UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

NOV 1 9 2014

REPLY TO THE ATTENTION OF:
WW-16J

Rebecca J. Flood, Assistant Commissioner
Minnesota Pollution Control Agency
520 Lafayette Road North
St. Paul, Minnesota 55155-4194

Dear Ms. Flood:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Loads (TMDLs) for segments within the Crow Wing River watershed (CWRW), including support documentation and follow up information. The CWRW is located in central Minnesota in parts of Becker, Cass, Clearwater, Crow Wing, Hubbard, Morrison, Otter Tail, Todd and Wadena Counties. The CWRW TMDLs address impaired aquatic recreation and aquatic life due to excessive nutrients (phosphorus), impaired aquatic recreation due to excessive bacteria (*E. coli*) and impaired aquatic life use due to a dearth of dissolved oxygen and heat stresses.

EPA has determined that the CWRW TMDLs meet the requirements of Section 303(d) of the Clean Water Act and EPA's implementing regulations set forth at 40 C.F.R. Part 130. Therefore, EPA approves Minnesota's eight nutrient TMDLs, ten bacteria and two heat TMDLs. The statutory and regulatory requirements, and EPA's review of Minnesota's compliance with each requirement, are described in the enclosed decision document.

We wish to acknowledge Minnesota's efforts in submitting these TMDLs and look forward to future TMDL submissions by the State of Minnesota. If you have any questions, please contact Mr. Peter Swenson, Chief of the Watersheds and Wetlands Branch, at 312-886-0236.

Sincerely,

Tinka G. Hyde /for T.H.
Director, Water Division

Enclosure

cc: Celine Lyman, MPCA
Bonnie Finnerty, MPCA

wq-iw8-45g

TMDL: Crow Wing River watershed nutrient, bacteria & temperature TMDLs
Becker, Cass, Clearwater, Crow Wing, Hubbard, Morrison, Otter Tail, Todd and Wadena Counties, MN
Date: November 19, 2014

DECISION DOCUMENT
FOR THE CROW WING RIVER WATERSHED NUTRIENT, BACTERIA & TEMPERATURE TMDLS, MINNESOTA

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. Part 130 describe the statutory and regulatory requirements for approvable TMDLs. Additional information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable. These TMDL review guidelines are not themselves regulations. They are an attempt to summarize and provide guidance regarding currently effective statutory and regulatory requirements relating to TMDLs. Any differences between these guidelines and EPA's TMDL regulations should be resolved in favor of the regulations themselves.

1. Identification of Water body, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the water body as it appears on the State's/Tribe's 303(d) list. The water body should be identified/georeferenced using the National Hydrography Dataset (NHD), and the TMDL should clearly identify the pollutant for which the TMDL is being established. In addition, the TMDL should identify the priority ranking of the water body and specify the link between the pollutant of concern and the water quality standard (see Section 2 below).

The TMDL submittal should include an identification of the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading, e.g., lbs/per day. The TMDL should provide the identification numbers of the NPDES permits within the water body. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background. This information is necessary for EPA's review of the load and wasteload allocations, which are required by regulation.

The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as:

(1) the spatial extent of the watershed in which the impaired water body is located;
(2) the assumed distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources;
(4) present and future growth trends, if taken into consideration in preparing the TMDL (e.g., the TMDL could include the design capacity of a wastewater treatment facility); and

(5) an explanation and analytical basis for expressing the TMDL through *surrogate measures*, if applicable. *Surrogate measures* are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

Comment:

Location Description/Spatial Extent:

The Crow Wing River watershed (CWRW) (HUC-8 #07010106) drains approximately 1,981 square miles (1,268,127 acres) in all or parts of Becker, Cass, Clearwater, Crow Wing, Hubbard, Morrison, Otter Tail, Todd and Wadena Counties. The headwaters of the Crow Wing River originate at the Crow Wing Chain of Lakes, near Park Rapids, Minnesota. The Crow Wing River flows southward and eastward before emptying into the Mississippi River southwest of Brainerd, Minnesota. Areas of the CWRW are in the boundaries of the North Central Hardwood Forest (NCHF) and the Northern Lakes and Forests (NLF) ecoregions as well as the Central Region River Nutrient Region (CRRNR). The White Earth Nation has tribal lands within the CWRW. These lands include areas upstream of Blueberry Lake, Lower Twin Lake and the Straight River subwatersheds.

The CWRW TMDLs address seven nutrient impaired lakes, one nutrient impaired stream, ten stream segments which are impaired due to bacteria and two stream segments with depleted dissolved oxygen (DO) in the water column. The lake and stream segments addressed by the CWRW TMDLs are found in Table 1 of this Decision Document.

Table 1: Crow Wing River Watershed impaired waters addressed by this TMDL

Water body name	Assessment Unit ID	Affected Use	Pollutant or stressor	TMDL
Blueberry Lake	80-0034-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Total Phosphorus
Eighth Crow Wing Lake	29-0079-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Total Phosphorus
First Crow Wing Lake	29-0086-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Total Phosphorus
Lower Twin Lake	80-0030-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Total Phosphorus
Mayo Lake	18-0408-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Total Phosphorus
Portage Lake	29-0250-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Total Phosphorus
Sibley Lake	18-0404-00	Aquatic Recreation	Excess Nutrients (total phosphorus)	Total Phosphorus
Swan Creek	07010106-527	Aquatic Recreation	DO / Aquatic Macroinvertebrate Bioassessments	Total Phosphorus
Swan Creek	07010106-527	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Partridge River	07010106-518	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Home Brook	07010106-524	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Cat River	07010106-544	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Pillager Creek	07010106-577	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Mayo Creek	07010106-604	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Unnamed Creek	07010106-684	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Stoney Brook	07010106-698	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Corey Brook	07010106-700	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Farnham Creek	07010106-702	Aquatic Recreation	Bacteria (*E. coli*)	Bacteria
Straight River	07010106-558	Aquatic Life	DO / Temperature	Temperature
Shell River	07010106-681	Aquatic Life	DO / Temperature	Temperature

The Minnesota Pollution Control Agency (MPCA) classified the following lakes as deep lakes according to its deep lake criteria (i.e., deep lakes as enclosed basins with maximum depths greater than 15 feet); Eighth Crow Wing, Lower Twin, Mayo, Portage and Sibley lakes. MPCA characterized Blueberry and First Crow Wing lakes as shallow lakes. MPCA defines shallow lakes as lakes with a maximum depth of 15 feet or less (Table 2 of this Decision Document).

Table 2: Morphometric and watershed characteristics of lakes addressed in the Crow Wing River Watershed TMDLs

Parameter	Blueberry	Eighth Crow Wing	First Crow Wing	Lower Twin	Mayo	Portage	Sibley
Surface Area (acres)	533	493	509	252	151	417	426
Littoral Area (% of total area)	100%	30%	100%	53%	94%	100%	60%
Volume (acre-feet)	3,634	9,050	2,926	2,859	1,141	3,004	5,667
Mean depth (feet)	6.8	18.4	5.8	11.4	7.6	7.2	13.3
Maximum Depth (feet)	15	30	15	26	22	17	40
Watershed area (including lake area) (acres)	136,332	25,086	166,458	383,426	35,941	3,416	35,161
Watershed area (surface area)	255 : 1	50 : 1	326 : 1	1,521 : 1	237 : 1	7 : 1	82 : 1

Land Use:

Land use in the CWRW is comprised of developed lands, croplands, grasslands and pastures, forested lands/woodlands and open water and wetlands (Table 3 of this Decision Document). MPCA determined that a majority of land use within the CWRW is composed of forested lands/woodlands and open water and wetland areas.

Table 3: Subwatershed Land Cover (NLCD 2006) for the Crow-Wing River Watershed

Water body Name	Developed	Cropland	Grasslands/ Pastures	Forested Lands /Woodlands	Open Water & Wetlands
Blueberry Lake	4%	11%	15%	56%	14%
Eighth Crow Wing Lake	4%	2%	13%	69%	9%
First Crow Wing Lake	3%	9%	9%	63%	16%
Lower Twin Lake	4%	12%	11%	59%	14%
Mayo Lake	4%	3%	26%	43%	23%
Portage Lake	5%	4%	7%	67%	2%
Sibley Lake	4%	3%	26%	43%	22%
Partridge River	6%	15%	8%	44%	26%
Home Brook	10%	0%	9%	44%	38%
Swan Creek	8%	3%	10%	43%	37%
Cat River	21%	4%	13%	41%	21%
Pillager Creek	5%	2%	3%	59%	31%
May Creek	7%	1%	3%	60%	28%
Unnamed Creek	10%	4%	11%	32%	43%
Stoney Brook	6%	0%	3%	59%	31%
Corey Brook	13%	0%	5%	43%	39%
Farnham Creek	2%	1%	4%	56%	37%
Straight River	12%	25%	10%	30%	23%

Shell River	14%	22%	4%	35%	26%
Crow Wing River Watershed	3%	10%	17%	48%	22%

Problem Identification:
All segments of the CWRW TMDLs are found on the draft 2014 Minnesota 303(d) list.

Bacteria TMDLs: The ten bacteria impaired stream segments (Table 1 of this Decision Document) are listed on the draft 2014 Minnesota 303(d) list for impaired aquatic recreation due to bacteria (*E. coli*) exceedances. MPCA describes the historic water quality conditions which indicate a bacteria impairment for each segments in Section 3.5.2 of the final TMDL document (pages 31-35).

Bacteria exceedances can negatively impact recreational uses (fishing, swimming, wading, boating, etc.) and public health. At elevated levels, bacteria may cause illness within humans who have contact with or ingest bacteria laden water. Recreation-based contact can lead to ear, nose, and throat infections, and stomach illness.

Nutrient TMDLs: The seven lakes are found on the 303(d) list for impaired aquatic recreation due to nutrient exceedances (phosphorus). The Swan Creek (07010106-527) segment is on the draft 2014 Minnesota 303(d) list for impaired aquatic life use due to dissolved oxygen deficiencies in the water column and impaired macroinvertebrate communities. Historic water quality conditions are presented by MPCA in Section 3.5.1 of the final TMDL document (page 30).

While phosphorus is an essential nutrient for aquatic life, elevated concentrations of total phosphorus (TP) can lead to nuisance algal blooms that negatively impact aquatic life and recreation (fishing, swimming, boating, etc.). Algal decomposition depletes oxygen levels within the water column which stress fish and macroinvertebrates species. Excess algae can shade the water column which limits the distribution of aquatic vegetation. Aquatic vegetation stabilizes bottom sediments, and also is an important habitat for macroinvertebrates and fish. Furthermore, depletion of oxygen can cause phosphorus release from bottom sediments (i.e. internal loading).

Degradations in aquatic habitats or water quality (ex. low dissolved oxygen) can negatively impact aquatic life use. Increased turbidity, brought on by elevated levels of nutrients within the water column, can reduce dissolved oxygen in the water column, and cause large shifts in dissolved oxygen and pH throughout the day. Shifting chemical conditions within the water column may stress aquatic biota (fish and macroinvertebrate species). In some instances, degradations in aquatic habitats or water quality have reduced fish populations or altered fish communities from a fish community which supports sport fish species to a community which supports more tolerant, 'rough' fish species (ex. carp).

Temperature TMDLs: The Straight River (07010106-558) and Shell River (07010106-681) segments are listed on the draft 2014 Minnesota 303(d) list due to these segments not attaining their designated aquatic life uses. MPCA determined that this non-attainment was due to dissolved oxygen deficiencies in the water column. MPCA investigated the stressors within the aquatic system which cause the low dissolved oxygen conditions by completing a stressor identification examination of the Straight and Shell Rivers. MPCA determined that the primary stressors to DO deficiencies in the Straight and Shell Rivers were related to increased water temperatures (Table 2 of the final TMDL document).

Increased temperatures in the water column may stress and negatively impact the reproductive capabilities of certain fish and macroinvertebrate species. Some fish species, such as the brown trout, thrive in cooler surface waters. If cool water conditions are not present, those species will migrate to areas where cooler waters exist.

MPCA explained that both the Straight River and Shell River hydrologic systems have strong connections to groundwater inflow/groundwater recharge. Water column temperatures in both of these environments depend on the recharge of cooler waters from the groundwater system. MPCA cited the presence of numerous springs, seeps and groundwater upwelling areas which contribute cooler waters to the tributaries which drain into the Straight River and Shell River (page 54 of the final TMDL document).

Groundwater inflows and tributary contributions to the Straight River and the Shell River act to regulate the water column temperatures. MPCA has observed increased groundwater withdrawals due agricultural activities in the CWRW. These withdrawals have decreased the groundwater inflow volume to the Straight and Shell Rivers and as a results the water column temperatures in these segments have increased.

Dissolved oxygen is critical to many forms of aquatic life, but particularly those associated with cold water systems. The concentration of DO is inversely related to water temperature. As water temperature increases, the amount of DO the water column can retain decreases. Reduced groundwater inflows result in higher temperatures and lower DO holding capacity in the stream environments.

Priority Ranking:
The water bodies addressed by the CWRW TMDLs were given a priority ranking for TMDL development due to: the impairment impacts on public health and aquatic life, the public value of the impaired water resource, the likelihood of completing the TMDL in an expedient manner, the inclusion of a strong base of existing data and the restorability of the water body, the technical capability and the willingness of local partners to assist with the TMDL, and the appropriate sequencing of TMDLs within a watershed or basin. Areas within the CWRW are popular locations for aquatic recreation. Water quality degradation has led to efforts to improve the overall water quality within the CWRW, and to the development of TMDLs for these water bodies.

Pollutants of Concern:
The pollutants of concern are <u>bacteria</u> (*E. coli*) for the bacteria impaired water bodies, <u>phosphorus</u> for nutrient impaired water bodies, and <u>heat</u> for the Straight River and Shell River segments.

Source Identification (point and nonpoint sources):

Point Source Identification: The potential point sources to the CWRW are:

<u>CWRW bacteria (*E. coli*) TMDLs:</u>
National Pollutant Discharge Elimination Systems (NPDES) permitted facilities: NPDES permitted facilities may contribute bacteria loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA determined that there is one NPDES discharger within the Partridge River subwatershed which impacts

the bacteria wasteload allocation (WLA) for the Partridge River (07010106-518) bacteria TMDL. This facility is the Bertha Wastewater Treatment Plan (WWTP) (MN0022799) and it was assigned a portion of the WLA for the Partridge River bacteria TMDL (Table 7 of this Decision Document).

CWRW nutrient TMDLs:
NPDES permitted facilities: NPDES permitted facilities may contribute nutrient loads to surface waters through discharges of treated wastewater. Permitted facilities must discharge treated wastewater according to their NPDES permit. MPCA determined that there is one NPDES discharger within the Blueberry Lake subwatershed which impacts the nutrient WLA for the Blueberry Lake (80-0034-00) TP TMDL. This facility is the Wolf Lake WWTP (MN0069205) and it was assigned a portion of the WLA for the Blueberry Lake TP TMDL (Table 8 of this Decision Document).

Permitted construction and industrial areas: Construction and industrial sites may contribute phosphorus via sediment runoff during storm events. These areas within the CWRW must comply with the requirements of the MPCA's NPDES Stormwater Program. The NPDES Stormwater Program requires construction and industrial sites to create a Stormwater Pollution Prevention Plan (SWPPP) that details how stormwater contributions from construction or industrial sites will be minimized.

Concentrated Animal Feeding Operations (CAFOs): MPCA identified one large animal feedlot in the Lower Twin Lake subwatershed. The Jennie-O Turkey Store: Menahga Farm (MNG440421) was a facility recognized by MPCA as one which has a general NPDES permit (page 90 of the final TMDL document). MPCA explained that this facility does not discharge effluent and therefore was not assigned a portion of the WLA for the Lower Twin Lake TP TMDL.

CWRW temperature TMDLs:
There are no regulated wastewater or stormwater sources contributing to the temperature TMDLs for the Straight River and the Shell River.

Nonpoint Source Identification: The potential nonpoint sources to the CWRW are:

CWRW bacteria (*E. coli*) TMDLs:
Stormwater from agricultural land use practices and feedlots near surface waters: Animal Feeding Operations (AFOs) in close proximity to surface waters can be a source of bacteria to water bodies in the CWRW. These areas may contribute bacteria via the mobilization and transportation of pollutant laden waters from feeding, holding and manure storage sites. Runoff from agricultural lands may contain significant amounts of bacteria which may lead to impairments in the CWRW. Feedlots generate manure which may be spread onto fields. Runoff from fields with spread manure can be exacerbated by tile drainage lines, which channelize the stormwater flows and reduce the time available for bacteria to die-off.

Illicit discharges from Subsurface Sewage Treatment Systems (SSTS) or unsewered communities: Failing septic systems are a potential source of bacteria within the CWRW. Septic systems generally do not discharge directly into a water body, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction and use of SSTS can vary throughout a watershed and influence the bacteria contribution from these systems.

Failing SSTS are specifically defined as systems that are failing to protect groundwater from contamination, while those systems which discharge partially treated sewage to the ground surface, road ditches, tile lines, and directly into streams, rivers and lakes are considered an imminent threat to public health and safety (ITPHS). ITPHS systems also include illicit discharges from unsewered communities.

Residential stormwater runoff: Runoff from residential areas may contribute various pollutants, including bacteria to local water bodies. Stormwater from residential areas, which drain impervious surfaces, may introduce pollutants to surface waters. Potential residential sources of bacteria can also include wildlife or pet wastes.

Wildlife: Wildlife is a known source of bacteria in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of bacteria. Wildlife contributes to the potential impact of contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

CWRW nutrient TMDLs:

Stormwater runoff from agricultural land use practices: Runoff from agricultural lands may contain significant amounts of nutrients which may lead to impairments in the CWRW. Manure spread onto fields is often a source of phosphorus, and can be exacerbated by tile drainage lines, which channelize the stormwater. Tile lined fields and channelized ditches enable particles to move more efficiently into surface waters. Phosphorus may be added via surface runoff from upland areas which are being used for Conservation Reserve Program (CRP) lands, grasslands, and agricultural lands used for growing hay or other crops. Stormwater runoff may contribute nutrients to surface waters from livestock manure, fertilizers, vegetation and erodible soils.

SSTS: Failing septic systems are a potential source of nutrients within the CWRW. Septic systems generally do not discharge directly into a water body, but effluents from SSTS may leach into groundwater or pond at the surface where they can be washed into surface waters via stormwater runoff events. Age, construction and use of SSTS can vary throughout a watershed and influence the bacteria contribution from these systems.

Internal loading: The release of phosphorus from lake sediments, the release of phosphorus from lake sediments via physical disturbance from benthic fish (rough fish, ex. carp), the release of phosphorus from wind mixing the water column, and the release of phosphorus from decaying curly-leaf pondweeds, may all contribute internal phosphorus loading to the lakes in the CWRW TMDL study. Phosphorus may build up in the bottom waters of the lake and may be resuspended or mixed into the water column when the thermocline decreases and the lake water mixes.

Atmospheric deposition: Phosphorus may be added via particulate deposition. Particles from the atmosphere may fall onto lake surfaces or other surfaces within the CWRW. Phosphorus can be bound to these particles which may add to the phosphorus inputs to surface water environments.

Residential stormwater sources: Nutrients may be added via runoff from developed areas in the lake subwatersheds. Stormwater runoff from developed areas can include phosphorus derived from fertilizers, leaf and grass litter, pet wastes, and other sources of anthropogenic derived nutrients.

Wetland and Forest Sources: Phosphorus may be added to surface waters by stormwater flows through wetland and forested areas in the CWRW. Storm events may mobilize phosphorus through the transport of suspended solids, decomposing vegetation and other organic soil particles.

Wildlife: Wildlife is a known source of nutrients in water bodies as many animals spend time in or around water bodies. Deer, geese, ducks, raccoons, and other animals all create potential sources of nutrients. Wildlife contributes to the potential impact of contaminated runoff from animal habitats, such as urban park areas, forest, and rural areas.

CWRW temperature TMDLs:
Groundwater withdrawal: Elevated temperatures in the CWRW are generally linked to decreased groundwater flow into the mainstem of the Straight River and the Shell River and tributaries which feed into both water bodies. Groundwater flow in the CWRW generally recharge surface waters with cooler water. Overland flows may also recharge surface waters, but overland flows are likely to be warmer in temperature than groundwater, especially in the summer months.

Groundwater inflows and tributary contributions to the Straight River and the Shell River act to regulate the water column temperatures in these segments. MPCA has observed increased groundwater withdrawals due agricultural activities in the CWRW. These withdrawals have decreased the groundwater inflow volume to the Straight and Shell Rivers.

Lack of riparian shading: The natural tree and shrub cover in the riparian areas of the Straight and Shell River subwatersheds has been reduced. The lack of shading may increase the temperatures in the surface waters of these subwatersheds.

Future Growth:
Significant development is not expected in the CWRW. The land use within the watershed is expected to remain unchanged for the foreseeable future. The WLA and load allocations (LA) for the CWRW TMDLs were calculated for all current sources. Any expansion of point or nonpoint sources will need to comply with the respective WLA and LA values calculated in the CWRW TMDLs.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the first criterion.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the water body, the applicable numeric or narrative water quality criterion, and the antidegradation policy (40 C.F.R. §130.7(c)(1)). EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

The TMDL submittal must identify a numeric water quality target(s) – a quantitative value used to measure whether or not the applicable water quality standard is attained. Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target. Occasionally, the pollutant of concern is different from the pollutant that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as Dissolved Oxygen (DO) criteria). In such cases, the TMDL submittal should explain the linkage between the pollutant of concern and the chosen numeric water quality target.

<u>Comment:</u>
Designated Uses:
Water quality standards (WQS) are the fundamental benchmarks by which the quality of surface waters are measured. Within the State of Minnesota, WQS are developed pursuant to the Minnesota Statutes Chapter 115, Sections 03 and 44. Authority to adopt rules, regulations, and standards as are necessary and feasible to protect the environment and health of the citizens of the State is vested with the MPCA. Through adoption of WQS into Minnesota's administrative rules (principally Chapters 7050 and 7052), MPCA has identified designated uses to be protected in each of its drainage basins and the criteria necessary to protect these uses.

Minnesota Rule Chapter 7050 designates uses for waters of the state. The segments addressed by the CWRW TMDLs are designated as Class 2 waters for aquatic recreation use (fishing, swimming, boating, etc.) and aquatic life use. The Class 2 designated use is described in Minnesota Rule 7050.0140 (3):

> *"Aquatic life and recreation includes all waters of the state that support or may support fish, other aquatic life, bathing, boating, or other recreational purposes and for which quality control is or may be necessary to protect aquatic or terrestrial life or their habitats or the public health, safety, or welfare."*

Standards:
<u>*Narrative Criteria:*</u> Minnesota Rule 7050.0150 (3) set forth narrative criteria for Class 2 waters of the State:

> *"For all Class 2 waters, the aquatic habitat, which includes the waters of the state and stream bed, shall not be degraded in any material manner, there shall be no material increase in undesirable slime growths or aquatic plants, including algae, nor shall there be any significant increase in harmful pesticide or other residues in the waters, sediments, and aquatic flora and fauna; the normal fishery and lower aquatic biota upon which it is dependent and the use thereof shall not be seriously impaired or endangered, the species composition shall not be altered materially, and the propagation or migration of the fish and other biota normally present shall not be prevented or hindered by the discharge of any sewage, industrial waste, or other wastes to the waters."*

<u>Numeric criteria:</u>
<u>For bacteria impaired waters:</u>
The bacteria water quality standards which apply to CWRW are:

Table 4: Bacteria Water Quality Standards Applicable to the CWRW TMDLs

Parameter	Units	Water Quality Standard
E. coli [1]	# of organisms / 100 mL	The geometric mean of a minimum of 5 samples taken within any calendar month may not exceed 126 organisms
		No more than 10% of all samples collected during any calendar month may individually exceed 1,260 organisms
[1] = *E. coli* standards apply only between April 1 and October 31		

Bacteria TMDL Target:
The bacteria TMDL target applies to both parts of the standard as stated above in Table 4. However, the focus of this TMDL is on the 126 organisms (orgs) per 100 mL (126 orgs/100 mL) portion of the standard. MPCA believes that using the 126 orgs/100 mL portion of the standard for TMDL calculations will result in the greatest bacteria reductions within the CWRW and will result in the attainment of the 1,260 orgs/100 mL portion of the standard. While the bacteria TMDLs will focus on the geometric mean portion of the water quality standard, attainment of both parts of the water quality standard is required.

For nutrient impaired waters:
Numeric criteria for TP, chl-*a*, and SD depth are set forth in Minnesota Rules 7050.0222. These three parameters form the MPCA eutrophication standards that must be achieved to attain the aquatic recreation designated use. The numeric eutrophication standards which are applicable to the CWRW TP TMDLs are found in Table 5 of this Decision Document.

Table 5: Minnesota Eutrophication Standards for Deep and Shallow lakes within the North Central Hardwood Forest (NCHF) and the Northern Lakes and Forest (NLF) ecoregions

Parameter	NCHF Eutrophication Standard (general lakes)	NCHF Eutrophication Standard (shallow lakes)[1]	NLF Eutrophication Standard
	(Lower Twin Lake)	*(Blueberry Lake & First Crow Wing Lake)*	*(Eighth Crow Wing Lake, Mayo Lake, Portage Lake & Sibley Lake)*
Total Phosphorus (μg/L)	TP < 40	TP < 60	TP < 30
Chlorophyll-a (μg/L)	chl-a < 14	chl-a < 20	chl-a < 9
Secchi Depth (m)	SD > 1.4	SD > 1.0	SD > 2.0

[1] = Shallow lakes are defined as lakes with a maximum depth less than 15-feet, or with more than 80% of the lake area shallow enough to support emergent and submerged rooted aquatic plants (littoral zone).

In developing the lake nutrient standards for Minnesota lakes, MPCA evaluated data from a large cross-section of lakes within each of the State's ecoregions. Clear relationships were established between the causal factor, TP, and the response variables, chl-*a* and SD depth. MPCA anticipates that by meeting the TP concentrations of 30 μg/L, 40 μg/L and 60 μg/L, the response variables chl-*a* and SD will be attained and the lakes addressed by the CWRW TP TMDLs will achieve their designated beneficial uses. For lakes to achieve their designated beneficial use, the lake must not exhibit signs of eutrophication and must allow water-related recreation, fishing and aesthetic enjoyment. MPCA views the control of eutrophication as the lake enduring minimal nuisance algal blooms and exhibiting desirable water clarity.

The Swan Creek segment (07010106-527) was identified by MPCA as being impaired due to low dissolved oxygen concentrations and deficient macroinvertebrate assessment scores. MPCA attributed these impaired conditions to elevated phosphorus levels in Swan Creek. MPCA developed a load duration curve (LDC) TP TMDL for Swan Creek and used its draft Central Region (CRRNR) phosphorus water quality criteria as the target for the development of the Swan Creek TP TMDL. The Central Region is a part of the MPCA delineated River Nutrient Regions. The River Nutrient Regions were established by MPCA as part of its new water quality standards to address river eutrophication.[1] MPCA's draft CRRNR phosphorus standard is 0.1 mg/L, which is applicable during the growing season (June 1 to September 30).

Nutrient TMDL Targets:
MPCA selected TP targets of 30 µg/L, 40 µg/L and 60 µg/L to develop TP TMDLs for the lakes addressed by the CWRW TMDL study. MPCA selected 0.1 mg/L as the TP target for the Swan Creek segment. MPCA selected TP as the appropriate target parameter to address eutrophication problems because of the interrelationships between TP and chl-*a*, as well as SD depth. Algal abundance is measured by chl-*a*, which is a pigment found in algal cells. As more phosphorus becomes available, algae growth can increase. Increased algae in the water column will decrease water clarity that is measured by SD depth. EPA feels the nutrient targets employed in the CWRW TP TMDLs are reasonable.

For temperature impaired waters:
MPCA's stressor identification determined that elevated water temperatures were responsible for the impaired dissolved oxygen conditions in the Straight River and Shell River. In order to address the identified stressor, temperature (i.e., lack of cool water recharge to these waters), MPCA converted its DO WQS (mg/L) to temperature targets (°C). The temperature targets were used to calculate heat loads (millions of kilo-joules per day (kJ/day)) for each river.

MPCA started with its dissolved oxygen WQS concentration (mg/L) and observed measurements of biochemical oxygen demand (BOD) to calculate a dissolved oxygen saturation (DO_{SAT}) threshold. The DO_{SAT} value was then employed in estimating temperature targets (°C). For the Straight River, the Class 2A daily minimum dissolved oxygen standard of 7.0 mg/L was added to observed maximum BOD of 2.64 mg/L. This calculation was rounded to the nearest 0.5 mg/L resulting in a DO_{SAT} value of 9.5 mg/L for the Straight River (Section 2.3.1.2 of the final TMDL document). MPCA converted this DO_{SAT} value to an instream temperature target of 18.5 °C for the Straight River.

For the Shell River, the Class 2B daily minimum dissolved oxygen standard of 5.0 mg/L was added to the observed maximum BOD of 3.0 mg/L. This resulted in a DO_{SAT} value of 8.0 mg/L for the Shell River (Section 2.3.1.2 of the final TMDL document). The corresponding instream temperature target for the Shell River was estimated at 26.5 °C (Table 6 of this Decision Document).

[1] MPCA webpage: http://www.pca.state.mn.us/index.php/water/water-permits-and-rules/water-rulemaking/new-water-quality-standards-for-river-eutrophication-and-total-suspended-solids.html

Table 6: Dissolved Oxygen targets Applicable in the Crow Wing River watershed TMDLs

Segment	Daily Minimum Dissolved Oxygen (mg/L) [1]	Dissolved Oxygen Saturation Threshold (mg/L)	Dissolved Oxygen Saturation Threshold Temperature (C°)
Straight River (07010106-558)	7.0 [2]	9.5	18.5
Shell River (07010106-681)	5.0 [3]	8.0	26.5

[1] = Dissolved Oxygen Stream Standards (Minnesota Rule 7050.0220)
[2] = For Class 2A Coldwater (Daily Minimum Dissolved Oxygen Standard)
[3] = For Class 2B Coolwater or Warmwater (Daily Minimum Dissolved Oxygen Standard)

Temperature TMDL Targets:
The water temperature target for the Straight River was set at 18.5 °C and water temperature target for the Shell River was set at 26.5 °C.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the second criterion.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a water body for the applicable pollutant. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

The pollutant loadings may be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. §130.2(i)). If the TMDL is expressed in terms other than a daily load, e.g., an annual load, the submittal should explain why it is appropriate to express the TMDL in the unit of measurement chosen. The TMDL submittal should describe the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

The TMDL submittal should contain documentation supporting the TMDL analysis, including the basis for any assumptions; a discussion of strengths and weaknesses in the analytical process; and results from any water quality modeling. EPA needs this information to review the loading capacity determination, and load and wasteload allocations, which are required by regulation.

TMDLs must take into account *critical conditions* for steam flow, loading, and water quality parameters as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable *critical conditions* and describe their approach to estimating both point and nonpoint source loadings under such *critical conditions*. In particular, the TMDL should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

Comment:
CWRW bacteria (*E. coli*) TMDLs:
For all *E. coli* TMDLs addressed by the CWRW TMDLs the geometric mean portion (**126 orgs/100 mL**) of the *E. coli* water quality standard was used to set the loading capacity of the

bacteria TMDLs. MPCA believes the geometric mean portion of the WQS provides the best overall characterization of the status of the watershed. EPA agrees with this assertion, as stated in the preamble of, *"The Water Quality Standards for Coastal and Great Lakes Recreation Waters Final Rule"* (69 FR 67218-67243, November 16, 2004) on page 67224, "...the geometric mean is the more relevant value for ensuring that appropriate actions are taken to protect and improve water quality because it is a more reliable measure, being less subject to random variation, and more directly linked to the underlying studies on which the 1986 bacteria criteria were based." MPCA stated that the bacteria TMDLs will focus on the geometric mean portion of the water quality standard (126 orgs/100 mL) and that it expects that by attaining the 126 orgs/100 mL portion of the *E. coli* WQS the 1,260 orgs/100 mL portion of the *E. coli* WQS will also be attained. EPA finds these assumption to be reasonable.

Typically loading capacities are expressed as a mass per time (e.g. pounds per day). However, for *E. coli* loading capacity calculations, mass is not always an appropriate measure because *E. coli* is expressed in terms of organism counts. This approach is consistent with the EPA's regulations which define "load" as "an amount of matter that is introduced into a receiving water" (40 CFR §130.2). To establish the loading capacities for the CWRW bacteria TMDLs, MPCA used Minnesota's WQS for *E. coli* (126 orgs/100 mL). A loading capacity is, "the greatest amount of loading that a water can receive without violating water quality standards." (40 CFR §130.2). Therefore, a loading capacity set at the WQS will assure that the water does not violate WQS. MPCA's *E. coli* TMDL approach is based upon the premise that all discharges (point and nonpoint) must meet the WQS when entering the water body. If all sources meet the WQS at discharge, then the water body should meet the WQS and the designated use.

Separate flow duration curves (FDCs) were created for the each of the bacteria TMDLs in the CWRW. The CWRW FDCs were developed based on daily stream flow records from 2000-2009. MPCA used flow records from the USGS station at the Sylvan Dam outlet (USGS #05347500) and flow records simulated by the Hydrologic Simulation Program Fortran (HSPF) model. HSPF flow estimates were used in instances when there was no recorded flow data for a particular reach. Where an impaired stream reach was located upstream of a gaging station or the outlet of an HSPF modeled subbasin, the flows from the contributing drainage area were area-weighted to account for differences in flow volume at the two locations. Flow data focused on dates within the recreation season (April 1 to October 31). Dates outside of the recreation season were excluded from the flow record. Daily stream flows were necessary to implement the load duration curve approach.

FDCs graphs have flow duration interval (percentage of time flow exceeded) on the X-axis and discharge (flow per unit time) on the Y-axis. The FDC were transformed into LDC by multiplying individual flow values by the WQS (126 orgs/100 mL) and then multiplying that value by a conversion factor. The resulting points are plotted onto a load duration curve graph. LDC graphs, for the CWRW bacteria TMDLs, have flow duration interval (percentage of time flow exceeded) on the X-axis and *E. coli* concentrations (number of bacteria per unit time) on the Y-axis. The CWRW LDC used *E. coli* measurements in billions of bacteria per day. The curved line on a LDC graph represents the TMDL of the respective flow conditions observed at that location.

Water quality monitoring was completed in 2009-2011 in the CWRW. Measured *E. coli* concentrations were converted to individual sampling loads by multiplying the sample concentration by the instantaneous flow measurement observed/estimated at the time of sample collection. The individual sampling loads were plotted on the same figure with the created LDC.

The LDC plots were subdivided into five flow regimes; high flows (exceeded 0–10% of the time), wet conditions (exceeded 10–40% of the time), mid-range flows (exceeded 40–60% of the time), dry conditions (exceeded 60–90% of the time), and low flow conditions (exceeded 90–100% of the time). LDC plots can be organized to display individual sampling loads with the calculated LDC. Watershed managers can interpret LDC graphs with individual sampling points plotted alongside the LDC to understand the relationship between flow conditions and water quality exceedances within the watershed. Individual sampling loads which plot above the LDC represent violations of the WQS and the allowable load under those flow conditions at those locations. The difference between individual sampling loads plotting above the LDC and the LDC, measured at the same flow is the amount of reduction necessary to meet WQS.

The strengths of using the LDC method are that critical conditions and seasonal variation are considered in the creation of the FDC by plotting hydrologic conditions over the flows measured during the recreation season. Additionally, the LDC methodology is relatively easy to use and cost-effective. The weaknesses of the LDC method are that nonpoint source allocations cannot be assigned to specific sources, and specific source reductions are not quantified. Overall, MPCA believes and EPA concurs that the strengths outweigh the weaknesses for the LDC method.

Implementing the results shown by the LDC requires watershed managers to understand the sources contributing to the water quality impairment and which Best Management Practices (BMPs) may be the most effective for reducing bacteria loads based on flow magnitudes. Different sources will contribute bacteria loads under varying flow conditions. For example, if exceedances are significant during high flow events this would suggest storm events are the cause and implementation efforts can target BMPs that will reduce stormwater runoff and consequently bacteria loading into surface waters. This allows for a more efficient implementation effort.

Bacteria TMDLs for the CWRW were calculated and those results are found in Table 7 of this Decision Document. The load allocation was calculated after the determination of the WLA, and the Margin of Safety (10% of the loading capacity). Load allocations (ex. stormwater runoff from agricultural land use practices and feedlots, SSTS, wildlife inputs etc.) were not split among individual nonpoint contributors. Instead, load allocations were combined together into a one value to cover all nonpoint source contributions.

Table 7 of this Decision Document reports five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. The LDC method can be used to display collected bacteria monitoring data and allows for the estimation of load reductions necessary for attainment of the bacteria water quality standard. Using this method, daily loads were developed based upon the flow in the water body. Loading capacities were determined for the segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Table 7 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

The reductions from current conditions needed to meet the bacteria WQS were estimated for each reach, where data were sufficient. The reductions were calculated from the geometric mean of fecal coliform observed in each reach. The calculation used was:

(observed geometric mean – 126 orgs/100 mL) / observed geometric mean)

MPCA states that these estimated reductions needed are intended to be approximate. The estimated reductions do not account for variability in flow and bacteria itself can be a highly variable parameter.

Table 7: Bacteria (*E. coli*) TMDLs for the Crow Wing River Watershed

Allocation	Source	High	Wet	Mid	Dry	Low
		E. coli (billions of bacteria/day)				
TMDL for Cat River (07010106-544)						
Existing Load		No data	99.50	162.40	34.90	13.60
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	155.70	80.90	47.70	30.10	16.00
Margin Of Safety (10%)		17.30	9.00	5.30	3.30	1.80
Loading Capacity (TMDL)		**173.00**	**89.90**	**53.00**	**33.40**	**17.80**
Estimated Load Reduction (%)		No data	10%	67%	4%	0%
TMDL for Corey Brook (07010106-700)						
Existing Load		110.90	251.20	50.50	20.30	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	211.90	62.20	26.70	12.30	2.20
23.5		23.50	6.90	3.00	1.40	0.20
Loading Capacity (TMDL)		**235.40**	**69.10**	**29.70**	**13.70**	**2.40**
Estimated Load Reduction (%)		0%	72%	41%	33%	No data
TMDL for Farnham Creek (07010106-702)						
Existing Load		82.60	209.20	47.30	21.90	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	49.80	29.90	20.20	13.90	9.10
Margin Of Safety (10%)		5.50	3.30	2.20	1.60	1.00
Loading Capacity (TMDL)		**55.30**	**33.20**	**22.40**	**15.50**	**10.10**
Estimated Load Reduction (%)		33%	84%	53%	29%	No data
TMDL for Home Brook (07010106-524)						
Existing Load		94.20	76.40	69.20	19.40	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	126.90	38.40	16.20	7.60	1.30
	Corey Brook tributary input	235.40	69.10	29.70	13.70	2.40

Margin Of Safety (10%)		40.30	11.90	5.10	2.40	0.40
Loading Capacity (TMDL)		**402.60**	**119.40**	**51.00**	**23.70**	**4.10**
Estimated Load Reduction (%)		0%	0%	26%	0%	No data
TMDL for Mayo Creek (07010106-604)						
Existing Load		99.40	30.40	25.40	No data	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	66.50	30.20	21.60	15.50	8.30
Margin Of Safety (10%)		7.40	3.40	2.40	1.60	0.90
Loading Capacity (TMDL)		**73.90**	**33.60**	**24.00**	**17.10**	**9.20**
Estimated Load Reduction (%)		26%	0%	6%	No data	No data
TMDL for Partridge River (07010106-518)						
Existing Load		No data	322.50	133.90	39.90	No data
Wasteload Allocation	WWTP: Bertha WWTP (MN0022799)	4.82	4.82	4.82	4.82	4.82
Load Allocation	Watershed runoff	324.13	143.59	76.90	27.58	21.01
Margin Of Safety (10%)		36.55	16.49	9.08	3.60	2.87
Loading Capacity (TMDL)		**365.50**	**164.90**	**90.80**	**36.00**	**28.70**
Estimated Load Reduction (%)		No data	49%	32%	10%	No data
TMDL for Pillager Creek (07010106-577)						
Existing Load		12.50	37.50	16.70	No data	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	43.60	24.70	16.70	11.20	6.70
Margin Of Safety (10%)		4.80	2.80	1.90	1.20	0.80
Loading Capacity (TMDL)		**48.40**	**27.50**	**18.60**	**12.40**	**7.50**
Estimated Load Reduction (%)		0%	27%	0%	No data	No data
TMDL for Stoney Brook (07010106-698)						
Existing Load		237.30	120.20	115.40	No data	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	127.30	61.40	45.80	32.10	17.50
Margin Of Safety (10%)		14.10	6.80	5.10	3.60	2.00
Loading Capacity (TMDL)		**141.40**	**68.20**	**50.90**	**35.70**	**19.50**
Estimated Load Reduction (%)		40%	43%	56%	No data	No data
TMDL for Swan Creek (07010106-527)						
Existing Load		188.90	302.90	304.40	No data	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	135.30	75.70	49.50	33.40	19.80
Margin Of Safety (10%)		15.00	8.40	5.50	3.70	2.20

Loading Capacity (TMDL)		**150.30**	**84.10**	**55.00**	**37.10**	**22.00**
Estimated Load Reduction (%)		20%	72%	82%	No data	No data
TMDL for Unnamed Creek (07010106-684)						
Existing Load		20.60	41.60	48.70	No data	No data
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	52.50	24.20	9.00	10.40	5.80
Margin Of Safety (10%)		5.80	2.70	1.70	1.20	0.70
Loading Capacity (TMDL)		**58.30**	**26.90**	**10.70**	**11.60**	**6.50**
Estimated Load Reduction (%)		0%	35%	78%	No data	No data

EPA concurs with the data analysis and LDC approach utilized by MPCA in its calculation of loading capacities, wasteload allocations, load allocations and the margin of safety for the CWRW bacteria TMDLs. The methods used for determining the TMDL are consistent with U.S. EPA technical memos.[2]

CWRW nutrient TMDLs:

MPCA used the BATHTUB model to calculate the loading capacities for each of the nutrient impaired lakes of Table 1 of this Decision Document. For the Swan Creek (07010106-527) nutrient TMDL, MPCA employed a LDC based TP TMDL. MPCA employed the same strategies for developing the LDC TP TMDL for Swan Creek as it did for the bacteria TMDLs. Those strategies are described above in this Decision Document.

The BATHTUB model was utilized to link observed phosphorus water quality conditions and estimated phosphorus loads to in-lake water quality estimates. MPCA has previously employed BATHTUB successfully in many lake studies in Minnesota. BATHTUB is a steady-state annual or seasonal model that predicts a lake's growing season (June 1 to September 30) average surface water quality. BATHTUB utilizes annual or seasonal time-scales which are appropriate because watershed TP loads are normally impacted by seasonal conditions.

BATHTUB has built-in statistical calculations which account for data variability and provide a means for estimating confidence in model predictions. BATHTUB employs a mass-balance TP model that accounts for water and TP inputs from tributaries, direct watershed runoff, the atmosphere, and sources internal to the lake, and outputs through the lake outlet, water loss via evaporation, and TP sedimentation and retention in the lake sediments. BATHTUB provides flexibility to tailor model inputs to specific lake morphometry, watershed characteristics and watershed inputs. The BATHTUB model also allows MPCA to assess different impacts of changes in nutrient loading. BATHTUB allows choice among several different mass-balance TP models.

The loading capacity of the lake was determined through the use of BATHTUB and the Canfield-Bachmann subroutine and then allocated to the WLA, LA, and Margin of Safety (MOS). To simulate the load reductions needed to achieve the WQS, a series of model simulations were performed. Each simulation reduced the total amount of TP entering each of the water bodies during the growing season (or summer season, June 1 through September 30) and computed the anticipated water quality response

[2] U.S. Environmental Protection Agency. August 2007. *An Approach for Using Load Duration Curves in the Development of TMDLs*. Office of Water. EPA-841-B-07-006. Washington, D.C.

within the lake. The goal of the modeling simulations was to identify the loading capacity appropriate (i.e., the maximum allowable load to the system, while allowing it to meet WQS) from June 1 to September 30. The modeling simulations focused on reducing the TP to the system.

The BATHTUB modeling efforts were used to calculate the loading capacity for each lake. The loading capacity is the maximum phosphorus load which each of these water bodies can receive over an annual period and still meet the deep and shallow lake NCHF and NLF WQS (Table 5 of this Decision Document). Loading capacities on the annual scale (lbs/year) were calculated to meet the WQS during the growing season (June 1 through September 30). The time period of June to September was chosen by MPCA as the growing season because it corresponds to the eutrophication criteria, contains the months that the general public typically uses the CWRW lakes for aquatic recreation, and is the time of the year when water quality is likely to be impaired by excessive nutrient loading. Loading capacities were divided by 365 to calculate the daily loading capacities.

MPCA subdivided the loading capacity among the WLA, LA, and MOS components of the TMDL (Tables 8 to 15 of this Decision Document). The LA accounted for a majority of the loading capacity. These calculations were based on the critical condition, the summer growing season, which is typically when the water quality in the lake is degraded and phosphorus loading inputs are the greatest. TMDL allocations assigned during the summer growing season will protect the CWRW lakes during the worst water quality conditions of the year. MPCA assumed that the loading capacities established by the TMDL will be protective of water quality during the remainder of the calendar year (October through May).

In developing the lake nutrient standards for Minnesota lakes (Minn. Rule 7050), the MPCA evaluated water quality data from a large cross-section of lakes within each of the state's ecoregions. Clear relationships were established between the causal factor TP and the response variables chl-*a* and SD depth. Based on these relationships it is expected that the allocations set forth in this TMDL to meet the phosphorus targets of 30 μg/L, 40 μg/L and 60 μg/L will result in the chl-*a* and Secchi standards being met.

Tables 8 to 15 of this Decision Document outline MPCA's estimates of the reductions required for the CWRW lake TP TMDLs to meet their water quality targets. These loading reductions (i.e., the percentage column) were estimated from existing and TMDL calculations. MPCA expects that these reductions will result in the attainment of the water quality targets and the lake water quality will return to a level where their designated uses are no longer considered impaired.

Table 8: Nutrient TMDL for Blueberry Lake (80-0034-00) in the Crow Wing River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	WWTP: Wolf Lake WWTP (MN0069205) [1]	23.00	23.00	0.86	0.0	0%
	Construction Stormwater (MNR100001)	0.45	0.45	0.001	0.0	0%
	Industrial Stormwater (MNR50000)	0.45	0.45	0.001	0.0	0%
	WLA Totals	***23.90***	***23.90***	***0.862***	--	--
Load Allocation	Watershed runoff	89.60	78.80	0.216	10.8	12%
	Failing Septics	3.50	0.00	0.000	3.5	100%
	Shell River inputs	2812.90	1998.00	5.474	814.9	29%
	Blueberry River inputs	3075.80	2309.80	6.328	766.0	25%
	Internal Load	2196.10	120.30	0.330	2075.8	95%
	Atmospheric Deposition	58.00	58.00	0.159	0.0	0%
	LA Totals	***8235.90***	***4564.90***	***12.507***	***3671.0***	***45%***
Margin Of Safety (10%)		--	510.00	1.397	--	--
Loading Capacity (TMDL)		**8259.80**	**5098.80**	**14.766**	**3671.0**	**44%**

[1] = Daily WLA were calculated from an assumed concentration of 2.0 mg/L and the maximum permitted effluent flow rate of 6"/day over the area of the facility's discharge cell(s).

Table 9: Nutrient TMDL for Eighth Crow Wing Lake (29-0072-00) in the Crow Wing River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	Construction Stormwater (MNR100001)	0.05	0.05	0.000	0.0	0%
	Industrial Stormwater (MNR50000)	0.05	0.05	0.000	0.0	0%
	WLA Totals	***0.10***	***0.10***	***0.00027***	--	--
Load Allocation	Watershed runoff	114.80	57.70	0.158	57.1	50%
	Failing Septics	9.50	0.00	0.000	9.5	100%
	North Crow Wing Lake inputs	192.20	192.20	0.527	0.0	0%
	Internal Load	295.20	295.20	0.809	0.0	0%
	Atmospheric Deposition	53.70	53.70	0.147	0.0	0%
	LA Totals	***665.40***	***598.80***	***1.641***	***66.6***	***10%***
Margin Of Safety (10%)		--	66.60	0.182	--	--
Loading Capacity (TMDL)		**665.50**	**665.50**	**1.823**	**66.6**	**10%**

Table 10: Nutrient TMDL for First Crow Wing Lake (29-0086-00) in the Crow Wing River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	(kg/yr)	(kg/day)	(kg/yr)	(%)
Wasteload Allocation	Construction Stormwater (MNR100001)	0.40	0.40	0.001	0.0	0%
	Industrial Stormwater (MNR50000)	0.40	0.40	0.001	0.0	0%
	WLA Totals	***0.80***	***0.80***	***0.0022***	--	--
Load Allocation	Watershed runoff	1028.40	629.00	1.723	399.4	39%
	Livestock	3.80	2.30	0.006	1.5	39%
	Failing Septics	3.40	0.00	0.000	3.4	100%
	Second Crow Wing Lake inputs	1424.10	1424.10	3.902	0.0	0%
	Internal Load	3094.10	2937.40	8.048	156.7	5%
	Atmospheric Deposition	55.40	55.40	0.152	0.0	0%
	LA Totals	***5609.20***	***5048.20***	***13.831***	***561.0***	***10%***
Margin Of Safety (10%)		--	561.00	1.537	--	--
Loading Capacity (TMDL)		**5610.00**	**5610.00**	**15.370**	**561.0**	**10%**

Table 11: Nutrient TMDL for Lower Twin Lake (80-0030-00) in the Crow Wing River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	(kg/yr)	(kg/day)	(kg/yr)	(%)
Wasteload Allocation	Construction Stormwater (MNR100001)	0.97	0.97	0.003	0.0	0%
	Industrial Stormwater (MNR50000)	0.97	0.97	0.003	0.0	0%
	WLA Totals	***1.94***	***1.94***	***0.005***	--	--
Load Allocation	Watershed runoff	110.30	82.80	0.227	27.5	25%
	Failing Septics	6.10	0.00	0.000	6.1	100%
	Upper Twin Lake inputs	8720.10	7819.40	21.423	900.7	10%
	Internal Load	476.60	476.60	1.306	0.0	0%
	Atmospheric Deposition	27.40	27.40	0.075	0.0	0%
	LA Totals	***9340.50***	***8406.20***	***23.031***	***934.3***	***10%***
Margin Of Safety (10%)		--	934.20	2.559	--	--
Loading Capacity (TMDL)		**9342.44**	**9342.34**	**25.595**	**934.3**	**10%**

Table 12: Nutrient TMDL for Mayo Lake (18-0408-00) in the Crow Wing River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	Construction Stormwater (MNR100001)	5.20	5.20	0.014	0.0	0%
	Industrial Stormwater (MNR50000)	5.20	5.20	0.014	0.0	0%
	WLA Totals	***10.40***	***10.40***	***0.028***	--	--
Load Allocation	Watershed runoff	27.2	23.0	0.063	4.2	15%
	Failing Septics	1.1	0.0	0.000	1.1	100%
	Sibley Lake inputs	880.2	708.4	1.941	171.8	20%
	Internal Load	198.3	88.0	0.241	110.3	56%
	Atmospheric Deposition	16.4	16.4	0.045	0.0	0%
	LA Totals	***1123.20***	***835.80***	***2.290***	***287.4***	***26%***
Margin Of Safety (10%)		--	94.00	0.258	--	--
Loading Capacity (TMDL)		**1133.60**	**940.20**	**2.576**	**287.4**	**25%**

Table 13: Nutrient TMDL for Portage Lake (29-0250-00) in the Crow Wing River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	Construction Stormwater (MNR100001)	0.004	0.004	0.00001	0.0	0%
	Industrial Stormwater (MNR50000)	0.004	0.004	0.00001	0.0	0%
	WLA Totals	***0.008***	***0.008***	***0.00002***	--	--
Load Allocation	Watershed runoff	175.1	61.0	0.167	114.1	65%
	Failing Septics	8.8	0.0	0.000	8.8	100%
	Internal Load	73.3	17.3	0.047	56.0	76%
	Atmospheric Deposition	45.4	45.4	0.124	0.0	0%
	LA Totals	***302.60***	***123.70***	***0.339***	***178.9***	***59%***
Margin Of Safety (10%)		--	13.70	0.038	--	--
Loading Capacity (TMDL)		**302.61**	**137.41**	**0.376**	**178.9**	**59%**

Table 14: Nutrient TMDL for Sibley Lake (18-0404-00) in the Crow Wing River watershed

Allocation	Source	Existing TP Load	TMDL		Load Reduction	
		(kg/yr)	*(kg/yr)*	*(kg/day)*	*(kg/yr)*	*(%)*
Wasteload Allocation	Construction Stormwater (MNR100001)	11.10	11.10	0.030	0.0	0%
	Industrial Stormwater (MNR50000)	11.10	11.10	0.030	0.0	0%
	WLA Totals	***22.20***	***22.20***	***0.061***	--	--
Load Allocation	Watershed runoff	1951.1	1,498.3	4.105	452.8	23%
	Livestock	47.5	36.6	0.100	10.9	23%
	Failing Septics	3.2	0.0	0.000	3.2	100%
	Internal Load	0.0	0.0	0.000	0.0	0%
	Atmospheric Deposition	46.3	46.3	0.127	0.0	0%
	LA Totals	***2048.10***	***1,581.20***	***4.332***	***466.9***	***23%***
Margin Of Safety (10%)		--	178.00	0.488	--	--
Loading Capacity (TMDL)		**2070.30**	**1,781.40**	**4.881**	**466.9**	**23%**

Table 15: Nutrient TMDL for Swan Creek (07010106-527) in the Crow Wing River Watershed

Allocation	Source	High	Wet	Mid	Dry	Low
		Total Phosphorus (kg/day)				
Existing Load		No data	1.20	0.60	No data	No data
TMDL for Sunrise River, West Branch (07030005-529)						
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation	Watershed runoff	1.08	0.61	0.40	0.26	0.15
	Iron Creek Tributary inputs	1.13	0.63	0.41	0.28	0.17
	LA Totals	***2.21***	***1.24***	***0.81***	***0.54***	***0.32***
Margin Of Safety (10%)		0.25	0.14	0.09	0.06	0.04
Loading Capacity (TMDL)		**2.46**	**1.38**	**0.90**	**0.60**	**0.36**
Estimated Load Reduction (%)		No data	0%	0%	No data	No data

EPA supports the data analysis and modeling approach utilized by MPCA in its calculation of wasteload allocations, load allocations and the margin of safety for the CWRW lake TP TMDLs. Additionally, EPA concurs with the loading capacities calculated by the MPCA in these TP TMDLs. EPA finds MPCA's approach for calculating the loading capacity for the CWRW lake TP TMDLs to be reasonable and consistent with EPA guidance.

CWRW temperature TMDLs:

MPCA's stressor identification determined that elevated water temperatures were leading to impaired dissolved oxygen conditions in the Straight River and Shell River. In order to address the identified stressor, temperature (i.e., lack of cool water recharge to these waters), MPCA calculated TMDLs using heat loads. Heat loads were estimated in millions of kJ/day.

MPCA calculated heat load TMDLs based on daily stream flows records (2000-2009) and the amount of energy in the water column at specific temperatures. Daily stream flows records (2000-2009) were used to develop flow and heating capacity load duration curves for each impaired reach. Flow records from gaged sources were used where possible and flow records from the HSPF model where used in all other cases. Where an impaired stream reach was located upstream of a gaging station or the outlet of an HSPF modeled subbasin, the flows from the contributing drainage area were area-weighted to account for differences in flow volume at the two locations.

The amount of energy in the water column at specific temperatures was characterized by MPCA as the 'total energy of flow'. The total energy of flow is composed of three parts: kinetic, potential, and internal energy. MPCA assumed that the kinetic and potential energy were negligible compared to the internal energy in both the Straight and Shell rivers. To calculate the internal energy load, the following equation was used:

$$\mathrm{E} = m * h$$

E = The energy flow rate in kilowatts (kW)
M = The mass flow rate of water in kilograms per second (kg/s)
H = The internal energy of water in kilojoules per kilogram (kJ/kg).

The internal energy of water was estimated as the specific heat capacity of water (4.186 kJ/kg-°C) multiplied by the water temperature (in °C). The internal energy load equation was used to calculate the energy flow rate at all flow rates and temperatures monitored during the period of record. This equation was also used to define the load duration curve and monitored loads by using the monitored stream flows and temperatures, the specific heat capacity of water, and the temperature-dependent density of water.

The translation of the instream temperature targets to heat loads was based on daily stream flows records (2000-2009) and the amount of energy in the water column at specific temperatures. The amount of energy in the water column at specific temperatures was estimated based on the specific heat capacity of water (4.186 kJ/kg-°C) multiplied by measured water temperatures (°C). TMDL and allocations were calculated in terms of the million kJ/day. These measurements represent the amount of heat the stream can assimilate and still attain water temperatures below the in-stream temperature targets (Straight River 18.5 °C and the Shell River at 26.5 °C).

TMDL and allocations were calculated in terms of the million kJ/day (Tables 16 and 17 of this Decision Document). Tables 16 and 17 of this Decision Document report five points (the midpoints of the designated flow regime) on the loading capacity curve. However, it should be understood that the components of the TMDL equation could be illustrated for any point on the entire loading capacity curve. Loading capacities were determined for the river segment for multiple flow regimes. This allows the TMDL to be represented by an allowable daily load across all flow conditions. Tables 16 and 17 of this Decision Document identifies the loading capacity for the water body at each flow regime. Although there are numeric loads for each flow regime, the LDC is what is being approved for this TMDL.

Table 16: Temperature TMDL for Straight River (07010106-558) in the Crow Wing River Watershed

Allocation	Source	High	Wet	Mid	Dry	Low
		Heat input (million kJ/day)				
TMDL for Sunrise River, West Branch (07030005-529)						
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation		15,048	11,237	9,705	8,343	6,640
Margin Of Safety (10%)		1,672	1,249	1,078	927	738
Loading Capacity (TMDL)		**16,720**	**12,486**	**10,783**	**9,270**	**7,378**

Table 17: Temperature TMDL for Shell River (07010106-681) in the Crow Wing River Watershed

Allocation	Source	High	Wet	Mid	Dry	Low
		Heat input (million kJ/day)				
TMDL for Sunrise River, West Branch (07030005-529)						
Wasteload Allocation		n/a	n/a	n/a	n/a	n/a
Load Allocation		115,123	75,103	56,945	44,018	22,854
Margin Of Safety (10%)		12,791	8,345	6,327	4,891	2,539
Loading Capacity (TMDL)		**127,914**	**83,448**	**63,272**	**48,909**	**25,393**

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the third criterion.

4. Load Allocations (LA)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity attributed to existing and future nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Where possible, load allocations should be described separately for natural background and nonpoint sources.

Comment:

MPCA determined the LA calculations for each of the TMDLs based on the applicable WQS or water quality targets. MPCA recognized that LAs for each of the individual TMDLs addressed by the CWRW TMDLs can be attributed to different nonpoint sources.

CWRW bacteria (*E. coli*) TMDLs:

The calculated LA values for the bacteria TMDLs are applicable across all flow conditions in the CWRW (Table 7 of this Decision Document). MPCA identified several nonpoint sources which contribute bacteria loads to the surface waters in the CWRW. Load allocations were recognized as originating from many diverse nonpoint sources including; stormwater from agricultural and feedlot areas, failing septic systems, and wildlife (deer, geese, ducks, raccoons, turkeys and other animals). MPCA did not determine individual load allocation values for each of these potential nonpoint source considerations, but aggregated the nonpoint sources into one LA value.

CWRW nutrient TMDLs:
MPCA divided the LA for the CWRW TP TMDLs between different nonpoint sources. These nonpoint sources included; watershed contributions from each lake's direct watershed, SSTS, atmospheric deposition, and internal loading sources. The direct watershed nonpoint sources for CWRW TP TMDLs include TP inputs from agricultural nonpoint source runoff, residential nonpoint source runoff and wetland and forest nonpoint source contributions. MPCA calculated estimated percent reductions for different LA sources. These reductions represent the estimated decreases necessary to meet the NCHF and NLF WQS (Tables 8 to 15 of this Decision Document). The reductions necessary from nonpoint sources ranged from 12% to 100%.

CWRW temperature TMDLs:
MPCA calculated LA values for the temperature TMDLs for the Straight River and the Shell River (Tables 16 and 17 of this Decision Document). MPCA did not determine individual load allocation values for the temperature TMDLs, instead MPCA aggregated the nonpoint sources into one LA value.

EPA finds MPCA's approach for calculating the LA to be reasonable.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the fourth criterion.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.

The individual WLAs may take the form of uniform percentage reductions or individual mass based limitations for dischargers where it can be shown that this solution meets WQSs and does not result in localized impairments. These individual WLAs may be adjusted during the NPDES permitting process. If the WLAs are adjusted, the individual effluent limits for each permit issued to a discharger on the impaired water must be consistent with the assumptions and requirements of the adjusted WLAs in the TMDL. If the WLAs are not adjusted, effluent limits contained in the permit must be consistent with the individual WLAs specified in the TMDL. If a draft permit provides for a higher load for a discharger than the corresponding individual WLA in the TMDL, the State/Tribe must demonstrate that the total WLA in the TMDL will be achieved through reductions in the remaining individual WLAs and that localized impairments will not result. All permittees should be notified of any deviations from the initial individual WLAs contained in the TMDL. EPA does not require the establishment of a new TMDL to reflect these revised allocations as long as the total WLA, as expressed in the TMDL, remains the same or decreases, and there is no reallocation between the total WLA and the total LA.

Comment:
CWRW bacteria (*E. coli*) TMDLs:
MCPA identified the Bertha WWTP (MN0022799) as an NPDES permitted facility within the Partridge River subwatershed and assigned this facility a portion of the WLA (Table 7 of this Decision

Document). The WLA for this facility was calculated based on the facility's design flow and the permit limit. MPCA expects the Bertha WWTP to meet the concentration targets assigned in the WLA across all flow conditions.

EPA finds the MPCA's approach for calculating the WLA for the CWRW bacteria TMDLs to be reasonable.

CWRW nutrient TMDLs:
MPCA identified the Wolf Lake WWTP (MN0069205) as an NPDES permitted facility within the Blueberry Lake subwatershed. MPCA assigned this facility a portion of the WLA (0.86 kg/day) for the Blueberry Lake TP TMDL (Table 8 of this Decision Document). The Wolf Lake WWTP does not have a TP loading limit in their current discharge permit.

MPCA calculated a portion of the WLA and assigned it to construction stormwater and industrial stormwater. MPCA's calculation for the construction stormwater WLA was based on areal coverage of construction permitted from 2007-2012. MPCA combined individual construction stormwater permits into one 'categorical' WLA (page 89 of the final TMDL document). The industrial stormwater WLA was set equal to the construction stormwater WLA to account for industrial stormwater contributions within the CWRW TP TMDLs.

MPCA explained that BMPs and other stormwater control measures should be implemented at active construction sites to limit the discharge of pollutants of concern. Those BMPs and control measures are defined in the State's NPDES/SDS General Stormwater Permit for Construction Activity (MNR100001). In the final TMDL document MPCA explained that if a construction site owner/operator obtains coverage under the NPDES/SDS General Stormwater Permit (MNR100001) and properly selects, installs and maintains all BMPs required under MNR1000001 and applicable local construction stormwater ordinances, including those related to impaired waters discharges and any applicable additional requirements found in Appendix A of the Construction General Permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL.

Industrial sites within the CWRW are expected to comply with the requirements of the State's NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000). In the final TMDL document MPCA explained that if a facility owner/operator obtains coverage under the appropriate NPDES/SDS General Stormwater Permit and properly selects, installs and maintains all BMPs required under the permit, the stormwater discharges would be expected to be consistent with the WLA in this TMDL. BMPs and other stormwater control measures which act to limit the discharge of the pollutant of concern (phosphorus) are defined in MNR050000 and MNG490000.

The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater pollutant discharges will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit (MNR100001) and applicable local construction stormwater ordinances, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan complies with the applicable requirements in the State permits and local ordinances. As noted above, MPCA has explained that meeting the terms of the applicable permits will be consistent with the WLAs set in the CWRW TP TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified. This applies to sites under permits for MNR100001, MNR050000 and MNG490000.

MPCA determined that there was one CAFO facility, the Jennie-O Turkey Store–Menahga Farm (MNG440421) in the CWRW. CAFOs and other feedlots are generally not allowed to discharge to waters of the State (Minnesota Rule 7020.2003). CAFOs were assigned a WLA of zero (WLA = 0) for the CWRW TP TMDLs.

EPA finds the MPCA's approach for calculating the WLA for the CWRW TP TMDLs to be reasonable and consistent with EPA guidance.

CWRW temperature TMDLs:
There are no regulated wastewater or stormwater sources contributing to the temperature TMDLs for the Straight River and the Shell River.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the fifth criterion.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment:
The final TMDL submittal outlines the use of an explicit Margin of Safety (10% of the loading capacity) for the bacteria, nutrient and temperature TMDLs. The explicit MOS was applied by reserving approximately 10% of the total loading capacity, and then allocating the remaining loads to point and nonpoint sources (Tables 7 to 17 of this Decision Document). The use of an explicit MOS accounted for environmental variability in pollutant loading, variability in water quality data (i.e., collected water quality monitoring data), calibration and validation processes of modeling efforts, uncertainty in modeling outputs, and conservative assumptions made during the modeling efforts.

CWRW bacteria *(E. coli)* TMDLs:
The bacteria TMDLs employed an explicit MOS of 10% of the total loading capacity. The use of the LDC approach minimized variability associated with the development of the CWRW bacteria TMDLs because the calculation of the loading capacity was a function of flow multiplied by the target value. The MOS was set at 10% to account for uncertainty due to field sampling error and assumptions made during the TMDL development process.

Challenges associated with quantifying *E. coli* loads include the dynamics and complexity of bacteria in stream environments. Factors such as die-off and re-growth contribute to general uncertainty that makes quantifying stormwater bacteria loads particularly difficult. The MOS for the CWRW bacteria TMDLs also incorporated certain conservative assumptions in the calculation of the TMDLs. No rate of decay, or die-off rate of pathogen species, was used in the TMDL calculations or in the creation of load duration curves for *E. coli*. Bacteria have a limited capability of surviving outside their hosts, and normally a rate of decay would be incorporated. MPCA determined that it was more conservative to use the WQS (126 orgs/100 mL) and not to apply a rate of decay, which could result in a discharge limit greater than the WQS.

As stated in *EPA's Protocol for Developing Pathogen TMDLs* (EPA 841-R-00-002), many different factors affect the survival of pathogens, including the physical condition of the water. These factors include, but are not limited to sunlight, temperature, salinity, and nutrient deficiencies. These factors vary depending on the environmental condition/circumstances of the water, and therefore it would be difficult to assert that the rate of decay caused by any given combination of these environmental variables was sufficient enough to meet the WQS of 126 orgs/100 mL. Thus, it is more conservative to apply the State's WQS as the bacteria target value, because this standard must be met at all times under all environmental conditions.

CWRW nutrient TMDLs:
The CWRW TP TMDLs employed an explicit MOS of 10% due to the following factors:

- The use of a robust water quality dataset which included lake water quality monitoring data collected over multiple years and basins;
- The strong correlation between the predicted water quality values from modeling efforts and the observed water quality values in the CWRW (i.e., the models reflect the water quality conditions in the CWRW reasonably well); and
- MPCA's confidence in the Canfield-Bachmann model's performance during the development of nutrient TMDLs.

CWRW temperature TMDLs:
The Straight River and Shell River temperature TMDLs employed an explicit MOS of 10%. MPCA explained that the explicit MOS accounted for uncertainty of flow measurements in the Straight River and Shell River which were extrapolated from the USGS stream gage at Sylvan Dam Outlet (USGS #05347500). MPCA employed an area-weighted regression equation to estimate flows in these two segments.

The EPA finds that the TMDL document submitted by MPCA contains an appropriate MOS satisfying the requirements of the sixth criterion.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variations. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Comment:

CWRW bacteria (*E. coli*) TMDLs:

Bacterial loads vary by season, typically reaching higher numbers in the dry summer months when low flows and bacterial growth rates contribute to their abundance, and reaching relatively lower values in colder months when bacterial growth rates attenuate and loading events, driven by stormwater runoff events aren't as frequent. Bacterial WQS need to be met between April 1st to October 31st, regardless of the flow condition. The development of the LDCs utilized flow measurements from a local USGS flow gage and HSPF modeled flows. These flow measurements were collected over a variety of flow conditions observed during the recreation season. LDCs developed from these flow records represented a range of flow conditions within the CWRW and thereby accounted for seasonal variability over the recreation season.

Critical conditions for *E. coli* loading occur in the dry summer months. This is typically when stream flows are lowest, and bacterial growth rates can be high. By meeting the water quality targets during the summer months, it can reasonably be assumed that the loading capacity values will be protective of water quality during the remainder of the calendar year (November through March).

CWRW nutrient TMDLs:

The nutrient targets employed in the CWRW TP TMDLs were based on the average nutrient values collected during the growing season (June 1 to September 30). The water quality targets were designed to meet the NCHF or NLF eutrophication WQS during the period of the year where the frequency and severity of algal growth is the greatest.

The Minnesota eutrophication standards state that total phosphorus WQS are defined as the mean concentration of phosphorus values measured during the growing season. In the CWRW TP TMDL efforts, the WLA and LA estimates were calculated from modeling efforts which incorporated mean growing season total phosphorus values. Nutrient loading capacities were set in the TMDL development process to meet the WQS during the most critical period. The mid-late summer time period is typically when eutrophication standards are exceeded and water quality within the CWRW is deficient. By calibrating the modeling efforts to protect these water bodies during the worst water quality conditions of the year, it is assumed that the loading capacities established by the TMDLs will be protective of water quality during the remainder of the calendar year (October through May).

CWRW temperature TMDLs:

Critical conditions and seasonal variations for the temperature TMDLs were accounted for via the daily stream flow records from 2000-2009. This daily information was used to create heating capacity LDCs. MPCA evaluated the heating load variability across all flow regimes of the LDC.

Stream temperatures in Straight River and Shell River vary seasonally due to climatic conditions (i.e., air temperatures, precipitation, snow/ice coverage, solar exposure etc.). Peak stream temperatures generally occur during the summer months (June, July, August and September) (Section 3.5.2.1 of the final TMDL document). Historic water temperature information demonstrates that the Straight River and the Shell River typically exhibit decreased DO concentrations, and violations of DO WQS, in the warmer summer months. Summer conditions typically have elevated atmospheric temperatures, the longest periods of sun exposure to surface waters and the greatest withdrawals of groundwater for agricultural purposes.

Groundwater contributions in the CWRW impact overall stream temperatures. Groundwater contributions vary depending on seasonal conditions (i.e., water table elevation compared to surface water elevation). Spring is typically associated with larger groundwater inputs to surface waters via snowmelt and high water table elevations. The summer months are typically associated with decreased groundwater/baseflow contributions. The summer period may also be when greater demands are made on groundwater resources via withdrawals for agricultural use and irrigation. The fall and winter months typically see groundwater resources replenished with precipitation events and snowmelt events.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of the seventh criterion.

8. Reasonable Assurance

When a TMDL is developed for waters impaired by point sources only, the issuance of a NPDES permit(s) provides the reasonable assurance that the wasteload allocations contained in the TMDL will be achieved. This is because 40 C.F.R. 122.44(d)(1)(vii)(B) requires that effluent limits in permits be consistent with, "the assumptions and requirements of any available wasteload allocation" in an approved TMDL.

When a TMDL is developed for waters impaired by both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur, EPA's 1991 TMDL Guidance states that the TMDL should provide reasonable assurances that nonpoint source control measures will achieve expected load reductions in order for the TMDL to be approvable. This information is necessary for EPA to determine that the TMDL, including the load and wasteload allocations, has been established at a level necessary to implement water quality standards.

EPA's August 1997 TMDL Guidance also directs Regions to work with States to achieve TMDL load allocations in waters impaired only by nonpoint sources. However, EPA cannot disapprove a TMDL for nonpoint source-only impaired waters, which do not have a demonstration of reasonable assurance that LAs will be achieved, because such a showing is not required by current regulations.

Comment:
The CWRW TMDLs provide reasonable assurance that actions identified in the implementation strategy, as discussed in the TMDL in Section 7, will be applied to attain the loading capacities and allocations calculated for the impaired reaches within the CWRW. The recommendations made by MPCA will be successful at improving water quality if the appropriate local groups work to implement these recommendations. Those mitigation suggestions, which fall outside of regulatory authority, will require commitment from state agencies and local partners to carry out the suggested actions.

Reasonable assurance that the WLA set forth will be implemented is provided by regulatory actions. According to 40 CFR 122.44(d)(1)(vii)(B), NPDES permit effluent limits must be consistent with assumptions and requirements of all WLAs in an approved TMDL. MPCA's stormwater program and the NPDES permit program are some of the implementing programs for ensuring WLA are consistent with the TMDL. The NPDES program requires construction and industrial sites to create SWPPPs which summarize how stormwater will be minimized from construction and industrial sites. Under the MPCA's Stormwater General Permit, managers of sites under construction or industrial stormwater permits must review the adequacy of local SWPPPs to ensure that each plan meets WLA set in the CWRW TMDLs. In the event that the SWPPP does not meet the WLA, the SWPPP will need to be modified. This applies to sites under the MPCA's General Stormwater Permit for Construction Activity (MNR100001) and its NPDES/SDS Industrial Stormwater Multi-Sector General Permit (MNR050000) or NPDES/SDS General Permit for Construction Sand & Gravel, Rock Quarrying and Hot Mix Asphalt Production facilities (MNG490000).

SSTS are regulated by Minnesota Statutes 115.55 and 115.56 which establish minimum technical standards for individual and mid-sized SSTS, a framework for local administration of SSTS programs and statewide licensing and certification of SSTS professionals, SSTS product review and registration, and establishment of the SSTS Advisory Committee.

The MPCA regulates the collection, transportation, storage, processing and disposal of animal manure and other livestock operation wastes at State registered AFO facilities. The MPCA Feedlot Program implements rules governing these activities, and provides assistance to counties and the livestock industry. The feedlot rules apply to most aspects of livestock waste management including the location, design, construction, operation and management of feedlots and manure handling facilities.

MPCA has identified several local partners which have expressed interest in working to improve water quality within the CWRW. Implementation practices will be implemented over the next several years. The following groups are expected to work closely with one another to ensure that pollutant reduction efforts via BMPs are being implemented within the CWRW: the Crow Wing County Soil and Water Conservation District (SWCD), Hubbard SWCD, Wadena SWCD, and various local lake associations (Blueberry Lake Association, Mayo Lake Association, Sibley Lake Association and Twin Lakes Association).

Continued water quality monitoring within the basin is supported by MPCA. Additional water quality monitoring results could provide insight into the success or failure of BMP systems designed to reduce bacteria and nutrient effluent loading into the surface waters of the watershed. Local watershed managers would be able to reflect on the progress of the various pollutant removal strategies and would have the opportunity to change course if observed progress is unsatisfactory.

Various funding mechanisms will be utilized to execute the recommendations made in the implementation section of this TMDL. MCPA is in the process of developing a Crow Wing Watershed Restoration and Protection Strategy (WRAPS) and will incorporate the loadings and implementation recommendations described in this TMDL. MPCA anticipates that the WRAPS will be finalized after the approval of the CWRW TMDLs. Funding for implementation efforts will be a mixture of local, state and federal funding vehicles. Local funding may be through SWCD cost-share funds, Natural Resources Conservation Service (NRCS) cost-share funds, and local government cost-share funds. Federal funding, via the Section 319 grants program, may provide money to implement voluntary nonpoint source programs within the CWRW. State efforts may be via Clean Water Legacy Act (CWLA) grant money and the Minnesota Clean Water Partnership program.

Clean Water Legacy Act: The CWLA is a statute passed in Minnesota in 2006 for the purposes of protecting, restoring, and preserving Minnesota water and providing the funding to do so. The Act discusses how MPCA and the involved public agencies and private entities will coordinate efforts regarding land use, land management, water management, etc. Cooperation is also expected between agencies and other entities regarding planning efforts, and various local authorities and responsibilities. This would also include informal and formal agreements to jointly use technical, educational, and financial resources. The CWLA provides the process to be used in Minnesota to develop TMDL implementation plans, which detail the restoration activities needed to achieve the allocations in the TMDL. The TMDL implementation plans are required by the State to obtain funding from the Clean Water Fund. MPCA expects the implementation plans to be developed within a year of TMDL approval.

The CWLA also provides details on public and stakeholder participation, and how the funding will be used. The implementation plans are required to contain ranges of cost estimates for point and nonpoint source load reductions, as well as monitoring efforts to determine effectiveness. MPCA has developed guidance on what is required in the implementation plans (Implementation Plan Review Combined Checklist and Comment, MPCA), which includes cost estimates, general timelines for implementation, and interim milestones and measures. The Minnesota Board of Soil and Water Resources administers the Clean Water Fund as well, and has developed a detailed grants policy explaining what is required to be eligible to receive Clean Water Fund money (FY '11 Clean Water Fund Competitive Grants Policy; Minnesota Board of Soil and Water Resources, 2011).

The EPA finds that this criterion has been adequately addressed.

9. Monitoring Plan to Track TMDL Effectiveness

EPA's 1991 document, *Guidance for Water Quality-Based Decisions: The TMDL Process* (EPA 440/4-91-001), recommends a monitoring plan to track the effectiveness of a TMDL, particularly when a TMDL involves both point and nonpoint sources, and the WLA is based on an assumption that nonpoint source load reductions will occur. Such a TMDL should provide assurances that nonpoint source controls will achieve expected load reductions and, such TMDL should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring and leading to attainment of water quality standards.

Comment:
Section 6 of the final TMDL document outlines the water monitoring efforts in the CWRW. Progress of TMDL implementation will be measured through regular monitoring efforts of water quality and total BMPs completed. MPCA anticipates that monitoring will be completed by local groups (e.g., Becker SWCD) as long as there is sufficient funding to support the efforts of these local entities. Additionally, volunteers may be relied on to complete monitoring in the lakes discussed within this TMDL. At a minimum, the CWRW will be monitored once every 10 years as part of the MPCA's Intensive Watershed Monitoring cycle.

Water quality monitoring is a critical component of the adaptive management strategy employed as part of the implementation efforts utilized in the CWRW. Water quality information will aid watershed managers in understanding how BMP pollutant removal efforts are impacting water quality within the CWRW. Water quality monitoring combined with an annual review of BMP efficiency will provide information on the success or failure of BMP systems designed to reduce pollutant loading into water bodies of the CWRW. Watershed managers will have the opportunity to reflect on the progress or lack of progress, and will have the opportunity to change course if progress is unsatisfactory. Review of BMP efficiency is expected to be completed by the local and county partners.

Stream Monitoring:
River and stream monitoring in the CWRW, has been completed by a variety of organizations (i.e., SWCDs) and funded by Clean Water Partnership Grants, and other available local funds. MPCA anticipates that stream monitoring in the CWRW should continue in order to build on the current water quality dataset and track changes based on implementation progress. Continuing to monitor water quality and biota scores in the listed segments will determine whether or not stream habitat restoration measures are required to bring the watershed into attainment with water quality standards. At a minimum, fish and macroinvertebrate sampling should be conducted by the MPCA, Minnesota Department of Natural Resources (MN DNR), or other agencies every five to ten years during the summer season.

Lake Monitoring:
The lakes of the CWRW have all been periodically monitored by volunteers and staff over the years. Monitoring for some of these locations is planned for the future to continue in order to keep a record of the changing water quality as funding allows. Lakes are generally monitored for TP, chl-a, and Secchi disk transparency. MPCA expects that in-lake monitoring will continue as implementation activities are installed across the watersheds. These monitoring activities should continue until water quality goals are met. Some tributary monitoring has been completed on the inlets to the lakes and may be important to continue as implementation activities take place throughout the subwatersheds.

The EPA finds that this criterion has been adequately addressed.

10. Implementation

EPA policy encourages Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired by nonpoint sources. Regions may assist States/Tribes in developing implementation plans that include reasonable assurances that nonpoint source LAs established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. In addition, EPA policy recognizes that other relevant watershed management processes may be used in the TMDL process. EPA is not required to and does not approve TMDL implementation plans.

Comment:
The findings from the CWRW TMDLs will be used to inform the selection of implementation activities as part of the Crow Wing River Watershed Restoration and Protection Strategy process. The purpose of the WRAPS report is to support local working groups and jointly develop scientifically-supported restoration and protection strategies to be used for subsequent implementation planning. The TMDL outlined implementation strategies in Sections 5 and Section 7 of the final TMDL document. MPCA referenced reports by County soil and water conservation districts which provide information on implementation activities underway within the CWRW. MPCA outlined the importance of prioritizing

areas within the CWRW, education and outreach efforts with local partners, and partnering with local stakeholders to improve water quality within the watershed. Reduction goals for the bacteria, nutrient and temperature TMDLs may be met via components of the following strategies:

<u>CWRW bacteria (*E. coli*) TMDLs:</u>
Pasture management/livestock exclusion plans: Reducing livestock access to stream environments will lower the opportunity for direct transport of bacteria to surface waters. The installation of exclusion fencing near stream and river environments to prevent direct access for livestock, installing alternative water supplies, and installing stream crossings between pastures, would work to reduce the influxes of bacteria and improve water quality within the watershed. Additionally, introducing rotational grazing to increase grass coverage in pastures, and maintaining appropriate numbers of livestock per acre for grazing, can also aid in the reduction of bacteria inputs.

Manure Collection and Storage Practices: Manure has been identified as a source of bacteria. Bacteria can be transported to surface water bodies via stormwater runoff. Bacteria laden water can also leach into groundwater resources. Improved strategies for the collection, storage and management of manure can minimize impacts of bacteria entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of bacteria in stormwater runoff.

Manure management plans: Developing manure management plans can ensure that the storage and application rates of manure are appropriate for land conditions. Determining application rates that take into account the crop to be grown on that particular field and soil type will ensure that the correct amount of manure is spread on a field given the conditions. Spreading the correct amount of manure will reduce the availability of bacteria to migrate to surface waters.

Feedlot runoff controls: Treatment of feedlot runoff via diversion structures, holding/storage areas, and stream buffering areas can all reduce the transmission of bacteria to surface water environments. Additionally, cleaner stormwater runoff can be diverted away from feedlots so as to not liberate bacteria.

Subsurface septic treatment systems: Improvements to septic management programs and educational opportunities can reduce the occurrence of septic pollution. Educating the public on proper septic maintenance, finding and eliminating illicit discharges and repairing failing systems could lessen the impacts of septic derived bacteria inputs into the CWRW.

Riparian Area Management Practices: Protection of streambanks within the watershed through planting of vegetated/buffer areas with grasses, legumes, shrubs or trees will mitigate bacteria inputs into surface waters. These areas will filter stormwater runoff before the runoff enters the main stem or tributaries of the CWRW.

<u>CWRW nutrient TMDLs:</u>
Septic Field Maintenance: Septic systems are believed to be a source of nutrients to waters in the CWRW. Failing systems are expected to be identified and addressed via upgrades to those SSTS not meeting septic ordinances. MPCA explained that SSTS improvement priority should be given to those failing SSTS on lakeshore properties or those SSTS adjacent to streams within the direct watersheds for each water body. MPCA aims to greatly reduce the number of failing SSTS in the future via local septic

management programs and educational opportunities. Educating the public on proper septic maintenance, finding and eliminating illicit discharges, and repairing failing systems could lessen the impacts of septic derived nutrients inputs into the CWRW.

Manure management (feedlot and manure stockpile runoff controls): Manure has been identified as a potential source of nutrients. Nutrients derived from manure can be transported to surface water bodies via stormwater runoff. Nutrient laden water can also leach into groundwater resources. Improved strategies in the collection, storage and management of manure can minimize impacts of nutrients entering the surface and groundwater system. Repairing manure storage facilities or building roofs over manure storage areas may decrease the amount of nutrients in stormwater runoff.

Pasture management and agricultural reduction strategies: These strategies involve reducing nutrient transport from fields and minimizing soil loss. Specific practices would include; erosion control through conservation tillage, reduction of winter spreading of fertilizers, elimination of fertilizer spreading near open inlets and sensitive areas, installation of stream and lake shore buffer strips, streambank stabilization practices (gully stabilization and installation of fencing near streams), and nutrient management planning.

Urban/Residential Nutrient Reduction Strategies: These strategies involve reducing stormwater runoff from lakeshore homes and other residences within the CWRW. These practices would include; rain gardens, lawn fertilizer reduction, lake shore buffer strips, vegetation management and replacement of failing septic systems. Water quality educational programs could also be utilized to inform the general public on nutrient reduction efforts and their impact on water quality.

Public Education Efforts: Public programs will be developed to provide guidance to the general public on nutrient reduction efforts and their impact on water quality. These educational efforts could also be used to inform the general public on what they can do to protect the overall health of lakes within the CWRW.

<u>CWRW temperature TMDLs:</u>
Reducing stormwater inputs to surface waters in the CWRW: Stormwater runoff from impervious surfaces and agricultural areas transfer heat to the surface waters of CWRW. Reducing the stormwater inputs to waters of CWRW via restoration of streamside buffers, wetlands, and other low impact green technologies will help regulate temperatures in the Straight River and Shell River. Restoration efforts should focus on systems which encourage stormwater to infiltrate, evaporate or evapotranspire before reaching the surface water.

Improving riparian shading: Planting trees or shrubbery in riparian areas to shade surface waters would mitigate temperature fluctuations, especially in the summer months.

The EPA finds that this criterion has been adequately addressed. The EPA reviews but does not approve implementation plans.

11. Public Participation

EPA policy is that there should be full and meaningful public participation in the TMDL development process. The TMDL regulations require that each State/Tribe must subject calculations to establish TMDLs to public review consistent with its own continuing planning process (40 C.F.R. §130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval should describe the State's/Tribe's public participation process, including a summary of significant comments and the State's/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. §130.7(d)(2)).

Provision of inadequate public participation may be a basis for disapproving a TMDL. If EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment:

The public participation section of the TMDL submittal is found in Section 8 of the final TMDL document. Throughout the development of the CWRW TMDLs the public was given various opportunities to participate. MPCA encouraged public participation through public meetings and small group discussions. MPCA worked with numerous local partners and a steering committee throughout the development of the CWRW TMDLs. The steering committee was composed of members representing the Minnesota Department of Natural Resources (MN-DNR), the Minnesota Department of Agriculture (MDA), the Becker SWCD, Cass SWCD, Crow Wing County SWCD, Hubbard SWCD, Morrison SWCD, Otter Tail SWCD, Todd SWCD and Wadena SWCD, local members of Board of Water and Soil Resources (BWSR) groups, members from the Nature Conservancy and representatives from the White Earth Nation. MPCA worked with members of the steering committee to share information about the TMDL development results and to solicit their input for potential implementation strategies. Members of the steering committee are the main groups which will ultimately be responsible for the implementation efforts within the CWRW. The meetings between MPCA and the steering committee were held in 2010, 2011, 2012, 2013 and 2014.

MPCA hosted a series public meetings in 2010, 2012, 2013 and 2014 (Section 8.2 of the final TMDL document). Members of the general public and lake associations were invited to a series of stakeholder meetings to discuss the progress of the CWRW TMDL. The draft TMDL was posted online by MPCA at (http://www.pca.state.mn.us/water/tmdl). The 30-day public comment period was started on November 4, 2013 and ended on December 4, 2013. MPCA received 4 public comments during the public comment period.

A comment was submitted by the Sharon Natzel who requested that MPCA conduct additional sampling within the watershed to monitor the presence and concentration of fertilizers, fungicides, herbicides and pesticides in surface waters. MPCA explained that Ms. Natzel should contact the MDA related to pesticide monitoring and other regulatory functions related to agriculture in the State of Minnesota. The MDA also conducts groundwater monitoring in Minnesota. MPCA provided Ms. Natzel with MDA website addresses for its monitoring and assessment program and its 2014 groundwater monitoring plan.

A comment was submitted by the Minnesota Department of Agriculture which requested that MPCA update language within the final CWRW TMDL to describe the calibration and validation of the HSPF model, to reference a manure application study, to describe tile drainage within the CWRW, to update phosphorus data in Section 4.1, to update water quality data for Swan Creek and Iron Creek and to provide additional discussion related to BATHTUB modeling assumptions of deep and shallow lakes. MPCA agreed to update language, where appropriate, in the final CWRW TMDL and provided MDA with responses to all of their comments which were received during the public notice period.

A comment was submitted by the Minnesota Center for Environmental Advocacy (MCEA) which requested that MPCA provide further clarification on: source assessment for bacteria and phosphorus sources within the CWRW, the watershed runoff estimates of Section 3.2, contributions from septic systems, the load reduction for Swan Creek, and insufficient reasonable assurance within the CWRW TMDL document. MPCA answered each of the concerns presented by MCEA and updated the final TMDL document accordingly. MPCA explained that reasonable assurance of TMDL implementation (i.e., goals, milestones, responsible parties etc.) would be developed as part of the Crow Wing Watershed Restoration and Protection Strategy (WRAPS) report which MPCA is currently developing.

A comment was submitted by the Mr. Bill Macheel who requested that MPCA designate additional waters, which Mr. Macheel believes to be impaired, on its impaired waters list and to include these segments within the CWRW TMDL efforts. Mr. Macheel included MPCA assessment unit identification numbers (AUIDs) in his request to MPCA. Additionally, Mr. Macheel described surface water conditions (foam and algal mats present on the river surface). MPCA outlined its reasoning for not including the requested lake and river segments on its 303(d) impaired waters list. MPCA's rationale was based on lack of water quality data for certain areas and other water quality data which did not meet the requirements for an impaired designation. MPCA also explained that a statewide assessment of river eutrophication would be completed in the spring of 2015 and the results of that assessment would be reflected in the 2016 303(d) impaired waters list.

EPA believes that MPCA adequately addressed each of these comments and updated the final TMDL with appropriate language to address these comments. The MPCA submitted all of the public comments and responses in the final TMDL submittal packet received by the EPA on October 3, 2014.

The Crow Wing River Watershed includes White Earth Nation tribal lands in upstream areas of the watershed. MPCA explained that portions of the Blueberry Lake, Lower Twin Lake, and Straight River subwatersheds (Figure 1 of the final TMDL document) include White Earth Nation tribal areas. EPA invited representatives of the White Earth Nation to consult with EPA regarding EPA's review and decision on the CWRW TMDLs. Representatives from the White Earth Nation declined EPA's invitation to consult on EPA's review and decision of the CWRW TMDLs.

The EPA finds that the TMDL document submitted by MPCA satisfies the requirements of this eleventh element.

12. Submittal Letter

A submittal letter should be included with the TMDL submittal, and should specify whether the TMDL is being submitted for a *technical review* or *final review and approval*. Each final TMDL submitted to EPA should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final review and approval, should contain such identifying information as the name and location of the water body, and the pollutant(s) of concern.

Comment:

The EPA received the final Crow Wing River watershed TMDL document, submittal letter and accompanying documentation from MPCA on October 3, 2014. The transmittal letter explicitly stated that the following final TMDLs were being submitted to EPA pursuant to Section 303(d) of the Clean Water Act for EPA review and approval. The lakes and stream segments of the CWRW TMDL are:

- Blueberry Lake (80-0034-00) (nutrient TMDL),
- Eighth Crow Wing Lake (29-0072-00) (nutrient TMDL),
- First Crow Wing Lake (29-0086-00) (nutrient TMDL),
- Lower Twin Lake (80-0030-00) (nutrient TMDL),
- Mayo Lake (18-0408-00) (nutrient TMDL),
- Portage Lake (29-0250-00) (nutrient TMDL),
- Sibley Lake (18-0404-00) (nutrient TMDL),
- Swan Creek (07010106-527) (nutrient and bacteria TMDLs),
- Partridge River (07010106-518) (bacteria TMDL),
- Home Brook (07010106-524) (bacteria TMDL),
- Cat River (07010106-544) (bacteria TMDL),
- Pillager Creek (07010106-577) (bacteria TMDL),
- Mayo Creek (07010106-604) (bacteria TMDL),
- Unnamed Creek (07010106-684) (bacteria TMDL),
- Stoney Brook (07010106-698) (bacteria TMDL),
- Corey Brook (07010106-700) (bacteria TMDL),
- Farnham Creek (07010106-702) (bacteria TMDL),
- Straight River (07010106-558) (dissolved oxygen/Temperature TMDL), &
- Shell River (07010106-681) (dissolved oxygen/Temperature TMDL).

The letter clearly stated that this was a final TMDL submittal under Section 303(d) of CWA. The letter also contained the name of the watershed as it appears on Minnesota's 303(d) list, and the causes/pollutants of concern. This TMDL was submitted per the requirements under Section 303(d) of the Clean Water Act and 40 CFR 130.

The EPA finds that the TMDL transmittal letter submitted for the CWRW TMDLs by MPCA satisfies the requirements of this twelfth element.

13. Conclusion

After a full and complete review, the EPA finds that the TMDLs for the Crow Wing River Watershed satisfy all of the elements of approvable TMDLs. This TMDL approval is for **twenty** TMDLs, **eight nutrient TMDLs**, **ten bacteria TMDLs** and **two temperature TMDLs** which address nineteen different water bodies for aquatic recreational and aquatic life use impairments.

The EPA's approval of these TMDLs extends to the water bodies which are identified above with the exception of any portions of the water bodies that are within Indian Country, as defined in 18 U.S.C. Section 1151. The EPA is taking no action to approve or disapprove TMDLs for those waters at this time. The EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.