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

SEP 28 2011

REPLY TO THE ATTENTION OF:
WW-16J

RECEIVED

OCT - 4 2011

Bureau of Watershed Mgmt

Cathy Stepp, Secretary
Wisconsin Department of Natural Resources
101 S. Webster St.
Madison, WI 53702

Dear Ms. Stepp:

The U.S. Environmental Protection Agency has conducted a complete review of the final Total Maximum Daily Load (TMDL) for the Rock River, including supporting documentation and follow-up information. The TMDL includes allocations for seven subwatersheds, the Upper Rock, Middle Rock, Afton, Yahara, Crawfish, Bark, and Turtle Creek, and three lakes, Lake Koshkonong, Lake Sinnissippi, and Fox Lake, covering all or portions of 11 counties in south central Wisconsin. The counties include Dodge, Jefferson, Rock, Dane, Columbia, Fond du Lac, Washington, Walworth, Waukesha, Green and Green Lake. The TMDLs were calculated for phosphorus and Total Suspended Solids (TSS) to address degraded habitat, low Dissolved Oxygen (DO), eutrophication, and turbidity impairments to achieve the designated use for fish and other aquatic life uses. This submittal is for 101 TMDLs for Total Phosphorus (TP) and Total Suspended Solids (TSS). There are 39 segments/lakes listed as impaired for both contaminants (78 TMDLs), 20 for only TSS, and 3 for only TP.

The TMDL meets the requirements of section 303(d) of the Clean Water Act and EPA's implementing regulations at 40 C.F.R. Part 130. Therefore, EPA hereby approves Wisconsin's phosphorus and TSS TMDLs, addressing degraded habitat, low DO, eutrophication, and turbidity. The statutory and regulatory requirements, and EPA's review of Wisconsin's compliance with each requirement, are described in the enclosed decision document.

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

Sincerely,

Tinka G. Hyde
Director, Water Division

Enclosure

cc: Robert Masnado, WDNR
Nicki Clayton, WDNR
Kevin Kirsch,WDNR

Date:

DECISION DOCUMENT FOR THE APPROVAL OF THE ROCK RIVER WISCONSIN TMDL

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 Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking

The TMDL submittal should identify the waterbody as it appears on the State's/Tribe's 303(d) list. The waterbody 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 waterbody 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 waterbody. 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 waterbody 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: Section 1.2 of the TMDL states that the Rock River Basin is located in southern Wisconsin and includes drainage from seven subbasins and watersheds: the Upper Rock, Middle Rock, Afton, Yahara, Crawfish and Bark Rivers, and Turtle Creek. There are 83 reaches and numerous lakes included in the areal extent of this TMDL, with 61 of these reaches and one lake that are determined to be impaired by the Wisconsin Department of Natural Resources (WDNR), for a total of 62 impaired waterbodies. The impaired waters are included in Table 1 in the TMDL submittal which is incorporated by reference. The Table includes the name of the impaired water, the river mile location, county, identification number, pollutants, impairments, and designated use. Two of the waterbodies, Lake Koshkonong and Lake Sinnissippi, are impoundments on the Rock River and do not have sufficient detention time to be considered reservoirs or lakes. Therefore, these waterbodies are classified as rivers when applying standards. For purposes of description, Lake Koshkonong and Lake Sinnissippi are referred to as "lakes" in the TMDL submittal; however, only Fox Lake is a true lake and as such has an applicable water quality standard for lakes. This submittal includes 101 TMDLs for Total Phosphorus (TP) and Total Suspended Solids (TSS). There are 39 segments/lakes listed as impaired for both contaminants (78 TMDLs), 20 for only TSS, and 3 for only TP. These TMDLs address degraded habitat, low Dissolved Oxygen (DO), eutrophication, and turbidity impairments.

The entire watershed covers 3750 sq. mi. in Dodge, Jefferson, Rock, Dane, Columbia, Fond du Lac, Washington, Walworth, Waukesha, Green and Green Lake Counties. Section 2.1 of the TMDL states that there are approximately 3,900 river miles draining the study area. The 62 impaired waters are shown in red on Figure 1 of the TMDL. The seven subbasins are shown in Figure 1 on page four of this document (Figure 2 of the TMDL). The largest surface water features are Horicon Marsh, Beaver Dam Lake, Lake Sinissippi, Lake Koshkonong, the Yahara Chain of Lakes, Oconomowoc Lake, and Lake Delavan, and 443 total lakes and impoundments in the basin.

Land use: The watershed once contained diverse ecosystems, including oak savanna, wetlands, mesic prairie, and lowland forests. The wetlands supported marshes, wet meadows, wet forests and deepwater marshes which were later converted to agriculture. Section 2.1 of the TMDL lists the current land uses, ranging from rural-agriculture to high density urban. Primary crops are corn and corn-soybean rotation in the southern portion of the watershed and mixed dairy, feeder operations, cash-cropping, and muck farming in the northern portion. Current overall land use is 62% agriculture, 12% wetland, 11% grassland, 7% forest, 4% urban, 3% water, 1% barren, and traces of shrubland. The basin lies within the formerly glaciated region of south central Wisconsin and has many glaciated features, such as drumlins and moraines. The basin is bounded on the east by the Niagaran escarpment, the eastern terminal moraine of the Green Bay lobe of the last glaciation. Overall the topography is very flat with fertile soils.

Other relevant issues: Another project, the Rock River Study, was commissioned by the Rock River Partnership and completed in August 2000. This project used computer modeling to assist in the simulation of the fate and transport of phosphorus in the basin. The study simulated scenarios with various tillage and fertilizer practices, and was in response to the phosphorus effluent limit proposed by Wisconsin Administrative Code NR (Natural Resources) 217 (Effluent Standards and Limitations), which limited phosphorus in wastewater effluent to 1 mg/L unless alternative limits were allowed. The model and database from that Study were used in this TMDL for phosphorus loading, along with several other applicable models which were used for this TMDL project.

Problem Identification: Section 2.2.1 and 2.2.2 of the TMDL submittal states that water quality was measured in 2006, 2008, and 2009 for TP and TSS. Figures 2 and 3 below, (Figure 5 and 6 of the TMDL) show impairments across the basin. The red segments indicate that they are listed on the impaired waters 303(d) list. The red and orange dot locations indicate observed median values above the water quality standards for wadeable and nonwadeable-size streams, and the green and light green indicate observed values meeting standards in both sized streams. Section 1.2 of the TMDL discusses further that the waters are impaired by nuisance algal growth, oxygen depletion, reduced aquatic vegetation, reduced water clarity and degraded habitat due to excess phosphorus. Excess sediment reduces water clarity and light needed for aquatic vegetation, and also transports phosphorus. Some segments have elevated water temperature where the riparian cover has decreased. Vegetation provides oxygenation, food, and habitat. However, when vegetation dies, the decomposition and eutrophication process reduces available oxygen for other aquatic life. Too much sedimentation also smothers larvae and eggs in the substrate, clogs fish and invertebrate gills, and can increase water temperature, overall degrading habitat. Excess phosphorus causes excessive algal growth which can degrade habitat by drastically altering dissolved oxygen levels as the algae dies. Table 1 in the TMDL submittal lists these pollutants and impairments.

Pollutant of Concern: The pollutants of concern are **phosphorus and sediment**, as described in Section 1.2 of the TMDL submittal and above.

Source Identification: Sources include both nonpoint and point sources. Though the watershed is dominated by nonpoint sources of agriculture, and to a lesser extent non-permitted urban runoff, discharges from regulated Municipal Separate Storm Sewer Systems (MS4), facilities covered by general permits, and Wastewater Treatment Facilities (WWTF) also contribute to the impairment, shown in Table 5 below from the TMDL submittal. WDNR uses the term WWTF to refer to individually- permitted industrial and municipal facilities.

Various nonpoint sources contribute TP and TSS to waterbodies. Agricultural lands contribute pollutants when precipitation events wash soils (and attached phosphorus) into waterbodies, which can be exacerbated by agricultural tiles and drains. Phosphorus also enters streams via fertilizer use, which can be washed into waterbodies during rain events. Livestock operations contribute sediments and phosphorus from manure spreading on fields as well as pasturing and grazing locations near waterbodies. Non-agricultural sources include failing septic systems, where material ponds at the surface and enters a stream, and non-regulated urban

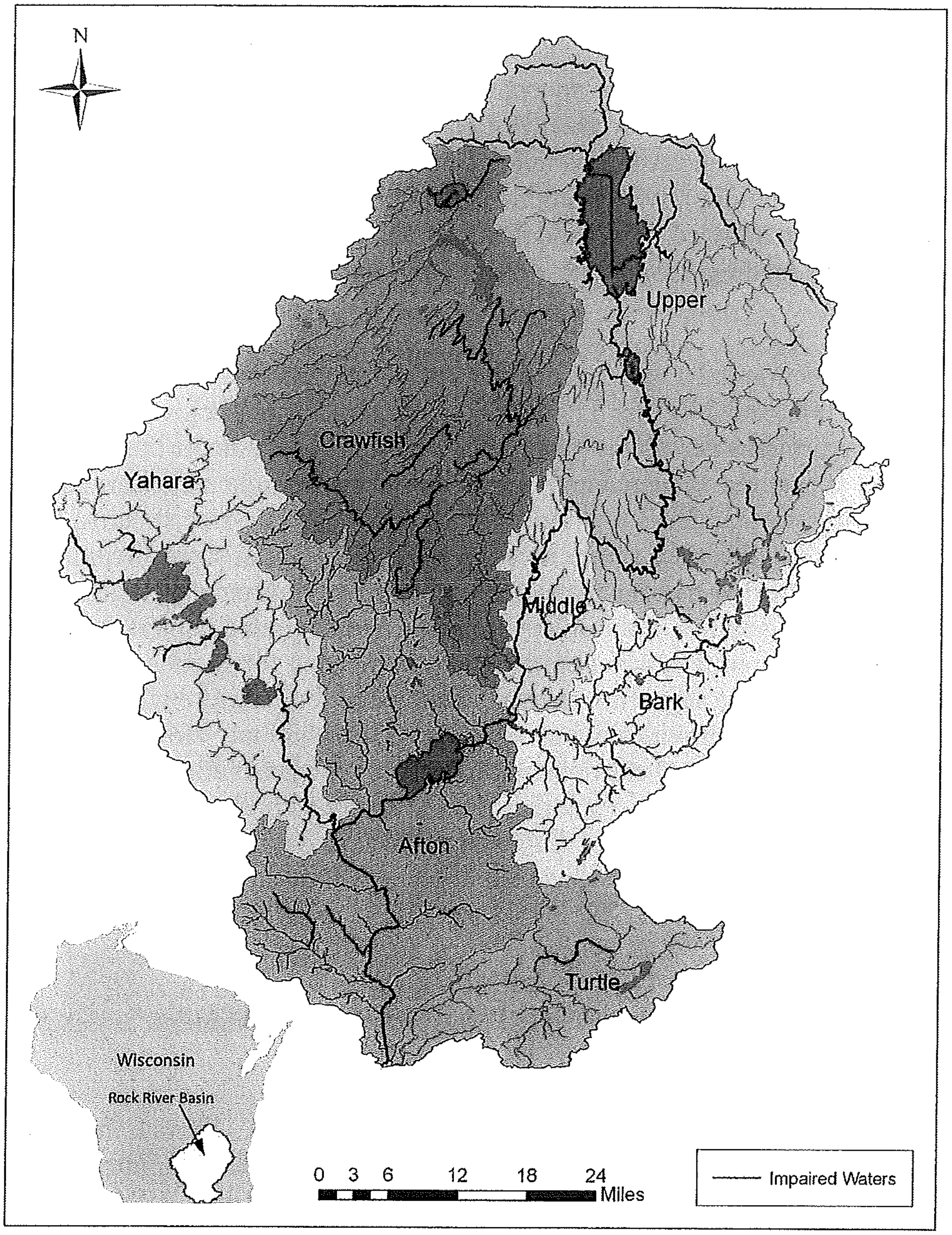

Figure 1. Map of major sub-basins of the Rock River Basin.

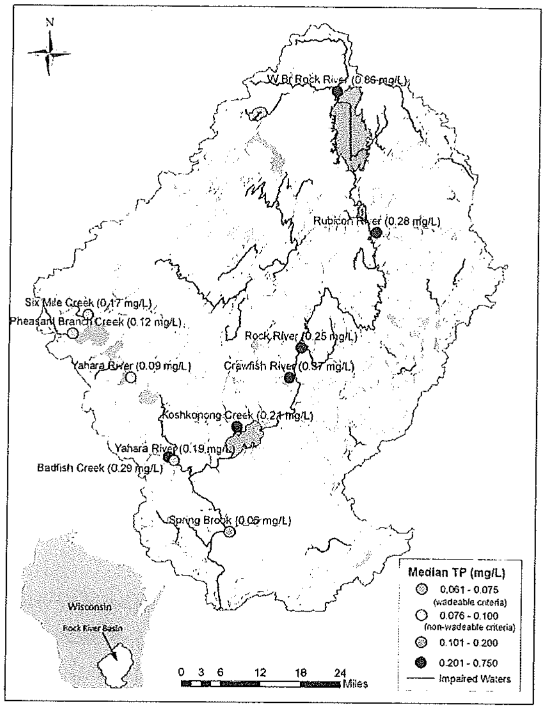

Figure 2. Median growing-season total phosphorus concentrations at 11 sampling stations in the Rock River Basin.

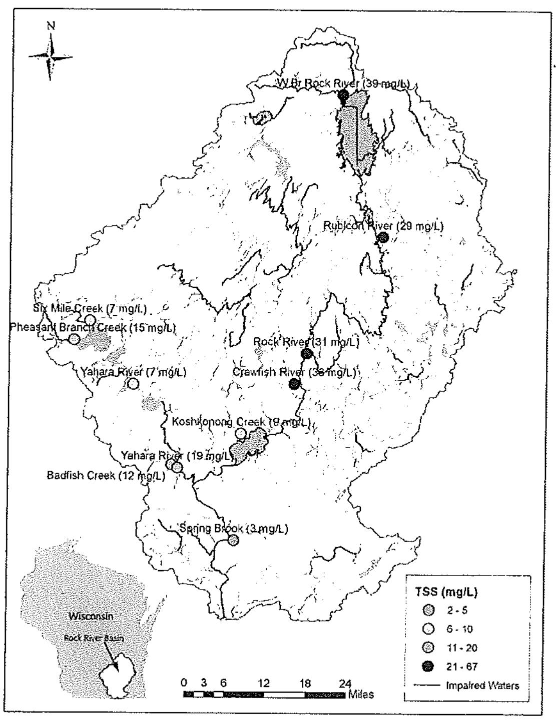

Figure 3. Median annual total suspended solids concentrations at 11 sampling stations in the Rock River Basin.

run-off which can contain sediment and phosphorus material. In addition, increased stormwater flow can cause streambank erosion, adding large amounts of sediment and phosphorus to the waterbodies.

Point sources also contribute significant amounts of phosphorus and sediment to the Rock River basin. As noted above, individual permittees, MS4s, CAFOs, and other discharges covered under general permits are present in the watershed, and contribute pollutants (Section 4.1 of the TMDL). Section 4.2.3 of the TMDL submittal lists WDNR permittees. Table 2 below lists 15 permitted industrial facilities in the basin, and 61 permitted municipal facilities. There are 48 MS4s in the basin listed in Table 3. CAFOs are also present in the basin, and 27 permitted locations are listed in Table 4. Because CAFOs must comply with their no discharge permit requirements, they are provided zero (0) allocation in the TMDL. Land application of manure is included in nonpoint source loading at locations not covered under CAFO permits. Although there are several facilities permitted via general permits (e.g., construction, industrial, sand and gravel), limited information is available about these sources.

Table 5 on page eight of this document is taken from Section 4.3 of the TMDL and shows the categories of sources that contribute TP and TSS to the Rock River Basin. It also summarizes characteristics of the sources: there is great seasonal variability of TP and TSS; over the course of a year, agricultural sources contribute the most TP and TSS load; individual permittees contribute a significant amount of TP (26.1%) but small amounts of TSS (2.5%); natural background, urban areas, and discharges covered under general permits contribute a small fraction of the total load. On a monthly average basis, the basinwide distribution of loading from WWTFs (individual permittees) for TP is 55.2%, and TSS 15.8%. Loadings from nonpoint sources vary due to weather, and can exceed point source discharges, which are relatively constant. However, WWTFs make up a greater proportion of the load in the average month.

Table 2. WWTFs in the Rock River Basin.

Industrial Facilities	Permit	Map
Alto Dairy Cooperative	0002003	1
General Motors Corp	0001945	2
Grande Cheese Co	0050016	3
Hormel Foods	0025941	4
Landmark Services Cooperative	0049379	5
Madison Gas & Electric	0001961	6
Middleton Tiedeman Pond	0049956	7
Nasco Division of Aristotle	0058220	8
National Rivet and Mfg	0001996	9
Renew Energy LLC	0002038	10
Rushing Waters Fisheries Inc	0002488	11
Sensient Flavors Inc	0002534	12
WI DNR Nevin Fish Hatchery	0002585	13
WI Electric Power Co	0061441	14
WI Power and Light	0002402	15

Municipal Facilities	Permit	Map
Allenton	0028053	1
Arlington	0021512	2
Ashippun	0031381	3
Beaver Dam	0023345	4
Beloit Town	0026930	5
Brandon	0023442	6
Brownsville	0021601	7
Burnett	0031551	8
Cambridge	0026948	9
City of Beloit	0023370	10
Clinton	0022039	11
Clyman	0020702	12
Columbus	0021008	13
Consolidated Koshkonong	0021059	14
Deerfield	0023744	15
Delafield-Hartland	0032026	16
Dousman	0021351	17
Edgerton	0020346	18
Fall River	0023973	19
Footville	0024023	20
Fort Atkinson	0022489	21
Great Lakes Investors	0060607	22
Hartford	0020192	23
Horicon	0020231	24
Hustisford	0020303	25
Iron Ridge	0020486	26
Ixonia	0031038	27
Janesville	0030350	28
Jefferson	0024333	29
Johnson Creek	0022161	30
Juneau	0021474	31
Kekoskee	0035548	32
Lake Mills	0031194	33
Lebanon #1	0031364	34
Lebanon #2	0023051	35
Lomira	0020532	36
Lowell	0029271	37
Madison Metropolitan	0024597	38
Marshall	0024627	39
Mayville	0024643	40
Milton	0060453	41
Oconomowoc	0021181	42
Oregon	0020681	43
Palmyra	0031020	44
Plymouth #1	0031054	45
Randolph	0031160	46
Reesville	0028509	47
Rockdale	0026352	48
Sharon	0022608	49
Slinger	0020290	50
Stoughton	0020338	51
Sullivan	0025585	52
Sullivan Town #1	0031844	53
Sun Prairie	0020478	54
Theresa	0022322	55
WalCoMet	0031461	56
Waterloo	0030881	57
Watertown	0028541	58
Waupun	0022772	59
Whitewater	0020001	60
Wisconsin Academy	0029611	61

Table 3. MS4s in the Rock River Basin.

City of Beaver Dam
City of Beloit
City of Delafield
City of Fitchburg
City of Fort Atkinson
City of Hartford
City of Janesville
City of Madison
City of Middleton
City of Milton
City of Monona
City of Oconomowoc
City of Stoughton
City of Sun Prairie
City of Watertown
City of Waupun
City of Whitewater
Town of Beloit
Town of Blooming Grove
Town of Bristol
Town of Burke
Town of Cottage Grove
Town of Delafield
Town of Dunkirk
Town of Dunn
Town of Harmony
Town of Janesville
Town of La Prairie
Town of Lisbon
Town of Madison
Town of Merton
Town of Middleton
Town of Oconomowoc
Town of Pleasant Springs
Town of Rock
Town of Summit
Town of Turtle
Town of Westport
Village of Cottage Grove
Village of DeForest
Village of Dousman
Village of Hartland
Village of McFarland
Village of Maple Bluff
Village of Merton
Village of Nashotah
Village of Shorewood Hills
Village of Waunakee

Table 4. CAFOs in the Rock River Basin.

CAFOs	Permit	Map
ABS Global, Inc	0059099	1
Blue Star Dairy Arlington	0062270	2
Blue Star Dairy Farms	0058815	3
Calamity Knoll Farm	0059048	4
Clover Hill Dairy	0061689	5
Cold Springs Egg Farm Inc - Main Farm	0002437	6
Cold Springs Egg Farm Inc - B Farm	0063517	7
Crave Brother's Farm, LLC	0061719	8
Creekwood Farms Inc	0056308	9
Daybreak Foods Inc	0057550	10
Double S Dairy	0061760	11
Hilltop Dairy	0063983	12
J M Schmidt and Sons Inc	0063801	13
Kippley Farms	0062201	14
Kutz Dairy	0062804	15
Naber Land and Cattle	0056294	16
Nehls Bros. Farms Ltd	0056812	17
Pond Hill Dairy, LLC	0062341	18
Pulsfus Poultry, LLC	0062553	19
Ripp's Dairy Valley	0062529	20
Roche Farms Inc	0063916	21
Rosy-Lane Holsteins LLC	0061590	22
Statz Brothers	0056791	23
Sunset Farms Inc	0058971	24
Tag Lane Dairy Farm	0063932	25
UW Arlington Research Station	0063908	26
Wagner Dairy Farm	0058751	27

Table 5. Baseline TP and TSS loading in the Rock River Basin

Source	Total Phosphorus (lbs/year)	Total Suspended Solids (tons/year)
Agriculture	1,048,799	165,083
Background	30,207	3,153
Urban (MS4)	50,151	4,948
Urban (non-permitted)	23,172	2,063
General Permits	2,317	206
WWTF	415,409	4,447
Total	1,570,055	179,900

Priority Ranking: Section 1.2 of the TMDL submittal states that the WDNR has ranked numerous waters in this basin as high priority for the development of TMDLs to address the impairments caused by excess phosphorus and sediment loading.

Future growth: Section 6.6 of the TMDL explains that the greatest increase in population in the Rock River Basin over the next 30 years is expected in Dane County, specifically in the City of Madison urban area at 22.8% growth; Dane County as a whole increased in population 15.2% from 2000 – 2009. EPA reviewed data that indicated other counties with a range from -3.3% to 11.2% occurring during 2000- 2009, and which are not expected to grow as much as Dane County (US Census Bureau at http://quickfacts.census.gov/qfd/states/55/55025.html).

WDNR used permitted daily average flows (DAF) and permitted effluent TP concentrations to calculate baseline loadings. Since permitted values are typically higher than actual values, three potential scenarios regarding reserve capacity were considered:

- Reserve capacity in most facilities will be accommodated in the next 30 years.
- The Madison Metropolitan Sewerage District in Dane County has a permit that can accommodate the larger growth with no reserve capacity calculated.
- Several municipal communities which may surpass permitted DAF levels in the next 30 years will need to reduce TP to meet their WLAs.

Surrogate measures: The phosphorus and sediment reductions calculated for this TMDL will not only address the phosphorus and sediment impairments, but also low DO, eutrophication, and habitat degradation. TSS is the surrogate for sedimentation and turbidity.

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning this first element.

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 waterbody, 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.

Comment:
Designated Uses – Section 3.1 of the TMDL submittal states that the Rock River Basin is designated for "fish and other aquatic life uses." Most of the Rock River in this study area has a designation of warm water sport fishery, and some is designated for warm water forage fish communities, as described in paragraphs (b) and (c) below (bold added). Wisconsin Administrative Code NR 102.04(3) defines these uses as follows:

"FISH AND OTHER AQUATIC LIFE USES. The department shall classify all surface waters into one of the fish and other aquatic life subcategories described in this subsection. Only those use subcategories identified in pars. (a) to (c) shall be considered suitable for the protection and propagation of a balanced fish and other aquatic life community as provided in the federal water pollution control act amendments of 1972, P.L. 92-500; 33 USC 1251 et. seq.

(a) *Cold water communities.* This subcategory includes surface waters capable of supporting a community of cold water fish and aquatic life, or serving as a spawning area for cold water fish species. This subcategory includes, but is not restricted to, surface waters identified as trout water by the department of natural resources (Wisconsin Trout Streams, publication 6-3600 (80)).
(b) *Warm water sport fish communities.* This subcategory includes surface waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish.
(c) *Warm water forage fish communities.* This subcategory includes surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.
(d) *Limited forage fish communities.* (Intermediate surface waters). This subcategory includes surface waters of limited capacity and naturally poor water quality or habitat. These surface waters are capable of supporting only a limited community of forage fish and other aquatic life.
(e) *Limited aquatic life.* (Marginal surface waters). This subcategory includes surface waters of severely limited capacity and naturally poor water quality or habitat. These surface waters are capable of supporting only a limited community of aquatic life."

Standards for Phosphorus – Numeric criteria for **phosphorus** are found in Order WT-25-08 (Item No. 3.A.4) from the Wisconsin Natural Resources Board to the Wisconsin Legislature and were developed based on the size of the stream: **0.100 mg/l TP** for non-wadeable, larger streams; **0.075 mg/l TP** for wadeable, smaller streams (NR 102.06(3) criteria for rivers and streams). These standards represent the highest allowable annual median water column TP concentration during critical conditions. Section 5.2 of the TMDL describes the critical conditions for phosphorus as the summer growing season when temperature, flow, and sunlight conditions are the most conducive to excess algal growth. Order WT-25-08 explains the process Wisconsin used to determine the criteria.

The table below is derived from information in Section 3.3.2 of the TMDL (NR 102.06(4) criteria for lakes and reservoirs). In lakes Koshkonong and Sinnissippi, which are in fact shallow impoundments, the criteria for the upstream rivers flowing into the lakes were used. For the deeper Fox Lake, the criterion for unstratified lakes was used.

Table 6. Standards for the impaired lake and impoundments in the TMDL.

Lake	Characteristics	Standard/target derivation	Standard/target
Koshkonong	Impoundment on Rock, Maximum depth 7 ft.	Rock River upstr. of lake (non-wadeable)	**0.1mg/L**
Sinnissippi	Impoundment on Rock, Maximum depth 8 ft.	Rock River upstr. of lake (wadeable)	**0.075mg/L**
Fox	Maximum depth 19 ft.	Unstratified lake	**0.040mg/L**

Targets for TSS - There are no numeric water quality criteria for TSS or sediment. Section 3.3.1 of the TMDL, the Wisconsin Administrative Code NR 102.04(1)(a) narrative water quality standard states: "Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state." Sediment is considered an objectionable deposit.

The **target for TSS is 26 mg/l** as an annual average under average conditions for all reaches and all months and is derived from the narrative standard. This target represents the flow-weighted average TSS concentration in runoff and discharge from industries and municipalities. The TSS loading varies by month and by reach along with variation in TP loading capacity. Though there is a close association of sediment with phosphorus, the relationship of TSS-TP is not always linear. Coefficients of monthly TSS-TP regression equations from monthly model output were used to determine the varied monthly targets. Section 5.1.3 of the TMDL explains this process, and illustrates that the nonlinear nature of the relationship is adequately addressed, with summer months indicating more TSS per pound of TP than winter months. This reflects observations that TSS critical conditions are wet weather events during which upland and streambank erosion adds loadings of sediment into the streams and which occur mostly in spring and summer.

Further, the TSS target of 26 mg/l is comparable to several other site-specific TSS targets derived from a numeric turbidity standard in Nephelometric Turbidity Units. Those locations have similar land use/land cover and nutrient ecoregion characteristics as the Rock River. EPA concurs with the TSS target of 26 mg/l and believes that the target is consistent with the narrative standard.

Higher flows will result in naturally higher TSS concentrations (and thus higher loads). Therefore, those months with higher flows due to spring snowmelt or higher rainfall will have higher concentrations and related loads. Although there are variations in the monthly targets, the annual average of 26 mg/l TSS will be attained by the TMDL allocations.

Section 3.3.2 of the TMDL states: "TSS targets for this TMDL were therefore calculated by determining the TSS load that is typically associated with the TP load that meets the phosphorus criteria." WDNR believes it is a reasonable assumption that the implementation that will occur to reduce TP to achieve that aquatic life use will also reduce TSS loads to achieve the aquatic life use. The relationships have been established through the regression formulas. The behavior of phosphorus, TSS, and habitat degradation are closely linked, and the relationships between these contaminants are discussed below. The modeling methodology is discussed in the next section of this document.

TSS and phosphorus linkage - Target development was closely linked with the TSS/sediment association with phosphorus, in general and in this watershed, which is well established in the literature. Section 1.2 of the TMDL submittal explains that sediment loads are linked to particulate phosphorus loads because much of the phosphorus that is delivered to streams is bound to sediment, especially from nonpoint sources. Phosphorus reduction will often result in sediment reduction because many pollutant reduction strategies will address both simultaneously.

Phosphorus and habitat degradation linkage – Section 1.2 further states that the relationship between phosphorus and aquatic biological characteristics has been well established in the literature. In this watershed and others, excessive phosphorus results in algal blooms, low DO from eutrophication and decomposition of vegetation, choking out of submerged vegetation resulting in unstable sediments, less light for growth, and elevated water temperature. These changes degrade both the habitat and the fish communities.

TSS and habitat degradation linkage - Sections 1 and 1.2 state that excessive amounts of sediment have been shown to have detrimental effects on stream biological communities. Sedimentation changes the water temperature, clarity and light altering the aquatic vegetation and habitat. Sedimentation also reduces photosynthetic processes by restricting light, and reduced vegetation produces less oxygenation for aquatic life. Excess sedimentation also smothers larvae and eggs in the substrate, and clogs fish and invertebrate gills. Figures 15 and 16 below show that the loading per acre of the TP and TSS is generally correlative.

In summary, the linkages are both complex but fairly well-documented through many studies of nutrient, habitat, and sediment associations. By reducing phosphorus and sediment, many stressors, such as low DO and eutrophication, will also be addressed.

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning this second element.

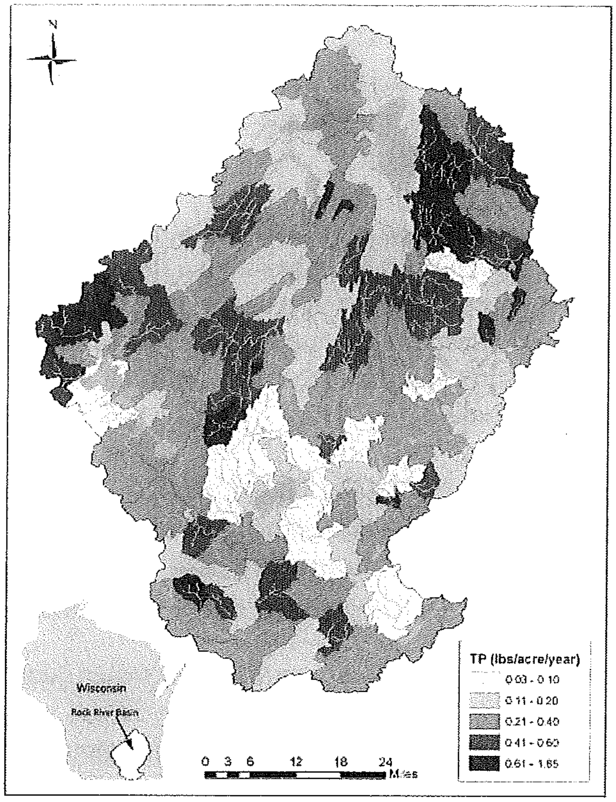

Figure 15. Map of median annual baseline TP loading per acre by sub-basin in the Rock River Basin.

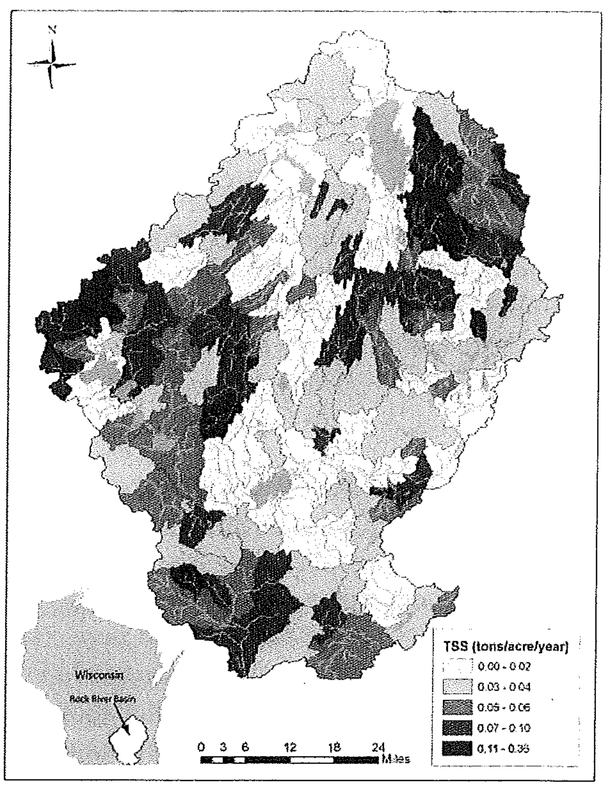

Figure 16. Map of median annual baseline TSS loading per acre by sub-basin in the Rock River Basin.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

A TMDL must identify the loading capacity of a waterbody 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 stream 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:

TMDL = Loading Capacity (LC) = $\sum$WLA + $\sum$LA + MOS

The loading capacities for each impaired waterbody for TP and TSS are shown in Appendices J and K of the TMDL which are hereby incorporated by reference. Appendices were developed to assist in the end-user's needs. The TMDL submittal also includes several other Appendices detailing how loads were determined, including alternative time increments (monthly and annual). Table 7 at the end of this document lists the Appendices. The site-specific details and rationale for loading capacity development are presented in this section, followed by the modeling methods.

Loading capacity - The calculation of loading capacity for the Rock River takes into account a large areal extent which includes a large variability in stream sizes (wadeable and non-wadeable, requiring the use of two water quality standards) and stream flows over time (the spectrum of flood through drought conditions). Section 5 of the TMDL describes methods for calculating allocations that account for the spatial and temporal variability in contaminant and flow. The rationale for the approach needs to take into account variability, yet not allow extreme low flow or high flow conditions to drive the process, which could result in unattainable allocations and reduction requirements. The goal of the approach is to meet water quality standards under most flow conditions.

Several methods were incorporated into the process to reduce the effects of the extreme flows, such as the use of a three-month rolling average, and the fourth lowest monthly flow rate (later discussed in the model outputs section). Another goal of the approach was to properly account for temporal changes, using statistical procedures that translate the probability of exceeding targets between monthly and annual loading. This procedure determined that the fourth lowest monthly flow rate was the optimal value to use in the process, which would achieve summer median loading targets 92% of the time.

This methodology is consistent with EPA's *Options for the Expression of Daily Loads in TMDLs* (EPA 2007), which states that: "Instead of selecting the maximum load value as the daily load, it is advisable to select a value that represents a high percentile (e.g., 95th or 99th), but not the maximum, of the distribution to protect against the presence of anomalous outliers. For example, selecting the 95th percentile implies a 5 percent probability that a daily load will exceed the specified value under the TMDL condition. Selecting higher percentile values as the maximum daily target is justified when there is high confidence in the accuracy of the dataset for extreme values. In cases where the analysis is based on a number of assumptions and there is a higher uncertainty in the analysis, it might be more appropriate to select a lower and, therefore, more conservative, maximum, providing an MOS. Whether the maximum daily load selected is based on the 75th or the 99th percentile load or some value in between, the TMDL developer should determine this on the basis of the site-specific issues and characteristics." http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/2007_06_26_tmdl_draft_daily_loads_tech-2.pdf

The methodology is also consistent with the Chesapeake Bay TMDL, where both the annual and seasonal loads were developed using a 95th percentile distribution to protect against outliers (flood and drought events) dominating the process. In other TMDLs, averaging methods have been used under various temporal conditions or flow regimes (i.e., annual, monthly; or dry, medium, and wet flow regimes). These approaches recognize that water quality standards may not be met under certain extreme conditions. EPA believes that the Rock River methodology and allocations are consistent with EPA guidance, with summer median targets projected to be met 92% of the time.

Method for determining cause and effect – In addition to the TMDL allocations, a Technical Approach document was developed for the Rock River modeling effort to explain the details of the site-specific approach. Data from several models were used, including the Soil and Water Assessment Tool (SWAT), the Source Loading and Management Model (SLAMM) (version 9.3), a customized allocation database, and STELLA.

SWAT - SWAT is a watershed loading model of medium complexity that predicts the impact of land management practices on water, sediment and agricultural chemical yields in large complex watersheds with varying soils, land use, and management conditions over long periods of time. Section 2 of the Technical Approach document and Section 4.2.1 and Appendix A to the TMDL submittal explain how SWAT was used in the TMDL. The use of SWAT follows a 2000 analysis that studied phosphorus loads in the basin. The SWAT model developed for that study was modified slightly and used to develop input data for the TMDL allocations. Specifically, SWAT was used to define the baseline nonpoint source flows and loads that were put into the allocation database, which were then used to derive the TP and TSS allocations.

Inputs - Inputs to the SWAT model include weather, soils, topography, vegetation, and land use data. SWAT is capable of simulating long-term watershed changes and the resulting fluctuations in pollutant concentrations downstream. Section 2.2 of the Technical Approach document explains how the SWAT model was modified to account for site-specific factors in the Rock River Basin. The modifications included re-delineation of sub-basins to correspond to the boundaries of impaired river reaches, and edits to model input files to account for the new sub-basins.

Outputs - The SWAT model output contains 10 years of data, and the fourth smallest value (out of the 10 annual values) was chosen to be the target flow. Because target concentrations are assessed as a summer median and load allocations are made on a monthly basis, a statistical procedure[1] was used to translate the probability of exceeding targets between the two time scales. Under the assumption that the probabilities of meeting monthly targets in adjacent months are independent, achieving monthly targets for each month in 7 out of 10 years equates to achieving summer median targets in approximately 9 out of 10 years, or 92% of the time.

To illustrate the use of the fourth lowest average flow used to achieve the summer median targets, Figure 19 below is taken directly from the TMDL submittal and shows, for a selected reach, each month across the x-axis at the bottom (1-12). Each circle represents the average flow in that month for a given year in a ten year period. The dark circle is the fourth lowest average flow in each month of the ten year cycle. This process was repeated for each reach.

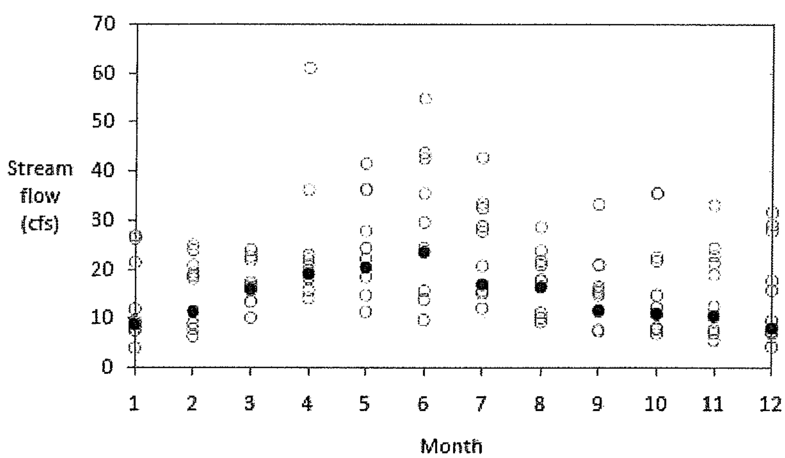

Figure 19. Variation in monthly stream flows over ten years in one example reach in the Rock River Basin. The filled circles are the fourth lowest value in each month and are the basis for calculating loading capacity.

[1] The WDNR protocol for evaluating compliance with water quality standards requires at least 10 samples. Based on binomial probability distributions, the probability that the median of 11 samples will be below a specified value is 92% when the probability that each individual sample is below that same value is 70%.

SLAMM – Section 2 of the Technical Approach document explains how SLAMM was used to simulate nonpoint source runoff loadings in urban areas from rainfall events for individual source areas. SLAMM was used to define the baseline loads that were put into the allocation database for these source areas, which were then used to derive the TP and TSS allocations. SLAMM models the impacts from various source areas and the impacts of stormwater controls (such as infiltration practices, wet detention ponds, porous pavement, street cleaning, catchbasin cleaning, and grass swales) and predicts concentrations and loadings of pollutants.

Allocation Database – Baseline data from SWAT (for nonpoint sources), SLAMM (for nonpoint source loads from urban areas), and permit data (for point sources) were input into a Microsoft Access database. The database was developed specifically for the Rock River TMDL and was coded with a series of equations to calculate loading capacities and allocations for each reach. The total loading capacities for TP and TSS were divided into allocations for nonpoint sources, permittees, and MS4s based on the relative contributions of these source categories to the baseline loads in each reach. This method assigns responsibility for attaining water quality targets in proportion to each source's contribution to the baseline load. Within SWAT and SLAMM are basic data for weather, soils, topography, etc. The output allocations from the database were used as inputs for the STELLA model for verification of in-stream water quality concentrations.

STELLA – STELLA was used as a verification tool for the allocations. It has a dynamic accounting model within its software that tracks both TP and flow, and transfers the phosphorus from one waterbody or compartment to another. These phosphorus loads in each compartment are mixed with the actual 10 years of monthly flow data to provide an empirical or actual test of the allocations.

Other relevant information - Baseline Load Definitions are found in Section 4.2.4 of the TMDL and show the assumptions used in the modeling effort.

Baseline Load Definitions

Baseline loads from each of the following source categories are equal to the lesser of 1) current loads or 2) loads that would result from full regulatory compliance (the endpoint of "delayed compliance schedules," where applicable) by permit holders:

- Agricultural and natural ("background") areas: Loads by sub-basin from SWAT simulations
- Non-permitted urban areas: Per-acre loading rates from SLAMM simulations
- General permits: 10% of the non-permitted urban loads in the sub-basin
- MS4s: Per-acre loading rates from SLAMM simulations, adjusted to represent compliance with 40% TSS reduction target (equals 27% TP reduction) in NR 216
- Wastewater treatment facilities: Concentrations and effluent volumes set equal to permit limits, with concentration capped at 1 mg/L per NR 217; average measured values used for industrial dischargers with no specified permit limits
- CAFO discharges: Set as zero to represent compliance with permit requirements
- CAFO land spreading operations: Accounted for in agricultural/natural area SWAT loads

The modeling summary below is modified from Appendix C of the TMDL submittal.

Initial allocation

1. The target monthly flow was identified for each reach (in STELLA), as the flow that is equaled or exceeded during that month in 7 out of 10 years. WDNR calculated the loading capacity[2] target concentration that would have met the target concentration when mixed with that target flow.
2. The background load allocation[3] was identified as the background load that occurred in the year with the target flow. WDNR calculated the general permit allocation[4] as 10% of the baseline non-permitted urban load, and subtracted the background load and the general permit allocations from the loading capacity to determine the remaining allocable load.
3. For each month, WDNR calculated the average fraction[5] of the total baseline load from PS, NPS, and MS4 sources and multiplied these fractions by the remaining allocable load from Step 2 to calculate the allocation for each source.
4. In the three steps above, to allow for seasonal variability without allowing the annual statistical highs and lows found in the data to drive the monthly values used in the model, an average monthly flow was calculated using three monthly values. For example, a June average monthly flow included May and July flow to create a three month moving average.
5. Calibration proceeded from upstream to downstream. Once calibration was completed at a station, alterations were not made to obtain a better fit at a downstream station.

Verification

1. WDNR ran the monthly allocated loads and 10 years of flow data through the STELLA model to evaluate the cumulative effects of loads moving downstream. The rate of exceedance of the median growing season in-stream concentration target in each reach was compared to the target compliance rate.
2. Flows were adjusted until compliance rates reached acceptable target (allocation)

Presentation of allocations

1. $TMDL = \sum LA + \sum WLA + MOS$

LA = Background + NPS

WLA = WWTF (Individual permits for industries and municipalities) + General permits + MS4

2. WWTF allocations were distributed to individual dischargers in proportion to contribution to the baseline load. EPA's recommended methodology for expressing monthly loads as daily maxima was used.
3. MS4 allocations for each reach were distributed to individual MS4s in proportion to their relative areas in the reach's watershed

Section 3.3.1 of the TMDL explains how TSS loading capacities were determined by calculating the TSS load that is typically associated with the TP load that meets the phosphorus criteria. To do this, monthly regressions were calculated between TSS and TP from SWAT model output for

---

[2] smoothed using 3 month moving average
[3] *Ibid.*
[4] *Ibid.*
[5] *Ibid.*

each reach and these relationships were used to calculate the corresponding TSS loading capacities. The equation is:

$$\log(\text{sediment load}) = A + B(\log(\text{phosphorus load}))$$

where A is a constant and B is a coefficient that represents the relationship between TP and TSS loads.

Lakes –Section 4.2.2 of the Technical Approach document describes how calculated loading capacities were adjusted to account for the unique characteristics of Lake Sinnissippi, Lake Koshkonong, and Fox Lake. The process for calculation of lake loading capacity was varied based on the size of the lake, and accounted for the different characteristics that can alter the behavior of phosphorus in the lakes, such as residence time, inflow and outflow relationships, and movement between bottom sediments and the water column. To account for these dynamic processes, a monthly adjustment factor was utilized. Though the inflows and outflows vary and there are adjustments with the temporal results needed for implementation (monthly versus annually), the modeling process had the long-term inflow of phosphorus into the lake equal the long-term outflow, resulting in more conservative modeling than if permanent phosphorus retention in the system was assumed.

Calibration and validation – The goal of calibration is to match observed and simulated values as closely as possible. The calibration of the SWAT model used for the Rock River TMDL was conducted as part of the 2000 study, for which the model was originally developed. The model was calibrated by first calibrating flow, followed by TSS, then phosphorus. The calibration was first conducted on an annual level, then monthly, followed by daily. The calibration occurred from upstream to downstream, that is, the input files in an upstream segment were not changed to make a better fit in a segment downstream. The statistical analyses for determining the fit of the calibration to the observed values were the Nash-Sutcliffe coefficient of efficiency and regression coefficients of determination. It was pre-determined that a good fit would be an R^2 of 0.6 for annual flow values. This goal was met in all but one of the 14 stations.

Critical Conditions: Section 5.2 in the TMDL states that critical conditions for pollutant loadings are predominantly during high flows in the spring and summer, while the critical condition for water quality impacts are during the summer when higher temperature and longer days causes an increase in excessive plant growth. Wet weather creates more upland runoff and streambank erosion. The influx of phosphorus can happen at any time of year and contribute to impairment under critical conditions.

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning this third element.

4. Load Allocations (LAs)

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:
LAs for phosphorus and TSS were determined by WDNR for natural background and for agricultural/non-regulated stormwater (Appendices K and L of the TMDL). In addition to daily loads, WDNR also determined annual loads and associated reductions to better assist implementation efforts (Appendices I and J of the TMDL).

The background load allocation was identified as the background load that occurred in the year with the target flow. The background load allocation was subtracted from the loading capacity to determine the remaining allocable load. For each month, WDNR calculated the average fraction of the total baseline load from all NPS and multiplied this fraction by the allocable load to calculate the LA.

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning this fourth element.

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:
As with the LA calculation, the WLA allocation process began by identifying the background load allocation as that which occurred in the year with the target flow. The background load allocation was subtracted from the loading capacity to determine the remaining allocable load. For each month, WDNR calculated the average fraction of the total baseline load from all PS and multiplied this fraction by the allocable load to calculate the overall WLA. The overall WLA is divided into three categories: 1) general permit sources, 2) individual permittees (WWTFs), and

3) MS4s. In addition to the daily loads, WDNR determined WLAs on an annual and monthly basis (Appendices N-S of the TMDL). WDNR determined daily WLAs for point sources of TP and TSS, which are presented by reach and month in Appendices J and K of the TMDL, respectively. These WLAs are incorporated by reference into the TMDL decision document.

To determine the WLAs for WWTFs, WDNR first determined baseline loads for TP and TSS. These were determined by multiplying the baseline concentrations by discharge volumes. For phosphorus, baseline concentrations were set equal to discharge limits specified in WPDES permits, unless the permitted phosphorus concentration was greater than 1 mg/l, in which case the baseline was set equal to 1 mg/l. For TSS, the baseline concentrations were set equal to discharge limits specified in WPDES permits. Average measured values of concentrations and flows were used to calculate loads for industrial dischargers with no specified limits. The average fraction of the total baseline load from each WWTF was then multiplied by the allocable load to calculate the individual WLAs for these facilities.

To determine the WLA for MS4s, WDNR first estimated urban loading rates based upon the area covered by the MS4 permit. The WDNR adjusted these urban loading rates to reflect compliance with NR 151 (Section 4.2.2 of the TMDL). NR 151 requires a 40% reduction in total suspended solids from the established urban area served by the MS4. The SLAMM model was used to calculate the resulting reduction of phosphorus corresponding to a 40% TSS reduction. For the 10-year period used in the TMDL, the 40% TSS reduction corresponded with an average 27% phosphorus reduction. The resulting TSS and phosphorus loading rates were used in the baseline condition for the TMDL analysis. The average fraction of the total baseline load from each MS4 was then multiplied by the allocable load to calculate the WLA for the individual MS4 WLAs.

Numerous facilities are located within the Rock River basin that discharge under the authority of a general permit. These include construction sites, certain industrial sites, scrap recyclers, and non-metallic mines). These facilities were assigned a general stormwater load, which was calculated as 10% of the non-permitted urban loads (Section 4.2.2 of the TMDL).

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning this fifth element.

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:
WDNR used an implicit MOS for the Rock River TMDL. First, the SWAT model assumed a conservative transport of TP and TSS, with phosphorus and TSS entering and being transported out of a reach or waterbody. In reality, an unknown fraction of phosphorus and sediment is retained in the river channel, permanently buried and not available for further transport and providing a margin of safety. Also, in the verification process, it was shown that the simulated TP and TSS were slightly higher than the observed values, adding an extra margin of safety within the process. The technical approach document developed for this project further explains that permitted loads for point sources are used in the allocation process because the discharger can discharge up to that permit limit, so the actual loads may be well below permitted values. These factors assisted in determining that an additional explicit MOS was not necessary.

EPA finds that the TMDL document submitted by WDNR contains an appropriate MOS satisfying all requirements concerning this sixth element.

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:
Seasonal variation was considered in this TMDL as described in Section 6.7 of the TMDL. Loading capacity and allocation was calculated on a monthly basis to account for seasonal variation, and takes into account the various source influences at different times of the year. When necessary, modeling of the lakes and cycling factors were adjusted for interactions between the bottom sediments and water column. Ten years of flow data also ensured a wide range of seasons and flow regimes were integrated into the process.

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning this seventh element.

8. Reasonable Assurances

When a TMDL is developed for waters impaired by point sources only, the issuance of a National Pollutant Discharge Elimination System (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:
Section 7 of the TMDL demonstrates that the reasonable assurance is a very strong, coordinated, and ongoing effort related to improvement of the Rock River Basin, both in the internal state planning and programs, and the extensive citizen and stakeholder involvement. The Section reviews many financial, regulatory, and implementation activities over the course of many years to help ensure that the TMDLs will be implemented through many initiatives in many organizations and agencies. Section 7 further discusses the history of watershed and water quality planning in the basin. In the future, the Areawide Water Quality Management Plan for the Upper and Lower Rock Basin will be amended to incorporate the goals of the TMDL. WDNR has established a Rock River TMDL Implementation Team to develop a strategy based on this TMDL, including five sectors: agriculture, stormwater, municipal and industrial wastewater, education and outreach, and assessment and monitoring. WDNR is also developing management strategies for both point sources and nonpoint sources in the basin. The detailed history, evolution of planning, and future implementation follow in Section 10 below.

Appendix D of the TMDL submittal gives details about the entities and their missions related to improving land, sustaining economic growth, preserving, managing and improving waters, community involvement and public outreach in the Rock River Basin. Their missions are:

- Wisconsin Working Lands Initiative – to achieve preservation of areas significant for current and future agricultural uses.
- Town and Country Resource Conservation and Development District – to optimize opportunities for sustainable economic growth, healthy communities, and healthy environment through coordination of projects in the area through agencies, municipalities, or organizations. It includes all of the Rock River basin counties.
- Rock River Coalition – to work on protection of natural resources, open spaces, and agriculture, promote tourism and recreation, preserve historical and cultural character of the basin, and river front revitalization.
- River Alliance of Wisconsin – to protect rivers through restoration, reducing degradation, encouraging advocacy, and training and technical assistance.
- Wisconsin Association of Lakes – to assist lake groups, manage and restore lakes, provide public policy to protect and preserve lakes, and increase public knowledge.

- Delavan Watershed Initiative 2030 – to preserve the health and beauty of Delavan Lake by managing sewage and fostering a watershed approach.
- Yahara CLEAN – to work with several entities to improve the water quality in the Yahara chain of lakes: Mendota, Monona, Waubesa, Kegonsa, and Wingra, with advisory groups for sediments, nutrients, and beach bacteria.
- South/West Branch Rock River Watershed Initiative – to coordinate efforts to implement agricultural practices that reduce phosphorus and sediment runoff into the Horicon Marsh.
- Rock River Coalition Water Quality Monitoring Project – to obtain federal grants for monitoring of the Horicon Marsh and to document water quality changes.
- Water Star Communities Program – to develop a listing of and reward communities that protect and restore water quality in their communities; actions included in evaluation may be related to planning and zoning, physical improvements, municipal policies and operations, educational offering, and community incentives and programs.

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 7.3 of the TMDL states that the basin will be closely monitored. The Monitoring and Assessment group is comprised of many organizations and agencies and will decide where the project will be monitored and will develop a strategy for monitoring. The task is to determine where implementation efforts will have the greatest impact. Monitoring will likely be the responsibility primarily of the WDNR and a citizen group, and possibly the USGS and agencies familiar with the project and with monitoring.

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.

<u>Comment:</u>
Section 7.2.1 of the TMDL states that water quality planning has been ongoing for the past 30-40 years, with much collaboration throughout the Basin to try to restore the designated beneficial use and achieve standards. These efforts are both within the WDNR and in collaboration with other external entities. Over the years, the efforts have become more coordinated and grown to a larger scale to include a more holistic approach to watershed improvement planning.

- Wisconsin has conducted Water Quality Planning since the mid-1970s. The CWA focused on wasteload allocations for biological oxygen demand (BOD) mostly related to point source dischargers.
- In the 1980s state implemented the Priority Watershed Program to control nonpoint source discharges. Legislation included State Administrative Code chapters NR 121 (Areawide Water Quality Management Plans), NR 110 (Sewerage Systems), and NR 120 (Priority Watershed and Priority Lake Program), for better planning and implementation.
- Sewer Service Area Plans began for areas designated in NR121, and for communities with populations exceeding 10,000 people. This included permit limits, stormwater plans, sewer service area plans, and priority watershed nonpoint source control plans.
- In the 1990s, the state began enacting a series of water resources rules. Further in the decade, basin plans began to focus on partnerships and on ecosystem-scale objectives
- In 1999, the water quality program worked with WDNR's Land Division and Bureau of Fisheries Management to develop statewide plans in a holistic, systems-based method.
- Following approval by WDNR and EPA, this TMDL will be amended to the Areawide Water Quality Management Plan for the Upper and Lower Rock Basin pursuant to chapter NR 121, Wisconsin Administrative Code. A detailed discussion of management activities aimed at meeting the goals of the TMDL will be included in the separate implementation plan.
- The Land and Water Resources Management Planning Program (1999), requires each county to develop a resource management plan for their county. Each county Land and Water Conservation Department in the basin has developed an approved plan for addressing soil and water conservation.
- Ch. NR 217 (1992) requires point source discharges of phosphorus greater than 150 lbs/month to reduce phosphorus in their effluent to 1 ppm. As a result, the Rock River Watershed Partnership, which includes the WDNR, conducted a planning effort to determine the feasibility of pollutant trading with nonpoint sources of phosphorus. This effort resulted in a trading concept for the basin and as well as background data for this TMDL.

- The Rock River Basin TMDL provides WDNR and County Land and Water Conservation Departments with the data necessary to more effectively identify and target pollutant.

EPA finds that this criterion has been adequately addressed.

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 was extensively involved in the development process of this TMDL. On December 12, 2006 the first introductory public meeting was held for the project. There were several technical advisory group meetings over the course of several years, to communicate and assist the understanding of the approaches and processes in developing the TMDL. Finally, the TMDL was public noticed from December 2, 2010 to February 15, 2011. A public meeting was held on December 16, 2010, at the Lake Mills Community Center, with extensive community participation. Copies of the draft TMDL were made available upon request and on the Internet web site: http://dnr.wi.gov/org/water/wm/wqs/303d/RockRiverTMDL

Several entities and individuals provided comments to the WDNR during the public comment period. The comments were adequately addressed by WDNR and are included with the final TMDL submittal. The comments are addressed within the text as appropriate, within tables in appendices, and in responses to comments included in the final TMDL in Appendix X. WDNR also adequately addressed EPA comments throughout the course of development of the TMDL.

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning 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 waterbody, and the pollutant(s) of concern.

Comment:

The EPA received the final Rock River TMDL on August 31, 2011, accompanied by a submittal letter dated August 30, 2011. In the submittal letter, WDNR stated that the submission includes the final TMDLs for total phosphorus and TSS.

EPA finds that the TMDL document submitted by WDNR satisfies all requirements concerning this twelfth element.

13. Conclusion

After a full and complete review, EPA finds that the phosphorus and TSS TMDLs for the 62 impaired reaches, and three lakes, Koshkonong, Sinnissippi, and Fox, satisfy all of the elements of an approvable TMDL document. This submittal is for 101 TMDLs for Total Phosphorus (TP) and Total Suspended Solids (TSS). There are 39 segments/lakes listed as impaired for both contaminants (78 TMDLs), 20 for only TSS, and 3 for only TP. These TMDLs address degraded habitat, low Dissolved Oxygen (DO), eutrophication, and turbidity impairments.

EPA's approval of this TMDL does not extend to those waters that are within Indian Country, as defined in 18 U.S.C. Section 1151. EPA is taking no action to approve or disapprove TMDLs for those waters at this time. EPA, or eligible Indian Tribes, as appropriate, will retain responsibilities under the CWA Section 303(d) for those waters.

Table 7. Reference of Appendices in Final TMDL

Appendix E, Table E-1	Summary of Potentially Restorable Wetlands in Rock River Basin
Table E-2	Sediment Load and Percent Reduction by Sub-basin Following 20%, 40%, 60% and 80% Wetland Restoration
Table E-3	Phosphorus Load and Percent Reduction by Sub-basin Following 20%, 40%, 60% and 80% Wetland Restoration
Appendix F, Table F-1	Unit-area nonpoint source loading of TP and TSS by SWAT sub-basin
Appendix G	Growing Season Median Total Phosphorus Concentrations after TMDL implementation using SWAT simulated Flows for 1989-1998
Appendix H	Required Percent Reduction of TP from Annual Baseline Load
Appendix I	Required Percent Reduction of TSS from Annual Baseline Load
Appendix J	**Daily Total Phosphorus Allocations**
Appendix K	**Daily Total Suspended Solids Allocations**
Appendix L	Agricultural/Non-Permitted Urban TP Load Summary – Baseline Loads, Load Allocations, and Percent Reductions
Appendix M	Agricultural/Non-Permitted Urban TSS Load Summary – Baseline Loads, Load Allocations, and Percent Reductions
Appendix N	MS4 TP Load Summary – Baseline Loads, Load Allocations, and Percent Reductions
Appendix O	MS4 TSS Load Summary – Baseline Loads, Load Allocations, and Percent Reductions
Appendix P	Monthly Total Phosphorus Allocations by Wastewater Treatment Facility
Appendix Q	Monthly Total Suspended Solids Allocations by Wastewater Treatment Facility
Appendix R	Daily Total Phosphorus Allocations by Wastewater Treatment Facility
Appendix S	Daily Total Suspended Solids Allocations by Wastewater Treatment Facility
Appendix T	Daily Total Phosphorus Allocations by MS4
Appendix U	Daily Total Suspended Solids Allocations by MS4
Appendix V	Annual Wasteload Allocations By MS4
Appendix W	Baseline Discharge Information for Wastewater Treatment Facilities
Appendix X	Response to Public Comments on the Rock River Basin TMDL