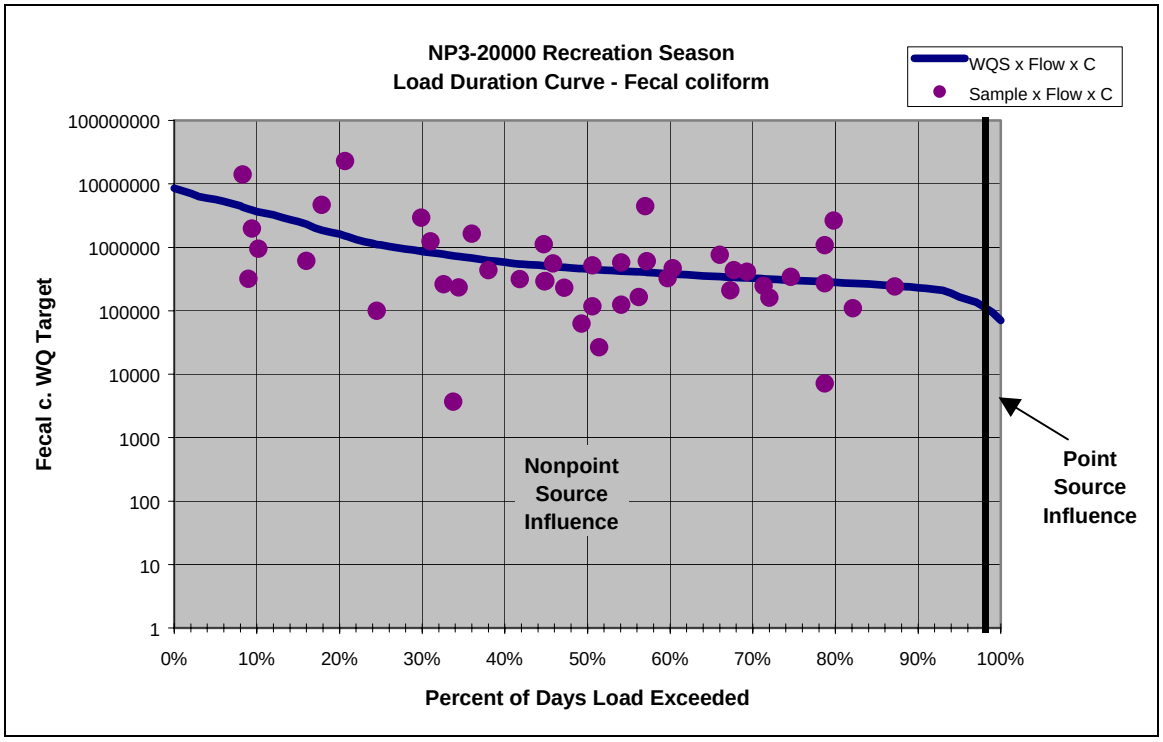
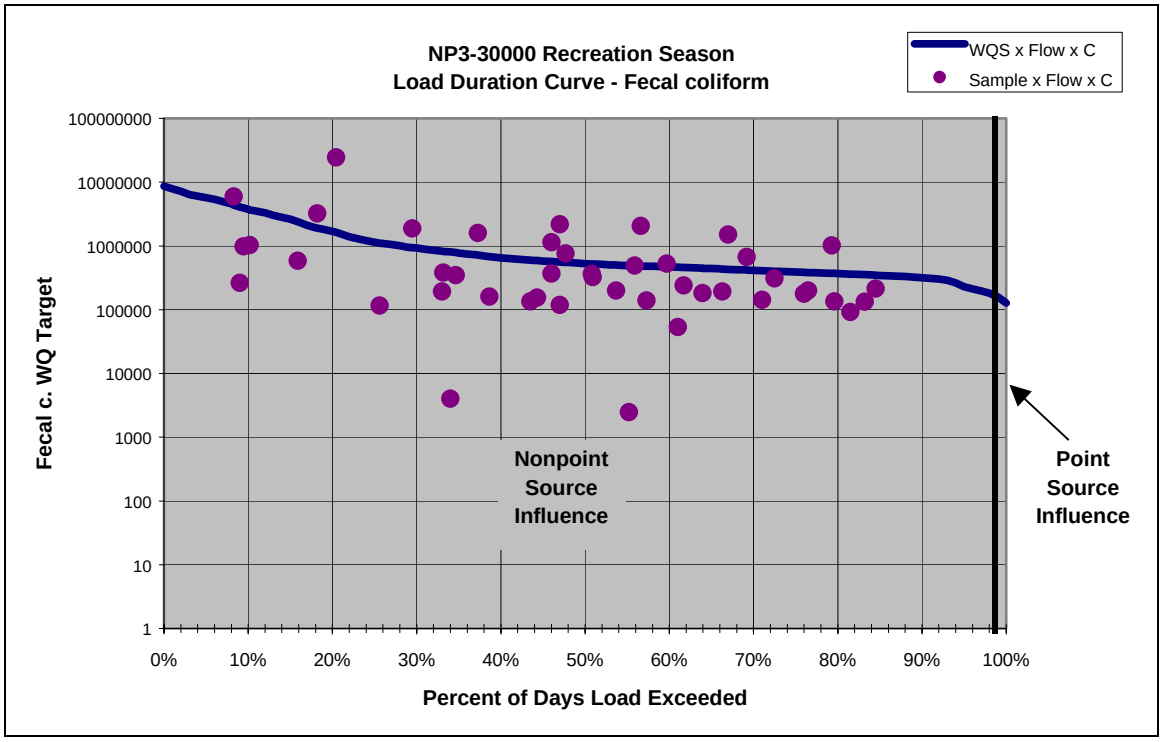


Figure 2.3.3f. Identification of Pollutant Sources Using the Load Curve for NP3-30000



2.3.3.1 Point Sources of Fecal coliform: Based upon the load curves and the position of the monitoring data points, it appears point sources are contributing to the fecal coliform impairment within Segments NP2-10000 and NP3-10000. Although not identified as playing a significant role by the remaining load curves, several facilities discharge either directly to or into a tributary of the North Platte Recreation segment and are listed in Table 2.3.3.1.

Other sources that are classified as point sources and will be acknowledged include municipal stormwater discharges, unpermitted (i.e., cross connections or illicit) sanitary or industrial discharges and failing individual treatment systems (e.g., septic tanks, lagoons).

2.3.3.2 Nonpoint and Natural Sources of Fecal Coliform: Due to the diverse nature, distribution and delivery method, nonpoint and natural sources will not be separated. Therefore, the monitoring data that lie above the duration curve are considered to be the result of nonpoint and natural background sources.

Along with the use of the load curves to identify the sources, monitoring data collected from selected North Platte River tributaries has been included in Appendix B.

2.4 Pollutant Allocation

A TMDL is defined as:

TMDL = Loading Capacity = WLA + LA + Background + MOS

As stated above, the loading capacity is based upon flow position in the hydrograph and is defined by:

Load Capacity = Flow x 400/100 ml x C

Where:

Flow = Stream flow volume (cubic feet per second)
400/100 ml = applicable/target water quality criteria for fecal coliform from Title 117
C = conversion factor.

By regulation, a TMDL requires a loading capacity value for the pollutant of concern. In the case of fecal coliform, a "load" (flow rate x concentration x time) could be calculated, but the approach may not be appropriate for expressing this non-conservative parameter. Therefore, for the purposes of these TMDLs, a loading capacity will not be "calculated" but will be expressed as the water quality standard. Because the water quality is expressed as a concentration, the LC will not equal the WLA + the LA.

To achieve the desired loading capacities requires the following allocations:

2.4.1 Wasteload Allocations

2.4.1.1 NPDES Permitted Facilities: Title 117 does not allow for the application of a mixing zone for the initial assimilation of effluents in order to meet the criteria associated with the recreation beneficial use. Because of this, the water quality criteria are applied as “end-of-pipe” permit limits and are applicable at all stream flows >7q10. Therefore, the wasteload allocation established by this TMDL will be a monthly geometric mean of 200/100 ml and a daily maximum permit limit of 400/100 ml.

Table 2.3.3.1 NPDES Permitted Discharges to the 303(d) Listed North Platte Segments

Recreation Segment	Receiving Water	Facility	NPDES Permit Number	Facility Type	Facility Design Flow (cfs)	Facility Discharge Directly to Recreation Segment?	Approximate Distance to Recreation Segment (stream miles)	Fecal coliform, Limits in NPDES permit?
NP1-10000	NP1-10000	North Platte WWTF	NE0032891	Lagoon	10.8	**Yes**		**No**
NP2-10000	NP2-10000	Coldwater Fish Farms	NE0123927	Lagoon	22.3	**Yes**		**No**
	NP2-10400	Chaulk Mound Trout Ranch East	NE0133736	Lagoon	5.6	No	28.2	No
NP3-10000	NP3-10000	Bridgeport WWTF	NE0112119	Lagoon	0.24	**Yes**		**Yes**
	NP3-10910	Bayard WWTF	NE0112739	Lagoon	0.195	No	5.0	No
	Not Designated	Western Sugar Co. - Bayard	NE0111651	Lagoon	9.7	No	1.8	No
	NP3-10000	Minatare WWTF	NE0043290	Lagoon	0.4	**Yes**		**No**
	NP3-10000	Scottsbluff WWTF	NE0036315	Lagoon	6.2	**Yes**		**Yes**
	NP3-10000	Gering WWTF	NE0027936	Lagoon	2.9	**Yes**		**No**
	NP3-10000	Western Sugar Co. - Scottsbluff	NE0111686	Lagoon	11.3	**Yes**		**No**
NP3-20000	NP3-20000	Mitchell WWTF	NE0026123	Lagoon	0.5	**Yes**		**Yes**
NP3-30000	NP3-30500	Lyman WWTF	NE0112208	Lagoon	0.1	No	5.9	No

The wasteload allocation will initially be applied to all facilities that discharge directly to a recreational segment. Future monitoring and evaluation will be utilized to determine if fecal coliform limitations are necessary for facilities discharging to the recreation segment's tributaries.

2.4.1.2 Dry Weather Discharges: Dry weather discharges can either be from illicit sources, cross-connections or mechanical failure and often exhibit the greatest influence on the base flow conditions of the stream. Thus, it is most appropriate to group these discharges and limit similarly to the WWTFs. Specifically, the wasteload allocations assigned to these discharges shall be a seasonal geometric mean of 200/100 ml and with <10% of the samples >400/100 ml.

2.4.1.3 Non-Discharging Facilities: Several facilities including confined animal feeding operations and lagoons are designed for "zero" discharge. In the case of animal feeding operations, discharges may only occur as the result of a 25 year 24 hour storm event or a chronic wet period with an accumulative precipitation equivalent to a 25 year 24 hour storm. Based on this permitting provision, the WLA for facilities classified as non-discharging will be zero (0).

2.4.2 Load Allocations

The load allocations assigned to these TMDLs will be based upon the stream flow volume and will be defined as:

$$LA_i = Q_i * 400/100 \text{ ml} * C$$

Where:
LA_i = load allocations at the i^{th} flow
Q_i = stream flow at the i^{th} flow
400/100 ml = applicable/target water quality criteria for fecal coliform from Title 117
C = conversion factor

2.4.2.1 Reduction in Nonpoint Source and Natural Background Loads to Meet Water Quality Criteria. It is important to report the reductions necessary to meet the water quality criteria. The necessary reductions were determined based upon the 1996 and 2001 data, which is considered representative information. The targeted reductions found in Table 2.4.2.1 provide water quality managers with a quantitative endpoint by which implementation planning can be carried out. The noted reductions along with the application of point source controls if achieved should result in the waterbodies fully supporting the primary contact recreation beneficial use.

Table 2.4.2.1 Targeted Nonpoint Source and Natural Background Reductions

Segment	Targeted NPS Reduction	Expected Seasonal Geometric Mean	Expected Percentage of Samples >400/100 ml
NP1-10000	74%	101/100 ml	10%
NP1-20000	40%	81/100 ml	9%
NP2-20500	67%	78/100 ml	7%
NP2-10000	10%	140/100 ml	10%
NP3-10000	67%	102/100 ml	9%
NP3-20000	71%	80/100 ml	9%
NP3-30000	65%	72/100 ml	9%
NP3-50000	45%	50/100 ml	9%

2.4.3 Margin of Safety

A margin of safety (MOS) must be incorporated into TMDLs in an attempt to account for uncertainty in the data, analysis or targeted allocations. The MOS can either be explicit or implicit and for these TMDLs are as follows:

- Decay and/or die off of fecal coliform were not accounted for in either the source assessment or in establishment of the load reduction. That is, the entire concentration/load from the source was assumed to be present within the waterbody and the reductions should focus on the load.
- These TMDLs assumed the effluents discharge the permitted average monthly fecal coliform density allowed. WWTF disinfection systems are often operated to achieve 100% reduction in Fecal coliform. Thus, the actual NPDES permitted point source contribution is likely less.
- In order to achieve the applicable water quality criteria, the load allocation reduction must focus on the extreme measurements. In doing this, the expected seasonal geometric means for the 8 segments are 30-75% less than the required seasonal geometric mean.

2.4.4 Pathogen TMDL Summary

TMDL/Waterbody Loading Capacity = 200/100 ml (WLA) + (Q_i*400/100 ml*C) (LA & Natural Background) + Implicit Margin of Safety

3.0 Implementation Plan

The implementation of controls to manage fecal coliform within the North Platte River Basin includes but is not limited to:

3.1 NPDES Permitted Point Sources

Facilities that discharge directly to the North Platte River will be required to meet the wasteload allocations at the end of the pipe. Facilities discharging to tributaries will be evaluated to determine the extent of the effluent's impact on the recreation segment. If deemed significant, a request will be made to limit the fecal coliform concentration discharged from these facilities in the NPDES permit.

In the course of compliance audits, deficiencies in the operation of the WWTF disinfection appurtenances and noncompliance with the NPDES permit limits should be noted and corrective action pursued.

Biosolids (sludge) generated by municipal and industrial facilities are regulated under 40 CFR Part 503 and 40 CFR Part 257, respectively. 40 CFR part 257 requires that facilities and practices not cause nonpoint source pollution of waters of the United States. Part 503 specifically requires that sludge applications be not less that 10 meters from waters of the United States and that the sludge not be applied to frozen, flooded or snow covered ground if the sludge can enter into waters of the United States.

Consistent with Section 3.4 below, a recommendation will be made that all NPDES permittees be required to adhere to items #1and #2 for land application activities taking place either during or 10 days prior to the recreation season (May 1 – September 30). In those areas where land slope or drainage is such where the application has a greater potential to run-off, or where application has been observed to have run-off, the recommendation will be consistent with #3

3.2 NPDES Storm Water Discharges

The WLA defined in section 2.4.1.1 will be applicable to all NPDES discharges including discharge from regulated stormwater outfall. The NDEQ is responsible for determining the applicability of NPDES stormwater permits for urbanized areas with populations >10,000 but <100,000. As well, other municipal or construction areas can be designated for coverage under an NPDES (stormwater) permit if the NDEQ determines control of the stormwater is necessary.

Facilities discharging stormwater under the authority of a NPDES permit are required to implement the following minimum control measures:

- Implement a public education and outreach program on stormwater impacts
- Comply with State and local public notice requirements when implementing a public participation program.
- Develop and enforce a program to detect and eliminate illicit discharges.
- Develop, implement and enforce a program to reduce pollutants from construction activities.
- Develop, implement and enforce a program to reduce pollutants from post construction activities in new or redevelopment projects
- Develop a pollution prevention/good housekeeping program.

Rather than apply numeric limitations on individual stormwater outfalls, the strategy will be to initially allow the municipalities sufficient opportunity to comply with the NPDES requirements; either voluntarily or under the authority of an NPDES permit. In the future, should additional monitoring data indicate the minimum control measures are inadequate or have not been incorporated; consideration will be given to application of wasteload allocations for the outfalls in the area of concern.

At this time no MS4 permits have been issued to municipalities residing in the North Platte Basin. The issuance of future permits will likely be contingent upon the collection of additional data, the future beneficial use status of the impaired segments and the voluntary actions the candidate facilities have taken to minimize pollutants in the stormwater discharges.

3.3 Dry Weather Discharges

Title 119 – Rules and Regulations Pertaining to the Issuance of Permits Under the National Pollutant Discharge Elimination System, Chapter 2 states:

> *"All persons discharging pollutants from a point source into any waters of the State are required to apply for and have a permit to discharge."*

Discharges not permitted should be required to obtain the proper authorization to discharge. All discharges are then subject to the appropriate limitations consistent with the WLAs established by this TMDL. Elimination of the discharge should be undertaken in the event permitting and control is not feasible.

3.4 Animal Feeding Operations

Title 130 – Rules and Regulations Pertaining to Livestock Waste Control states:

> *<u>001</u> A livestock waste control facility shall be required for an existing or proposed livestock operation of three hundred animal units or larger, when livestock wastes:*

001.01 Violate or threaten to violate Title 117 (Neb. Administrative Code (NAC)), Nebraska Surface Water Quality Standards;
001.02 Violate or threaten to violate Title 118 (NAC), Ground Water Quality Standards and Use Classification;
001.03 Discharge into waters of the State; or
001.04 Violate The Nebraska Environmental Protection Act.

002 Any livestock operation less than three hundred animal units is exempt from the permitting process, including the requirement to request an inspection, unless there has been a confirmed discharge into waters of the State, or the Department has determined that because of conditions at the livestock operation there is a high potential for discharge into waters of the State in which case the Department shall notify the owner of the livestock operation by certified mail that the owner is subject to the Livestock Waste Management Act.

When a livestock waste control facility is required the owner/operator must also be issued a construction and/or a state-operating permit. State operating permits require facilities be properly operated and maintained to prevent water pollution and to protect the environment of the State.

Livestock waste control facilities for open lots, by regulation must be designed and constructed to contain all waste generated under conditions less than a 25 year 24 hour precipitation event. Confined animal feeding operations are required to maintain 180 days of storage or a lagoon to treat the waste products. Meeting these permit requirements should equate to "zero" discharge during under conditions less than a 25 year 24 hour precipitation event, or a chronic wet period.

Wastewater and biosolids (manure) produced by the animal feeding operations are most often land applied for beneficial reuse. Permitted facilities are required to follow best management practices (BMPs) for the land application as defined in Title 130, Chapter 11. Those BMPs include:

1. Utilize application areas which are under proper conservation treatment to prevent run-off into waters of the State
2. Not apply waste within 30 feet of any stream, lake or impounded waters identified in Chapter 6 and Chapter 7 of Title 117, unless in accordance with an approved comprehensive nutrient management plan
3. When waste is applied within 100 feet of any streams, lakes an impounded waters identified in Chapter 6 and 7 of Title 117, the Department may also require additional buffer and/or vegetative buffers, and that the livestock waste be applied in a manner which reduces potential for run-off of nutrients or pathogens by incorporation, injection of waste or other approved practices.

Based upon the above, it shall be recommended that the NDEQ's Agriculture Section stipulate in the state operating or other permits, for facilities located in the North Platte Basin, that the application of livestock waste occurring during or 10 days prior to the Recreation Season (May 1 – September 30) be consistent with the above #1 and #2 and the application setback be the minimum of 30 feet regardless of the status of the comprehensive nutrient management plan. In those areas where land slope or drainage is such where the application has a greater potential to run-off, or where application has been observed to have run-off, the recommendation will be consistent with the requirements of #3 with the minimum setback being 100 feet.

3.5 Exempt Facilities/Other Agricultural Sources

Animal feeding operations are exempt from the regulations set forth in Title 130 if:

- The operation is less than 300 animal units
- There has not been a confirmed discharge to waters of the State, or
- The Department has determined that because of conditions at the livestock operation there is **not** a high potential for discharge into waters of the State

Periodically, the NDEQ will receive a complaint on or a request for an inspection from a facility operating with <300 animal units. Should deficiencies be noted during the on-site visit, the owners/operator will often be given an opportunity to make corrections prior to enforcement or permit action being taken. In the event the efforts at voluntary compliance fail, civil enforcement or the issuance of a permit will be pursued to bring about the necessary corrective measures.

Because these facilities are "non-regulated", it is difficult to assess the impacts to the environment. As well, pastures or other temporary feeding practices may contribute to the fecal coliform impairments if conditions are such that run-off from the site occurs. In lieu of regulatory requirements, the NDEQ will first look to the USDA-Natural Resource Conservation Service for assistance utilizing programs under the control of the Service such as Conservation Reserve Program, Environmental Quality Incentives Program, Conservation Farm Option, Conservation of Private Grazing Land Initiative, the Wetlands Reserve Program and others that aid in the maintenance and improvement of water quality.

3.6 Section 319 – Nonpoint Source Management Program

The United States Environmental Protection Agency supplies grant funds to states to aid in managing nonpoint source pollution. When grant applications are submitted for review, an effort should be made to include the control of fecal coliform and surface run-off for the proposed projects in the North Platte Basin. As well, an effort will be made to redirect applicants to develop proposals consistent with the goals of this TMDL. Preference may be given to those projects that will have a direct reduction in the fecal coliform contributions of nonpoint source discharges.

3.7 Non-Government Organizations

Several non-governmental organizations with an emphasis on agriculture disseminate information to their members on a regular basis. As well, some of the organizations have established environmental education programs to assist in the understanding of environmental regulations and topics. The NDEQ will communicate with these entities in an attempt to utilize the membership distribution process as a means of providing information on the water quality impairments, the TMDL and suggestions to assist in solving the identified problems.

3.8 Reasonable Assurances

The NDEQ is responsible for the issuance of NPDES or state operating permits for industrial and municipal wastewater discharges, regulated stormwater discharges and livestock operations (open lot or confined). Issued permits must be consistent with or more stringent then the wasteload allocations set forth by this TMDL. Compliance with the permit may require construction or modification of a facility and the issued permits may account for this through the inclusion of a compliance schedule or administrative order.

Effective management of nonpoint source pollution in Nebraska necessarily requires a cooperative and coordinated effort by many agencies and organizations, both public and private. Each organization is uniquely equipped to deliver specific services and assistance to the citizens of Nebraska to help reduce the effects of nonpoint source pollution on the State's water resources. While a few of the organizations have been previously identified, Appendix A is a more complete compilation of those entities that may be included in the implementation process. These agencies have been identified as being responsible for program oversight or fund allocation that may be useful in addressing and reducing fecal coliform contributions to the North Platte River. Participation will depend on the agency/organization's program capabilities.

4.0 Future Monitoring

Future monitoring will generally be consistent with the rotating basin monitoring scheme. That is, annually, 2 or 3 river basins in the same geographic location are the focus of the monitoring effort. The North Platte basin was monitored in 2001 and will again be targeted in 2006. An effort will be made to expand the monitoring in an effort to isolate areas of concern and to focus resources to address identified problems.

Periodically, compliance monitoring will be conducted at NPDES permitted facilities to verify the permit limitations are being adhered to. Facilities are selected either randomly or in response to inspection or reported information.

As well, the NPDES permits require self-monitoring of the effluent by the permittee with the frequency of the monitoring being based on the discharge characteristics. The data is then reported to NDEQ quarterly, semiannually or annually and entered into the EPA's Permitting Compliance System. The compliance monitoring and self-monitoring information will be used in assessing the success of the TMDL.

Recently, analytical techniques have been introduced that may provide a greater level of confidence in the identification of pollutant sources. These techniques include microbial source tracking and specialized sampling the targets human wastewater. As the science progresses the application of these analytical techniques may become a valuable tool for source identification and pollutant reduction.

5.0 Public Participation

The availability of the TMDLs in draft form was published in the North Platte Telegraph and the Scottsbluff Star-Herald with the public comment period running from approximately July 31, 2003 to September 5, 2003. These TMDLs were also made available to the public on the NDEQ's Internet site and announcement letters were mailed to interested stakeholders.

In response to the public notice, a single comment letter was received from the Nebraska Pork Producers Association. The comments were reviewed and considered however; no changes were made to the TMDLs as a result of the correspondence. Copies of the letters and the NDEQ's response to those comments have been included with the submittal to EPA Region 7.

6.0 References

Chapman, Shannen, S. Omernik, J.M., Freeouf, J.A., Huggins, D.G., McCauley, J.R., Freeman, C.C., Steiner, G.A., Robert, T., Schlepp, R.L., 2001. Ecoregions of Nebraska and Kansas (color poster with map, descriptive text, summary tables and photographs): Reston, Virginia, U.S. Geological Survey

NDEQ 1992. Title 119 – Rules and Regulations Pertaining to the Issuance of Permits Under the National Pollutant Discharge Elimination System. Nebraska Department of Environmental Quality. Lincoln, NE.

NDEQ 1998. 1998 Section 303(d) List of Impaired Waters. Nebraska Department of Environmental Quality. Lincoln, NE.

NDEQ 2001a. Methodology for Waterbody Assessment and Developing the 2002 Section 303(d) List of Impaired Waterbodies for Nebraska. Nebraska Department of Environmental Quality. Lincoln, NE.

NDEQ 2001b. Title 130 – Rules and Regulations Pertaining to Livestock Waste Control. Nebraska Department of Environmental Quality. Lincoln, NE.

NDEQ 2002a. 2002 Section 303(d) List of Impaired Waters. Nebraska Department of Environmental Quality. Lincoln, NE.

6.0 References (continued)

NDEQ 2002b. 2002 Nebraska Water Quality Report. Nebraska Department of Environmental Quality. Lincoln, NE.

NDEQ 2002c. Title 117 – Nebraska Surface Water Quality Standards. Nebraska Department of Environmental Quality. Lincoln, NE.

NDEQ 2002d. Nebraska's Approach for Developing TMDLs for Streams Using the Load Duration Curve Methodology. Nebraska Department of Environmental Quality. Lincoln, NE.

NDNR. ____. Nebraska Department of Natural Resources Databank, NDNR Internet Site, Nebraska Department of Natural Resources. Lincoln, NE.

NNRC 1975. North Platte River Basin Water Quality Management Plan. Nebraska Natural Resources Commission. Lincoln, NE.

Appendix A – Federal, State Agency and Private Organizations Included in TMDL Implementation.

FEDERAL

- Bureau of Reclamation
- Environmental Protection Agency
- Fish and Wildlife Service
- Geological Survey
- Department of Agriculture - Farm Services Agency
- Department of Agriculture - Natural Resources Conservation Service

STATE

- Nebraska Association of Resources Districts
- Department of Agriculture
- Department of Environmental Quality
- Department of Roads
- Department of Water Resources
- Department of Health and Human Services
- Environmental Trust
- Game and Parks Commission
- Natural Resources Commission
- University of Nebraska Institute of Agriculture and Natural Resources (IANR)
- UN-IANR: Agricultural Research Division
- UN-IANR: Cooperative Extension Division
- UN-IANR: Conservation and Survey Division
- UN-IANR: Nebraska Forest Service
- UN-IANR: Water Center and Environmental Programs

LOCAL

- Natural Resources Districts
- County Governments (Zoning Board)
- City/Village Governments

NON-GOVERNMENTAL ORGANIZATIONS

- Nebraska Wildlife Federation
- Pheasants Forever
- Nebraska Water Environment Association
- Nebraska Corn Growers Association, Wheat Growers, etc.
- Nebraska Cattlemen's Association, Pork Producers, etc
- Other specialty interest groups
- Local Associations (i.e. homeowners associations)

Appendix B – Fecal Coliform Data Collected in 2001 from North Platte Tributaries

Monitoring information collected during the recreation season in 2001 was not only obtained from sites on the segments assigned the recreation beneficial use but also from 8 tributaries. These sites were chosen based upon the location of a USGS or NDNR gage. The location of the sites and the area of the basin drainage evaluated by the sites are shown in Figure B1. Table B1 then provides a summary of the tributary monitoring information.

Figure B1. Tributary Monitoring Locations in the North Platte Basin

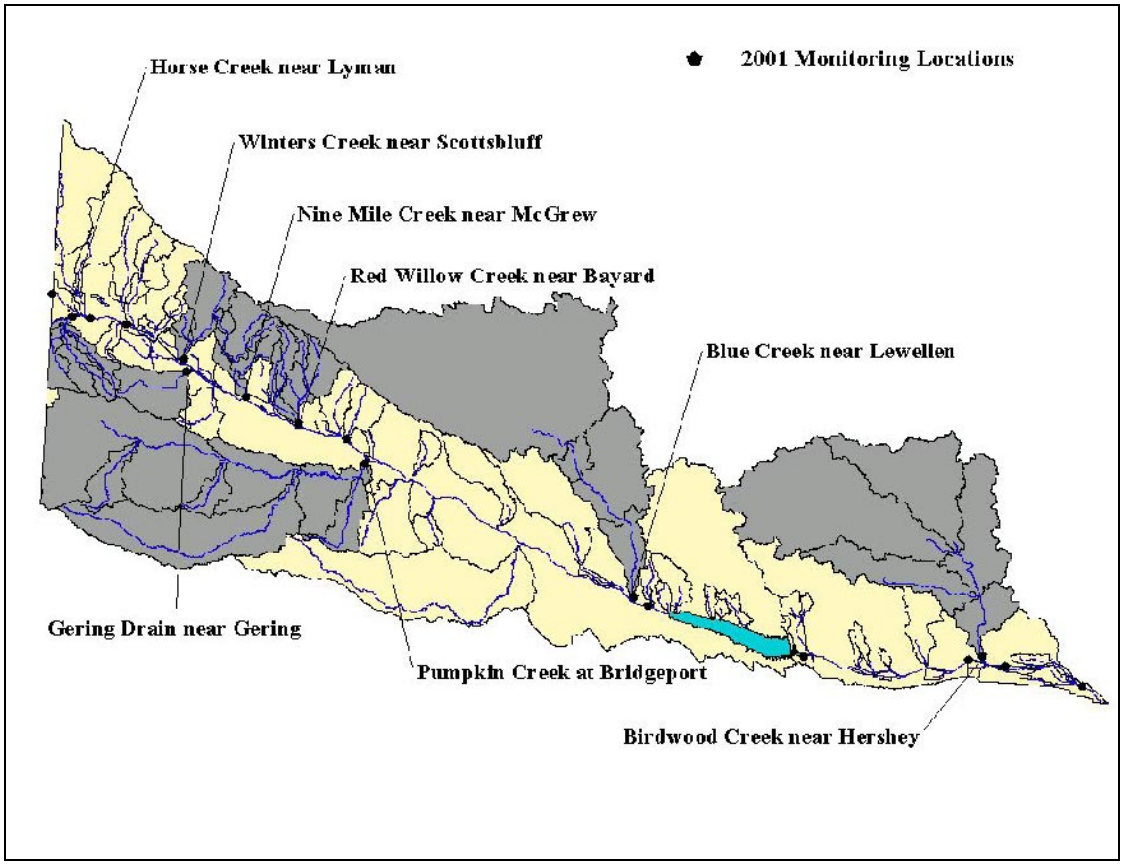


Table B1. Summary of 2001 Monitoring from North Platte Tributaries

Stream	Title 117 Segment Identification	Location	Number of Samples	Recreation Season Geometric Mean (#/100 ml)	Number of Samples >400/100 ml	% of Samples >400/100 ml
Blue Creek	NP2-10800	Near Lewellen	20	287	7	35
Pumpkin Creek	NP3-10100	Near Bridgeport	20	2500	20	100
Red Willow Creek	NP3-10900	Near Bayard	20	429	9	45
Nine Mile Creek	NP3-11700	Near McGrew	20	394	10	50
Gering Drain	NP3-12400	Near Gering	20	614	13	65
Winters Creek	NP3-12600	Near Scottsbluff	20	636	14	70
Horse Creek	NP3-30600	Near Lyman	19	702	15	79