PRESTO
Pollutant Load Ratio Estimation Tool

Documentation, Validation, & Analysis
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DISCLAIMER

PRESTO, the included help manuals, and sample data files are made available free on an "as is" basis with no implied or expressed warranties. The user must assume the entire risk of using the tool. Although PRESTO has been tested with statewide data, good engineering practice requires that all work completed using this program should be checked with alternative methods.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

APPENDICES

Executive Summary

The objective of the Wisconsin Department of Natural Resources' (WDNR) Bureau of Water Quality is to protect and enhance Wisconsin's water resources. As part of this, the Water Quality Modeling Technical Team strives to provide the public with timely information on water quality and decision support tools to guide management decisions. Phosphorus, which is a nutrient that can impair water quality, is the focus of several new water quality regulations in Wisconsin. Reduction of phosphorus concentrations within Wisconsin waterways requires identification of the sources of phosphorus. To assist in achieving phosphorus reductions, a state-wide screening tool was developed that identifies the dominant source (point vs. nonpoint) of phosphorus within a watershed. The regulatory catalysts for this work include:

- Chapter NR 217, Wisconsin Administrative Code which controls the point source effluent limits for phosphorus;
- The Federal Clean Water Act which requires the prioritization and targeting of TMDLs in order to set limits on pollutant loading.

The Pollutant Load Ratio Estimation Tool (PRESTO) is a statewide GIS-based tool that compares the average annual phosphorus loads originating from point and nonpoint sources within a watershed. The comparison provides a screening tool for industrial and municipal dischargers to determine one of the conditions of eligibility for adaptive management as part of ch. NR 217, Wis. Adm. Code. The watershed adaptive management option described in s. NR 217.18, Wis. Adm. Code, allows a point source to achieve compliance with applicable water quality based effluent limits needed to achieve the phosphorus water quality standards criteria in a more economically efficient manner, through comprehensively managing point and nonpoint sources of phosphorus in the watershed. Under this option the permitted facility is given interim effluent limits and must work with watershed partners to implement a watershed adaptive management plan. PRESTO also helps industrial and municipal dischargers determine if water quality trading is a feasible option within their watershed. PRESTO provides dischargers with a consistent and transparent method for determining regulatory compliance and allows the DNR to make fast and effective permitting decisions to aid in the permit streamlining effort.

PRESTO was used to evaluate approximately 606 permitted industrial and municipal outfall locations throughout the state. The ratio of point to nonpoint source phosphorus loads for each evaluated facility was calculated. For 82% of the facilities evaluated (494 of 606), point sources of phosphorus were less than 50% of the total annual phosphorus load, thus satisfying one of the eligibility conditions for adaptive management.

1.0 INTRODUCTION

While phosphorus (P) is an essential nutrient for plant growth, excess phosphorus can accelerate eutrophication of water bodies, increasing the frequency of algal blooms that can negatively impact both human and ecosystem health. Locating and effectively managing the sources of phosphorus within a watershed is critical for improving water quality. The most general categories of phosphorus sources are waste water treatment facilities (hereafter called "point sources" because they discharge to surface waters at a defined point) and nonpoint sources, which include runoff from diffuse sources across the landscape. The relative significance of point and nonpoint sources of phosphorus vary substantially among watersheds, which means there is no "one-size-fits-all" approach to managing phosphorus.

The Wisconsin Department of Natural Resources (WDNR) has developed a spatial toolset called the Pollutant Load Ratio Estimation Tool (PRESTO) to compare a watershed's average annual point and nonpoint phosphorus loads (Figure 1). PRESTO was designed to be easily modified, transparent to the end user, and provide a consistent result based on readily available datasets. PRESTO performs three basic functions: watershed delineation, nonpoint source loading estimation, and point source loading aggregation. The PRESTO outputs include a delineated watershed, watershed land cover composition, the estimated average annual nonpoint source and measured point source phosphorus loads (pounds per year), and the ratio of point to nonpoint phosphorus at a watershed outlet.

The comparison provides a screening tool for industrial and municipal dischargers to determine whether they have fulfilled s. NR 217.18(2)(b), Wis. Adm. Code, one of the conditions to determine eligibility for adaptive management. Adaptive management allows a point source to control phosphorus discharges from other point and/or nonpoint sources to achieve compliance with applicable phosphorus water quality criteria in s. NR 102.06 in the most economically efficient manner possible. PRESTO also helps industry and municipalities determine if water quality trading is a feasible option within their watershed.

While the main use of PRESTO is in support of NR 217, it also has other more general applications. The tool can be used solely for watershed delineation. The methods used in PRESTO are such that delineations performed for locations throughout the state will be consistent, following the previously established Watershed Boundary Dataset HUC12 unit boundaries (USGS and NRCS, 2011). Also, instead of using PRESTO delineated basins, the model can accept custom user-specified basins on which to perform the nonpoint and point source calculations. One example of the use of this function would be to summarize the point and nonpoint phosphorus loads for every HUC12 in Wisconsin.

The following report provides information on the model inputs, methodology, outputs and limitations; it also describes the statewide model validation and presents model output for over six hundred permitted outfalls throughout the state. Throughout the report phosphorus will refer to total phosphorus which includes both dissolved and particulate

forms of phosphorus. Section 2 of this report describes the framework upon which PRESTO is built. Section 3 specifies the standard and user-defined inputs to PRESTO. Section 4 explains the methodologies behind the watershed delineation and nonpoint source loading processes. Section 5 describes the outputs generated by PRESTO. The model limitations are outlined in Section 6. Section 7 illustrates the statewide validation of the model methodologies. Section 8 describes the results of the statewide outfall analysis. The appendices contain additional validation information, PRESTO scripting details, a statewide analysis table and table of permitted outfall locations excluded from this analysis. A companion report, the PRESTO User Manual, outlines in detail, the necessary steps to install and run PRESTO with default and user-supplied data.

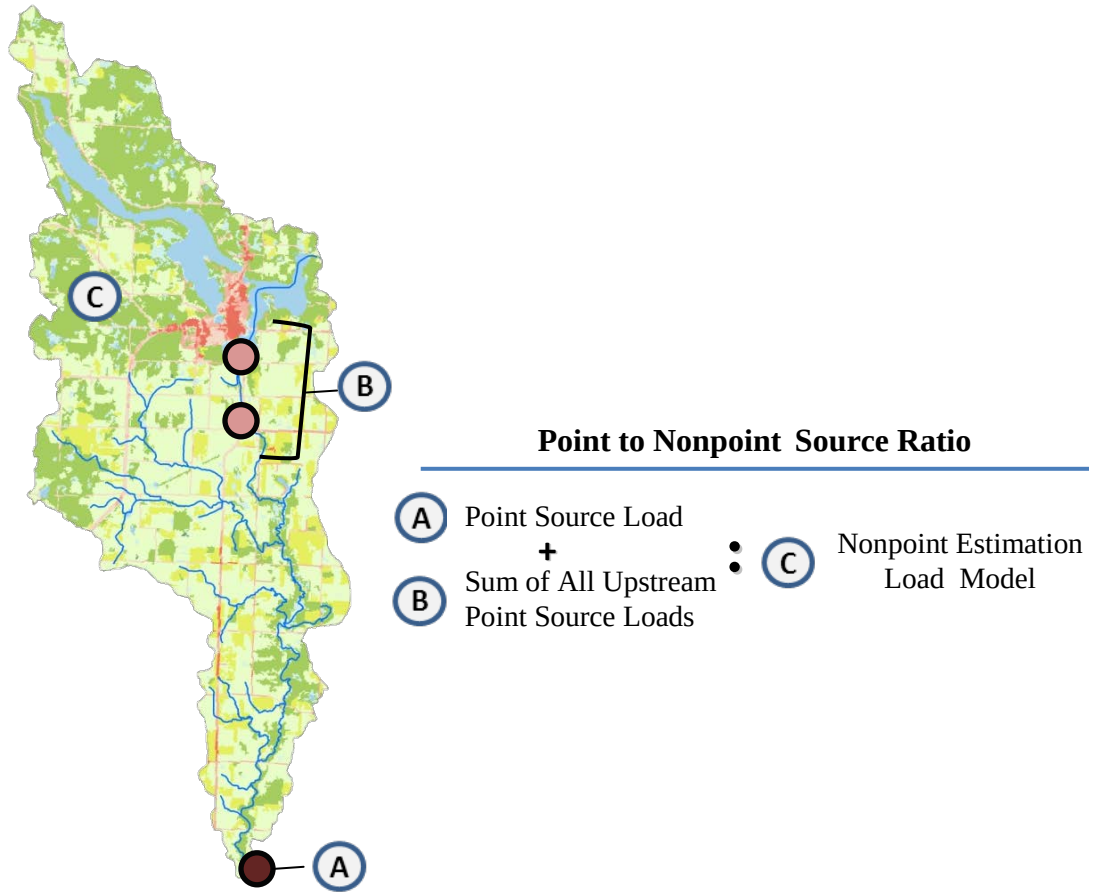

Figure 1: PRESTO Point to Nonpoint Source Phosphorus Load Ratio Calculation

2.0 PRESTO FRAMEWORK

PRESTO is written in the Python scripting language, which has been adopted as the native scripting language for ArcGIS 10, replacing Visual Basic in the command line and map algebra environments. Python was chosen as the scripting language for PRESTO not only because of the ease of integration with ArcGIS 10, but because of its transparency, availability, and power. ESRI aptly describes Python as "free, cross platform, open source, stable, mature, simple, and powerful" – with this in mind, PRESTO is designed to be easily customizable and transparent to users with only a basic knowledge of scripting. Because PRESTO performs a large number of distinct functions, these functions are divided into separate libraries (script files) for the ease of reading the script and making changes to the various subroutines in the tool. Details on the Python scripting are presented in Appendix A.

The PRESTO interface was developed within the ArcGIS 10 Desktop framework and requires the Spatial Analyst extension. Additional system requirements are presented in the accompanying User Manual. PRESTO is packaged with an ESRI ArcMap document *(PRESTO.mxd*), toolbox (PRESTO.tbx), and seven folders containing the model scripts and default input datasets. Even though PRESTO is comprised of several Python script files, the user needs only to open the PRESTO ToolBox within ArcMap to run PRESTO. The input screen for PRESTO requires the user to specify their input data and other datasets required for the tool to run. PRESTO can be run with only the datasets included in the tool package, though it allows the user to specify custom datasets as necessary. Detailed descriptions of the tool inputs and required datasets are included in the User Manual. The tool runs within the ArcGIS window and inserts the output files into the open ArcMap document.

3.0 PRESTO DATA SOURCES

PRESTO requires up to five spatial datasets in order to accomplish its core functions: watershed delineation, nonpoint source loading, and point source loading aggregation. PRESTO is packaged with a default set of input datasets with which the tool was designed to work. To allow for greater flexibility, PRESTO allows the user to load other datasets into the tool, provided they follow a similar attribute structure.

There are five statewide inputs included with PRESTO:

Digital Elevation Model (DEM): A DEM is used to subdelineate the area within the most downstream subbasin (e.g., HUC12) containing the user defined outfall location or delineation point. The DEM is also necessary to determine where the water drains as it leaves a subbasin. To ensure that delineation coincides with known flow paths, the DEM is hydrologically modified by filling sinks, burning in the streams, and building walls. Stream burning ensures that flow is forced to those cells that correspond to the true locations of streams; this is especially important in flat areas where the DEM may not

accurately represent stream locations. In addition to developing preferred stream paths, walls were created within the DEM ensuring that pre-defined subbasin (HUC12) boundaries are always used as part of the upstream watershed delineation. Building walls involves raising the elevation of the DEM cells along the subbasin boundaries in order to prevent flow across them.

Hydrologic Network: The hydrologic network provides PRESTO with polylines to which outfall/delineation points can be snapped and then linked with the DEM's flow accumulation grid. The hydrologic network is also necessary for one of the nonpoint source loading calculation methods.

Subbasin Boundaries: Subbasin boundaries can be used to provide consistency between the delineations that are used by other sources and ones derived by PRESTO. In addition, user-defined subbasins can be used as the basis for summarizing point and nonpoint loads.

Outfall or Delineation Points: These points define the spatial locations from which the delineation and subsequent load calculations occur. For the Wisconsin outfall file, the outfall points represent the location where a facility's end-of-pipe discharge enters a receiving water. The dataset should contain attribute information for each outfall including a unique numeric identifier, the receiving water to which the outfall discharges, and the annual effluent load per year.

Land cover: The land cover dataset is used by the nonpoint source loading calculation methods. Additional information regarding the use of the land cover dataset for the nonpoint calculations can be found in Section 4.0.

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4.0 PRESTO METHODOLOGY

PRESTO performs two routines: (1) delineation of a drainage basin upstream of a point, and (2) application of a spatially-explicit nonpoint source phosphorus model (or models) to a drainage basin polygon. When running PRESTO, it is possible to perform both of these functions in sequence, or either of them individually.

4.1 Delineation

While tools exist to delineate watersheds within GIS (e.g., ArcHydro), one of the main goals of the delineation function within PRESTO was to have a method that was consistent throughout Wisconsin and conformed to the standard HUC12 boundaries where appropriate. The delineation method employed by PRESTO is novel and is distinguished from conventional batch watershed delineation algorithms in two primary ways: (1) short processing times and (2) minimal requirements for data preprocessing. PRESTO is capable of rapid delineation of watersheds using a DEM with burned streams, a corresponding set of stream polylines, and a set of hierarchical subbasins. These

advantages are achieved through a relatively complex delineation algorithm, which is displayed graphically in Figure 2.

The delineation algorithm can be summarized in five steps illustrated in Figure 2:

1. Subbasin topology (how each subbasin connects to another) is created using upstream-downstream basin attributes and intersecting stream lines with subbasin boundaries;

2. The outfall point is snapped to a stream;

3. The upstream section of the subbasin containing the outfall point, or "**inner watershed**", is derived using terrain analysis;

4. Upstream subbasins are identified and joined to form an "**outer watershed**";

5. The inner watershed and outer watershed are joined and dissolved to create the "**total watershed**".

Rapid delineation is achieved by performing time-consuming terrain analysis on only a small area (sub-HUC12 by default), then conforming to existing basin boundaries for the upstream portions of the watersheds. The tool was designed to use the HUC12 basins, with average areas of 30 square miles.

4.2 Nonpoint Source Loading

PRESTO uses the land use classifications and drainage lines within a specific watershed to calculate the nonpoint source phosphorus loading. The nonpoint source phosphorus loading is calculated using three different methods: land use specific export coefficients, multiple regression model #1, and multiple regression model #2. This section describes the basic structure of each method. The relative merits of the three approaches are discussed in Section 7.

The first method uses land-cover-specific export coefficients from the Wisconsin Lake Modeling Suite (WiLMS) software which were derived from values published in Panuska and Lillie, 1995 and Corsi et al, 1998 and values from MPCA, 2004 (Table 2). Nonpoint phosphorus loads are calculated by multiplying the area of each land cover type in a watershed by an export coefficient for each type. Low, high, and most likely export coefficients are used to give low, high, and most likely annual loading values. Table 1 displays the NLCD land cover categories and their corresponding export coefficients.

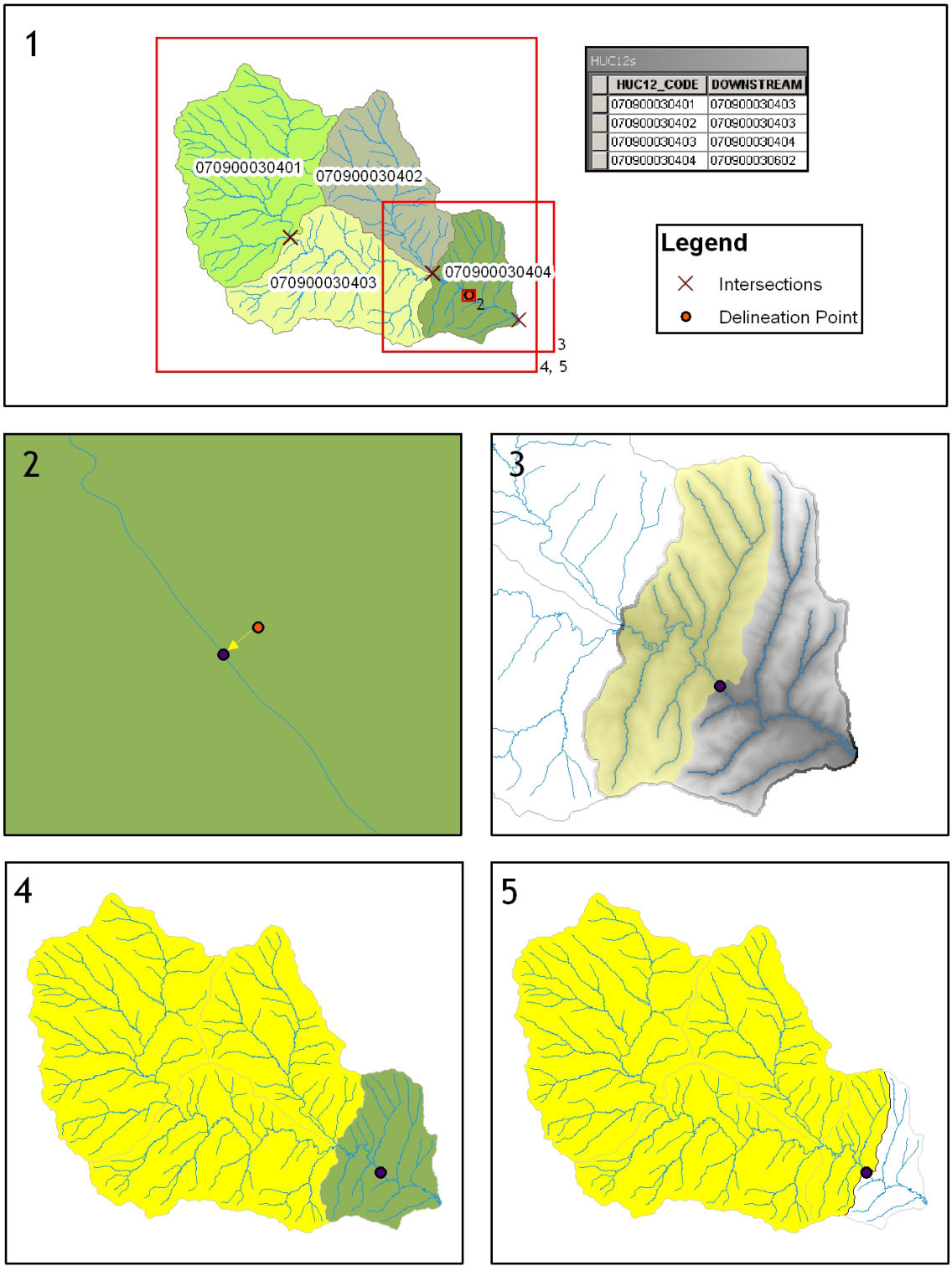

Figure 2: Delineation Process

Table1: Phosphorus export coefficients by land cover category.

LC ID	Description	P Low		P Most Likely		P High		Source
		lb/mi^2	(kg/ha)	lb/mi^2	(kg/ha)	lb/mi^2	(kg/ha)	
11	Open Water	0	(0)	0	(0)	0	(0)	NA
21	Developed, Open Space	57	(0.1)	171	(0.3)	286	(0.5)	WiLMS: Pasture/Grass
22	Developed, Low Intensity	29	(0.05)	57	(0.1)	143	(0.25)	WiLMS: Rural Residential (> 1 Ac)
23	Developed, Medium Intensity	171	(0.3)	286	(0.5)	457	(0.8)	WiLMS: Medium Density Urban (1/4 Ac)
24	Developed, High Intensity	571	(1.0)	856	(1.5)	1142	(2.0)	WiLMS: High Density Urban (1/8 Ac)
31	Barren Land	0	(0)	0	(0)	0	(0)	NA
41	Deciduous Forest	29	(0.05)	54	(0.09)	103	(0.2)	WiLMS: Forest
42	Evergreen Forest	29	(0.05)	54	(0.09)	103	(0.2)	WiLMS: Forest
43	Mixed Forest	29	(0.05)	54	(0.09)	103	(0.2)	WiLMS: Forest
52	Shrub/Scrub	43*	(0.08)*	74	(0.13)*	123*	(0.22)*	MPCA, 2004: Shrubland/Transitional
71	Grassland/Herbaceous	57	(0.1)	97	(0.17)	143	(0.25)	MPCA, 2004: Grassland/Herbaceous
81	Pasture/Hay	57	(0.1)	171	(0.30)	286	(0.5)	WiLMS: Pasture/Grass
82	Cultivated Crops	286	(0.5)	571	(1.0)	1713	(3.0)	WiLMS: Row Crop AG
90	Woody Wetlands	0	(0)	0	(0)	0	(0)	NA
95	Emergent Herbaceous Wetlands	0	(0)	0	(0)	0	(0)	NA

* Average of Deciduous Forest and Grassland/Herbaceous values

The second method (MR #1) uses a multiple regression model that was modified from a version originally developed for the Wisconsin Buffer Initiative (Diebel, *et. al.* 2009). In the model, grassland along streams is associated with more nonpoint phosphorus loading, and may represent phosphorus from grazing animals. Forest in the stream watershed is associated with less phosphorus, and can be considered the inverse of cropland. Stream density represents the capacity of the landscape to transport phosphorus. The validation analysis described in Section 7 showed that Model #1 is the best predictor of measured phosphorus loads statewide.

$$\log_{10}(P) = -0.01284 + 0.12966 * \sqrt{G} + 4.80482 * \frac{1}{F+4} + 1.57791 * \ln(S+1)$$

Where

P = average annual total phosphorus load in kg/km^2
G = % grassland in 30 meter zone around 24k streams
F = % forest in the watershed
S = stream density or the total length of 24k streams in watershed divided by the watershed area

The third method uses multiple regression model #2, which was developed from the same dataset as MR #1, but using a different combination of variables. The land cover variables in MR #2 are cropland and urban land, whose connections to phosphorus loading are more well-defined than the variables in MR #1. Despite its more intuitive structure, the predictive ability of MR #2 is somewhat less than MR #1, which is why both models are included in PRESTO.

$$\log_{10}(P) = 0.241141 + 0.006127 * C + 0.127819 * \ln(U + 1) + 1.666141 * \ln(S + 1)$$

Where

P = average annual total phosphorus load in kg/km^2
C = % cropland in the watershed
U = % urban land in the watershed
S = stream density or the total length of 24k streams in watershed divided by the watershed area

As with the export coefficients (Table 1), both multiple regression models can also be used to predict low, high, and most likely load estimates. Most likely values are derived directly from the equations above. Low and high load estimates account for uncertainty in the actual effects of the model variables and are calculated as the bounds of the 80% prediction interval from the regression equation. This means that we can be 80% confident that the load will fall within that range.

4.3 Point Source Loading

Annual permitted municipal and industrial point source loads have been calculated from permitted facilities with effluent flow and phosphorus monitoring records stored in the WDNR's SWAMP database. To calculate the annual phosphorus loads, first the average annual discharge and phosphorus concentration were calculated from the specific year's monitoring data. There were several instances in which missing records (usually phosphorus, rarely flow) were replaced with estimated values. Some permittees, typically smaller facilities, were not required to collect routine phosphorus data. In those instances, an estimated value based on the most recent year's monitoring record was used.

$$\text{Annual Discharge (MGD)} = \frac{\text{Measured Total Flow (MGD)}}{\text{\# of Discharge Days}}$$

$$\text{Annual P (mg/L)} = \frac{\sum(\text{P Sample Concentrations (mg/L)})}{\text{\# of Samples}}$$

$$\text{Annual P Mass (lbs)} = \text{Annual Discharge} * \text{Annual P Concentration} * 8.344 * 365.25$$

The annual loading data was joined to the georeferenced active outfalls coverage stored within WDNR's SDE spatial server. In the instances were a permit had multiple outfalls, the loads were summed together to represent a single load per permitted site. At the time of this effort, there were 677 permitted outfalls throughout Wisconsin that were georeferenced and had phosphorus monitoring data.

To define the point source loading, PRESTO calculates the total loading upstream from a particular point source and exports that value along with the loading at the location of interest (if applicable). These results and the nonpoint source load are used to calculate the ratio of point to nonpoint source loads at each outfall location or user-defined subbasin.

5.0 PRESTO OUTPUTS

PRESTO applies the methodology in Section 4.0 to determine the ratio of the point source loading to the nonpoint loading, which is dependent on the nonpoint estimation model that is used. In conjunction with the phosphorus point to nonpoint source ratio, the PRESTO outputs information related to the watershed's land cover and other calculations related to the nonpoint source (Table 2).

Table 2: PRESTO Output Categories

Output Category	Output Sub-Category
Watershed Characteristics	Basin Area
	Stream Density
	% Grassland within 30 meters of stream reach
Land Cover	% composition of each land cover type in the watershed
Point Load	P load of all upstream point sources
	P load of point source
Nonpoint Estimation Model – Export Coefficient (EC)	EC Model P Load Estimate (most likely)
	ECModel P Load Estimate (lower bound)
	ECModel P Load Estimate (upper bound)
	ECModel Total Load (most likely estimate load, point source load, all upstream point source load)
	PS:EC NPS Load Ratio (%)
	Export Coefficient Model P Yield Estimate
Nonpoint Estimation Model – Multiple Regression #1 (MR #1)	MR #1 Load Estimate (most likely)
	MR #1 Load Estimate (lower bound)
	MR #1 Load Estimate (upper bound)
	MR#1 Total Load (most likely estimate MR#1 load, point source load, all upstream point source load)
	PS:MR #1 NPS Load Ratio (%)
	Multiple Regression Model #1 P Yield Estimate
Nonpoint Estimation Model – Multiple Regression #2 (MR #2)	MR #2 Load Estimate (most likely)
	MR #2 Load Estimate (lower bound)
	MR #2 Load Estimate (upper bound)

	MR#2 Total Load (most likely estimate MR#2 load, point source load, all upstream point source load)
	PS : MR #2 NPS Load Ratio (%)
	Multiple Regression Model #2 P Yield Estimate

The attribute information in Table 2 can be output in three spatial forms, as specified by the user:

- **Snapped Outfalls –** A point shapefile containing the locations of the snapped outfall/delineation points, with model outputs as attributes
- **Combined Watersheds –** A single polygon shapefile containing polygons representing delineated watersheds, with model outputs as attributes
- **Individual Watersheds –** A series of polygon shapefiles containing a single polygon representing a delineated watershed, with model outputs as attributes

6.0 PRESTO LIMITATIONS

PRESTO was designed for the purpose of supporting NR 217 and TMDL prioritization at a statewide level. While several of its functions may have other applications, users should be aware of the following limitations:

- The most downstream HUC12 typically requires sub-delineation using a 30-meter DEM (default dataset). The subwatershed delineation is only as accurate as the DEM resolution and burned hydrology, though PRESTO does allow the user to integrate more detailed datasets if they are available.

- PRESTO can only be applied for watersheds fully within Wisconsin. All input data layers are clipped at the Wisconsin border even though some watersheds extend into neighboring states.

- PRESTO may not be very accurate for watersheds with significant internally drained areas because the nonpoint load estimation assumes that the entire drainage contributes.

- Application to highly urban areas may lead to inaccurate results because of the highly modified drainage patterns indicative of urban areas. Landscapes that drain to stormwater systems export pollutants differently than those that rely primarily on overland runoff. PRESTO's nonpoint estimation models were developed in landscapes with a small urban land cover component.

- The watershed delineation may not accurately delineate small watershed areas in very flat regions due to the resolution of the default DEM.

- The nonpoint source load estimation methods predict loading under average climatic conditions and therefore will not accurately predict loading in years with extremely high or low runoff.

- The applicability of PRESTO for subwatershed prioritization (HUC12 or smaller) cannot be verified due to lack of extensive monitoring data within watersheds of that scale.

7.0 PRESTO STATEWIDE VALIDATION

Each nonpoint estimation model used in PRESTO was developed based on measured phosphorus load data from throughout Wisconsin. Therefore, these methods should give reasonable results when applied to watersheds within the state. To verify this, the three PRESTO nonpoint estimation models were compared to measured annual loadings at numerous points throughout the state. This exercise demonstrates the validity of the methods, reveals which method performs best statewide, and which nonpoint estimation models are more appropriate for watersheds with different characteristics.

7.1 Measured Phosphorus Loading

The measured annual phosphorus loading values were obtained from two main sources. The first was a USGS publication (Corsi et. al., 1997) that reported unit-area loads from small watersheds in Wisconsin. This publication presented median annual total phosphorus loads at 52 sites throughout the state. The sites represented watersheds with data from 1975 to 1996, drainage areas less than 200 square miles, one or more years of continuous data, and less than 15% of the total monitored yearly load attributable to point sources.

The second source of measured annual phosphorus loading was data developed by the USGS to support SPARROW model calibration (Saad et. al., 2011). This dataset consisted of mean annual phosphorus loads that were detrended to a 2002 base year. These annual loads were determined using Fluxmaster and consisted of data from 1970 to 2007. Individual measurement locations had between 27 and 1038 phosphorus concentration measurements that were used in the loading calculation. The process of detrending helps “compensate for differences in the length and amount of monitoring data among sites, and minimizes the inherent noise introduced by year-to-year variations” (Saad et. al., 2011).

While these two datasets were not developed in exactly the same way, it was the best information available for this analysis. Therefore, the inconsistencies between datasets can be included as a source of uncertainty in this validation analysis.

In order to validate the multiple regression models against an independent data source, any measured load location that was used in the development of the multiple regression analysis was excluded from the validation dataset. The export coefficients developed in Panuska and Lilly, 1995, (and used in WiLMS) used phosphorus loads from various

studies throughout the state. Some of the data used to determine those loads, and thus the export coefficients, may overlap with some of the data being used for the validation. Without knowing exactly what data overlaps, it was not possible to exclude it from the validation dataset.

7.2 Validation Analysis

PRESTO was used to delineate drainage basins for each of the measured data locations. After eliminating the known monitoring sites used in the development of one the nonpoint estimation models, 77 were selected to measure how well the three nonpoint methods performed (Figure 3).

In addition to the drainage basin delineation, PRESTO also calculated the annual nonpoint phosphorus load using each of the three nonpoint estimation methods for each delineated drainage basin and summed the total average annual point loads (upstream point load plus primary point load) using the average point load from 1995-2009. Again, since this timeframe does not necessarily match that of the measured data, this also contributes to the uncertainty in this analysis. The upstream point source loads were added to the nonpoint loads and then compared to the measured loads. This comparison assumes there is no loss or gain of phosphorus within the stream channels, presenting another source of uncertainty in the analysis.

7.3 Validation Statistics

Several goodness-of-fit measures were used to determine which nonpoint estimation method predicted loads that best corresponded with measured loads; they included graphical, Nash-Sutcliffe, percent bias, ratio of root mean square error to standard deviation, average percent error, and coefficient of determination as suggested by Moriasi et al, 2007. Since each measure has its own strengths and weaknesses, looking at several measures provides a more holistic view of model performance.

Figure 4 is a plot of the observed versus “most likely” predicted annual phosphorus loads for each of the three nonpoint methods. This plot reveals that, in general, the larger the annual load the larger the error, though with the great range of values, it is difficult to visualize the performance of the models at low annual load values.

Since there was a large scale range of the data, it was also plotted on a log-log scale shown in Figure 5. This type of plot is better at displaying percent differences of the predicted values from observed. This plot now shows less variability in the larger loads and more in the smaller loads. Both this and the previous plots show that MR #2 tends to overpredict, while the other two methods appear to have the tendency to over- and under-predict.

Plots such as figures 4 and 5 are useful to visualize the data; but to more objectively evaluate the goodness-of-fit of each model, several statistics are presented in Table 3.

Table 3: Statewide fit statistics.

	Export Coefficient	MR #1	MR #2
Nash-Sutcliffe	0.64	0.81	-0.11
Percent Bias	23%	-17%	69%
RSR (RMSE/SD)	0.60	0.43	1.05
Average % Error	47%	-6%	113%
R^2	0.88	0.83	0.89

The fit statistics calculated in Table 3 show that MR#1 gives the best results in all measures except coefficient of determination, though the value is not significantly different than for the other two models.

In addition the fit statistics were calculated on subsets of the data according to ecoregion, drainage area, stream density, and percentages of land use in agriculture, forest and urban. Those results are shown in Tables B1-B10 Appendix B. See Figure 6 for a map of Wisconsin ecoregions, based on the Level III classification with the addition of the Central Sands region. Data plots of fit statistics and error versus various watershed metrics are shown in Appendix B Figures B1-B9.

7.4 Discussion

The fit statistics show that, in general, the MR #1 model performs best statewide, with the land use export coefficient method the next best. The MR #2 model generally over-predicts loads at larger drainage areas, though when the data are log-transformed, the fit statistics are comparable to the other two methods. The MR #1 and export coefficient models perform better at higher stream densities than the MR #2 model and similarly for drainage basins where agriculture is dominant, though stream density is slightly positively correlated to percent agriculture in these basins. There are fewer drainage areas that are dominated by forest and urban, but all models perform well in forested basins while the MR #2 model performs best in highly urbanized basins, which is expected since it uses percent urban area in the basin in its calculation. None of the methods simulated phosphorus loading in the Central Sands area well, though there were only 4 validation points within this ecoregion. The export coefficient model performs best in the Driftless Area with little difference between models in the remaining ecoregions.

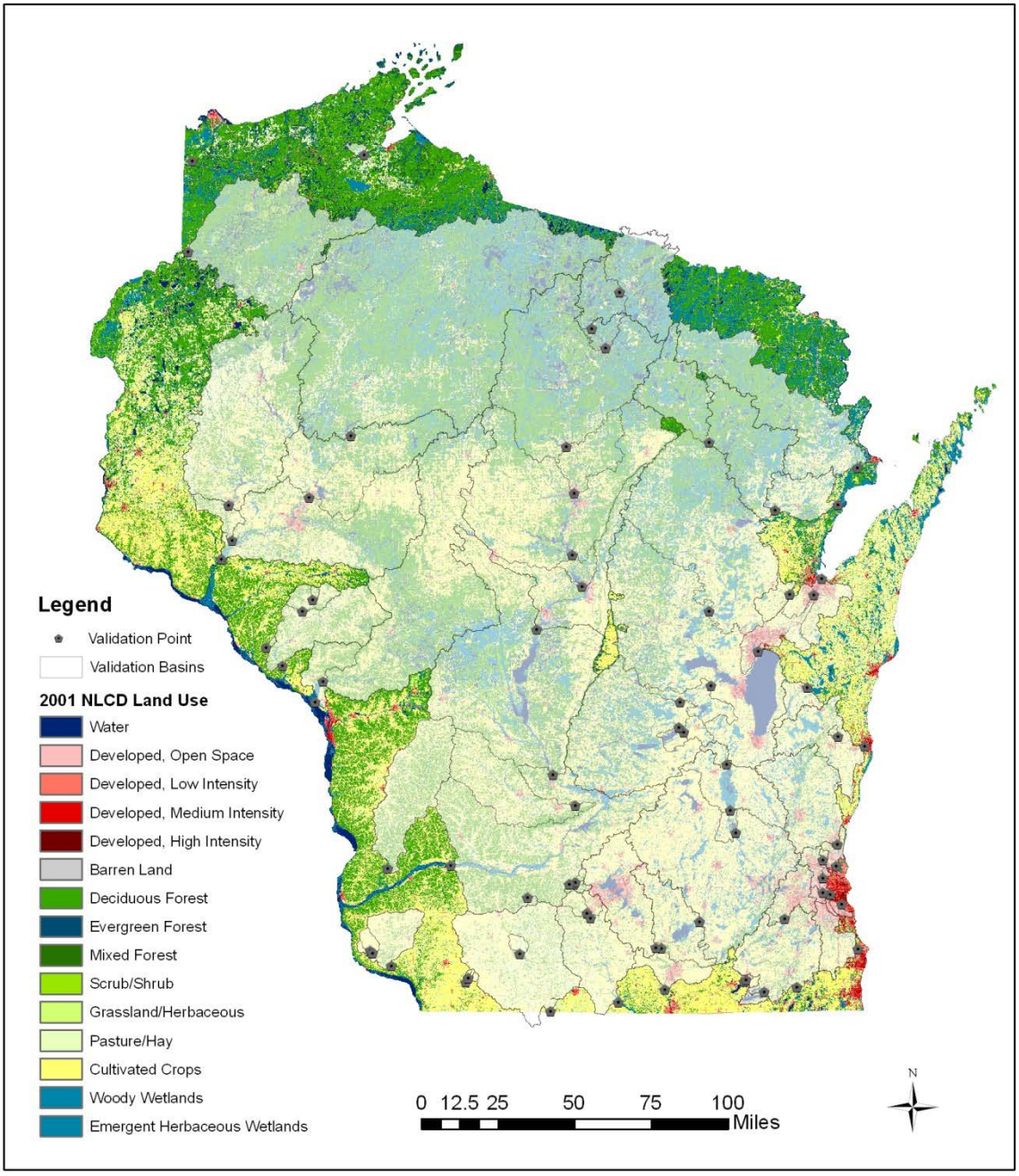

Figure 3: Validation analysis points and associated drainage basins

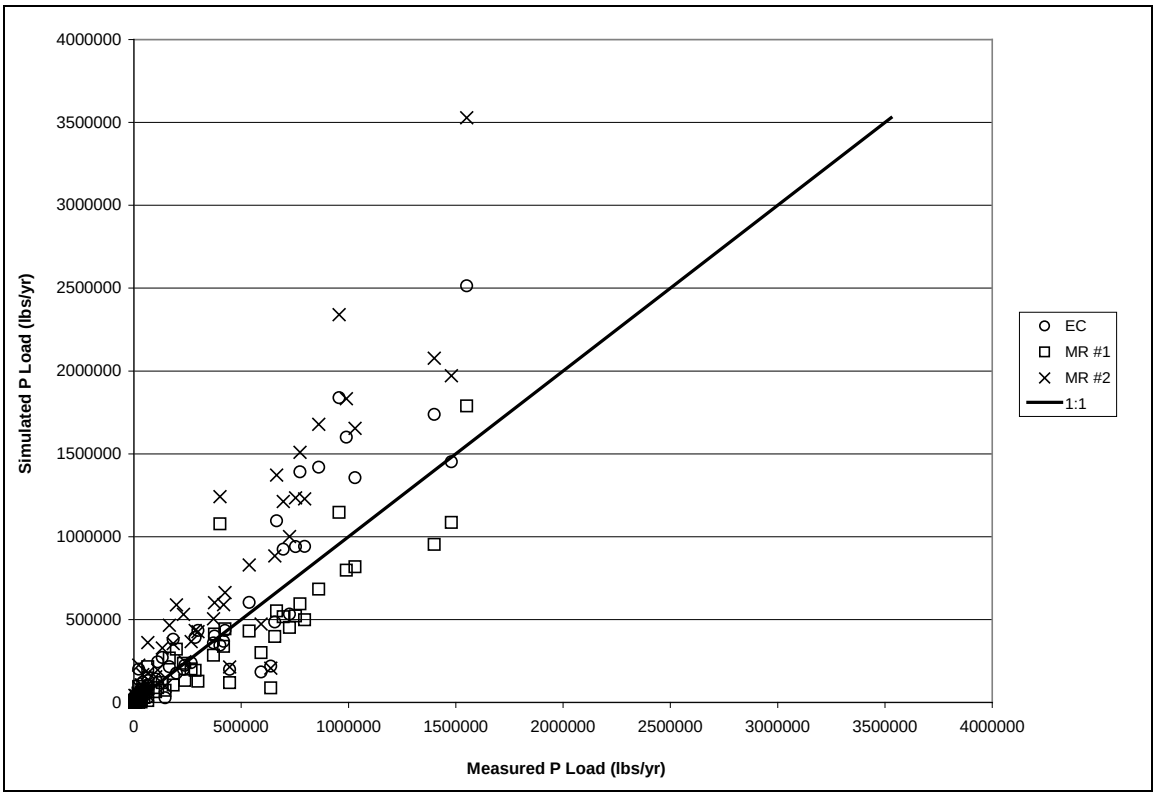

Figure 4: Measured versus "most likely" simulated annual phosphorus loads.

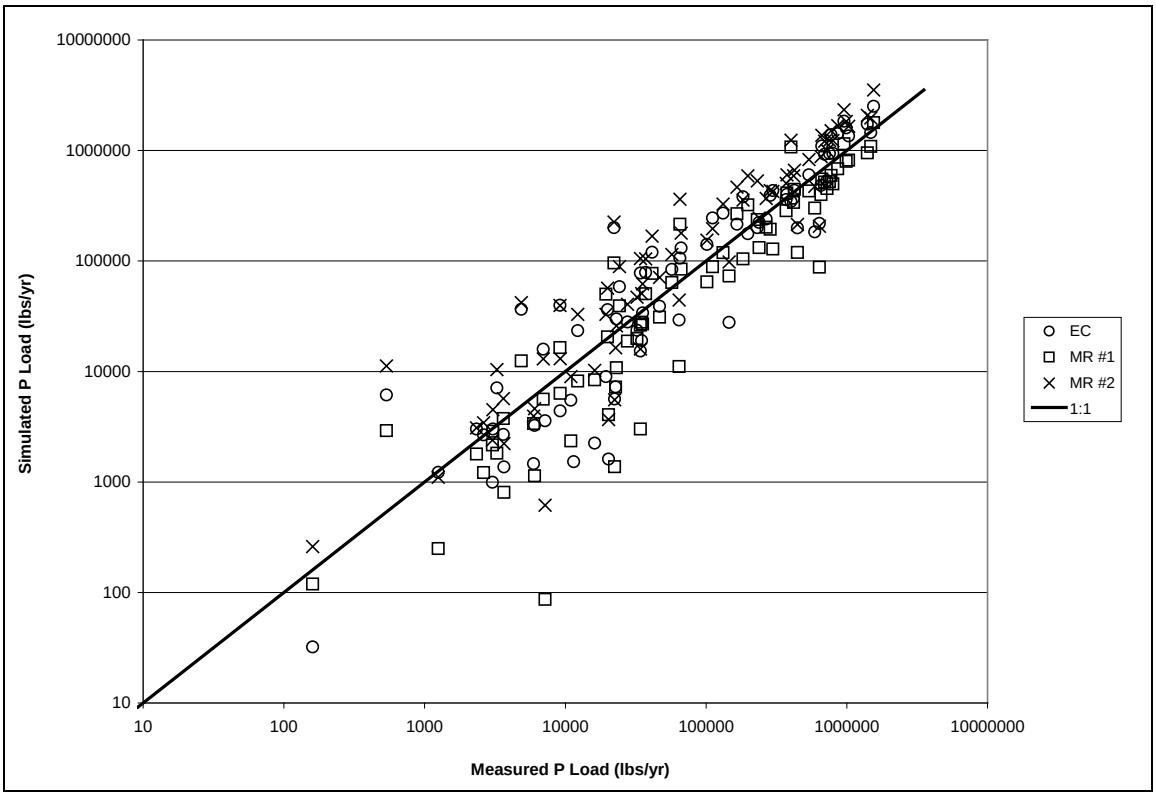

Figure 5: Log measured versus log simulated annual phosphorus loads

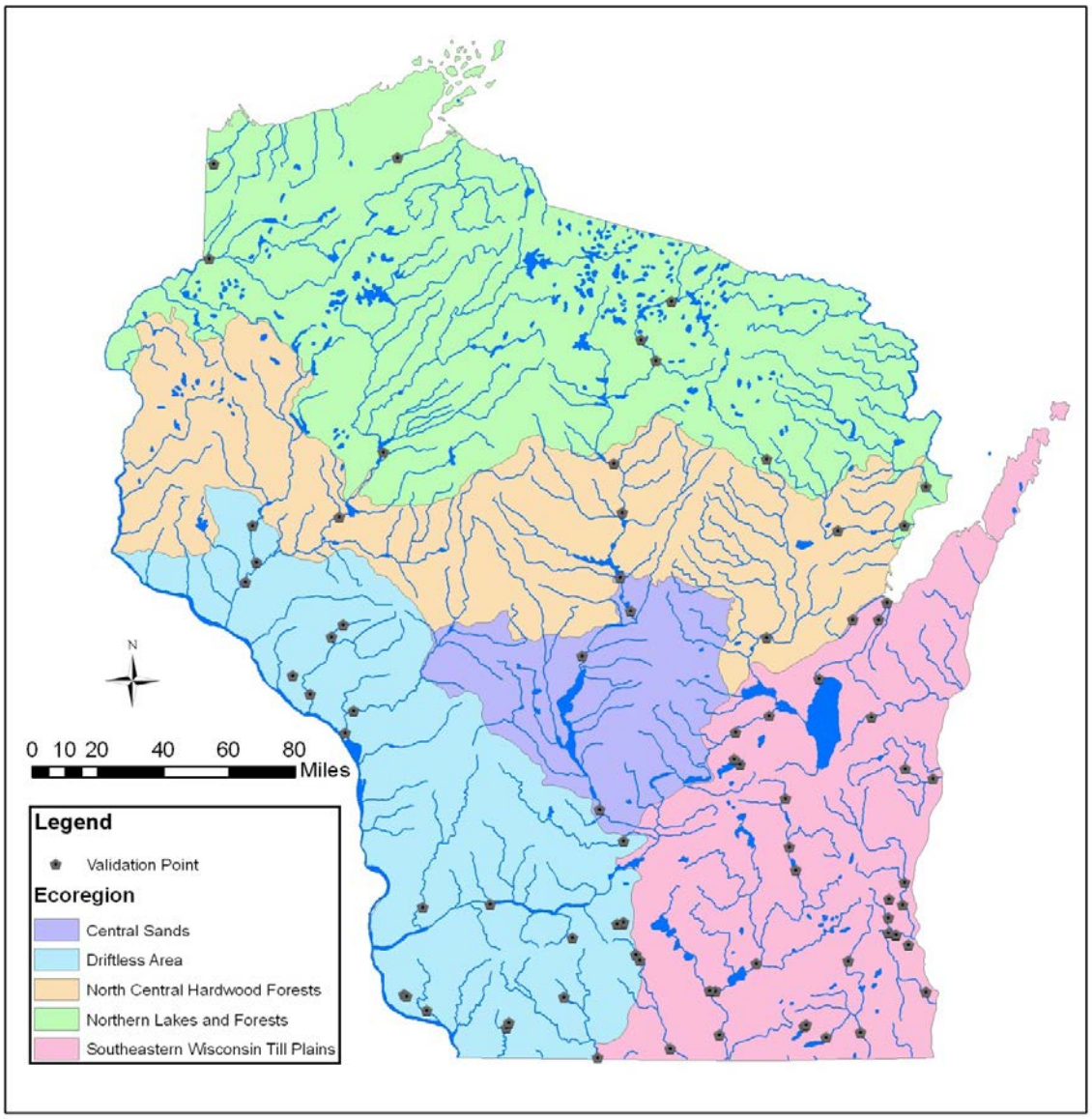

Figure 6: Validation Points per Wisconsin Ecoregion

8.0 VALIDATION OF SUBWATERSHED PRIORITIZATION

In addition to calculating the ratio of point to nonpoint source contributions based on a specified outfall or delineation point, PRESTO can also be applied to pre-defined subwatersheds such as the PRESTO default HUC12 subwatersheds. Each individual subwatershed serves as the spatial unit for modeling and analysis and therefore point and nonpoint loads are calculated for each subwatershed. One application for this type of analysis would be a screening level approach towards identifying subwatersheds with the largest pollutant loads.

To validate the applicability of the different nonpoint source estimation models in targeting phosphorus export from subwatersheds within a large drainage, two of the three

nonpoint estimation models (export coefficient and MR #1) used in PRESTO were compared to the results of a data intensive, process based model called the Soil and Water Assessment Tool (SWAT). The MR #2 model was omitted from this analysis because the estimated loads were statistically less relevant than the other two methods when evaluated against statewide monitoring data. The Eau Claire River Watershed in western Wisconsin was used for the comparison of SWAT and the PRESTO nonpoint estimation models since the SWAT model had already been applied there. Given the process-based natured of the SWAT model, the detail of the input data, and rigor of calibration, we consider the SWAT model results to be the best information available. The Eau Claire Watershed is an 800 square mile watershed with 37 subwatersheds (average size 22 mi^2).

When comparing the two PRESTO nonpoint source estimation methods against SWAT, the MR #1 model estimated a watershed outlet load that most closely matched the SWAT simulated load. While the MR #1 model most closely matched the SWAT simulated phosphorus load at the watershed outlet, the individual subwatershed loads calculated by the MR #1 model did not have the same spatial pattern as the SWAT model results (Figure 7). The export coefficient model more closely matched the spatial pattern of the SWAT model; however, the annual total nonpoint source load was overestimated compared to the SWAT model results. These same trends held true in other SWAT modeled watersheds including the Mead Lake and Red Cedar watersheds.

The results of this analysis indicate that without detailed monitoring data to verify phosphorus export from both the larger basin and its contributing subwatersheds, the use of PRESTO for targeting nonpoint source reduction efforts toward subwatersheds with high phosphorus export may be inappropriate. At the watershed outlet, the MR #1 produced a similar phosphorus load as the SWAT model, indicating that when compared to a multi-objective calibrated SWAT model, MR #1 is best choice of the three models nonpoint source estimation for watersheds not dominated by urban land use.

9.0 PRESTO STATEWIDE ANALYSIS

One of the main objectives of the PRESTO development was to provide industrial and municipal dischargers throughout Wisconsin the information necessary to determine if they satisfy one of the preconditions for adaptive management as stated in Wisconsin administrative code NR 217. Appendix C presents the point to nonpoint source phosphorus load ratio for every georeferenced permitted outfall in Wisconsin for which effluent monitoring data was available (excluding some in the Milwaukee River Basin in the highly urbanized area). If the facility and all permitted upstream point sources within their watershed contribute less than 50% of the phosphorus loading at the outfall point, then the facility has fulfilled NR 217.18(2)(b) and may be eligible for adaptive management.

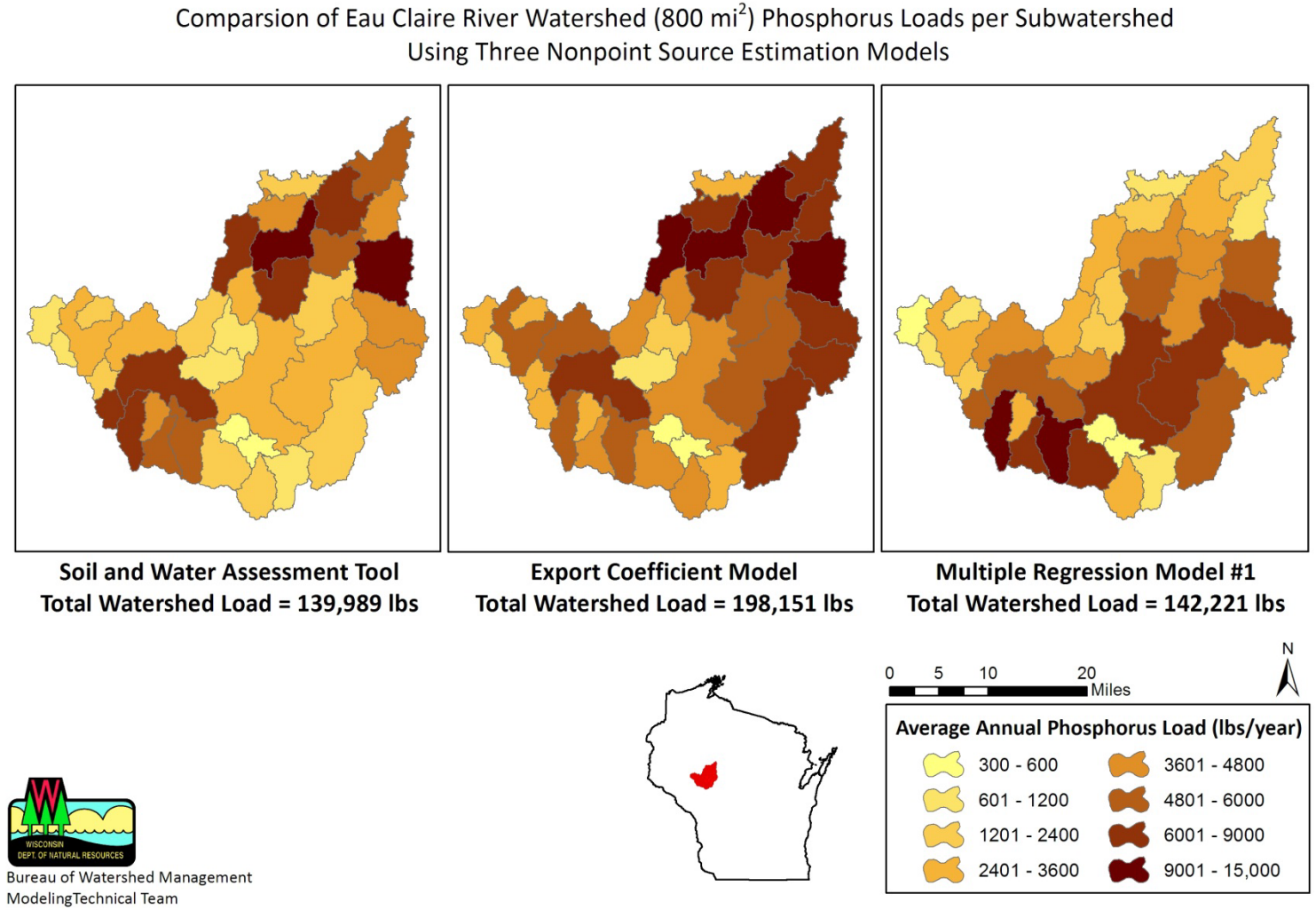

Figure 7: Comparison of nonpoint estimation models for subwatershed prioritization

9.1 Data

The data used for this analysis are described in Section 3. Some modifications to the original datasets were necessary to enable the tool to delineate the appropriate contributing watershed. The data are listed below along with the modifications made.

- HUC 12 Boundaries: Some of the "Downstream" HUC12 values were modified because errors were found in the original dataset.
- Outfall locations: Some outfall locations were eliminated from the analysis because their contributing watershed extended beyond the state boundary (the input datasets were clipped at the state line) or they were located in Lake Michigan or Lake Superior. In addition, because of the resolution of the DEM and stream drainage network, adjustments were necessary to some of the outfall (end of pipe) locations so that PRESTO would delineate the appropriate contributing watershed. Outfall locations were moved for the following reasons:
    - The outfall was near a stream junction and had to be moved slightly past the junction because of DEM resolution;
    - The outfall discharged to a ditch tributary upstream of its official receiving water and had to be moved to the receiving water.
- Hydrography: orphan reaches and lake/reservoir shorelines were removed.
- Land use: no modifications made for this analysis.
- DEM: no modifications made for this analysis.

9.2 Results

PRESTO was run on the outfall points for each major basin in Wisconsin except those within the densely urban region of the Milwaukee River Basin. These points were omitted from the analysis because of the highly altered drainage pattern (storm sewers, etc.) and is therefore outside the nonpoint source models' application range. The results of the statewide analysis are shown in Appendix C. They are organized by major drainage basin, then by phosphorus source ratio, then by alphabetical order. Because there is some uncertainty in the output results, plots of the reported point source contribution percentage along with the 80% confidence interval are presented in Appendix C. The delineated contributing watersheds for each point source are in *watersheds.shp* and will also be available on the WDNR's Surface Water Data Viewer.

According to this screening-level analysis, 494 dischargers (if the lower limit of the confidence interval is used) out of the 606 evaluated would satisfy NR 217.18(2)(b) and may be eligible for adaptive management.

As was mentioned, numerous outfall locations were not evaluated as part of this analysis. First, some points falling within the Milwaukee River Watershed were excluded because of the highly urbanized nature of the lower portion of the basin. In addition, there are many outfalls that discharge into Lakes Michigan and Superior, the Mississippi River and

other waters located along the state boundary. Since the contributing basins at those points contain areas outside the state, they were eliminated from this analysis. Finally, there were also many outfalls that have not yet been geo-located and added to the WDNR outfall GIS layer. The facility outfalls excluded from this analysis are presented in Appendix D along with their receiving water and reason for exclusion.

10.0 CONCLUSIONS

The Wisconsin Department of Natural Resources (WDNR) has developed a spatial toolset called the Pollutant Load Ratio Estimation Tool (PRESTO) to compare a watershed's average annual point and nonpoint phosphorus loads. The comparison provides a screening tool for industrial and municipal dischargers to determine whether they have fulfilled NR 217.18(2)(b), one of the conditions to determine eligibility for adaptive management.

PRESTO is written in the Python scripting language, and is run through ArcGIS 10 with Spatial Analyst. It is designed to be easily customizable and transparent to users with even basic scripting skills.

PRESTO can be run with only the datasets included in the tool package, though it allows the user to specify custom datasets as necessary. The default datasets include: 30 meter digital elevation model (DEM), 1:24k hydrologic network, HUC12 subbasin boundaries, statewide georeferenced permitted outfall points, and 2006 statewide land cover.

PRESTO performs two routines: (1) delineation of a drainage basin upstream of a point, and (2) application of a spatially-explicit nonpoint source phosphorus model (or models) to a drainage basin polygon. The delineation method employed by PRESTO is novel and is distinguished from conventional batch watershed delineation algorithms in two primary ways: (1) short processing times and (2) minimal requirements for data preprocessing. PRESTO uses the land use classifications and drainage lines within a specific watershed to calculate the nonpoint source phosphorus loading, which can be calculated using three different methods: land use specific export coefficients, multiple regression model #1, and multiple regression model #2. High, low, and most likely values are calculated for each method providing the user with the understanding of the range of model certainty.

The PRESTO outputs include snapped outfall locations and watershed polygons with the following associated attributes: watershed characteristics, land cover breakdown, aggregated point source phosphorus loading, nonpoint phosphorus load estimations from three methods, and ratios of point to nonpoint phosphorus loading.

As with any model system, PRESTO has limitations related to both the methods employed for estimating the nonpoint source phosphorus loading and the default datasets provided for those calculations. While PRESTO can be employed for uses other than in support of NR217, the user is encouraged to be aware of the limitations for other applications.

To verify the validity of the nonpoint source estimation models used in PRESTO the outputs from the three nonpoint estimation models were compared to measured annual loadings at numerous points throughout the state. This process revealed that the multiple regression model #1 (MR #1) performed the best statewide. The validation also showed that the other nonpoint estimation models may be more appropriate for watersheds with certain characteristics.

The PRESTO results were also compared to results of a more detailed model, SWAT, for a few basins in the state to determine if the PRESTO results were appropriate to use to target specific subbasins for implementation of phosphorus load reduction strategies. The results of this analysis indicate that without detailed monitoring data to verify phosphorus export from both the larger basin and its contributing subwatersheds, the use of PRESTO for implementation targeting of subwatersheds with high phosphorus export may be inappropriate. Further validation with a more detailed monitoring dataset is warranted.

PRESTO (using multiple regression model #1 for nonpoint phosphorus load estimation) was used to evaluate 606 permitted industrial and municipal outfall locations throughout the state. According to this screening-level analysis, 494 dischargers out of the 606 evaluated would satisfy NR 217.18(2)(b) and may be eligible for adaptive management.

PRESTO, the documentation, user manual, model scripts and datasets, and results of the statewide analysis are being made available to both internal and external DNR customers and will be supported by the WDNR Modeling Technical Team.

11.0 REFERENCES

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U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service, 2011, Federal Standards and procedures for the National Watershed Boundary Dataset (WBD), (2d ed.): U.S. Geological Survey Techniques and Methods 11–A3, 62 p.

APPENDIX A
TECHNICAL SCRIPTING DETAILS

Delineation Method

1. Snap Point to Drain (function *snap*)

At the start of delineation, the outfall point is snapped to a line feature in the "Drain Lines" layer. The point will automatically be snapped to the nearest point on the nearest eligible drain, and the snap distance is recorded in the output tables.

Stream eligibility is defined by two determining factors: (1) Only streams that fall within the sub-basin containing the outfall are considered eligible; (2) If a *Receiving Water Field* for the outfall layer and a corresponding *Drain Name Field* for the drains layer are specified in the tool execution, eligibility is limited to drains with names matching the outfall receiving water. If a match is not found, this step is disregarded and the point is snapped to the nearest drain line within the sub-basin.

Snapping is performed using a custom snap function intended to mimic the *Snap* function in ArcINFO, without requiring an ArcINFO license level.

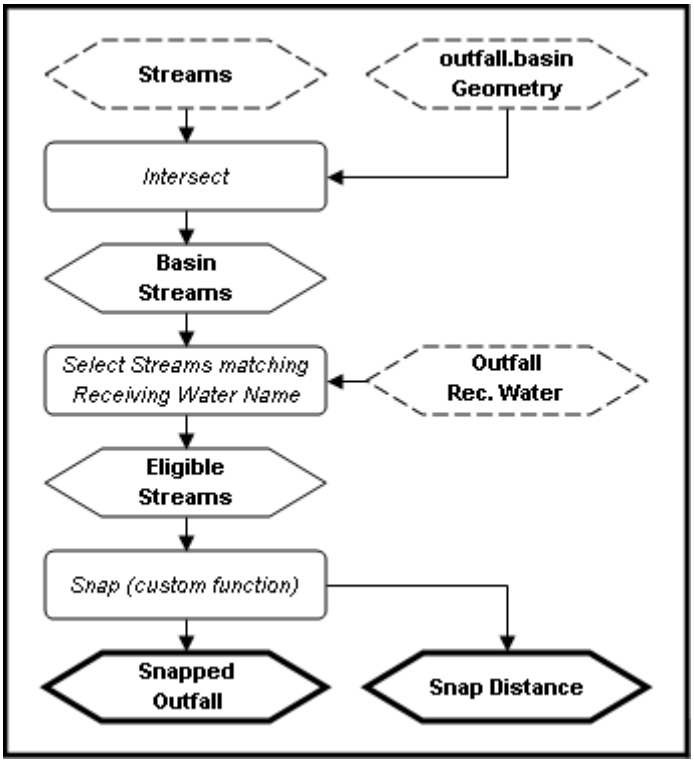


Figure 1: Snap Point to Drain

2. Terrain-based "inner" watershed delineation (function *inner_watershed*)

As the most complex and time-consuming of the four steps in watershed delineation, the delineation of the raster "inner" watershed is itself broken down into several functions and subroutines. This description breaks the delineation down into # steps:

2.1 Basin analysis

The sub-basin containing the outfall point (hereby referred to as the "active sub-basin"), is selected and extracted as a geometrical object. This geometry is used to generate several layers to be used in the analysis.

First, the active sub-basin geometry is intersected with the drains layer, and the points where the lines the active sub-basin boundary are designated as either "inlets" or "outlets" depending on the *Sub-basin ID* and *Downstream Sub-basin* values of adjacent sub-basins. Next, the geometry is buffered by twice the raster resolution and used to extract a local DEM from the input DEM layer. This local DEM is walled by reclassifying all external cells to 1000 meters. A drain hole is created by buffering the outlet points, converting them to raster objects, and subtracting 1000 meters at those points. This is useful for forcing flow in level DEMs. This burned, drained local DEM is then used to generate a Flow Direction raster.

2.2 Raster watershed delineation

The outfall point is converted to a raster cell to serve as the pour point for watershed delineation. This is performed by buffering the point by 1 cell and extracting a piece of the DEM from this mask. The Spatial Analyst *Watershed* function is executed using the raster outfall point and the Flow Direction raster generated in step 2.1.

2.3 Checking for failed delineations and recursive snapping

The area of the watershed generated in step 2.2 is determined reclassified to a binary raster, determining the average cell value, and multiplying this by the raster resolution. If the calculated value is found to be less than 1 square mile, a Flow Accumulation layer is generated for the active sub-basin, and the raster pour point is snapped to the Flow Accumulation layer by a maximum distance of 1-5 cells, increasing incrementally each time the watershed area fails to reach the 1 square mile threshold. After 5 attempted delineations, the watershed is assumed to actually be small, or that the data is faulty. The Flow Accumulation layer is saved in the scratch workspace for diagnostic purposes and delineation proceeds.

2.4 Conversion to a polygon and gap repair

The raster watershed generated in step 2.3 is converted to a polygon, and this polygon is then clipped to the active sub-basin boundary. A custom function mimicking the ArcINFO *Erase* function is executed, generating shapefile geometry representing the gaps between the watershed polygon and the active sub-basin. Each of these gaps is tested for intersection with the *Outlet* points. Those that do not touch an outlet are assumed to be incidental cracks and are appended to the watershed polygon. This watershed polygon is then returned as the finished inner watershed.

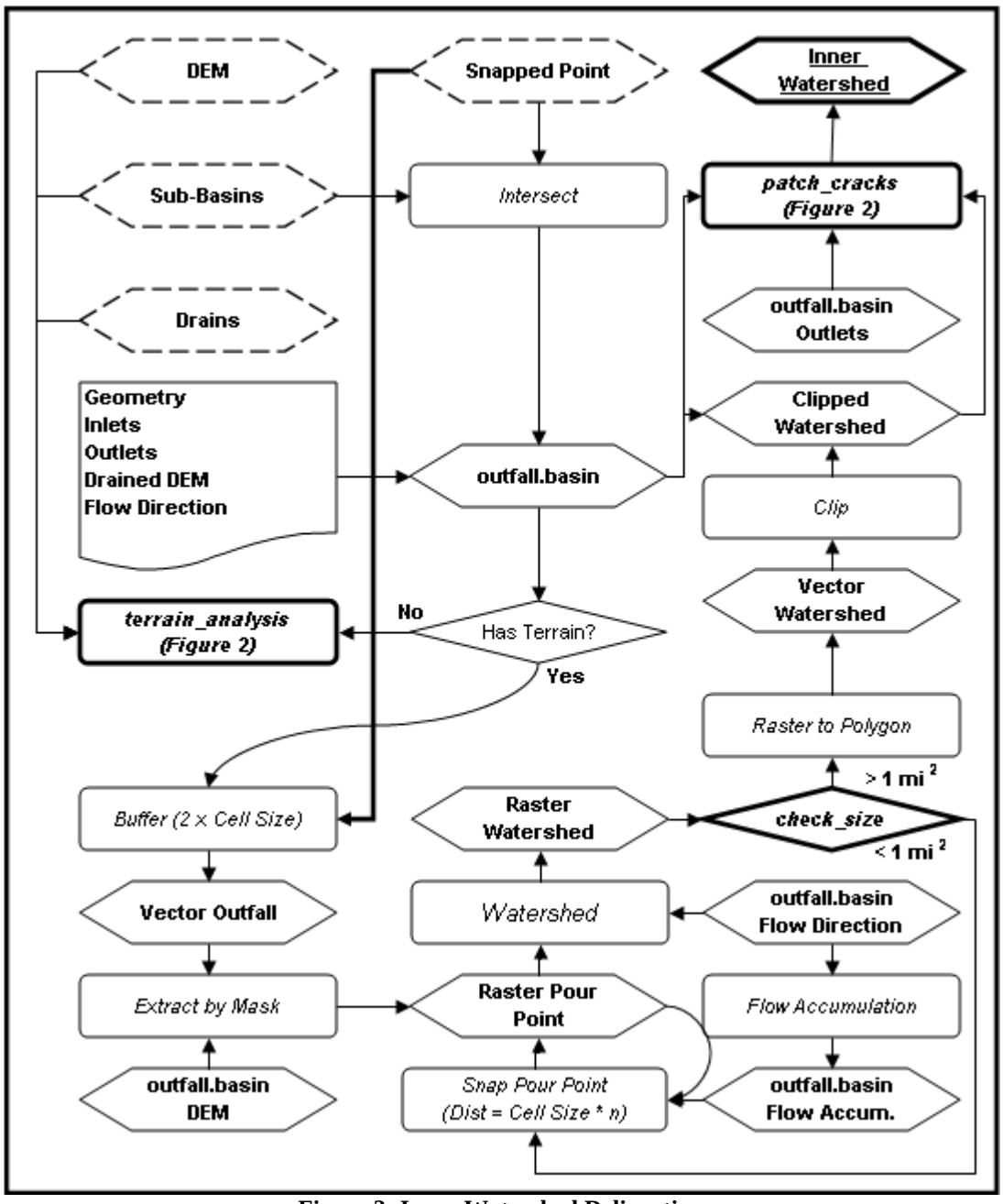


Figure 2: Inner Watershed Delineation

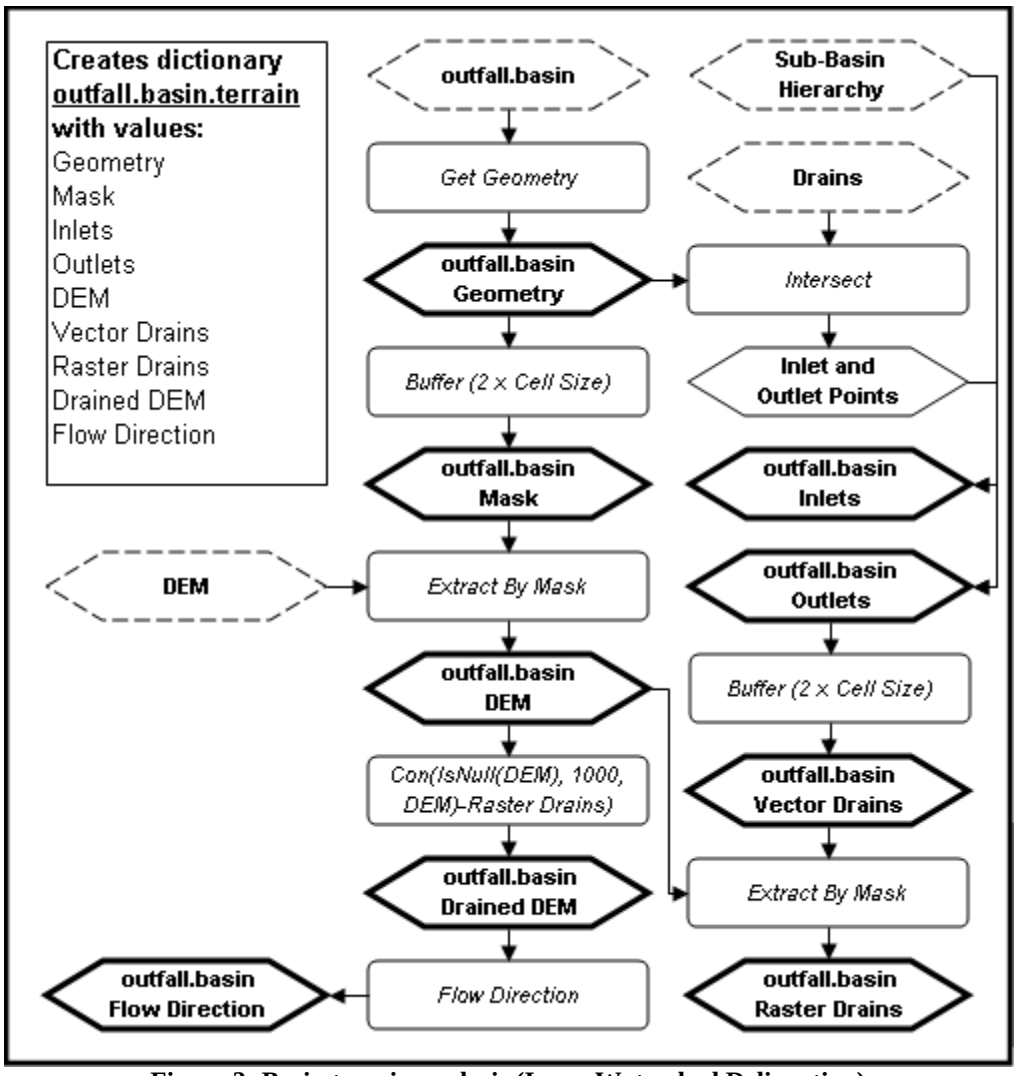


Figure 3: Basin terrain analysis (Inner Watershed Delineation)

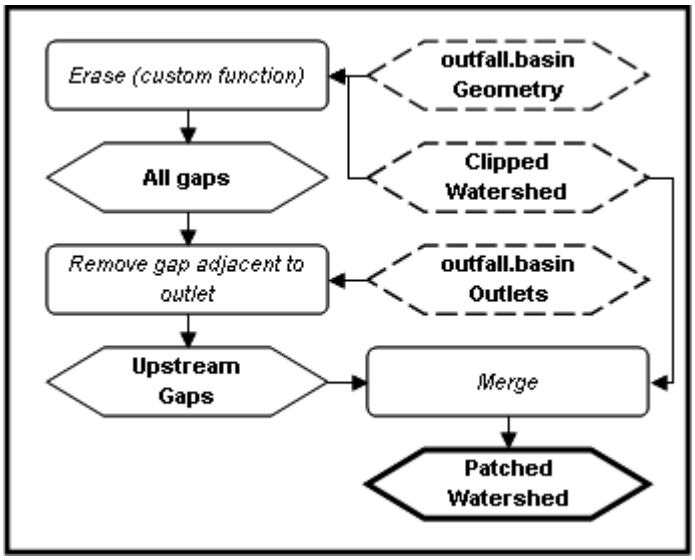


Figure 4: Patch Gaps function (Inner Watershed Delineation)

3. Hierarchical "outer" watershed delineation (function *outer_watershed*)

The inner watershed is buffered to 2 times the raster cell distance. Each of the *Inlet* points generated in step 2.1 are tested for overlap with the buffered inner watershed. Those that intersect are assumed to be hydrologically adjacent, and the adjacent inlet sub-basin is added to a list of upstream basins. All known sub-basins upstream of the adjacent upstream sub-basins are added to the list. These sub-basins are selected in the sub-basins layer, and copied to a new geometry. This is the outer watershed.

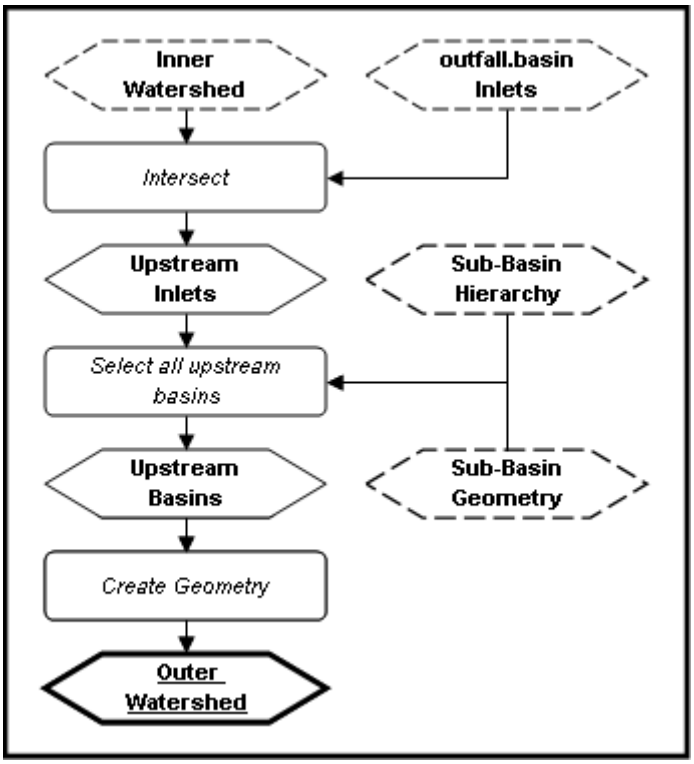


Figure 5: Outer Watershed Delineation

4. Merger of inner and outer watersheds (function *total_watershed*)

The inner watershed and outer watershed geometries are merged, and this merged geometry is dissolved to form the completed watershed.

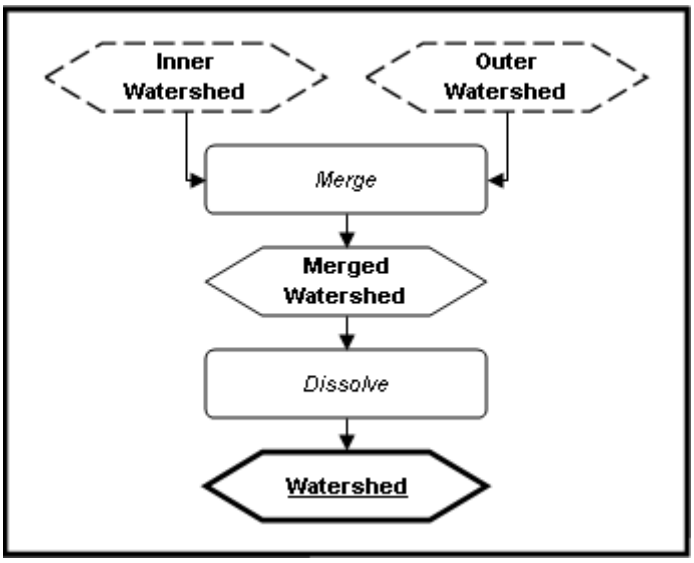


Figure 6: Final watershed preparation

Nonpoint Source Estimation

The application of the three nonpoint source estimation methods is contained within **t**he script *calculate.py*, which performs a wide range of analyses on basins and adds these data to the *unit.out_data* object before passing the unit onto out.py for writing to shapefiles. This section provides a list and explanation of the analyses performed and outputs generated through PRESTO analysis, in the order in which they are calculated.

1. **"Out of State" flags** – The function *out_state* is run to determine the relationship of the watershed to the state boundary, which serves as the outer boundary for terrain processing. *out_state* will return one of three possible values: (1) the watershed is completely within the state, (2) the watershed is partly in the state, or (3) the watershed is completely outside the state. In the first case, no flags are created. In the second, a flag is created, and some analyses will be truncated at the state boundary. In the third case, watershed analysis is skipped entirely.
2. **Watershed area** – The function *basin_area* is run to calculate the basin area in square miles. This data is then added to the *unit* object and written to the output table.
3. **"Own" Point Source Load** – When possible, a load value is assigned to the watershed which represents a loading at the watershed outlet, such as when discharge points are assigned as *Outfall Points*. If *Drainage Area* Definition is set to *Basins*, the function *get_basin_load* is run in an attempt to match a load in the Outfall Points to the unit watershed. This is done by selecting a *Basin ID Field* which matches the *Outfall ID Field*.
4. **Upstream Point Source Load** – The function *upstream_pointsource* is run, which finds all outfall points within the watershed and sums their loads, excluding the point assigned as the "own load".
5. **Land Cover Histogram –** If a land cover layer is provided, the function *land_cover_histogram* returns a dictionary containing land cover classes and the number of pixels belonging to each class.
6. **Non-Point Source Load –** All selected nonpoint models are executed in the function *run_models*. Unlike the other load calculations, NPS model loads are exported as a *tree* object containing the model name and code along with the output value.
7. **Ratio –** A point source:nonpoint source ratio is calculated for each model and each watershed. Because values differ between NPS models, a ratio is calculated for each of the models utilized. It is important to note that only one ratio is calculated for mode – at this time, PRESTO does not support multiple ratios for multiple types of pollutants (ratios will be generated but will be invalid), though this may be easily accomplished in post-processing.

When all of the above attributes have been computed, they are added to the unit's *write* dictionary for output.

Division of scripts, functions

Because PRESTO performs a large number of disparate functions, these functions are divided into separate libraries for the ease of reading the script and making changes to the various subroutines in the tool. The Python scripts are divided as follows (* indicates scripts which are not essential to PRESTO):

\PRESTO vX.XX\Scripts

- **presto.py** – The main script
- **export_table.py** – Script for exporting tables to csv file
- **cleanup.py** – Script for deleting unneeded files
- **functions\ -** Libraries for most script functions
    - **build.py –** Functions related to data processing, data preparation, and other miscellaneous tasks
    - **calculate.py –** Functions related to the application of calculations and numerical analysis to delineated basins
    - **delineate.py –** Functions related to the delineation of basins from a set of points
    - **out.py –** Functions related to writing of output data to files
- **models\ -** Scripts for non-point source models and associated functions
    - **define.py –** Activates and sets names for non-point scripts
    - **export_coeff.py –** Script for included “Export Coefficient” model *
    - **mr.py –** Functions for included “Multiple Regression” models *

Data and Function maps

This section provides lists of all the important variables and functions utilized by PRESTO, along with a brief description.

Variable Map

Below is a list of the important variables utilized in PRESTO, as well as their data type. Nested variable names are sub-objects within the parent object and are utilized in the form “parent.child”, e.g. *ot.basin.file*

None of the variables are truly global in that they must be passed to functions which call them. They are considered “global” for the purposes of this documentation in that they are singular used for all units being processed, in contrast to “local” variables such as *model* and *unit* which typically have several instances within a script run.

Variable Name	Data Type	Description
ot	Tree	Parent object tree containing global variables
ot.**basin**	Tree	Contains paths and data related to sub-basins
ot.basin.**file**	String	Path to sub-basin shapefile
ot.basin.**id_field**	String	Field in shapefile containing sub-basin ID
ot.basin.**ds_field**	String	Field in shapefile containing downstream basin ID
ot.basin.**layer**	String	Sub-basin layer name
ot.basin.**dict**	Dictionary	Dictionary containing sub-basin units
ot.**drain**	Tree	Contains paths and data related to drain lines
ot.drain.**file**	String	Path to drains shapefile
ot.drain.**name_field**	String	Field in shapefile containing stream names
ot.drain.**layer**	String	Drain layer name
ot.**outfall**	Tree	Contains paths and data related to outfalls
ot.outfall.**file**	String	Path to outfall shapefile
ot.outfall.**id_field**	String	Field in shapefile containing outfall ID
ot.outfall.**load_field**	String	Field in shapefile containing outfall loads
ot.outfall.**rec_wat_field**	String	Field in shapefile containing receiving water name
ot.outfall.**layer**	String	Outfall layer name
ot.outfall.**is_empty**	Boolean	Indicates if outfalls are provided
ot.outfall.**dict**	Dictionary	Dictionary containing outfall units
ot.**output**	Tree	Contains output file paths. Attributes ending in “_path” contain the full path to the output GDB

ot.output.**folder, folder_path**	String	Output folder
ot.output.**csv, csv_path**	String	Name of output csv file
ot.output.**gdb, gdb_path**	String	Output geodatabase name
ot.output.**scratch, scratch_path**	String	Path to scratch folder
ot.output.**pour, pour_path**	String	Name of pour point shapefile
ot.output.**snapped, snapped_path**	String	Name of snapped points shapefile
ot.output.**watersheds, watersheds**	String	Name of output watersheds shapefile
ot.output.**temp, temp_path**	String	Name of temporary layer
ot.output.**gdb_full, gdb_full_path**	String	Name of output geodatabase with full path
ot.**reclass**	Tree	Contains data related to reclassification table
ot.reclass.**is_empty**	Boolean	Indicates if reclass table is empty
ot.reclass.**file**	String	Path to reclass table
ot.reclass.**code_field**	String	Field in reclass table with land use code
ot.reclass.**table**	Dictionary	Land cover dictionary with code as index and name as value
ot.reclass.**name_field**	String	Field in reclass table with land use type names
ot.**mode**	String	
ot.mode.**drain_def**	String	Drainage Area Definition
ot.mode.**delineate_only**	Boolean	Shuts off analysis beyond delineation
ot.mode.**has_drain**	Boolean	Indicates whether drain layer is provided
ot.mode.**has_lu**	Boolean	Indicates whether land use is provided
ot.mode.**overwrite_records**	Boolean	Indicates whether records are overwritten
ot.**geog**	Tree	Contains paths and data related to various geographical input files
ot.geog.**dem**	String	Path to digital elevation model
ot.geog.**lu**	String	Path to land use raster
ot.geog.**state**	String	Path to state boundary shapefile
ot.geog.**rast_res**	Integer	Resolution of rasters
ot.**models**	List	List of model objects

“Local” Variables

While there are dozens of local, function-specific variables employed within the script, there are 3 broad types of local variable trees which are passed through several functions with each iterative analysis performed by PRESTO and contain data relevant to both model development and script interpretation. These variables are passed to nonpoint modeling scripts, and described in further detail in the section “Creating Custom Models”.

Variable Name	Data Type	Description
unit	Tree	Contains data related to analysis of a specific basin
unit.**is_redundant**	Boolean	

unit.**watershed**	Geometry	Watershed polygon for a basin
unit.**out_state**	Boolean	Indicates whether basin extends beyond state boundary
unit.**id**	String	String which identifies unit. Either Outfall ID or Sub-basin ID depending on Drainage Area Definition
unit.**area**	Float	Basin area in square miles
unit.**loads**	Tree	Contains load data for basin
unit.loads.**us_pt**	Float	Upstream point sources
unit.loads.**us_np**	List	Upstream nonpoint sources
unit.loads.**pt**	Float	Load for point associated with basin
unit.**out_data**	List	List containing output trees representing output attributes
unit.**ws_clip**	Geometry	Watershed polygon clipped to state boundary
unit.**basin**	String	ID of sub-basin containing point, if delineating watersheds
unit.**ratios**	List	List containing output trees representing ratios of pollutant loads
unit.**lc_hist**	Dictionary	Histogram indicating number of pixels belonging to land cover classes from reclassification table
"Output Object"	Tree	Contains data for writing to tables
obj.**short_name**	String	Formatted field name
obj.**long_name**	String	Descriptive field name
obj.**cat**	String	Category for sorting output
obj.**value**	Various	Output value
model	Tree	Contains data describing a nonpoint source estimation model
model.**code**	String	Abbreviated model code
model.**name**	String	Full model name
model.**script**	String	Filename of model script

Function Map

Below is a list of all the defined functions in the PRESTO function libraries. Model-specific functions are described in the section "Creating Custom Models".

Library	**Function Name**	**Description**
build.py	basin_hierarchy	Adds a list of all upstream sub-basins to each feature in the sub-basin dictionary
build.py	check_inputs	Examines input parameters to make sure the script can run successfully and set various internal parameters
build.py	cleanup	Deletes all files in each input folder

build.py	get_basin_geometry	Reads a basin shapefile and gets the geometry object
build.py	is_numerical	Determines if an input value is a number
build.py	is_redundant	Determines whether a basin or point has already been run, and whether to overwrite it or not
build.py	is_within_state	Determines whether a polygon extends beyond the boundaries of the state, if a state polygon is provided
build.py	match_points_basins	Adds an attribute to the outfalls layer indicating in which sub-basin the point lies
build.py	pour_points	Finds pour points between sub-basins and assigns each point to a basin pair
build.py	read_table	Reads a reclassification table into a dictionary
build.py	seq_name	Determines if a name is redundant in a directory and appends a sequential number to make it unique
build.py	shapefile_to_dict	Reads a shapefile, with all attributes (geometry optional) into a dictionary
build.py	trim_features	Trims sub-basin layer to maximum drainage extent
calculate.py	**attributes_and_loads**	**Primary function scripting nonpoint load estimation. Runs NPS models and calculates other output data.**
calculate.py	basin_area	Calculates the area in square miles of a watershed polygon
calculate.py	get_basin_load	Matches an input basin to a corresponding outfall point, and assigns that load to the basin
calculate.py	land_cover_histogram	Creates a land cover histogram for a watershed polygon
calculate.py	run_models	Executes nonpoint estimation models and returns the calculated values
calculate.py	upstream_pointsource	Adds the loads of all points in a watershed polygon
calculate.py	ratios	Calculates pollutant load ratios from raw load values
delineate.py	**watershed**	**Primary function scripting the delineation of watersheds**
delineate.py	inner_watershed	Delineates an “inner” watershed for a point through terrain analysis
delineate.py	outer_watershed	Delineates an “outer” watershed from the upstream sub-basin hierarchy

delineate.py	total_watershed	Merges and dissolves inner and outer watersheds
delineate.py	snap	Snaps an outfall point to a stream based on matching water characteristics
delineate.py	is_fragment	Flags delineated inner watersheds which may be fragments
out.py	add_to_map	Adds a new shapefile layer to the map
out.py	clear_selections	Clears the selection for input layers
out.py	export_table	Exports a shapefile to a CSV table
out.py	pour_shapefile	Creates a shapefile from pour points
out.py	write_to_shapefile	Writes out_data for a unit to output shapefiles
Models\define.py	activate	Activates nonpoint sources models

Special Objects and Methods

Shapefile Dictionaries

The *Outfall Points* and *Drainage Basins* shapefile layers are fed to a function entitled *shapefile_to_dict* which reads the relevant shapefile data into a dictionary that is easier and faster to access within the script than the use of cursor objects. Essentially, the function reads each line of a shapefile, then creates a dictionary entry where the key is the value of the *Outfall ID/Basin ID* attribute field, and the value is a *tree* object containing each column heading as an attribute. The ID field will also be stored as attribute ".id". For example, if an outfall layer with ID field "ID_FIELD" is read into a dictionary "outfall_dict", and a point has the ID "Point_A" and attributes "'area' = 39" and "'REC_WAT' = 'Wisconsin River'", these attributes can be accessed from the dictionary as such:

```
>>> outfall_dict['Point_A'].area
39
>>>outfall_dict['Point_A'].rec_wat
Wisconsin River
>>>outfall_dict['Point_A'].id
Point_A
>>>outfall_dict['Point_A'].id_field
Point_A
```

Additionally, if the *get_geometry* parameter is activated, the dictionary will include an ArcGIS geometry object, stored in attribute ".geo". This is optional because large numbers of geometry objects, particularly polygons, can be demanding of virtual memory.

Cursors and Geometry

PRESTO makes extensive use of cursor objects, which are used to loop through datasets at the row level to read or modify attributes or geometry. Cursor objects are created (typically named "rows"), iterated through with a *for* loop, and deleted to free up memory. Geometry is stored as lists of objects within the Python code, and is read from a shapefile by reading the *Shape* field from the data table.

"Tree" Objects and applications

The PRESTO script stores datasets together with associated names, attributes, layers in *tree* objects, a custom object type. As an example, the outfalls shapefile is stored in the *Outfall Object* tree and can be referenced with outfall_obj.file. Other attributes about the outfalls data are accessed in a similar manner: the ID field in the outfalls shapefile is stored as outfall_obj.id_field, a boolean indicating whether a load field is provided is

stored as outfall_obj.has_load, etc. Trees are used to store output filenames, reclassification tables, and many other datasets in the script.

"Unit" Object

The *unit* object is a special tree object which corresponds to a drainage basin and contains associated outfalls, terrain analysis layers, and other data that are specific to the basin being analyzed. If the script is run in *Points* delineation mode, an outfall point will be assigned to a unit object. A watershed will then be delineated for the point and assigned to the unit, from which calculations will be made. If running in *Basins* mode, each basin will be designated as a unit.

"*Write*" Method and "Output Trees"

Contained within the *tree* method is a function called "write", which is intended for use only with unit object. and is called to designate data to appear in the output files. The write method takes four attributes: the value to be written, the short (10 character, formatted) heading name, the long heading name, and the attribute category. For example, the following line would be used to record a basin's area to the output tables:

unit.write(unit.area, "BSN_AREA", "Basin Area (sq. mi"), 'attribute')

These parameters are used to create what may be called an "*output tree*" object – a *tree* object with the parameters *value*, *long_name*, *short_name*, and *cat*. On execution of the *write* method, an output tree is created and added to a list *unit.out_data* within the unit object. At the end of a model run, all data in the *out_data* list are recorded to the output tables, grouped by attribute category.

"Model" object

Another application of the *tree* object is for storing model attributes, which is done using the *model* object. Model objects are created for each of the selected nonpoint estimation models at the start of each PRESTO run, using a custom function called "*activate*" located in the file *define.py*. This function matches selected model names with model attributes such as the model name, an abbreviated model code, and the associated script file. Model scripts are declared in *\Scripts\Models__init__.py*

Creating Custom Models

PRESTO is designed to be modular and accept custom nonpoint estimation models. Model development is relatively easy but does require some knowledge of Python scripting, ArcGIS, and the structure of PRESTO. Models that come packaged with PRESTO can be modified as a starting point provided that the script files are renamed. This section covers the steps to adding a model to PRESTO and some model development tips.

To add a custom model to PRESTO, the following steps must be taken:

i. **Create a new script** – A new Python script must be created in the folder *PRESTO vX.XX\Scripts\Models* with a unique name. The script must contain a function called "run" which is called by PRESTO as the primary model script. The *run* function should be declared as follows:

```
def run(unit, model, ot):
    pass
```

where *pass* should be replaced with the model script. This makes the *unit* object, *model* object, and "object tree" datasets available to the model.

ii. **Declare new script –** The script *PRESTO vX.XX\Scripts\Models__init__.py* contains a list which must contain the name of all model scripts available to PRESTO. Add the new script to this list.

iii. **Add model to "activate" function –** The *activate* function in the script *PRESTO vX.XX\Scripts\Models\define.py* contains the long name, code, and script for all models available to PRESTO. Add the new model to this function following the syntax of existing models.

iv. **Add model to tool –** The model must be added to the *Nonpoint Estimation Models* dialog in the *PRESTO* tool in the *PRESTO Tools* toolbox. To access the script parameters, right click the PRESTO tool in ArcToolbox, click the *Parameters* tab, and find *Nonpoint Estimation Models*. Click "…" button under the parameter *Nonpoint Estimation Models* and add the name of the new model. It is important that the name matches the long name of the model specified in define.py *exactly*.

v. **Add new fields to sorting list –** The file out.py contains a list of short field names for the ordering of fields in the output tables. Put any new fields into this table for sorting.

Model development tips

- As you can see from the declaration parameters for the function "*run*", PRESTO makes the global variable tree available to models.

- The *run* function is the function which is initially called by PRESTO, and this function must return an integer or float value which will be recorded as the nonpoint load predicted by that model. Additional data generated by a model can be recorded to the output tables by use of the unit.write method. For example, the "Multiple Regression" models calculate data such as basin stream density and grass buffer percentages, which are recorded in the output data using this method.

- Remember to import all necessary modules in the script header. This will include "arcpy" in most cases, but other useful modules such as *math* also need to be imported if used.

- Data may be appended to unit objects for use in future models – for example, the Multiple Regression script records basin stream density as an attribute *unit.sd* which is utilized by multiple models in that script.

- Multiple models can utilize the same script. It is often useful to group similar models into a single script, and use the *model.code* attribute to differentiate model behavior within a script. An example is the packaged Multiple Regression script, which has its own library managing four distinct models.

- Raster and vector layers generated in the analyses can be saved to the scratch folder with unique names to be viewed for diagnostic purposes. Vector files can be saved using the following line of code:

  arcpy.CopyFeatures_management(*vector_layer_name*, "*output_name*_{a}".format(a = *identifier*))

  where *vector_layer_name* is the data to be saved, *output_name* is the name of the output scratch file, and *identifier* is a variable identification attribute such as *unit.id*

  Raster files are saved using the following method, with the same variables as the vector example:

  raster_layer.save("*output_name_{*a}".format(a = *identifier*))

APPENDIX B
VALIDATION STATISTICS TABLES AND PLOTS

Table B1. Fit statistics for drainage basins within Central Sands (N=4).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	-11.73	-1.18	-35.70
RSR (RMSE/SD)	3.57	1.48	6.06
R2	0.61	0.61	0.52

Table B2. Fit statistics for drainage basins within Driftless Area (N=24).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.74	0.89	-0.05
RSR (RMSE/SD)	0.51	0.33	1.02
R2	0.87	0.90	0.89

Table B3. Fit statistics for drainage basins within North Central Hardwood Forests (N=5).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.87	0.77	-0.01
RSR (RMSE/SD)	0.36	0.48	1.00
R2	0.93	0.98	0.98

Table B4. Fit statistics for drainage basins with within NorthernLakes and Forests (N=10).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.90	0.93	0.53
RSR (RMSE/SD)	0.32	0.26	0.69
R2	0.90	0.97	0.94

Table B5. Fit statistics for drainage basins within Southeastern Wisconsin Till Plains (N=34).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.59	0.69	0.00
RSR (RMSE/SD)	0.64	0.56	1.00
R2	0.88	0.71	0.86

Table B6. Fit statistics for drainage basins with areas greater than median (511 mi^2, N=38).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.50	0.72	-0.39
RSR (RMSE/SD)	0.71	0.52	1.18
R2	0.83	0.76	0.87

Table B7. Fit statistics for drainage basins with stream density greater than median (0.81, N=38).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.47	0.78	-0.78
RSR (RMSE/SD)	0.73	0.47	1.34
R2	0.87	0.81	0.89

Table B8. Fit statistics for drainage basins with agriculture > 50% (N=13).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.56	0.44	-0.36
RSR (RMSE/SD)	0.66	0.75	1.17
R2	0.79	0.51	0.73

Table B9. Fit statistics for drainage basins with forest > 50% (N=7).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.97	0.94	0.59
RSR (RMSE/SD)	0.17	0.25	0.64
R2	0.97	1.00	0.99

Table B10. Fit statistics for drainage basins with urban > 50% (N=4).

	LU Export Coeff.	MR #1	MR #2
Nash-Sutcliffe	0.31	-0.50	0.67
RSR (RMSE/SD)	0.83	1.23	0.57
R2	0.96	0.95	0.95

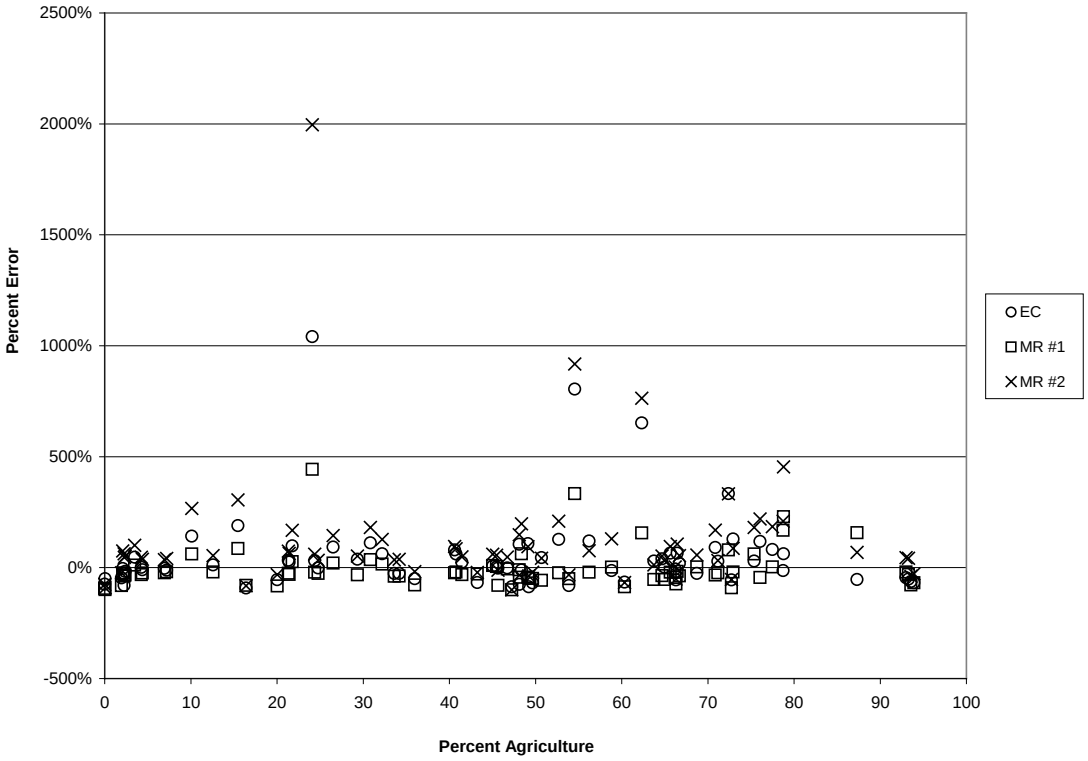


Figure B1.Percent error versus percent agriculture.

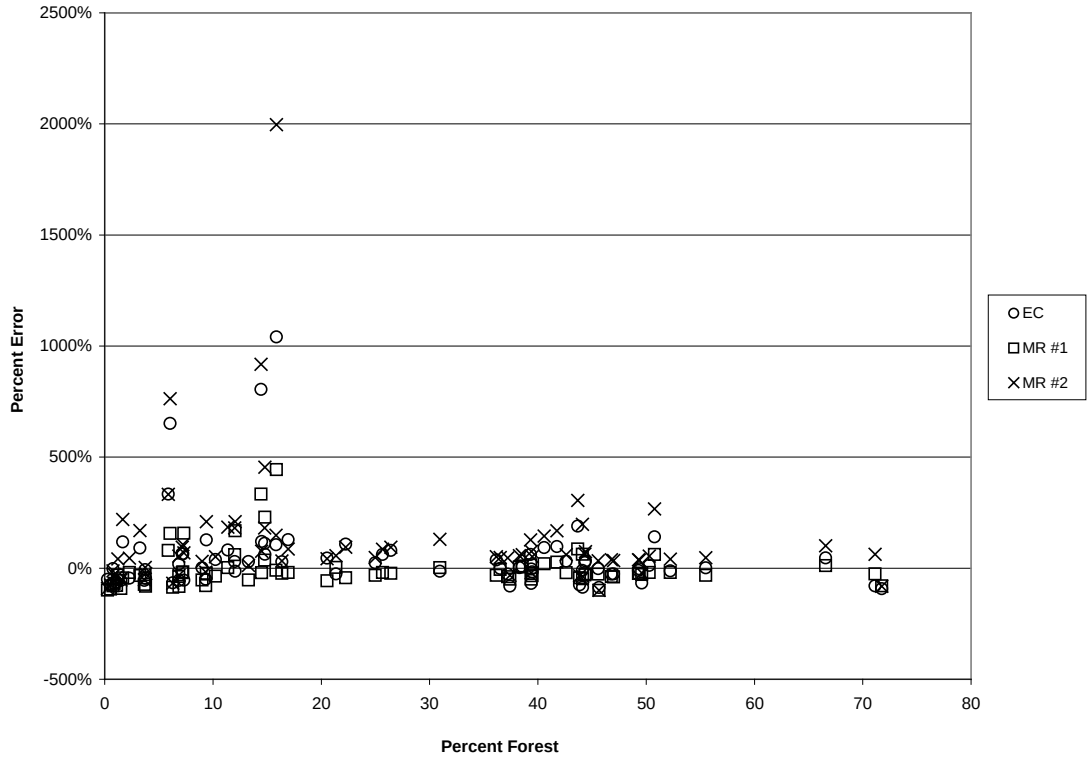


Figure B2.Percent error versus percent forest.

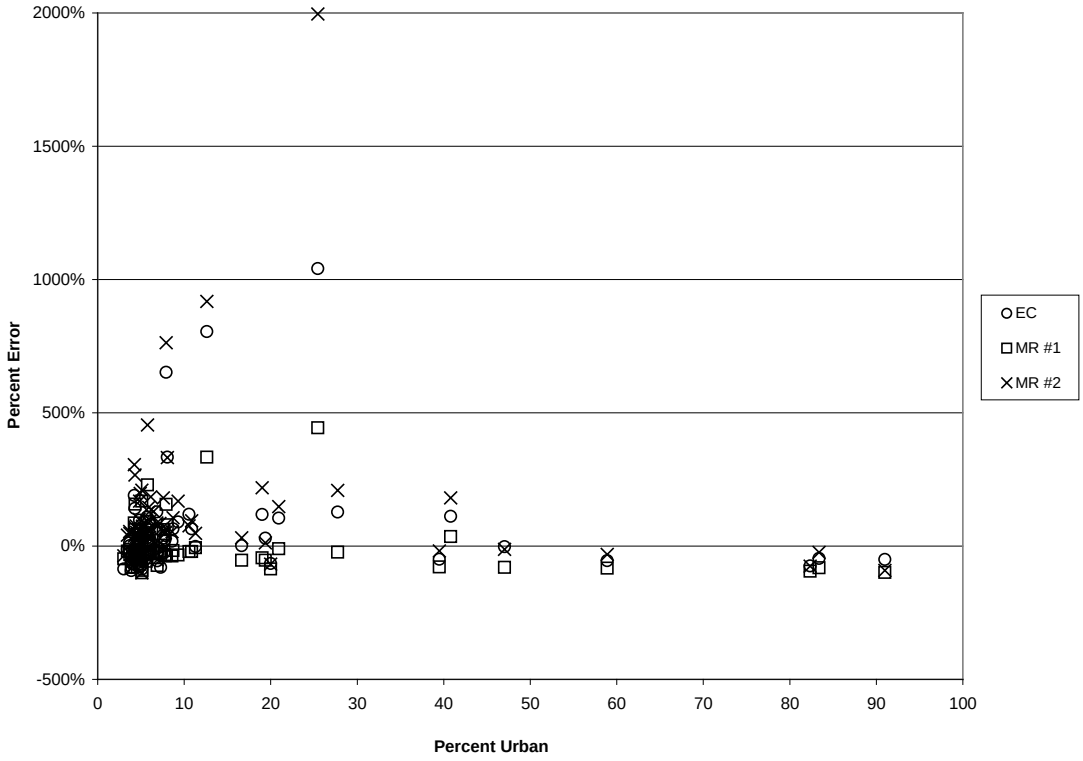


Figure B3.Percent error versus percent urban.

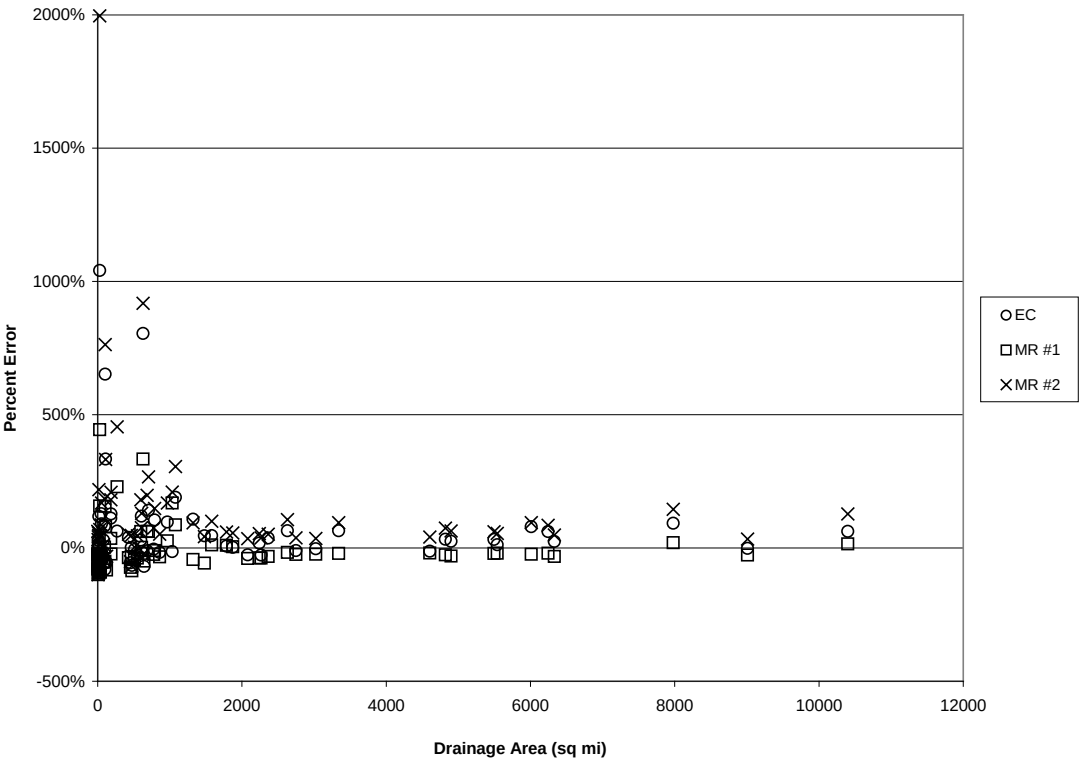


Figure B4.Percent error versus drainage area.

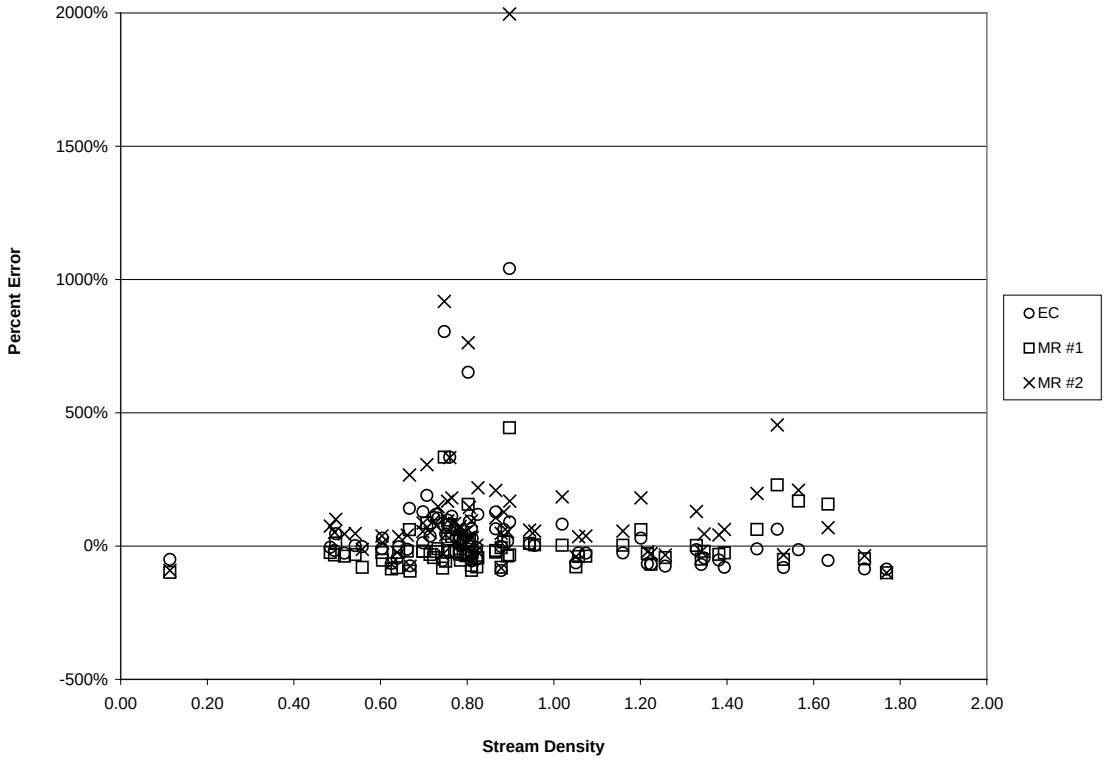


Figure B5.Percent error versus stream density.

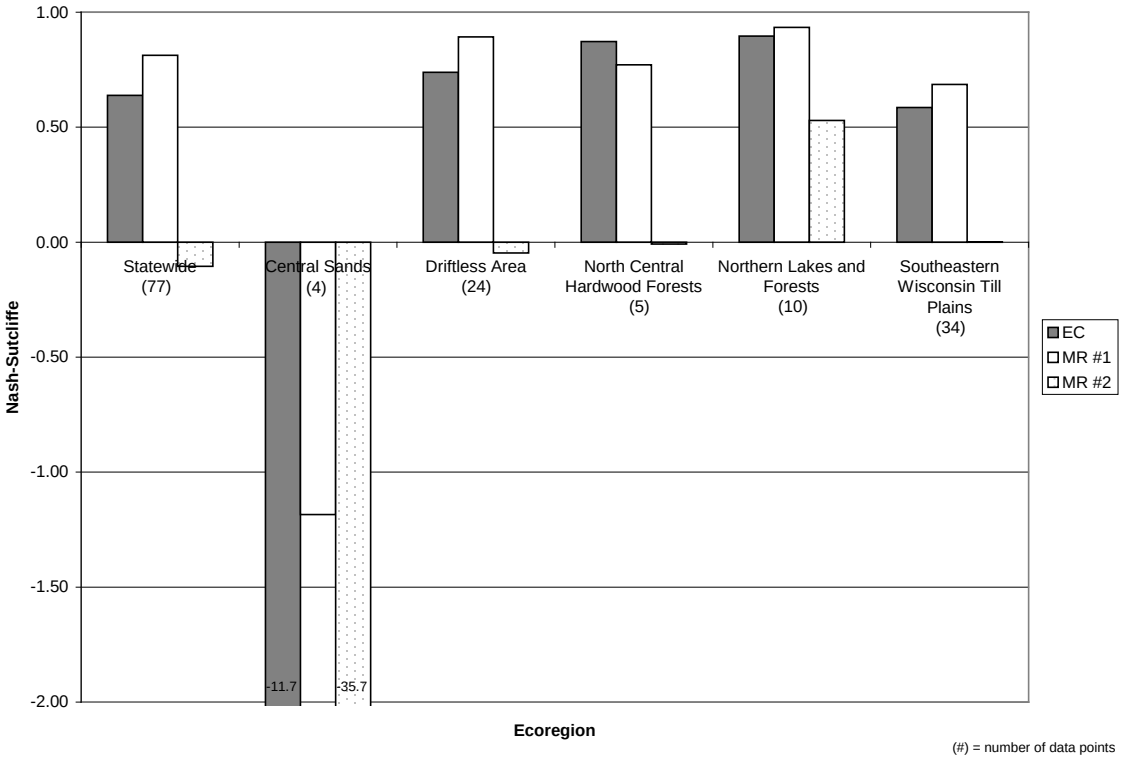


Figure B6.Nash-Sutcliffe by ecoregion.

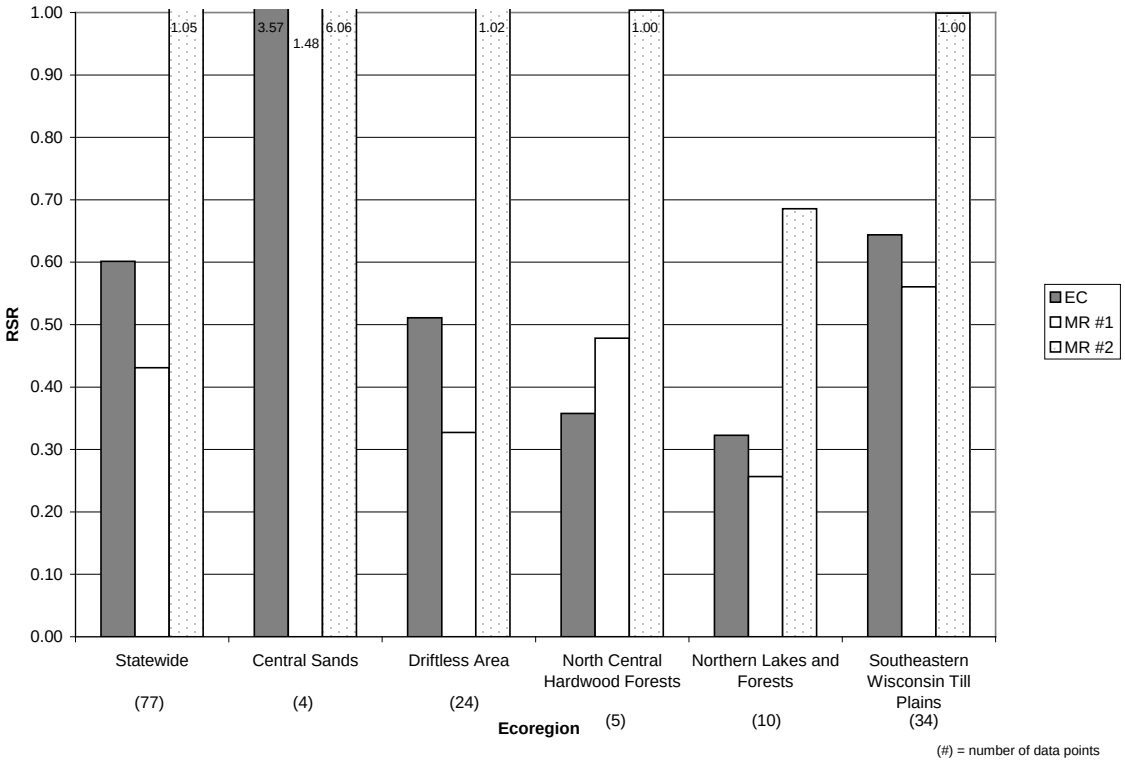


Figure B7.RSR by ecoregion.

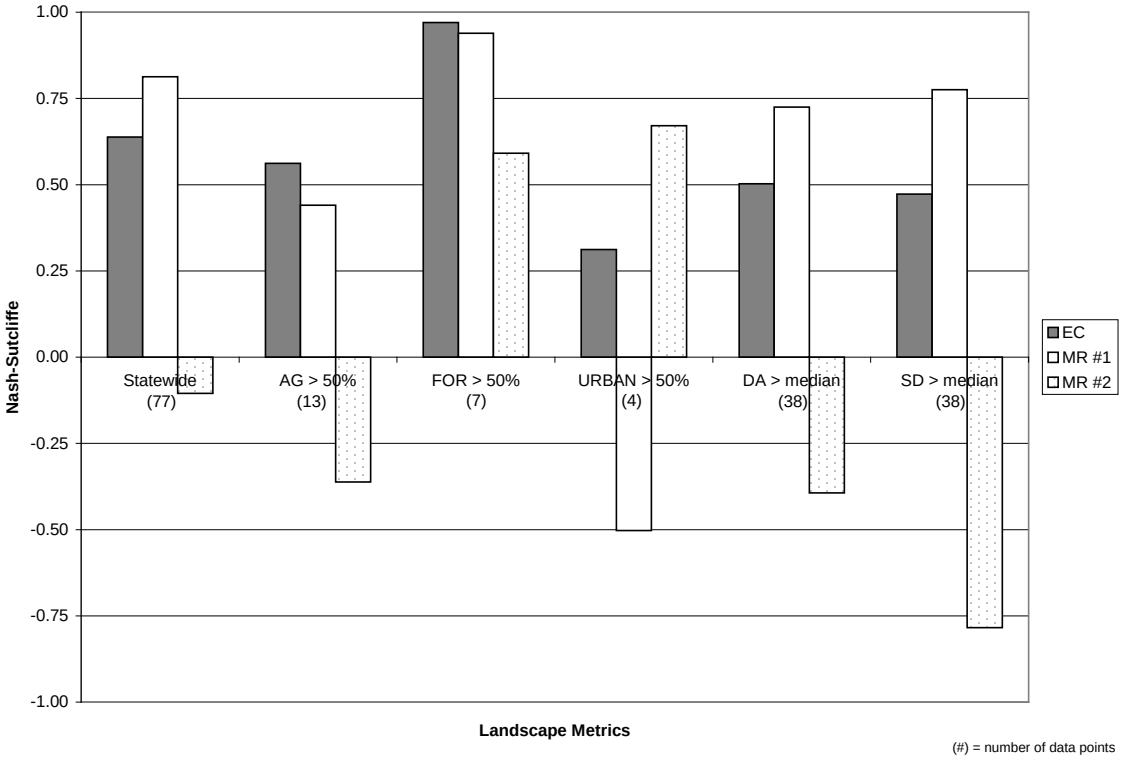


Figure B8.Nash-Sutcliffe by watershed metric.

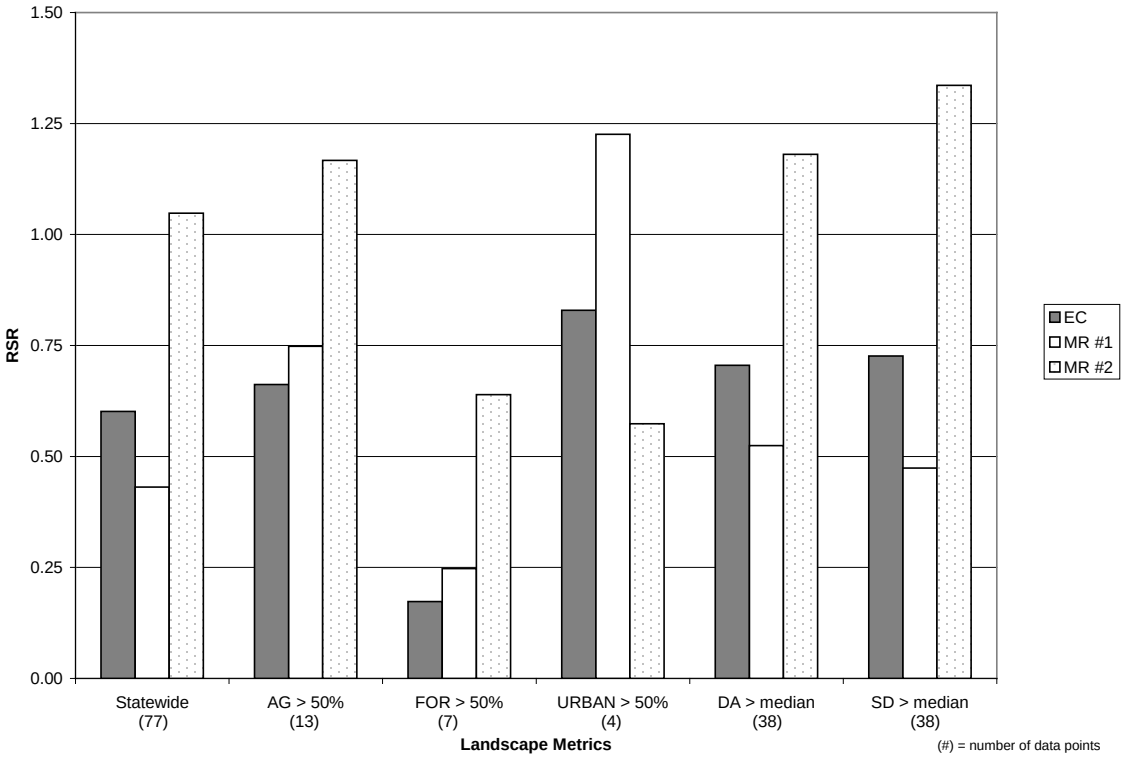


Figure B9.RSR by watershed metric on log-transformed data.

APPENDIX C
STATEWIDE ANALYSIS RESULTS TABLE & PLOTS

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
Bad Axe - La Crosse													
FERRYVILLE WASTEWATER TREATMENT FACILITY	Sugar Creek	24.6	6295	12934	26576	0	147	6442	13081	26723	1:99	1 - 2	
COON VALLEY WASTEWATER TREATMENT FACILITY	Coon Creek	79.3	16061	32758	66814	0	984	17045	33742	67798	3:97	1 - 6	
FOREMOST FARMS USA COOP SPARTA	La Crosse River	149.4	12429	24834	49619	714	106	13249	25654	50439	3:97	2 - 6	
CHASEBURG WASTEWATER TREATMENT FAC	Coon Creek	107.2	23153	47284	96561	984	1084	25221	49352	98629	4:96	2 - 8	
MAPLE GROVE ESTATES SANITARY DISTRICT	Unnamed	5.3	1341	2742	5608	0	123	1464	2865	5731	4:96	2 - 8	
WEST SALEM WASTEWATER TREATMENT FACILITY	La Crosse River	389.3	41599	83630	168129	4234	875	46708	88739	173238	6:94	3 - 11	
US ARMY HEADQUARTERS, FORT MCCOY WWTP	La Crosse River	60.4	5812	11636	23296	0	714	6526	12350	24010	6:94	3 - 11	
BANGOR WASTEWATER TREATMENT FACILITY	La Crosse River	316.5	30666	61545	123519	3640	594	34900	65779	127753	6:94	3 - 12	
SPARTA WASTEWATER TREATMENT FACILITY	La Crosse River	168.7	14349	28686	57350	820	2175	17344	31681	60345	9:91	5 - 17	
ST JOSEPH SANITARY DISTRICT	Unnamed	0.6	151	311	638	0	338	489	649	976	52:48	35 - 69	
WESTBY WASTEWATER TREATMENT FACILITY	Unnamed	1.8	447	906	1837	4376	1525	6348	6807	7738	87:13	76 - 93	
VIROQUA WASTEWATER TREATMENT FACILITY	Unnamed	1.7	42	83	163	0	704	746	787	867	89:11	81 - 94	
ROCKLAND WATER SEWER UTILITIES WWTF	Unnamed	0.1	14	29	83	0	645	659	674	728	96:4	89 - 98	EC
WESTBY COOP CREAMERY	Unnamed	0.4	53	106	214	0	4376	4429	4482	4590	98:2	95 - 99	
Black													
ETTRICK WASTEWATER TREATMENT FACILITY	North Fork Beaver Creek	50.7	9518	19458	39778	0	335	9853	19793	40113	2:98	1 - 3	
MERRILLAN WASTEWATER TREATMENT FACILITY	Halls Creek	47.1	4706	9502	19185	0	184	4890	9686	19369	2:98	1 - 4	
MELROSE WASTEWATER TREATMENT FACILITY	Black River	1927.0	168268	338707	681783	9103	240	177611	348050	691126	3:97	1 - 5	
WAZEE AREA WASTEWATER COMMISSION	Black River	1531.3	135527	272954	549735	7131	419	143077	280504	557285	3:97	1 - 5	
HATFIELD SANITARY DISTRICT	Black River	1290.2	112968	227615	458613	6417	530	119915	234562	465560	3:97	1 - 6	
BLACK RIVER FALLS WWTF	Black River	1595.6	141707	285362	574647	7550	1553	150810	294465	583750	3:97	2 - 6	
GALESVILLE WASTEWATER TREATMENT PLANT	Beaver Creek	157.1	26192	53291	108426	335	1772	28299	55398	110533	4:96	2 - 7	
NEILLSVILLE WASTEWATER TREATMENT FACILITY	Black River	744.9	43686	87758	176292	6002	415	50103	94175	182709	7:93	4 - 13	
GRASSLAND DAIRY PRODUCTS, INC.	Black River	611.0	32896	65957	132246	4971	0	37867	70928	137217	7:93	4 - 13	
MINDORO SAN DIST 1 WWTF	Fleming Creek	24.7	4142	8425	17139	0	650	4792	9075	17789	7:93	4 - 14	
OWEN WASTEWATER TREATMENT FACILITY	Black River	330.2	13345	26636	53164	1263	928	15536	28827	55355	8:92	4 - 14	
CHELSEA SANITARY DISTRICT	Black River	4.4	217	436	874	0	36	253	472	910	8:92	4 - 14	
HOLMEN WASTEWATER TREATMENT FACILITY	Halfway Creek	31.1	5945	12157	24858	0	1060	7005	13217	25918	8:92	4 - 15	
GREENWOOD WASTEWATER TREATMENT FACILITY	Black River	526.9	25802	51666	103453	4390	581	30773	56637	108424	9:91	5 - 16	
CLARK COUNTY HEALTH CARE CENTER WWTF	North Fork of the Popple River	54.3	2848	5715	11470	757	367	3972	6839	12594	16:84	9 - 28	
GRANTON WASTEWATER TREATMENT FACILITY	South Branch O"Neill Creek	16.6	1798	3653	7422	923	108	2829	4684	8453	22:78	12 - 36	
MEDFORD CITY OF	Black River	46.7	2015	4013	7994	36	1192	3243	5241	9222	23:77	13 - 38	
MAPLE ISLAND INC	Black River	47.1	2043	4071	8110	1228	35	3306	5334	9373	24:76	13 - 38	
LYNN DAIRY/LYNN PROTEIN, INC.	South Branch O"Neill Creek	11.1	954	1929	3903	0	923	1877	2852	4826	32:68	19 - 49	
DORCHESTER WASTEWATER TREATMENT FACILITY	Unnamed	2.5	40	79	157	0	757	797	836	914	91:9	83 - 95	
CURTISS WASTEWATER TREATMENT FACILITY	Unnamed	0.4	10	19	38	0	1075	1085	1094	1113	98:2	97 - 99	
Buffalo - Trempealeau													
FOREMOST FARMS USA COOP WAUMANDEE	Waumandee Creek	41.2	16065	32967	67652	0	13	16078	32980	67665	0:100	0 - 0	
AMPI BLAIR CHEESE PLANT	Trempealeau River	180.8	22209	44979	91093	328	10	22547	45317	91431	1:99	0 - 1	
TAYLOR WASTEWATER TREATMENT FACILITY	Trempealeau River	138.8	16427	33230	67221	78	250	16755	33558	67549	1:99	0 - 2	
OSSEO WASTEWATER TREATMENT FACILITY	Buffalo River	70.7	9961	20199	40959	0	246	10207	20445	41205	1:99	1 - 2	
SPF NORTH AMERICA, INC.	Buffalo River	217.8	39817	81034	164917	1109	4	40930	82147	166030	1:99	1 - 3	
INDEPENDENCE WASTEWATER TREATMENT PLANT	Trempealeau River	454.7	95117	193771	394746	1706	1230	98053	196707	397682	1:99	1 - 3	
MONDOVI WASTEWATER TREATMENT FACILITY	Buffalo River	237.5	45249	92130	187583	1113	437	46799	93680	189133	2:98	1 - 3	
ELEVA WASTEWATER TREATMENT FACILITY	Buffalo River	165.2	29052	59129	120347	873	236	30161	60238	121456	2:98	1 - 4	
STRUM WASTEWATER TREATMENT FACILITY	Buffalo River	127.8	20766	42216	85824	246	627	21639	43089	86697	2:98	1 - 4	
DODGE SANITARY DISTRICT NO 1	Trempealeau River	642.0	137838	280694	571611	5864	128	143830	286686	577603	2:98	1 - 4	
ARCADIA WASTEWATER TREATMENT FACILITY	Trempealeau River	561.0	127836	260669	531527	2936	2928	133700	266533	537391	2:98	1 - 4	
WHITEHALL WASTEWATER TREATMENT FACILITY	Trempealeau River	224.0	30641	62113	125912	338	1368	32347	63819	127618	3:97	1 - 5	
FOREMOST FARMS USA COOP ALMA CENTER	South Branch Trempealeau River	9.6	1319	2657	5356	0	78	1397	2735	5434	3:97	1 - 6	
Chippewa													
SENECA FOODS CORPORATION	Hay River	13.5	73	141	275	0	0	73	141	275	0:100	0 - 0	
BIRCHWOOD MANUFACTURING CO	Red Cedar River	384.9	16231	32184	63818	0	3	16234	32187	63821	0:100	0 - 0	
RIDGELAND WASTEWATER TREATMENT PLANT	Lower Pine Creek	32.5	5524	11212	22753	0	46	5570	11258	22799	0:100	0 - 1	
GLIDDEN SANITARY DISTRICT	East Fork Chippewa River	98.2	4738	9443	18820	0	57	4795	9500	18877	1:99	0 - 1	
GILMAN VILLAGE OF	Yellow River	188.7	6363	12670	25229	0	88	6451	12758	25317	1:99	0 - 1	
FAIRCHILD WASTEWATER TREATMENT FAC	South Fork Eau Claire River	216.7	12987	26135	52595	0	215	13202	26350	52810	1:99	0 - 2	
BOYCEVILLE WASTEWATER TREATMENT FACILITY	South Fork Hay River	92.3	18563	37744	76748	0	328	18891	38072	77076	1:99	0 - 2	
CADOTT WASTEWATER TREATMENT FACILITY	Yellow River	364.8	14513	28991	57912	88	305	14906	29384	58305	1:99	1 - 3	
CONRATH VILLAGE OF	Main Creek	118.4	6214	12429	24859	136	70	6420	12635	25065	2:98	1 - 3	
JENNIE O TURKEY STORE INC BARRON PLANT	Yellow River	160.2	34350	69567	140891	43	1251	35644	70861	142185	2:98	1 - 4	
CHETEK CITY OF	Chetek River	198.9	7557	15038	29926	0	283	7840	15321	30209	2:98	1 - 4	
WHEELER WASTEWATER TREATMENT FACILITY	Hay River	422.9	95175	193181	392111	4570	284	100029	198035	396965	2:98	1 - 5	

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
AUGUSTA WASTEWATER TREATMENT FACILITY	Bridge Creek	40.6	9439	19218	39129	0	483	9922	19701	39612	2:98	1 - 5	
DALLAS VILLAGE OF	Upper Pine Creek	22.1	4542	9211	18678	0	240	4782	9451	18918	3:97	1 - 5	
WILSON WASTEWATER TREATMENT FACILITY	Unnamed	1.3	1235	2557	5294	0	77	1312	2634	5371	3:97	1 - 6	
KNAPP WASTEWATER TREATMENT FACILITY	Wilson Creek	27.3	6791	13863	28301	77	360	7228	14300	28738	3:97	2 - 6	
SHELDON VILLAGE OF	Jump River	570.5	20038	39910	79489	1164	111	21313	41185	80764	3:97	2 - 6	
SPRING VALLEY WASTEWATER TREATMENT FACILITY	Eau Galle River	70.2	15047	30552	62033	0	1044	16091	31596	63077	3:97	2 - 6	
COLFAX WASTEWATER TREATMENT FACILITY	Red Cedar River	1163.6	95852	191930	384314	5134	1522	102508	198586	390970	3:97	2 - 6	
DOWNSVILLE SANITARY DISTRICT #1 WWTF	Red Cedar River	1880.3	208206	418580	841519	15154	272	223632	434006	856945	4:96	2 - 7	
PLUM CITY WASTEWATER TREATMENT PLANT	Plum Creek	31.9	5485	11178	22778	0	415	5900	11593	23193	4:96	2 - 7	
WESTBORO SANITARY DISTRICT #1	Silver Creek	29.3	1766	3550	7137	0	132	1898	3682	7269	4:96	2 - 7	
MENOMONIE WASTEWATER TREATMENT FACILITY	Red Cedar River	1795.4	197134	396197	796270	11947	3207	212288	411351	811424	4:96	2 - 7	
ELMWOOD VILLAGE WWTP	Eau Galle River	99.6	22315	45390	92327	1044	883	24242	47317	94254	4:96	2 - 8	
GLENWOOD CITY WASTEWATER TREATMENT FACILITY	Tiffany Creek	15.5	11803	24352	50245	0	1175	12978	25527	51420	5:95	2 - 9	
MAIDEN ROCK WASTEWATER TREATMENT FACILITY	Rush River	214.5	34915	70715	143222	3844	213	38972	74772	147279	5:95	3 - 10	
PRAIRIE FARM VILLAGE OF	Hay River	97.3	25691	52085	105596	2833	234	28758	55152	108663	6:94	3 - 11	
CATAWBA KENNAN JOINT SEWAGE COMMISSION	North Fork Jump River	70.8	1725	3421	6784	0	204	1929	3625	6988	6:94	3 - 11	
GLEN FLORA VILLAGE OF	Deer Trail Creek	11.1	477	953	1905	0	59	536	1012	1964	6:94	3 - 11	
ARKANSAW WASTEWATER TREATMENT FACILITY	Eau Galle River	224.1	36135	73209	148317	4593	182	40910	77984	153092	6:94	3 - 12	
DURAND WASTEWATER TREATMENT FACILITY	Chippewa River	8999.4	492628	983676	1964196	71706	923	565257	1056305	2036825	7:93	4 - 13	
BLOOMER WASTEWATER TREATMENT FACILITY	Duncan Creek	53.8	2542	5064	10086	0	422	2964	5486	10508	8:92	4 - 14	
HAWKINS VILLAGE OF	South Fork Main Creek	16.1	705	1408	2813	0	136	841	1544	2949	9:91	5 - 16	
CHIPPEWA FALLS WWTP	Chippewa River	5666.7	193320	384262	763794	32690	4967	230977	421919	801451	9:91	5 - 16	
RICE LAKE UTILITIES CITY OF	Red Cedar River	387.3	16425	32572	64591	3	3268	19696	35843	67862	9:91	5 - 17	
CASCADES TISSUE GROUP WISCONSIN INC	Chippewa River	5731.0	195671	388920	773026	37657	2053	235381	428630	812736	9:91	5 - 17	
AMPI JIM FALLS DIVISION	Chippewa River	4884.7	156179	310113	615769	31151	721	188051	341985	647641	9:91	5 - 17	
CORNELL WASTEWATER TREATMENT FACILITY	Chippewa River	4800.2	152261	302292	600154	29990	1161	183412	333443	631305	9:91	5 - 17	
EAU CLAIRE WASTEWATER TREATMENT FACILITY	Chippewa River	6645.5	264460	526758	1049207	41518	13972	319950	582248	1104697	10:90	5 - 17	
THORP WASTEWATER TREATMENT FACILITY	North Fork Eau Claire River	49.8	2158	4325	8667	55	425	2638	4805	9147	10:90	5 - 18	
NORTHERN WISCONSIN CENTER FOR DEV DISABLED	Unnamed	0.4	13	26	53	0	3	16	29	56	10:90	5 - 19	
PHILLIPS PLATING CORPORATION	Elk Lake	177.2	3298	6529	12924	455	761	4514	7745	14140	16:84	9 - 27	
PHILLIPS CITY OF	Elk River	177.2	3298	6529	12924	761	455	4514	7745	14140	16:84	9 - 27	
STANLEY WASTEWATER TREATMENT FACILITY	Wolf River	30.7	1615	3251	6547	0	630	2245	3881	7177	16:84	9 - 28	
CELLU TISSUE - CITYFOREST LLC	Flambeau River	1859.9	50148	99304	196646	18528	4497	73173	122329	219671	19:81	10 - 31	
ALMENA VILLAGE OF	Hay River	32.9	4840	9683	19372	1952	731	7523	12366	22055	22:78	12 - 36	
LADYSMITH CITY OF	Flambeau River	1861.5	50280	99569	197174	23025	5238	78543	127832	225437	22:78	13 - 36	
LUBLIN VILLAGE OF	North Fork Eau Claire River	5.2	87	173	343	0	55	142	228	398	24:76	14 - 39	
PRENTICE VILLAGE OF	South Fork Jump River	56.4	1141	2262	4485	0	811	1952	3073	5296	26:74	15 - 42	
FLAMBEAU RIVER PAPERS LLC	Flambeau River	758.7	16655	32897	64979	0	13594	30249	46491	78573	29:71	17 - 45	
WI DOC FLAMBEAU CORRECTIONAL CENTER	Hackett Creek	9.0	184	362	714	0	173	357	535	887	32:68	20 - 48	
PARK FALLS CITY OF	Flambeau River	759.7	16684	32956	65098	13594	3545	33823	50095	82237	34:66	21 - 51	
LAKELAND SANITARY DISTRICT # 1	Unnamed	0.4	29	68	119	0	43	72	111	162	39:61	27 - 60	EC
CRYSTAL LAKE SANITARY DISTRICT	Unnamed	1.0	64	126	247	0	150	214	276	397	54:46	38 - 70	
OGEMA SANITARY DISTRICT	Unnamed	0.2	7	14	34	0	17	24	31	51	55:45	33 - 71	EC
ELLSWORTH COOP CREAMERY	Isabelle Creek	1.7	374	763	1557	0	1107	1481	1870	2664	59:41	42 - 75	
FOREMOST FARMS USA COOP WILSON	Cady Creek	1.8	702	1431	2918	0	2666	3368	4097	5584	65:35	48 - 79	
ELLSWORTH WASTEWATER TREATMENT FACILITY	Isabelle Creek	2.5	419	852	1731	1107	497	2023	2456	3335	65:35	48 - 79	
BALDWIN WASTEWATER TREATMENT FACILITY	Baldwin Creek	3.9	658	1370	3668	0	3844	4502	5214	7512	74:26	51 - 85	EC
CUMBERLAND CITY OF	Hay River	14.0	222	435	850	0	1952	2174	2387	2802	82:18	70 - 90	
WEYERHAEUSER VILLAGE OF	Unnamed	0.3	4	8	16	0	130	134	138	146	94:6	89 - 97	
ELK MOUND WASTEWATER TREATMENT FACILITY	Unnamed	0.5	3	6	12	0	790	793	796	802	99:1	99 - 100	
Fox (IL)													
EAST TROY WASTEWATER TREATMENT FACILITY	Unnamed	40.6	1629	3228	6399	0	439	2068	3667	6838	12:88	6 - 21	
PLYMOUTH TUBE - EAST TROY & TRENT PLANTS	Honey Creek	42.5	1622	3213	6364	439	0	2061	3652	6803	12:88	6 - 21	
V I P SERVICES INC	Unnamed	0.3	34	68	136	0	13	47	81	149	16:84	9 - 28	
WI DNR RICHARD BONG RECREATION AREA	Peterson Creek	2.3	39	77	153	0	21	60	98	174	21:79	12 - 35	
LYONS SANITARY DISTRICT NO 2	White River	62.8	3446	6902	13824	1450	1397	6293	9749	16671	29:71	17 - 45	
GRAND GENEVA RESORT & SPA	Como Creek	16.8	1405	2830	5699	0	1450	2855	4280	7149	34:66	20 - 51	
KENOSHA BEEF INTERNATIONAL	Unnamed	0.5	18	35	71	0	21	39	56	92	37:63	23 - 54	
SILVER LAKE VILLAGE	Fox River	832.3	37587	74877	149163	50196	497	88280	125570	199856	40:60	25 - 57	
SALEM UTILITY DISTRICT	Fox River	843.8	38325	76354	152116	50693	1895	90913	128942	204704	41:59	26 - 58	
WHEATLAND ESTATES MHP	Fox River	791.0	34701	69105	137616	49396	118	84215	118619	187130	42:58	26 - 59	
BURLINGTON WATER POLLUTION CONTROL	Fox River	755.2	33026	65770	130980	42431	6965	82422	115166	180376	43:57	27 - 60	
PELL LAKE SANITARY DISTRICT NO. 1	Unnamed	2.1	148	296	594	0	281	429	577	875	49:51	32 - 66	
WESTERN RACINE COUNTY SEWERAGE DISTRICT	Fox River	447.3	17865	35539	70698	34608	2764	55237	72911	108070	51:49	35 - 68	

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
MUKWONAGO WASTEWATER TREATMENT PLANT	Fox River	303.4	10086	20035	39796	30510	1792	42388	52337	72098	62:38	45 - 76	
WAUKESHA CITY	Fox River	127.1	5799	11568	23076	24723	5787	36309	42078	53586	73:27	57 - 84	
BROOKFIELD, CITY OF	Fox River	73.9	3790	7570	15119	3252	21471	28513	32293	39842	77:23	62 - 87	
BRISTOL UTILITY DISTRICT 1	Bristol Creek	0.9	31	61	120	0	253	284	314	373	81:19	68 - 89	
LAKEVIEW NEUROLOGICAL REHAB CENTER-MIDWEST	Unnamed	1.2	22	43	84	0	189	211	232	273	82:18	69 - 90	
EAGLE LAKE SEWER UTILITY	Unnamed	6.4	85	167	327	0	1760	1845	1927	2087	91:9	84 - 95	
NORWAY TN SANITARY DISTRICT 1 WWTF	Unnamed	5.2	59	116	228	0	2117	2176	2233	2345	95:5	90 - 97	
SUSSEX WASTEWATER TREATMENT FACILITY	Unnamed	7.8	74	145	282	0	3252	3326	3397	3534	96:4	92 - 98	
FONKS HOME CENTER, INC. - HICKORY HAVEN	Unnamed	0.3	1	2	5	0	167	168	169	172	99:1	97 - 99	
TWIN LAKES WASTEWATER TREATMENT FAC	Unnamed	1.0	4	8	15	0	661	665	669	676	99:1	98 - 99	
PADDOCK LAKE WASTEWATER TRTMNT FAC	Unnamed	1.1	3	6	12	0	712	715	718	724	99:1	98 - 100	
Grant - Platte													
JAMESTOWN SANITARY DISTRICT NO 2 WWTF	Menominee River	12.4	4704	9585	19533	0	64	4768	9649	19597	1:99	0 - 1	
BENTON WASTEWATER TREATMENT FACILITY	Galena River	71.6	27805	56971	116730	0	1076	28881	58047	117806	2:98	1 - 4	
BLOOMINGTON WASTEWATER TREATMENT FACILITY	Blake Fork	18.0	8165	16789	34521	380	517	9062	17686	35418	5:95	3 - 10	
BAGLEY WASTEWATER TREATMENT FACILITY	Glass Hollow Creek	7.8	1593	3248	6624	0	301	1894	3549	6925	8:92	4 - 16	
PLATTEVILLE WASTEWATER TREATMENT FACILITY	Rountree Branch	12.5	4793	9848	20232	0	1932	6725	11780	22164	16:84	9 - 29	
MOUNT HOPE WASTEWATER TREATMENT FACILITY	Little Grant River	0.7	153	309	622	0	121	274	430	743	28:72	16 - 44	
STITZER SANITARY DISTRICT WWTF	Gregory Branch	6.5	972	1974	4011	659	153	1784	2786	4823	29:71	17 - 46	
SHULLSBURG WASTEWATER TREATMENT FACILITY	Shullsburg Branch	7.8	2072	4237	8662	0	2031	4103	6268	10693	32:68	19 - 49	
PATCH GROVE WASTEWATER TREATMENT FACILITY	Unnamed	1.3	180	365	739	0	380	560	745	1119	51:49	34 - 68	
FENNIMORE WASTEWATER TREATMENT FACILITY	Gregory Branch	1.6	106	214	430	0	659	765	873	1089	76:24	61 - 86	
ORCHARD MANOR WASTEWATER TREATMENT FACILITY	Austin Branch	0.4	52	104	207	0	367	419	471	574	78:22	64 - 88	
POTOSI-TENNYSON SEWAGE COMMISSION WWTF	Unnamed	3.2	183	366	733	0	1654	1837	2020	2387	82:18	69 - 90	
SINSINAWA DOMINICANS INC WWTF	Unnamed	0.1	10	20	50	0	279	289	299	329	93:7	85 - 97	EC
DICKEYVILLE WASTEWATER TREATMENT FACILITY	Unnamed	0.2	20	39	77	0	1122	1142	1161	1199	97:3	94 - 98	
LIVINGSTON WASTEWATER TREATMENT FACILITY	Little Platte River	0.6	22	44	89	0	1388	1410	1432	1477	97:3	94 - 98	
KIELER SANITARY DISTRICT NO 1 WWTF	Sinnipee Creek	0.1	5	10	20	0	508	513	518	528	98:2	96 - 99	
CUBA CITY WASTEWATER TREATMENT FACILITY	Coon Branch	0.6	21	43	85	0	2929	2950	2972	3014	99:1	97 - 99	
LANCASTER WASTEWATER TREATMENT FACILITY	Unnamed	0.5	11	22	44	0	1642	1653	1664	1686	99:1	97 - 99	
Green Bay													
GRAF CREAMERY INC	Pensaukee River	6.5	1121	2272	4605	0	14	1135	2286	4619	1:99	0 - 1	
LITTLE SUAMICO SANITARY DISTRICT NO 1	Little Suamico River	59.6	12158	24784	50523	0	213	12371	24997	50736	1:99	0 - 2	
ABRAMS SANITARY DISTRICT 1	Pensaukee River	113.2	18158	36867	74853	14	387	18559	37268	75254	1:99	1 - 2	
SURING WASTEWATER TREATMENT FACILITY	Oconto River	602.3	15414	30565	60611	1236	531	17181	32332	62378	5:95	3 - 10	
CRIVITZ WASTEWATER TREATMENT FACILITY	Peshtigo River	659.5	20417	40548	80527	1073	1459	22949	43080	83059	6:94	3 - 11	
PESHTIGO JOINT WASTEWATER TREATMENT FACILITY	Peshtigo River	1113.4	37401	74359	147837	3348	1506	42255	79213	152691	6:94	3 - 11	
OCONTO UTILITY COMMISSION WWTF	Oconto River	956.1	39311	78309	155996	6266	689	46266	85264	162951	8:92	4 - 15	
GILLETT WASTEWATER TREATMENT FACILITY	Oconto River	682.1	19270	38249	75921	1767	1714	22751	41730	79402	8:92	4 - 15	
ST PAPER LLC	Oconto River	713.5	20437	40566	80519	3556	1966	25959	46088	86041	12:88	6 - 21	
OCONTO FALLS WASTEWATER TREATMENT FACILITY	Oconto River	713.7	20442	40575	80538	5522	390	26354	46487	86450	13:87	7 - 22	
SENECA FOODS CORPORATION GILLETT	Christie Brook	8.0	207	410	810	0	75	282	485	885	15:85	8 - 27	
COLEMAN WASTEWATER TREATMENT FACILITY	Little Peshtigo River	45.7	2064	4122	8229	0	816	2880	4938	9045	17:83	9 - 28	
LAKEWOOD SANITARY DISTRICT NO 1	McCaslin Brook	58.0	882	1736	3416	0	356	1238	2092	3772	17:83	9 - 29	
LAONA SANITARY DISTRICT #1	Rat River	38.2	599	1179	2322	0	304	903	1483	2626	20:80	12 - 34	
WI DNR THUNDER RIVER REARING STATION	South Fork Thunder River	21.2	787	1574	3147	0	769	1556	2343	3916	33:67	20 - 49	
WABENO SANITARY DISTRICT #1	North Branch Oconto River	31.2	629	1244	2459	0	742	1371	1986	3201	37:63	23 - 54	
WI DNR LAKEWOOD REARING STATION	Unnamed	4.2	97	193	383	0	138	235	331	521	42:58	26 - 59	
PROVIMI FOODS INC	Unnamed	0.1	13	27	78	0	36	49	63	114	58:42	32 - 73	EC
LENA WASTEWATER TREATMENT FACILITY	Jones Creek	0.9	24	48	95	0	251	275	299	346	84:16	72 - 91	
SAPUTO CHEESE USA LENA	Jones Creek	0.9	25	50	101	251	103	379	404	455	88:12	78 - 93	
Lake Superior													
KNIGHT TOWN OF	Alder Creek	10.1	1258	2550	5168	0	16	1274	2566	5184	1:99	0 - 1	
WHITECAP MOUNTAINS SANITARY DISTRICT	Alder Creek	18.9	1543	3105	6245	16	16	1575	3137	6277	1:99	1 - 2	
WI DNR LES VOIGT STATE FISH HATCHERY	Pikes Creek	30.8	2050	4114	8256	0	57	2107	4171	8313	1:99	1 - 3	
MELLEN CITY OF	Bad River	99.0	5037	10076	20158	0	562	5599	10638	20720	5:95	3 - 10	
MIDDLE RIVER HEALTH & REHABILITATION CENTER	Middle River	33.0	1045	2074	4116	0	124	1169	2198	4240	6:94	3 - 11	
MAPLE SCHOOL DISTRICT	Bardon Creek	0.2	68	137	277	0	9	77	146	286	6:94	3 - 12	
MONTREAL CITY OF	West Fork Montreal River	75.8	3214	6408	12779	0	746	3960	7154	13525	10:90	6 - 19	
DULUTH WINNIPEG & PACIFIC RAILWAY	Unnamed	0.9	20	39	78	0	7	27	46	85	15:85	8 - 26	
SCHOOL DISTRICT OF SUPERIOR	Unnamed	0.1	2	5	9	0	2	4	7	11	29:71	18 - 45	EC
SUPERIOR VILLAGE OF	Pokegama River	26.1	415	890	1737	0	525	940	1415	2262	37:63	23 - 56	EC
PORT WING TOWN OF	Unnamed	7.4	273	638	1175	0	525	798	1163	1700	45:55	31 - 66	EC
POPLAR VILLAGE OF	Barden Creek	0.3	235	484	1000	9	429	673	922	1438	47:53	30 - 65	

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
SAXON SANITARY DISTRICT #1	Vaughn Creek	1.4	49	99	198	0	109	158	208	307	52:48	35 - 69	
WI DNR BRULE RIVER STATE FISH HATCHERY	Little Bois Brule River	28.8	97	188	366	0	313	410	501	679	62:38	46 - 76	
IRON RIVER NATIONAL FISH HATCHERY	Schacte Creek	2.5	60	119	234	0	1648	1708	1767	1882	93:7	88 - 96	
CLOVER SANITARY DISTRICT	Unnamed	0.1	3	6	11	0	100	103	106	111	94:6	90 - 97	EC
GRAND VIEW SANITARY DISTRICT	Twentymile Creek	0.5	2	3	6	0	58	60	61	64	95:5	90 - 97	
BURLINGTON NORTHERN SANTA FE RAILWAY COMPANY	Unnamed	0.0	1	1	2	0	48	49	49	50	98:2	96 - 99	EC
MURPHY OIL USA INC	Newton Creek	0.7	3	6	11	0	273	276	279	284	98:2	96 - 99	
Manitowoc													
HOLY FAMILY CONVENT WASTEWATER TREATMENT FAC	Silver Lake	18.1	2749	5549	11201	0	65	2814	5614	11266	1:99	1 - 2	
LEMBERGER LANDFILL SUPERFUND SITE	Branch River	79.7	24802	50300	102009	1489	0	26291	51789	103498	3:97	1 - 6	
LAKESIDE FOODS INC MANITOWOC PLANT	Manitowoc River	526.2	79876	160691	323267	8310	1	88187	169002	331578	5:95	3 - 9	
ROCKLAND SD1 WASTEWATER TREATMENT FACILITY	Mud Creek	53.3	8467	16990	34095	807	79	9353	17876	34981	5:95	3 - 9	
CLARKS MILLS SANITARY DISTRICT	Manitowoc River	392.2	43575	87410	175341	6763	58	50396	94231	182162	7:93	4 - 14	
REEDSVILLE WASTEWATER TREATMENT FACILITY	Mud Creek	26.8	4805	9658	19414	0	807	5612	10465	20221	8:92	4 - 14	
CHILTON WASTEWATER TREATMENT FACILITY	South Branch Manitowoc River	75.8	4252	8477	16901	793	701	5746	9971	18395	15:85	8 - 26	
BRILLION IRON WORKS	Spring Creek	6.5	511	1017	2022	0	408	919	1425	2430	29:71	17 - 44	
BRILLION WASTEWATER TREATMENT FACILITY	Unnamed	6.8	768	1546	3113	0	690	1458	2236	3803	31:69	18 - 47	
VALDERS WASTEWATER TREATMENT FACILITY	Unnamed	4.4	817	1649	3331	0	813	1630	2462	4144	33:67	20 - 50	
HILBERT WASTEWATER TREATMENT FACILITY	Unnamed	3.4	237	473	942	0	258	495	731	1200	35:65	21 - 52	
MORRISON SANITARY DISTRICT NO 1	Unnamed	0.8	308	625	1268	0	741	1049	1366	2009	54:46	37 - 71	
POTTER WASTEWATER TREATMENT FACILITY	Unnamed	1.8	44	87	172	0	107	151	194	279	55:45	38 - 71	
KOHLER COMPANY GENERATOR	Unnamed	1.0	142	287	580	0	481	623	768	1061	63:37	45 - 77	
NEW HOLSTEIN WASTEWATER TREATMENT FACILITY	Jordan Creek	3.4	144	286	567	0	830	974	1116	1397	74:26	59 - 85	
ST NAZIANZ WASTEWATER TREATMENT FACILITY	Unnamed	2.1	89	176	347	0	1277	1366	1453	1624	88:12	79 - 93	
WHITELAW WASTEWATER TREATMENT FACILITY	Unnamed	0.6	25	48	94	0	748	773	796	842	94:6	89 - 97	
FOREMOST FARMS USA CHILTON	Unnamed	1.3	4	7	14	0	793	797	800	807	99:1	98 - 100	
Milwaukee													
WASTE MANAGEMENT OMEGA HILLS LANDFILL	Menomonee River	34.5	2115	4235	8479	0	1	2116	4236	8480	0:100	0 - 0	
KEWASKUM VILLAGE	Milwaukee River	147.2	8520	16987	33867	1732	580	10832	19299	36179	12:88	6 - 21	
CAMPBELLSPORT WASTEWATER TREATMENT FACILITY	Milwaukee River	53.9	3572	7135	14252	0	1732	5304	8867	15984	20:80	11 - 33	
FREDONIA MUNICIPAL SEWER AND WATER UTILITY	Milwaukee River	437.0	20230	40257	80111	9948	339	30517	50544	90398	20:80	11 - 34	
SCHREIBER FOODS INC - WEST BEND	Cedar Creek	85.0	5658	11320	22646	2794	279	8731	14393	25719	21:79	12 - 35	
SAUKVILLE VILLAGE SEWER UTILITY	Milwaukee River	454.7	21323	42441	84475	10287	1847	33457	54575	96609	22:78	13 - 36	
WEST BEND CITY	Milwaukee River	245.7	11740	23366	46508	2312	5006	19058	30684	53826	24:76	14 - 38	
NEWBURG VILLAGE	Milwaukee River	263.2	12812	25512	50802	7318	689	20819	33519	58809	24:76	14 - 38	
GRAFTON VILLAGE WATER & WASTEWATER UTILITY	Milwaukee River	470.7	22173	44139	87865	12134	3210	37517	59483	103209	26:74	15 - 41	
JACKSON (VILLAGE) WASTEWATER TREATMENT PLANT	Cedar Creek	53.6	3525	7046	14081	0	2794	6319	9840	16875	28:72	17 - 44	
CEDARBURG WASTEWATER TREATMENT FACILITY	Cedar Creek	125.2	6835	13640	27221	3073	3395	13303	20108	33689	32:68	19 - 49	
CASCADE WASTEWATER TREATMENT FACILITY	North Branch Milwaukee River	9.1	237	467	920	0	535	772	1002	1455	53:47	37 - 69	
RANDOM LAKE VILLAGE	Silver Creek	10.1	210	414	817	0	504	714	918	1321	55:45	38 - 71	
MILK SPECIALTIES CO INC - ADELL FACILITY	Unnamed	2.8	39	76	149	0	586	625	662	735	88:12	80 - 94	
WI DNR KETTLE MORAINE SPRINGS FISH HATCHERY	Unnamed	0.3	9	17	34	0	316	325	333	350	95:5	90 - 97	
Rock													
SENSIENT FLAVORS INC	Dead Creek	0.7	2	4	8	0	0	2	4	8	0:100	0 - 0	
WI ACADEMY WASTEWATER TREATMENT FACILITY	Crawfish River	55.7	2251	4483	8927	0	147	2398	4630	9074	3:97	2 - 6	
FALL RIVER WASTEWATER TREATMENT FACILITY	Crawfish River	135.7	5898	11763	23462	147	272	6317	12182	23881	3:97	2 - 7	
ALLENTON SANITARY DISTRICT WWTP	East Branch rock River	28.3	2941	5902	11843	0	308	3249	6210	12151	5:95	3 - 9	
MADISON GAS & ELECTRIC BLOUNT STATION	Lake Monona	262.6	11339	22497	44635	1422	45	12806	23964	46102	6:94	3 - 11	
WATERLOO WASTEWATER TREATMENT FACILITY	Maunesha River	90.6	7629	15349	30881	967	314	8910	16630	32162	8:92	4 - 14	
MARSHALL WASTEWATER TREATMENT FACILITY	Maunesha River	70.3	5342	10729	21548	0	967	6309	11696	22515	8:92	4 - 15	
COLUMBUS WASTEWATER TREATMENT FACILITY	Crawfish River	165.5	8121	16228	32426	419	1339	9879	17986	34184	10:90	5 - 18	
PLYMOUTH TOWN SANITARY DISTRICT #1 WWTF	Bass Creek	49.1	7994	16225	32932	1953	88	10035	18266	34973	11:89	6 - 20	
IRON RIDGE WASTEWATER TREATMENT FACILITY	Unnamed	1.1	341	692	1406	0	95	436	787	1501	12:88	6 - 22	
SENECA FOODS MAYVILLE	Unnamed	0.5	10	20	40	0	3	13	23	43	13:87	7 - 23	
MAYVILLE WASTEWATER TREATMENT FACILITY	East Branch Rock River	176.1	17832	35799	71866	4518	1028	23378	41345	77412	13:87	7 - 24	
THERESA WASTEWATER TREATMENT FACILITY	East Branch Rock River	141.1	11642	23307	46657	2491	2027	16160	27825	51175	16:84	9 - 28	
JEFFERSON WASTEWATER TREATMENT FACILITY	Rock River	1849.1	128471	257407	515747	60903	3762	193136	322072	580412	20:80	11 - 33	
NASCO DIVISION OF ARISTOTLE	Rock River	2268.5	151453	303336	607531	78859	517	230829	382712	686907	21:79	12 - 34	
ASHIPPUN SANITARY DISTRICT WWTF	Rock River	691.8	54437	109105	218673	28252	1712	84401	139069	248637	22:78	12 - 36	
FORT ATKINSON WASTEWATER TREATMENT FACILITY	Rock River	2268.6	151466	303362	607583	79376	4795	235637	387533	691754	22:78	12 - 36	
JOHNSON CREEK WASTEWATER TREATMENT FACILITY	Rock River	1055.8	77930	156154	312896	42731	778	121439	199663	356405	22:78	12 - 36	
VALERO RENEWABLE FUELS COMPANY, LLC	Rock River	1058.2	77986	156264	313113	43509	639	122134	200412	357261	22:78	12 - 36	
HUSTISFORD WASTEWATER TREATMENT FACILITY	Rock River	553.4	39080	78202	156487	20153	2237	61470	100592	178877	22:78	13 - 36	
MILTON WASTEWATER TREATMENT FACILITY	Rock River	2564.2	165403	331094	662763	95748	1490	262641	428332	760001	23:77	13 - 37	

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
WATERTOWN WASTEWATER TREATMENT FACILITY	Rock River	970.0	71005	142227	284890	38332	4399	113736	184958	327621	23:77	13 - 38	
CONSOLIDATED KOSHKONONG SANITARY DIST WWTF	Rock River	2564.2	165403	331094	662763	95748	3794	264945	430636	762305	23:77	13 - 38	
EDGERTON WASTEWATER TREATMENT FACILITY	Rock River	2635.5	167112	334421	669238	101032	949	269093	436402	771219	23:77	13 - 38	
HORICON WASTEWATER TREATMENT FACILITY	Rock River	454.4	29827	59610	119132	17975	1150	48952	78735	138257	24:76	14 - 39	
FOOTVILLE WASTEWATER TREATMENT FACILITY	Bass Creek	13.9	2720	5537	11270	0	1953	4673	7490	13223	26:74	15 - 42	
LANDMARK SERVICES COOPERATIVE	Unnamed	0.4	1	2	5	0	1	2	3	6	29:71	18 - 45	
HORMEL FOODS CORPORATION	Spring Brook	9.2	670	1345	2700	557	20	1247	1922	3277	30:70	18 - 46	
LEROY KEKOSKEE WWTF COMMISSION	Irish Creek	3.0	696	1410	2860	0	625	1321	2035	3485	31:69	18 - 47	
RIVERSIDE ENERGY CENTER LLC	Rock River	3432.1	203227	406063	811345	192570	145	395942	598778	1004060	32:68	19 - 49	
BELOIT TOWN WASTEWATER TREATMENT FACILITY	Rock River	3440.6	202961	405505	810176	192715	1350	397026	599570	1004241	32:68	19 - 49	
JANESVILLE WASTEWATER UTILITY	Rock River	3336.1	192919	385370	769804	154669	35860	383448	575899	960333	33:67	20 - 50	
BELOIT WASTEWATER TREATMENT FACILITY	Rock River	3466.3	204852	409294	817768	194065	11252	410169	614611	1023085	33:67	20 - 50	
ROCKDALE WASTEWATER TREATMENT FACILITY	Koshkonong Creek	143.1	11286	22644	45430	11504	73	22863	34221	57007	34:66	20 - 51	
LOWELL WASTEWATER TREATMENT FACILITY	Beaver Dam River	239.0	9699	19307	38434	10398	113	20210	29818	48945	35:65	21 - 52	
WALWORTH COUNTY METRO	Turtle Creek	83.5	2854	5655	11206	0	3160	6014	8815	14366	36:64	22 - 53	
REESEVILLE WASTEWATER TREATMENT FACILITY	Beaver Dam River	244.4	10175	20262	40349	10511	943	21629	31716	51803	36:64	22 - 53	
CAMBRIDGE OAKLAND WASTEWATER COMMISSION	Koshkonong Creek	120.2	10120	20325	40823	9916	1588	21624	31829	52327	36:64	22 - 53	
SULLIVAN TWN SANITARY DISTRICT #1 WWTF	Bark River	147.6	6072	12094	24086	6809	408	13289	19311	31303	37:63	23 - 54	
BURNETT SANITARY DISTRICT #1 WWTF	Spring Brook	205.7	7720	15322	30413	11510	291	19521	27123	42214	44:56	28 - 60	
OCONOMOWOC WASTEWATER TREATMENT PLNT	Oconomowoc River	100.8	3459	6859	13603	0	6436	9895	13295	20039	48:52	32 - 65	
LSP WHITEWATER LIMITED PARTNERSHIP	Whitewater Creek	43.5	1779	3538	7034	3137	214	5130	6889	10385	49:51	32 - 65	
WHITEWATER WASTEWATER TREATMENT FACIL	Whitewater Creek	43.5	1778	3534	7026	214	3137	5129	6885	10377	49:51	32 - 65	
BEAVER DAM WASTEWATER TREATMENT FACILITY	Beaver Dam River	157.0	5421	10766	21380	2452	7946	15819	21164	31778	49:51	33 - 66	
GRANDE CHEESE CO BROWNSVILLE	Kummel Creek	11.4	524	1038	2054	783	559	1866	2380	3396	56:44	40 - 72	
BROWNSVILLE WASTEWATER TREATMENT FACILITY	Kummel Creek	11.4	524	1038	2054	559	783	1866	2380	3396	56:44	40 - 72	
STOUGHTON WASTEWATER TREATMENT FACILITY	Yahara River	409.8	17915	35588	70695	44604	2898	65417	83090	118197	57:43	40 - 73	
LEBANON SANITARY DISTRICT #2 WWTF	Unnamed	0.7	136	284	801	0	379	515	663	1180	57:43	32 - 74	EC
PALMYRA WASTEWATER TREATMENT FACILITY	Scuppernong River	30.2	1100	2195	4379	0	3017	4117	5212	7396	58:42	41 - 73	
NATIONAL RIVET AND MANUFACTURING COMPANY	South Branch Rock River	59.7	2721	5408	10747	6676	910	10307	12994	18333	58:42	41 - 74	
SULLIVAN WASTEWATER TREATMENT FACILITY	Duck Creek	8.6	215	428	850	0	710	925	1138	1560	62:38	46 - 77	
GREAT LAKES INVESTORS LLC WWTF	Unnamed	0.2	30	60	175	0	119	149	179	294	67:33	40 - 80	EC
WAUPUN WASTEWATER TREATMENT FACILITY	South Branch Rock River	62.2	2809	5581	11090	7586	3924	14319	17091	22600	67:33	51 - 80	
LAKE MILLS WASTEWATER TREATMENT FACILITY	Rock Creek	15.3	539	1066	2109	0	2262	2801	3328	4371	68:32	52 - 81	
DELAFIELD HARTLAND POLLUTION CONTROL COMM	Bark River	59.3	1144	2256	4450	0	4996	6140	7252	9446	69:31	53 - 81	
DOUSMAN WASTEWATER TREATMENT FACILITY	Bark River	62.1	1210	2388	4712	4996	984	7190	8368	10692	71:29	56 - 83	
HARTFORD WATER POLLUTION CONTROL FACILITY	Rubicon River	29.6	1137	2259	4488	1038	4630	6805	7927	10156	72:28	56 - 83	
JUNEAU WASTEWATER TREATMENT FACILITY	Dead Creek	1.2	67	134	267	0	505	572	639	772	79:21	65 - 88	
FONTANA WALWORTH WATER POLLUTION CONT. COMM	Piscasaw Creek	10.7	284	563	1113	0	2653	2937	3216	3766	83:17	70 - 90	
CLYMAN WASTEWATER TREATMENT FACILITY	Unnamed	0.9	39	77	154	0	428	467	505	582	85:15	73 - 92	
SUN PRAIRIE WASTEWATER TREATMENT FACILITY	Koshkonong Creek	12.4	823	1646	3293	0	9441	10264	11087	12734	85:15	74 - 92	
RUSHING WATERS FISHERIES, INC	Unnamed	0.6	46	92	185	0	609	655	701	794	87:13	77 - 93	
LOMIRA WASTEWATER TREATMENT FACILITY	Lomira Creek	3.4	65	128	251	0	841	906	969	1092	87:13	77 - 93	
LEBANON SANITARY DISTRICT #1 WWTF	Unnamed	0.2	12	25	50	0	194	206	219	244	89:11	79 - 94	
CLINTON WASTEWATER TREATMENT FACILITY	Unnamed	0.4	23	45	88	0	557	580	602	645	93:7	86 - 96	
ARLINGTON WASTEWATER TREATMENT FACILITY	Goose Lake	0.2	32	60	140	0	988	1020	1048	1128	94:6	88 - 97	EC
SLINGER WASTEWATER TREATMENT FACILITY	Unnamed	2.0	19	38	74	0	1038	1057	1076	1112	97:3	93 - 98	
SAPUTO CHEESE WAUPUN FACILITY	Unnamed	1.7	95	189	376	0	5505	5600	5694	5881	97:3	94 - 98	
BRANDON WASTEWATER TREATMENT FACILITY	Unnamed	0.1	20	36	82	0	1171	1191	1207	1253	97:3	93 - 98	EC
WI DNR NEVIN FISH HATCHERY	Unnamed	0.2	4	9	17	0	407	411	416	424	98:2	96 - 99	
OREGON WASTEWATER TREATMENT FACILITY	Oregon Branch	11.6	36	69	135	0	5186	5222	5255	5321	99:1	97 - 99	
IXONIA SANITARY DISTRICT #1 WWTF	Unnamed	0.3	7	15	29	0	1553	1560	1568	1582	99:1	98 - 100	
DEERFIELD WASTEWATER TREATMENT FACILITY	Unnamed	0.6	2	4	8	0	474	476	478	482	99:1	98 - 100	
RANDOLPH WASTEWATER TREATMENT FACILITY	Unnamed	0.4	10	19	38	0	2452	2462	2471	2490	99:1	98 - 100	
SHARON WASTEWATER TREATMENT FACILITY	Little Turtle Creek	0.2	8	16	33	0	2253	2261	2269	2286	99:1	99 - 100	
MIDDLETON CITY TIEDEMAN POND	Lake Mendota	0.0	1	2	4	0	434	435	436	438	100:0	99 - 100	EC
MADISON METROPOLITAN SEWERAGE DISTRICT WWTF	Unnamed	0.2	80	164	335	0	42730	42810	42894	43065	100:0	99 - 100	
Root - Pike													
PPG INDUSTRIES INC	Unnamed	0.8	16	32	64	0	18	34	50	82	36:64	22 - 53	
FONKS HOME CENTER INC., HARVEST VIEW ESTATES	East Branch Root River Canal	3.3	152	303	603	0	193	345	496	796	39:61	24 - 56	
UNION GROVE VILLAGE	West Branch Root River Canal	3.9	200	397	785	0	843	1043	1240	1628	68:32	52 - 81	
YORKVILLE SEWER UTILITY DISTRICT NO 1	Unnamed	2.1	71	139	272	0	1219	1290	1358	1491	90:10	82 - 94	
Sheboygan													
SARTORI FOOD CORPORATION-WEST MAIN BUILDING	Mullet River	54.4	1767	3502	6943	0	99	1866	3601	7042	3:97	1 - 5	
HOWARDS GROVE WASTEWATER TRTMT FAC	Pigeon River	48.8	4107	8206	16394	0	525	4632	8731	16919	6:94	3 - 11	

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
ST CLOUD VILLAGE UTILITY COMMISSION	Sheboygan River	73.5	6508	13053	26182	1289	340	8137	14682	27811	11:89	6 - 20	
KIEL WASTEWATER TREATMENT FACILITY	Sheboygan River	157.7	9506	18979	37892	1629	1553	12688	22161	41074	14:86	8 - 25	
LAKELAND COLLEGE	Sheboygan River	192.9	10518	20970	41811	3182	650	14350	24802	45643	15:85	8 - 27	
JOHNSONVILLE SAUSAGE LLC	Sheboygan River	196.9	10883	21702	43276	3832	192	14907	25726	47300	16:84	9 - 27	
KOHLER COMPANY	Sheboygan River	425.0	26168	52265	104388	11542	96	37806	63903	116026	18:82	10 - 31	
PENTAIR - PLYMOUTH PRODUCTS INC	Sheboygan River	434.3	26465	52853	105549	11638	230	38333	64721	117417	18:82	10 - 31	
GIBBSVILLE SANITARY DISTRICT	Onion River	84.5	5281	10545	21060	2862	575	8718	13982	24497	25:75	14 - 39	
WALDO WASTEWATER UTILITY	Onion River	27.6	706	1396	2760	0	671	1377	2067	3431	32:68	20 - 49	
ONION RIVER WASTEWATER COMMISSION	Onion River	36.9	1512	3006	5974	671	1137	3320	4814	7782	38:62	23 - 54	
CEDAR GROVE WASTEWATER TRTMNT FACIL	Barr Creek	8.5	963	1944	3924	0	1468	2431	3412	5392	43:57	27 - 60	
LAKESIDE FOODS, INC. - BELGIUM PLANT	Unnamed	1.8	5	10	20	0	8	13	18	28	44:56	29 - 60	
PLYMOUTH CITY UTIL COMMISSION WWTF	Mullet River	56.3	1856	3680	7296	99	3982	5937	7761	11377	53:47	36 - 69	
MOUNT CALVARY WASTEWATER TREATMENT FACILITY	Unnamed	6.2	554	1112	2234	0	1289	1843	2401	3523	54:46	37 - 70	
CEDAR VALLEY CHEESE INC	Unnamed	0.9	3	5	10	0	20	23	25	30	79:21	66 - 88	
OOSTBURG WASTEWATER TREATMENT PLANT	Unnamed	0.3	24	48	96	0	640	664	688	736	93:7	87 - 96	
BELGIUM WASTEWATER TREATMENT FACIL	Unnamed	2.4	15	29	56	8	1046	1069	1083	1110	97:3	95 - 99	
St. Croix													
DEER PARK WASTEWATER TREATMENT FACILITY	Willow River	81.7	20653	41806	84624	327	159	21139	42292	85110	1:99	1 - 2	
LAKESIDE FOODS, INC. NEW RICHMOND	Willow River	20.2	1229	2448	4875	0	54	1283	2502	4929	2:98	1 - 4	
BURNETT DAIRY COOPERATIVE	Wood River	75.9	4679	9289	18441	0	339	5018	9628	18780	4:96	2 - 7	
WI DNR GOV TOMMY THOMPSON FISH HATCHERY	Yellow River	61.3	906	1779	3490	0	115	1021	1894	3605	6:94	3 - 11	
STAR PRAIRIE WASTEWATER TREATMENT FACILITY	Apple River	450.8	16394	32379	63948	1798	515	18707	34692	66261	7:93	3 - 12	
SOMERSET WASTEWATER TREATMENT FACILITY	Apple River	546.1	17856	35234	69524	2313	297	20466	37844	72134	7:93	4 - 13	
AMERY CITY OF	Apple River	255.0	11113	21989	43510	804	994	12911	23787	45308	8:92	4 - 14	
RIVER FALLS MUNICIPAL UTILITY WWTF	Kinnickinnic River	120.0	11100	22269	44677	0	2073	13173	24342	46750	9:91	4 - 16	
GRANTSBURG VILLAGE OF	Wood River	151.1	8300	16474	32695	339	2480	11119	19293	35514	15:85	8 - 25	
CLEAR LAKE VILLAGE OF	Unnamed	2.3	657	1323	2665	0	327	984	1650	2992	20:80	11 - 33	
NEW RICHMOND WASTEWATER TREATMENT FACILITY	Willow River	34.6	1368	2705	5350	54	1384	2806	4143	6788	35:65	21 - 51	
CLAYTON VILLAGE OF	Unnamed	1.6	141	283	566	0	804	945	1087	1370	74:26	59 - 85	
AMANI SANITARY DISTRICT	Wetland	0.0	3	6	14	0	18	21	24	32	74:26	56 - 86	EC
LUCK VILLAGE OF	Wetland	1.2	94	185	367	0	732	826	917	1099	80:20	67 - 89	
WEBSTER VILLAGE OF	Unnamed	0.3	6	12	24	0	340	346	352	364	97:3	93 - 98	
Sugar - Pecatonica													
WI DNR YELLOWSTONE LAKE STATE PARK WWTF	Unnamed	0.6	224	456	929	0	0	224	456	929	0:100	0 - 0	
BROWNTOWN WASTEWATER TREATMENT FACILITY	Skinner Creek	69.2	39123	80495	165618	32	352	39507	80879	166002	0:100	0 - 1	
GRATIOT WASTEWATER TREATMENT FACILITY	Wolf Creek	27.9	21776	44842	92343	0	385	22161	45227	92728	1:99	0 - 2	
ARGYLE WASTEWATER TREATMENT FACILITY	East Branch Pecatonica River	329.2	204531	422140	871269	5164	1084	210779	428388	877517	1:99	1 - 3	
DARLINGTON WASTEWATER TREATMENT FACILITY	Pecatonica River	273.6	111734	229417	471051	3503	619	115856	233539	475173	2:98	1 - 4	
BLANCHARDVILLE WASTEWATER TREATMENT FACILITY	East Branch Pecatonica River	217.2	132095	272708	563000	4611	553	137259	277872	568164	2:98	1 - 4	
HOLLANDALE WASTEWATER TREATMENT FACILITY	Dodge Branch	67.8	37719	77805	160494	1291	305	39315	79401	162090	2:98	1 - 4	
ALBANY WASTEWATER TREATMENT FACILITY	Sugar River	463.4	90869	184146	373172	9171	642	100682	193959	382985	5:95	3 - 10	
NEW GLARUS WASTEWATER TREATMENT FACILITY	Little Sugar River	22.9	12789	26396	54481	0	1601	14390	27997	56082	6:94	3 - 11	
LACTALIS USA BELMONT INC	Bonner Branch	5.6	1672	3425	7017	0	305	1977	3730	7322	8:92	4 - 15	
BELLEVILLE WASTEWATER TREATMENT FACILITY	Sugar River	174.3	26126	52684	106241	4375	353	30854	57412	110969	8:92	4 - 15	
MONTICELLO WASTEWATER TREATMENT FACILITY	West Branch Little Sugar River	33.6	4037	8980	22754	0	852	4889	9832	23606	9:91	4 - 17	EC
MINERAL POINT WASTEWATER TREATMENT FACILITY	Brewery Creek	6.9	3451	7059	14442	0	670	4121	7729	15112	9:91	4 - 16	
BRODHEAD WASTEWATER TREATMENT FACILITY	Sugar River	21.6	3727	7594	15473	0	851	4578	8445	16324	10:90	5 - 19	
BARNEVELD WASTEWATER TREATMENT FACILITY	East Branch Pecatonica River	17.7	10449	21511	44287	512	1951	12912	23974	46750	10:90	5 - 19	
BLOOMFIELD MANOR WASTEWATER TREATMENT FAC	Pedler Creek	1.7	432	885	1813	0	117	549	1002	1930	12:88	6 - 21	
KLONDIKE CHEESE CORP	Unnamed	0.5	110	221	445	0	32	142	253	477	13:87	7 - 23	
REWEY WASTEWATER TREATMENT FACILITY	Williams-Rewey Branch	0.6	444	915	1888	0	208	652	1123	2096	19:81	10 - 32	
PGP INTERNATIONAL INC	North Fork Juda Branch	3.0	634	1283	2596	0	377	1011	1660	2973	23:77	13 - 37	
BELMONT WASTEWATER TREATMENT FACILITY	Bonner Branch	5.6	1730	3545	7265	305	1264	3299	5114	8834	31:69	18 - 48	
RIDGEWAY WASTEWATER TREATMENT FACILITY	Smith Conley Creek	0.9	473	974	2004	0	552	1025	1526	2556	36:64	22 - 54	
LINDEN WASTEWATER TREATMENT FACILITY	Unnamed	3.0	631	1277	2585	0	939	1570	2216	3524	42:58	27 - 60	
MOUNT HOREB WASTEWATER TREATMENT FACILITY	West Branch Sugar River	1.8	306	621	1262	0	1119	1425	1740	2381	64:36	47 - 79	
ORFORDVILLE WASTEWATER TREATMENT FACILITY	Unnamed	0.9	307	624	1272	0	1899	2206	2523	3171	75:25	60 - 86	
BROOKLYN WASTEWATER TREATMENT FACILITY	Allen Creek	10.9	272	538	1061	0	1990	2262	2528	3051	79:21	65 - 88	
MONROE WASTEWATER TREATMENT FACILITY	Honey Creek	4.8	413	830	1667	0	4132	4545	4962	5799	83:17	71 - 91	
DODGEVILLE WASTEWATER TREATMENT FACILITY	Dodge Branch	1.1	99	201	411	0	1291	1390	1492	1702	87:13	76 - 93	
BLUE MOUNDS WASTEWATER TREATMENT FACILITY	Unnamed	0.6	39	78	156	0	512	551	590	668	87:13	77 - 93	
MADISON METROPOLITAN SEWERAGE DISTRICT WWTF	Badger Mill Creek	15.4	208	408	801	0	3256	3464	3664	4057	89:11	80 - 94	
Twin - Door - Kewanee													
KEWAUNEE WASTEWATER TREATMENT FACILITY	Kewaunee River	140.7	59966	122163	248872	517	120	60603	122800	249509	1:99	0 - 1	

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
TWO RIVERS WASTEWATER TREATMENT FACILITY	West Twin River	305.5	94866	192217	389471	1167	2711	98744	196095	393349	2:98	1 - 4	
ALGOMA WASTEWATER TREATMENT FACILITY	Ahnapee River	113.6	15098	30160	60248	595	453	16146	31208	61296	3:97	2 - 6	
SEVASTOPOL SD NO 1 WWTF	Donlans Creek	6.6	885	1766	3524	0	86	971	1852	3610	5:95	2 - 9	
PACKERLAND WHEY PRODUCTS INC	Unnamed	1.9	1084	2212	4512	0	119	1203	2331	4631	5:95	3 - 10	
MARIBEL WASTEWATER TREATMENT FACILITY	Unnamed	2.1	1379	2828	5803	0	281	1660	3109	6084	9:91	5 - 17	
FORESTVILLE WASTEWATER TREATMENT FACILITY	Ahnapee River	39.4	2945	5840	11583	0	595	3540	6435	12178	9:91	5 - 17	
KOSSUTH SANITARY DISTRICT NO. 2 WWTF	Unnamed	0.8	618	1270	2609	0	180	798	1450	2789	12:88	6 - 23	
CASCO WASTEWATER TREATMENT FACILITY	Casco Creek	13.4	1351	2695	5376	0	398	1749	3093	5774	13:87	7 - 23	
DENMARK WASTEWATER TREATMENT FACILITY	Unnamed	1.9	905	1851	3789	0	706	1611	2557	4495	28:72	16 - 44	
Wisconsin													
WISCONSIN POWER & LIGHT COLUMBIA GEN. STATION	Duck Creek	6.2	404	810	1623	0	0	404	810	1623	0:100	0 - 0	
HUB ROCK SANITARY DISTRICT #1 WWTF	Pine River	121.2	29008	59191	120780	0	185	29193	59376	120965	0:100	0 - 1	
HUSTLER WASTEWATER TREATMENT FACILITY	Little Lemonweir River	37.9	14322	29431	60478	0	116	14438	29547	60594	0:100	0 - 1	
BOAZ WASTEWATER TREATMENT FACILITY	Mill Creek	59.0	14838	30387	62230	0	121	14959	30508	62351	0:100	0 - 1	
O DELL BAY SANITARY DISTRICT 1	Wisconsin River	672.4	61091	123264	248714	1128	317	62536	124709	250159	1:99	1 - 2	
SEXTONVILLE SANITARY DISTRICT #1 WWTF	Willow Creek	78.1	19665	40134	81909	0	529	20194	40663	82438	1:99	1 - 3	
LA FARGE WASTEWATER TREATMENT PLANT	Kickapoo River	301.6	68995	140879	287659	1575	622	71192	143076	289856	2:98	1 - 3	
LOGANVILLE WASTEWATER TREATMENT FACILITY	Narrows Creek	43.2	12414	25370	51850	243	164	12821	25777	52257	2:98	1 - 3	
WAUZEKA WASTEWATER TREATMENT FACILITY	Kickapoo River	766.9	168283	343831	702506	5039	541	173863	349411	708086	2:98	1 - 3	
READSTOWN WASTEWATER TREATMENT FACILITY	Kickapoo River	484.3	110359	225406	460388	3622	79	114060	229107	464089	2:98	1 - 3	
GAYS MILLS WASTEWATER TREATMENT FACILITY	Kickapoo River	616.1	138424	282783	577691	4132	569	143125	287484	582392	2:98	1 - 3	
SOLDIERS GROVE WASTEWATER TREATMENT FACILITY	Kickapoo River	530.3	120619	246397	503331	3701	431	124751	250529	507463	2:98	1 - 3	
CAZENOVIA WASTEWATER TREATMENT FACILITY	Little Baraboo River	60.9	15613	31978	65498	0	652	16265	32630	66150	2:98	1 - 4	
WILTON WASTEWATER TREATMENT FACILITY	Kickapoo River	35.1	10443	21384	43790	0	461	10904	21845	44251	2:98	1 - 4	
HILLSBORO WASTEWATER TREATMENT FACILITY	West Branch Baraboo River	39.3	8272	16903	34541	0	374	8646	17277	34915	2:98	1 - 4	
VIOLA WASTEWATER TREATMENT FACILITY	Kickapoo River	339.3	77401	158073	322826	2197	1425	81023	161695	326448	2:98	1 - 4	
HILL POINT SANITARY DISTRICT WWTF	Hill Point Creek	9.4	2850	5833	11938	0	150	3000	5983	12088	3:97	1 - 5	
NEW LISBON WASTEWATER TREATMENT FACILITY	Lemonweir River	503.7	58530	118125	238402	3322	412	62264	121859	242136	3:97	2 - 6	
MILK SPECIALTIES CO, INC	Crooked Creek	16.7	3494	7154	14648	0	253	3747	7407	14901	3:97	2 - 7	
MAUSTON WASTEWATER TREATMENT FACILITY	Lemonweir River	567.0	61699	124438	250976	3734	766	66199	128938	255476	3:97	2 - 7	
WI AIR NATIONAL GUARD	Lemonweir River	417.1	42114	84845	170932	1397	1809	45320	88051	174138	4:96	2 - 7	
NORWALK WASTEWATER TREATMENT FACILITY	Moore Creek	18.2	4299	8784	17948	0	351	4650	9135	18299	4:96	2 - 8	
TOMAH WASTEWATER TREATMENT FACILITY	South Fork Lemonweir River	48.5	9047	18357	37246	0	739	9786	19096	37985	4:96	2 - 8	
LA VALLE WASTEWATER TREATMENT FACILITY	Baraboo River	307.8	64106	130855	267102	5391	309	69806	136555	272802	4:96	2 - 8	
LAKESIDE FOODS INC. - REEDSBURG	Baraboo River	385.8	75666	154281	314574	5700	1356	82722	161337	321630	4:96	2 - 9	
FOREMOST FARMS USA REEDSBURG	Baraboo River	386.8	75683	154310	314623	7056	33	82772	161399	321712	4:96	2 - 9	
VPP GROUP, LLC	Moore Creek	20.9	4721	9638	19676	351	104	5176	10093	20131	5:95	2 - 9	
UNION CENTER WASTEWATER TREATMENT FACILITY	Baraboo River	165.0	39573	80927	165497	2932	901	43406	84760	169330	5:95	2 - 9	
DANE IOWA WASTEWATER COMMISSION WWTF	Black Earth Creek	101.9	16831	34006	68709	740	921	18492	35667	70370	5:95	2 - 9	
EASTMAN WASTEWATER TREATMENT FACILITY	Pine Creek	12.8	3312	6767	13825	0	338	3650	7105	14163	5:95	2 - 9	
ONTARIO WASTEWATER TREATMENT FACILITY	Brush Creek	31.6	6369	12976	26435	0	659	7028	13635	27094	5:95	2 - 9	
WI DNR ART OEHMCKE STATE FISH HATCHERY	Minocqua Thoroughfare	22.7	173	340	665	0	18	191	358	683	5:95	3 - 9	
WONEWOC WASTEWATER TREATMENT FACILITY	Baraboo River	174.4	40661	83121	169922	3833	906	45400	87860	174661	5:95	3 - 10	
KENDALL WASTEWATER TREATMENT FACILITY	Baraboo River	16.3	4659	9512	19421	0	546	5205	10058	19967	5:95	3 - 10	
MONTFORT WASTEWATER TREATMENT FACILITY	Blue River	19.5	6866	14042	28718	0	820	7686	14862	29538	6:94	3 - 11	
ELROY WASTEWATER TREATMENT FACILITY	Baraboo River	65.5	17977	36785	75268	546	2012	20535	39343	77826	7:93	3 - 12	
GOETZ COMPANIES INC (PORTAGE PETRO TRAVEL P)	Baraboo River	648.5	108476	220431	447931	15242	512	124230	236185	463685	7:93	3 - 13	
ROCK SPRINGS WASTEWATER TREATMENT FACILITY	Baraboo River	484.6	90155	183519	373571	12985	417	103557	196921	386973	7:93	3 - 13	
BARABOO WASTEWATER TREATMENT FACILITY	Baraboo River	573.8	101338	206132	419290	13824	1418	116580	221374	434532	7:93	4 - 13	
NORTH FREEDOM WASTEWATER TREATMENT FACILITY	Baraboo River	491.2	91718	186723	380137	13402	422	105542	200547	393961	7:93	4 - 13	
MARATHON WATER & SEWER DPT WW TREATMNT PLANT	Big Rib River	370.4	27227	54959	110938	3475	600	31302	59034	115013	7:93	4 - 13	
LAKE TOMAHAWK TOWNSHIP SANITARY DISTRICT 1	Wisconsin River	745.5	12279	24234	47830	1388	442	14109	26064	49660	7:93	4 - 13	
RICHLAND CENTER WASTEWATER TREATMENT FAC	Pine River	190.0	42565	86697	176586	185	6656	49406	93538	183427	7:93	4 - 14	
ROXBURY SANITARY DISTRICT #1 WWTF	Roxbury Creek	18.6	3399	6862	13856	0	557	3956	7419	14413	8:92	4 - 14	
REEDSBURG WASTEWATER TREATMENT FACILITY	Baraboo River	389.0	75289	153473	312844	7089	5446	87824	166008	325379	8:92	4 - 14	
SAPUTO CHEESE USA INC REEDSBURG	Baraboo River	389.4	75247	153383	312652	12535	43	87825	165961	325230	8:92	4 - 14	
CROSS PLAINS WASTEWATER TREATMENT FACILITY	Black Earth Creek	26.6	3044	6112	12272	0	740	3784	6852	13012	11:89	6 - 20	
SENECA FOODS CORPORATION CAMBRIA	Unnamed	0.4	117	237	482	0	33	150	270	515	12:88	6 - 22	
ATHENS WASTEWATER TREATMENT FACILITY	Black Creek	52.8	3878	7818	15761	0	1096	4974	8914	16857	12:88	7 - 22	
ADAMS WASTEWATER TREATMENT FACILITY	Little Roche a Cri Creek	57.9	1514	2988	5900	0	441	1955	3429	6341	13:87	7 - 23	
EAGLE RIVER CITY OF	Eagle River	237.7	4732	9358	18506	1010	378	6120	10746	19894	13:87	7 - 23	
LODI WASTEWATER TREATMENT FACILITY	Spring Creek	37.7	2882	5757	11498	0	869	3751	6626	12367	13:87	7 - 23	
COLBY CITY WWTF	Dill Creek	12.9	957	1933	3906	0	302	1259	2235	4208	14:86	7 - 24	
AVOCA WASTEWATER TREATMENT FACILITY	Morrey Creek	18.6	2158	4359	8802	0	687	2845	5046	9489	14:86	7 - 24	

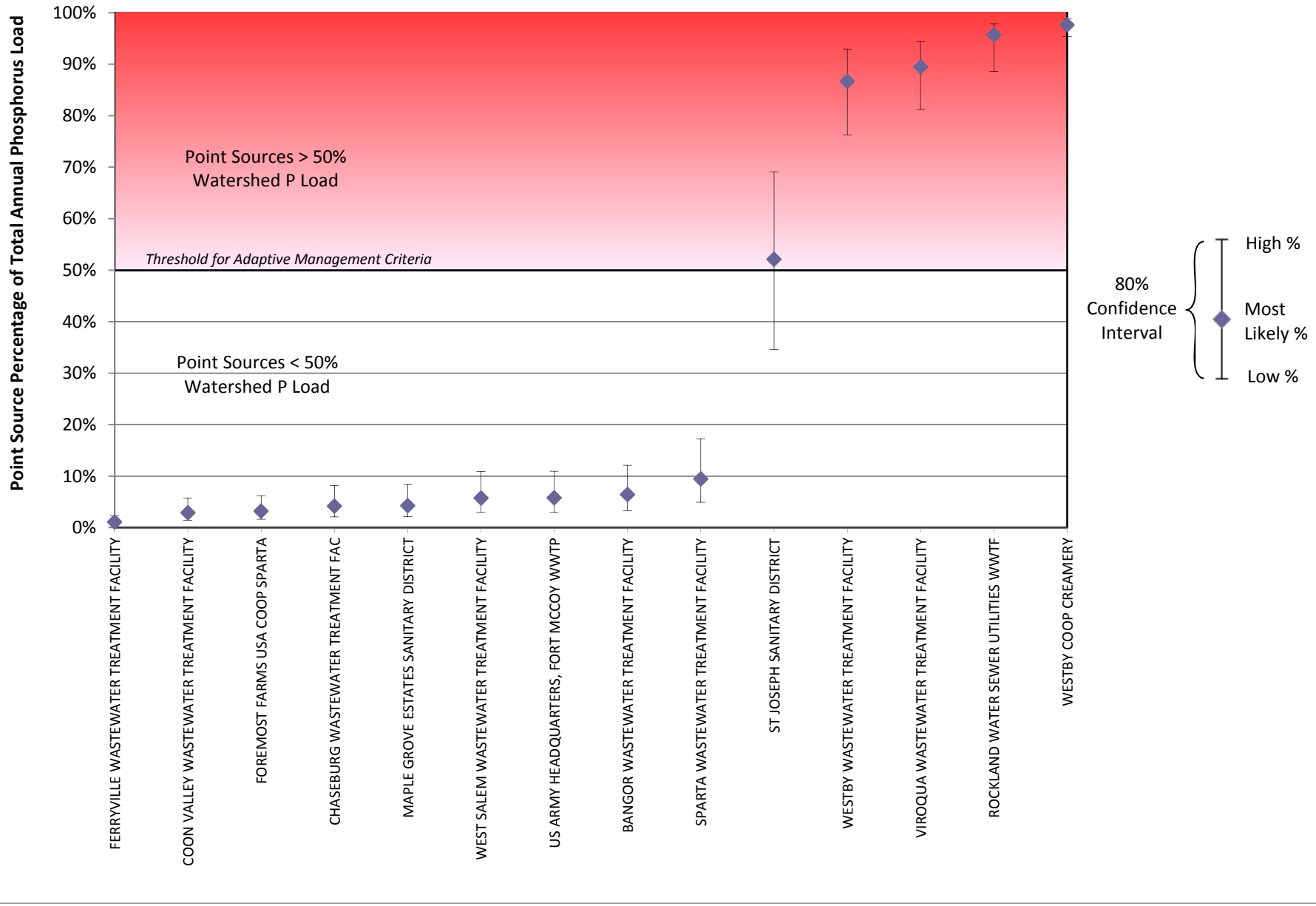
Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
CAMBRIA WASTEWATER TREATMENT FACILITY	North Branch Duck Creek	8.6	1133	2291	4632	0	407	1540	2698	5039	15:85	8 - 26	
BOSCOBEL WASTEWATER TREATMENT FACILITY	Wisconsin River	10762.7	730046	1463144	2932405	298911	282	1029239	1762337	3231598	17:83	9 - 29	
BLUE RIVER WASTEWATER TREATMENT FACILITY	Blue River	10614.7	709630	1421931	2849215	298623	288	1008541	1720842	3148126	17:83	9 - 30	
SPRING GREEN WASTEWATER TREATMENT FACILITY	Wisconsin River	9646.4	544624	1089400	2179105	288614	291	833529	1378305	2468010	21:79	12 - 35	
RIB LAKE VILLAGE OF	Sheep Ranch Creek	6.0	451	915	1857	0	256	707	1171	2113	22:78	12 - 36	
LYNDON STATION WASTEWATER TREATMENT FACILITY	Lyndon Creek	6.8	493	994	2003	0	293	786	1287	2296	23:77	13 - 37	
FISH, CRYSTAL AND MUD LAKE REHABILITATION DISTRICT	Wisconsin River	9032.0	466497	932387	1863562	285118	103	751718	1217608	2148783	23:77	13 - 38	
BADGER ARMY AMMUNITION PLANT	Wisconsin River	9010.5	466112	931651	1862155	282114	3004	751230	1216769	2147273	23:77	13 - 38	
LIGNOTECH USA INC	Wisconsin River	3987.3	118620	235869	469016	76549	343	195512	312761	545908	25:75	14 - 39	
DEL MONTE FOODS CAMBRIA PLANT #108	North Branch Duck Creek	11.0	1532	3098	6264	440	585	2557	4123	7289	25:75	14 - 40	
STEVENS POINT WASTEWATER TREATMENT FACILITY	Wisconsin River	4953.8	164708	328141	653743	107905	6223	278836	442269	767871	26:74	15 - 41	
WAUSAU PAPER MILLS LLC	Wisconsin River	861.5	14906	29429	58102	1830	8757	25493	40016	68689	26:74	15 - 42	
MULLINS CHEESE INC	Wisconsin River	4490.6	145670	290091	577692	105369	846	251885	396306	683907	27:73	16 - 42	
PORTAGE WASTEWATER TREATMENT FACILITY	Wisconsin River	8010.5	356108	710698	1418364	260745	2970	619823	974413	1682079	27:73	16 - 43	
RUSSELL SANITARY DISTRICT #1 TOWN OF	North Branch Prairie River	39.3	515	1013	1992	164	217	896	1394	2373	27:73	16 - 43	
WI DELLS LK DELTON SEWERAGE COMMISSION WWTF	Wisconsin River	7869.1	345777	689996	1376885	257992	2753	606522	950741	1637630	27:73	16 - 43	
NEW PAGE WISCONSIN	Wisconsin River	4957.0	164763	328249	653954	114128	10539	289430	452916	778621	28:72	16 - 43	
CROCKETT'S RESORT	Wisconsin River	7763.9	338499	675433	1347742	257673	26	596198	933132	1605441	28:72	16 - 43	
WHITING WASTEWATER TREATMENT FACILITY	Wisconsin River	4957.2	164766	328255	653965	124667	790	290223	453712	779422	28:72	16 - 43	
NEENAH PAPER INC WHITING MILL	Wisconsin River	5138.0	166689	331949	661053	125457	1630	293776	459036	788140	28:72	16 - 43	
DOMTAR PAPER CO LLC	Wisconsin River	3987.6	118628	235886	469049	76892	14848	210368	327626	560789	28:72	16 - 44	
FOREMOST FARMS USA COOP ROTHSCHILD	Wisconsin River	4002.2	118941	236505	470273	91740	651	211332	328896	562664	28:72	16 - 44	
FOREMOST FARMS USA COOP PLOVER	Wisconsin River	5163.6	166722	331991	661085	127087	3104	296913	462182	791276	28:72	16 - 44	
LIME RIDGE WASTEWATER TREATMENT FACILITY	Narrows Creek	0.8	116	234	474	0	93	209	327	567	28:72	16 - 45	
PLOVER WASTEWATER TREATMENT FACILITY	Wisconsin River	5170.4	166818	332177	661450	130191	1865	298874	464233	793506	28:72	17 - 44	
POYNETTE WASTEWATER TREATMENT FACILITY	Rowan Creek	11.3	746	1493	2990	0	615	1361	2108	3605	29:71	17 - 45	
RIB MOUNTAIN METRO SEWAGE DISTRICT WWTF	Wisconsin River	4002.9	118952	236526	470315	92391	5312	216655	334229	568018	29:71	17 - 45	
WISCONSIN PUBLIC SERVICE CORP WESTON 3 & 4	Wisconsin River	4003.4	118961	236546	470353	97703	886	217550	335135	568942	29:71	17 - 45	
WAUSAU PAPER MILLS, LLC	Wisconsin River	4092.5	122924	244475	486218	98589	3336	224849	346400	588143	29:71	17 - 45	
MOSINEE WASTEWATER TREATMENT FACILITY	Wisconsin River	4092.8	122929	244483	486234	101925	667	225521	347075	588826	30:70	17 - 45	
WAUSAU PAPER MILLS, LLC	Wisconsin River	3024.2	75426	149581	296641	57595	7045	140066	214221	361281	30:70	18 - 46	
BROKAW WASTEWATER TREATMENT FACILITY	Wisconsin River	3024.9	75439	149606	296690	64640	23	140102	214269	361353	30:70	18 - 46	
MCCAIN FOODS USA, INC., PLOVER	Wisconsin River	5314.4	176847	352262	701674	141654	16923	335424	510839	860251	31:69	18 - 47	
MERRILL CITY OF	Wisconsin River	2750.1	63461	125698	248974	55203	2392	121056	183293	306569	31:69	19 - 48	
WAUSAU WATER WORKS WW TREATMENT FACILITY	Wisconsin River	3054.7	76330	151378	300214	64663	6975	147968	223016	371852	32:68	19 - 48	
LAKELAND SANITARY DISTRICT	Tomahawk River	71.5	554	1086	2127	18	525	1097	1629	2670	33:67	20 - 49	
NEWPAGE CORPORATION- WATER QUALITY CENTER	Wisconsin River	5384.5	183044	364678	726550	158985	32149	374178	555812	917684	34:66	21 - 51	
WISCONSIN RAPIDS WWTF	Wisconsin River	5387.3	183076	364741	726672	191134	6381	380591	562256	924187	35:65	21 - 52	
UNITY WASTEWATER TREATMENT FACILITY	Little Eau Pleine River	7.5	407	817	1640	0	472	879	1289	2112	37:63	22 - 54	
RHINELANDER CITY OF	Wisconsin River	862.0	14923	29463	58171	10587	6520	32030	46570	75278	37:63	23 - 53	
EDGAR WASTEWATER TREATMENT FACILITY	Scotch Creek	15.3	1762	3590	7317	0	2123	3885	5713	9440	37:63	22 - 55	
NEKOOSA WASTEWATER TREATMENT FACILITY	Wisconsin River	5575.8	190403	379286	755542	250730	557	441690	630573	1006829	40:60	25 - 57	
JUNCTION CITY WASTEWATER TREATMENT FACILITY	Unnamed	0.7	69	139	281	0	93	162	232	374	40:60	25 - 57	
DOMTAR A W LLC	Wisconsin River	5543.1	187285	373033	743008	197515	51434	436234	621982	991957	40:60	25 - 57	
PORT EDWARDS WASTEWATER TREATMENT FACILITY	Wisconsin River	5543.7	187303	373069	743079	248949	196	436448	622214	992224	40:60	25 - 57	
ERCO WORLDWIDE (USA) INC - PORT EDWARDS	Wisconsin River	5548.6	187723	373913	744774	249145	1585	438453	624643	995504	40:60	25 - 57	
PACKAGING CORPORATION OF AMERICA	Wisconsin River	2014.2	39991	79038	156209	17650	36482	94123	133170	210341	41:59	26 - 58	
TOMAHAWK CITY OF	Wisconsin River	2015.7	39992	79040	156212	54132	690	94814	133862	211034	41:59	26 - 58	
ANTIGO CITY OF	Spring Brook	37.8	613	1204	2364	0	836	1449	2040	3200	41:59	26 - 58	
MILLADORE WASTEWATER TREATMENT FACILITY	Unnamed	2.7	185	371	743	0	276	461	647	1019	43:57	27 - 60	
CHILI WASTEWATER TREATMENT FACILITY	Unnamed	0.7	127	255	515	0	208	335	463	723	45:55	29 - 62	
ARPIN WASTEWATER TREATMENT FACILITY	Hemlock Creek	5.3	252	506	1013	0	431	683	937	1444	46:54	30 - 63	
STRATFORD WASTEWATER TREATMENT FACILITY	Unnamed	2.2	97	196	394	0	212	309	408	606	52:48	35 - 69	
PLAIN WASTEWATER TREATMENT FACILITY	Unnamed	4.3	393	793	1600	0	1018	1411	1811	2618	56:44	39 - 72	
BLENKER SHERRY SANITARY DISTRICT WWTP	Mill Creek	41.8	3552	7164	14449	8924	305	12781	16393	23678	56:44	39 - 72	
SPRING GREEN GOLF CLUB SANITARY DIST #2 WWTF	Unnamed	0.5	58	118	238	0	157	215	275	395	57:43	40 - 73	
BETHEL CENTER WWTF	Unnamed	1.8	45	90	179	0	179	224	269	358	67:33	50 - 80	
GRANDE CHEESE CORP WYOCENA	Unnamed	1.6	15	30	58	0	62	77	92	120	68:32	52 - 80	
RIO WASTEWATER TREATMENT FACILITY	Unnamed	1.7	16	31	60	0	74	90	105	134	71:29	55 - 82	
THREE LAKES SANITARY DISTRICT #1	Wetland	1.4	94	190	386	0	562	656	752	948	75:25	59 - 86	
STETSONVILLE, VILLAGE OF	West Branch Big Eau Pleine Riv	2.9	122	246	494	0	879	1001	1125	1373	78:22	64 - 88	
SPENCER WASTEWATER TREATMENT FACILITY	Unnamed	1.1	27	53	106	0	323	350	376	429	86:14	75 - 92	
AUBURNDALE WASTEWATER TREATMENT FACILITY	Little Bear Creek	1.3	58	115	229	0	895	953	1010	1124	89:11	80 - 94	
MILAN S D WASTEWATER TREATMENT FACILITY	Wetland	0.2	32	66	183	0	545	577	611	728	89:11	75 - 95	EC

Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
HIGHLAND WASTEWATER TREATMENT FACILITY	Unnamed	0.3	40	81	166	0	720	760	801	886	90:10	81 - 95	
HEWITT SANITARY DISTRICT WWTP	Mill Creek	10.3	398	797	1595	8248	676	9322	9721	10519	92:8	85 - 96	
MARSHFIELD WASTEWATER TREATMENT FACILITY	Mill Creek	8.5	278	554	1105	0	8248	8526	8802	9353	94:6	88 - 97	
ABBOTSFORD WASTEWATER TREATMENT FACILITY	Elm Brook	0.5	28	56	114	0	839	867	895	953	94:6	88 - 97	
RUDOLPH WASTEWATER TREATMENT FACILITY	Unnamed	1.0	14	27	53	63	345	422	435	461	94:6	89 - 97	
WISCONSIN DAIRY STATE CHEESE, INC.	Unnamed	1.0	14	27	53	345	63	422	435	461	94:6	89 - 97	
NASONVILLE DAIRY INC	Unnamed	0.2	3	7	13	0	310	313	317	323	98:2	96 - 99	
WI DOC LINCOLN HILLS SCHOOL	Unnamed	0.1	1	1	2	0	164	165	165	166	99:1	99 - 100	
PHELPS SANITARY DISTRICT #1	Wetland	0.0	1	2	4	0	448	449	450	452	100:0	99 - 100	EC
OAKDALE WASTEWATER TREATMENT FACILITY	Unnamed	0.1	0	1	1	0	658	658	659	659	100:0	100 - 100	
Wolf - Fox													
SENECA FOODS CORPORATION OAKFIELD	Unnamed	0.3	53	106	214	0	0	53	106	214	0:100	0 - 0	
NICHOLS WASTEWATER TREATMENT FACILITY	Shioc River	91.8	13966	28284	57282	0	187	14153	28471	57469	1:99	0 - 1	
DARLING INTERNATIONAL INC	Harrington Creek	5.0	293	584	1166	0	4	297	588	1170	1:99	0 - 1	
MANAWA WASTEWATER TREATMENT FACILITY	Little Wolf River	310.1	9793	19430	38550	0	215	10008	19645	38765	1:99	1 - 2	
STEPHENSVILLE SANITARY DISTRICT NO 1	Bear Creek	62.1	4720	9475	19024	0	184	4904	9659	19208	2:98	1 - 4	
GEORGIA-PACIFIC CONSUMER PRODUCTS LP	East River	147.4	53215	109044	223445	584	3273	57072	112901	227302	3:97	2 - 7	
ARLA FOODS PRODUCTION LLC	Unnamed	3.7	1837	3774	7752	0	151	1988	3925	7903	4:96	2 - 8	
LITTLE RAPIDS CORP SHAWANO SPECIALTY PAPERS	Wolf River	1123.0	23384	46229	91392	535	2173	26092	48937	94100	6:94	3 - 10	
FREEDOM SANITARY DISTRICT NO 1	Duck Creek	49.8	4908	9846	19753	0	639	5547	10485	20392	6:94	3 - 12	
WRIGHTSTOWN SANITARY DISTRICT 2	Unnamed	1.3	227	463	947	0	32	259	495	979	6:94	3 - 12	
CAROLINE SD 1 WASTEWATER TREATMENT FACILITY	Embarrass River	240.3	6555	13015	25841	819	91	7465	13925	26751	7:93	3 - 12	
GRESHAM WASTEWATER TREATMENT FACILITY	Red River	162.0	3740	7416	14703	93	442	4275	7951	15238	7:93	4 - 13	
WISCONSIN VENEER AND PLYWOOD INC	West Branch Red River	27.5	557	1103	2183	0	93	650	1196	2276	8:92	4 - 14	
MONTELLO WASTEWATER TREATMENT FACILITY	Fox River	547.1	17593	34980	69550	2498	553	20644	38031	72601	8:92	4 - 15	
HORTONVILLE WASTEWATER TREATMENT FACILITY	Wolf River	1553.2	55381	110039	218641	9404	531	65316	119974	228576	8:92	4 - 15	
WITTENBERG WASTEWATER TREATMENT FACILITY	Middle Branch Embarrass River	74.8	1887	3741	7419	0	349	2236	4090	7768	9:91	4 - 16	
SHIOCTON WASTEWATER TREATMENT FACILITY	Wolf River	1449.7	49368	98040	194698	8759	461	58588	107260	203918	9:91	5 - 16	
EMBARRASS CLOVERLEAF LAKES SD LAGOON SYSTEM	Embarrass River	412.4	11992	23811	47278	1332	928	14252	26071	49538	9:91	5 - 16	
REDGRANITE WASTEWATER TREATMENT FACILITY	Willow Creek	58.2	802	1581	3115	0	161	963	1742	3276	9:91	5 - 17	
HOLLAND SD 1 WASTEWATER TREATMENT FACILITY	Unnamed	4.9	2500	5132	10538	151	391	3042	5674	11080	10:90	5 - 18	
TIGERTON WASTEWATER TREATMENT FACILITY	South Branch Embarrass River	93.2	2223	4406	8733	81	389	2693	4876	9203	10:90	5 - 17	
FREMONT ORIHULA WOLF RIVER JOINT S C	Wolf River	3213.3	114604	227807	452828	24097	735	139436	252639	477660	10:90	5 - 18	
GREEN LAKE SANITARY DISTRICT	Fox River	961.5	32009	63658	126601	6258	925	39192	70841	133784	10:90	5 - 18	
NEW LONDON WASTEWATER TREATMENT FACILITY	Wolf River	2268.9	86627	172337	342849	17270	2288	106185	191895	362407	10:90	5 - 18	
BUTTE DES MORTS CONSOLIDATED SD 1	Lake Butte des Morts	5228.4	198262	394506	784997	43900	1270	243432	439676	830167	10:90	5 - 19	
NORTH LAKE POYGAN S D WWTF	Lake Poygan	286.9	9329	18532	36815	2245	138	11712	20915	39198	11:89	6 - 20	
OMRO WASTEWATER TREATMENT FACILITY	Fox River	1506.6	56867	113232	225465	13494	1116	71477	127842	240075	11:89	6 - 20	
PRINCETON WASTEWATER TREATMENT FACILITY	Fox River	977.5	32499	64634	128544	7183	1280	40962	73097	137007	12:88	6 - 21	
SEYMOUR WASTEWATER TREATMENT FACILITY	Black Creek	22.9	3215	6491	13106	0	887	4102	7378	13993	12:88	6 - 22	
POWER PACKAGING INC	Unnamed	3.3	210	420	837	0	58	268	478	895	12:88	6 - 22	
WOLF TREATMENT PLANT	Wolf River	1123.2	23396	46253	91441	2708	3872	29976	52833	98021	12:88	7 - 22	
DEL MONTE CORPORATION MARKESAN PLANT #116	Grand River	49.2	2741	5471	10918	520	275	3536	6266	11713	13:87	7 - 22	
BERLIN WASTEWATER TREATMENT FACILITY	Fox River	1374.2	46478	92439	183852	11999	1495	59972	105933	197346	13:87	7 - 23	
OSHKOSH WASTEWATER TREATMENT PLANT	Fox River	5354.1	209402	416782	829538	45170	20061	274633	482013	894769	14:86	7 - 24	
POYGAN POYSIPPI SD 1 WWTF	Lake Poygan	293.8	9733	19340	38427	2383	710	12826	22433	41520	14:86	7 - 24	
LAKESIDE FOODS INC EDEN	Unnamed	1.9	141	284	571	0	47	188	331	618	14:86	8 - 25	
GALLOWAY COMPANY	Fox River	5883.2	252779	503633	1003428	86620	4	339403	590257	1090052	15:85	8 - 26	
EXOPACK - MENASHA PLANT	Fox River	5883.2	252779	503633	1003428	86624	637	340040	590894	1090689	15:85	8 - 26	
MENASHA ELECTRIC AND WATER UTILITY	Fox River	5883.4	252785	503645	1003452	87261	100	340146	591006	1090813	15:85	8 - 26	
SENECA FOODS CORPORATION RIPON	Unnamed	3.0	123	245	488	0	44	167	289	532	15:85	8 - 26	
BLACK CREEK WASTEWATER TREATMENT FACILITY	Black Creek	52.0	5053	10163	20440	909	978	6940	12050	22327	16:84	8 - 27	
BEAR CREEK WASTEWATER TREATMENT FACILITY	Bear Creek	19.4	1377	2759	5528	0	524	1901	3283	6052	16:84	9 - 28	
NEENAH MENASHA SEWER COMMISSION WWTF	Fox River	5883.4	252789	503652	1003466	87361	15960	356110	606973	1106787	17:83	9 - 29	
CELLU TISSUE NEENAH	Fox River	5883.5	252792	503658	1003479	103321	538	356651	607517	1107338	17:83	9 - 29	
AMHERST WASTEWATER TREATMENT FACILITY	Waupaca River	68.7	993	1954	3843	0	423	1416	2377	4266	18:82	10 - 30	
SCA TISSUE NORTH AMERICA LLC	Little Lake Butte des Morts	5883.9	252809	503691	1003546	103859	6098	362766	613648	1113503	18:82	10 - 30	
NEENAH PAPER INC NEENAH MILL	Fox River	5883.2	188398	374946	746209	85288	1332	275018	461566	832829	19:81	10 - 31	
GRAND CHUTE MENASHA WEST SEWERAGE COMMISSION	Little Lake Butte des Morts	5919.0	254563	507191	1010526	109957	8609	373129	625757	1129092	19:81	11 - 32	
WEYAUWEGA WASTEWATER TREATMENT FACILITY	Waupaca River	265.5	5724	11307	22333	2058	687	8469	14052	25078	20:80	11 - 32	
GREEN LAKE WASTEWATER TREATMENT FACILITY	Puchyan River	104.2	5159	10296	20548	1422	1203	7784	12921	23173	20:80	11 - 34	
CLINTONVILLE WASTEWATER TREATMENT FACILITY	Pigeon River	112.5	5228	10414	20743	1535	1217	7980	13166	23495	21:79	12 - 34	
APPLETON WASTEWATER TREATMENT FACILITY	Fox River	5955.5	256780	511641	1019456	118566	21267	396613	651474	1159289	21:79	12 - 35	
AGROPUR INC WEYAUWEGA PLANT	Waupaca River	265.7	5731	11320	22359	2745	462	8938	14527	25566	22:78	13 - 36	

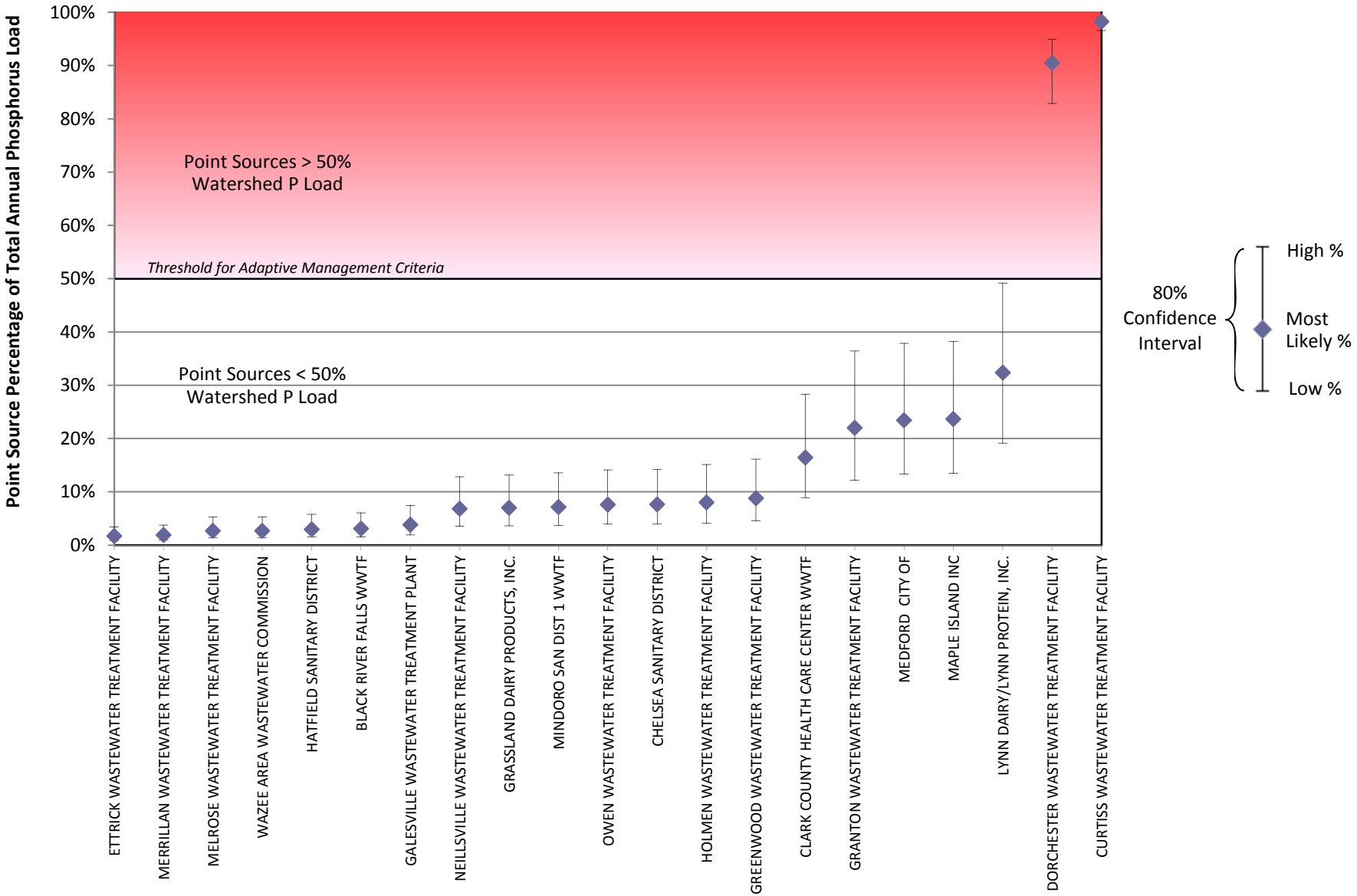
Facility Name	Receiving Water	Watershed Area	Nonpoint Load LOW	Nonpoint Load AVE	Nonpoint Load HIGH	2007-2009 Avg. Upstream Point Source Load	2007-2009 Avg. Point Source Load	Total Load LOW	Total Load AVE	Total Load HIGH	PS:NPS Ratio AVE	PS Range *(80% CI)*	Model Flag
		(mi^2)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(%)	(%)	**
NEWPAGE CORPORATION - KIMBERLY MILL	Fox River	5958.3	256847	511773	1019719	139833	10629	407309	662235	1170181	23:77	13 - 37	
FOREST JUNCTION SANITARY DISTRICT	Plum Creek	2.2	364	734	1482	0	217	581	951	1699	23:77	13 - 37	
APPLETON PAPERS LLC, COMBINED LOCKS MILL	Fox River	5965.3	257227	512535	1021244	150462	9306	416995	672303	1181012	24:76	14 - 38	
NESHKORO WASTEWATER TREATMENT FACILITY	White River	99.3	1428	2815	5547	587	320	2335	3722	6454	24:76	14 - 39	
THE PROCTER & GAMBLE PAPER PRODUCTS CO	Fox River	6333.7	327189	652993	1303219	224242	346	551777	877581	1527807	26:74	15 - 41	
GREEN BAY PACKAGING, INC. - MILL DIVISION	Fox River	6334.2	327187	652988	1303208	224588	645	552420	878221	1528441	26:74	15 - 41	
THILMANY LLC - DE PERE FACILITY	Fox River	6113.6	284044	566356	1129260	195668	0	479712	762024	1324928	26:74	15 - 41	
BOWLER WASTEWATER TREATMENT FACILITY	North Branch Embarrass River	39.0	615	1213	2393	0	422	1037	1635	2815	26:74	15 - 41	
GBMSD - DE PERE	Fox River	6114.7	284093	566455	1129457	195668	5520	485281	767643	1330645	26:74	15 - 41	
WAUPACA WASTEWATER TREATMENT FACILITY	Waupaca River	146.9	2899	5717	11272	423	1635	4957	7775	13330	26:74	15 - 42	
WRIGHTSTOWN SEWER & WATER UTILITY	Fox River	6047.5	272582	543342	1083052	195388	280	468250	739010	1278720	26:74	15 - 42	
THILMANY, LLC	Fox River	6006.3	262682	523473	1043178	160637	27976	451295	712086	1231791	26:74	15 - 42	
FOX ENERGY CO LLC - FOX ENERGY CENTER	Fox River	6011.1	263275	524663	1045567	194453	176	457904	719292	1240196	27:73	16 - 43	
HEART OF VALLEY MSD WW TRTMNT FAC	Fox River	6007.0	262670	523448	1043127	188613	5840	457123	717901	1237580	27:73	16 - 43	
GEORGIA PACIFIC CONSUMER PRODUCTS LP	Fox River	6179.7	292755	583831	1164312	201188	19186	513129	804205	1384686	27:73	16 - 43	
SCHROEDERS GREENHOUSE	Fox River	6180.0	292766	583852	1164353	220374	11	513151	804237	1384738	27:73	16 - 43	
WISCONSIN PUBLIC SERVICE CORP PULLIAM	Fox River	6336.5	327143	652894	1303010	263597	1899	592639	918390	1568506	29:71	17 - 45	
GREEN BAY METROPOLITAN SEWERAGE DISTRICT	Fox River	6336.5	327143	652894	1303010	227132	38364	592639	918390	1568506	29:71	17 - 45	
SILVER LAKE SANITARY DISTRICT	White River	64.5	706	1386	2723	0	587	1293	1973	3310	30:70	18 - 45	
OAKFIELD WASTEWATER TREATMENT FACILITY	Campground Creek	9.8	1879	3805	7703	0	1638	3517	5443	9341	30:70	18 - 47	
FRIESLAND WASTEWATER TREATMENT FACILITY	Unnamed	1.4	71	142	283	0	63	134	205	346	31:69	18 - 47	
MARKESAN WASTEWATER TREATMENT FACILITY	Grand River	58.3	3033	6046	12054	795	2349	6177	9190	15198	34:66	21 - 51	
FOND DU LAC WATER POLLUTION CONTROL PLANT	Lake Winnebago	172.0	16777	33790	68055	2853	15802	35432	52445	86710	36:64	22 - 53	
RIPON WASTEWATER TREATMENT FACILITY	Silver Creek	27.4	1262	2518	5026	44	1378	2684	3940	6448	36:64	22 - 53	
STOCKBRIDGE WASTEWATER TREATMENT FACILITY	Unnamed	1.9	905	1866	3847	0	1059	1964	2925	4906	36:64	22 - 54	
WINNECONNE WASTEWATER TREATMENT FACILITY	Unnamed	4.3	501	1016	2061	0	620	1121	1636	2681	38:62	23 - 55	
MARION WASTEWATER TREATMENT FACILITY	North Branch Pigeon River	21.0	1228	2455	4907	0	1535	2763	3990	6442	38:62	24 - 56	
BIRNAMWOOD WASTEWATER TREATMENT FACILITY	Unnamed	0.5	62	125	335	0	81	143	206	416	39:61	19 - 56	EC
EDEN WASTEWATER TREATMENT FACILITY	Unnamed	2.1	244	494	998	47	296	587	837	1341	41:59	26 - 58	
POY SIPPI SD WASTEWATER TREATMENT FACILITY	Pine River	100.7	1372	2703	5323	1761	323	3456	4787	7407	44:56	28 - 60	
RIDGEWAY COUNTRY CLUB INC WWTF	Unnamed	0.3	8	15	30	0	12	20	27	42	44:56	28 - 60	
IOLA WASTEWATER TREATMENT FACILITY	South Branch Little Wolf River	30.1	639	1263	2497	0	1117	1756	2380	3614	47:53	31 - 64	
LAKESIDE FOODS INC SEYMOUR PLANT	Unnamed	0.1	11	24	59	0	22	33	46	81	48:52	27 - 66	EC
WRIGHTSTOWN SANITARY DISTRICT 1	Unnamed	0.4	251	516	1058	0	552	803	1068	1610	52:48	34 - 69	
OXFORD WASTEWATER TREATMENT FACILITY	Neenah Creek	33.4	390	765	1503	0	1148	1538	1913	2651	60:40	43 - 75	
WESTFIELD WASTEWATER TREATMENT FACILITY	Westfield Creek	26.2	309	606	1189	0	1017	1326	1623	2206	63:37	46 - 77	
SAPUTO CHEESE USA INC BLACK CREEK	Unnamed	0.6	2	5	9	0	10	12	15	19	69:31	53 - 81	
FAIRWATER WASTEWATER TREATMENT FACILITY	Unnamed	0.4	102	206	414	0	520	622	726	934	72:28	56 - 84	
LARSEN WINCHESTER SD WWTF	Unnamed	2.0	65	130	257	0	346	411	476	603	73:27	57 - 84	
PACKWAUKEE SANITARY DISTRICT NO 1	Unnamed	1.0	54	109	221	0	333	387	442	554	75:25	60 - 86	
MAPLE LANE HEALTH CARE CENTER	Wetland	0.9	15	29	58	0	95	110	124	153	77:23	62 - 87	
WILD ROSE WASTEWATER TREATMENT FACILITY	Pine River	22.4	138	269	526	0	1242	1380	1511	1768	82:18	70 - 90	
DALE SANITARY DISTRICT NO 1 WWTF	Unnamed	2.1	40	79	155	0	387	427	466	542	83:17	71 - 91	
WI DNR WILD ROSE FISH HATCHERY	Pine River	23.6	154	301	588	1242	519	1915	2062	2349	85:15	75 - 92	
SHERWOOD WASTEWATER TREATMENT FACILITY	Unnamed	0.2	16	32	62	0	315	331	347	377	91:9	84 - 95	
BELGIOIOSO CHEESE INC SHERWOOD	Unnamed	0.3	23	46	90	0	554	577	600	644	92:8	86 - 96	
ROSENDALE WASTEWATER TREATMENT FACILITY	Unnamed	0.3	23	56	125	0	1157	1180	1213	1282	95:5	90 - 98	EC
SARA LEE FOODS - NEW LONDON	Unnamed	0.0	9	15	24	0	1799	1808	1814	1823	99:1	99 - 99	EC

***** EC = Export coefficient nonpoint model results are used instead of Multiple Regression #1 nonpoint model results.***

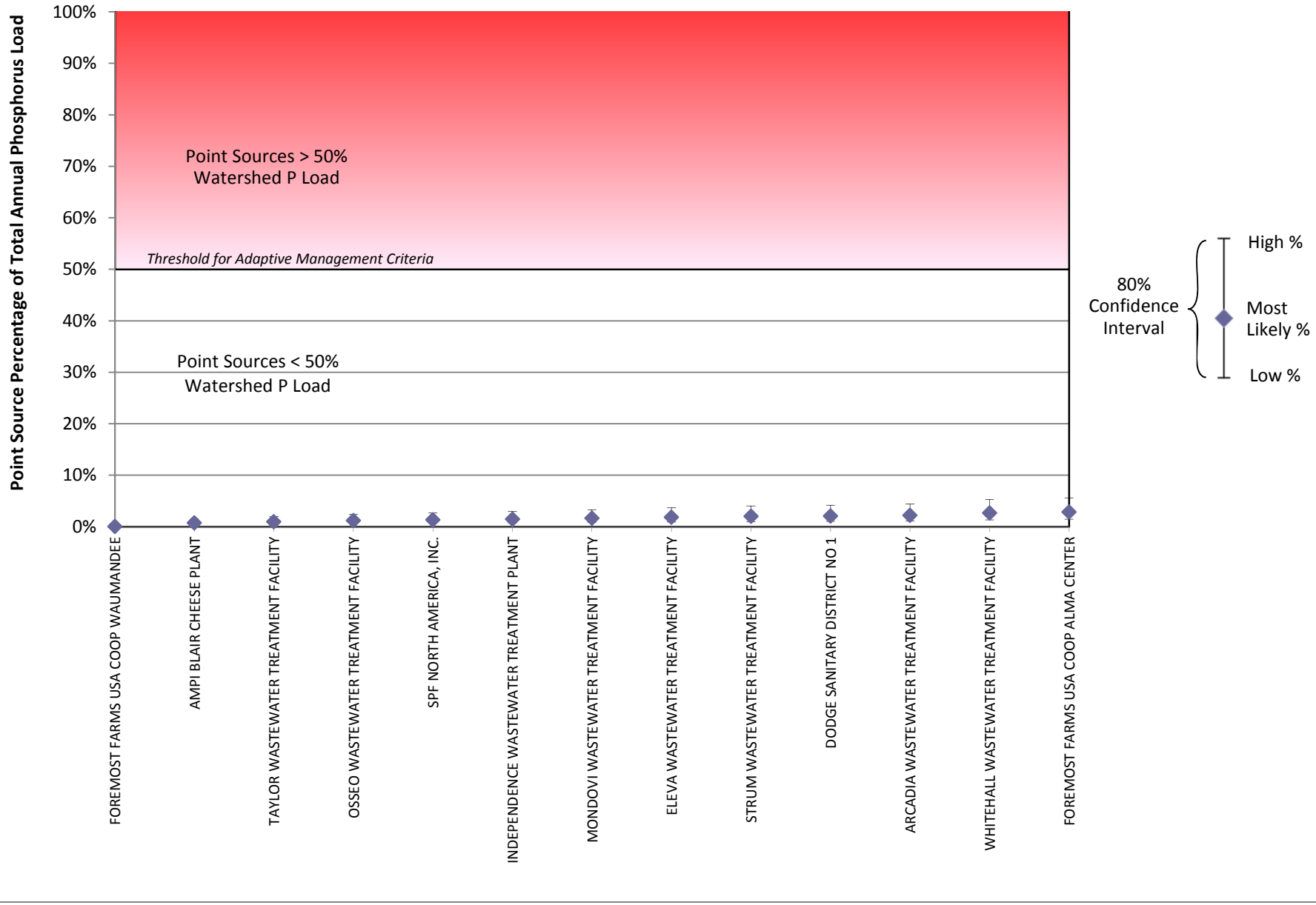
Bad Axe - La Crosse Basin



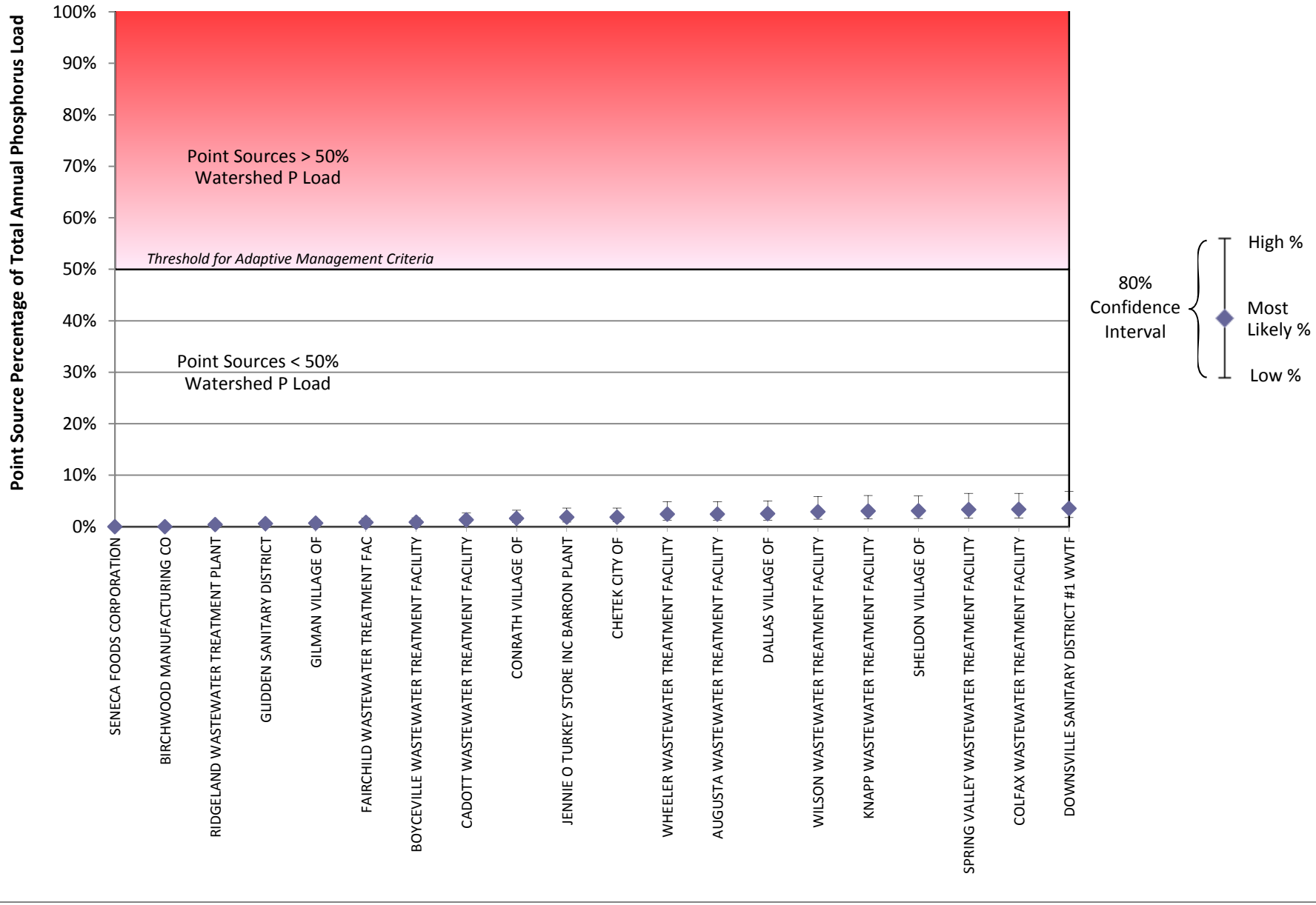
Black Basin


Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
80%
Confidence
Interval
High %
Most
Likely %
Low %
ETTRICK WASTEWATER TREATMENT FACILITY
MERRILLAN WASTEWATER TREATMENT FACILITY
MELROSE WASTEWATER TREATMENT FACILITY
WAZEE AREA WASTEWATER COMMISSION
HATFIELD SANITARY DISTRICT
BLACK RIVER FALLS WWTF
GALESVILLE WASTEWATER TREATMENT PLANT
NEILLSVILLE WASTEWATER TREATMENT FACILITY
GRASSLAND DAIRY PRODUCTS, INC.
MINDORO SAN DIST 1 WWTF
OWEN WASTEWATER TREATMENT FACILITY
CHELSEA SANITARY DISTRICT
HOLMEN WASTEWATER TREATMENT FACILITY
GREENWOOD WASTEWATER TREATMENT FACILITY
CLARK COUNTY HEALTH CARE CENTER WWTF
GRANTON WASTEWATER TREATMENT FACILITY
MEDFORD CITY OF
MAPLE ISLAND INC
LYNN DAIRY/LYNN PROTEIN, INC.
DORCHESTER WASTEWATER TREATMENT FACILITY
CURTISS WASTEWATER TREATMENT FACILITY

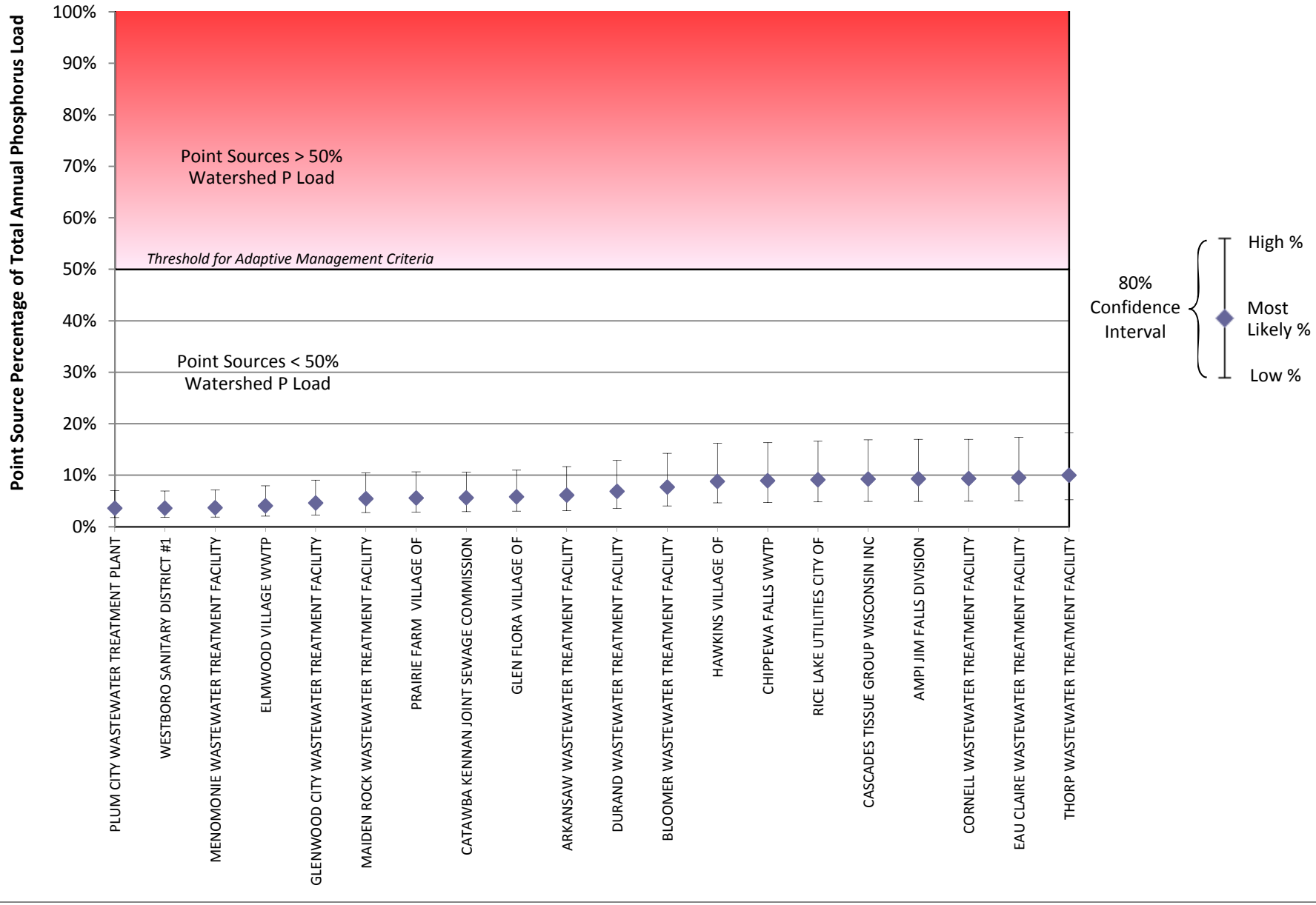
Buffalo - Trempealeau Basin



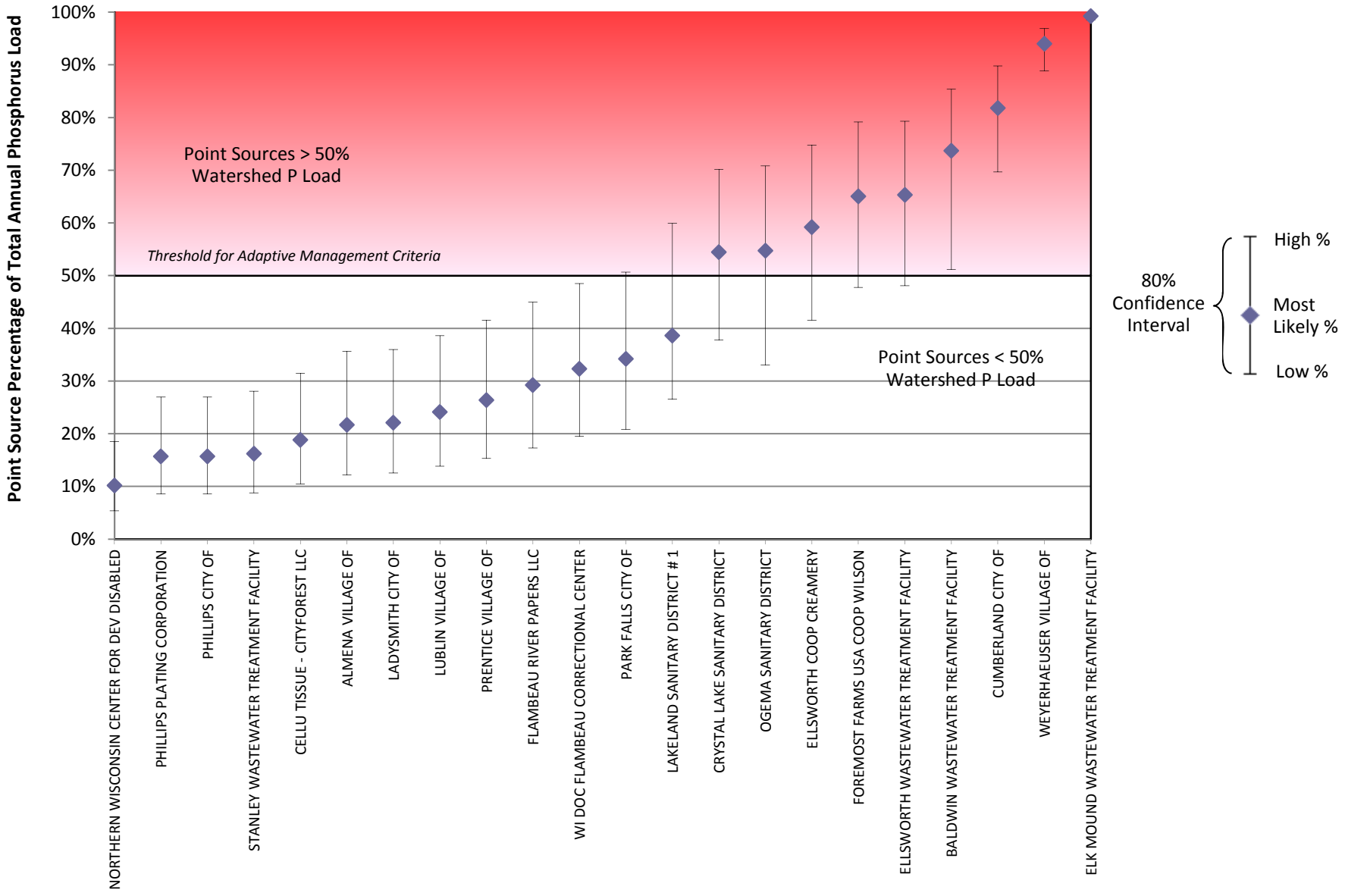
Chippewa Basin



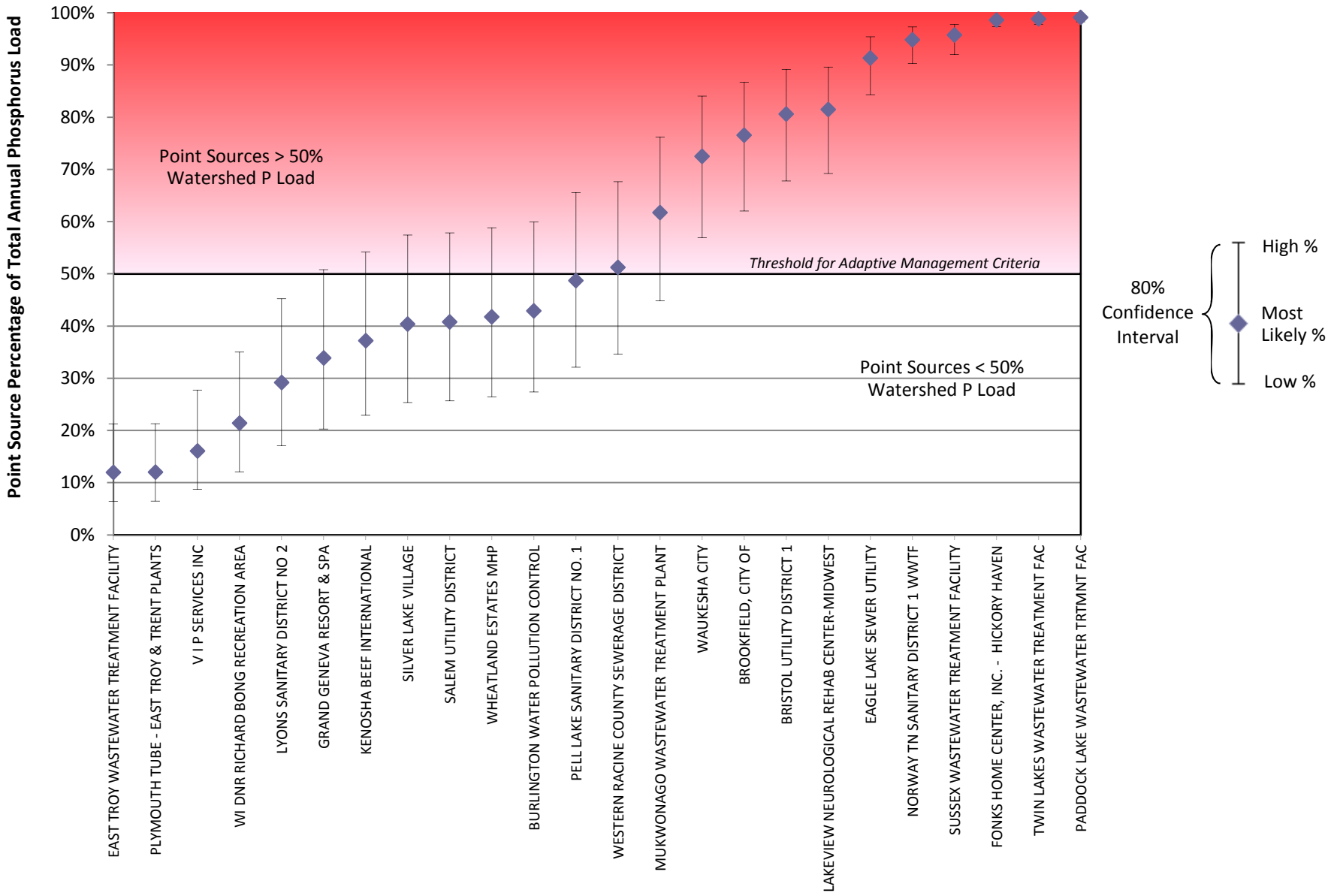
Chippewa Basin



Chippewa Basin



Fox (IL) Basin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80%
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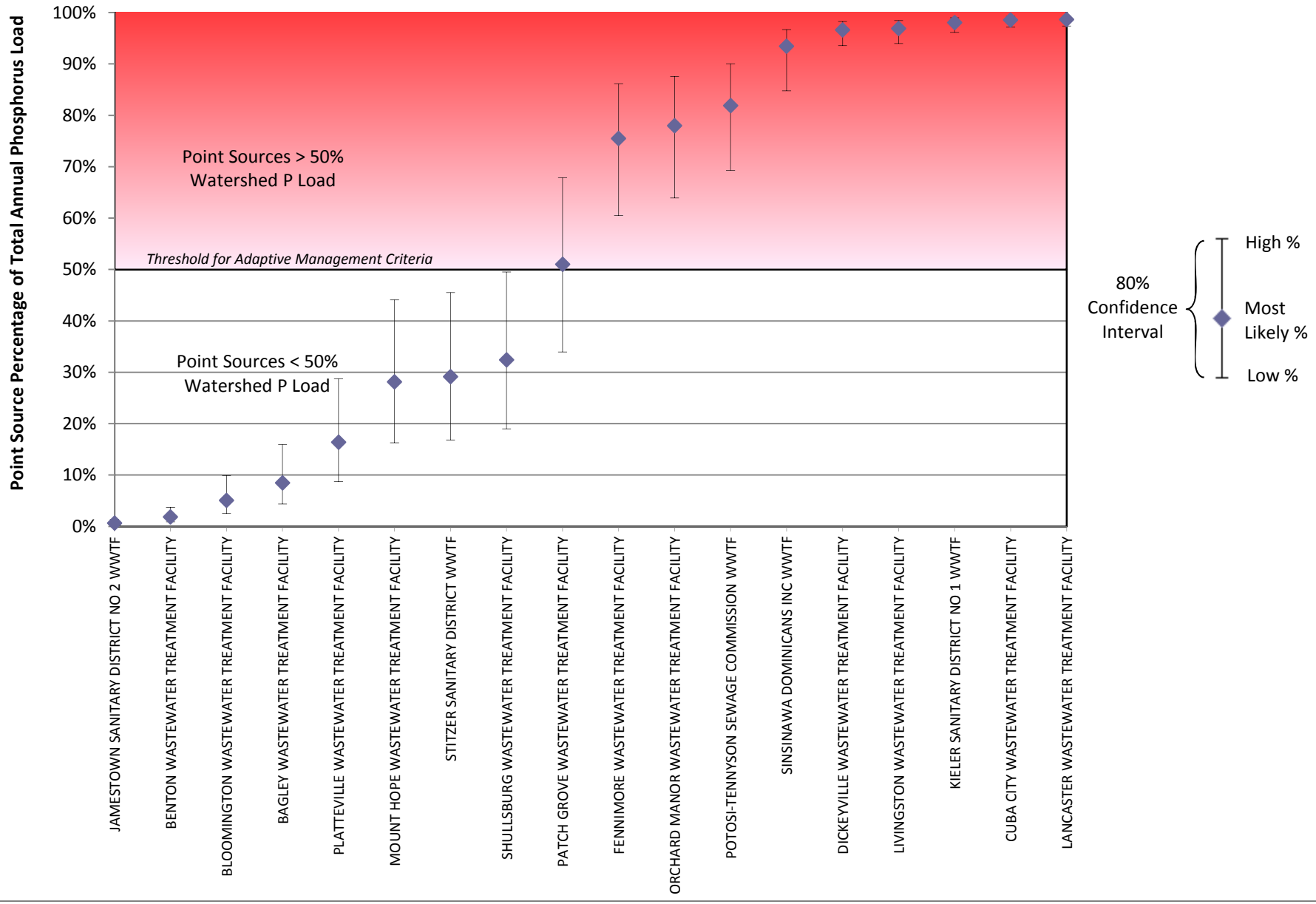
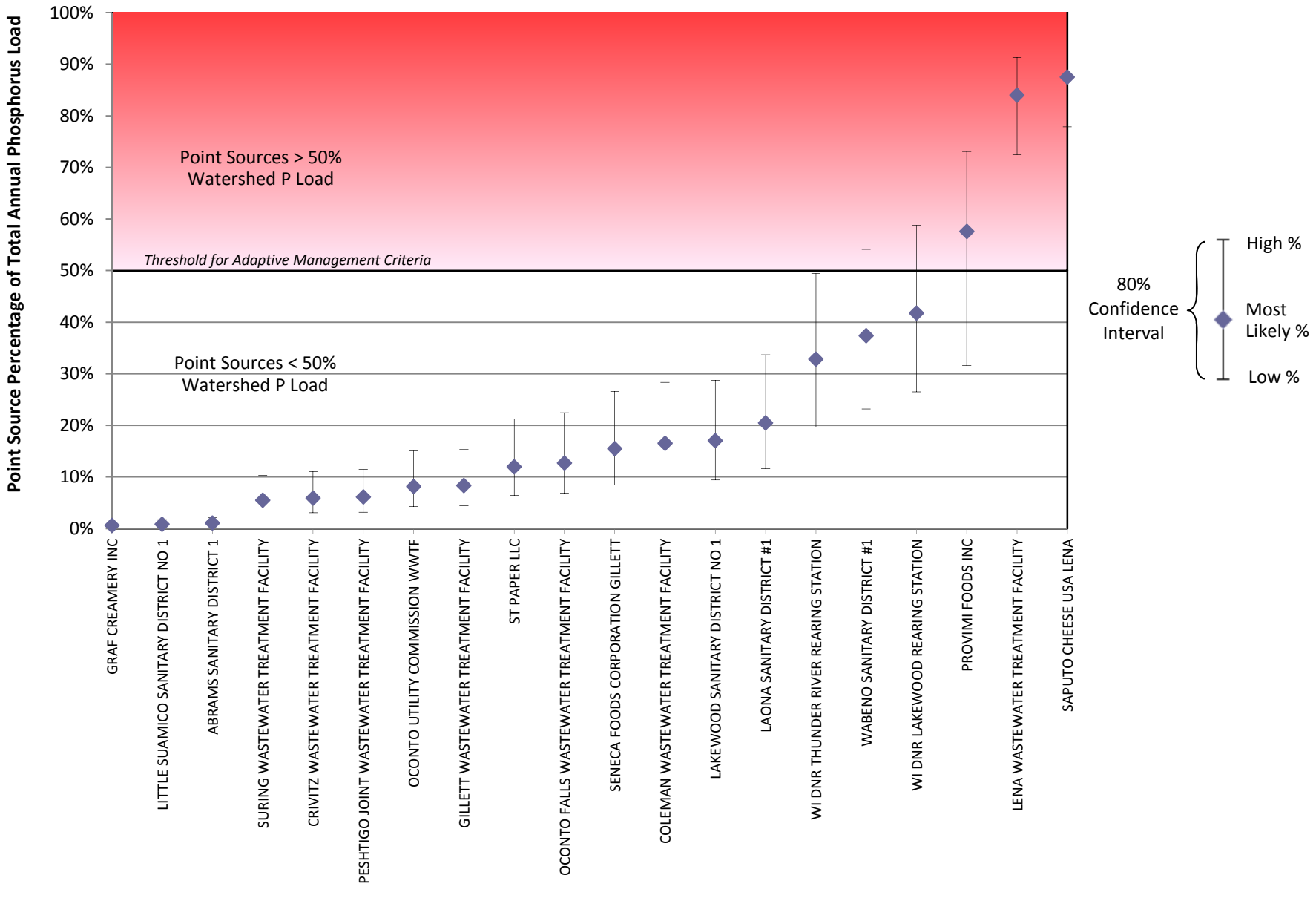
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
80%
Confidence
Interval
High %
Most
Likely %
Low %
EAST TROY WASTEWATER TREATMENT FACILITY
PLYMOUTH TUBE - EAST TROY & TRENT PLANTS
V I P SERVICES INC
WI DNR RICHARD BONG RECREATION AREA
LYONS SANITARY DISTRICT NO 2
GRAND GENEVA RESORT & SPA
KENOSHA BEEF INTERNATIONAL
SILVER LAKE VILLAGE
SALEM UTILITY DISTRICT
WHEATLAND ESTATES MHP
BURLINGTON WATER POLLUTION CONTROL
PELL LAKE SANITARY DISTRICT NO. 1
WESTERN RACINE COUNTY SEWERAGE DISTRICT
MUKWONAGO WASTEWATER TREATMENT PLANT
WAUKESHA CITY
BROOKFIELD, CITY OF
BRISTOL UTILITY DISTRICT 1
LAKEVIEW NEUROLOGICAL REHAB CENTER-MIDWEST
EAGLE LAKE SEWER UTILITY
NORWAY TN SANITARY DISTRICT 1 WWTF
SUSSEX WASTEWATER TREATMENT FACILITY
FONKS HOME CENTER, INC. - HICKORY HAVEN
TWIN LAKES WASTEWATER TREATMENT FAC
PADDOCK LAKE WASTEWATER TRTMNT FAC

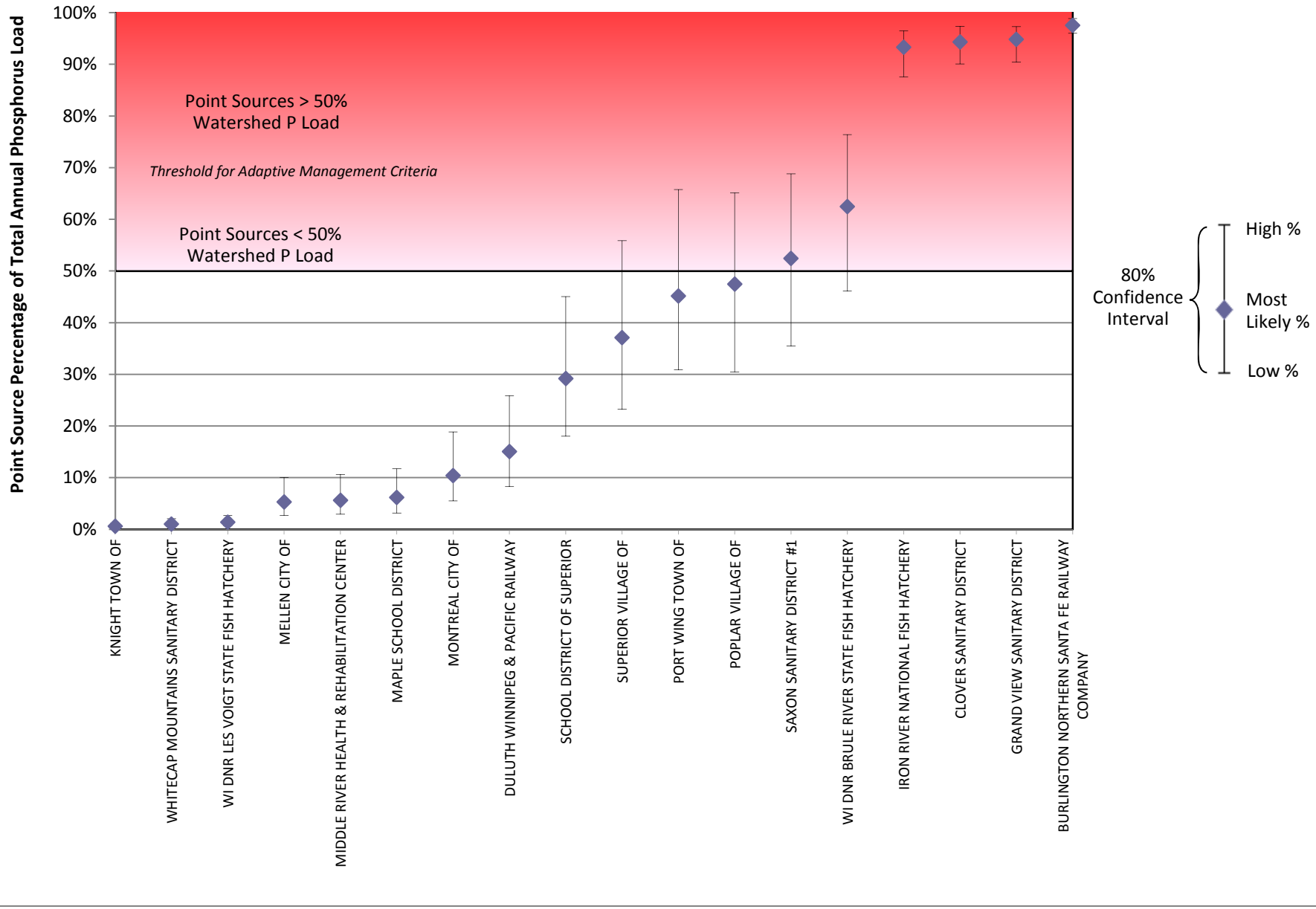
Grant - Platte Basin

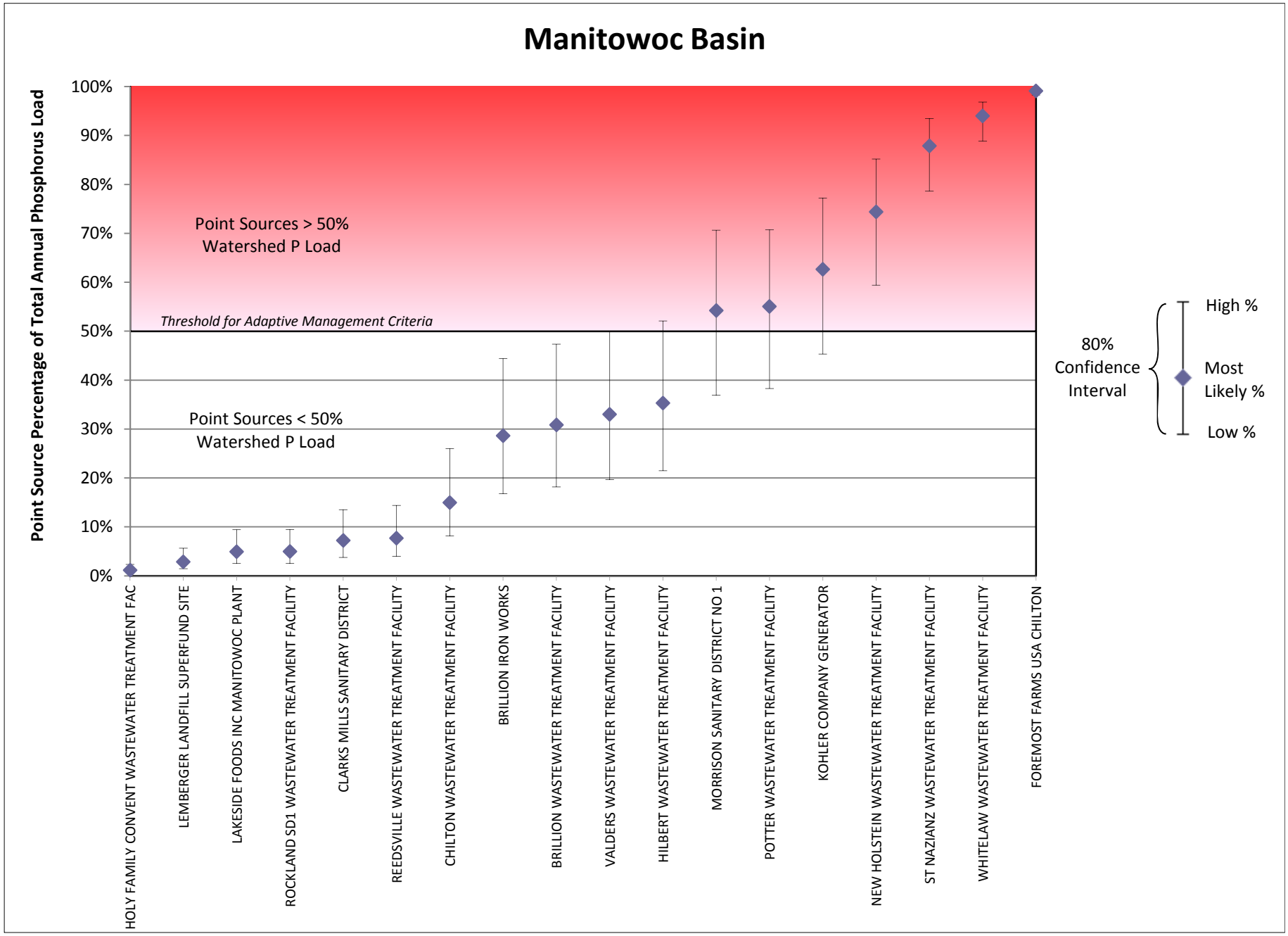


Green Bay Basin

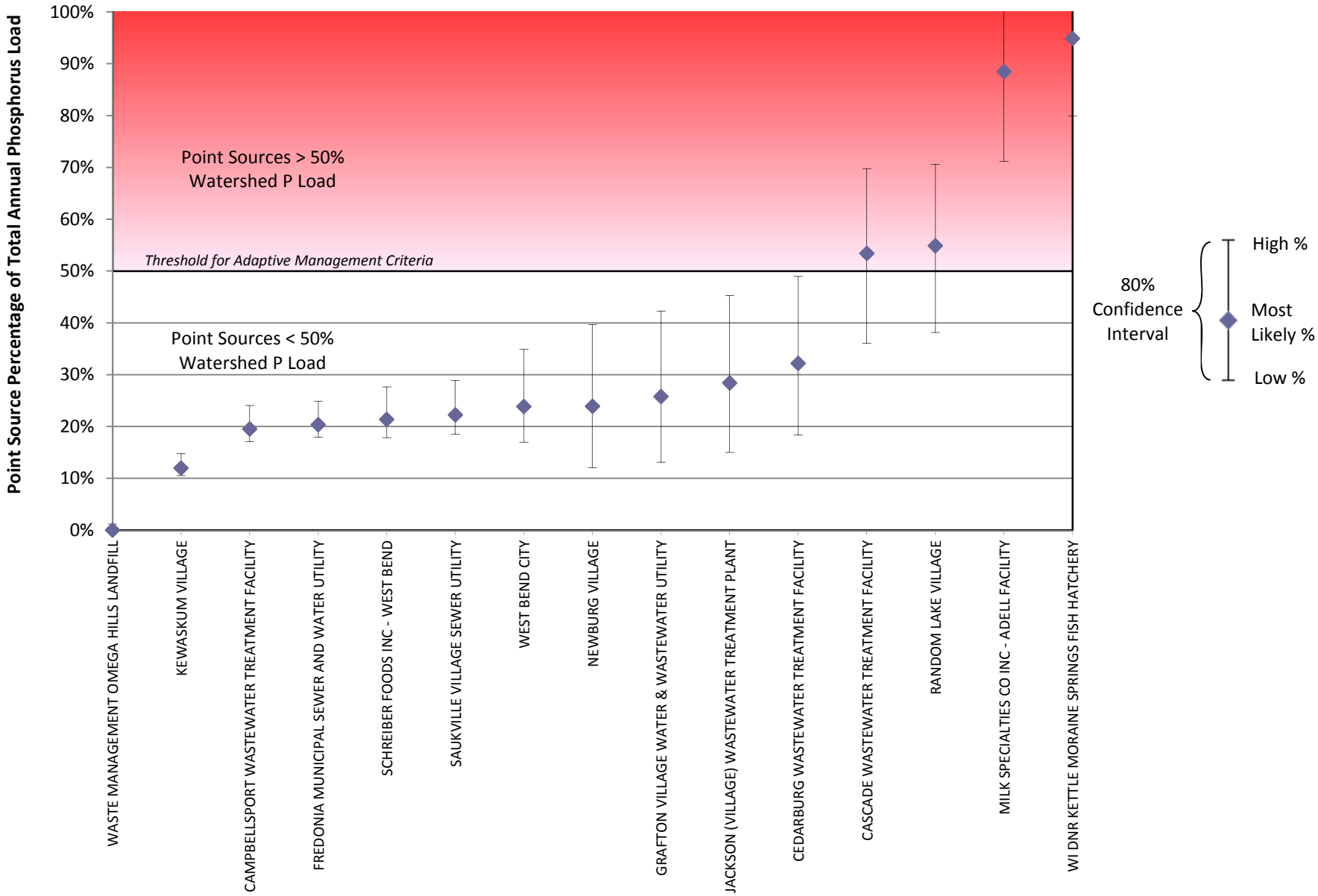


Lake Superior Basin

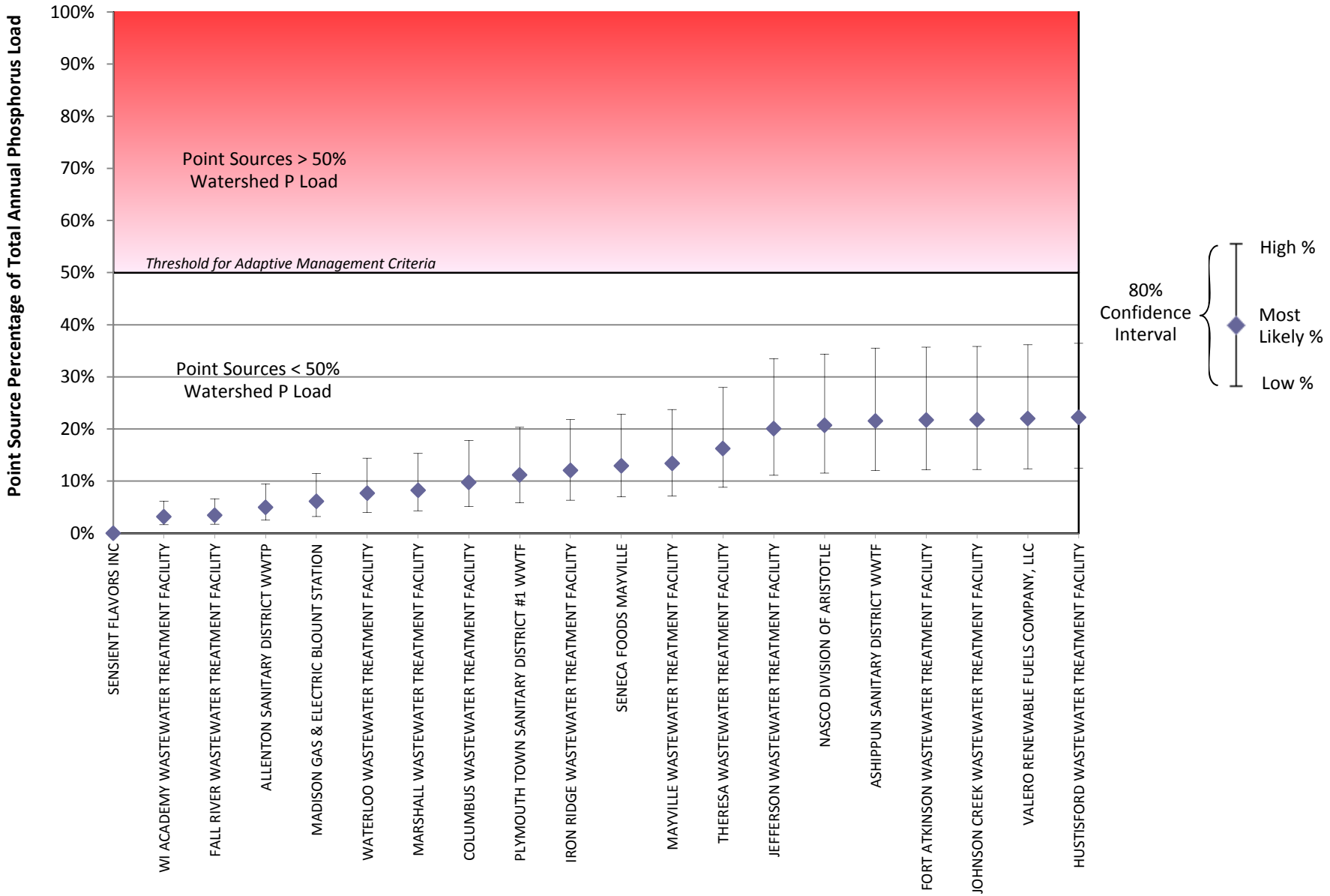



Manitowoc Basin
Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
80%
Confidence
Interval
High %
Most
Likely %
Low %
HOLY FAMILY CONVENT WASTEWATER TREATMENT FAC
LEMBERGER LANDFILL SUPERFUND SITE
LAKESIDE FOODS INC MANITOWOC PLANT
ROCKLAND SD1 WASTEWATER TREATMENT FACILITY
CLARKS MILLS SANITARY DISTRICT
REEDSVILLE WASTEWATER TREATMENT FACILITY
CHILTON WASTEWATER TREATMENT FACILITY
BRILLION IRON WORKS
BRILLION WASTEWATER TREATMENT FACILITY
VALDERS WASTEWATER TREATMENT FACILITY
HILBERT WASTEWATER TREATMENT FACILITY
MORRISON SANITARY DISTRICT NO 1
POTTER WASTEWATER TREATMENT FACILITY
KOHLER COMPANY GENERATOR
NEW HOLSTEIN WASTEWATER TREATMENT FACILITY
ST NAZIANZ WASTEWATER TREATMENT FACILITY
WHITELAW WASTEWATER TREATMENT FACILITY
FOREMOST FARMS USA CHILTON

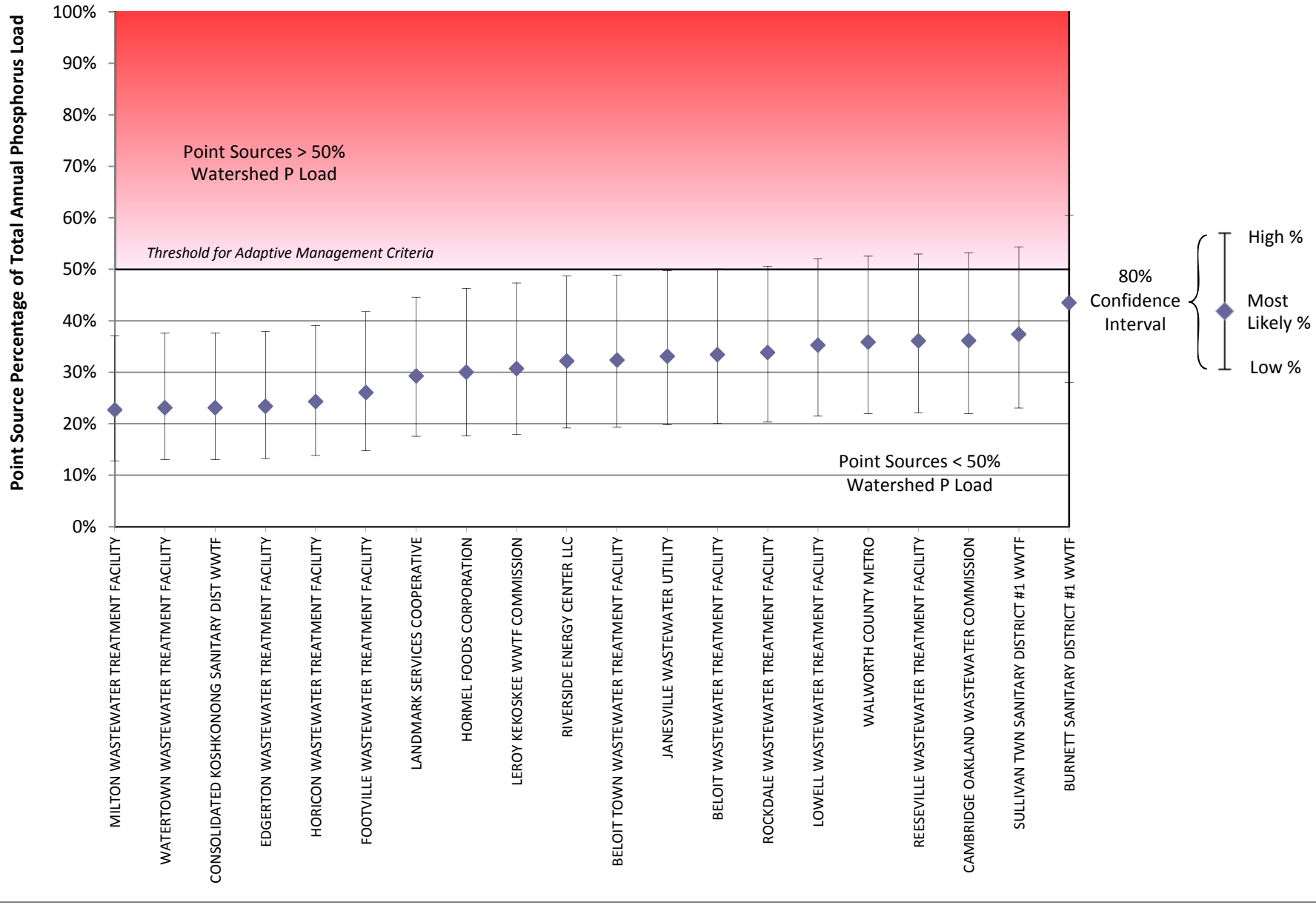
Milwaukee River Basin



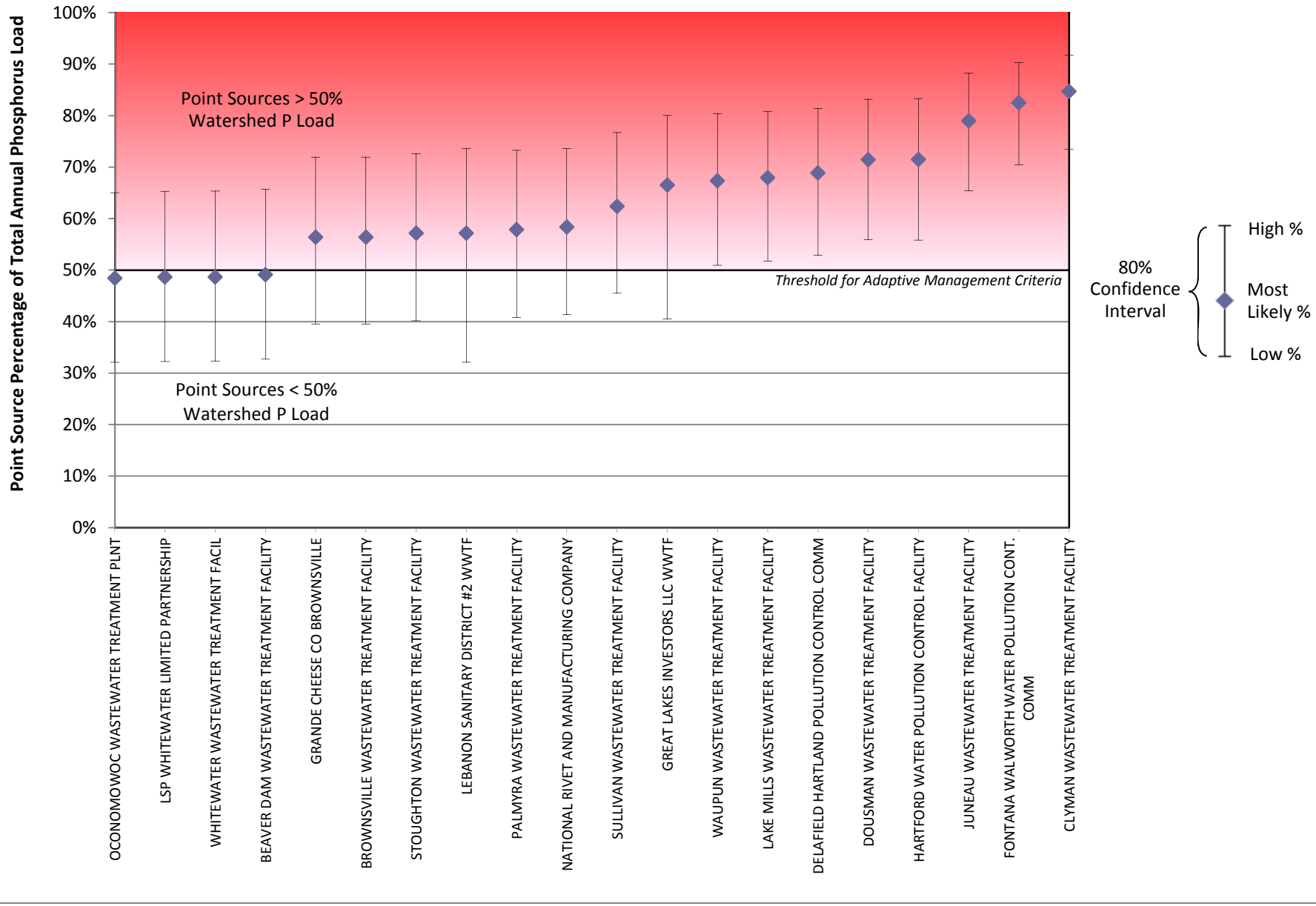
Rock Basin

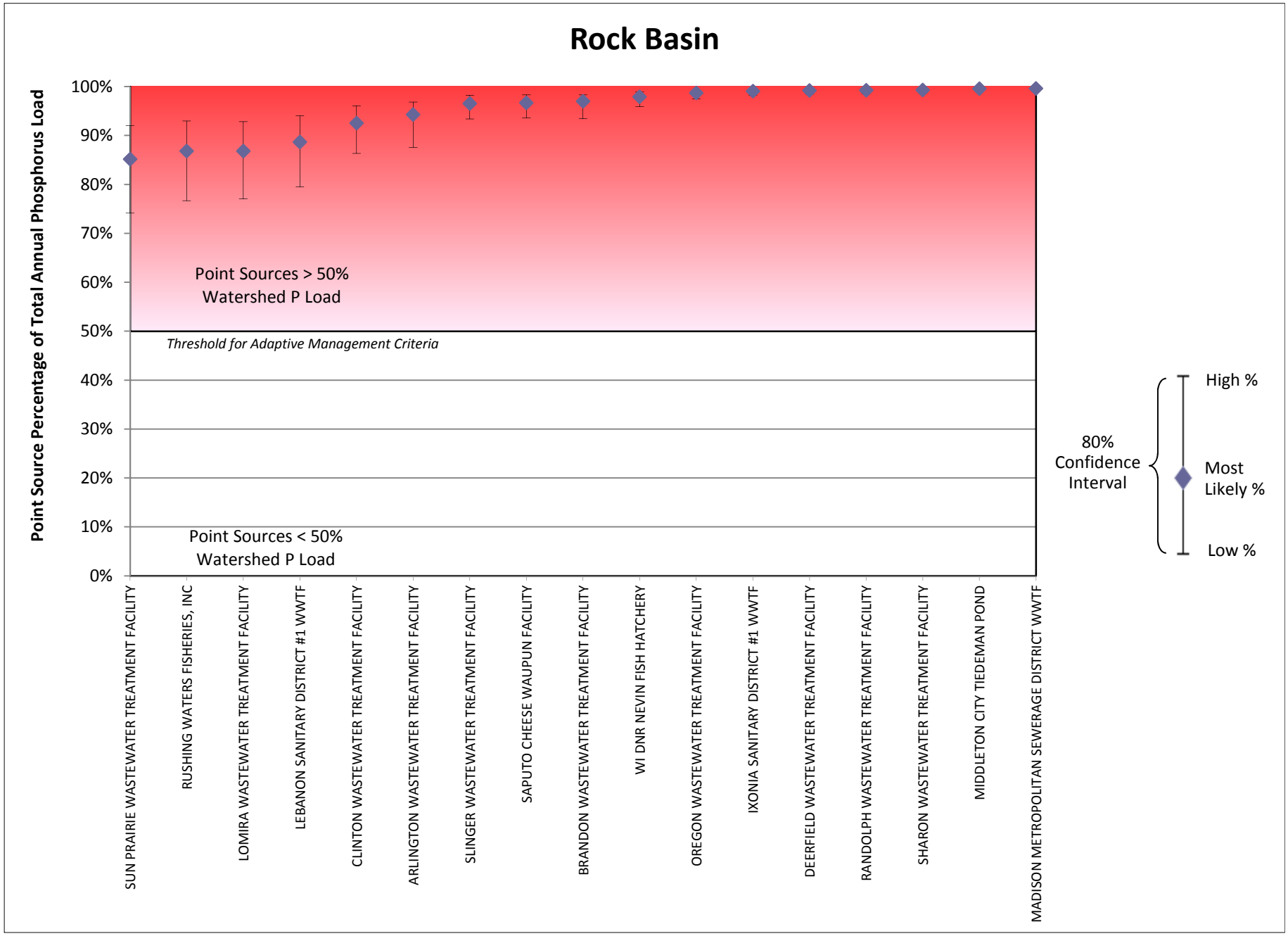

Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
80%
Confidence
Interval
High %
Most
Likely %
Low %
SENSIENT FLAVORS INC
WI ACADEMY WASTEWATER TREATMENT FACILITY
FALL RIVER WASTEWATER TREATMENT FACILITY
ALLENTON SANITARY DISTRICT WWTP
MADISON GAS & ELECTRIC BLOUNT STATION
WATERLOO WASTEWATER TREATMENT FACILITY
MARSHALL WASTEWATER TREATMENT FACILITY
COLUMBUS WASTEWATER TREATMENT FACILITY
PLYMOUTH TOWN SANITARY DISTRICT #1 WWTF
IRON RIDGE WASTEWATER TREATMENT FACILITY
SENECA FOODS MAYVILLE
MAYVILLE WASTEWATER TREATMENT FACILITY
THERESA WASTEWATER TREATMENT FACILITY
JEFFERSON WASTEWATER TREATMENT FACILITY
NASCO DIVISION OF ARISTOTLE
ASHIPPUN SANITARY DISTRICT WWTF
FORT ATKINSON WASTEWATER TREATMENT FACILITY
JOHNSON CREEK WASTEWATER TREATMENT FACILITY
VALERO RENEWABLE FUELS COMPANY, LLC
HUSTISFORD WASTEWATER TREATMENT FACILITY

Rock Basin

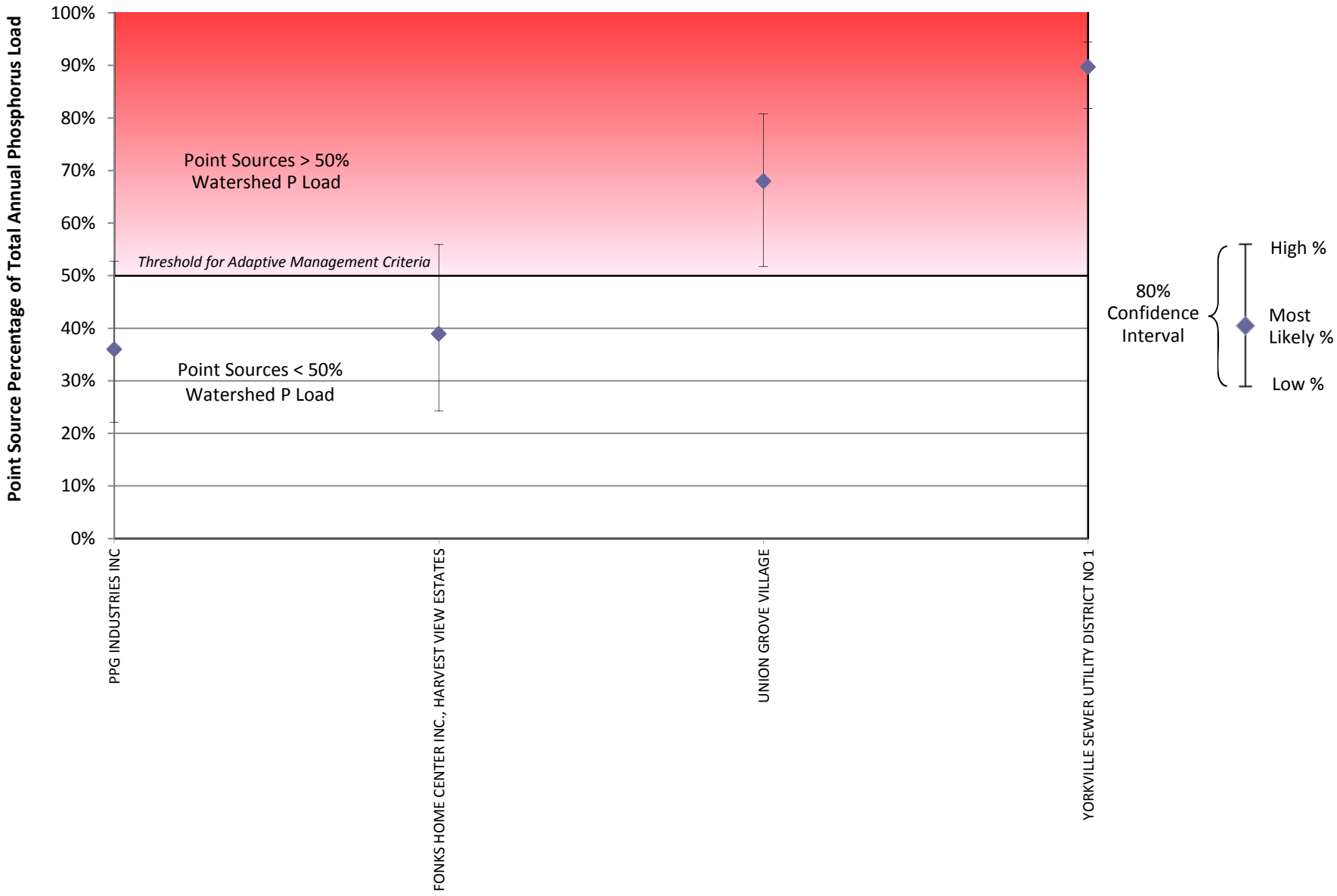

Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
80%
Confidence
Interval
High %
Most
Likely %
Low %
MILTON WASTEWATER TREATMENT FACILITY
WATERTOWN WASTEWATER TREATMENT FACILITY
CONSOLIDATED KOSHKONONG SANITARY DIST WWTF
EDGERTON WASTEWATER TREATMENT FACILITY
HORICON WASTEWATER TREATMENT FACILITY
FOOTVILLE WASTEWATER TREATMENT FACILITY
LANDMARK SERVICES COOPERATIVE
HORMEL FOODS CORPORATION
LEROY KEKOSKEE WWTF COMMISSION
RIVERSIDE ENERGY CENTER LLC
BELOIT TOWN WASTEWATER TREATMENT FACILITY
JANESVILLE WASTEWATER UTILITY
BELOIT WASTEWATER TREATMENT FACILITY
ROCKDALE WASTEWATER TREATMENT FACILITY
LOWELL WASTEWATER TREATMENT FACILITY
WALWORTH COUNTY METRO
REESEVILLE WASTEWATER TREATMENT FACILITY
CAMBRIDGE OAKLAND WASTEWATER COMMISSION
SULLIVAN TWN SANITARY DISTRICT #1 WWTF
BURNETT SANITARY DISTRICT #1 WWTF

Rock Basin

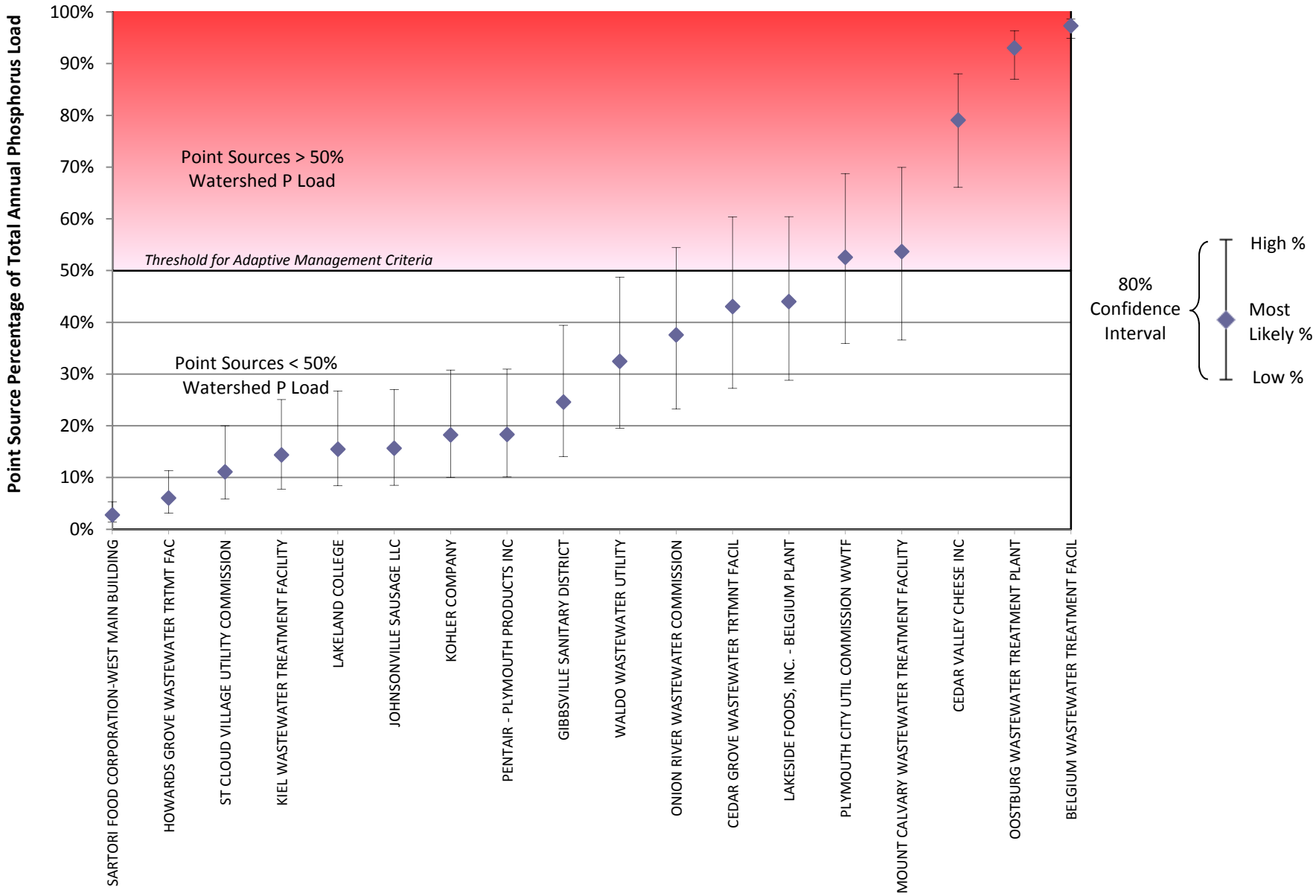

Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50% Watershed P Load
Point Sources < 50% Watershed P Load
Threshold for Adaptive Management Criteria
80% Confidence Interval
High %
Most Likely %
Low %
OCONOMOWOC WASTEWATER TREATMENT PLNT
LSP WHITEWATER LIMITED PARTNERSHIP
WHITEWATER WASTEWATER TREATMENT FACIL
BEAVER DAM WASTEWATER TREATMENT FACILITY
GRANDE CHEESE CO BROWNSVILLE
BROWNSVILLE WASTEWATER TREATMENT FACILITY
STOUGHTON WASTEWATER TREATMENT FACILITY
LEBANON SANITARY DISTRICT #2 WWTF
PALMYRA WASTEWATER TREATMENT FACILITY
NATIONAL RIVET AND MANUFACTURING COMPANY
SULLIVAN WASTEWATER TREATMENT FACILITY
GREAT LAKES INVESTORS LLC WWTF
WAUPUN WASTEWATER TREATMENT FACILITY
LAKE MILLS WASTEWATER TREATMENT FACILITY
DELAFIELD HARTLAND POLLUTION CONTROL COMM
DOUSMAN WASTEWATER TREATMENT FACILITY
HARTFORD WATER POLLUTION CONTROL FACILITY
JUNEAU WASTEWATER TREATMENT FACILITY
FONTANA WALWORTH WATER POLLUTION CONT. COMM
CLYMAN WASTEWATER TREATMENT FACILITY


Rock Basin
Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
SUN PRAIRIE WASTEWATER TREATMENT FACILITY
RUSHING WATERS FISHERIES, INC
LOMIRA WASTEWATER TREATMENT FACILITY
LEBANON SANITARY DISTRICT #1 WWTF
CLINTON WASTEWATER TREATMENT FACILITY
ARLINGTON WASTEWATER TREATMENT FACILITY
SLINGER WASTEWATER TREATMENT FACILITY
SAPUTO CHEESE WAUPUN FACILITY
BRANDON WASTEWATER TREATMENT FACILITY
WI DNR NEVIN FISH HATCHERY
OREGON WASTEWATER TREATMENT FACILITY
IXONIA SANITARY DISTRICT #1 WWTF
DEERFIELD WASTEWATER TREATMENT FACILITY
RANDOLPH WASTEWATER TREATMENT FACILITY
SHARON WASTEWATER TREATMENT FACILITY
MIDDLETON CITY TIEDEMAN POND
MADISON METROPOLITAN SEWERAGE DISTRICT WWTF
80%
Confidence
Interval
High %
Most
Likely %
Low %

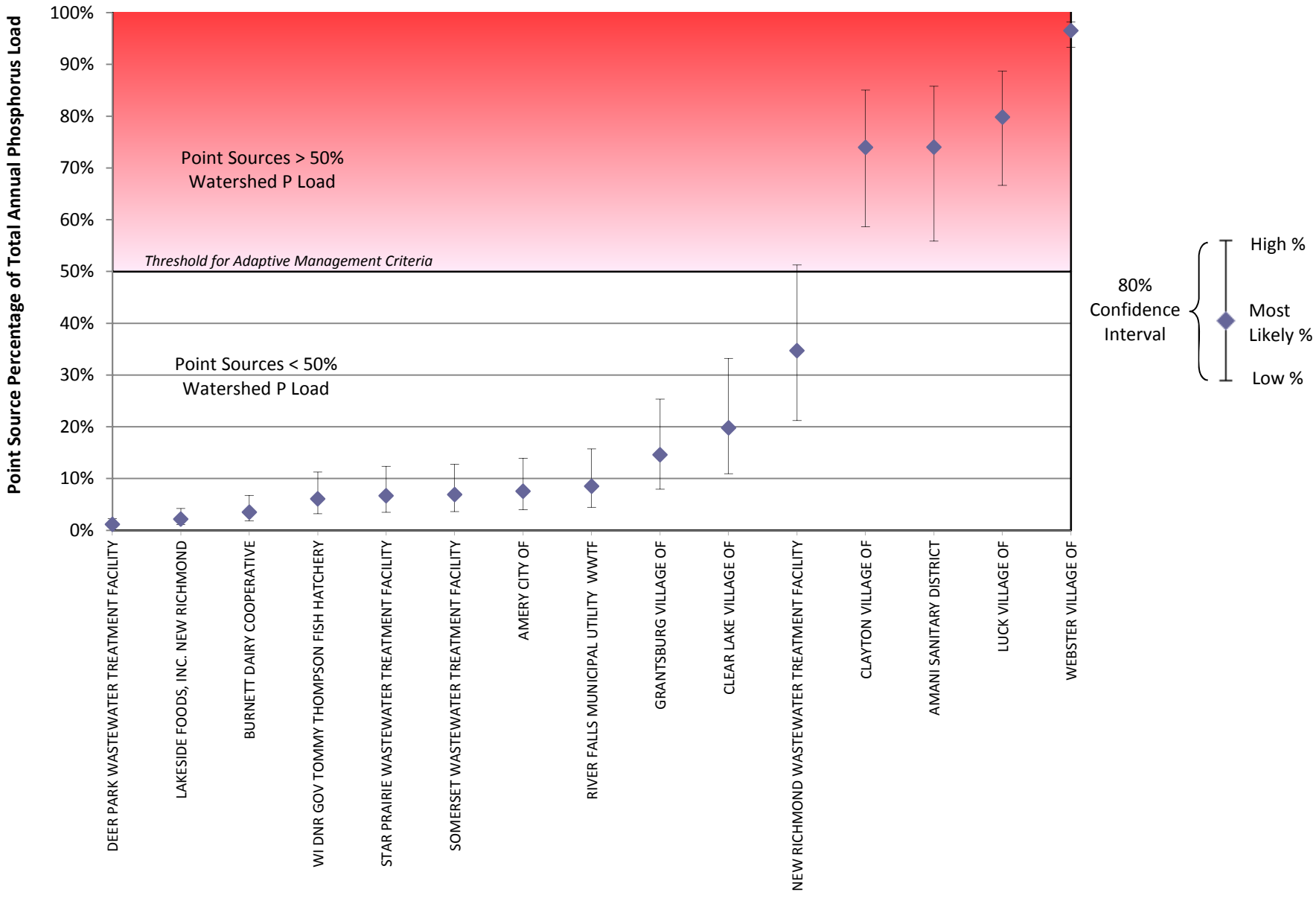
Root - Pike Basin



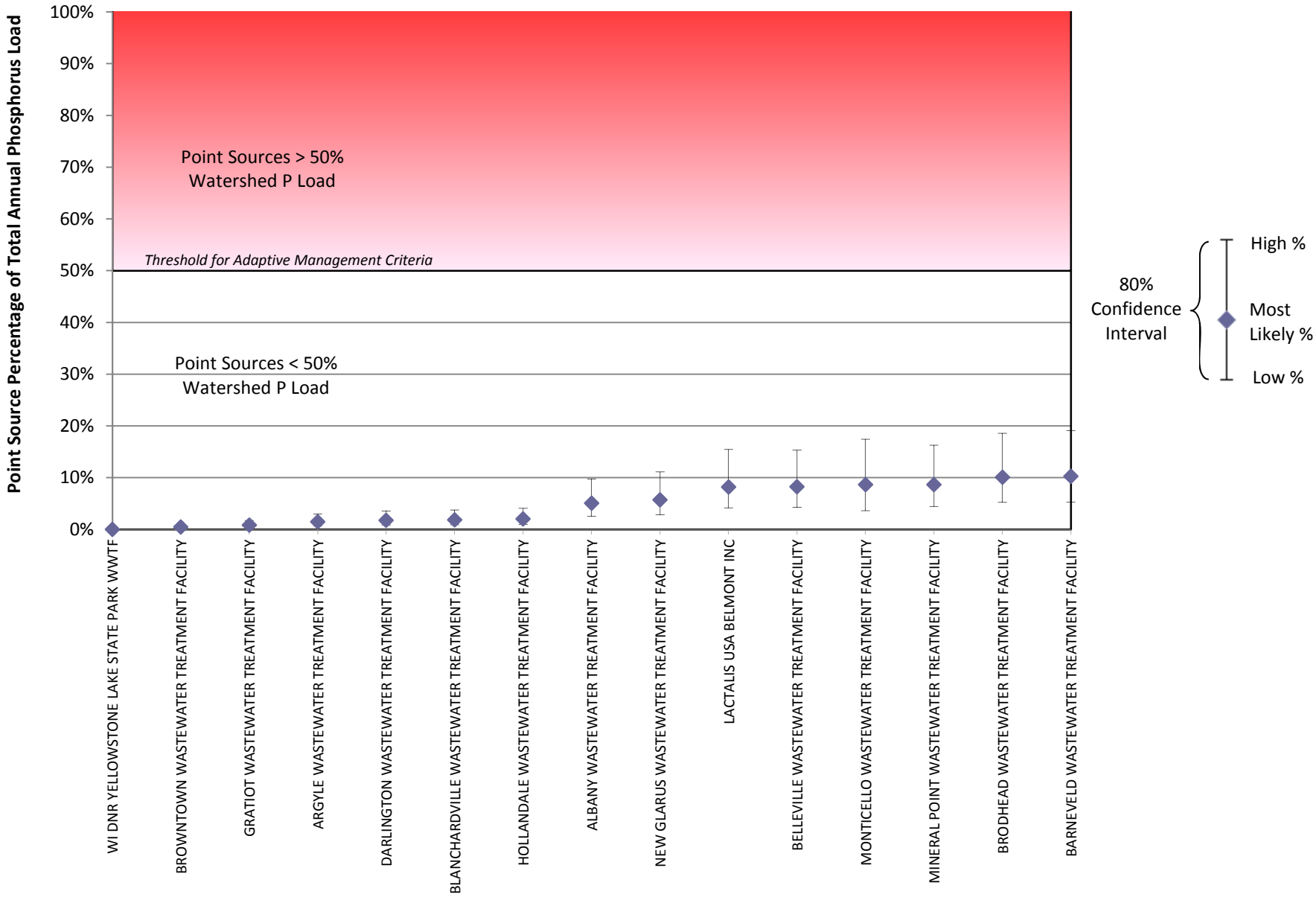
Sheboygan Basin



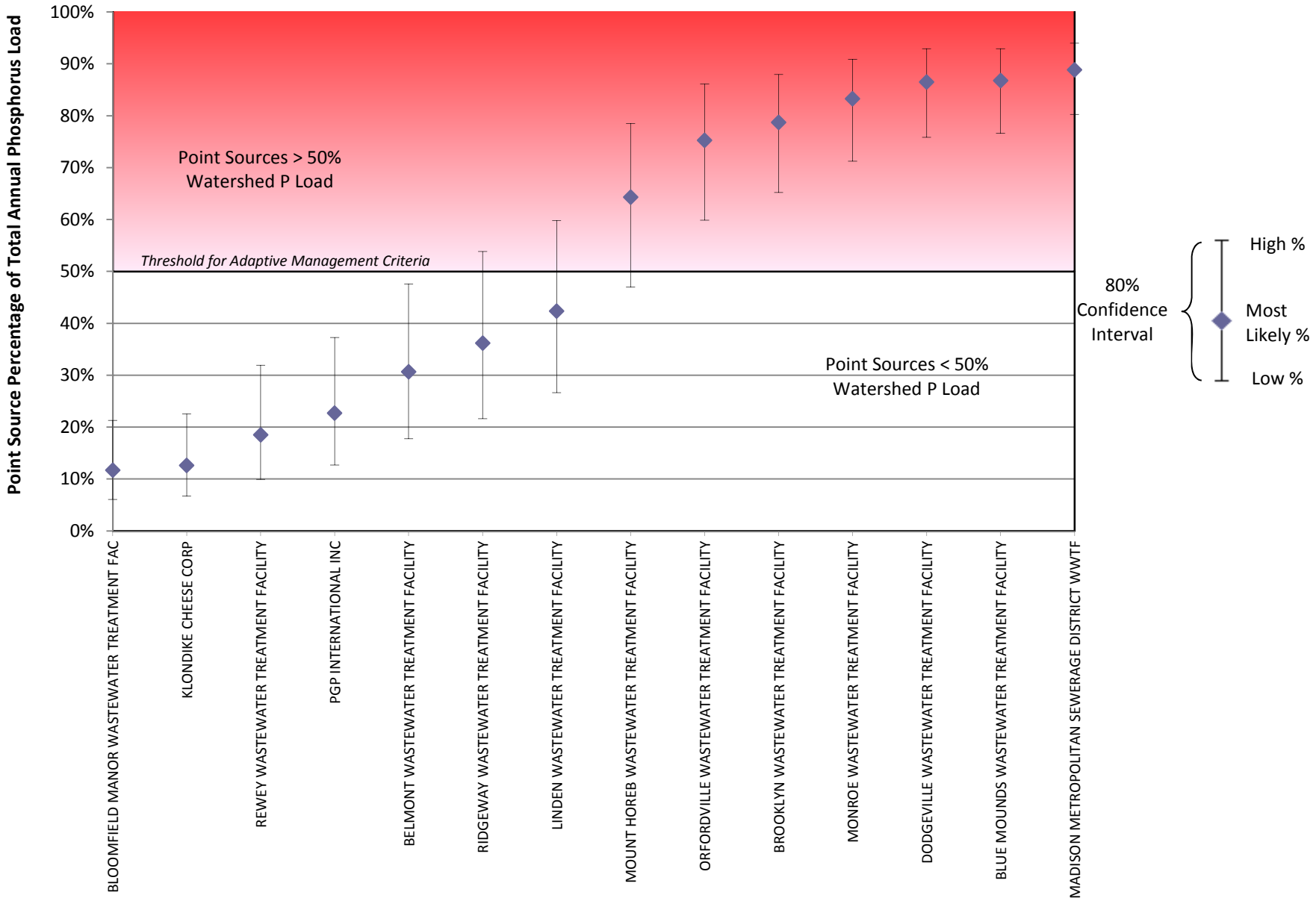
St. Croix Basin



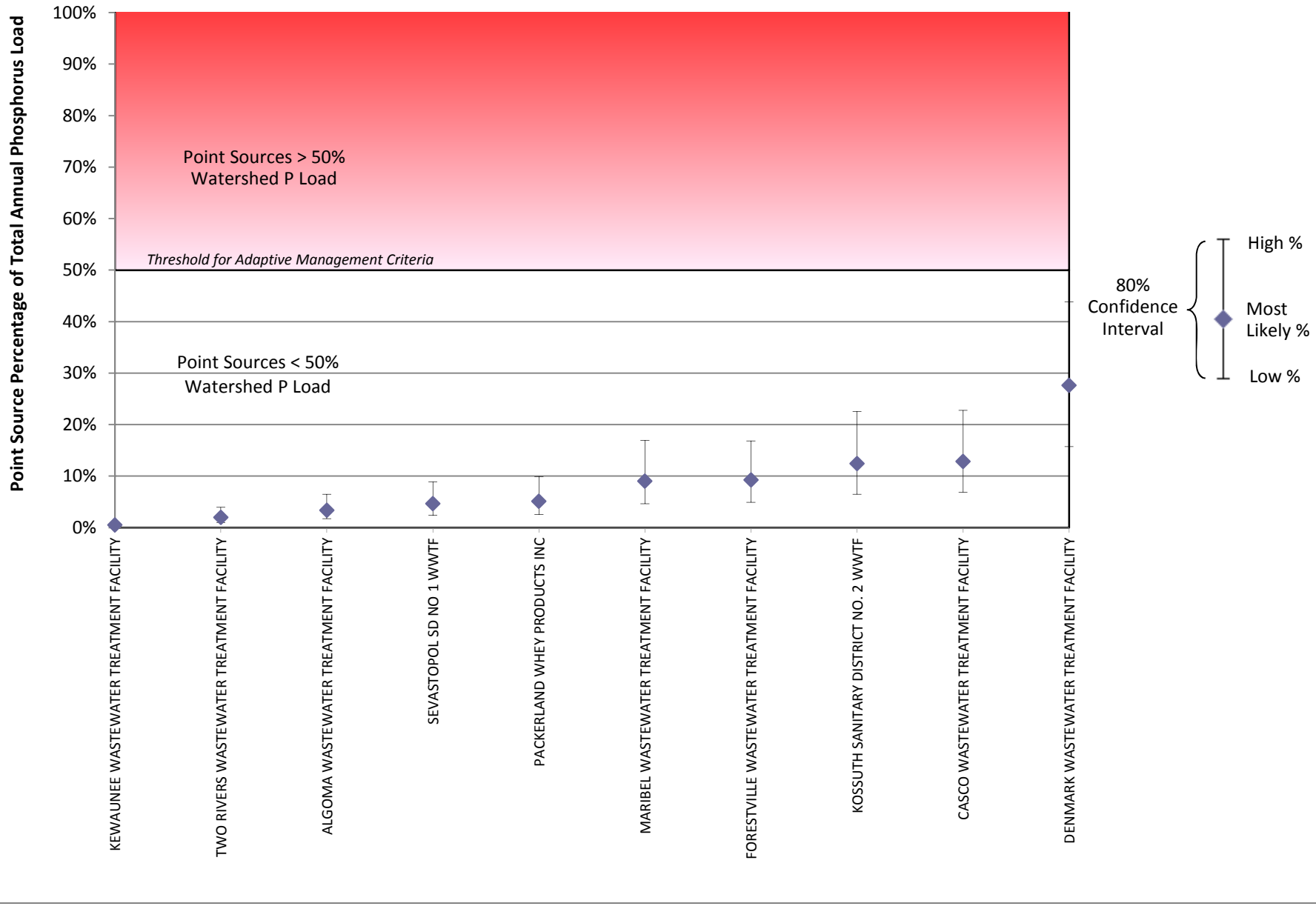
Sugar - Pecatonica Basin



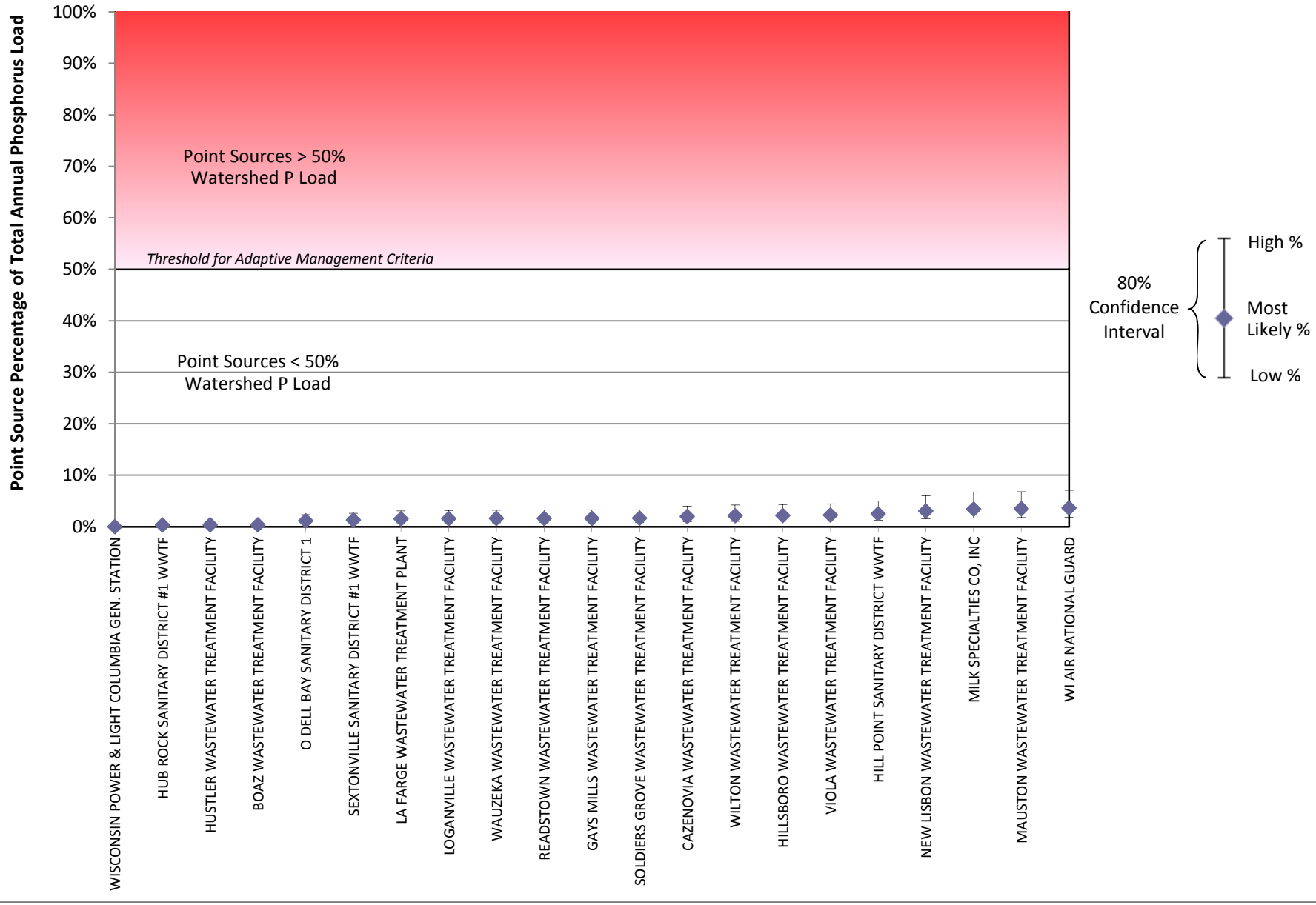
Sugar - Pecatonica Basin



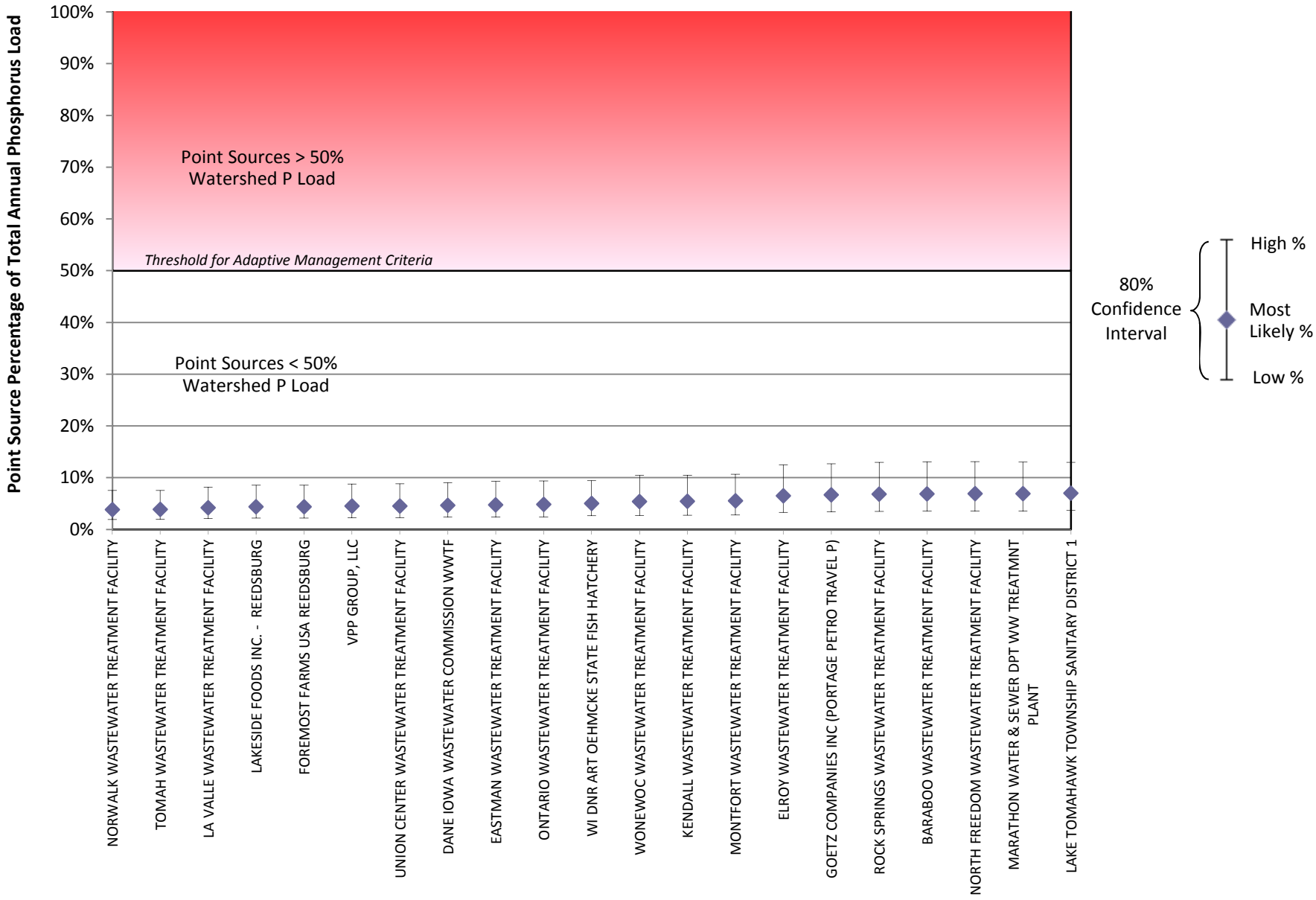
Twin - Door - Kewanee Basin



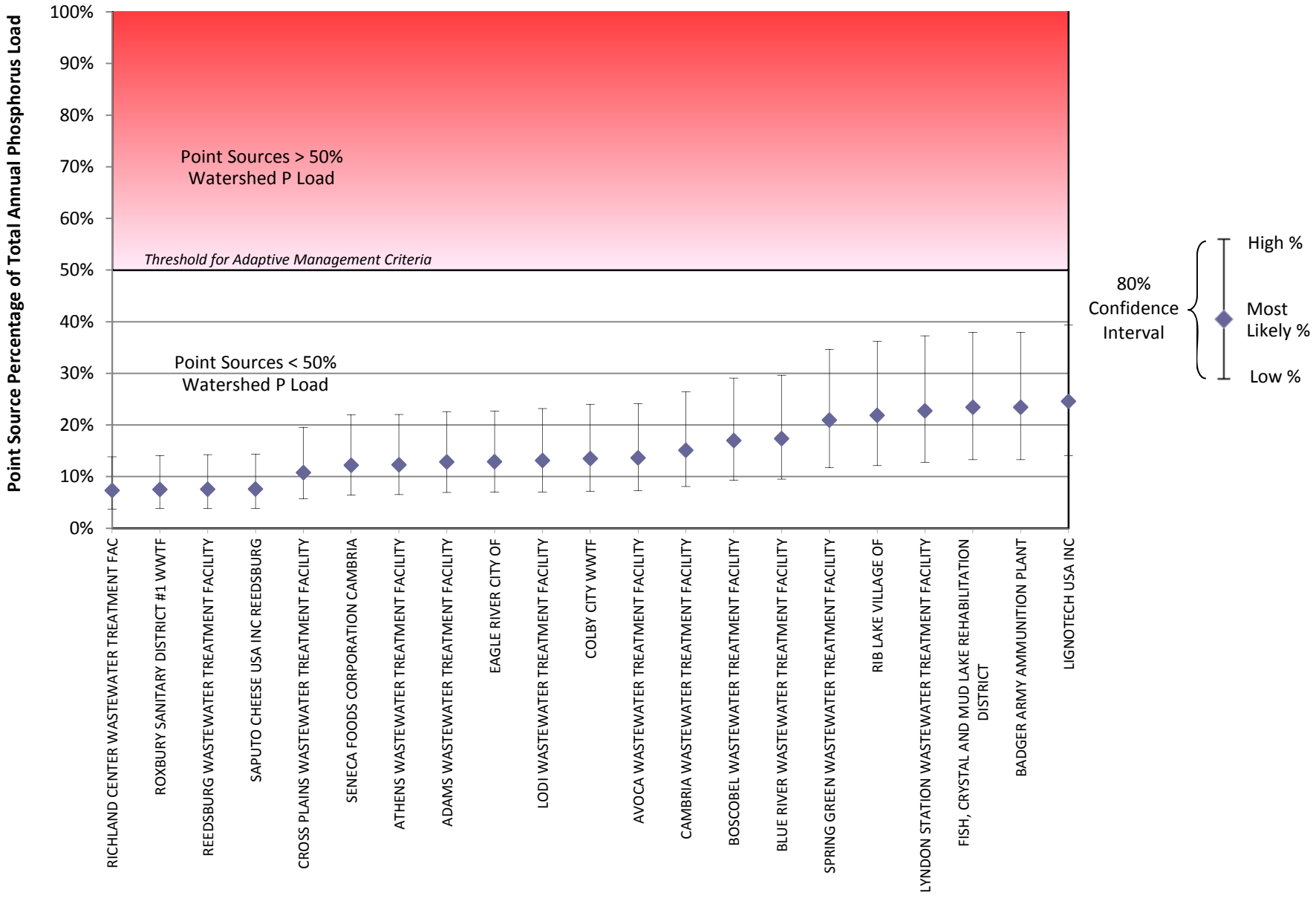
Wisconsin Basin



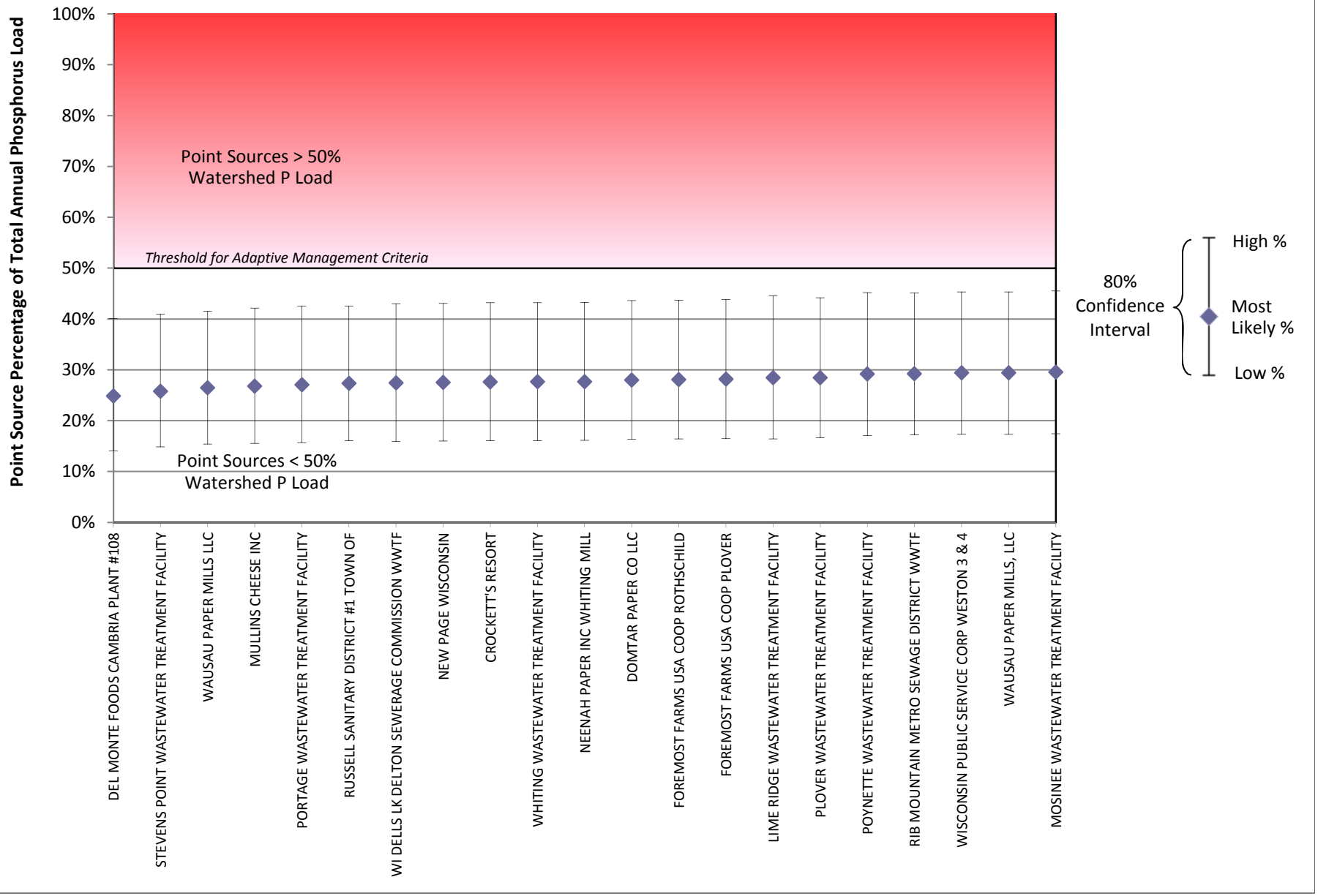
Wisconsin Basin



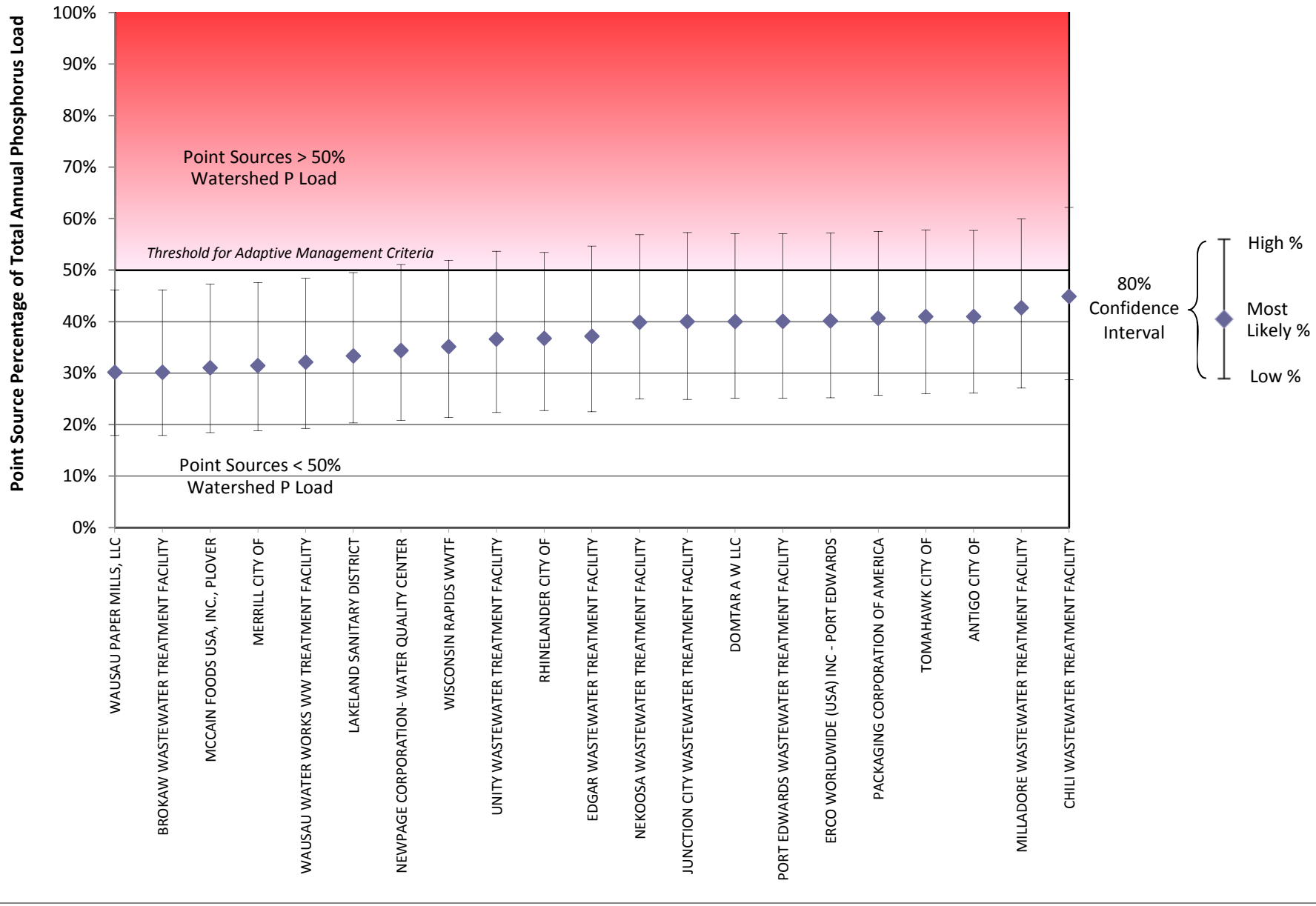
Wisconsin Basin

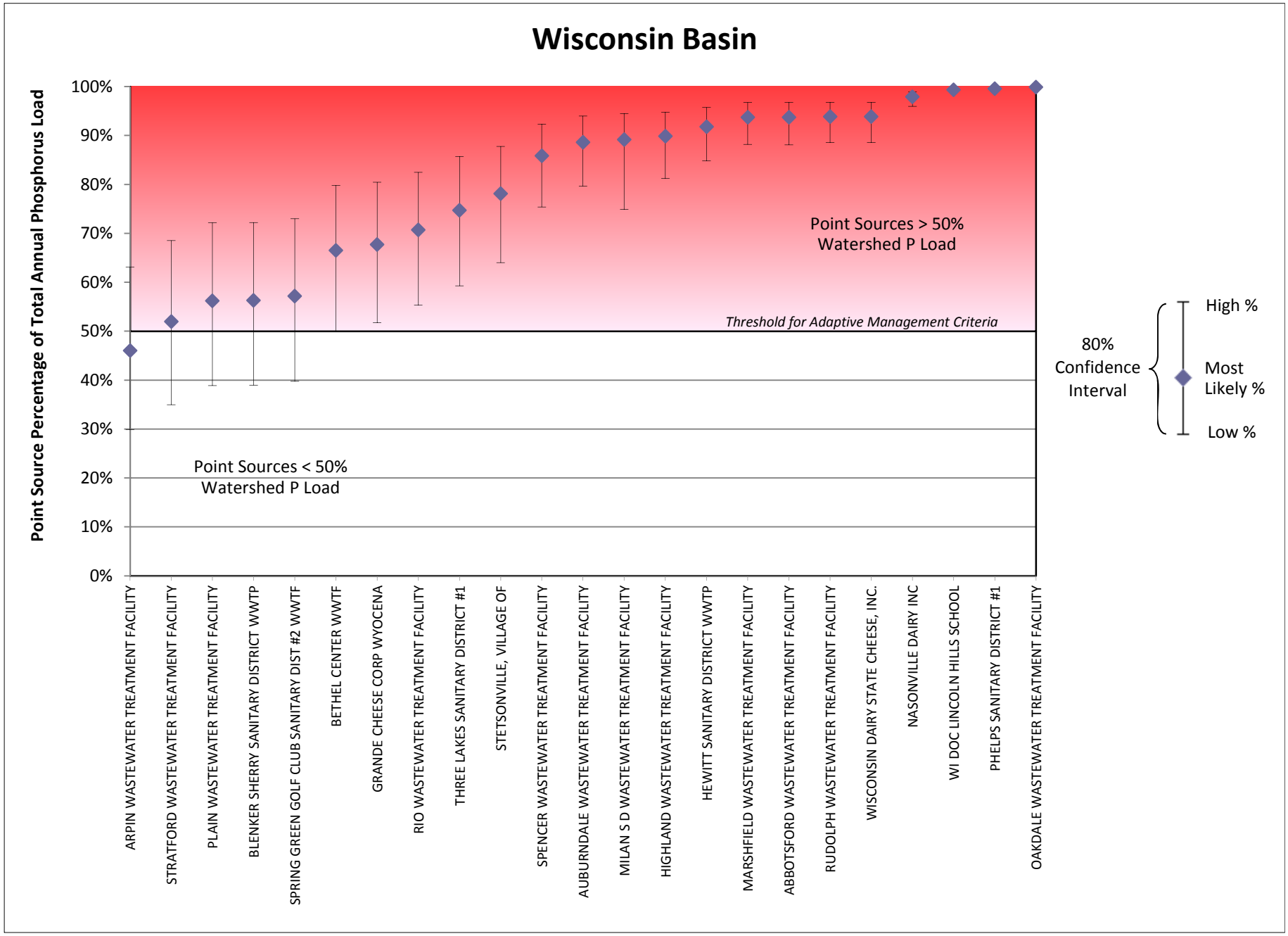


Wisconsin Basin

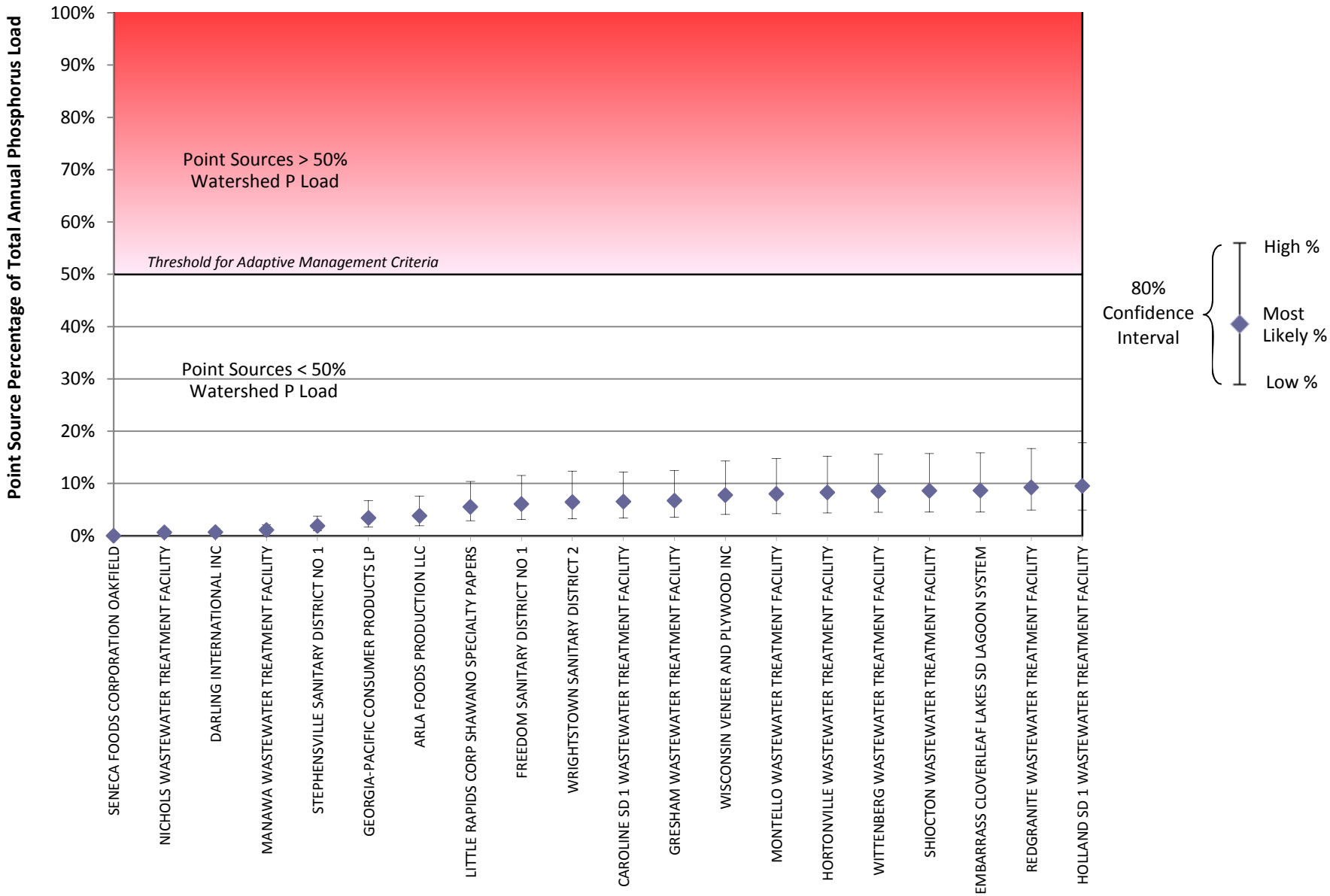


Wisconsin Basin

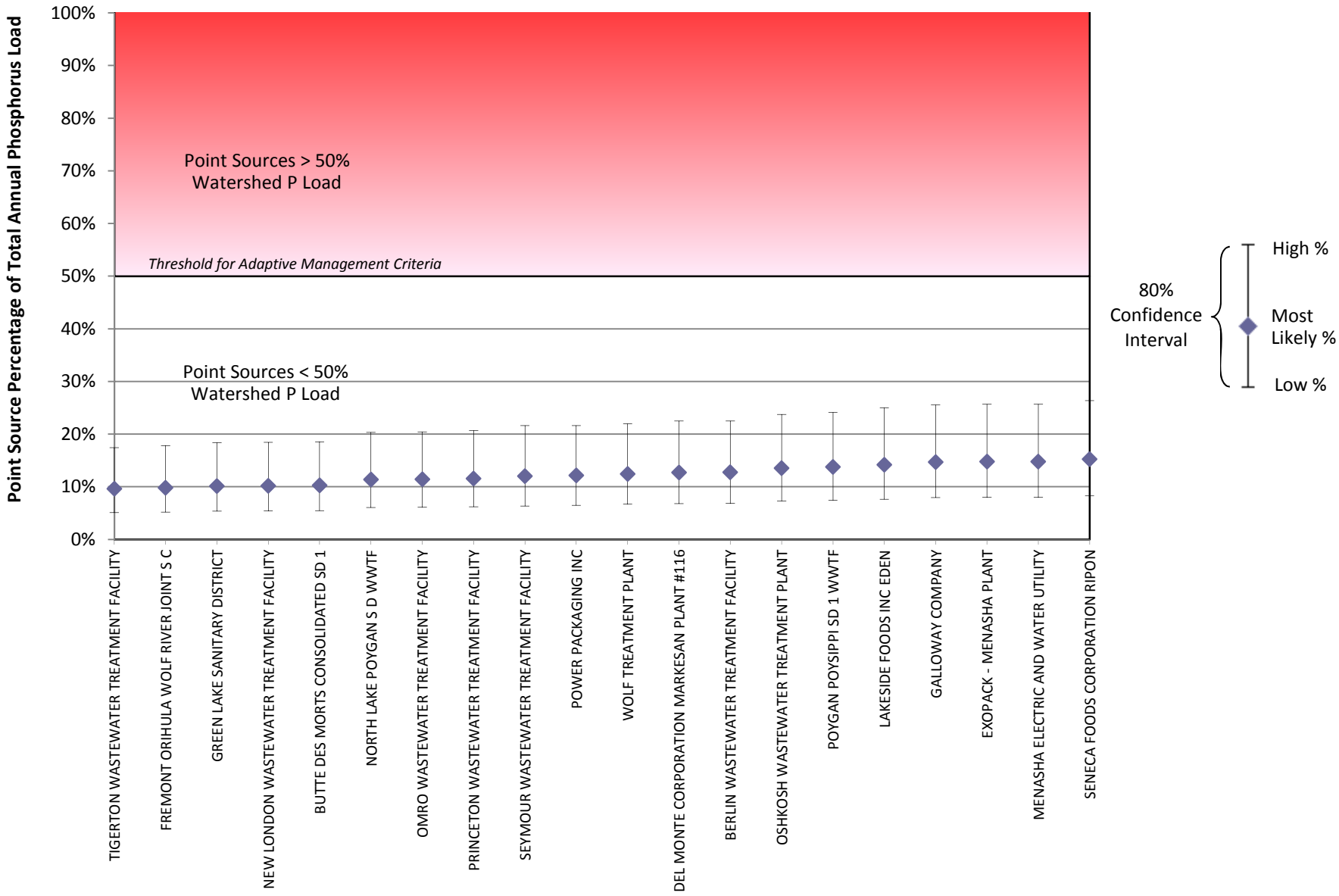



Wisconsin Basin
Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
80%
Confidence
Interval
High %
Most
Likely %
Low %
ARPIN WASTEWATER TREATMENT FACILITY
STRATFORD WASTEWATER TREATMENT FACILITY
PLAIN WASTEWATER TREATMENT FACILITY
BLENKER SHERRY SANITARY DISTRICT WWTP
SPRING GREEN GOLF CLUB SANITARY DIST #2 WWTF
BETHEL CENTER WWTF
GRANDE CHEESE CORP WYOCENA
RIO WASTEWATER TREATMENT FACILITY
THREE LAKES SANITARY DISTRICT #1
STETSONVILLE, VILLAGE OF
SPENCER WASTEWATER TREATMENT FACILITY
AUBURNDALE WASTEWATER TREATMENT FACILITY
MILAN S D WASTEWATER TREATMENT FACILITY
HIGHLAND WASTEWATER TREATMENT FACILITY
HEWITT SANITARY DISTRICT WWTP
MARSHFIELD WASTEWATER TREATMENT FACILITY
ABBOTSFORD WASTEWATER TREATMENT FACILITY
RUDOLPH WASTEWATER TREATMENT FACILITY
WISCONSIN DAIRY STATE CHEESE, INC.
NASONVILLE DAIRY INC
WI DOC LINCOLN HILLS SCHOOL
PHELPS SANITARY DISTRICT #1
OAKDALE WASTEWATER TREATMENT FACILITY

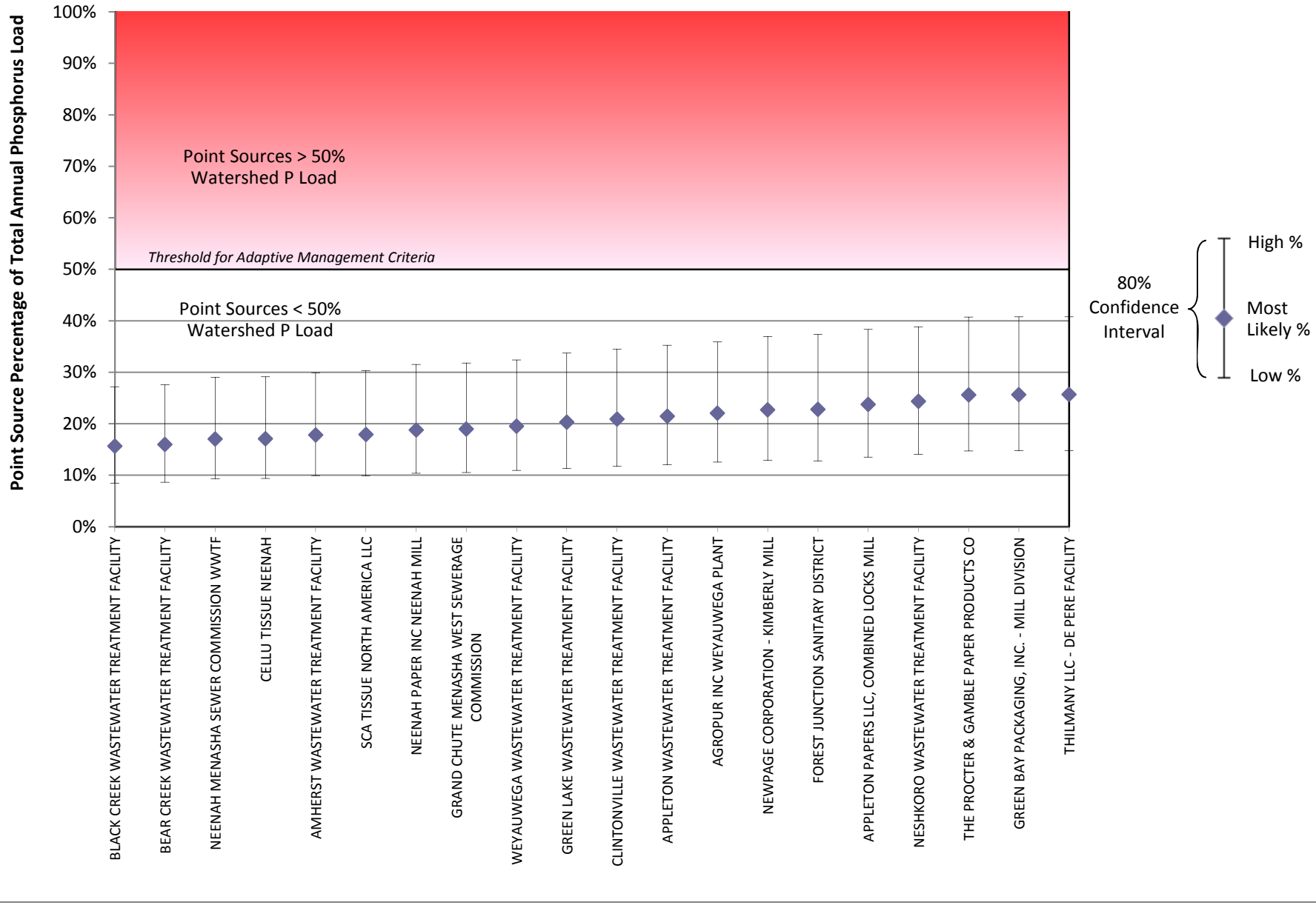
Wolf - Fox Basin



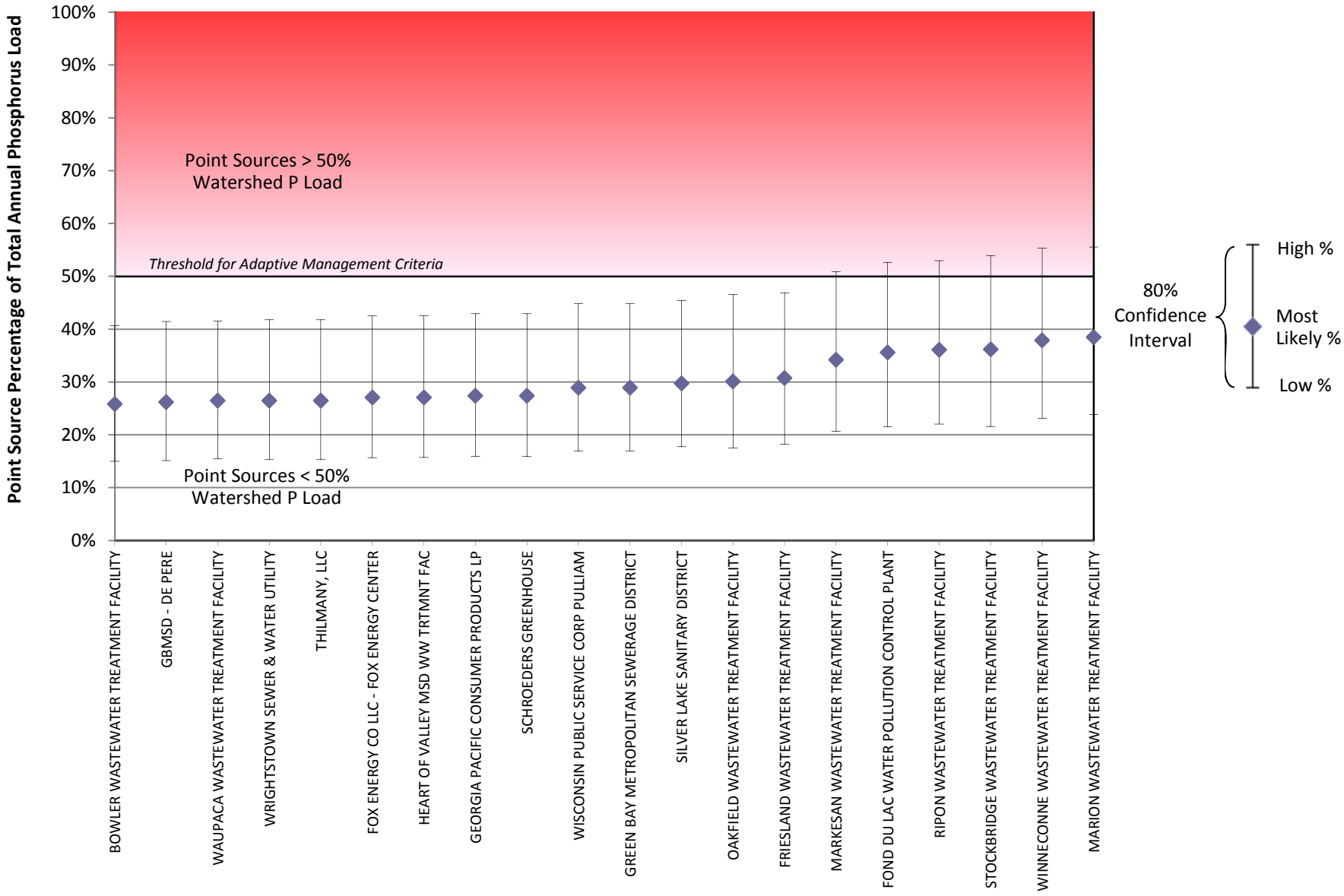
Wolf - Fox Basin

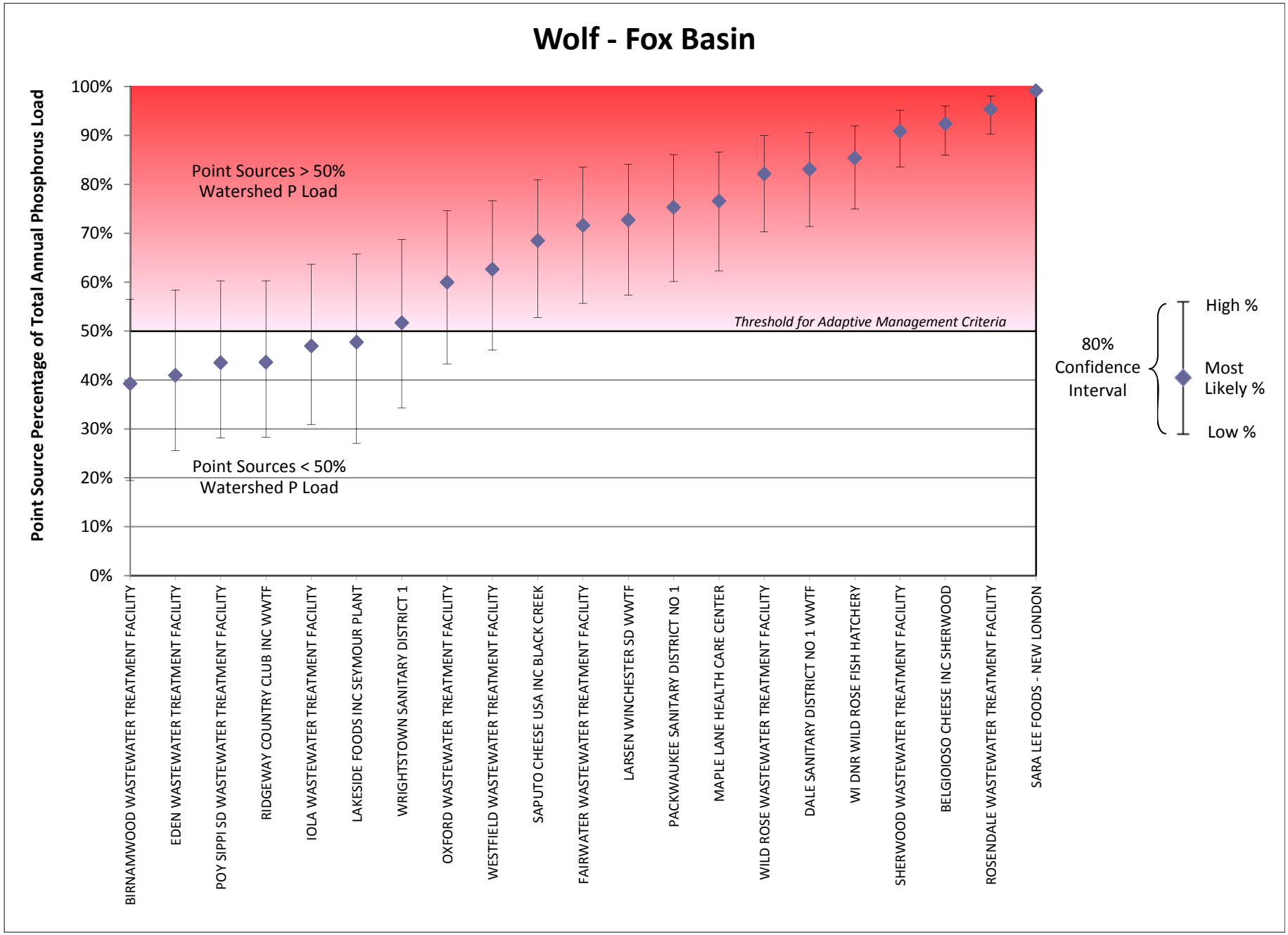


Wolf - Fox Basin



Wolf - Fox Basin




Wolf - Fox Basin
Point Source Percentage of Total Annual Phosphorus Load
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Point Sources > 50%
Watershed P Load
Threshold for Adaptive Management Criteria
Point Sources < 50%
Watershed P Load
80%
Confidence
Interval
High %
Most
Likely %
Low %
BIRNAMWOOD WASTEWATER TREATMENT FACILITY
EDEN WASTEWATER TREATMENT FACILITY
POY SIPPI SD WASTEWATER TREATMENT FACILITY
RIDGEWAY COUNTRY CLUB INC WWTF
IOLA WASTEWATER TREATMENT FACILITY
LAKESIDE FOODS INC SEYMOUR PLANT
WRIGHTSTOWN SANITARY DISTRICT 1
OXFORD WASTEWATER TREATMENT FACILITY
WESTFIELD WASTEWATER TREATMENT FACILITY
SAPUTO CHEESE USA INC BLACK CREEK
FAIRWATER WASTEWATER TREATMENT FACILITY
LARSEN WINCHESTER SD WWTF
PACKWAUKEE SANITARY DISTRICT NO 1
MAPLE LANE HEALTH CARE CENTER
WILD ROSE WASTEWATER TREATMENT FACILITY
DALE SANITARY DISTRICT NO 1 WWTF
WI DNR WILD ROSE FISH HATCHERY
SHERWOOD WASTEWATER TREATMENT FACILITY
BELGIOIOSO CHEESE INC SHERWOOD
ROSENDALE WASTEWATER TREATMENT FACILITY
SARA LEE FOODS - NEW LONDON

APPENDIX D
TABLE OF FACILITIES EXCLUDED FROM ANALYSIS

Facility Name	Receiving Water	Reason for Exclusion
Bad Axe - La Crosse		
DE SOTO WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
LA CROSSE CITY	Mississippi River	Drainage area extends beyond state boundary
VALLEY RIDGE CLEAN WATER COMMISSION WWTF	Mississippi River	Drainage area extends beyond state boundary
PRAIRIE DU CHIEN WASTEWATER TREATMENT FAC.	Mississippi River	Drainage area extends beyond state boundary
GENOA WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
STODDARD WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
UNITED STATES DEPARTMENT OF INTERIOR USGS	Black River	Drainage area extends beyond state boundary
Black		
Buffalo - Trempealeau		
TREMPEALEAU WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
ALMA WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
DAIRYLAND POWER COOP ALMA 1-5 & J.P. MADGETT	Mississippi River	Drainage area extends beyond state boundary
Chippewa		
PEPIN WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
PRESCOTT WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
BAY CITY VILLAGE	Mississippi River	Drainage area extends beyond state boundary
Fox (IL)		
GENOA CITY VILLAGE	North Branch Nippersink Creek	Drainage area extends beyond state boundary
BRISTOL RAINBOW LAKE, LLC	Unnamed	Drainage area extends beyond state boundary
Grant - Platte		
WISCONSIN POWER & LIGHT NELSON DEWEY GEN STATIO	Mississippi River	Drainage area extends beyond state boundary
CASSVILLE WASTEWATER TREATMENT FACILITY	Mississippi River	Drainage area extends beyond state boundary
HAZEL GREEN WASTEWATER TREATMENT FACILITY	Galena River	Drainage area extends beyond state boundary
Green Bay		
WAUSAUKEE WASTEWATER TREATMENT FACILITY	Menominee River	Drainage area extends beyond state boundary
AURORA SANITARY DISTRICT # 1	Menominee River	Drainage area extends beyond state boundary
NIAGARA WASTEWATER TREATMENT FACILITY	Menominee River	Drainage area extends beyond state boundary
NEWPAGE CORPORATION NIAGARA MILL	Menominee River	Drainage area extends beyond state boundary
KIMBERLY CLARK CORPORATION MARINETTE	Menominee River	Drainage area extends beyond state boundary
MARINETTE WASTEWATER UTILITY	Menominee River	Drainage area extends beyond state boundary
THYSSENKRUPP WAUPACA INC MARINETTE	Menominee River	Drainage area extends beyond state boundary
TYCO FIRE SUPPRESSION & BP - ANSUL LLC	Menominee River	Drainage area extends beyond state boundary
Lake Superior		

Facility Name	Receiving Water	Reason for Exclusion
DRUMMOND SANITARY DISTRICT 1	Unnamed	Drainage area extends beyond state boundary
BELL SANITARY DISTRICT 1	Lake Superior	Drainage area extends beyond state boundary
SUPERIOR SEWAGE DISPOSAL SYSTEM	Lake Superior	Drainage area extends beyond state boundary
MIDWEST ENERGY RESOURCES COMPANY	Lake Superior	Drainage area extends beyond state boundary
WASHBURN CITY OF	Lake Superior	Drainage area extends beyond state boundary
MADELINE SANITARY DISTRICT	Lake Superior	Drainage area extends beyond state boundary
ASHLAND SEWAGE UTILITY	Lake Superior	Drainage area extends beyond state boundary
Manitowoc		
MANITOWOC WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
CLEVELAND WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
Milwaukee		
MILLERCOORS LLC	Menomonee River	Located in highly urbanized area
WE - VALLEY POWER PLANT	Menomonee River	Located in highly urbanized area
P & H MINING EQUIPMENT	Menomonee River	Located in highly urbanized area
BRIGGS STRATTON CORP WAUWATOSA	Menomonee River	Located in highly urbanized area
BADGER METER INC	Beaver Creek	Located in highly urbanized area
PENTAIR RESIDENTIAL FILTRATION, LLC	Milwaukee River	Located in highly urbanized area
WISCONSIN THERMOSET MOLDING INC	Milwaukee River	Located in highly urbanized area
MAYFAIR MALL	Menomonee River	Located in highly urbanized area
DRS POWER & CONTROL TECHNOLOGIES, INC.	Lincoln Creek	Located in highly urbanized area
MAYNARD STEEL CASTING CO	Kinnickinnic River	Located in highly urbanized area
MILLERCOORS LLC	Menomonee River	Located in highly urbanized area
LADISH FORGING, LLC	Unnamed	Located in highly urbanized area
MILWAUKEE METRO SEW DIST COMBINED	Lake Michigan	Drainage area extends beyond state boundary
Rock		
Root - Pike		
SOUTH MILWAUKEE WASTEWATER TREAT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
WE - PLEASANT PRAIRIE POWER PLANT	Lake Michigan	Drainage area extends beyond state boundary
WE ENERGIES OAK CREEK POWER PLANT	Lake Michigan	Drainage area extends beyond state boundary
RACINE WASTEWATER UTILITY	Lake Michigan	Drainage area extends beyond state boundary
KENOSHA WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
OCEAN SPRAY CRANBERRIES INC KENOSHA	Lake Michigan	Drainage area extends beyond state boundary
Sheboygan		
SHEBOYGAN WASTEWATER TREATMENT PLANT	Lake Michigan	Drainage area extends beyond state boundary

Facility Name	Receiving Water	Reason for Exclusion
WISCONSIN POWER & LIGHT EDGEWATER GEN. STATION	Lake Michigan	Drainage area extends beyond state boundary
WE - PORT WASHINGTON GENERATING STATION	Lake Michigan	Drainage area extends beyond state boundary
PORT WASHINGTON WWTP	Lake Michigan	Drainage area extends beyond state boundary
St. Croix		
WI DNR OSCEOLA FISH HATCHERY	Unnamed	Drainage area extends beyond state boundary
HUDSON WASTEWATER TREATMENT FACILITY	Saint Croix River	Drainage area extends beyond state boundary
WI DNR ST CROIX FALLS HATCHERY	St. Croix River	Drainage area extends beyond state boundary
ST CROIX FALLS CITY OF	Saint Croix River	Drainage area extends beyond state boundary
OSCEOLA VILLAGE OF	Saint Croix River	Drainage area extends beyond state boundary
Sugar - Pecatonica		
SOUTH WAYNE WASTEWATER TREATMENT FACILITY	Pecatonica River	Drainage area extends beyond state boundary
Twin - Door - Kewanee		
WI DNR PENINSULA STATE PARK WWTF	Tennison Bay Marsh	Drainage area extends beyond state boundary
BAILEYS HARBOR WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
EGG HARBOR WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
FISH CREEK SD1 WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
STURGEON BAY UTILITIES WWTF	Lake Michigan	Drainage area extends beyond state boundary
SISTER BAY WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
EPHRAIM WASTEWATER TREATMENT FACILITY	Lake Michigan	Drainage area extends beyond state boundary
Wisconsin		
Wolf - Fox		
Facilities Not Currently Geo-Located		
AGROPUR INC LUXEMBURG	unknown	Not in GIS database
BIRDS EYE FOODS INC. HORTONVILLE	unknown	Not in GIS database
BRIESS INDUSTRIES	unknown	Not in GIS database
CADY CHEESE	unknown	Not in GIS database
CHULA VISTA RESORT	unknown	Not in GIS database
FOREMOST FARMS USA COOP LANCASTER	unknown	Not in GIS database
FOREMOST FARMS USA RICHLAND CENTER	unknown	Not in GIS database
FORT JAMES OPERATING CO ASHLAND MILL	unknown	Not in GIS database
FOUNTAIN CITY WASTEWATER TREATMENT FACILITY	unknown	Not in GIS database
FREDERIC VILLAGE OF	unknown	Not in GIS database
GERETT PRODUCTS	unknown	Not in GIS database
GRANDE CHEESE JUDA	unknown	Not in GIS database

Facility Name	Receiving Water	Reason for Exclusion
GREATER BAYFIELD WASTEWATER TREATMENT FACILITY	unknown	Not in GIS database
JOHN DEERE HORICON	unknown	Not in GIS database
KERWIN PAPER	unknown	Not in GIS database
KRAKOW SANITARY DISTRICT WASTEWATER TREATMENT	unknown	Not in GIS database
LOYAL WASTEWATER TREATMENT FACILITY	unknown	Not in GIS database
LUXEMBURG WASTEWATER PRETREATMENT	unknown	Not in GIS database
MALTEUROP NORTH AMERICA, INC.	unknown	Not in GIS database
MAPLE LEAF FARMS	unknown	Not in GIS database
METSO PAPER	unknown	Not in GIS database
MISHICOT WASTEWATER TREATMENT FACILITY	unknown	Not in GIS database
NORTHLAND CRANBERRIES	unknown	Not in GIS database
OCONOMOWOC ELECTROPLATING SUPERFUND SITE	unknown	Not in GIS database
P.H. GLATFELTER	unknown	Not in GIS database
PARKER HANNIFIN CORPORATION	unknown	Not in GIS database
PECHINEY PLASTIC - NEENAH	unknown	Not in GIS database
PITTSVILLE SANITARY DISTRICT	unknown	Not in GIS database
PLEASANT PRAIRIE UTLITY DISTRICT 73	unknown	Not in GIS database
PLEASANT PRAIRIE UTLITY DISTRICT D	unknown	Not in GIS database
RADDISON VILLAGE OF	unknown	Not in GIS database
REGAL WARE	unknown	Not in GIS database
ROBERTS VILLAGE OF	unknown	Not in GIS database
SAPUTO CHEESE ALMENA	unknown	Not in GIS database
SAPUTO CHEESE USA INC DENMARK	unknown	Not in GIS database
SAUK COUNTY HEALTH CARE CENTER	unknown	Not in GIS database
SCHOOL DISTRICT OF NEW BERLIN	unknown	Not in GIS database
SENECA FOODS COLEMAN	unknown	Not in GIS database
SHEBOYGAN CO COMP HEALTH CTR WWTF	unknown	Not in GIS database
SIREN VILLAGE OF	unknown	Not in GIS database
ST CROIX TRIBAL FISHERIES	unknown	Not in GIS database
SUAMICO SANITARY DISTRICT NO 1	unknown	Not in GIS database
TURTLE LAKE WASTEWATER TREATMENT FACILITY	unknown	Not in GIS database
UTICA ENERGY LLC	unknown	Not in GIS database
VESPER WASTEWATER TREATMENT FACILITY	unknown	Not in GIS database
WARRENS WASTEWATER TREATMENT FACILITY	unknown	Not in GIS database

Facility Name	Receiving Water	Reason for Exclusion
WI DNR LANGLADE REARING STATION	unknown	Not in GIS database