CHAPTER 6: ESTIMATE THE LOAD REDUCTIONS AND OTHER BENEFITS EXPECTED FROM MANAGEMENT MEASURES

6.1 Introduction

Chapters 1 through 5 of this watershed restoration plan (WRP) have described the goals for the Menomonee River watershed, identified and quantified the pollutant loads from all of the sources, and listed a suite of existing and recommended management measures. The next step is to determine the potential benefit that would result from implementing each of the potential management measures. These potential benefits are needed to: (a) determine if the proposed management measures will be sufficient to achieve the desired watershed goals, and (b) to help prioritize the most effective measures.

One useful way to determine the potential benefits of the management measures is to quantify the expected load reductions. Pollutant load reductions directly translate into improved water quality and are an easy way to convey information to the general public. However, it is difficult to develop quantifiable load reductions for all of the issues of concern within the Menomonee River watershed. For example, some goals (e.g., improved aesthetics) are only indirectly related to pollutant loads and trying to link them to one or even a few specific pollutants and source loads is difficult or inappropriate. Therefore, this chapter reports not only the expected load reductions for those management measures for which information exists, but also includes a description of measures for which load reductions cannot be quantified.

Also included is the priority rating for the various actions based upon Southeastern Wisconsin Regional Planning Commission's (SEWRPC) Regional Water Quality Management Plan Update (RWQMPU). These priorities were offered as a starting point for further discussion with the Southeastern Wisconsin Watersheds Trust, Inc. (SWWT) and Watershed Action Team (WAT). Modifications to the priority ratings and additional actions developed by the SWWT committees are presented in Chapter 7. The recommended implementation schedule is presented in Chapter 8.

6.2 Expected Load Reductions from the Regional Water Quality Management Plan Update

To support the development of the Menomonee River WRP, the models that were developed to support the Milwaukee Metropolitan Sewerage District (MMSD) 2020 Facilities Plan (2020 FP) and the RWQMPU were updated to run through December 31, 2007. The purpose of this update was to account for the known changes in the watershed that occurred during earlier model development. The updated modeling results for the Menomonee River watershed model were found to accurately simulate observed flows and water quality conditions and were used to support development of the WRP.

Expected load reductions for the Menomonee River watershed were estimated from the modeling that was completed to support the 2020 FP, the RWQMPU, and the Menomonee River WRP. In some ways, these load reductions represent an upper estimate of the load reductions that could be achieved in the watershed because they are based on full implementation of a variety of management measures that were deemed to be possible during development of the RWQMPU. However, it should be noted that several management measures included in this WRP (e.g., the

statewide ban on phosphorus in fertilizers) were not included in the model runs. Furthermore, better information continues to be gathered about the significance of some of the key pollutant sources in the watershed (e.g., illicit sewer connections and other unknown sources of fecal coliform). It is therefore possible that load reductions greater than those anticipated for the RWQMPU could eventually be realized.

The modeling results for the major components of the RWQMPU are summarized in Table 6-1, Figure 6-1 and Figure 6-2 and reveal several significant outcomes:

- Total phosphorus (TP) and biochemical oxygen demand (BOD) loads decrease from Baseline Year 2000 to the Planned 2020 Future with Planned Growth condition whereas total suspended solids (TSS) and fecal coliform loads slightly increase.
- Implementation of Wis. Admin. Code Natural Resources (NR) 151 *Runoff Management* (non-Agriculture [Ag] only), as called for under the RWQMPU, results in an 11% decrease in TP loads, a 24% decrease in TSS loads, a 14% decrease in BOD loads, and an 18% decrease in fecal coliform loads, relative to the Planned 2020 Future with Planned Growth condition.
- Implementation of the Point Source Plan, as called for under the RWQMPU, results in additional load reductions of 1% for TP, 0.3% for TSS, 1% for BOD, and 3% for fecal coliform, relative to the Planned 2020 Future with NR 151 (non-Ag only) condition.
- Implementation of the remaining measures in the recommended RWQMPU results in additional load reductions of 4% for TP, 2% for TSS and BOD, and 29% for fecal coliform relative to the Planned 2020 Future with Point Source Plan condition.

TABLE 6-1

PROJECTED EFFECTIVENESS OF ACTIONS PLANNED PRIOR TO THE INITIATION OF THE WATERSHED RESTORATION PLAN

	TP (LBS/YR)	TSS (TONS/YR)	BOD (LB/YR)	Fecal Coliform (COUNTS/YR)
A. Baseline Year 2000	53,129	8,982	1,352,685	16.87E+15
B. Planned 2020 Future with Planned Growth	42,576	9,267	1,345,474	17.29E+15
C. Planned 2020 Future with NR 151 (non-Ag only)	37,968	7,021	1,158,922	14.19E+15
D. Planned 2020 Future Load Reductions with NR 151 (non-Ag only) (B-C)	-4,608	-2,246	-186,522	-3.10E+15
E. Planned 2020 Future Percent Reduction with NR 151 (non-Ag only) (B vs. C)	-11%	-24%	-14%	-18%
F. Planned 2020 Future with Point Source Plan (5-Year LOP)	37,490	7,003	1,147,951	13.71E+15
G. Planned 2020 Future Load Reductions with the Point Source Plan (C-F)	-478	-18	-10,971	-0.48E+15
H. Additional Percent Reduction from the Point Source Plan (C vs. F)	-1%	-0.3%	-1%	-3%
I. RWQMPU Recommended Plan	35,898	6,868	1,128,219	9.80E+15
J. RWQMPU Additional Planned Reductions (F-I)	-1,592	-135	-19,732	-3.91E+15
K. RWQMPU Recommended Plan Additional Percent Reduction (F vs. I)	-4%	-2%	-2%	-29%
L. RWQMPU Planned 2020 Future Reductions vs. Baseline Year 2000 (A-I)	-17,231	-2,114	-224,466	-7.07E+15
M. RWQMPU Planned 2020 Future Percent Reductions vs. Baseline Year 2000 (A-I)	-32%	-24%	-17%	-42%

Notes:
BOD = Biochemical oxygen demand,
LOP = Level of protection
NR 151 = Wis. Admin. Code Natural Resources (NR) 151, *Runoff Management* (non-Ag only)
TP = Total phosphorus
TSS = Total suspended solids
Negative values and percentages indicate load reductions between planned actions being compared.

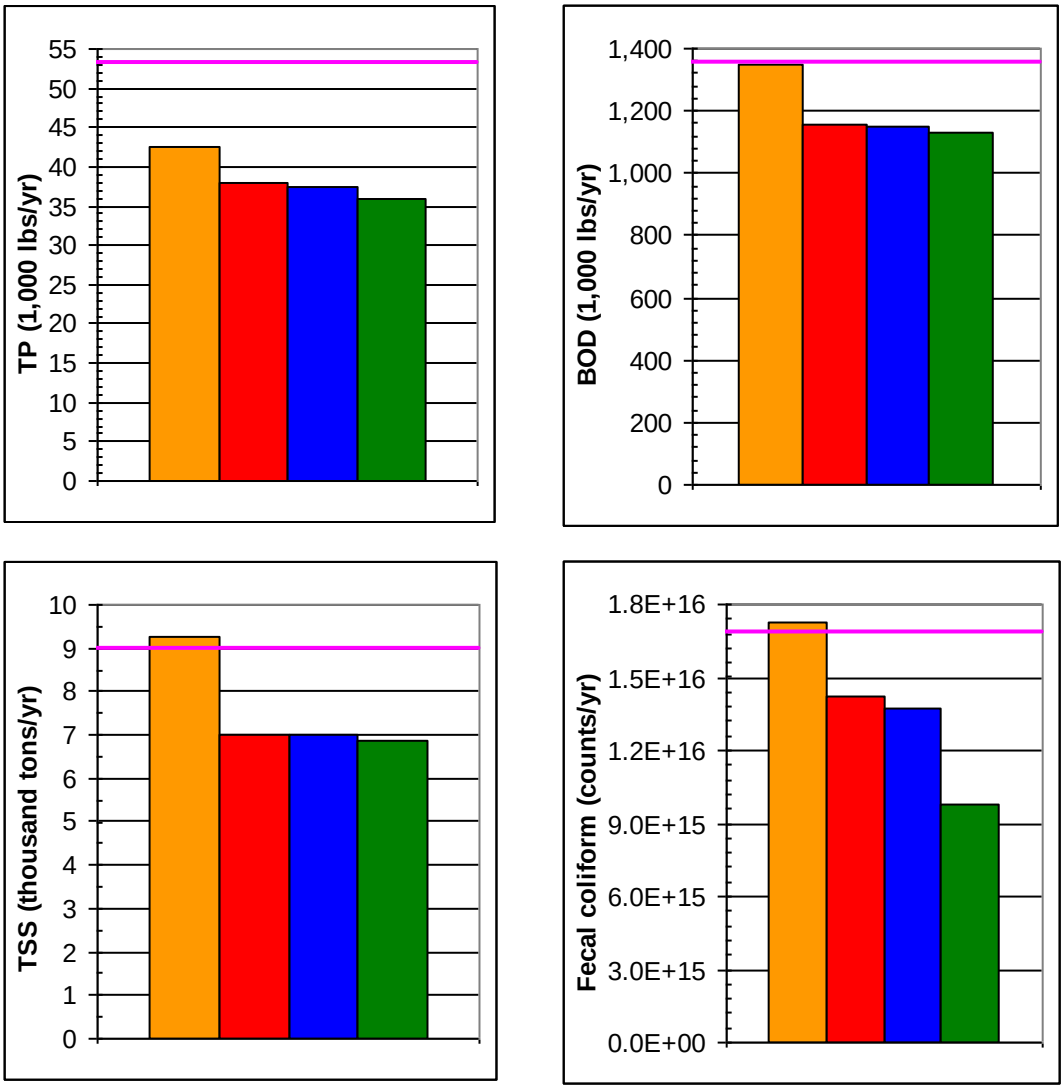

FIGURE 6-1: PROJECTED ANNUAL LOADS BY PARAMETER FOR THE MAJOR COMPONENTS OF THE REGIONAL WATER QUALITY MANAGEMENT PLAN UPDATE

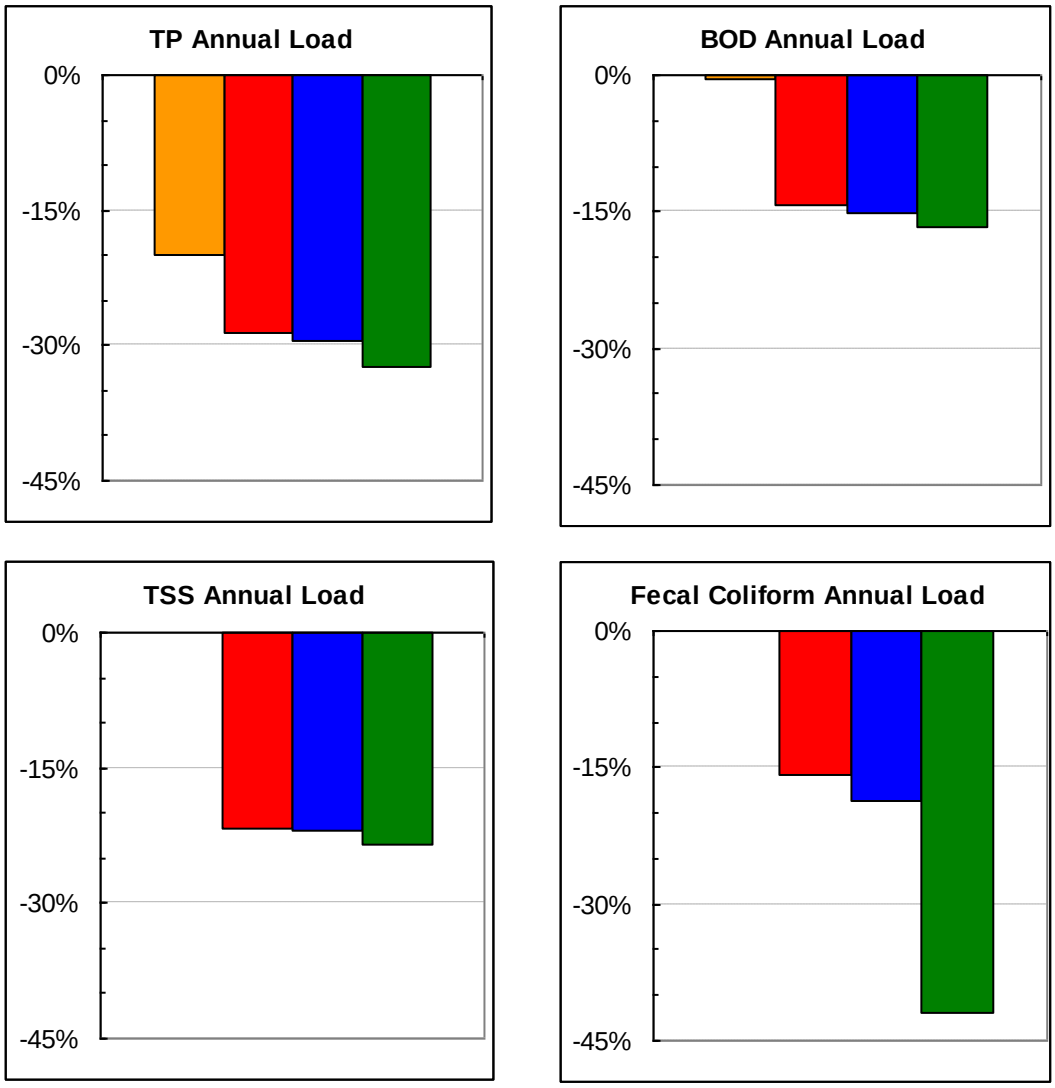

FIGURE 6-2: PERCENT REDUCTION IN ANNUAL LOADS BY PARAMETER FOR THE MAJOR COMPONENTS OF THE REGIONAL WATER QUALITY MANAGEMENT PLAN UPDATE, RELATIVE TO THE YEAR 2000 BASELINE

Notes:
Percent is calculated as the difference between the component and baseline conditions divided by baseline conditions.
The absence of a bar representing Year 2020 with planned growth – no management measures indicates that no material reductions are projected for that parameter, relative to the baseline.

The remainder of this section presents the individual load reductions and other anticipated benefits for each of the specific management measures presented in Chapter 5. A summary of the load reductions and other benefits of actions included in this WRP is shown in Table 6-2.

TABLE 6-2

EFFECTIVENESS OF REGIONAL WATER QUALITY MANAGEMENT PLAN UPDATE RECOMMENDED ACTIONS

Management Measure	TP	TSS	BOD	Fecal Coliform	Chlorides	Flow/Habitat
Phosphorus fertilizer ban[1]	20% reduction in loads from residential grass	No impact	No impact	No impact	No impact	Only minor impacts expected
MMSD Chapter 13 revisions	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	10 to 20% reduction in peak runoff rate from disturbed areas (Note: Those reductions do not translate into in-stream reductions of 10 to 20%.)
Programs to detect and eliminate illicit discharges	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Potential 19 - 59% reduction in watershed loads[2]	Only minor impacts expected	Only minor impacts expected
Expand riparian areas	8% reduction in watershed loads	8% reduction in watershed loads	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Significant benefit to habitat
Manage pet litter	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	50% reduction in loads from residential grass	Only minor impacts expected	Only minor impacts expected
Concrete channel renovation and rehabilitation	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Significant benefit to habitat

TABLE 6-2, continued

EFFECTIVENESS OF REGIONAL WATER QUALITY MANAGEMENT PLAN UPDATE RECOMMENDED ACTIONS

Management Measure	TP	TSS	BOD	Fecal Coliform	Chlorides	Flow/Habitat
Limit number of culverts, bridges, drop structures, and channelized stream segments	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Significant benefit to habitat
Remove abandoned bridges and culverts	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Significant benefit to habitat
Protect remaining natural stream channels	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Significant benefit to habitat
Restore, enhance, and rehabilitate stream channels	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Only minor impacts expected	Significant benefit to habitat
Road salt reduction	Only minor impacts expected	No impact	No impact	No impact	Potential for 20% reduction	Only minor impacts expected
Rain barrels/rain gardens program (30% of homes)	1.5% reduction in watershed loads	1% reduction in watershed loads	Only minor impacts expected	10% reduction in watershed loads	Only minor impacts expected	2% decrease in flashiness

Notes:
BOD = Biochemical oxygen demand
TP = Total phosphorus
TSS = Total suspended solids

The RWQMPU recommended a reduction in the use of fertilizers – this new Phosphorus Ban exceeds the RWQMPU recommendation.
The RWQMPU assumed that 33% of illicit discharges would be eliminated, which corresponds to a 19% reduction in watershed loads. Elimination of more than 33% of illicit discharges would result in load reductions that exceed the reductions noted in the RWQMPU. If 100% of the discharges were eliminated, the watershed load of fecal coliforms would be reduced by 59%.

6.2.1 Committed Programs

Committed programs include efforts that are already well underway and will continue or that can be expected to be implemented because they are regulatory requirements.

Wis. Admin. Code Natural Resources (NR) 151 Runoff Management (non-Ag only)
(Regional Water Quality Management Plan Update high priority)

The expected load reductions from the urban requirements of NR 151 were quantified during the development of the 2020 FP, the RWQMPU, and this WRP. A combination of best management practices (BMPs) is anticipated to be used to meet these requirements, including vacuum

sweeping of streets and parking lots, infiltration systems, parking lot implementation of multi-chambered treatment train (MCTTs) and wet detention basins.

Compared to Year 2000 Baseline conditions, the impact of this rule will result in load reductions that range from 29% for TP to 22% for TSS as shown in Figure 6-2.

Programs to detect and eliminate illicit discharges and control pathogens that are harmful to public health
(Regional Water Quality Management Plan Update high priority)

As shown in Chapter 4, unknown sources are considered to contribute approximately 60% of the fecal coliform load to the Menomonee River watershed. These sources may be caused by illicit connections to the storm sewer system, leaking sewers, or other unidentified sources. A bacterial identification program could therefore be very effective at reducing loads if it can pinpoint the specific nature and location of these sources and if they can be removed. As recommended in the RWQMPU, to address the threats to public health and degradation of water quality resulting from human-specific pathogens and viruses entering stormwater systems, each municipality in the study area should implement a program consisting of the following:

1) Enhanced storm sewer outfall monitoring to test for fecal coliform bacteria in dry- and wet-weather discharges
2) Molecular tests for presence or absence of human-specific strains at outfalls where high fecal coliform counts are found in the initial dry-weather screenings
3) Additional dry-weather screening upstream of outfalls where human-specific strains are found to be present, with the goal of isolating the source of the discharge
4) Elimination of illicit discharges that were detected through the program described in the preceding three steps

Additionally, comments received during the development of this WRP recommended monitoring and testing of sewer infrastructure in the vicinity of new construction projects or new sewer connection projects.

It is anticipated that the program outlined above would also identify cases where the unknown fecal coliform sources are not illicit connections and the primary source of bacteria is stormwater runoff. Examples could include nonpoint sources such as parks along streams where people walk their dogs or impervious surfaces with large numbers of waterfowl. To adequately assess the appropriate way to deal with such bacterial sources (and the potentially associated pathogens), it is recommended that public health and ecological risk assessments be conducted to address pathogens in stormwater runoff. Depending on the findings of the risk assessments, consideration should be given to pursuing innovative means of identifying and controlling possible pathogen sources in stormwater runoff.

Combined Sewer Overflow / Sanitary Sewer Overflow Reduction Program (Point Source Plan)
(Sanitary Sewer Overflow: Regional Water Quality Management Plan Update high priority, Combined Sewer Overflow: Regional Water Quality Management Plan Update medium priority)

The expected load reductions from the existing Point Source Plan were quantified during the development of the 2020 FP, the RWQMPU, and the Menomonee River WRP. These additional load reductions, relative to the planned 2020 future with NR 151 (non-Ag only) condition, are anticipated to range from less than 1% for TSS to 3% for fecal coliform and are presented Figure 6-2.

Industrial noncontact cooling water discharges
(Regional Water Quality Management Plan Update, included but not prioritized)

There are 67 known noncontact cooling water dischargers in the Menomonee River watershed and, as shown in Chapter 4, these dischargers are a significant source of TP. It is believed that the phosphorus is contained in the source water because the city of Brookfield and the Milwaukee Water Works, which provide the majority of the drinking water to residents and businesses within the watershed, add phosphorus compounds to their drinking waters. The phosphorus compounds are added as corrosion control to prevent certain metals from leaching from distribution systems and building plumbing materials into the treated water. Given the public health benefits involved and the reliability of the current technology, the Milwaukee Water Works has indicated that it would not consider changing its current practice.

Recognizing the public health benefits involved, it is not recommended that water utilities within the Menomonee River watershed end their current practice. It is, however, recommended that various groups (universities, the Milwaukee 7 Water Council, etc.) and water utilities in the study area give further consideration to changing to an alternative technology that does not increase phosphorus loading if such a technology is both effective in controlling corrosion in pipes and cost-effective for the utility to implement. This development would have watershed-wide significance, as well as the potential to revolutionize a national (and perhaps world-wide) practice.

Industrial stormwater
(Regional Water Quality Management Plan Update, included but not prioritized)

Pollutant loads from industrial point sources are represented in the water quality model based on permitted discharge limits. No changes to these permit limits are assumed to occur between the existing and the future water quality models.

Wisconsin Pollutant Discharge Elimination System stormwater permits (Municipal Separate Storm Sewer System)
(Regional Water Quality Management Plan Update, included but not prioritized)

The requirements placed on the Wisconsin Pollutant Discharge Elimination System (WPDES) stormwater permittees in the Menomonee River watershed are described in Chapter 5. These requirements include a number of specific management measures that are individually described elsewhere in this chapter, such as illicit discharge detection and elimination as well as post-construction stormwater management.

Milwaukee Metropolitan Sewerage District Chapter 13 revisions
(Regional Water Quality Management Plan Update, included but not prioritized)

Proposed revisions to the MMSD surface water and storm water rules (Chapter 13) stipulate additional runoff management requirements for redevelopment. Based on the models developed for the 2020 FP and the RWQMPU, these requirements are anticipated to reduce peak flow from the re-developed area by 10 to 20%, as summarized below. Reduced peak flow will also lead to reduced loads of a variety of pollutants, including TSS, TP, BOD, and fecal coliform.

1) If demolition or construction during redevelopment will disturb an area larger than 2 acres, then the redevelopment shall include runoff management techniques that will reduce the runoff release rate by the amount listed in the following table for the 1% / 100-year and 50% / 2-year storms, unless runoff management is required according to sec. 13.10(2), MMSD rules or if the exclusions of sec. 13.10(3)(a), (c), or (e) apply.

Area Disturbed by Demolition or Construction	Reduction to the Existing Runoff Release Rate from the Site
Between 2 acres and 3.5 acres	10%
From 3.5 to 5 acres	15%
Greater than 5 acres	20%

2) If soil or groundwater contamination or other site features make the runoff release rate reduction required by sub. (1) unreasonably stringent, then the redevelopment shall achieve the greatest practicable reduction. The site development storm water management plan shall describe the features that restrict runoff management options and the reasons for the proposed runoff management techniques.

6.2.2 Other Management Strategies in Various Stages of Implementation

This section discusses the potential effectiveness of a range of other management strategies that are being implemented to some degree in the Menomonee River watershed.

Preserve highly productive agricultural land
(Regional Water Quality Management Plan Update high priority)

The preservation of highly productive agricultural land will benefit water quality by avoiding the conversion of pervious lands to impervious lands and the associated change in runoff volumes and peak flow rates. Agricultural land also contributes lower loading rates for some pollutants, such as metals, and avoids the need for additional wastewater treatment services.

Provide six months of manure storage for livestock operations
(Regional Water Quality Management Plan Update high priority)

Manure management incorporates structural and non-structural practices to address manure application, manure storage and animal lot runoff. Manure storage from confined livestock areas allows the manure to be safely stockpiled until conditions are environmentally favorable for spreading. In Wisconsin, common manure storage includes walled enclosures, earthen ponds, above-ground tanks, and under-floor storage. When used in conjunction with livestock management, manure management is assumed to reduce fecal coliforms from agricultural land by about 50%.

Control barnyard runoff
(Regional Water Quality Management Plan Update high priority)

Barnyard runoff control includes diversion of stormwater runoff from the confined area along with a capture or filter technology for runoff from the area. Theoretically, a 100% reduction in direct deposition of fecal matter could be achieved if all of the barnyard runoff can be captured and treated.

Prepare and/or implement nutrient management plans
(Regional Water Quality Management Plan Update high priority)

Nutrient management involves practices for application of manure and any supplemental nutrients to cropland. It is recommended that all livestock operations in the watershed with 35 combined animal units or greater as defined in Chapter NR 243, "Animal Feeding Operations," of the *Wisconsin Administrative Code* provide six months of manure storage to enable manure to be spread on non-frozen fields twice a year. These practices could reduce fecal coliform bacteria and *E. coli* concentrations by about 90%.

Convert marginal cropland and pasture to wetlands and prairies
(Regional Water Quality Management Plan Update high priority)

The conversion of cropland to forest/wetland areas was evaluated during the development of the RWQMPU. The Root River Canal is located outside of the Menomonee River watershed, but is characterized by similar agricultural land uses, soil types, and applications of controls relative to the Menomonee River watershed. Based on a test model run for the West Branch of the Root River Canal in which 15% of the cropland was converted to wetlands or prairies, rural phosphorus loads were reduced by 13%, 20% for TSS, 18% for fecal coliform, and 16% for BOD.

Manage contaminated sediment sites
(Regional Water Quality Management Plan Update high priority)

Most of the data on contaminants in sediments of the Menomonee River watershed are from the Little Menomonee River and are related to the Moss-American U.S. Environmental Protection Agency (USEPA) Superfund site. From 2003 to 2005, sections of channel between Brown Deer Road and Leon Terrace were relocated. Current plans call for five sections totaling six miles of the Little Menomonee River to be treated by rerouting the channel, removing and treating the contaminated sediment, filling the old channel, and re-vegetating the new channel. Eliminating contaminated sediments from the river has the potential to significantly improve the habitat for the affected portion of the watershed.

Maintain and preserve environmentally significant lands
(Regional Water Quality Management Plan Update high priority)

The District's Greenseams Program is an important example of ongoing efforts to maintain and preserve environmentally significant lands. The purpose of Greenseams is to purchase natural wetlands to retain stormwater and reduce the risk of future flooding problems. Although no Greenseams projects currently exist in the Menomonee River watershed, this WRP recommends that they be initiated. Purchased properties provide multiple benefits to the local community in the form of open space and wildlife habitat. The preservation of open space and wildlife habitat provides the public with passive recreation opportunities to quietly enjoy natural settings without extensive public facilities.

Note: Increased recreational opportunities will benefit the Menomonee River watershed. Recreation can increase awareness of the river as well as impact amenity value, personal relationships to the river, and community connections necessary to provide the financial resources necessary to address water quality concerns.

Expand riparian buffers and maintain groundwater seepage
(Regional Water Quality Management Plan Update RWQMPU high priority)

Modeling conducted in support of the 2020 FP, the RWQMPU, and the Menomonee River WRP indicated that the expansion of riparian areas in a rural portion of the Root River watershed would reduce loads of TSS, TP, and total nitrogen (TN) to the stream by approximately 8%. This is consistent with values found in the general literature, including within urban areas, and is therefore considered a good approximation for the Menomonee River watershed. While planning for expansion of riparian buffers, note that ongoing maintenance is an important consideration for these areas.

Riparian litter and debris control
(Regional Water Quality Management Plan Update high priority)

Efforts to remove litter and debris from riparian areas of the Menomonee River watershed will greatly improve the aesthetic value of the streams. The SEWRPC indicates that addressing aesthetics also includes the management of invasive species and the rehabilitation of in-stream and riparian habitat for both human purposes as well as ecological purposes. See SEWRPC's MR-194 in Appendix 4A for a complete discussion of impairments and response.

Research and implement projects on nonpoint pollution controls
(Regional Water Quality Management Plan Update high priority)

A great deal of information is already available on the effectiveness of various nonpoint source pollution controls using the work completed for the RWQMPU. However, this WRP recommends that studies be continued to refine those practices that make the most sense for the Menomonee River watershed, both in terms of environmental benefit and acceptance by local stakeholders. This refinement should include continuation of the MMSD's yearly nonpoint demonstration projects with an emphasis on documentation of the source reduction data. Future work should include analysis of the performance of the various demonstration projects already funded.

To the extent practicable, protect remaining natural stream channels including small tributaries and shoreland wetlands
(Regional Water Quality Management Plan Update high priority)

Riparian habitat conditions can have a strong influence on water quality and existing natural stream channels should be protected. Wooded riparian buffers are a vital functional component of stream ecosystems and are instrumental in the detention, removal, and assimilation of nutrients, soil, and other pollutants from or by the water column. Therefore, a stream with good riparian habitat is better able to prevent erosion and moderate the impacts of high nutrient loads than a stream with poor habitat. Wooded riparian buffers can also provide shading that reduces stream temperatures and increase the dissolved oxygen (DO) saturation capacity of the stream.

Continue collection programs for household hazardous wastes and expand such programs to communities that currently do not have them
(Regional Water Quality Management Plan Update high priority)

Leftover household products that contain corrosive, toxic, ignitable, or reactive ingredients are considered to be "household hazardous waste." Common products include paints, cleaners, oils, batteries, and pesticides. Improper disposal of household hazardous wastes include pouring them down the drain, on the ground, into storm sewers, or putting them in the trash. Collection programs allow communities to safely dispose of these wastes, thus protecting the environment and reducing threats to public health.

Continue and possibly expand current Milwaukee Metropolitan Sewerage District, Wisconsin Department of Natural Resources, and U.S. Geological Survey water quality monitoring programs, including Phases II and III of the Milwaukee Metropolitan Sewerage District Corridor Study
(Regional Water Quality Management Plan Update high priority)

Continued agency water quality monitoring will be essential to track the progress of the management measures included in the WRP. T he MMSD plans to install X real-time WQ stations over the next X years.

Continue and possibly expand U.S. Geological Survey stream gauging program
(Regional Water Quality Management Plan Update high priority)

Continued stream gauging efforts will be essential to track the progress of the management measures included in the WRP. This effort is already partially under way through MMSD's real-time monitoring stations. These stations monitor continuous water-quality information using remote sensor technology with the data collected by the MMSD in cooperation with the USGS. Collection of continuous data will allow scientists to better assess how water quality responds seasonally and in response to storm events.

Continue citizen-based water quality monitoring efforts
(Regional Water Quality Management Plan Update high priority)

Continued citizen-based water quality monitoring will be essential to track the progress of the management measures included in the WRP. See Appendix 4A for recommendations for citizen-based monitoring.

Bacterial ID Program
(Regional Water Quality Management Plan Update high priority)

As shown in Chapter 4, unknown sources are considered to contribute approximately 50 to 75% of the fecal coliform load to certain reaches in the Menomonee River watershed. These sources may be caused by illicit connections to the storm sewer system, leaking sewers, or other unidentified sources. A bacterial identification program could therefore be very effective at reducing loads it if is successful in better pinpointing the specific nature and location of these sources so that they can be removed.

Implementing chloride reduction programs
(Regional Water Quality Management Plan Update high priority)

Water quality monitoring data set forth in SEWRPC Technical Report No. 39 indicated that chloride concentrations in the Menomonee River have been increasing. Since 1993, the mean concentration of chloride at all stations has been increasing. A recent study conducted by the U.S. Geological Survey and the Wisconsin State Laboratory of Hygiene, included as Appendix 5A, showed very high chloride concentrations in area streams. It is therefore recommended that the municipalities and counties in the study area continue to evaluate their practices regarding the application of chlorides for ice and snow control and strive to obtain optimal application rates to ensure public safety without applying more chlorides than necessary for that purpose. Municipalities should also consider alternatives to current ice and snow control programs and implement educational programs that provide information about alternative ice and snow control measures in public and private parking lots, optimal application rates in such areas, alternative water softening media, and the use of more-efficient water softeners that are regenerated based upon the amount of water used and the quality of the water.

Limited information is available regarding the effectiveness of road salt reduction programs to reduce chloride loads to streams. However, a TMDL implementation plan prepared for the Shingle Creek watershed in Minnesota concluded that a 71% reduction could be achieved by implementing a plan based on the following five principles:[1]

- Use appropriate snow plow techniques
- Select, store, and apply materials appropriately
- Encourage communication between applicators
- Foster stewardship through improved applicator awareness
- Communicate with the public

Both in the RWQMPU and this WRP, efforts were undertaken to develop a mass balance "model" to reflect the impacts of reduced chloride use on watershed water quality. In both instances, the data available (both salt use and water quality data) were inadequate to develop any meaningful results.

Actions underway include evaluation of MMSD/USGS real time monitoring of conductivity in the Menomonee River, and correlation of the conductivity with chloride concentration.

[1] Wenck Associates, *Shingle Creek Chloride TMDL Implementation Plan*, prepared for the Shingle Creek Water Management Commission (February 2007)

Restore wetlands, woodlands, and grasslands adjacent to the stream channels and establish riparian buffers
(Regional Water Quality Management Plan Update high priority)

The expected load reductions from converting croplands to wetlands were modeled during the development of the 2020 FP, the RWQMPU, and the Menomonee River WRP. Load reductions of 13% for TP, 20% for TSS, 18% for fecal coliform, and 16% for BOD were predicted assuming conversion of 15% of the cropland. The restoration of wetlands, woodlands and grasslands immediately adjacent to stream channels would increase the acreage of riparian buffers and improve water quality in the Menomonee River watershed.

Implement programs to discourage unacceptably high numbers of waterfowl from congregating near water features
(Regional Water Quality Management Plan Update high priority)

Waterfowl control measures are various methods that can be used to reduce the waterfowl population around waterways. Potential measures include chemical repellent and erecting a barrier, possibly a stone wall, hedge, or plastic fencing along the shoreline. However, the use of chemicals and unnatural physical barriers would be less desirable than planting buffer strips of natural tall grasses, plants, or shrubs.

Waterfowl droppings are believed to be a major contributor to coliform in waterways, although their loads have not been quantified for the Menomonee River watershed and therefore it is not possible to quantify the potential load reductions from this management measure.

Reduce soil erosion from cropland
(Regional Water Quality Management Plan Update medium priority)

A number of practices can significantly reduce soil erosion from cropland, including conservation tillage, vegetated filter strips, grassed waterways, and riparian buffers. These practices can be very effective at reducing soil erosion, with reductions of 88% reported for conservation tillage, 65% for filter strips, 93% for grassed waterways, and 20% for riparian buffers.[2,3]

Restrict livestock access to streams
(Regional Water Quality Management Plan Update medium priority)

Preventing livestock from directly accessing streams prevents the direct deposition of manure into the waterways and also provides streambank and shoreline protection by reducing livestock damage due to bank erosion and overgrazing bank vegetation. The Lake Champlain Basin Watershed Project in Vermont showed that reducing cattle access to streams reduced fecal coliforms by about 38%.[4]

[2] USEPA, *National Management Measures to Control Nonpoint Source Pollution from Agriculture* (EPA 841-B-03-004, July 2003)
[3] Winer, R.. *National Pollutant Removal Performance Database for Stormwater Treatment Practices*, 2nd Edition Center for Watershed Protection. Ellicott City, MD (2000)
[4] USEPA, *Section 319 Success Stories, Vol. III, Lake Champlain Basin Watershed Project: Significant Pollutant Reductions Achieved*, http://www.epa.gov/nps/Section319III/VT.htm (Updated February 2007)

Manage milking center wastewater
(Regional Water Quality Management Plan Update medium priority)

Milking center wastewater derives from water used to clean milking systems, bulk tanks, cows, buildings, and equipment in milkhouses, milking parlors, and holding areas. Unmanaged milking center wastewater can cause significant water quality problems due to high concentrations of fecal coliform, nutrients, and BOD. Milking center wastewater can be disposed of by adding it to manure and land spreading the resulting mixture, through underground treatment, and storing wastewater in a holding tank or lagoon. Each of these practices can be very effective in reducing or eliminating the discharge of pollutants to nearby surface waters and groundwater.

Expand oversight and maintenance of private onsite wastewater treatment systems
(Regional Water Quality Management Plan Update medium priority)

Failures of private onsite wastewater treatment systems (POWTs) can result in untreated wastewater and sewage entering the groundwater and/or nearby waterway; regular maintenance and inspection is required to ensure proper operation of a system and can eliminate this source of pollution. Failing systems within 300 feet of waterways may contribute 10,000 colony-forming units per 100 milliliters (colony forming units (cfu) /100 ml) to receiving waters and direct discharges of septic system sewage can contribute up to 12 million cfu/100 ml. Expanded oversight and maintenance of POWTs therefore could reduce a potentially significant source of fecal coliform.

Manage pet litter
(Regional Water Quality Management Plan Update medium priority)

Improved pet litter management can be accomplished through a variety of efforts, including fines for failure to comply with established ordinances and a public education program that includes signs, pick-up bags and receptacles in key areas as well as inclusion of pet litter control in overall public water quality informational brochures and newsletters. The effectiveness of a pet litter control program is dependent on its implementation and enforcement, but could result in an approximate 50% reduction in fecal coliform loads from grassed residential areas.

Concrete channel renovation and rehabilitation (includes drop structures)
(Regional Water Quality Management Plan Update medium priority)

The MMSD commissioned a study of sediment transport in the Menomonee River watershed in 2001 and, of the 63 miles of channel examined, about 14.5 miles were found to be lined with concrete or riprap, consist of bedrock, or were enclosed in conduit. Efforts to rehabilitate these impacted channels will result in a channel with vastly improved habitat for aquatic life and potential improvements to flashiness and water quality. For example, flashiness could improve to the extent that additional floodplain storage is created and water quality could improve if the new channel is less conducive to excessive algal growth. Note that hazardous materials assessments should be considered during planning and design of channel renovation and rehabilitation projects; some concrete channels overlay contaminated soils.

Limit number of culverts, bridges, drop structures, and channelized stream segments and incorporate design measures to allow for passage of aquatic life
(Regional Water Quality Management Plan Update medium priority)

The significant number of culverts, bridges, drop structures, and channelized stream segments located along the Menomonee River and its tributaries severely limit the amount of suitable habitat. Efforts to limit such structures will be critical to attracting and retaining desired fish and macroinvertebrate communities.

Remove abandoned bridges and culverts or reduce culvert length
(Regional Water Quality Management Plan Update medium priority)

Abandoned bridges and extended culverts also limit the amount of suitable habitat within the watershed and serve as barriers to aquatic life. Efforts to remove the bridges and reduce the culvert lengths are needed to attract and retain desired fish and macroinvertebrate communities.

Restore, enhance, and rehabilitate stream channels to provide improved water quality and quantity of available fisheries habitat
(Regional Water Quality Management Plan Update medium priority)

Habitat management efforts should focus on maintaining and restoring the riparian functions that are often lost when streams are channelized or riparian areas are otherwise encroached upon. High quality channel habitats with intact riparian zones and natural channel morphology may improve water quality by assimilating excess nutrients directly into plant biomass (e.g., trees and macrophytes), by sequestering nutrients into invertebrate and vertebrate biomass, by "deflecting" nutrients into the immediate riparian zone during overland (flood) flow events, and by reducing sunlight through shading.

Monitor fish and macroinvertebrate populations
(Regional Water Quality Management Plan Update medium priority)

Enhanced monitoring of fish and macroinvertebrate populations will be essential to track the progress of the management measures included in the WRP. Biological monitoring provides direct information on one of the ultimate goals of the WRP (improved biology) and also can provide important insight into other aspects of general watershed health (e.g., habitat and water quality conditions).

Continue and support programs to reduce the spread of exotic invasive species, including public education programs
(Regional Water Quality Management Plan Update medium priority)

Invasive species are alien species whose introduction causes economic or environmental harm or harm to public health. Invasive species can affect aquatic ecosystems directly or by affecting the land in ways that harm aquatic ecosystems. Common sources of aquatic invasive species include introduction of ballast water, aquaculture escapes, and accidental and/or intentional introductions, among others. Public education programs are therefore one important way to attempt to control the spread of invasive species.

Monitor exotic invasive species
(Regional Water Quality Management Plan Update medium priority)

Enhanced monitoring of exotic invasive species populations will be essential to track the progress of the management measures included in the WRP.

Continue maintenance of Milwaukee Metropolitan Sewerage District conveyance system modeling tools
(Regional Water Quality Management Plan Update medium priority)

Continued maintenance of the MMSD conveyance system modeling tools is an important activity because the tools allow for decision makers to evaluate the potential benefits of a variety of conveyance system improvements.

Continue maintenance of watershed-wide riverine water quality models (Loading Simulation Program in C++)
(Regional Water Quality Management Plan Update medium priority)

Continued maintenance of the watershed-wide riverine water quality models is an important activity because the tools allow for decision makers to evaluate the potential benefits of a variety of management measures, including many of those included in this WRP.

Disconnect residential roof drains from sanitary and combined sewers and infiltrate roof runoff, including rain barrels and rain gardens
(Regional Water Quality Management Plan Update medium priority)

The expected load reductions from residential roof drain disconnections were modeled during the development of the 2020 FP, the RWQMPU, and this WRP using the following assumptions:

- Rain barrels and downspout disconnection were applied to 15% of the residences. The modelers assumed that downspouts serve approximately 50% of the impervious area on residential lots, so the effective application rate to residential impervious area was 7.5%. Rain barrels will presumably be used for horticultural irrigation and the overflow from rain barrels is also supposed to be routed to pervious areas. Therefore, the water routed through rain barrels was modeled as a lateral surface input on pervious land areas.
- Rain gardens/bioretention cells and downspout disconnection were assumed to apply to a different 15% of new and existing residences. As with rain barrels, it was assumed that 50% of the impervious area on the lots is routed to these structures, for an effective application rate of 7.5%. The rain gardens were simulated as an infiltration BMP.

Load reductions of fecal coliform, TSS and TP are expected because stormwater plays a prominent role in transporting these pollutants to the Menomonee River. Also, actions that reduce TSS loads often result in coincident reductions in TP loads because some forms of phosphorus compounds are frequently attached to TSS. Ultimately, actions that reduce or slow stormwater runoff typically result in reduced fecal coliform, TP and TSS loads. The results of this analysis indicated that fecal coliform loads could be reduced by approximately 10%, with TSS and TP loads reduced by 1.5% and 1%, respectively. In addition, the rain gardens and rain barrels were predicted to decrease flashiness by approximately 2% (based on an analysis done on Underwood Creek).

Develop according to approved land use plans
Regional Water Quality Management Plan Update, included but not prioritized)

The land use plans are linked to watershed modeling; therefore, development according to the approved plans should be sought. Adherence to the plans will increase the chances for success at achieving the water quality goals and reduce the likelihood that new development will result in disproportionate impacts to water quality within the watershed.

Dam abandonment and restoration plans
(Regional Water Quality Management Plan Update low priority)

There are many environmental benefits to dam abandonment or removal, including re-connection of important seasonal fish habitat, normalized temperature regimes, improved water clarity (in most cases), improved dissolved oxygen concentrations, normalized sediment and energy transport, and improved biological diversity.

6.2.3 Management Strategies Recommended for Implementation in the Regional Water Quality Management Plan Update, but Not Yet Implemented

This section describes the management strategies recommended for implementation in the RWQMPU but not yet initiated within the Menomonee River watershed.

Implement collection programs for expired and unused household pharmaceuticals and personal care products
(Regional Water Quality Management Plan Update high priority)

A program to collect household pharmaceuticals and personal care products (PPCPs) within the watershed should be initiated to allow communities to safely dispose of PPCPs, thus protecting the environment and reducing threats to public health. Establish partnerships with health care facilities, senior citizen care facilities and pharmacies to identify opportunities and implement programs to reduce PPCP waste.

Establish long-term water quality monitoring programs for areas outside of Milwaukee Metropolitan Sewerage District service area
(Regional Water Quality Management Plan Update high priority)

Establishing long-term water quality monitoring outside of those areas already monitored by the MMSD will be essential to track the progress of the management measures included in the WRP.

Conduct assessments and evaluations on the significance for public health and aquatic and terrestrial wildlife of the presence of pharmaceuticals and personal care products in surface waters
(Regional Water Quality Management Plan Update medium priority)

Pharmaceuticals and personal care products are used by individuals for personal health or cosmetic reasons or used by agribusiness to enhance growth or health of livestock. The PPCPs comprise a diverse collection of thousands of chemical substances, including prescription and over-the-counter therapeutic drugs, veterinary drugs, fragrances, and cosmetics. Studies have shown that pharmaceuticals are present in our nation's waterbodies and some research suggests that certain drugs may cause ecological harm. This WRP recommends that an evaluation be conducted regarding the potential significance of this issue within the Menomonee River watershed.

Establish long-term fisheries and macroinvertebrate monitoring stations
(Regional Water Quality Management Plan Update medium priority)

Long-term fisheries and macroinvertebrate monitoring stations should be established to allow decision makers to track progress in the health and diversity of the aquatic community.

Establish long-term aquatic habitat monitoring stations
(Regional Water Quality Management Plan Update medium priority)

Long-term habitat monitoring stations should be established to allow decision makers to track progress in improving aquatic habitat.

Follow recommendations of the regional water supply plan regarding maintenance of groundwater recharge areas
(Regional Water Quality Management Plan Update medium priority)

Following the recommendations of the regional water supply plan regarding maintenance of groundwater will help ensure that recharge areas will benefit the watershed by improving the likelihood that a clean and sufficient supply of groundwater is available.

Utilize groundwater sustainability guidance results in evaluating the sustainability of proposed developments and in conduct of local land use planning
(Regional Water Quality Management Plan Update medium priority)

Groundwater sustainability issues should be factored into the review of proposed developments and the development of local land use planning efforts to improve the likelihood that a clean and sufficient supply of groundwater is available.

Consider more intensive fisheries management measures where warranted
(Regional Water Quality Management Plan Update medium priority)

More intensive fisheries management may be needed to restore the fishery in the Menomonee River and should be considered as one element of this WRP.

6.3 Prioritization of Management Measures

Effective implementation of this WRP requires the prioritization of the identified management measures so that limited resources are directed toward those efforts that are most likely to be effective. Measures must also be prioritized so that lessons learned from certain measures can be used to inform efforts scheduled to take place at a later date. Notes have been added to Section 6.2 to show the prioritization of the actions based upon the RWQMPU. This prioritization must be evaluated and either confirmed or revised by the SWWT and WAT.

This process of prioritization is documented in Chapter 7. Input on prioritization was received through comments from the review of Chapters 4, 5 and 6 by the stakeholders for the WRP (SWWT, WAT, SEWRPC and MMSD).

6.4 Water Quality Improvements Estimated with the Regional Water Quality Management Plan Update

Implementation of the management measures identified in this WRP should result in improved conditions within the Menomonee River watershed. Although many of these improvements cannot be easily quantified, the water quality models have been used to evaluate the potential significance of several of them, all of which are called for under the RWQMPU. These include

meeting NR 151 standards beyond those achieved under the Baseline Year 2000 condition, the Point Source Plan, and additional measures called for under the RWQMPU. These measures will contribute to some reduction in phosphorus loads due to various fertilizer management efforts. However, the model results will probably underestimate the TP load reduction because they did not account for the statewide fertilizer ban. These improvements are presented in the following sections by assessment point and are based on the scoring guidelines summarized in Table 6-3. The table presents data from the Baseline 2000, Baseline 2020 (year 2020 planned growth – no management measures), and Plan 2020 (full implementation of the RWQMPU) conditions. Additional information about each metric is provided in the following sections:

Flashiness

Flashiness trend scores were calculated using the Richards-Baker (R-B) Index.[5] The assessments were based upon interpolations of box-and-whisker charts provided in Baker et al. Consistent with the index, the range of flashiness values is partitioned into quartiles and the highest flashiness values corresponding to poor conditions. The assessments are based off of quartile assignments.

DO-Minimum (May-Oct)

The percentage compliance is the percent of hours per summer season during the 10-year modeling period that the 5.0 mg/L minimum target is met. The colors are assigned based upon the percent compliance color scheme.

DO-Maximum (May-Oct)

The percentage compliance is the percent of hours per summer season during the 10-year modeling period that the 15.0 mg/L maximum target is met. The colors are assigned based upon the percent compliance color scheme.

Fecal Coliform (annual)

The percentage compliance is the percent of hours during the 10-year modeling period that the 400 count/ 100 ml [not-to-exceed] target is met during the entire year. The colors are assigned based upon the percent compliance color scheme.

Fecal Coliform (May-Sep)

The percentage compliance is the percent of hours per recreation season (May through September) during the 10-year modeling period that the 400 count/ 100 ml [not-to-exceed] target is met. The colors are assigned based upon the percent compliance color scheme.

TP

The percentage compliance is the percent of hours during the 10-year modeling period that the 0.1 mg/L target is met. The colors are assigned based upon the percent compliance color scheme.

TSS

[5] Baker, D., Richards, R., Loftus, T., and Kramer, J, "A New Flashiness Index: Characteristics and Applications to Midwestern Rivers and Streams," *Journal of the American Water Resources Association* Vol. 40(2):503-522 (2004)

The percentage compliance is the percent of years that the mean annual concentration met the 17.2 mg/L [reference concentration] target. The mean annual concentration is calculated as the annual average of the 365 or 366 daily average concentrations. The colors are assigned based upon the percent compliance color scheme.

TABLE 6-3

SCORING OF WATER QUALITY CONDITIONS IN THE MENOMONEE RIVER

		DO, FC, TP, & TSS			***Flashiness***	
		Percentage Compliance				
Score	**Description**	**Minimum**	**Maximum**	**Quartile**	**Minimum**	**Maximum**
	Very Good	95	100	Lowest	0	0.45
	Good	85	94	Lower Middle	0.46	0.55
	Moderate	75	84	Upper Middle	0.56	0.75
	Poor	0	74	Highest	0.76	2

Assessment Point	Modeled Condition	Flashiness	DO-Min (May-Oct)	DO-Max (May-Oct)	Fecal Coliform (annual)	Fecal Coliform (May-Sep)	TP	TSS
MN-1	Baseline 2000	0.30	80%	100%	81%	89%	95%	100%
	Baseline 2020	0.32	80%	100%	79%	88%	95%	100%
	Plan 2020	0.32	80%	100%	80%	87%	95%	100%
MN-2	Baseline 2000	0.25	99%	100%	75%	86%	70%	100%
	Baseline 2020	0.28	99%	100%	72%	84%	69%	100%
	Plan 2020	0.28	99%	100%	73%	85%	70%	100%
MN-3	Baseline 2000	0.49	82%	100%	77%	90%	91%	100%
	Baseline 2020	0.57	82%	100%	76%	89%	90%	100%
	Plan 2020	0.55	82%	100%	76%	87%	91%	100%
MN-4	Baseline 2000	0.44	92%	100%	76%	87%	93%	100%
	Baseline 2020	0.50	89%	100%	74%	86%	93%	100%
	Plan 2020	0.48	89%	100%	75%	86%	93%	100%
MN-5	Baseline 2000	0.33	98%	100%	68%	82%	70%	100%
	Baseline 2020	0.37	98%	100%	66%	81%	68%	100%
	Plan 2020	0.36	99%	100%	67%	81%	69%	100%

MN-6	Baseline 2000	0.48	100%	100%	72%	83%	90%	60%
	Baseline 2020	0.65	100%	100%	70%	82%	88%	100%
	Plan 2020	0.64	100%	100%	72%	83%	89%	100%
MN-7	Baseline 2000	0.69	85%	100%	69%	81%	85%	10%
	Baseline 2020	0.75	84%	100%	69%	81%	87%	100%
	Plan 2020	0.73	84%	100%	72%	84%	87%	100%
MN-8	Baseline 2000	0.67	87%	100%	64%	79%	85%	30%
	Baseline 2020	0.69	87%	100%	65%	80%	86%	100%
	Plan 2020	0.68	87%	100%	68%	82%	87%	100%
MN-9	Baseline 2000	0.42	98%	100%	57%	76%	69%	70%
	Baseline 2020	n/a	98%	100%	56%	75%	66%	100%
	Plan 2020	0.46	98%	100%	59%	78%	68%	100%
MN-10	Baseline 2000	0.31	95%	100%	57%	73%	89%	0%
	Baseline 2020	0.32	96%	100%	58%	73%	90%	0%
	Plan 2020	0.33	96%	100%	59%	74%	91%	20%
MN-11	Baseline 2000	0.46	96%	100%	53%	70%	89%	100%
	Baseline 2020	0.50	96%	100%	53%	70%	90%	100%
	Plan 2020	0.49	96%	100%	54%	71%	91%	100%
MN-12	Baseline 2000	0.42	98%	100%	50%	69%	69%	100%
	Baseline 2020	n/a	98%	100%	49%	69%	68%	100%
	Plan 2020	0.46	98%	100%	52%	72%	69%	100%
MN-13	Baseline 2000	0.65	92%	98%	61%	77%	83%	60%
	Baseline 2020	0.67	92%	99%	62%	78%	85%	100%
	Plan 2020	0.66	92%	99%	64%	80%	86%	100%
MN-14	Baseline 2000	0.72	95%	100%	63%	79%	84%	60%
	Baseline 2020	0.72	96%	100%	63%	79%	86%	100%
	Plan 2020	0.71	96%	100%	65%	81%	87%	100%

MN-15	Baseline 2000	0.46	99%	100%	47%	67%	84%	80%
	Baseline 2020	0.49	100%	100%	47%	68%	84%	100%
	Plan 2020	0.48	99%	100%	50%	70%	87%	100%
MN-16	Baseline 2000	0.83	82%	92%	66%	81%	84%	100%
	Baseline 2020	0.83	82%	92%	66%	81%	85%	100%
	Plan 2020	0.82	83%	92%	68%	82%	85%	100%
MN-17	Baseline 2000	0.49	99%	100%	47%	67%	66%	70%
	Baseline 2020	0.51	99%	100%	47%	67%	65%	100%
	Plan 2020	0.50	99%	100%	49%	70%	67%	100%
MN-18	Baseline 2000	0.49	99%	100%	48%	68%	52%	70%
	Baseline 2020	0.49	99%	100%	47%	68%	50%	100%
	Plan 2020	0.49	98%	100%	50%	71%	52%	100%

6.5 Allocations

Allocation of pollutant reductions required to meet applicable water quality standards in the Menomonee River watershed should be deferred at this time for the following reasons:

1) For fecal coliform, allocations would have to be made using a measure (fecal coliform) that is an imperfect indicator of threats to public health and that is likely to be changed in favor of a better indicator (discussed in Section 7.2.1 of the WRP). The allocations would have to assume a high level of reduction of any illicit human fecal coliform sources because these are not "permitted" discharges. Because there could be multiple sources of such discharges that would be attributable to multiple entities, it would be very difficult to equitably allocate loads. Further, any allocations based upon fecal coliform are likely to only be temporary given the probability that the fecal coliform water quality criterion will be phased out in the future in favor of better measurements that address the risks of human bacteria and pathogens.

2) Regarding phosphorus, allocations of allowable loads could result in the need to treat cooling water discharges or require that communities reduce the amount of phosphorus used in drinking water systems for metal exposure control. Both actions would require significant cost, based on current technology. In addition, the recently enacted ban on phosphate containing fertilizers may produce enough reductions that most, if not all, of the assessment point reaches in the Menomonee River watershed will meet the pending phosphorus water quality standard, assumed to be 0.1 mg/l. The impact from the ban on phosphorus in fertilizers needs to be analyzed further.

3) The remaining water quality parameters (TSS, TN, chlorides, etc.) either do not have water quality standards or already meet water quality guidelines. Specifically:

a. The median TSS for the entire Menomonee River watershed already meets the U.S. Geological Survey (USGS) Reference Concentration of 17.2 mg/l. To address localized, high concentrations of TSS, local sediment issues should also be monitored and analyzed.

b. Compliance with the water quality standard for DO (which is affected by several pollutants including nitrogen, BOD and sediment as well as other factors such as the concrete channels, which promote algal growth) is met for the most part in the entire watershed.

c. Chlorides may prove to be the largest water quality issue that needs further action for habitat improvement, but the data base for chlorides is not sufficient to assess the overall impact of chlorides on water quality.

Therefore, it is recommended that the allocation issue be considered at some future date when and if a TMDL is conducted on the Menomonee River or as a part of a watershed permitting effort. The implementation of NR 151 (non-Ag only) may offer some opportunities to develop an "allocation" program based upon the various municipal permit and regulatory requirements.