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Relationships and Thresholds for Continuous Dissolved Oxygen Variables, Nutrient Effects, and Biological Attributes in Northeast Illinois Rivers and Streams

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Relationships and Thresholds for Continuous Dissolved Oxygen Variables, Nutrient Effects, and Biological Attributes in Northeast Illinois Rivers and Streams

Technical Report MBI/2023-7-15

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SUMMARY AND CONCLUSIONS

A suite of continuous D.O. statistics was generated from the available statewide continuous database from which minimum daily, maximum daily, mean daily, and maximum daily diel swing values were derived. To reduce the influence of extreme daily minimum or maximum values, the 5th and 95th percentile values were used as more consistent, representative, and biologically meaningful exposures to low or high D.O. levels. Data was limited to the July 15-September 30 period to ensure that the most biologically and D.O. limiting period was captured, *i.e.,* the seasonal period that coincides with the highest ambient temperatures, low summer-early fall flows, low minimum D.O. levels, and the widest diel swings. These statistics were plotted against the fIBI and mIBI to visually reveal variables that are meaningfully associated with biological assemblage performance. Statistical analysis included Pearson correlation and Random forest regression tree (RF) analyses at sites that had continuous D.O. and paired habitat and biological data statewide. Weighted Stressor Values (WSVs) were derived for continuous D.O. variables for fish species and macroinvertebrate taxa. Species and taxa were ranked along each D.O. variable and the 20th (tolerant) and 80th (sensitive) percentile ranks were used to identify the most sensitive and tolerant species/taxa for each D.O. variable.

Minimum D.O. as represented by the 5th percentile value was the most explanatory of all of the D.O. variables examined in this study. Because of the lack of association between the maximum D.O. or maximum diel D.O. swing and the fIBI or mIBI, these statistics were not by themselves predictive of aquatic life impairment unless they were associated with low minimum D.O. values. As a result Weighted Stressor Values (WSVs) were not derived for either fish or macroinvertebrates for these variables.

No significant correlation between chlorophyll a measures and the fIBI and mIBI was found by this study. The lack of significant correlation may be the result of generally low benthic chlorophyll a values compared to much higher literature values that are considered to be excessive. This is consistent with other Illinois studies that found similarly low benthic chlorophyll a measures than might be expected based on elevated nutrient concentrations. Minimum D.O. thresholds, represented by the 5th percentile D.O. statistic for fish and macroinvertebrates, can be used for stressor identification purposes. This measure was also incorporated into a modification of the Nutrient Ranking Index (NRI) that was previously designed to help identify when nutrients are likely to impair aquatic life.

The identification of nutrients as major causes of aquatic life impairment is complex in urbanized watersheds with unrelated co-occurring stressors. Salinization in the form of elevated chloride levels can influence nutrient availability. Modified stream geomorphology and physical habitat quality can also influence the dynamics about how nutrients affect D.O. and aquatic life. In this study, QHEI and several of its metrics showed threshold relationships that influenced minimum D.O. concentrations at degraded sites. Therefore these co-occurring factors need to be considered when evaluation or predicting the influence of nutrients on the D.O. regime.

INTRODUCTION

Nutrients are among the most widespread stressors affecting aquatic life across the United States (Carpenter et al. 1998, U.S. EPA 2017, 2020), and especially in the Midwest (Waite and Van Metre 2017, Meador and Frey 2018). U.S. EPA has responded by encouraging the States to adopt nutrient criteria initially prompted by the Clean Water Action Plan that stated:

> *"EPA will establish by the year 2000 numeric criteria for nutrients (i.e., nitrogen and phosphorus) that reflect the different types of water bodies (e.g., lakes, rivers, and estuaries) and different ecoregions of the country and will assist states and tribes in adopting numeric water quality standards based on these criteria"*.[1]

Widespread adoption of numeric nutrient criteria by the States did not occur by 2000 and has been accomplished in a single state since. U.S. EPA reinvigorated their push for nutrient criteria with a memorandum to States and Tribes entitled: *"Accelerating Nutrient Pollution Reductions in the Nation's Waters"* in April of 2022.[2] Aspects of this memorandum urges a . . . *"more robust adoption of numeric nutrient criteria into Water Quality Standards"* and the *"Office of Water expects that states will either adopt numeric nutrient criteria into their water quality standards or commit to use numeric targets to implement applicable narrative criteria statements."*

Illinois completed an assessment that recommended approaches for implementing numeric nutrient criteria and eutrophication standards for Illinois streams and rivers (Illinois NSAC 2018). The report identified several data issues that hindered developing strong associations between biological responses and stressor levels, one of which was too few samples with continuous dissolved oxygen (D.O.) data. The Northeast Illinois Integrated Priority System (IPS) document (MBI 2023) also identified data gaps including a lack of continuous D.O. data to assess the influence of nutrients on the D.O. regime and also on fish and macroinvertebrate assemblages in streams and rivers using the combined approach recommended by Illinois NSAC (2018). A major goal of this analysis is to examine statewide statistics generated from recently collected continuous D.O. data and from sites with a sufficient range of quality from Excellent/Good to various degrees of biological impairment and nutrient enrichment. Continuous D.O. data permits the examination of the frequency and duration of exceedances of Illinois D.O. standards and diel fluctuations to examine how these are related to biological assemblages, habitat, nutrients, and nutrient related parameters (e.g., total P, nitrate-N, NH_3-N, TKN, etc.), sestonic chlorophyll a concentrations, and benthic chlorophyll a biomass across Illinois.

BACKGROUND

The effect of nutrients on aquatic life is complex with the most serious impacts related to alterations of the D.O. regime in rivers and streams. Recent work also suggests that in urban

[1] Federal Register, Vol. 63, No. 56, Tuesday, March 24, 1998, p. 14111.
[2] U.S. EPA Memorandum: Accelerating Nutrient Pollution Reductions in the Nation's Waters, issued by Radhika Fox.

areas, increased salinization can influence the availability of nutrients (Haq et al. 2018), which is a relevant issue across NE Illinois. These complexities can be seen in the conceptual model modified from Mazor et al. 2022 (Figure 1) with the key response measure being biological condition. The complexity of nutrient effects was summarized by Zheng and Paul (2007) as follows:

> *"Nutrient enrichment also accelerates litter breakdown rates by bacteria and fungi. The dramatic changes at lower trophic levels may also lead to "trophic cascading". As nutrient concentrations increase and destabilize the primary producer assemblage and water chemistry, macroinvertebrates and fish may shift from sensitive species to*

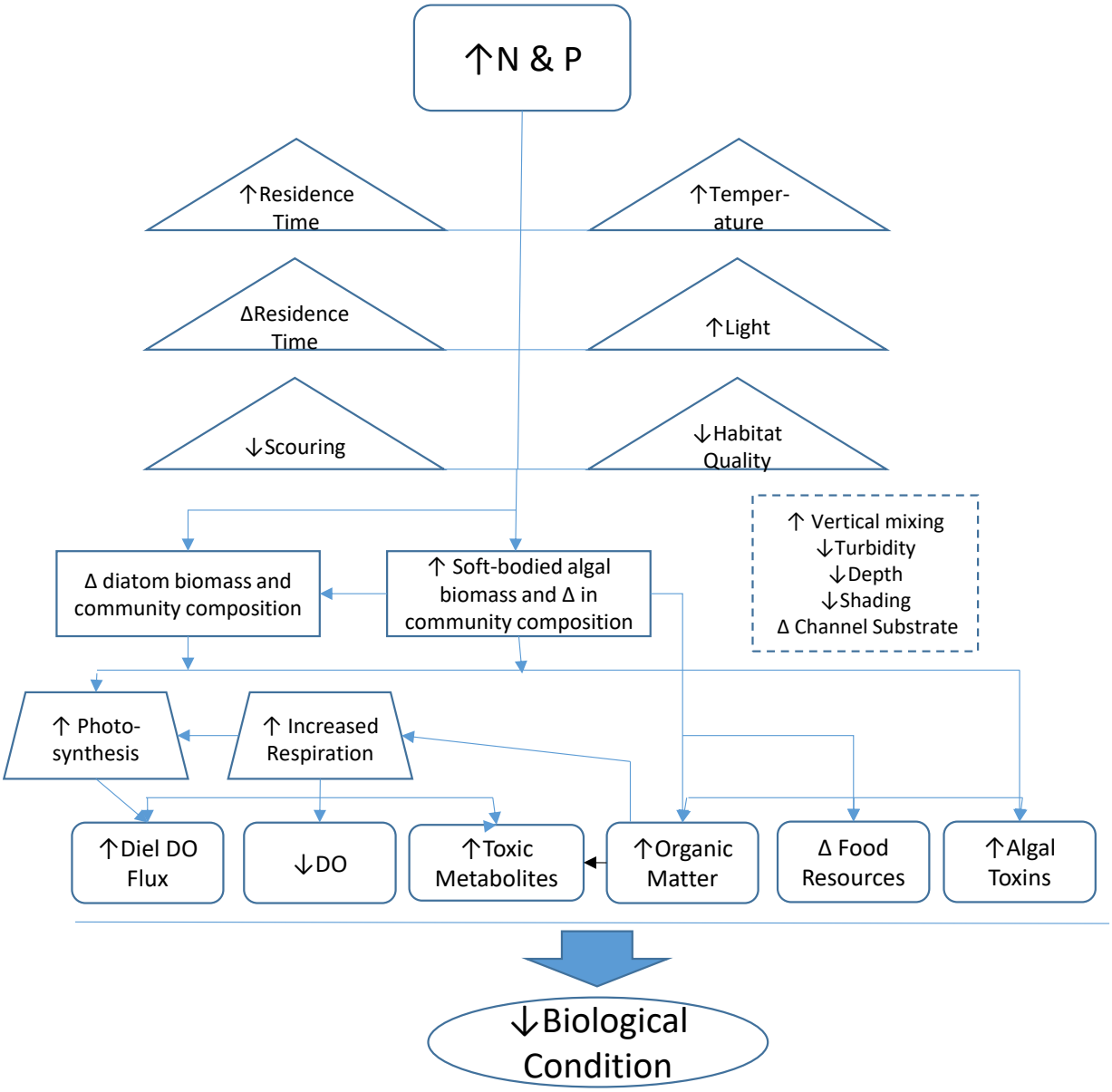

Figure 1*. Conceptual nutrient enrichment model for wadeable streams produced by Mazor et al. (2022).*

> *more tolerant, often non-native species. Changes in the food web may also cause changes in ecosystem function and further alter stream physical habitat and water chemistry, e.g., decreasing dissolved oxygen*."

While U.S. EPA has continued to emphasize the adoption of numeric nutrient criteria, several States have recognized the complexity of nutrient effects by developing a "combined" approach to the development of nutrient criteria by setting targets for multiple indicators. Such indicators include nutrient parameters, multiple D.O. measures including the frequency and duration of minimum and maximum values, the width of the diel swing, parameters associated with nutrient and organic enrichment (BOD, TKN, TSS), benthic and/or sestonic chlorophyll a, biological assemblage performance, and habitat quality. Some states have used continuous pH data to demonstrate diel swings as a measure of the response of algal respiration to nutrient enrichment. Our focus in this report is on understanding the usefulness of several characteristics of continuous D.O. data, their influence on aquatic assemblages (fish and macroinvertebrates), and constraints on their usefulness in relation to habitat quality and attributes in streams and rivers. While this analysis does not directly address aesthetic endpoints, it can provide insights about how that aspect of water quality coincides with effects on aquatic life with sestonic chlorophyll a and visual observations of nuisance algal growths serving as the potential indicators of aesthetic impacts.

Stressor Identification Efforts

In an ideal world, sufficient observational and experimental data would be available to quantify precise causal associations between response variables (biological indicators) and stressors in the environment. In reality, ecological "epidemiology" is more difficult with the collinearity of different stressors, incomplete datasets, and the bias inherent to even the largest data sets that makes assigning causation difficult. Herein, we use a variety of univariate and multivariate statistical analyses, results from the Northeastern Illinois IPS (MBI 2023), findings in the ecological literature, and lessons learned from multiple watershed assessment cycles to estimate the relative strength of nutrient related stressors and their influence on aquatic life. This study is particularly focused on continuous D.O. data that has been lacking from recent efforts to establish criteria for nutrients (Illinois NSAC 2018; MBI 2023) to better understand the indirect role of nutrients on aquatic life via its influence on D.O. dynamics. By observing environmental conditions over time related to ongoing stream restoration actions and pollution source controls, these can act as "natural experiments" and may provide feedback that necessitate changes to nutrient effect thresholds over time. For example the effects of nutrient related stressors on aquatic life could be masked by more dominant stressors (e.g., habitat, toxics) that might be remediated over time. Conversely, some stressors, such as those influenced by climate change (e.g., hydrology, temperature) or the increased accumulation of chlorides in watersheds, could worsen and affect nutrient dynamics in stream ecosystems as a result.

The effect of stream physical features and geomorphology on D.O. is important to understand when identifying how nutrient effects can be exerted on biological assemblages. Garvey et al. (2007) summarizes some of the natural influences on D.O.:

> *"Flow velocity interacts with factors such as water depth, streambed morphology [i.e., riffle-pool features], and stream surface area to influence the exchange between water and the atmosphere, re-oxygenating streams (Owns et al. 1964), … Conversely, low-gradient systems that experience a reduction in average flow velocity and concomitant decline in discharge may be more susceptible to declining oxygen."*

The QHEI, which includes stream features that influence the oxygenation of streams (*e.g.,* riffle-run features, current velocity, gradient) can likewise affect biological condition directly because the most sensitive species and taxa are frequently habitat-specific and fluvial dependent, responding to factors that co-vary with natural D.O. regimes. Although multivariate statistical approaches to compare the relative association of co-varying stressors are important, univariate exploratory methods (e.g., quantile regression, graphical scatterplots of key stressor and response variables) can also provide insight into stressor levels that may be limiting to aquatic life. For example, comparing the stressor levels to determine when stressor-sensitive species are reduced or absent is useful in determining protective thresholds.

METHODS

Adequate monitoring is essential to providing this important feedback over time with having paired chemical, physical, habitat, and biological data at each site a major objective (MBI 2023). However, because the data were sometimes from different entities with their own program objectives, having paired data was not always possible. Some parameters sampled by one entity were not sampled by another and continuous monitoring in particular was not always at the same location as the grab sample data, being either slightly upstream or downstream. In such cases best professional judgement was used to link sites and the data to a common site. Most locations were very close being less than one mile apart. The locations of sites with continuous data used in this study are illustrated in Figure 2 and listed in Appendix 1.

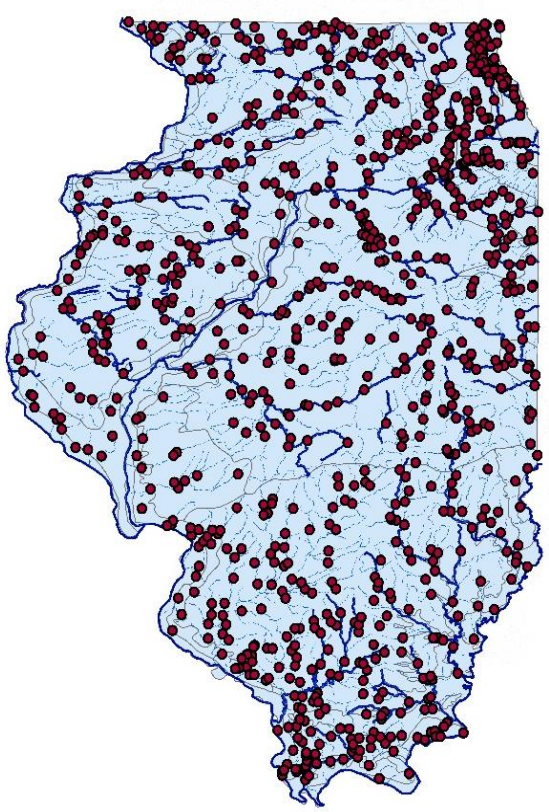

Figure 2*. Map of Illinois stream and river sites used in this study that had continuous D.O. measurements between July 15 and September 30 for a given year.*

Data used for this study included readily available data in the Midwest Biodiversity Institute (MBI) MBI ECOS data system, data collected by the DuPage River Salt Creek Workgroup (DRSCW), the Lower DuPage River Watershed Coalition (LDRWC), the Des Plaines River Watershed Workgroup (DRWW), and Illinois EPA data downloaded from the U.S EPA Water Quality Exchange (WQX). Data elements included that collected by continuous monitors (both long- and short-term), grab water chemistry data collected during watershed or basin surveys, stream habitat data (Qualitative Habitat Evaluation Index, QHEI), and biological assemblage data (fish and macroinvertebrates), mostly by MBI and IEPA and which, with the exception of continuous D.O. and chlorophyll a data, was already compiled for the Northeast Illinois IPS (MBI 2023).

ANALYSES

Continuous D.O. Data Statistics

A suite of continuous D.O. statistics was generated from the available continuous database (SONDE) from which the minimum daily, maximum daily, mean daily, and maximum daily diel swing values were derived. To reduce the influence of extreme daily minimum or maximum values to affect these analyses, the 5th and 95th percentile values were used as more consistent, representative, and biologically meaningful exposures to low or high D.O. Data was limited to July 15-September 30 to ensure that the most biologically limiting period was captured, *i.e.,* the seasonal period that coincides with highest ambient temperature, low summer-early fall flows, low minimum D.O. levels, and the widest diel swings. These statistics were plotted against the fIBI and mIBI to visually reveal variables that are meaningfully associated with biological assemblage performance.

Biological Stressor Thresholds

As with the NE Illinois IPS analyses (MBI 2023), fish species and macroinvertebrate taxa were linked to SONDE stations and Weighted Stressor Values (WSVs) were derived for the continuous D.O. variables previously described. Species and taxa were ranked along each D.O. variable and the 20th and 80th percentile ranks were used to identify the most sensitive and tolerant species/taxa for each variable. Species/taxa above the 80th percentile rank are considered sensitive (*i.e.,* more frequent occurrence at higher minimum D.O.) while below the 20th percentile rank would be considered tolerant of an altered D.O. regime including wider diel swings. Thresholds were then derived by using the 25th (or 75th) percentile values at sites meeting the mIBI or fIBI General Use biocriteria for aquatic life for sites with >25th percentile values for the D.O. sensitive species or taxa groups. Sites that were attaining the fIBI and mIBI thresholds, but which had stressor values above the derived threshold, are considered threatened. Plots of the stressors versus the counts of species/taxa sensitive to each stressor variable were examined to visually illustrate the strength of the relationship and goodness-of-fit scores (FIT; MBI 2023) were calculated to determine the strength of those relationships.

Goodness-of-Fit (FIT) Scores

The number of D.O. stressor-specific sensitive fish species or macroinvertebrate taxa at a site were used to predict a stressor rank. The observed stressor rank can then be compared to the predicted stressor rank using a "FIT" analysis. Stressors that are strongly limiting along a stressor gradient should exhibit a relatively "tight" relationship with few outliers that are below or exceeding the predicted threshold. Weak stressor relationships will have more outliers exceeding the threshold and the magnitude of the deviation reveals the relative strength of the relationship. To quantify the goodness-of-fit (FIT) the observed stressor rank versus the predicted stressor rank is plotted, assuming that the number of stressor sensitive species or taxa is limited by the corresponding stressor level at each site. A statistic is calculated that quantifies the proportion of sites, by bins (integer levels) of observed stressor ranks and predicted stressor ranks above what is expected along the regressed threshold line (stressor level = predicted stressor level). The magnitude of the deviation was weighted by a factor that increases by 1 the further above the predicted line (by integer categories) and weighted by the proportion of all sites represented by that bin as follows:

$$FIT = \sum_{n=1}^{Bins} (\mathrm{BPE} * \mathrm{W} * \mathrm{P})$$

where;

BPE = Percent Bin Prediction Error, which is the percentage of sites in that bin compared to those samples in a measured stressor bin column;
W = Bin weighting (1-9) where weighting values increase by 1 with each bin exceeding the prediction line;
P = proportion of all sites that are represented in that bin.

Figure 3 illustrates the weighting factors on a hypothetical plot of observed stressor ranks versus a predicted stressor ranks. The lower the FIT score the stronger the relationship. FIT values increase when there are a higher proportion of sites exceeding the prediction line and as the distance from the line increases resulting in higher FIT scores.

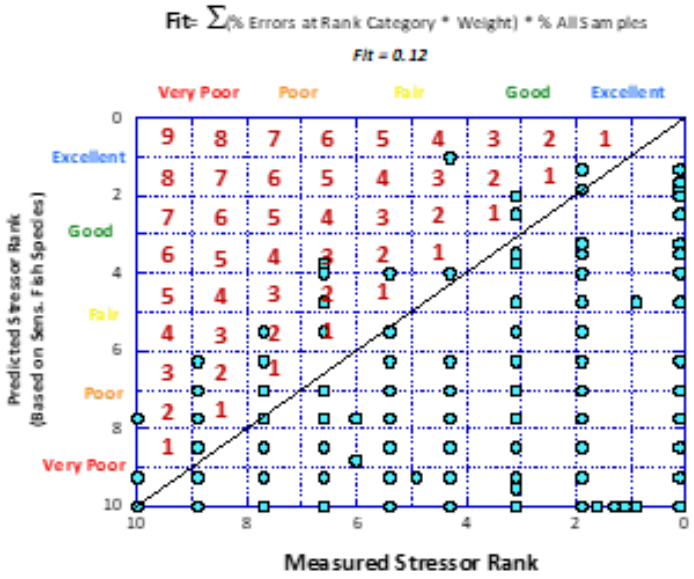

Figure 3. *Illustration showing how the FIT scores are calculated for parameters in the NE IL IPS study and for minimum D.O. in this effort.*

Short vs. Long Term Dissolved Oxygen Data

The D.O. data included long-term continuous data (*i.e.,* 30 days to several months, LTDO), short-term continuous data (4-7 day periods, STDO), and grab data consisting of instantaneous samples (GRABDO) collected during the July 15-September 30 index period. Of particular interest is determining how useful are grab and short-term data for identifying D.O. related stress, compared that generated from long-term data because of the comparative paucity of that data. Comparisons of how each type of data is able to identify exceedances of the various forms of the Illinois D.O. standard (*e.g.,* never-to-exceed, 7-day rolling average, 7-day rolling minimum, etc.). For SONDE sites with long-term data it was compared to 100 trials of randomly selected 4-16 day periods from the LTDO data. Because we recently determined that LTDO better captures the most important stress periods relative to D.O. (MBI 2024), this analysis was done to reveal the likelihood (*i.e.,* percent of samples) of missing or including critical exceedances of the various D.O. thresholds. Because D.O. is a key factor for aquatic life use attainment and also as a primary response to nutrient enrichment, it is important to know the potential error rate for identifying D.O. related impairments when conducting different types of D.O. monitoring.

Sestonic and Benthic Chlorophyll Data

Chlorophyll a data consisted of benthic chlorophyll a and/or sestonic chlorophyll-a based on grab samples at a selected sites in Illinois rivers and streams. A smaller subset of sites had continuous sestonic chlorophyll-a data collected via a Datasonde probe mostly at long term monitoring sites. Studies in the Midwest have had varying levels of success in relating nutrient regimes to D.O. stressors and algal responses both in the water column and as periphytic algae on stream and river substrates. Plots of sestonic and benthic chlorophyll a versus fIBI and mIBI and versus minimum D.O. were used to explore whether these measures are strongly related to biological impairment and low D.O. values.

Correlation Analyses

The initial analyses used a correlation matrix, also known as “correlelograms”, in R-statistics (Patil 2021) to scan for the magnitude of positive or negative relationships between the continuous D.O. statistics and the mIBI and fIBI to ascertain the strength of their overall correlation.

Confounding Factors

It is clear, particularly in urban and suburban streams and other developed watersheds (*e.g.,* intensive agriculture drainage), that factors other than D.O. and nutrients contribute to impaired aquatic assemblage condition (MBI 2023). To partially assess such overlying contributions, a subset of key stressor variables was selected to conduct Random Forest Regression Tree (RF) analyses[3] of factors that can contribute to limiting the sensitive fish

[3] RandomForest package in R statistics (Liaw and Wiener 2002).

species and macroinvertebrate taxa metrics that were derived using the D.O. stressor variables. Random Forest and similar Boosted Regression and Classification Trees (BRT) have some advantages over the more traditional regression tools as pointed out by Chakona and Swartz (2012):

> "*The ability of partitioning methods to address the problem of multicollinearity makes them more desirable approaches for ecological studies, because explanatory variables are often only nominally independent. BRT is a relatively new approach for modelling species-environment relationships (Elith et al. 2008). Advantages of BRT models include superior predictive performance compared to most traditional modelling methods, ability to handle different types of explanatory variables (data can be categorical, numeric or binary), ability to accommodate missing data, and they do not require elimination of outliers or prior data transformation. BRT models are insensitive to differing scales of measurement, and they can fit complex nonlinear relationships and interactions between predictors (Elith et al. 2008).*"

For these analyses the D.O. sensitive fish species, fIBI, D.O. sensitive macroinvertebrate taxa, and mIBI were used as the dependent variables and the stressor variables included each of the key D.O. statistics, nutrient related parameters (ammonia-N, nitrate-N, total phosphorus, and TKN), total suspended solids (TSS), maximum pH, and the QHEI score. These variables are among the most common stressors across the sites that also had continuous D.O. data (MBI 2023).

RESULTS AND DISCUSSION

Short-Term vs Long-Term Datasonde (SONDE) Deployments

A key issue related to the use of short-term (STDO) versus long-term D.O. data (LTDO) is the efficacy of LTDO at capturing the cumulative stress of diel D.O. cycles on aquatic life and algal response indicators (MBI 2024). A key advantage of using biological indices as a response indicator is that they integrate multiple stressors and thus reflect the aggregated ecological condition, provided they are sampled effectively. Chemical sampling best captures the magnitude of a stress period if samples are collected during the time(s) when a stressor is (are) the most acute. Chemical stressor regimes with relatively continuous chronic stress periods (*e.g.,* pollutants from steady-state sources such as WWTPs) are adequately characterized by grab or short-term samples. In these cases, chronic loadings of pollutants are generally continuous and grab sampling has been used to identify causes of aquatic life impairment. Impacts from certain types of toxicants (*e.g.,* metals, ammonia) have declined substantially over the past 30-40 years and chronic impairments that were previously detected by grab water column samples are now best identified with surficial sediment sampling that integrates variable toxicant concentrations.

The ability of periodic versus continuous chemical sampling to identify chemical stress periods is somewhat analogous to the scenario described for point source chemical impacts. Elevated

nutrient concentrations are often identified by grab sampling, although the precise magnitude of such inputs may be obscured by storm flows, base flow conditions, and factors such as habitat quality, each of which can either lessen or exacerbate the effects of nutrients on aquatic life. The mode of effect of nutrients on the higher aquatic assemblages such as fish and macroinvertebrates is indirect which explains the weak correlations that are sometimes observed between nutrients and assemblage level response and even algal-based variables (Illinois NSAC 2018; Miltner 2018).

Plots of the LTDO absolute minimum D.O. datasets (≥30 days) versus the mean STDO minimum D.O. from randomly re-sampled datasets of 4-days and 16-days (100 trials; LTDO versus STDO) showed a strong correlation (Figure 4) with the median of 100 trials, but the extremes showed substantial variation. For example, in the case where the LTDO absolute minimum was 2 mg/L, the median of 100 trials was ~4 mg/L for the 4-day (STDO) sets and ~3 mg/L for the 16-day (STDO) datasets. Maximum trials ranged from >6 mg/L for the 4-day (STDO) datasets to >5 mg/L

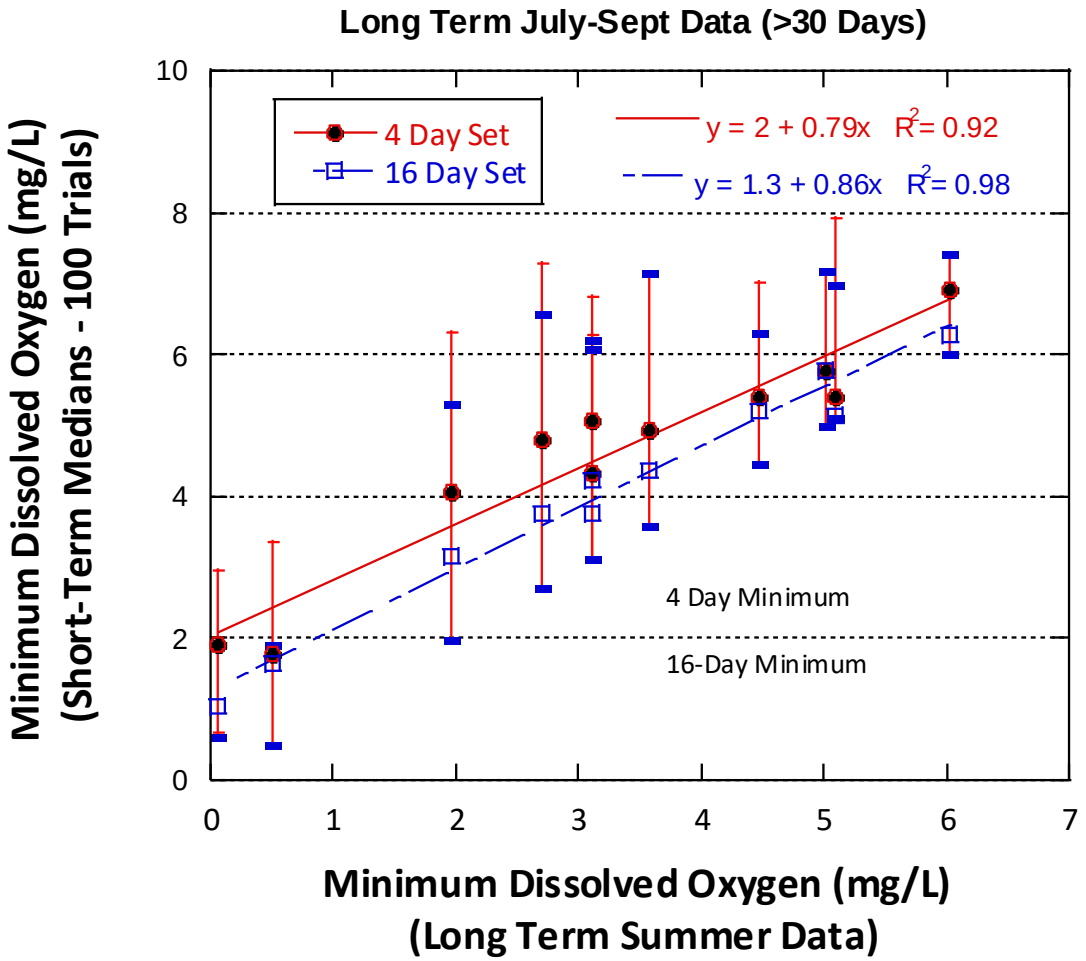

Figure 4. *Plots of minimum D.O. (mg/L) from long-term continuous D.O. (collected within the July 15-September 30 window) vs median minimum D.O. (mg/L) of 100 trials of randomly selected 4-day or 16-day subsamples (between July 15 and September 30). Error bars represent minimum and maximum minimum D.O. values of these 100 trials.*

for the 16-day (STDO) datasets. These are intended to represent “worst case” scenarios because the short term deployments target low-flow, high temperature periods when minimum D.O. values would be expected to be the lowest.

Grab D.O. sampling did not accurately measure minimum or maximum D.O. when compared to the LTDO continuous sampling based on sites that had matching GRABDO samples (Figure 5).

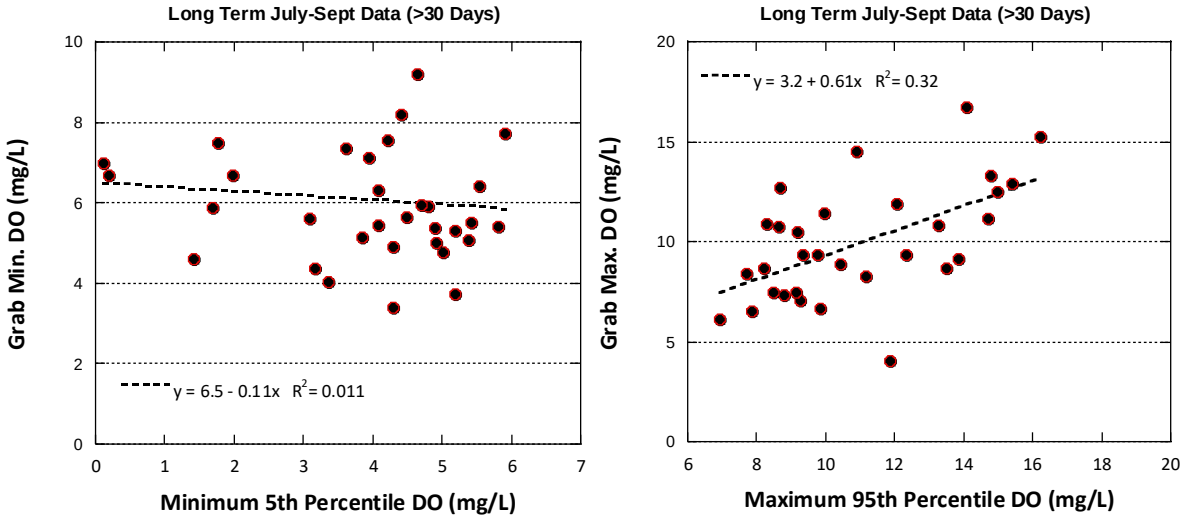

Figure 5*. Minimum D.O. from grab samples (left) and maximum D.O. from grab samples (right) compared to the minimum 5th percentile and maximum 95th percentile, respectively, from continuous measurements.*

Minimum D.O. values generally occur at night and thus escape detection by daytime grab samples. Maximum GRABDO samples were better correlated with maximum (95th percentile) LTDO values (Figure 5, right), but can also miss maximum D.O. values revealed by continuous monitoring.

Datasonde Statistics Correlelograms

Figure 6 depicts the correlations between SONDE variables generated from the continuous data (LTDO) from across Illinois. The minimum D.O., as represented by the 5th percentile value, was the most highly correlated with the actual minimum D.O., mean D.O., and mean D.O. %saturation, but it was negatively correlated with the maximum diel D.O. swing (Figure 6). Maximum D.O. as represented by the 95th percentile continuous D.O. values was highly correlated with maximum D.O. %saturation, maximum D.O. swing, and mean D.O. saturation. The negative association between minimum D.O. values and high D.O. swings indicates that D.O. swings are not necessarily associated with low D.O. events. A similar lack of correlation of diel D.O. swings with mIBI and fIBI scores shown later indicates that maximum diel D.O. swings and maximum D.O., while indicative of enrichment effects compared to reference conditions, may not be consistent predictors of aquatic life impairment, particularly for to the General Use biocriteria benchmarks.

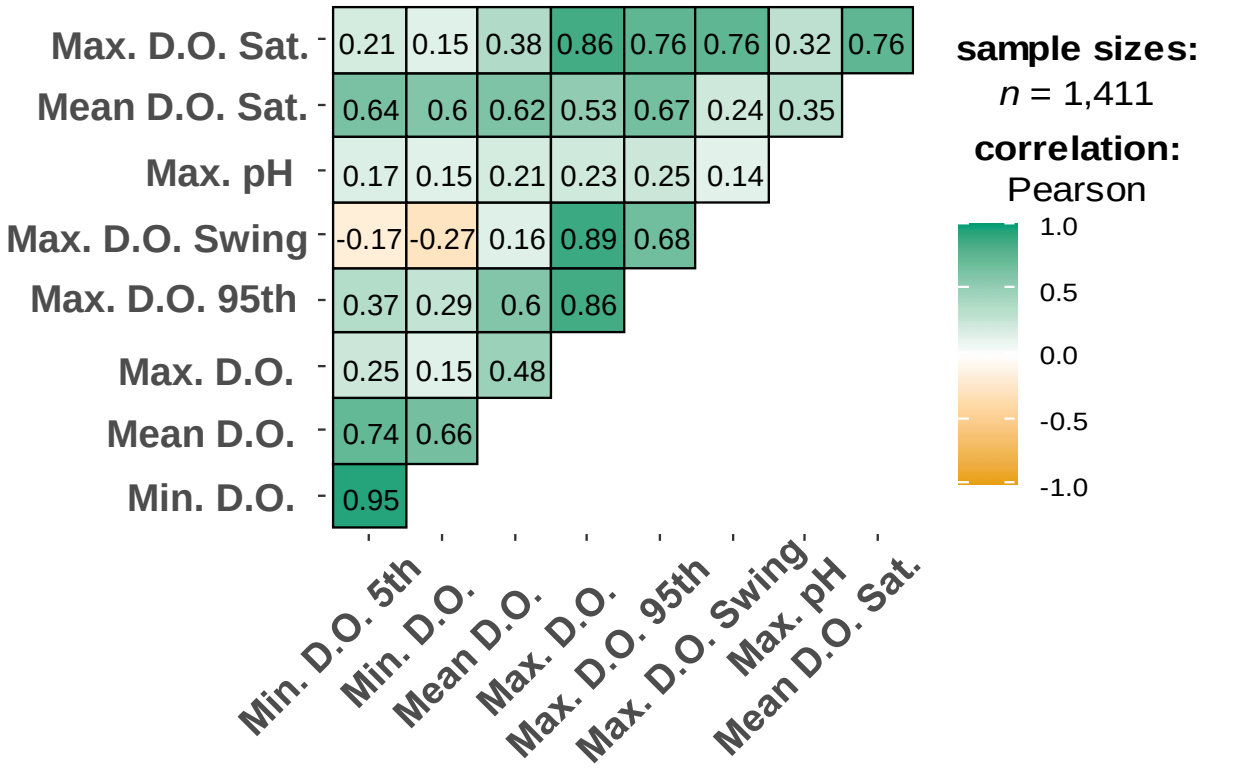

Figure 6. *Pearson correlation coefficients among continuous D.O. statistics from stations across Illinois rivers and streams.*

Figure 7 shows Pearson correlation coefficients from a subset of the SONDE (LTDO) data that had paired macroinvertebrate and QHEI data (upper) and paired fish and QHEI data (lower). Sites with an 'X' are not significantly correlated with P values >0.05. Only minimum D.O. and QHEI had significant correlations with the mIBI (Figure 7, upper). Similar correlations were observed with the fIBI (Figure 7, lower), but the fIBI also had positive correlations, albeit weaker, with maximum D.O. All of the correlations are positive with higher mIBI and fIBI scores tracking with higher D.O. values. The higher maximum D.O. associated with higher fIBI scores indicates that this likely tracks with higher D.O. values in general as opposed to wider diel swings.

Identification of D.O. Sensitive Fish Species and Macroinvertebrate Taxa

Weighted Stressor Values (WSVs) for fish species and macroinvertebrate taxa were derived for minimum D.O., average D.O., and the percentage of days exceeding the Illinois never-to-be-exceeded standards and are provided in Appendices 2 and 3. When comparing stressors with different units of measurement, each variable is placed on a 0.1 to 10 scale with the General Use or Good threshold assigned a value of 4 and the Excellent threshold a value of 2 (MBI 2023). Once the different D.O. WSV thresholds were derived for the number of D.O. sensitive fish species and macroinvertebrate taxa, the results were extrapolated between the Good threshold and the 5th percentile (e.g., "statistical minimum" stressor levels) to estimate the threshold breakpoints between Fair and Poor (value of 6), and Poor and Very Poor (value of 8) to the "maximum" stressor level (value of 10). Figure 8 shows plots of the number of D.O. sensitive fish species and D.O. sensitive macroinvertebrate taxa, respectively, against the

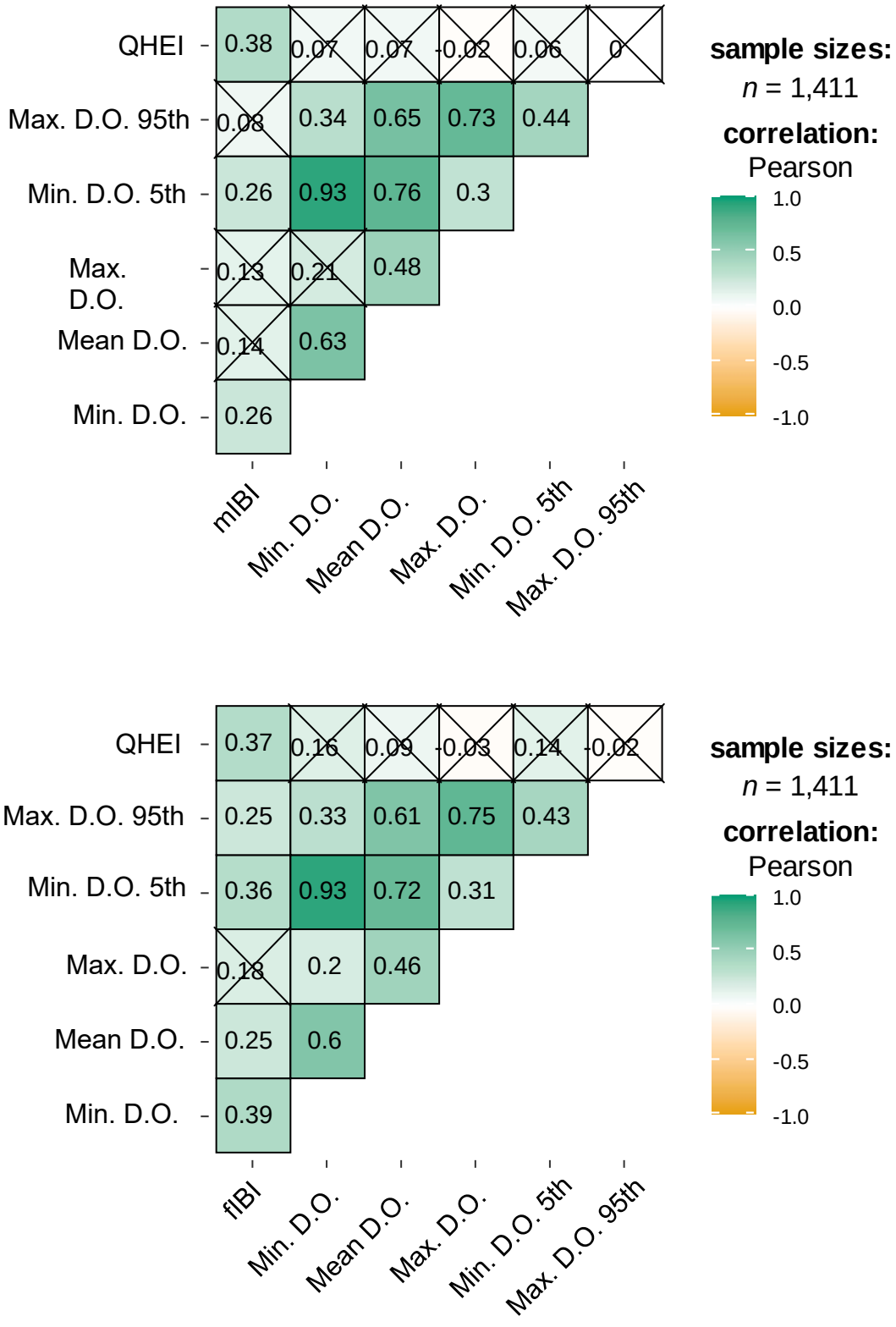

Figure 7. *Pearson correlation coefficients among continuous D.O. statistics at sites with mIBI and QHEI data (upper) or fIBI and QHEI data (lower) at Illinois river and stream sites with continuous data. Non-significant correlations at p>0.05 have an X in the box.*

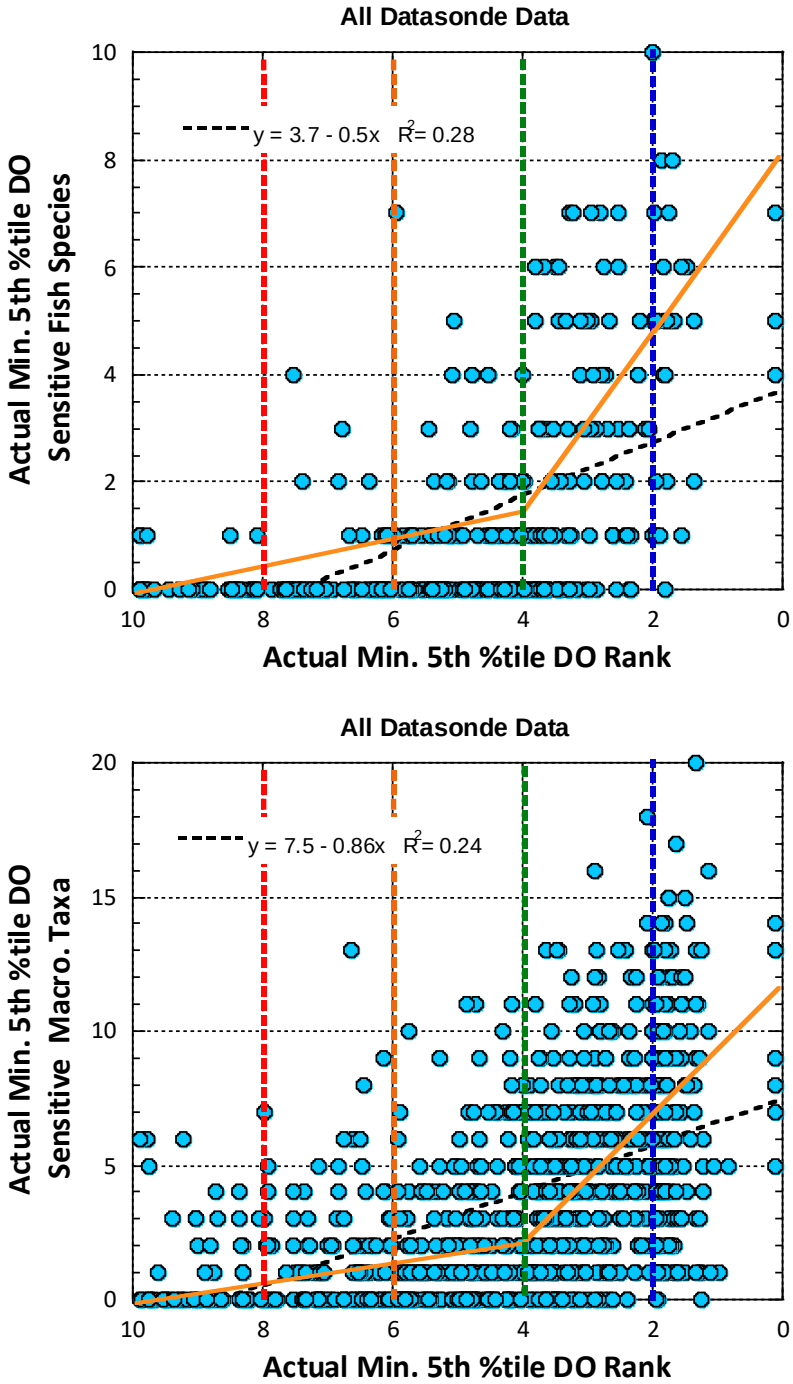

Figure 8. *Plots of the rank of the minimum 5th percentile D.O. versus the number of minimum 5th percentile sensitive fish species (top) and minimum 5th percentile sensitive macroinvertebrate taxa (bottom) for all Illinois sites with continuous D.O. data (between 15 July-30 September) and associated fish or macroinvertebrate assemblage data. Vertical lines represent the boundaries between Excellent (blue), Good (green), Fair (Orange), Poor (Red), and Very Poor stressor categories. The orange line represents the average expected sensitive fish species or macroinvertebrate taxa based on the rank of the D.O. statistic.*

minimum D.O. rank as measured by the 5th percentile. These plots illustrate the form of the relationship between sensitive species/taxa and the respective D.O. statistic. This yielded a characteristic "wedge" plot that reflects the limiting effect of D.O. on the richness of D.O. sensitive fish species or macroinvertebrate taxa (Figure 8). The same procedure was followed for setting stressor thresholds for multiple variables in the NE Illinois IPS (MBI 2023) by setting the threshold at the concentration represented by the 25th or 75th percentile of a stressor at sites attaining the fIBI or mIBI General Use (Good) thresholds that also had ≥25th percentile of sensitive species or taxa for that particular stressor. Sites attaining the General Use biocriteria thresholds, but which had values exceeding a D.O. threshold are considered threatened for that particular statistic. Box plots illustrating the distribution differential in the D.O. statistic (actual D.O. values) between "attaining" and "attaining, but threatened" sites are illustrated in Figure 9 for macroinvertebrates. This graphic uses the actual D.O. values rather than the percentile ranks.

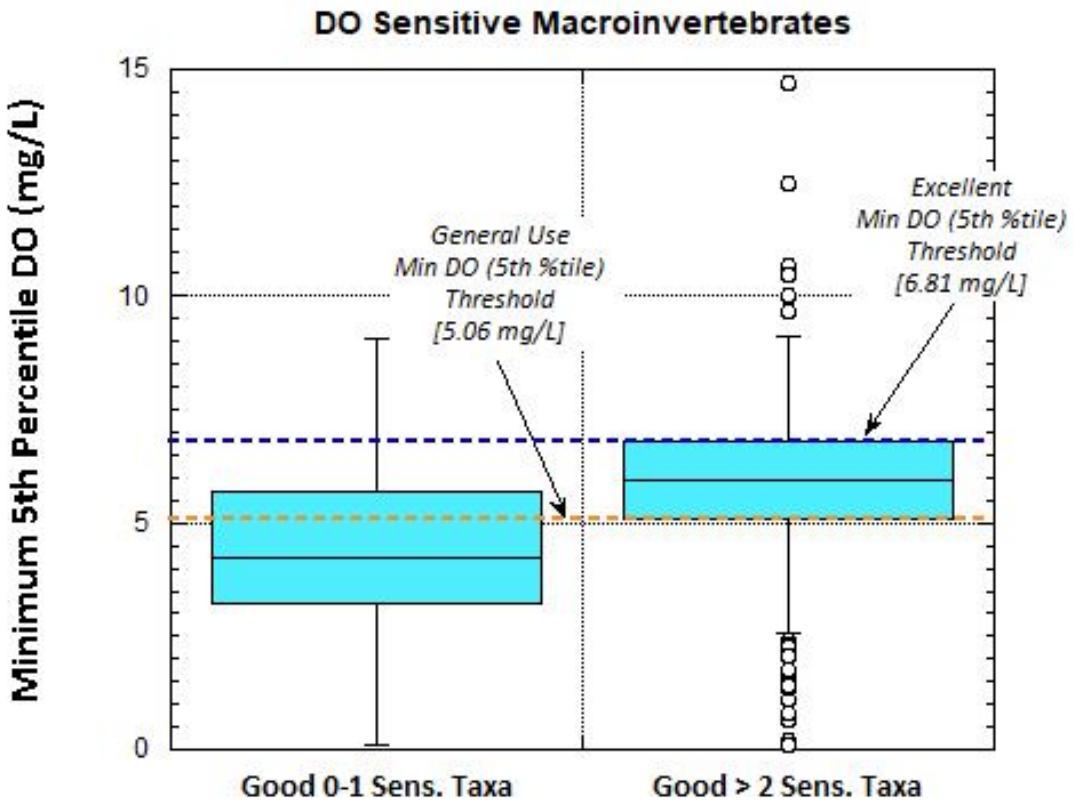

***Figure 9**. Box plot of minimum D.O. (5th percentile) for sites attaining the General Use mIBI threshold for sites with 0-1 D.O. sensitive taxa (left) versus sites with ≥2 D.O. sensitive taxa (right).*

Table 1. *Table summarizing FIT scores from the NE Illinois IPS study area and the score for the continuous D.O. minimum statistic (5th percentile) generated in this study (in bold italics).*

Parameter	Group	FIT Score	Type
Min. 5th %tile DO	Fish	***0.03***	Sonde
Total Phosphorus	Fish	0.04	Grab
Conductivity	Fish	0.05	Grab
Total Dissolved Solids	Fish	0.10	Grab
Minimum DO	Macros	0.10	Grab
Min. 5th %tile DO	Macros	***0.13***	Sonde
Total Zinc	Fish	0.13	Grab
Total Kjeldahl Nitrogen	Macros	0.14	Grab
Total Chloride	Fish	0.17	Grab
Mean Dissolved Oxygen	Macros	0.21	Grab
BOD (5-Day)	Macros	0.21	Grab
Total Amonia	Macros	0.28	Grab

Goodness-of-Fit Analyses for D.O. Statistics and D.O. Sensitive Fish Species and Macroinvertebrate Taxa

It is important to understand the predictability of a stressor variable in terms of its effect on aquatic life. The relationship between sensitive fish species or macroinvertebrate taxa and the minimum 5th percentile D.O. statistic (Figure 8) was used to illustrate the "fit" of the number of sensitive fish species (upper) or macroinvertebrate taxa (lower), respectively, versus the rank of the D.O. statistic. Deviations of observed species or taxa from the expected species or taxa were used to calculate a FIT score as outlined in the methods section. D.O. sensitive fish species had a better fit (0.03) than did D.O. sensitive macroinvertebrate taxa (0.13) for the minimum 5th percentile D.O. statistic. However, both were among the "better" FIT scores for the stressors included in the NE Illinois IPS (MBI 2023; Table 1) and were within the FIT scores of 14 QHEI related measures and 6 urban related stressors (MBI 2023). As will be discussed below, the maximum D.O. statistics were not reliable predictors of low D.O. or were at levels not likely to have adverse effects on their own, thus sensitive fish species and sensitive macroinvertebrate taxa derived relationships were not established for maximum D.O.

Associations Between Nutrient and Chlorophyll Parameters and D.O. Statistics

The Illinois NASC (2018) found little predictive relationships between nutrients and response variables such as sestonic algal concentrations and fish and macroinvertebrate assemblage data, thus concluding that ". . . *the data were too variable to derive defensible nutrient criteria from empirical stressor-response relationships*." This does not mean that nutrients and algal growth are not related, but rather that grab sample based measures of nutrients at widely scattered sites were not sufficient to produce predictive relationships with algal biomass or fish and macroinvertebrate assemblage quality. Two caveats that Illinois NSAC (2018) identified was the lack of continuous D.O. data and benthic chlorophyll a biomass data that could better link eutrophication to biological assemblage quality. Those factors expressed through continuous D.O. data were examined in this analysis.

Influence of Habitat on Nutrient and D.O. Relationships with Response Indicators

Another layer of complexity regarding the influence of nutrient enrichment on aquatic assemblage condition is the relationship of the D.O. regime with physical habitat at the local

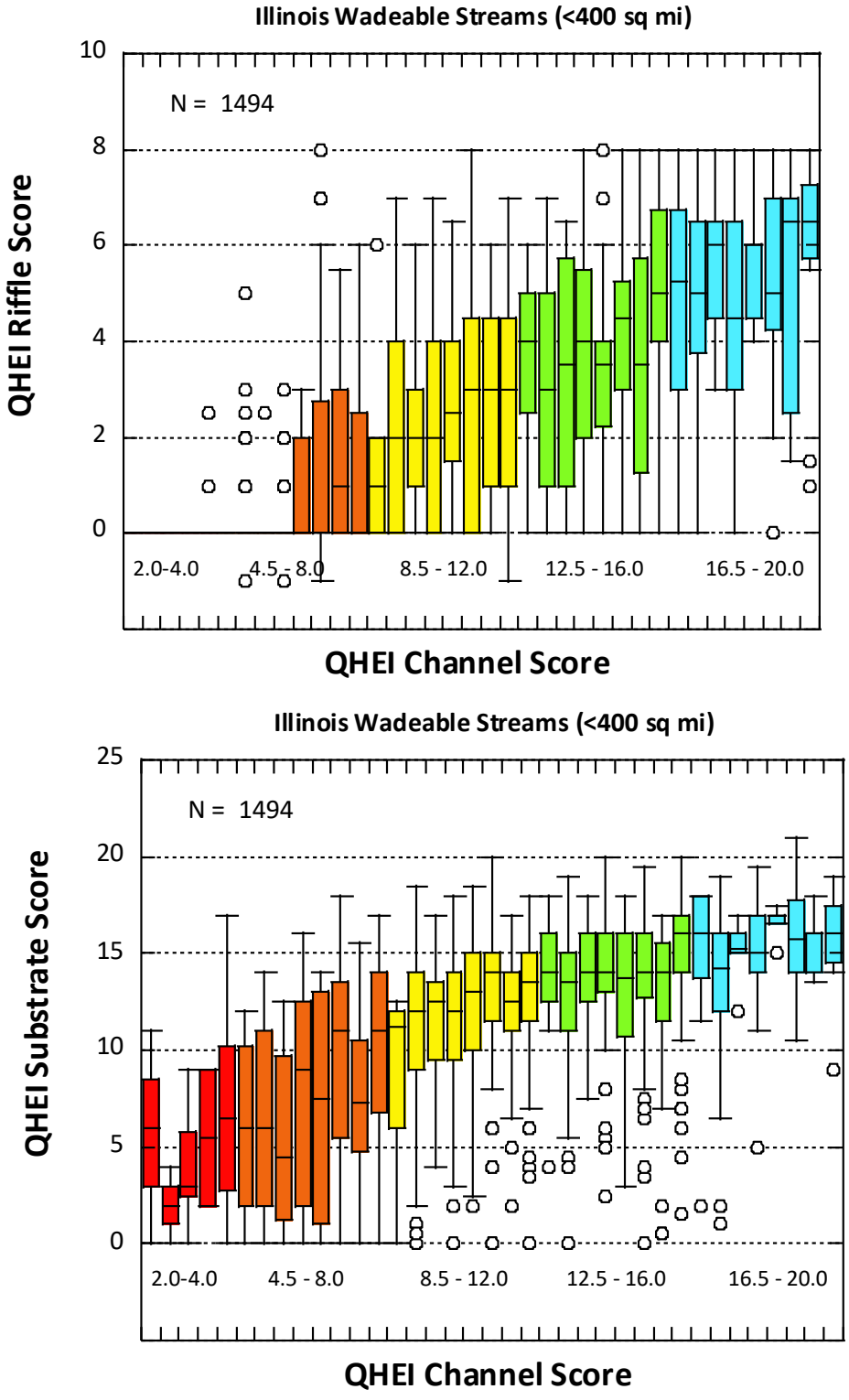

***Figure 10**. Plots of QHEI channel score vs. the QHEI riffle score (top) and QHEI substrate score (bottom) from wadeable stream sites (< 400 sq. mi.) in Illinois in the MBI database.*

and small watershed scales. Examination of QHEI data in the wadeable streams of Illinois shows the attributes are known to influence D.O. such as riffle condition (e.g., depth, morphology, current velocity) are strongly related to channel condition (channelization, channel development, channel erosion) as measured by the QHEI channel metric (Figure 10, top). In Midwest U.S. Corn Belt streams, a significant proportion of total phosphorus is bound to clayey soil particles, thus streams with more siltation and sedimentation are more likely to be associated with elevated total phosphorus concentrations with some being considered as "legacy" sources from eroding streambanks and the floodplain. According to Garvey et al. (2007) legacy P *". . . is accumulated soil and sediment P which can be remobilized and serve as a continuing source to areas downstream for years to centuries after deposition (McDowell and Sharpley, 2001; Kleinman et al., 2011)."* At wadeable sites in Illinois with QHEI data, the QHEI substrate score, which is strongly influenced by silt and sand fines (substrate size, silt cover, substrate embeddedness QHEI attributes), is directly related to channel condition (Figure 10, bottom). This suggests that the restoration of substrate condition (*e.g.,* reducing sedimentation) is contingent on restoring stream channel condition in order to be effective. Streams with the poorest channel condition (e.g., Substrate metric score <8.0) almost always have poor substrate and riffle conditions (Figure 10). In large data sets such as the NE Illinois IPS, "wedge" relationships are frequently observed between individual stressors and response variables (*e.g.,* stressor sensitive species and taxa) and are useful for identifying when stressors are limiting and setting thresholds or developing appropriate regulatory requirements or choosing best management practices.

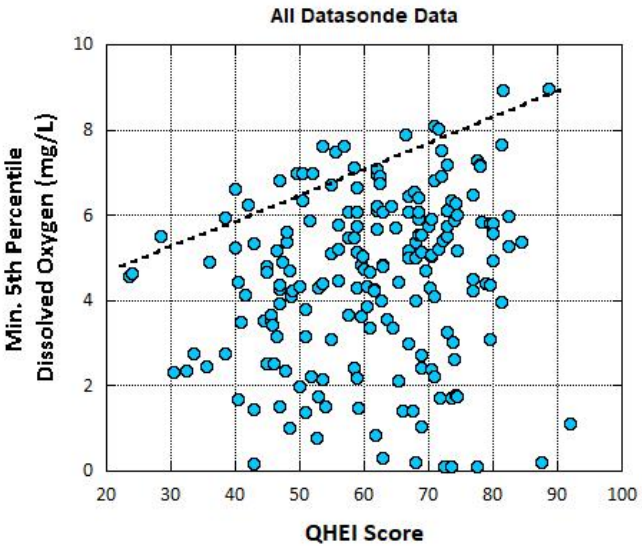

Figure 11. *Plot of overall QHEI score versus the minimum D.O., as represented by the 5th percentile D.O. concentration (mg/L). Data from sites with matching continuous D.O. and QHEI data. Dashed line is a threshold line drawn by*

Although the physical attributes of streams can have influences on D.O. regimes (*e.g.,* low D.O.), nutrient over-enrichment can overwhelm their influence. Figure 11 illustrates a plot of QHEI vs. the minimum 5th percentile D.O. values that illustrates limiting conditions associated with overall habitat condition as measured by QHEI. Low D.O. values can occur at sites with high QHEI scores where there is excessive organic enrichment (Figure 10). There does appear to be a threshold relationship, however where the highest minimum D.O. values are limited by low QHEI scores. That is, sites with very poor habitat (QHEI <50) have few sites with minimum D.O. >6 mg/L, but these increase in frequency as QHEI scores increase. Similar limiting relationships were observed with the QHEI substrate, channel, and gradient metric scores underscoring the role of habitat quality in influencing

higher minimum D.O. values (Figure 12). Sites with poor substrate conditions are generally characterized by elevated silt loadings and poor channel conditions and generally lack well-developed riffle/pool features that tend to add D.O. to streams (see Figure 9). Similarly, sites with low gradient scores are much more likely to lack well-developed riffle-run features and are more likely to be dominated by glide and pool habitats. Sites with poor habitat are also likely to have open canopies with less shading than streams with higher quality habitat features. Examination of these univariate relationships can be useful when designing approaches to reduce the effects of eutrophication in streams and their watersheds.

Effects of Maximum D.O. and Diel D.O. Swings on Aquatic Life

The effect of minimum D.O. on aquatic life has been well known known for nearly a century (Ellis 1937; Hynes 1960). However, attempts to derive nutrient criteria for aquatic life have only recently included the consideration of maximum D.O. and diel D.O. swings as indicators of

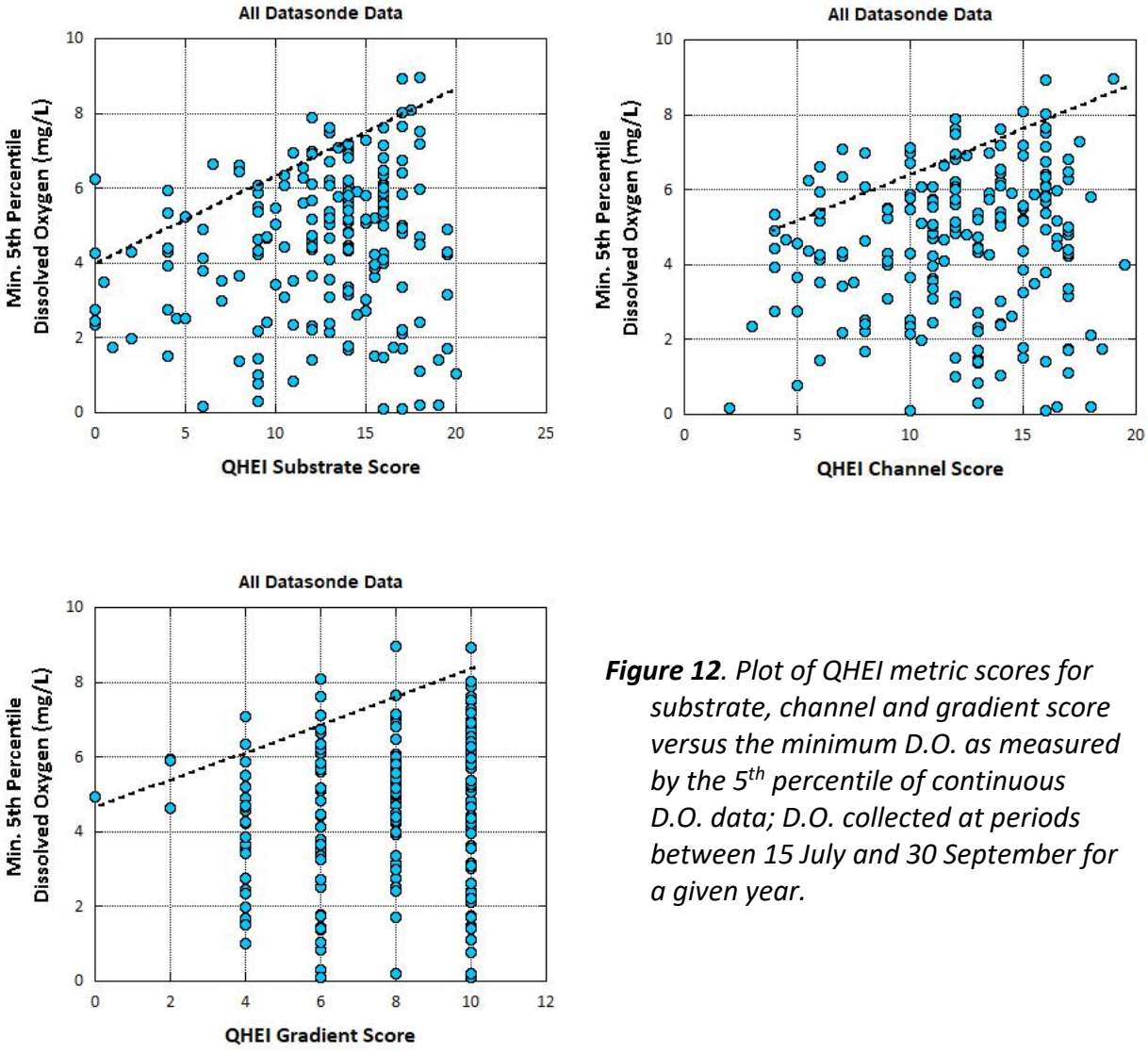

***Figure 12**. Plot of QHEI metric scores for substrate, channel and gradient score versus the minimum D.O. as measured by the 5th percentile of continuous D.O. data; D.O. collected at periods between 15 July and 30 September for a given year.*

eutrophication that can adversely impact aquatic assemblages (*e.g.,* Heiskary and Bouchard 2015, Miltner 2010, 2018). Heiskary et al. (2013) point out that diel D.O. swings and high maximum D.O. values can act as signatures for low D.O. values that are not captured by daytime grab D.O. sampling. They also point out that large diel D.O. swings are surmised to have direct impacts on aquatic life via physiological stresses. High levels of D.O. or supersaturation (*e.g.*, "hyperoxia" after Anushk and Mishra 2022) can act as a physiological stressor by causing gas bubble disease in fish (Heiskary et al. 2013). The effects of supersaturation on fish (*e.g.,* gas bubble disease) is generally related to total dissolved gas (TDG) which includes gases such as nitrogen in addition to D.O. (Weitkamp and Kamp 1980; Ma et al. 2013). Most studies about supersaturated conditions are long-term, whereas experiments on the effects of supersaturation take place over days or weeks. Studies of short-term exposure D.O. supersaturation found a reduction of symptoms when conditions quickly returned to lower saturation levels (Weitkamp and Kamp 1980). High D.O. saturation (90^{th} percentile values) was not associated with biological impairment in this analysis (Figure 13). The range of mean D.O. saturation the Illinois database are observed in plots of mean D.O. with mean percent D.O. saturation (Figure 14), mean percent D.O. saturation versus maximum D.O. saturation, and mean percent D.O. saturation vs. 90^{th} percentile D.O. saturation from Illinois continuous D.O. sampling (>15 days between July 15 and September 30).

Ma et al. (2013) suggested that D.O. saturation may not be the best proxy for TDG saturation. Levels of D.O. saturation that result in gas bubble disease in fishes varies by species. Toxic responses to supersaturation have occurred downstream from dams where the supersaturation is consistent, high, and long-term. Increased D.O. saturation associated with eutrophication is typically diurnal with periods of supersaturation during daytime followed by periods of lesser D.O. saturation at night. Studies of harm to fish by supersaturation typically involve continual exposure to these conditions over days and weeks (Weitkamp and Kamp 1980).

Plots of fIBI and mIBI versus D.O. saturation statistics did not show any appreciable association except at very low levels of D.O. saturation that were associated with low D.O. levels (Figure 13). The lack of correspondence of biological impairment to high D.O. saturation may be related to the diurnal nature of the exposure, thus allowing recovery from any short-term physiological stresses that may result. High levels of D.O. saturation do not appear to be a strong predictor of biological impairment in Illinois streams. The lack of a strong predictive relationship between maximum D.O. values and the fIBI or mIBI precluded calculation of a reliable sensitive species/taxa distribution. However, variable D.O. regimes can be associated with biological impairment when episodes of low D.O. are included.

To determine whether there are meaningful relationships between minimum D.O. and maximum D.O. concentrations with fish and macroinvertebrate assemblages we examined plots of these D.O. statistics vs. the fIBI and mIBI (Figure 14). The 5th percentile (minimum) and 95th percentile (maximum) statistics were used as minimum and maximum values to eliminate the infrequent, but extreme outlier values. The minimum 5^{th} percentile D.O. shows a threshold relationship with both the mIBI and fIBI demonstrated by an orange dashed line representing a ~ 95th percentile line "drawn-by-eye" (Figure 14, middle). Maximum D.O. data showed little

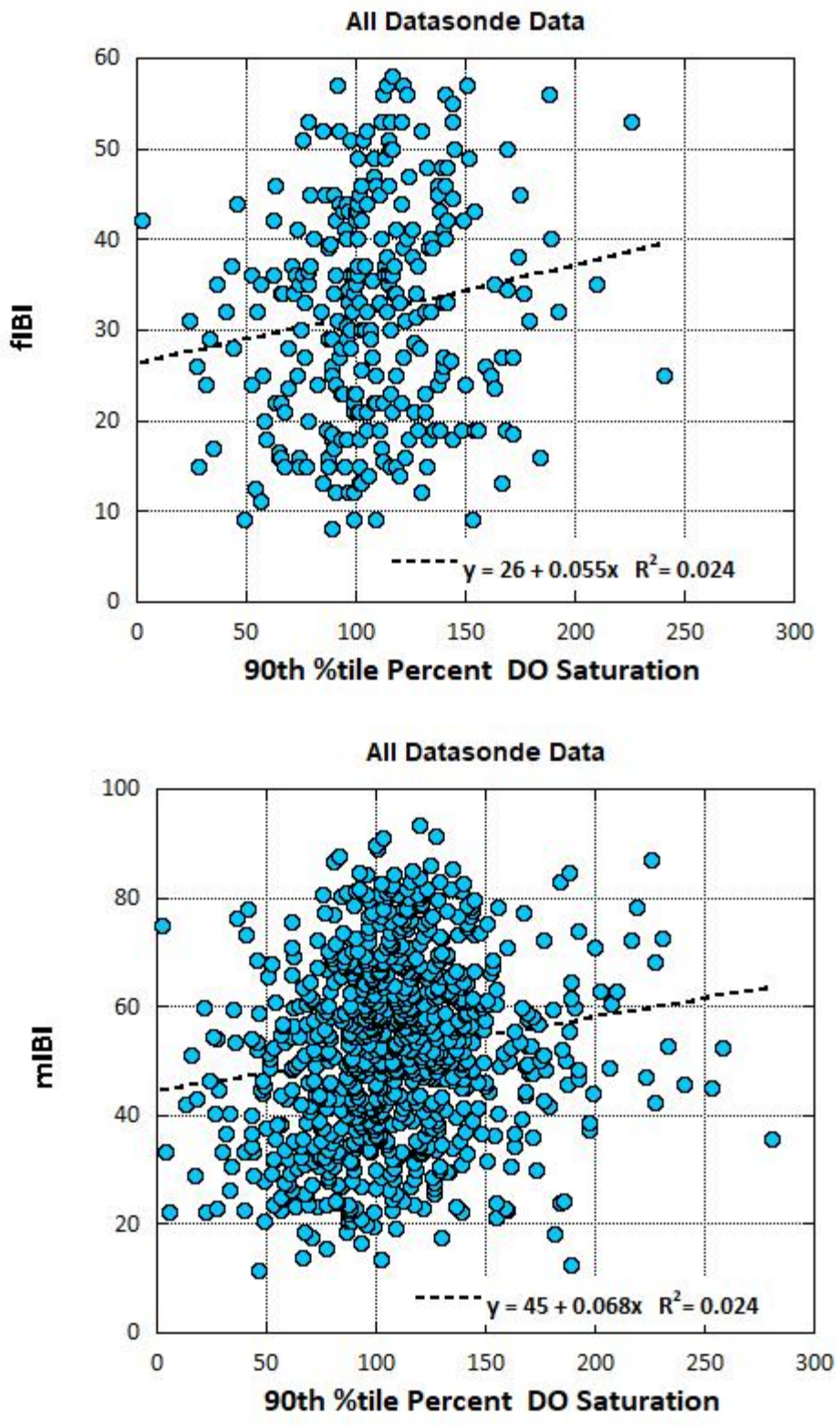

Figure 13. *Plots of 90th percentile D.O. saturation versus fIBI (top) and mIBI (bottom) for sites in with continuous D.O. data and fish or macroinvertebrate assemblage data.*

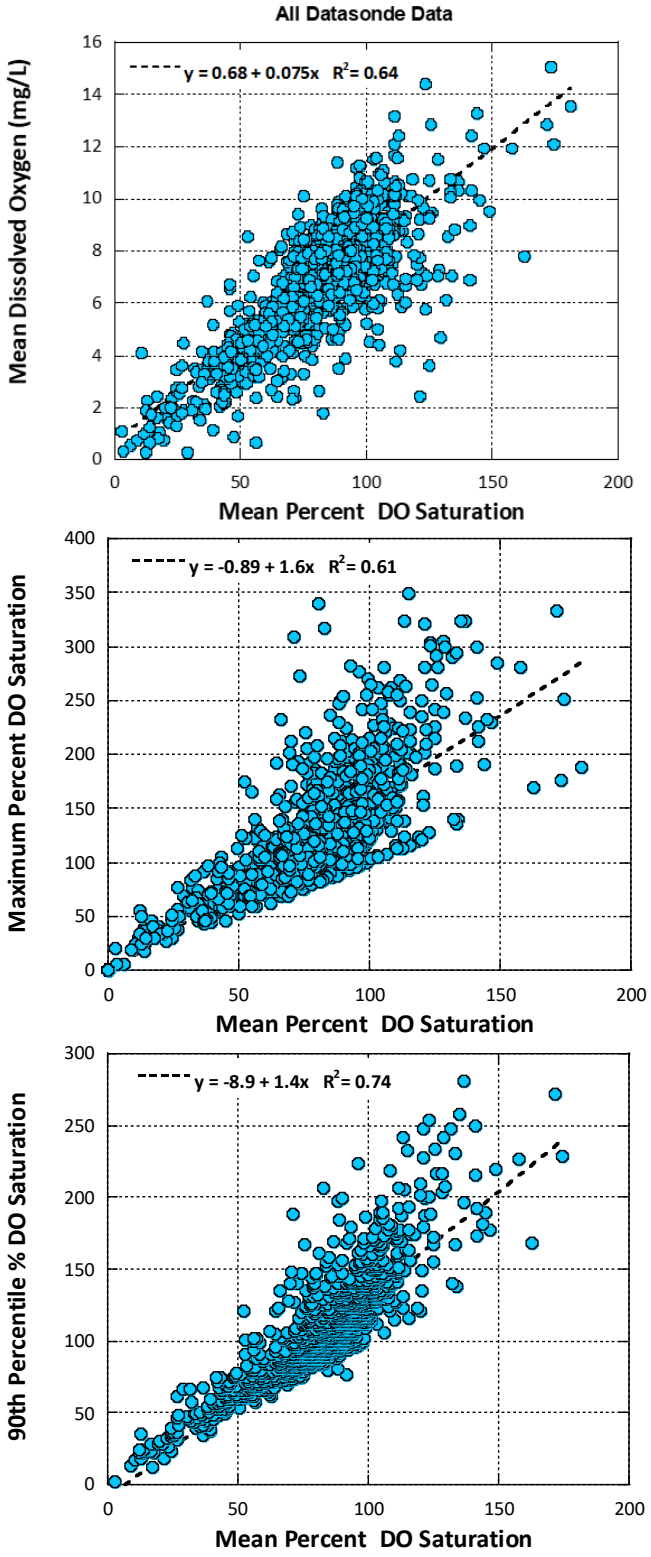

Figure 14. *Mean percent D.O. saturation versus Mean D.O. (top), maximum percent D.O. saturation (middle) and 90th percentile D.O. saturation (bottom) from Illinois continuous D.O. data collected between July 15 and September 30.*

relationship with the fIBI or mIBI (Figure 14, top) with numerous values attaining the General Use aquatic life fIBI and mIBI thresholds even with extremely high maximum D.O. values (e.g., >15 mg/L, upper boxes of Figure 14). Because low D.O. is more predictive of fIBI or mIBI impairment, this relationship was examined in more detail by generating lists of low D.O. sensitive fish species and macroinvertebrate taxa.

High Dissolved Oxygen and Elevated pH

Biological impairment was not consistently associated with elevated D.O. or D.O. swings in this study. However, another mode of nutrient related stress may be related to elevated pH concentrations at or above the maximum pH water quality criterion of 9.0 S.U. Plots of maximum D.O. and 95th percentile maximum D.O. versus maximum pH based on continuous data (at least 15 days between July 15–September 30) are illustrated in Figure 15. As the maximum D.O. increases the probability of maximum pH values exceeding the Illinois standard of 9.0 S.U. also increases. For example, high pH can damage aquatic life directly by reducing the slime coating on fish or causing other physiological effects such as gill damage (EIFAC 1968). Indirect effects of high pH are increasing the toxic unionized fraction of total ammonia-N. Sites with elevated pH >9.0 were not

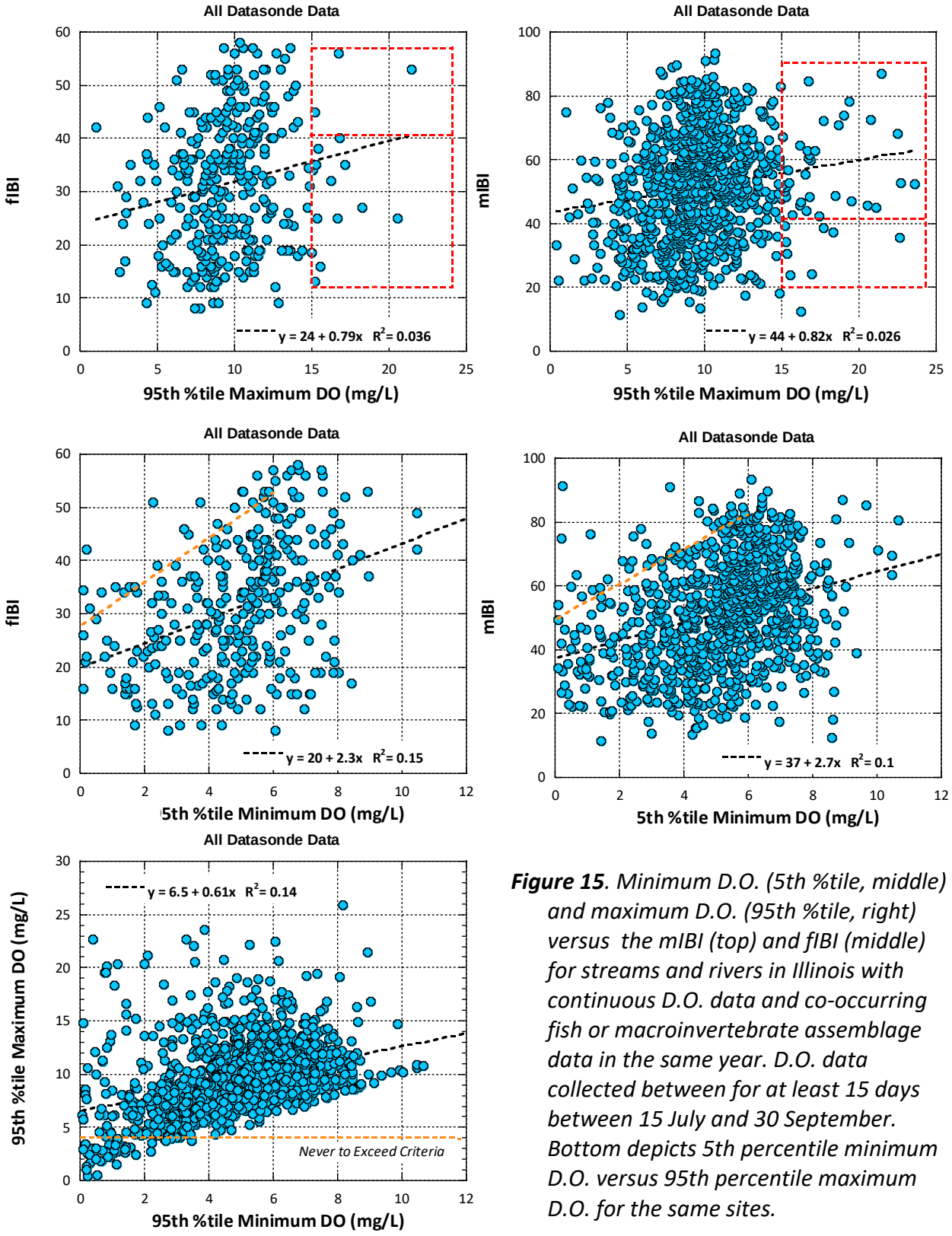

Figure 15. *Minimum D.O. (5th %tile, middle) and maximum D.O. (95th %tile, right) versus the mIBI (top) and fIBI (middle) for streams and rivers in Illinois with continuous D.O. data and co-occurring fish or macroinvertebrate assemblage data in the same year. D.O. data collected between for at least 15 days between 15 July and 30 September. Bottom depicts 5th percentile minimum D.O. versus 95th percentile maximum D.O. for the same sites.*

correlated with low QHEI or low fIBI scores (Appendix 5), thus poor habitat and poor biology are not necessarily related to maximum pH conditions within the range observed in this study.

While direct impacts of high pH are possible, its effect on intensifying other stressors is more common. An example is when enrichment results in increased diurnal fluctuations of pH spurred by increased algal activity, the more it can increase the toxic unionized fraction of total ammonia-N. The Illinois chronic standard for total ammonia-N is pH and temperature dependent. Where such data was available, the most stringent total ammonia-N standard occurred during July 15-September 30. Figure 16 illustrates the association between maximum pH values vs. the most stringent total ammonia-N standard based on temperature and pH. The distribution of mean total ammonia-N from grab samples were superimposed for sites with ammonia-N data. These data were paired across the index period of July 15-September 30. The results showed that the most stringent ammonia-N standard encompasses the interquartile range of ambient total ammonia-N values suggesting that high pH can foster increased chronic toxicity when these values co-occur. This would most likely occur downstream from municipal wastewater treatment effluents that discharge total ammonia-N.

Maximum D.O. as a proxy for adverse nutrient enrichment effects is not a strong predictor of biological impairment by itself. However, there are sites where high daytime D.O. can be a predictor of low nighttime D.O. and co-occurring factors (*e.g.,* total ammonia-N) that could potentially contribute to the impairment of aquatic life. According to U.S. EPA[4] "*. . . . As pH increases, unionized ammonia (NH_3), which is more toxic to aquatic life than the ionized form (NH4+), becomes the dominant form. At pH >9, the fraction of unionized ammonia is >100 times the fraction at pH = 7 (>90% of the total ammonia)*." In addition, ammonia toxicity can occur over relatively brief exposure times.

Sestonic and Benthic Chlorophyll Measures

Algal biomass, typically measured as chlorophyll a, has been proposed as an important variable for determining the level of eutrophication in streams and rivers. For wadeable streams, benthic chlorophyll a is generally considered to be the most appropriate measure of eutrophication with sestonic chlorophyll more appropriate in larger streams and rivers (NSAC 2018; Miltner 2010, 2018). Although the Illinois data set contained some data on benthic chlorophyll a at a subset of SONDE sites, the sample size was comparatively small (N = 73). Both sestonic and benthic chlorophyll a at SONDE sites were poorly correlated with the fIBI (Figure 17, left) and mIBI (Figure 18, left). The dataset was expanded to include sites not associated with SONDE data (Figure 17 and 18, right) or with measures of minimum or maximum D.O. (e.g., 5th percentile or 95th percentiles, Figure 19). Sestonic chlorophyll a and benthic chlorophyll a in NE Illinois were not well correlated with nutrients (nitrate-N, TP, TKN; Appendix 4). For both sestonic and benthic chlorophyll a, the lack of a meaningful relationship may be related to the restricted range of values in the chlorophyll a datasets. Figure 21 illustrates

[4] https://www.epa.gov/caddis-vol2/ph#high

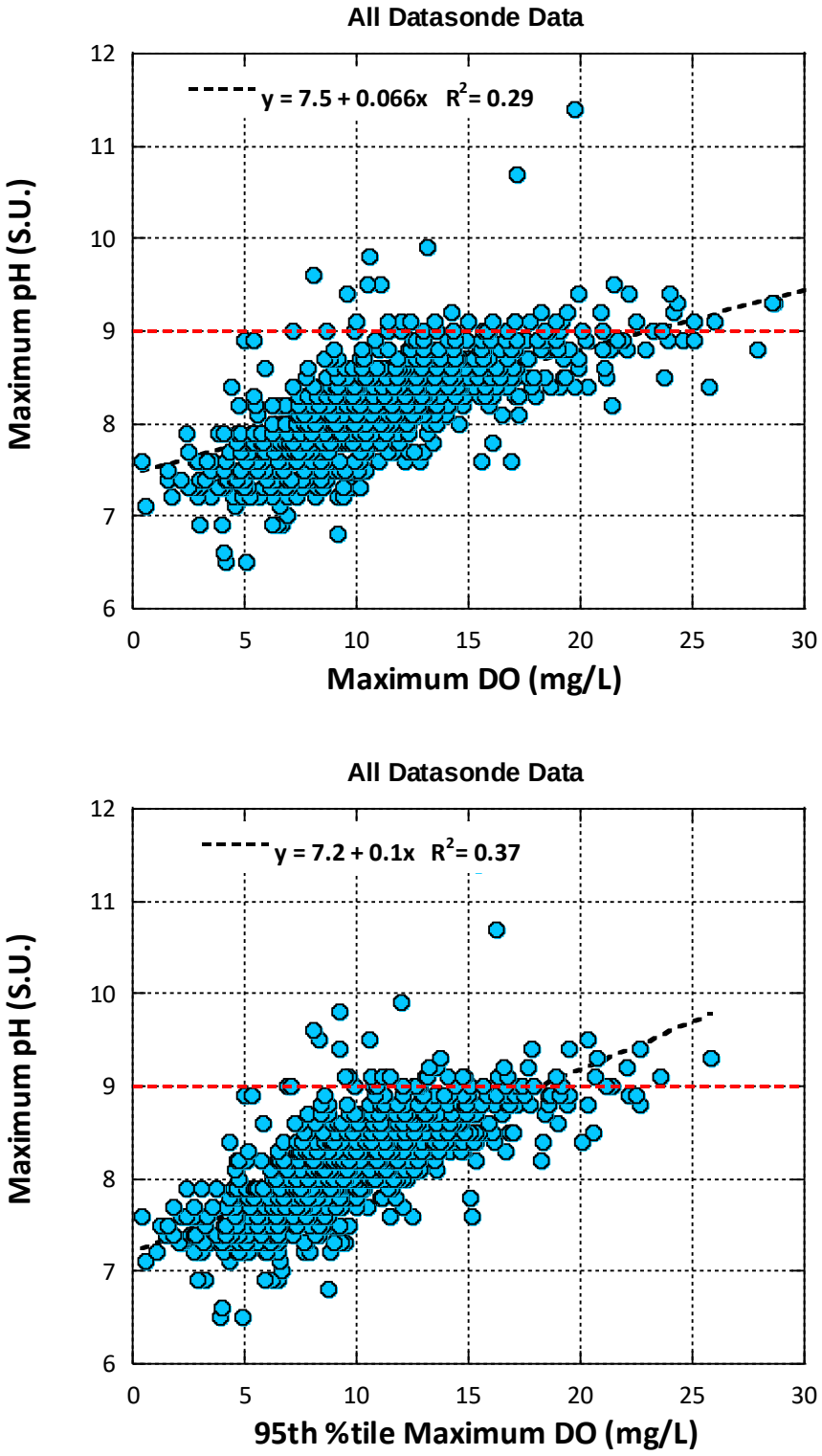

Figure 16*. Plot of the absolute maximum D.O. value versus maximum pH (bottom) and 95th percentile maximum D.O. value versus maximum pH (top) for sites in Illinois with continuous D.O. and pH data.*

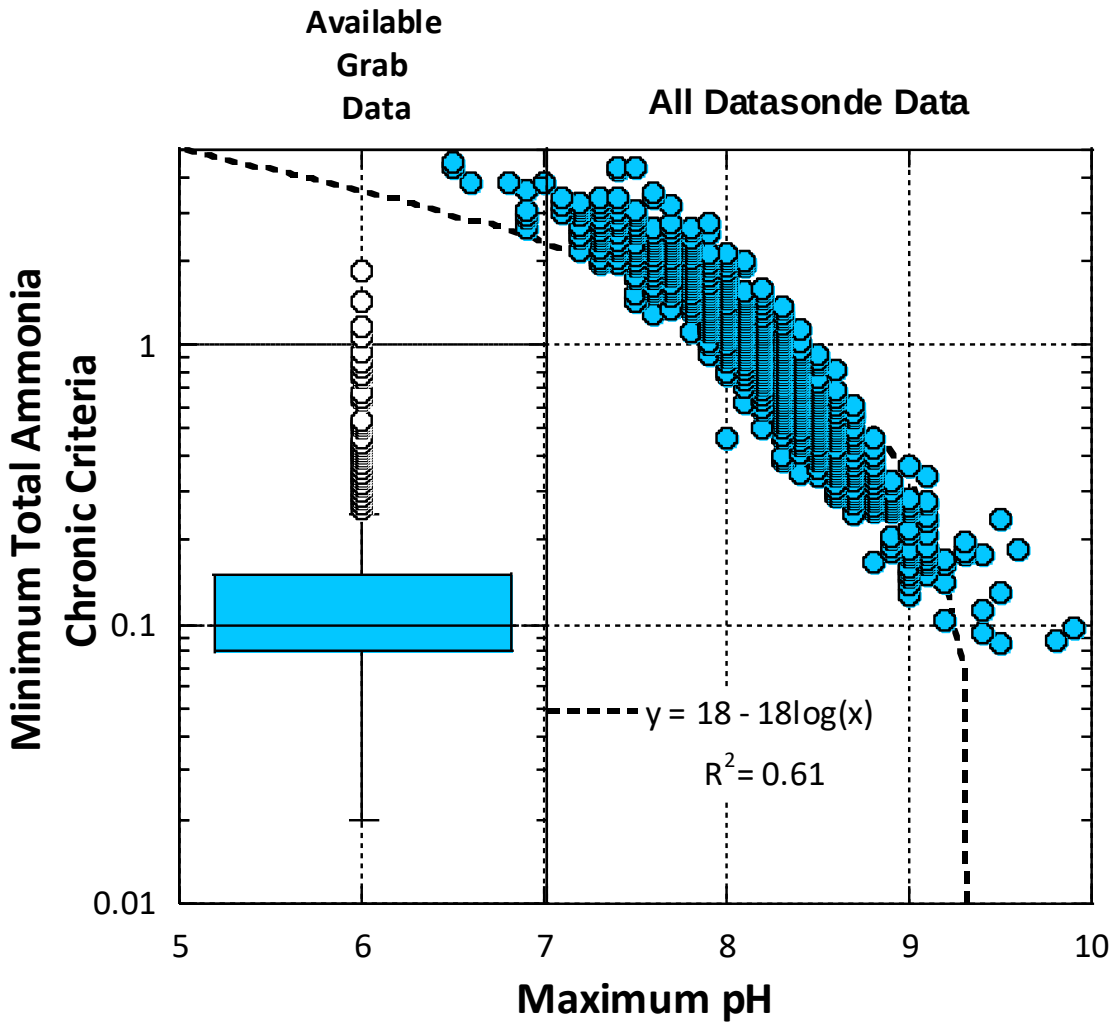

***Figure 17**. Plot of maximum pH vs the associated minimum total ammonia criteria (based on pH and temperature) for sites in Illinois with continuous data collected for at least 15 days between 15 July and 30 September. Superimposed is a box and whisker plot of available grab total ammonia data at a subset of these sites.*

probability plots of benthic and sestonic chlorophyll a with literature "problem" values of eutrophication levels of benthic or sestonic chlorophyll a noted. All of the benthic chlorophyll a measures in the dataset were <100 mg/m^2 (Figure 21). In Ohio, Miltner (2010) identified 106 mg/m^2 as a "protection" threshold for streams and rivers draining less than 500 sq. mi. and 182 mg/m^2 as a level associated with minimum D.O. values >4 mg/L. Welch et al. (1988) identified 100-150 mg/m^2 as a level generally considered to be excessive. For sestonic chlorophyll a, most sites (>95%) in our database had levels less than the 25 µg/L NSAC proposed threshold (Illinois NSAC 2018) and even fewer were >30 µg/L which is at the eutrophic/mesotrophic boundary of Van Nieuwenhuyse and Jones (1996) and Miltner (2018). Figueroa-Nieves et al. (2006) found that in nutrient-enriched agricultural areas of Illinois chlorophyll a seemed to be limited by turbidity despite having elevated ambient nutrient concentrations. Morgan et al. (2006), also in

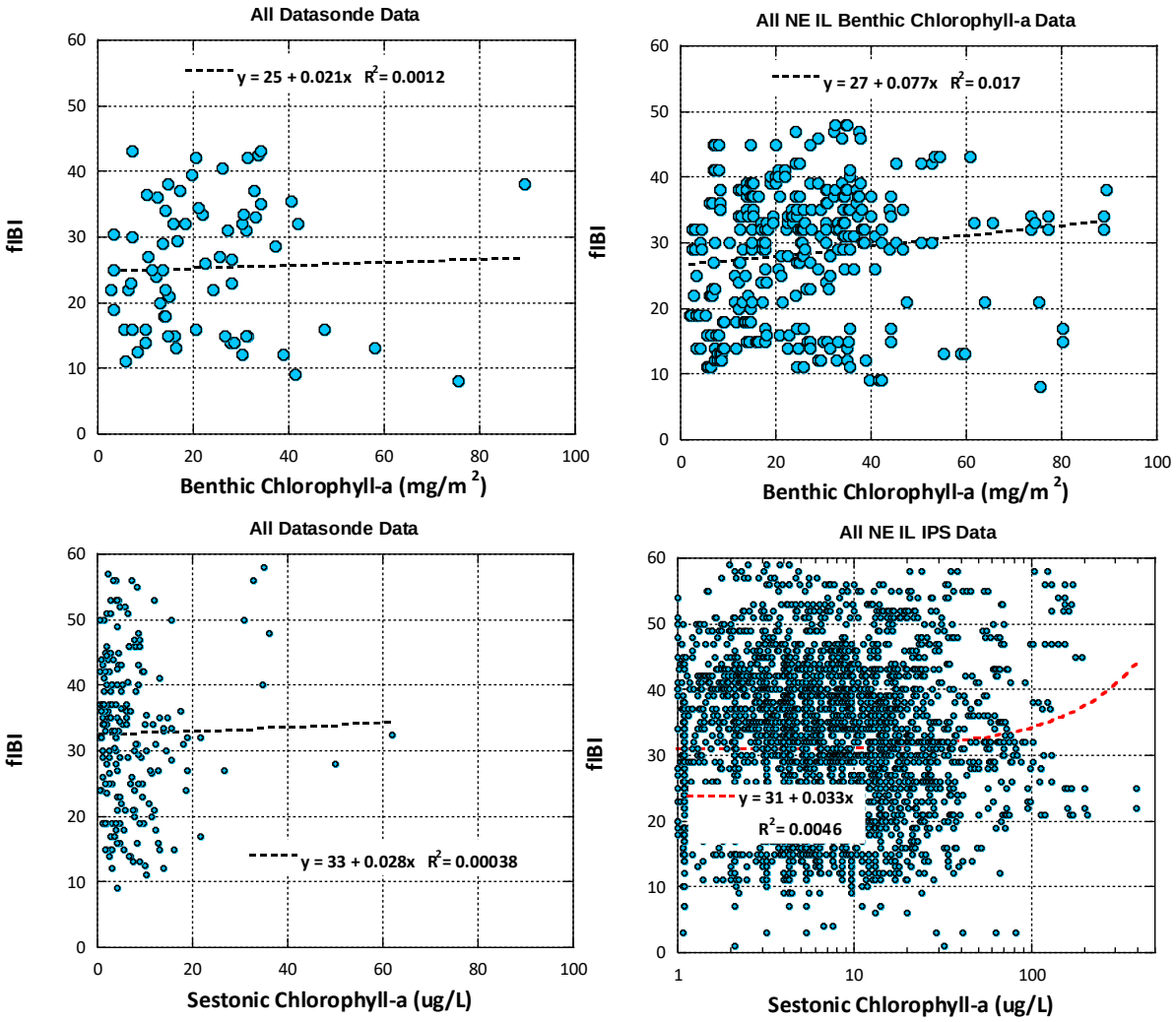

***Figure 18**. Plots of Sestonic Chlorophyll a (bottom) and benthic chlorophyll a (top) vs fIBI at sites with SONDE data (left) or all available data (right).*

a study of Illinois streams, found little association between nutrients and periphytic algal biomass and concluded that hydrology and light, rather than nutrient levels, explained benthic chlorophyll biomass and concluded that sestonic chlorophyll was also a poor indicator of eutrophication. The effect of habitat modification including riparian denudation and reduced shading as is obvious in many enriched streams in both urban and agricultural areas as can be observed in the photo in Figure 22.

Minimum D.O. Thresholds

The Illinois WQS provide the regulatory thresholds used to identify waters as being impaired by D.O. The thresholds derived using the NE Illinois IPS methodology are not WQS, but rather are used in a risk assessment approach relative to the effects of nutrients and organic enrichment in NE Illinois streams and rivers. The statewide Illinois dataset was used to derive the continuous D.O. thresholds in this study because insufficient continuous data across the full

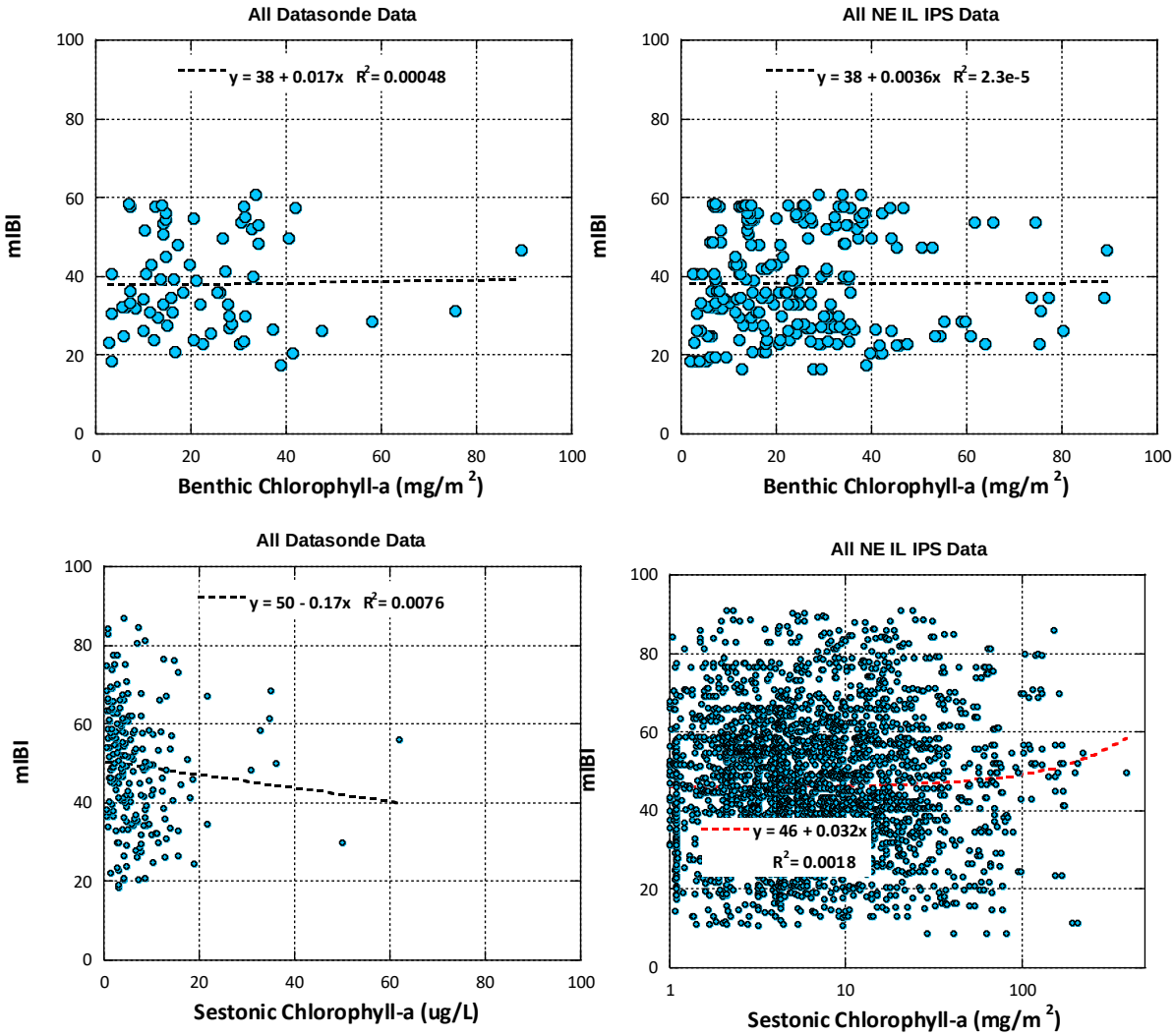

Figure 19*. Plots of Sestonic Chlorophyll a (bottom) and benthic chlorophyll a (top) vs mIBI at sites with SONDE data (left) or all available data (right).*

gradient of assemblage quality was not available for the NE Illinois IPS study area. D.O. is less likely to have strong regional patterns in comparison with other variables such as nutrients or habitat. The minimum D.O. thresholds were derived by using continuous data at sites attaining the fIBI or mIBI General Use thresholds for aquatic life that also had $\geq 25^{th}$ percentile of D.O. sensitive fish species or macroinvertebrate taxa. Sites that exceeded the D.O. threshold, but had attaining fIBI or mIBI scores were considered "threatened". These sites are also more likely to be missing some or all of the D.O. sensitive fish species or macroinvertebrate taxa. As described above, maximum D.O. and the diel D.O. swing were individually less reliable predictors of impaired aquatic life, thus thresholds were not derived. While these thresholds are used as a component of a risk assessment approach to identifying causes of impairment, they are not a replacement for the Illinois D.O. standards. To make the analyses of stressors more comparable, the 5^{th} percentile minimum D.O. values were placed on a consistent scale of 0.1 (best) to 10 (worst) with the General Use threshold assigned a rank of four (4) and the

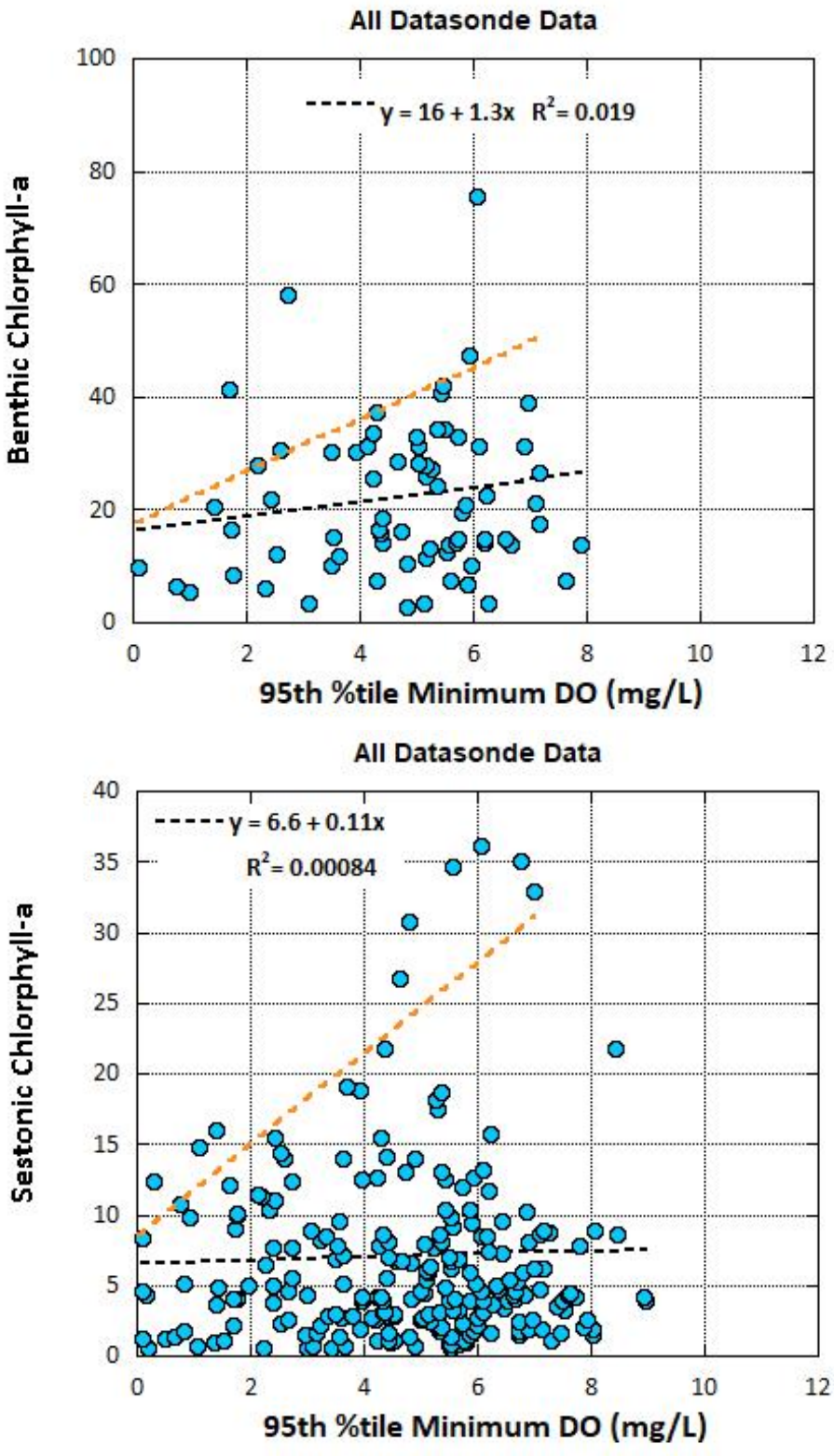

***Figure 20**. Plots of minimum D.O. (5th percentile) vs mean benthic chlorophyll a (mg/m^2) (top) and sestonic chlorophyll a (µg/L) (bottom) at sites with paired continuous D.O. data (collected at some period between 15 July and 30 September).*

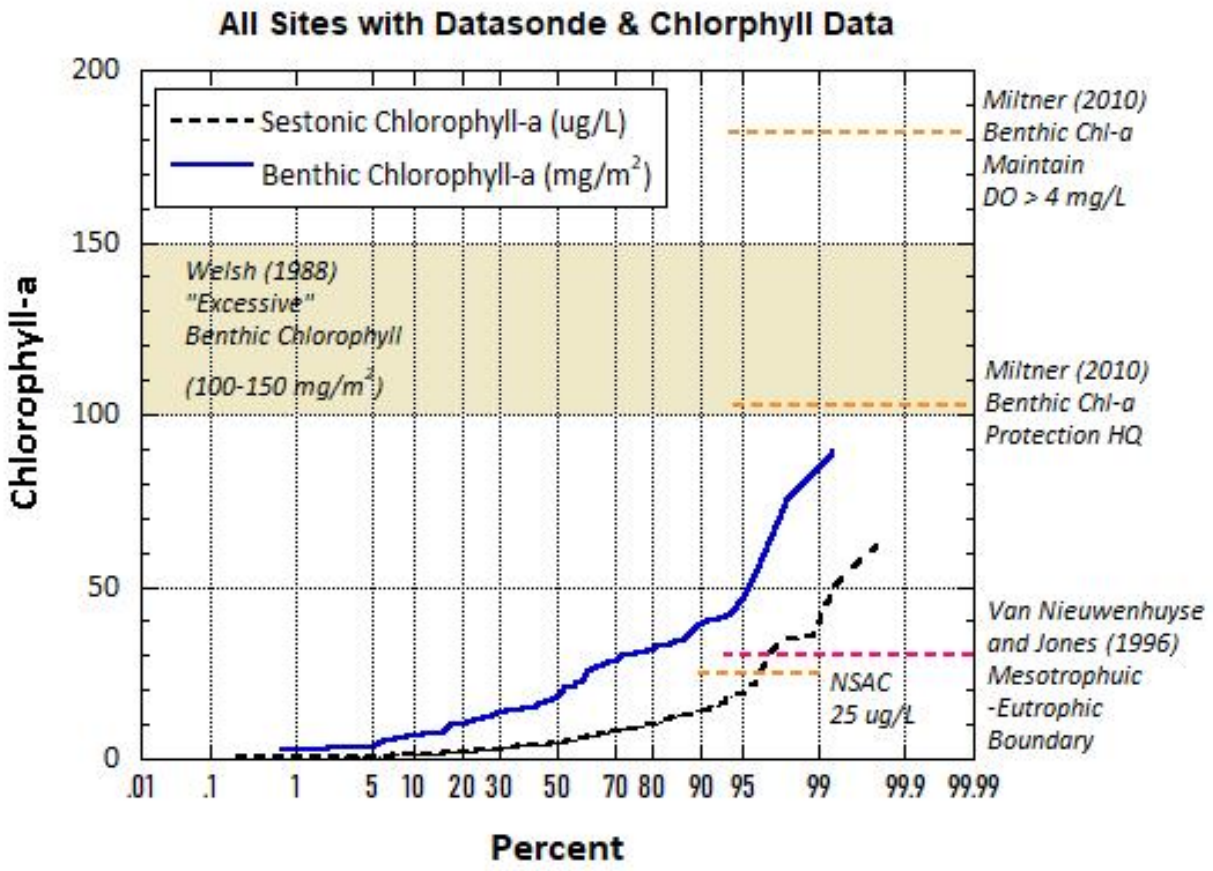

***Figure 21**. Probability plot of chlorophyll a (benthic, mg/m2 and sestonic (µg/L) at sites in Illinois paired with continuous D.O. data. Various reported thresholds are noted on plot.*

excellent threshold assigned a two (2). Values >4 were extrapolated to a 5th percentile minimum of zero and values at the upper end are extrapolated to the 99th percentile minimum D.O. which is assigned 0.1 (as well as any outliers above that value). Predicted 5th percentile minimum D.O. sensitive fish species or macroinvertebrate taxa were generated from these ranks and used to generate the goodness-of-fit (FIT) scores described previously. In all cases, except boatable sites for average D.O., the macroinvertebrate thresholds were the most limiting.

Northeast Illinois IPS Nutrient Ranking Index

The IPS Nutrient Ranking Index (NRI) is a multi-parameter index designed to identify nutrient impaired waters where the biological thresholds are not met or, if met, are considered threatened. The current version in the NE Illinois IPS (MBI 2023) relied on grab sample data to populate each of the chemical stressor parameters including D.O. which was limited to daytime grab samples. Continuous D.O. data were used in this study to obtain a more meaningful assessment of the effects of nutrients on D.O. as an improvement over the grab sample data based analyses. The NRI concept is that multiple indicators of nutrient-related stress should be more reliable than single nutrient parameters for identifying enrichment stressors associated with an aquatic life impairment or which pose a threat to full use support. The current NRI was

Figure 22*. Photograph of a highly modified urban stream (Middle Fork Chicago River at Illinois St. Rt. 22; upper) and an enriched and modified agricultural stream with nuisance algae in the unshaded portion of the stream channel (lower), Spring Creek which is a tributary to the DuPage R. at RM 17.8.*

developed by summing the ranking of each of the individual primary nutrient or nutrient-related parameters with each weighted based on their FIT coefficient (Table 2). The NRI equation follows:

Nutrient Ranking Index = (TPR*1) + (Min. DOR*1) + (TKNR*0.8) + (BODR*0.8) + (NITRR*0.8) + (Max. DOR*0.6):

Where; TPR = Total Phosphorus Rank
Min. DOR = Minimum Dissolved Oxygen Rank
TKNR = Total Kjeldahl Nitrogen Rank
BODR = Biochemical Oxygen Demand (5-day) Rank
NITRR = Nitrate-N Rank
Max. DOR = Maximum Dissolved Oxygen Rank

The NRI score is inverse to biological condition with increasing values related to increasingly degraded biota.

The NRI derived herein differs by replacing the minimum D.O. based on grab samples with the continuous D.O. using the minimum 5th percentile statistic and dropping the maximum D.O. component. Because it had a low (good) FIT score, the same weighting factor (x1) was used for the 5th percentile minimum D.O. This analysis is based on the statewide continuous D.O. dataset. Figure 23 illustrates the correlation between the NRI and the fIBI (top), and the mIBI (bottom). In these graphs the points were color coded to the strongest very poor or poor stressor rank for the stressors used in the NRI at that site. There is a strong threshold relationship between the revised NRI and the fIBI and mIBI (Figure 23). For the fish assemblage sites that scored above the General Use fIBI threshold of 41 also had an NRI <20 (Figure 23, top). For macroinvertebrates sites that scored above the General Use threshold of 41.8 had NRI values <25 and excellent mIBI scores had NRI scores <20 (Figure 23, bottom). An examination of primary causes located along the thresholds between the NRI and the fIBI and mIBI show that low D.O. and TP are the majority of the nutrient stressors that were ranked as poor or very poor (Figure 23). The influence of low D.O. on aquatic life is obvious. The TP values contributing to the NRI at very high values were in the poor (1.0 mg/L) or very poor (1.7 mg/L) ranges. If the most limiting nutrient cause was in the fair range (yellow points) the sites clustered below a NRI value of 20. Similarly, sites with no associated elevated nutrient stressors were, not surprisingly, associated with the lowest NRI scores and were more likely to meet the mIBI or fIBI General Use thresholds or better (Table 2). NRI values of >25 were most associated with fair, poor, or very poor fish and macroinvertebrate assemblages and values >20 were associated with fair, poor, or very poor fish assemblages (Figure 23).

Overlapping Stressors

Nutrients and D.O. related impacts rarely act alone to impair aquatic assemblages, particularly in watersheds where urban and suburban stormwater and agricultural nonpoint source impacts

(*e.g.,* chemical, altered flow, modified habitat) co-occur. Some of these factors, especially habitat, can have strong influences on the magnitude and mode of nutrient related impacts and can both moderate or exacerbate the effects of nutrients on aquatic life. In Illinois, Heatherly et al. (2007) found that streams with high quality habitats generally had lower nutrient concentrations, a finding similar to that from a statewide assessment in Ohio (Ohio EPA 1999). In both studies, using statewide data that has a significant agricultural footprint, sites with the highest quality habitat had lower total phosphorus concentrations. However, for the NE Illinois IPS sites that are largely urban also influenced included wastewater effluents, there was little correlation with habitat as it was likely masked by more dominant urban and wastewater stressors (Appendix 6). For example, streams with good natural base flows, well developed riffle and run features, good connection to floodplains,[5] and shading can all act to reduce the adverse effects of nutrient impacts through nutrient sequestration in good biota and by depressing algal growth and decay. In contrast, streams that have few or no areas of fast current, that lack well developed riffles and runs (*i.e.,* low reaeration), or that lack shading can foster increased algal growth and decay. Base flow in urban areas can rise or fall depending on the nature of land use changes (Bhaskar et al. 2016) and the influence of altered base flows can influence nutrient dynamics by either more rapidly exporting and diluting nutrient concentrations or by increasing retention time that fosters more rapid algal growth.

Random forest regression tree (RF) analyses for sites that had continuous D.O. data statewide was conducted. Some of these sites also had paired chemical and QHEI data. Only 136 of the 322 statewide sites had QHEI data, thus the need for two separate analyses. RF analyses were also conducted for the mIBI and fIBI as the response variable and for the number of minimum D.O. (5th percentile D.O.) sensitive fish species and macroinvertebrate taxa. For parameters

Table 2*. General use thresholds for fish and macroinvertebrates generated from statewide sites in Illinois with continuous D.O. data and fish or macroinvertebrate assemblage data. The most stringent General Use thresholds are highlighted in yellow.*

Stream Size	Group	Statistic	Samples	Excellent Threshold	General Use (Good) Threshold	Fair-Poor Threshold	Poor- Very Poor Threshold	25th %tile Sensitive Species or Taxa
Wadeable	Fish	5th %tile Min. D.O. (mg/L)	57	7.50	5.54	3.65	1.83	1.5
	Macros		437	6.81	5.06	3.34	1.67	2.0
	Fish	Minimum D.O. (mg/L)	60	7.13	4.94	3.26	1.62	2.0
	Macros		438	6.50	4.34	2.86	1.43	2.0
	Fish	Average D.O. (mg/L)	60	8.45	6.37	4.20	2.10	2.0
	Macros		438	8.51	6.29	4.15	2.07	2.0
Boatable	Fish	5th %tile Min. D.O. (mg/L)	11	6.75	5.90	3.90	1.95	1.3
	Macros		86	6.80	5.43	3.58	1.79	2.0
	Fish	Minimum D.O. (mg/L)	12	6.31	5.44	3.60	1.80	2.0
	Macros		86	6.58	5.00	3.30	1.65	2.0
	Fish	Average D.O. (mg/L)	12	8.73	6.34	4.19	2.09	2.0
	Macros		86	9.03	6.73	4.44	2.22	2.0

[5] https://nemallc.com/baseflow_channels_for_stormwater_sediment_and_nutrient_uptake.

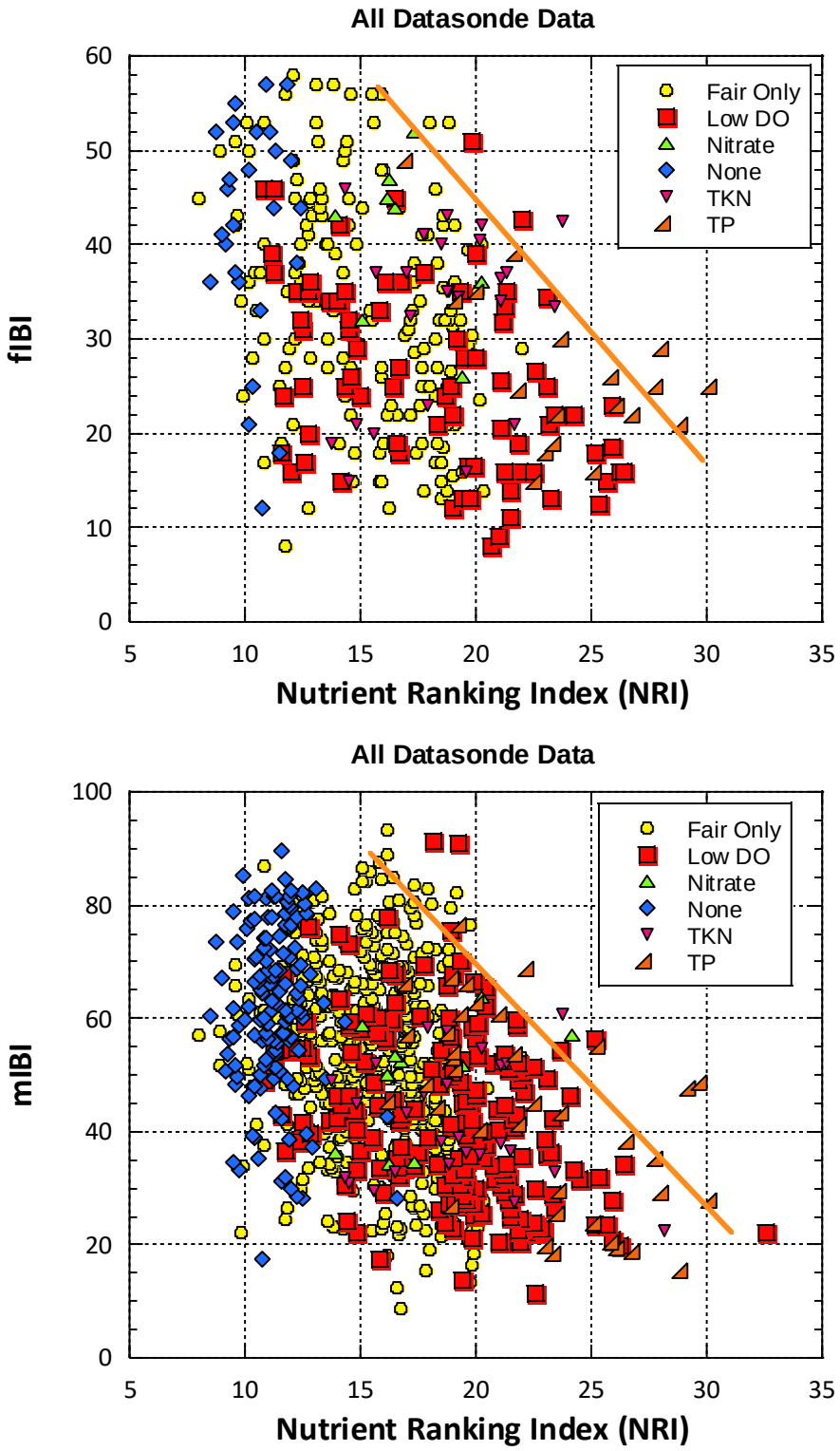

Figure 23*. Plots of the Nutrient Ranking Index (NRI) and the fIBI (top) and mIBI (bottom) for sites in Illinois with continuous D.O. data, grab nutrient parameters and co-occurring fish assemblage of macroinvertebrate data. Points are coded by the strongest very poor or poor stressor rank for the stressors used in the NRI at that site. Site with a fair ranking are coded with a yellow circle and with no fair or worse nutrient stressors as blue diamonds.*

with missing chemical or habitat data, the median for those parameters was substituted. The goal was not to create a predictive model, but rather to ascertain if independent variables other than low D.O. were important in explaining the variation in the dependent or response variables.

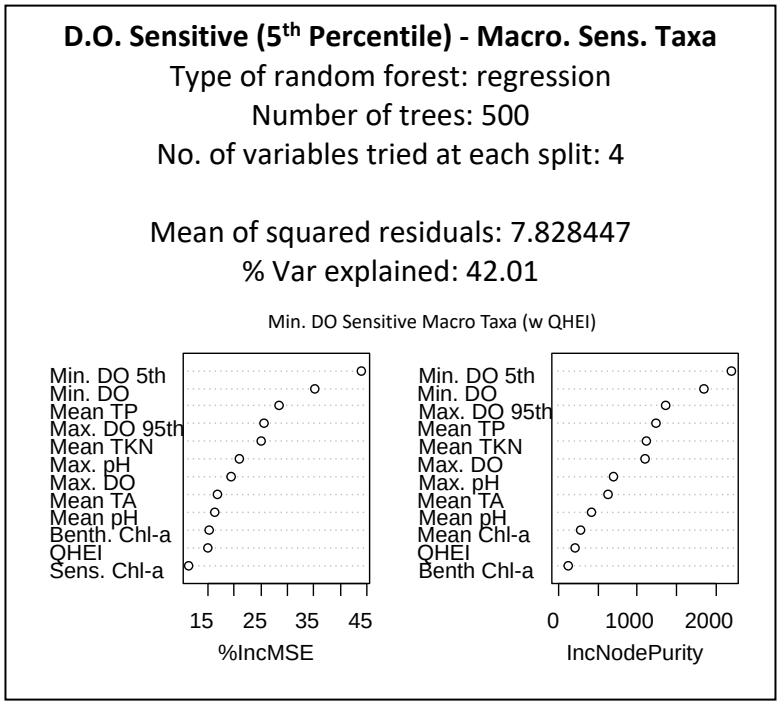

Figure 24*. Results of RF tree regression at Illinois sites with continuous D.O. data (between July 15-September 30). The response variable is the minimum D.O. sensitive macroinvertebrate taxa and stressor variables include grab sample chemical data and QHEI. Stressor variables with missing data were replaced with medians of all data.*

Macroinvertebrate Responses

The RF regression trees with all stressor variables explained 42% of the variation in the first response variable, which was the minimum 5th percentile D.O.-sensitive species (Figure 24). As expected, the most important stressor parameter (*i.e.,* greatest percent increase in MSE) used to derive this measure explained most of the variation in these taxa, which was the minimum D.O., based on the 5th percentile of continuous data. Other important explanatory variables included mean TP and mean TKN suggesting that organic and nutrient enrichment contributes to the variation these regression trees, but was a lesser contributor which may be due to missing data (replaced by the median QHEI where absent).

When the response variable was the mIBI the percent variation declined to 29.8% (Figure 25) with TKN the most explanatory variable. Multimetric indices as compared to the stressor-sensitive species are a composite of multiple metrics designed to respond to the expected range of stressors found across Illinois. Minimum D.O. variables are still an important variable. Compared to when the response variable was the minimum D.O. sensitive taxa, the QHEI was a more important stressor to the mIBI reflecting multiple metrics that are likely sensitive to habitat (*e.g.,* taxa richness metrics) in addition to D.O.

Because there was less QHEI data in the statewide database versus more numerous data in the NE Illinois IPS study area, the RF analyses were rerun with only sites that had QHEI data. As a result the total sites decreased from 874 to 178. The re-examination of the importance of stressor variables resulted in QHEI becoming the dominant stressor when the mIBI was the response variable (Figure 26). This matches the results from the NE IL IPS (MBI 2023) that consistently identified habitat as a dominant stressor. Organic enrichment stressors (TKN, TP,

Nitrate-N, Minimum D.O.) become even more important at the statewide scale. When the number of minimum D.O. sensitive macroinvertebrate taxa was the response variable, QHEI declined in importance.

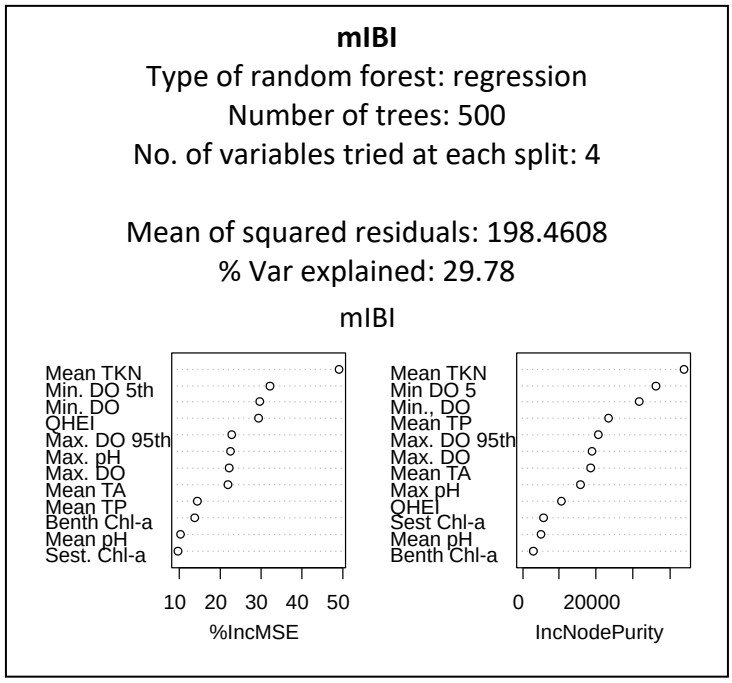

Figure 25*. Results of a RF tree regression with sites in Illinois with continuous D.O. data (between 15 July – 30 September). Response variable is the mIBI and stressor variables include chemical grab samples and QHEI. Stressor variables with missing data replaced with medians of all data.*

Fish Responses

The first fish RF regression tree explain 53% of the variation in the response variable which was the number of minimum D.O. sensitive fish species (Figure 27) using data for all sites. D.O. stressor metrics were the most important metrics (the response variable was constructed to measure this sensitivity), with QHEI, suspended sediments/turbidity and chlorophyll measures less important. As with the macroinvertebrate, we re-ran the RF analyses only using sites with actual QHEI data (Figures 28-29). The results were similar to the analyses with the macroinvertebrates. Where the fIBI was the response variable, an index designed to integrate multiple stressors, QHEI become the most dominant stressor and organic enrichment variables (e.g., TKN, Nitrate, D.O.) increased in importance (Figure 28). When the response stressor was the number of minimum D.O. sensitive fish species QHEI decreased substantially in importance and the minimum D.O. (5^{th} percentile) variable became the most important (Figure 29).

SUMMARY

Minimum D.O. as represented by the 5^{th} percentile value was the most explanatory of the D.O. variables examined in this study. Because of the lack of association between the maximum D.O. or maximum diel D.O. swing and the fIBI or mIBI, these statistics were not by themselves predictive of aquatic life impairment unless they were associated with low minimum D.O. values. As a result Weighted Stressor Values (WSVs) were not derived for either fish or macroinvertebrates.

Similarly, there was no significant correlation between chlorophyll a measures and the fIBI and mIBI. For benthic chlorophyll a, the lack of significant correlation may be the result of having generally low benthic chlorophyll a values compared to higher literature values that are considered as being excessive. This is consistent with other Illinois studies that found similarly

low benthic chlorophyll a measures than might be expected based on elevated nutrient concentrations. We generated minimum D.O. thresholds, represented by the 5th percentile D.O. statistic for fish and macroinvertebrates, such that it can be used for stressor identification purposes. This measure was also incorporated into a modification of the Nutrient Ranking Index (NRI) that was previously designed to help identify when nutrients are likely to impair aquatic life. The identification of nutrients as major causes of aquatic life impairment can be complex particularly in urbanized watersheds. For example, recent research has identified salinization as having an influence on nutrient availability in urban watersheds (Haq et al. 2018). Stream geomorphology and physical habitat quality can also influence the dynamics about how nutrients affect D.O. and aquatic life. In this study, QHEI and several of its metrics showed threshold relationships with minimum D.O. that limited those concentrations at degraded sites. Other studies have shown that hyporheic transport and processing of nutrients is important, thus reconnecting to the hyporheic zone should be a consideration for physical stream restoration (Gies 2022).

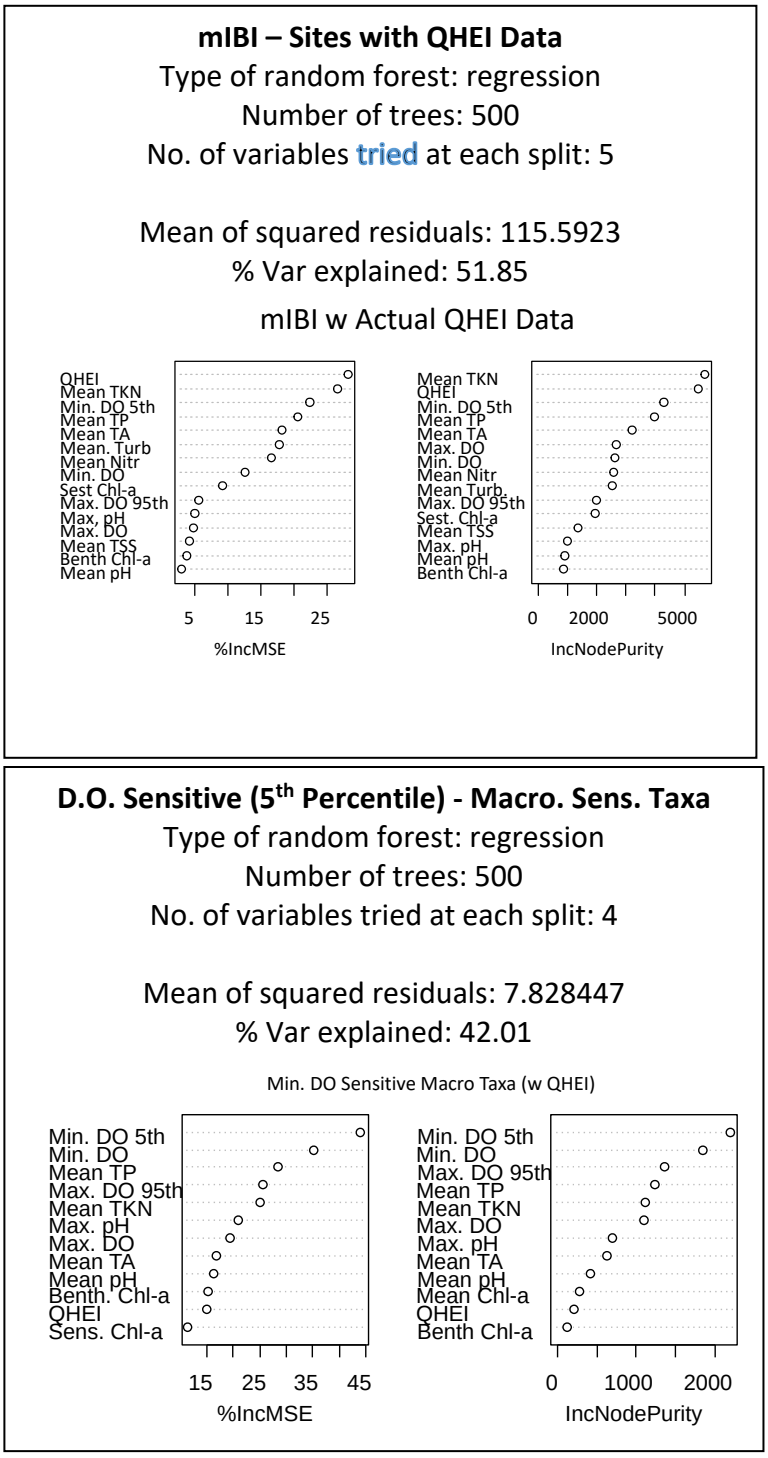

Figure 26*. Results of a RF tree regression with sites in Illinois with continuous D.O. data (between July 15 –September 30). In the upper panel the response variable is the mIBI and stressor variables include grab chemical data and sites were limited to those with QHEIs. Other stressor variables with missing data were replaced with medians of all data. In the lower panel the response variable is the number of min. D.O. sensitive macroinvertebrate taxa and stressor variables include grab chemical data and sites were limited to those with QHEI. Other stressor variables with missing data were replaced with medians of all data.*

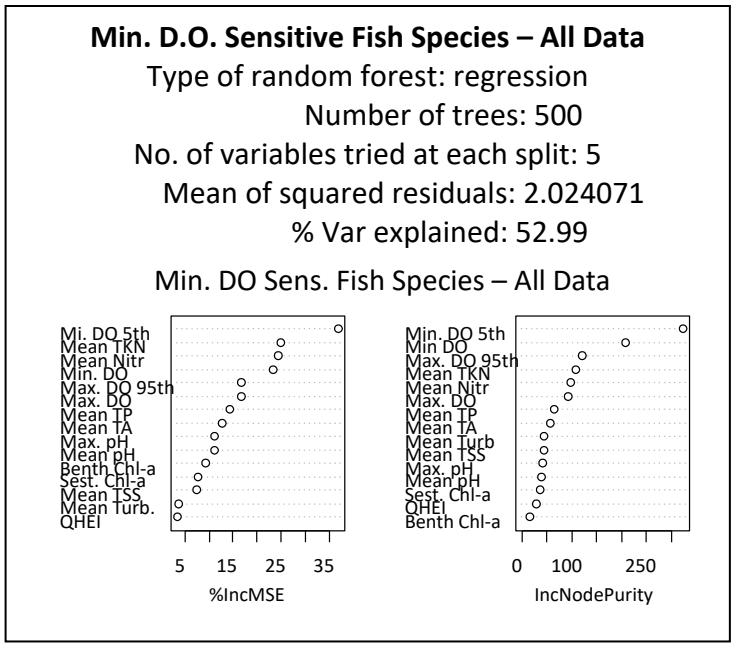

Figure 27*. Results of a RF tree regression with sites in Illinois with continuous D.O. data (between 15 July – 30 September). Response variable is the minimum D.O. sensitive fish species and stressor variables include chemical grab samples and QHEI. Stressor variables with missing data replaced with medians of all data.*

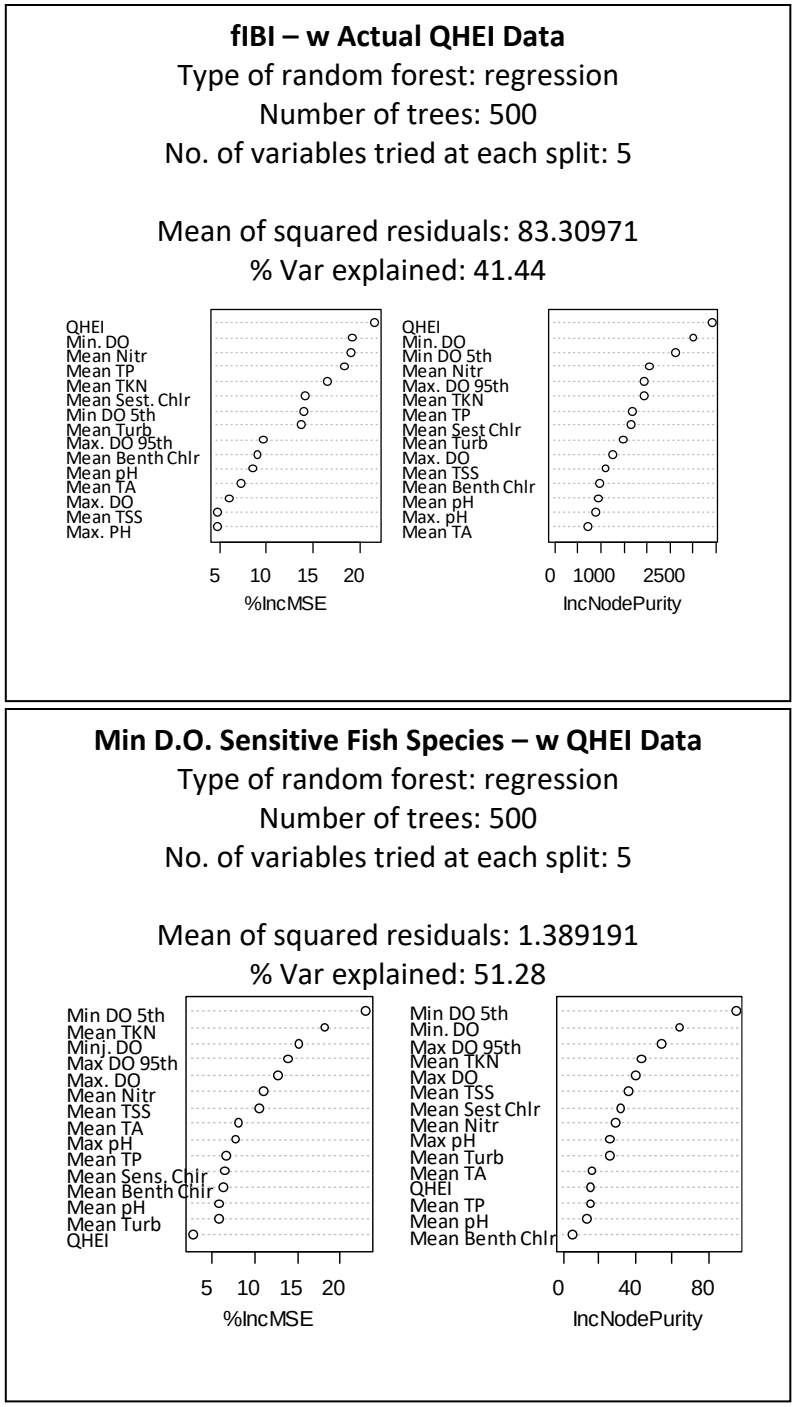

Figure 28*. Results of RF tree regression with sites in Illinois with continuous D.O. data (between July 15 – September 30). Upper: Response variable is the fIBI and stressor variables include chemical grab samples and sites were limited to those with actual QHEIs. Other stressor variables with missing data replaced with medians of all data. Lower: Response variable is the number of minimum D.O. sensitive fish species and stressor variables include chemical grab samples and sites were limited to those with actual QHEIs. Other stressor variables with missing data replaced with medians of all data.*

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Appendix 1. List of continuous D.O. stations used in this study with summary statistics.

(Available from DRSCW on request; contact smccracken@theconservationfoundation.org)

Appendix 2. Weighted Stressor Values (WSVs) for 5th percentile dissolved oxygen for fish species.

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
43	079	SILVER CARP	*Hypophthalmichthys molitrix*	Mindo5th	Boatable	13	4.26	5.31	6.18	3.62	3.62	3.72	6.24	6.70	6.70
80	003	YELLOW PERCH	*Perca flavescens*	Mindo5th	Boatable	16	4.52	4.83	5.47	0.18	0.66	5.04	5.77	5.87	6.01
43	041	BULLHEAD MINNOW	*Pimephales vigilax*	Mindo5th	Boatable	21	4.52	4.86	5.57	2.27	2.27	3.62	6.24	6.71	6.73
43	002	GOLDFISH	*Carassius auratus*	Mindo5th	Boatable	6	4.54	4.23	4.91	0.18	0.61	4.44	5.47	5.47	5.47
77	001	WHITE CRAPPIE	*Pomoxis annularis*	Mindo5th	Boatable	6	4.62	5.16	5.36	3.62	3.62	3.62	6.46	6.55	6.56
70	001	BROOK SILVERSIDE	*Labidesthes sicculus*	Mindo5th	Boatable	6	4.63	4.31	3.72	3.62	3.62	3.62	5.60	5.60	5.60
77	010	ORANGESPOTTED SUNFISH	*Lepomis humilis*	Mindo5th	Boatable	21	4.70	4.45	4.83	1.33	2.27	3.62	5.57	6.56	6.76
15	001	BOWFIN	*Amia calva*	Mindo5th	Boatable	6	4.71	4.71	4.90	3.62	3.62	3.62	5.60	5.60	5.60
37	001	REDFIN PICKEREL	*Esox americanus vermiculatus*	Mindo5th	Boatable	15	5.04	5.40	6.01	2.27	2.27	5.34	6.69	6.73	6.73
20	003	GIZZARD SHAD	*Dorosoma cepedianum*	Mindo5th	Boatable	37	5.20	5.62	5.57	3.62	3.72	5.25	6.24	7.87	8.67
43	032	SPOTFIN SHINER	*Cyprinella spiloptera*	Mindo5th	Boatable	50	5.28	5.53	5.65	2.27	3.72	5.16	6.46	6.73	6.76
77	006	LARGEMOUTH BASS	*Micropterus salmoides*	Mindo5th	Boatable	67	5.31	5.50	5.74	2.27	3.86	5.33	6.38	6.70	6.73
77	009	BLUEGILL SUNFISH	*Lepomis macrochirus*	Mindo5th	Boatable	67	5.32	5.53	5.74	2.27	3.64	5.20	6.38	6.73	8.16
54	002	BLACKSTRIPE TOPMINNOW	*Fundulus notatus*	Mindo5th	Boatable	40	5.34	5.30	5.57	1.90	4.23	5.25	5.87	6.42	6.46
77	002	BLACK CRAPPIE	*Pomoxis nigromaculatus*	Mindo5th	Boatable	27	5.41	5.10	5.47	0.18	4.51	5.16	5.70	6.03	6.46
80	001	SAUGER	*Sander canadensis*	Mindo5th	Boatable	13	5.42	5.25	5.54	3.62	3.62	3.72	6.18	6.70	6.70
47	006	BLACK BULLHEAD	*Ameiurus melas*	Mindo5th	Boatable	5	5.45	5.45	5.37	4.99	4.99	5.26	5.62	6.07	6.07
43	045	COMMON CARP X GOLDFISH	*HYBRID*	Mindo5th	Boatable	9	5.45	5.52	5.57	2.27	3.42	5.39	6.53	6.75	6.76
77	013	PUMPKINSEED SUNFISH	*Lepomis gibbosus*	Mindo5th	Boatable	25	5.46	5.16	5.54	0.18	4.44	5.13	5.86	6.07	6.46
10	004	LONGNOSE GAR	*Lepisosteus osseus*	Mindo5th	Boatable	9	5.48	5.84	6.07	4.44	4.68	5.27	6.36	6.70	6.70
47	013	TADPOLE MADTOM	*Noturus gyrinus*	Mindo5th	Boatable	16	5.50	5.53	5.67	1.62	5.00	5.32	6.58	6.75	6.76
80	005	BLACKSIDE DARTER	*Percina maculata*	Mindo5th	Boatable	37	5.51	5.45	5.73	2.74	3.86	5.13	5.92	6.53	6.73
43	001	COMMON CARP	*Cyprinus carpio*	Mindo5th	Boatable	75	5.54	5.52	5.73	2.27	3.62	5.20	6.42	6.73	8.16
43	028	SPOTTAIL SHINER	*Notropis hudsonius*	Mindo5th	Boatable	12	5.54	5.37	5.48	4.85	4.94	5.02	5.54	5.80	5.80
40	018	SPOTTED SUCKER	*Minytrema melanops*	Mindo5th	Boatable	20	5.60	5.52	5.49	4.99	5.02	5.16	5.83	5.97	6.07
80	014	JOHNNY DARTER	*Etheostoma nigrum*	Mindo5th	Boatable	34	5.61	5.65	5.79	2.78	4.97	5.47	6.18	6.73	6.75
43	004	HORNYHEAD CHUB	*Nocomis biguttatus*	Mindo5th	Boatable	39	5.63	5.57	5.79	2.27	4.89	5.40	6.36	6.70	6.73
80	011	LOGPERCH	*Percina caprodes*	Mindo5th	Boatable	16	5.63	5.60	5.64	5.01	5.05	5.32	5.80	6.20	6.24
80	011	LOGPERCH	*Percina caprodes*	Mindo5th	Boatable	16	5.63	5.60	5.64	5.01	5.05	5.32	5.80	6.20	6.24
77	008	GREEN SUNFISH	*Lepomis cyanellus*	Mindo5th	Boatable	60	5.63	5.54	5.74	2.27	4.08	5.33	6.24	6.73	6.76
10	002	SHORTNOSE GAR	*Lepisosteus platostomus*	Mindo5th	Boatable	9	5.64	5.50	6.18	3.62	3.62	5.11	6.24	6.24	6.24
40	016	WHITE SUCKER	*Catostomus commersoni*	Mindo5th	Boatable	53	5.65	5.77	5.80	2.65	4.99	5.38	6.43	6.81	6.99
47	004	YELLOW BULLHEAD	*Ameiurus natalis*	Mindo5th	Boatable	39	5.67	5.53	5.73	4.61	4.99	5.34	5.87	6.42	6.62

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
43	003	GOLDEN SHINER	*Notemigonus crysoleucas*	Mindo5th	Boatable	15	5.69	5.52	5.49	4.87	4.99	5.34	5.80	5.87	6.02
37	003	NORTHERN PIKE	*Esox lucius*	Mindo5th	Boatable	21	5.71	5.63	5.73	4.92	5.02	5.47	5.86	6.07	6.29
43	042	FATHEAD MINNOW	*Pimephales promelas*	Mindo5th	Boatable	5	5.75	5.68	5.86	5.16	5.16	5.30	5.95	6.18	6.18
77	003	ROCK BASS	*Ambloplites rupestris*	Mindo5th	Boatable	50	5.77	5.79	5.79	4.83	5.02	5.47	6.24	6.57	6.73
47	002	CHANNEL CATFISH	*Ictalurus punctatus*	Mindo5th	Boatable	63	5.83	5.56	5.60	2.27	3.62	5.33	6.42	6.76	7.67
40	002	BIGMOUTH BUFFALO	*Ictiobus cyprinellus*	Mindo5th	Boatable	8	5.85	5.88	5.80	5.57	5.57	5.59	6.24	6.24	6.24
77	011	LONGEAR SUNFISH	*Lepomis megalotis*	Mindo5th	Boatable	32	5.93	5.24	5.98	2.27	2.27	3.72	6.42	6.71	6.73
40	008	SILVER REDHORSE	*Moxostoma anisurum*	Mindo5th	Boatable	21	5.94	6.10	6.24	2.27	2.27	6.14	6.73	8.94	8.94
74	001	WHITE BASS	*Morone chrysops*	Mindo5th	Boatable	13	6.08	6.24	6.24	4.61	5.37	6.04	6.70	6.99	6.99
43	043	BLUNTNOSE MINNOW	*Pimephales notatus*	Mindo5th	Boatable	69	6.08	5.87	5.86	2.27	4.99	5.47	6.57	6.76	7.09
47	008	STONECAT MADTOM	*Noturus flavus*	Mindo5th	Boatable	24	6.11	6.18	5.83	5.12	5.44	5.64	6.42	6.92	8.94
47	007	FLATHEAD CATFISH	*Pylodictis olivaris*	Mindo5th	Boatable	13	6.14	6.02	5.57	3.62	3.62	3.72	7.31	8.94	8.94
40	003	BLACK BUFFALO	*Ictiobus niger*	Mindo5th	Boatable	13	6.18	6.16	6.24	3.62	3.62	5.57	6.70	8.94	8.94
77	004	SMALLMOUTH BASS	*Micropterus dolomieui*	Mindo5th	Boatable	61	6.26	5.92	6.07	2.27	4.99	5.47	6.57	7.46	8.94
40	010	GOLDEN REDHORSE	*Moxostoma erythrurum*	Mindo5th	Boatable	43	6.28	6.32	6.42	2.27	5.52	6.05	6.73	8.16	8.94
43	044	CENTRAL STONEROLLER	*Campostoma anomalum*	Mindo5th	Boatable	21	6.28	5.96	6.42	2.27	4.25	5.79	6.74	6.99	6.99
40	015	NORTHERN HOG SUCKER	*Hypentelium nigricans*	Mindo5th	Boatable	35	6.31	6.11	6.42	2.27	2.27	5.90	6.70	6.99	8.94
43	025	STRIPED SHINER	*Luxilus chrysocephalus*	Mindo5th	Boatable	21	6.33	6.32	6.42	2.27	4.14	5.73	6.99	8.94	8.94
80	016	BANDED DARTER	*Etheostoma zonale*	Mindo5th	Boatable	12	6.34	6.85	6.24	5.79	5.79	5.99	7.76	8.94	8.94
40	004	SMALLMOUTH BUFFALO	*Ictiobus bubalus*	Mindo5th	Boatable	24	6.37	6.08	6.21	3.62	3.71	5.57	6.70	8.94	8.94
43	013	CREEK CHUB	*Semotilus atromaculatus*	Mindo5th	Boatable	19	6.40	6.37	6.46	2.27	3.68	5.87	6.93	8.94	8.94
43	034	SAND SHINER	*Notropis stramineus*	Mindo5th	Boatable	58	6.41	6.04	6.18	2.27	5.04	5.57	6.73	6.99	8.63
40	007	HIGHFIN CARPSUCKER	*Carpiodes velifer*	Mindo5th	Boatable	9	6.42	6.72	6.24	6.18	6.18	6.18	6.98	8.16	8.16
40	009	BLACK REDHORSE	*Moxostoma duquesnei*	Mindo5th	Boatable	9	6.53	6.45	6.42	6.18	6.18	6.23	6.56	6.99	6.99
40	005	QUILLBACK CARPSUCKER	*Carpiodes cyprinus*	Mindo5th	Boatable	35	6.59	6.25	6.42	2.61	3.62	5.86	6.75	8.16	8.94
43	047	GRASS CARP	*Ctenopharyngodon idella*	Mindo5th	Boatable	10	6.60	6.91	6.70	6.24	6.24	6.24	6.99	8.16	8.16
43	015	SUCKERMOUTH MINNOW	*Phenacobius mirabilis*	Mindo5th	Boatable	14	6.63	5.57	6.64	2.27	2.27	3.62	6.73	6.76	6.76
80	007	SLENDERHEAD DARTER	*Percina phoxocephala*	Mindo5th	Boatable	19	6.64	6.05	6.58	2.27	2.27	5.89	6.73	8.07	8.94
40	011	SHORTHEAD REDHORSE	*Moxostoma macrolepidotum*	Mindo5th	Boatable	36	6.70	6.33	6.44	2.27	5.40	6.18	6.75	8.16	8.94
85	001	FRESHWATER DRUM	*Aplodinotus grunniens*	Mindo5th	Boatable	29	6.78	6.35	6.42	3.62	3.72	6.04	6.82	8.63	8.94
43	033	BIGMOUTH SHINER	*Notropis dorsalis*	Mindo5th	Boatable	12	6.90	6.73	6.73	4.90	5.29	6.64	6.99	8.16	8.16
80	002	WALLEYE	*Sander vitreus*	Mindo5th	Boatable	12	7.11	6.71	6.72	5.57	5.57	6.32	6.76	8.16	8.16
80	023	ORANGETHROAT DARTER	*Etheostoma spectabile*	Mindo5th	Boatable	12	7.17	6.99	6.42	5.79	5.79	6.21	7.97	8.94	8.94

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
43	020	EMERALD SHINER	*Notropis atherinoides*	Mindo5th	Boatable	17	7.32	6.38	6.24	3.72	4.21	6.18	6.70	8.16	8.16
43	022	ROSYFACE SHINER	*Notropis rubellus*	Mindo5th	Boatable	14	7.55	6.86	6.57	5.02	5.69	6.18	6.99	8.94	8.94
43	006	SILVER CHUB	*Macrhybopsis storeriana*	Mindo5th	Boatable	5	7.74	7.60	8.16	6.76	6.76	6.76	8.16	8.16	8.16
43	023	REDFIN SHINER	*Lythrurus umbratilis*	Mindo5th	Boatable	13	7.93	5.80	5.79	2.27	2.27	4.74	7.05	8.94	8.94
37	001	REDFIN PICKEREL	*Esox americanus vermiculatus*	P299mean	Boatable	15	5.53	6.61	7.66	1.66	1.66	5.75	8.94	9.36	10.06
43	041	BULLHEAD MINNOW	*Pimephales vigilax*	P299mean	Boatable	21	5.57	5.63	5.98	1.66	1.66	5.25	6.71	8.08	8.71
43	045	COMMON CARP X GOLDFISH	*HYBRID*	P299mean	Boatable	9	5.62	6.03	5.85	1.66	3.17	5.42	7.04	8.59	9.22
43	079	SILVER CARP	*Hypophthalmichthys molitrix*	P299mean	Boatable	13	5.66	6.53	6.31	5.25	5.25	5.98	6.71	8.71	8.71
43	028	SPOTTAIL SHINER	*Notropis hudsonius*	P299mean	Boatable	12	5.72	6.05	5.56	5.16	5.16	5.42	5.85	8.74	8.74
43	003	GOLDEN SHINER	*Notemigonus crysoleucas*	P299mean	Boatable	15	5.96	6.18	5.85	5.22	5.42	5.48	6.35	8.13	8.59
43	002	GOLDFISH	*Carassius auratus*	P299mean	Boatable	6	5.97	6.16	5.44	5.16	5.18	5.42	6.96	8.37	8.53
43	042	FATHEAD MINNOW	*Pimephales promelas*	P299mean	Boatable	5	6.02	6.22	6.24	5.73	5.73	5.92	6.51	6.70	6.70
80	014	JOHNNY DARTER	*Etheostoma nigrum*	P299mean	Boatable	34	6.07	6.26	6.24	2.36	5.40	5.74	6.73	7.77	9.12
40	018	SPOTTED SUCKER	*Minytrema melanops*	P299mean	Boatable	20	6.09	5.91	5.85	5.16	5.29	5.56	6.31	6.44	6.57
70	001	BROOK SILVERSIDE	*Labidesthes sicculus*	P299mean	Boatable	6	6.12	6.01	6.31	5.25	5.25	5.25	6.45	6.45	6.45
80	005	BLACKSIDE DARTER	*Percina maculata*	P299mean	Boatable	37	6.12	6.30	6.09	2.89	5.18	5.53	6.73	8.74	9.26
77	010	ORANGESPOTTED SUNFISH	*Lepomis humilis*	P299mean	Boatable	21	6.22	6.01	5.79	1.66	1.66	5.38	6.87	9.26	9.63
43	032	SPOTFIN SHINER	*Cyprinella spiloptera*	P299mean	Boatable	50	6.25	6.66	6.31	1.66	5.29	5.74	7.66	9.72	10.89
37	003	NORTHERN PIKE	*Esox lucius*	P299mean	Boatable	21	6.29	6.30	6.07	5.30	5.42	5.69	6.39	7.52	9.71
80	001	SAUGER	*Sander canadensis*	P299mean	Boatable	13	6.30	6.46	5.98	5.17	5.23	5.61	6.91	8.72	8.74
10	002	SHORTNOSE GAR	*Lepisosteus platostomus*	P299mean	Boatable	9	6.35	6.17	6.45	5.25	5.25	5.80	6.71	6.71	6.71
77	013	PUMPKINSEED SUNFISH	*Lepomis gibbosus*	P299mean	Boatable	25	6.35	6.82	6.24	5.16	5.42	5.69	8.53	9.22	9.43
80	003	YELLOW PERCH	*Perca flavescens*	P299mean	Boatable	16	6.47	6.44	6.16	5.24	5.42	5.74	6.44	8.53	8.68
47	006	BLACK BULLHEAD	*Ameiurus melas*	P299mean	Boatable	5	6.56	6.56	5.73	5.16	5.16	5.36	7.31	10.08	10.08
80	011	LOGPERCH	*Percina caprodes*	P299mean	Boatable	16	6.56	6.41	6.15	5.28	5.56	5.79	6.71	8.54	8.74
80	011	LOGPERCH	*Percina caprodes*	P299mean	Boatable	16	6.56	6.41	6.15	5.28	5.56	5.79	6.71	8.54	8.74
10	004	LONGNOSE GAR	*Lepisosteus osseus*	P299mean	Boatable	9	6.59	6.83	6.71	5.73	5.74	5.82	7.40	8.71	8.71
43	044	CENTRAL STONEROLLER	*Campostoma anomalum*	P299mean	Boatable	21	6.59	6.72	6.84	1.66	4.14	6.17	7.81	8.66	9.26
40	002	BIGMOUTH BUFFALO	*Ictiobus cyprinellus*	P299mean	Boatable	8	6.63	6.75	6.58	5.79	5.79	6.12	6.71	8.57	9.36
43	004	HORNYHEAD CHUB	*Nocomis biguttatus*	P299mean	Boatable	39	6.64	6.67	6.24	1.66	5.16	5.75	8.45	9.26	10.20
77	008	GREEN SUNFISH	*Lepomis cyanellus*	P299mean	Boatable	60	6.72	6.95	6.57	5.16	5.44	5.82	8.13	9.26	10.04
77	002	BLACK CRAPPIE	*Pomoxis nigromaculatus*	P299mean	Boatable	27	6.73	6.90	6.44	5.16	5.42	5.60	8.43	9.12	9.30
47	013	TADPOLE MADTOM	*Noturus gyrinus*	P299mean	Boatable	16	6.74	6.80	6.45	5.28	5.56	5.92	7.68	8.71	9.06

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
15	001	BOWFIN	*Amia calva*	P299mean	Boatable	6	6.74	6.74	6.45	5.25	5.25	5.25	6.96	9.77	10.08
54	002	BLACKSTRIPE TOPMINNOW	*Fundulus notatus*	P299mean	Boatable	40	6.79	6.90	6.31	5.20	5.34	5.79	8.33	9.24	9.53
43	015	SUCKERMOUTH MINNOW	*Phenacobius mirabilis*	P299mean	Boatable	14	6.80	6.62	6.84	1.66	1.66	5.25	8.71	8.87	9.97
80	007	SLENDERHEAD DARTER	*Percina phoxocephala*	P299mean	Boatable	19	6.81	6.99	6.84	1.66	1.66	6.71	8.45	11.27	11.93
77	006	LARGEMOUTH BASS	*Micropterus salmoides*	P299mean	Boatable	67	6.83	7.05	6.71	5.16	5.56	5.98	8.67	9.25	9.80
40	008	SILVER REDHORSE	*Moxostoma anisurum*	P299mean	Boatable	21	6.88	7.46	7.66	1.66	1.66	5.98	9.59	11.93	11.93
47	004	YELLOW BULLHEAD	*Ameiurus natalis*	P299mean	Boatable	39	6.88	6.97	6.44	5.28	5.44	5.88	8.43	9.26	9.80
77	003	ROCK BASS	*Ambloplites rupestris*	P299mean	Boatable	50	7.01	7.05	6.44	5.16	5.42	5.79	8.74	9.80	10.89
77	001	WHITE CRAPPIE	*Pomoxis annularis*	P299mean	Boatable	6	7.06	8.09	8.67	5.25	5.25	5.25	9.80	10.78	10.89
43	013	CREEK CHUB	*Semotilus atromaculatus*	P299mean	Boatable	19	7.11	7.73	7.66	1.66	3.39	6.36	9.26	11.93	11.93
77	009	BLUEGILL SUNFISH	*Lepomis macrochirus*	P299mean	Boatable	67	7.11	7.06	6.44	4.63	5.29	5.80	8.67	9.71	10.38
43	001	COMMON CARP	*Cyprinus carpio*	P299mean	Boatable	75	7.19	7.15	6.70	5.16	5.42	5.85	8.67	9.80	10.74
20	003	GIZZARD SHAD	*Dorosoma cepedianum*	P299mean	Boatable	37	7.20	7.18	6.45	5.25	5.43	5.79	8.57	9.12	11.28
40	007	HIGHFIN CARPSUCKER	*Carpiodes velifer*	P299mean	Boatable	9	7.25	7.66	6.71	5.98	5.98	5.98	8.71	10.65	10.89
47	008	STONECAT MADTOM	*Noturus flavus*	P299mean	Boatable	24	7.34	7.46	6.72	5.42	5.54	6.03	8.73	10.45	11.93
74	001	WHITE BASS	*Morone chrysops*	P299mean	Boatable	13	7.45	7.55	6.96	5.98	5.98	6.45	8.71	9.03	10.05
43	043	BLUNTNOSE MINNOW	*Pimephales notatus*	P299mean	Boatable	69	7.46	6.96	6.71	1.66	5.42	5.83	8.26	9.58	10.94
40	016	WHITE SUCKER	*Catostomus commersoni*	P299mean	Boatable	53	7.47	6.83	6.44	2.19	5.37	5.82	8.26	9.26	9.80
40	010	GOLDEN REDHORSE	*Moxostoma erythrurum*	P299mean	Boatable	43	7.48	7.58	7.66	1.66	5.79	6.71	9.09	10.41	11.93
43	025	STRIPED SHINER	*Luxilus chrysocephalus*	P299mean	Boatable	21	7.51	7.77	7.66	1.66	4.14	6.55	9.26	11.93	11.93
40	003	BLACK BUFFALO	*Ictiobus niger*	P299mean	Boatable	13	7.55	7.57	6.71	5.25	5.25	5.79	8.71	11.93	11.93
80	016	BANDED DARTER	*Etheostoma zonale*	P299mean	Boatable	12	7.63	8.60	6.73	6.05	6.49	6.71	11.41	11.93	11.93
47	002	CHANNEL CATFISH	*Ictalurus punctatus*	P299mean	Boatable	63	7.64	6.96	6.45	1.66	5.23	5.79	8.46	9.86	11.25
80	002	WALLEYE	*Sander vitreus*	P299mean	Boatable	12	7.64	7.64	7.66	5.79	5.79	6.61	8.45	9.37	10.67
40	011	SHORTHEAD REDHORSE	*Moxostoma macrolepidotum*	P299mean	Boatable	36	7.71	7.57	7.66	1.66	5.79	5.98	9.24	10.83	11.93
43	047	GRASS CARP	*Ctenopharyngodon idella*	P299mean	Boatable	10	7.71	7.91	8.22	6.71	6.71	6.71	8.71	8.71	8.71
40	004	SMALLMOUTH BUFFALO	*Ictiobus bubalus*	P299mean	Boatable	24	7.75	7.41	6.71	5.25	5.73	5.98	8.49	11.93	11.93
43	006	SILVER CHUB	*Macrhybopsis storeriana*	P299mean	Boatable	5	7.78	7.65	8.19	6.84	6.84	6.84	8.19	8.19	8.19
43	034	SAND SHINER	*Notropis stramineus*	P299mean	Boatable	58	7.89	7.05	6.71	1.66	5.61	5.98	8.26	9.84	11.51
40	015	NORTHERN HOG SUCKER	*Hypentelium nigricans*	P299mean	Boatable	35	7.89	7.49	7.66	1.66	1.66	6.16	9.25	10.89	11.93
40	005	QUILLBACK CARPSUCKER	*Carpiodes cyprinus*	P299mean	Boatable	35	7.90	7.55	7.66	2.56	5.25	6.16	8.71	10.89	11.93
47	007	FLATHEAD CATFISH	*Pylodictis olivaris*	P299mean	Boatable	13	7.91	7.71	6.31	5.25	5.25	5.79	10.70	11.93	11.93
40	009	BLACK REDHORSE	*Moxostoma duquesnei*	P299mean	Boatable	9	7.95	7.74	8.26	5.98	5.98	6.53	9.26	9.26	9.26

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
77	011	LONGEAR SUNFISH	*Lepomis megalotis*	P299mean	Boatable	32	7.95	6.50	6.45	1.66	4.18	5.89	7.66	9.23	9.26
43	020	EMERALD SHINER	*Notropis atherinoides*	P299mean	Boatable	17	8.18	7.22	6.71	5.98	5.98	6.23	8.32	8.71	8.71
77	004	SMALLMOUTH BASS	*Micropterus dolomieui*	P299mean	Boatable	61	8.21	7.61	7.66	5.16	5.50	5.98	9.22	10.16	11.93
85	001	FRESHWATER DRUM	*Aplodinotus grunniens*	P299mean	Boatable	29	8.22	7.92	6.96	5.25	5.98	6.42	9.26	11.51	11.93
43	033	BIGMOUTH SHINER	*Notropis dorsalis*	P299mean	Boatable	12	8.41	7.83	8.22	5.47	5.53	6.84	8.71	9.19	10.13
80	023	ORANGETHROAT DARTER	*Etheostoma spectabile*	P299mean	Boatable	12	8.72	8.64	8.26	6.05	6.49	6.72	10.60	11.93	11.93
43	022	ROSYFACE SHINER	*Notropis rubellus*	P299mean	Boatable	14	9.56	8.90	8.76	5.56	5.93	6.73	10.89	11.93	11.93
43	023	REDFIN SHINER	*Lythrurus umbratilis*	P299mean	Boatable	13	10.46	6.95	6.73	1.66	1.66	4.76	9.93	11.93	11.93
43	079	SILVER CARP	*Hypophthalmichthys molitrix*	P299min	Boatable	13	3.79	4.92	5.55	3.13	3.13	3.44	5.95	6.43	6.43
77	001	WHITE CRAPPIE	*Pomoxis annularis*	P299min	Boatable	6	3.99	4.44	4.17	3.13	3.13	3.13	5.99	6.04	6.05
43	041	BULLHEAD MINNOW	*Pimephales vigilax*	P299min	Boatable	21	4.11	4.42	5.43	1.20	1.20	3.13	5.95	6.51	6.62
70	001	BROOK SILVERSIDE	*Labidesthes sicculus*	P299min	Boatable	6	4.19	3.89	3.44	3.13	3.13	3.13	5.09	5.09	5.09
77	010	ORANGESPOTTED SUNFISH	*Lepomis humilis*	P299min	Boatable	21	4.24	3.99	4.67	0.74	1.20	3.13	5.43	5.93	6.29
15	001	BOWFIN	*Amia calva*	P299min	Boatable	6	4.26	4.26	4.55	3.13	3.13	3.13	5.09	5.09	5.09
43	002	GOLDFISH	*Carassius auratus*	P299min	Boatable	6	4.29	4.01	4.75	0.18	0.57	4.08	5.15	5.15	5.15
80	003	YELLOW PERCH	*Perca flavescens*	P299min	Boatable	16	4.40	4.70	5.12	0.18	0.64	4.96	5.69	5.79	5.92
37	001	REDFIN PICKEREL	*Esox americanus vermiculatus*	P299min	Boatable	15	4.56	4.93	5.43	1.20	1.20	4.70	6.52	6.62	6.62
20	003	GIZZARD SHAD	*Dorosoma cepedianum*	P299min	Boatable	37	4.81	5.18	5.39	3.13	3.44	4.69	5.95	6.43	7.71
43	045	COMMON CARP X GOLDFISH	*HYBRID*	P299min	Boatable	9	4.90	5.18	5.43	1.20	2.75	5.13	6.11	6.49	6.62
43	032	SPOTFIN SHINER	*Cyprinella spiloptera*	P299min	Boatable	50	4.92	5.22	5.43	1.20	3.44	4.96	5.99	6.62	6.62
80	001	SAUGER	*Sander canadensis*	P299min	Boatable	13	4.95	4.84	5.09	3.13	3.13	3.44	5.59	6.43	6.43
40	016	WHITE SUCKER	*Catostomus commersoni*	P299min	Boatable	53	4.98	5.31	5.55	1.57	4.47	5.00	6.00	6.62	6.79
77	009	BLUEGILL SUNFISH	*Lepomis macrochirus*	P299min	Boatable	67	5.00	5.09	5.43	1.20	3.19	4.82	5.95	6.43	6.62
77	006	LARGEMOUTH BASS	*Micropterus salmoides*	P299min	Boatable	67	5.03	5.13	5.49	1.20	3.48	4.86	5.95	6.29	6.46
54	002	BLACKSTRIPE TOPMINNOW	*Fundulus notatus*	P299min	Boatable	40	5.04	4.99	5.43	1.66	3.39	4.82	5.69	5.98	6.05
77	002	BLACK CRAPPIE	*Pomoxis nigromaculatus*	P299min	Boatable	27	5.08	4.77	5.09	0.18	3.74	4.70	5.45	5.92	6.05
43	001	COMMON CARP	*Cyprinus carpio*	P299min	Boatable	75	5.11	5.10	5.43	1.20	3.13	4.82	5.97	6.62	6.82
47	006	BLACK BULLHEAD	*Ameiurus melas*	P299min	Boatable	5	5.14	5.14	5.02	4.73	4.73	4.80	5.36	5.98	5.98
10	004	LONGNOSE GAR	*Lepisosteus osseus*	P299min	Boatable	9	5.15	5.58	5.95	4.08	4.34	4.90	6.09	6.43	6.43
43	042	FATHEAD MINNOW	*Pimephales promelas*	P299min	Boatable	5	5.22	5.32	5.47	4.73	4.73	4.99	5.61	5.79	5.79
10	002	SHORTNOSE GAR	*Lepisosteus platostomus*	P299min	Boatable	9	5.22	5.04	5.55	3.13	3.13	4.60	5.95	5.95	5.95
47	013	TADPOLE MADTOM	*Noturus gyrinus*	P299min	Boatable	16	5.28	5.30	5.54	1.57	4.83	5.08	6.17	6.42	6.43
77	013	PUMPKINSEED SUNFISH	*Lepomis gibbosus*	P299min	Boatable	25	5.29	4.96	5.39	0.18	4.08	5.01	5.72	5.98	6.05

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
43	004	HORNYHEAD CHUB	*Nocomis biguttatus*	P299min	Boatable	39	5.30	5.23	5.49	1.20	4.73	5.01	5.77	6.43	6.62
77	011	LONGEAR SUNFISH	*Lepomis megalotis*	P299min	Boatable	32	5.33	4.80	5.52	1.20	1.20	3.44	5.95	6.49	6.62
80	005	BLACKSIDE DARTER	*Percina maculata*	P299min	Boatable	37	5.34	5.16	5.49	1.88	3.44	5.04	5.69	5.99	6.62
43	028	SPOTTAIL SHINER	*Notropis hudsonius*	P299min	Boatable	12	5.35	5.16	5.12	4.69	4.78	4.89	5.39	5.69	5.69
47	004	YELLOW BULLHEAD	*Ameiurus natalis*	P299min	Boatable	39	5.36	5.15	5.39	3.65	4.32	4.97	5.69	5.98	6.18
47	002	CHANNEL CATFISH	*Ictalurus punctatus*	P299min	Boatable	63	5.38	5.14	5.43	1.20	3.13	4.82	5.98	6.62	7.37
77	008	GREEN SUNFISH	*Lepomis cyanellus*	P299min	Boatable	60	5.39	5.19	5.45	1.20	3.55	4.96	5.87	6.46	6.62
80	014	JOHNNY DARTER	*Etheostoma nigrum*	P299min	Boatable	34	5.41	5.34	5.55	1.89	4.81	5.07	5.98	6.32	6.62
80	011	LOGPERCH	*Percina caprodes*	P299min	Boatable	16	5.42	5.38	5.39	4.86	4.96	5.07	5.69	5.93	5.95
80	011	LOGPERCH	*Percina caprodes*	P299min	Boatable	16	5.42	5.38	5.39	4.86	4.96	5.07	5.69	5.93	5.95
40	002	BIGMOUTH BUFFALO	*Ictiobus cyprinellus*	P299min	Boatable	8	5.45	5.53	5.43	5.09	5.09	5.21	5.95	5.95	5.95
40	018	SPOTTED SUCKER	*Minytrema melanops*	P299min	Boatable	20	5.46	5.36	5.39	4.78	4.82	5.02	5.69	5.89	5.98
77	003	ROCK BASS	*Ambloplites rupestris*	P299min	Boatable	50	5.47	5.37	5.49	3.65	4.68	5.07	5.79	6.14	6.62
40	008	SILVER REDHORSE	*Moxostoma anisurum*	P299min	Boatable	21	5.48	5.60	5.95	1.20	1.20	5.50	6.62	8.40	8.40
43	003	GOLDEN SHINER	*Notemigonus crysoleucas*	P299min	Boatable	15	5.53	5.29	5.15	4.68	4.69	4.88	5.69	5.79	5.93
37	003	NORTHERN PIKE	*Esox lucius*	P299min	Boatable	21	5.53	5.45	5.47	4.75	4.90	5.14	5.72	5.98	5.98
47	007	FLATHEAD CATFISH	*Pylodictis olivaris*	P299min	Boatable	13	5.71	5.65	5.43	3.13	3.13	3.44	6.82	8.40	8.40
74	001	WHITE BASS	*Morone chrysops*	P299min	Boatable	13	5.71	5.88	5.95	4.23	4.89	5.44	6.43	6.82	6.82
77	004	SMALLMOUTH BASS	*Micropterus dolomieui*	P299min	Boatable	61	5.72	5.46	5.69	1.20	3.91	5.06	6.09	6.70	8.40
40	015	NORTHERN HOG SUCKER	*Hypentelium nigricans*	P299min	Boatable	35	5.74	5.55	5.95	1.20	1.20	5.51	6.43	6.82	8.40
43	043	BLUNTNOSE MINNOW	*Pimephales notatus*	P299min	Boatable	69	5.75	5.51	5.57	1.20	4.68	5.09	6.09	6.62	6.90
47	008	STONECAT MADTOM	*Noturus flavus*	P299min	Boatable	24	5.75	5.80	5.56	4.99	5.00	5.15	5.95	6.63	8.40
40	010	GOLDEN REDHORSE	*Moxostoma erythrurum*	P299min	Boatable	43	5.78	5.80	5.95	1.20	4.94	5.51	6.43	6.82	8.40
43	025	STRIPED SHINER	*Luxilus chrysocephalus*	P299min	Boatable	21	5.79	5.84	5.69	1.20	2.67	5.48	6.82	8.40	8.40
40	007	HIGHFIN CARPSUCKER	*Carpiodes velifer*	P299min	Boatable	9	5.82	5.93	5.95	5.55	5.55	5.55	6.25	6.32	6.32
40	003	BLACK BUFFALO	*Ictiobus niger*	P299min	Boatable	13	5.82	5.79	5.95	3.13	3.13	5.09	6.43	8.40	8.40
43	044	CENTRAL STONEROLLER	*Campostoma anomalum*	P299min	Boatable	21	5.83	5.58	5.79	1.20	3.48	5.48	6.62	6.82	6.82
80	016	BANDED DARTER	*Etheostoma zonale*	P299min	Boatable	12	5.89	6.40	5.95	5.05	5.34	5.52	7.31	8.40	8.40
43	013	CREEK CHUB	*Semotilus atromaculatus*	P299min	Boatable	19	5.92	5.91	6.05	1.20	2.92	5.59	6.77	8.40	8.40
40	004	SMALLMOUTH BUFFALO	*Ictiobus bubalus*	P299min	Boatable	24	5.98	5.70	5.75	3.13	3.41	5.09	6.43	8.40	8.40
40	009	BLACK REDHORSE	*Moxostoma duquesnei*	P299min	Boatable	9	6.01	5.97	5.69	5.55	5.55	5.66	6.17	6.82	6.82
43	034	SAND SHINER	*Notropis stramineus*	P299min	Boatable	58	6.05	5.64	5.69	1.20	4.80	5.43	6.43	6.76	7.77
43	015	SUCKERMOUTH MINNOW	*Phenacobius mirabilis*	P299min	Boatable	14	6.16	5.14	6.26	1.20	1.20	3.13	6.43	6.62	6.62

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
80	007	SLENDERHEAD DARTER	*Percina phoxocephala*	P299min	Boatable	19	6.17	5.59	6.22	1.20	1.20	5.51	6.57	7.69	8.40
40	011	SHORTHEAD REDHORSE	*Moxostoma macrolepidotum*	P299min	Boatable	36	6.17	5.75	5.97	1.20	3.79	5.55	6.43	6.82	8.40
40	005	QUILLBACK CARPSUCKER	*Carpiodes cyprinus*	P299min	Boatable	35	6.18	5.72	5.95	1.68	3.13	5.43	6.43	6.82	8.40
80	002	WALLEYE	*Sander vitreus*	P299min	Boatable	12	6.24	6.18	6.31	5.43	5.43	5.99	6.43	6.62	6.62
43	047	GRASS CARP	*Ctenopharyngodon idella*	P299min	Boatable	10	6.26	6.34	6.38	5.95	5.95	5.95	6.43	6.82	6.82
43	020	EMERALD SHINER	*Notropis atherinoides*	P299min	Boatable	17	6.29	5.74	5.95	3.44	3.86	5.55	6.35	6.43	6.43
43	006	SILVER CHUB	*Macrhybopsis storeriana*	P299min	Boatable	5	6.31	6.31	6.32	6.29	6.29	6.29	6.32	6.32	6.32
85	001	FRESHWATER DRUM	*Aplodinotus grunniens*	P299min	Boatable	29	6.32	5.80	5.95	3.13	3.44	5.44	6.35	7.77	8.40
43	033	BIGMOUTH SHINER	*Notropis dorsalis*	P299min	Boatable	12	6.65	6.20	6.32	4.74	5.17	6.26	6.43	6.82	6.82
80	023	ORANGETHROAT DARTER	*Etheostoma spectabile*	P299min	Boatable	12	6.73	6.55	5.95	5.49	5.49	5.62	7.61	8.40	8.40
43	022	ROSYFACE SHINER	*Notropis rubellus*	P299min	Boatable	14	7.08	6.45	6.11	4.83	5.41	5.55	6.82	8.40	8.40
43	023	REDFIN SHINER	*Lythrurus umbratilis*	P299min	Boatable	13	7.36	5.20	5.49	1.20	1.20	4.37	6.37	8.40	8.40
37	004	MUSKELLUNGE	*Esox masquinongy oh.*	Mindo5th	Wadeable	5	2.53	2.92	3.10	0.20	0.20	1.33	4.50	5.42	5.42
80	001	SAUGER	*Sander canadensis*	Mindo5th	Wadeable	5	2.57	3.66	4.00	1.48	1.48	1.48	5.61	5.80	5.80
77	012	REDEAR SUNFISH	*Lepomis microlophus*	Mindo5th	Wadeable	24	2.87	3.39	2.53	0.16	1.01	1.68	5.11	7.10	7.16
68	001	PIRATE PERCH	*Aphredoderus sayanus*	Mindo5th	Wadeable	31	3.15	3.16	3.00	0.34	0.85	2.42	4.41	5.54	5.79
77	001	WHITE CRAPPIE	*Pomoxis annularis*	Mindo5th	Wadeable	14	3.20	3.89	3.01	0.93	1.45	2.22	5.71	6.99	6.99
77	005	SPOTTED BASS	*Micropterus punctulatus*	Mindo5th	Wadeable	22	3.23	3.47	3.60	1.10	1.37	2.40	4.55	5.18	5.30
70	001	BROOK SILVERSIDE	*Labidesthes sicculus*	Mindo5th	Wadeable	43	3.30	3.84	3.92	1.35	1.98	2.40	5.35	6.20	6.49
34	001	CENTRAL MUDMINNOW	*Umbra limi*	Mindo5th	Wadeable	20	3.44	4.64	4.61	1.82	2.19	4.28	5.79	6.50	6.92
77	007	WARMOUTH SUNFISH	*Lepomis gulosus*	Mindo5th	Wadeable	45	3.67	3.78	3.94	1.42	1.62	2.49	5.12	5.69	6.98
43	031	STEELCOLOR SHINER	*Cyprinella whipplei*	Mindo5th	Wadeable	14	3.76	3.52	3.94	1.48	1.48	2.40	5.06	5.30	5.30
40	003	BLACK BUFFALO	*Ictiobus niger*	Mindo5th	Wadeable	16	3.77	4.37	4.64	1.92	2.92	2.96	5.65	5.72	6.42
43	041	BULLHEAD MINNOW	*Pimephales vigilax*	Mindo5th	Wadeable	22	3.80	4.16	4.81	1.48	2.00	2.27	5.54	6.76	6.98
20	003	GIZZARD SHAD	*Dorosoma cepedianum*	Mindo5th	Wadeable	117	3.81	4.40	4.38	1.48	2.19	2.88	5.83	6.99	7.23
80	003	YELLOW PERCH	*Perca flavescens*	Mindo5th	Wadeable	40	3.83	4.40	4.39	0.48	2.31	4.10	5.47	5.87	6.14
15	001	BOWFIN	*Amia calva*	Mindo5th	Wadeable	34	3.84	4.09	4.09	2.24	2.42	2.92	5.37	6.31	6.99
43	003	GOLDEN SHINER	*Notemigonus crysoleucas*	Mindo5th	Wadeable	105	3.86	4.29	4.32	1.51	2.19	3.23	5.47	6.28	6.47
80	004	DUSKY DARTER	*Percina sciera sciera*	Mindo5th	Wadeable	5	3.88	3.88	4.00	3.25	3.25	3.25	4.44	4.44	4.44
10	004	LONGNOSE GAR	*Lepisosteus osseus*	Mindo5th	Wadeable	22	3.92	3.79	3.55	1.10	1.37	2.42	5.51	6.29	6.81
10	003	SPOTTED GAR	*Lepisosteus oculatus*	Mindo5th	Wadeable	8	3.94	3.61	3.09	2.66	2.66	2.79	4.43	5.60	5.60
40	004	SMALLMOUTH BUFFALO	*Ictiobus bubalus*	Mindo5th	Wadeable	30	4.05	4.31	3.96	1.48	2.16	2.74	5.69	6.99	6.99
77	013	PUMPKINSEED SUNFISH	*Lepomis gibbosus*	Mindo5th	Wadeable	79	4.11	4.57	5.04	1.10	2.25	3.92	5.79	6.37	6.86

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
77	002	BLACK CRAPPIE	*Pomoxis nigromaculatus*	Mindo5th	Wadeable	108	4.18	4.17	4.30	1.45	1.74	2.96	5.45	6.16	6.46
43	023	REDFIN SHINER	*Lythrurus umbratilis*	Mindo5th	Wadeable	123	4.20	4.87	5.29	1.10	2.37	3.59	5.99	6.90	7.99
40	012	GREATER REDHORSE	*Moxostoma valenciennesi*	Mindo5th	Wadeable	5	4.23	5.63	6.00	3.74	3.74	5.44	6.20	6.20	6.20
74	001	WHITE BASS	*Morone chrysops*	Mindo5th	Wadeable	9	4.23	4.78	5.60	2.92	2.92	2.92	5.88	6.71	7.26
54	002	BLACKSTRIPE TOPMINNOW	*Fundulus notatus*	Mindo5th	Wadeable	202	4.23	4.69	5.07	1.70	2.32	3.66	5.87	6.28	6.76
47	007	FLATHEAD CATFISH	*Pylodictis olivaris*	Mindo5th	Wadeable	11	4.26	3.60	3.00	1.51	1.85	2.23	4.07	6.76	6.76
77	011	LONGEAR SUNFISH	*Lepomis megalotis*	Mindo5th	Wadeable	121	4.29	4.23	4.53	1.10	2.17	2.92	5.60	6.11	6.66
80	002	WALLEYE	*Sander vitreus*	Mindo5th	Wadeable	38	4.29	4.99	5.48	0.80	1.82	3.66	6.76	6.99	7.42
10	002	SHORTNOSE GAR	*Lepisosteus platostomus*	Mindo5th	Wadeable	15	4.34	4.69	5.60	2.74	2.74	2.92	6.10	6.99	6.99
40	018	SPOTTED SUCKER	*Minytrema melanops*	Mindo5th	Wadeable	72	4.37	4.34	4.53	1.52	2.21	3.10	5.45	5.87	6.06
43	002	GOLDFISH	*Carassius auratus*	Mindo5th	Wadeable	40	4.41	4.23	4.50	0.19	1.72	3.47	5.29	6.01	6.98
43	001	COMMON CARP	*Cyprinus carpio*	Mindo5th	Wadeable	242	4.42	5.01	5.05	1.51	2.27	4.00	6.36	7.41	7.89
77	010	ORANGESPOTTED SUNFISH	*Lepomis humilis*	Mindo5th	Wadeable	96	4.44	4.39	4.57	1.48	1.75	3.55	5.45	6.65	6.93
77	006	LARGEMOUTH BASS	*Micropterus salmoides*	Mindo5th	Wadeable	360	4.51	4.86	5.08	1.52	2.22	3.94	6.08	7.04	7.63
43	079	SILVER CARP	*Hypophthalmichthys molitrix*	Mindo5th	Wadeable	8	4.52	5.19	5.88	2.92	2.92	2.92	6.99	6.99	6.99
37	001	REDFIN PICKEREL	*Esox americanus vermiculatus*	Mindo5th	Wadeable	62	4.55	4.81	5.29	1.52	2.24	3.59	6.04	6.53	6.99
77	009	BLUEGILL SUNFISH	*Lepomis macrochirus*	Mindo5th	Wadeable	357	4.61	4.89	5.12	1.46	2.22	3.94	6.14	7.13	7.64
77	008	GREEN SUNFISH	*Lepomis cyanellus*	Mindo5th	Wadeable	366	4.65	4.92	5.20	1.48	2.22	3.92	6.09	7.16	7.64
47	004	YELLOW BULLHEAD	*Ameiurus natalis*	Mindo5th	Wadeable	290	4.70	4.77	5.08	1.48	2.40	3.95	5.93	6.76	7.14
47	006	BLACK BULLHEAD	*Ameiurus melas*	Mindo5th	Wadeable	69	4.71	4.46	4.44	1.69	2.42	3.86	5.29	6.86	7.09
47	013	TADPOLE MADTOM	*Noturus gyrinus*	Mindo5th	Wadeable	62	4.71	4.33	5.06	0.32	2.40	3.10	5.54	6.07	6.49
43	039	SILVERJAW MINNOW	*Notropis buccatus*	Mindo5th	Wadeable	10	4.74	5.03	5.08	3.59	3.59	4.53	5.29	6.66	6.66
80	011	LOGPERCH	*Percina caprodes*	Mindo5th	Wadeable	52	4.80	4.93	5.45	1.48	2.18	3.94	5.84	7.02	7.53
80	011	LOGPERCH	*Percina caprodes*	Mindo5th	Wadeable	52	4.80	4.93	5.45	1.48	2.18	3.94	5.84	7.02	7.53
43	043	BLUNTNOSE MINNOW	*Pimephales notatus*	Mindo5th	Wadeable	364	4.90	5.21	5.38	1.91	2.53	4.25	6.35	7.41	7.89
40	002	BIGMOUTH BUFFALO	*Ictiobus cyprinellus*	Mindo5th	Wadeable	11	4.95	5.33	5.60	2.92	2.92	3.24	6.93	6.99	6.99
43	030	BIGEYE SHINER	*Notropis boops*	Mindo5th	Wadeable	10	4.97	4.33	4.55	3.10	3.10	3.25	5.06	5.67	5.67
37	003	NORTHERN PIKE	*Esox lucius*	Mindo5th	Wadeable	64	5.02	5.20	5.44	2.02	2.60	4.24	6.07	6.67	7.45
80	023	ORANGETHROAT DARTER	*Etheostoma spectabile*	Mindo5th	Wadeable	64	5.12	5.52	5.78	2.53	3.09	4.48	6.95	7.55	8.08
43	045	COMMON CARP X GOLDFISH	*HYBRID*	Mindo5th	Wadeable	36	5.14	4.73	5.28	1.88	2.30	3.75	5.71	6.64	6.92
85	001	FRESHWATER DRUM	*Aplodinotus grunniens*	Mindo5th	Wadeable	38	5.16	5.56	5.60	1.98	2.79	3.00	6.91	7.18	9.29
77	003	ROCK BASS	*Ambloplites rupestris*	Mindo5th	Wadeable	141	5.19	5.34	5.47	2.46	3.59	4.53	5.97	6.81	7.37
43	025	STRIPED SHINER	*Luxilus chrysocephalus*	Mindo5th	Wadeable	122	5.21	5.34	5.51	2.69	3.25	4.45	6.20	7.51	8.08

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
43	028	SPOTTAIL SHINER	*Notropis hudsonius*	Mindo5th	Wadeable	25	5.21	5.15	5.42	3.35	4.22	4.30	5.61	6.23	7.53
43	032	SPOTFIN SHINER	*Cyprinella spiloptera*	Mindo5th	Wadeable	182	5.22	5.04	5.29	2.21	2.42	4.08	6.07	7.02	7.54
43	042	FATHEAD MINNOW	*Pimephales promelas*	Mindo5th	Wadeable	54	5.30	5.32	5.45	2.23	2.72	3.97	6.52	7.43	8.29
40	008	SILVER REDHORSE	*Moxostoma anisurum*	Mindo5th	Wadeable	33	5.32	6.24	6.09	2.27	2.27	5.29	6.81	8.69	10.19
80	025	LEAST DARTER	*Etheostoma microperca*	Mindo5th	Wadeable	5	5.38	5.42	5.52	4.80	4.80	4.80	5.75	6.44	6.44
43	004	HORNYHEAD CHUB	*Nocomis biguttatus*	Mindo5th	Wadeable	194	5.39	5.78	5.72	3.34	3.98	5.04	6.73	7.88	8.07
80	005	BLACKSIDE DARTER	*Percina maculata*	Mindo5th	Wadeable	123	5.44	4.99	5.38	2.41	2.65	4.24	5.80	6.28	6.94
80	014	JOHNNY DARTER	*Etheostoma nigrum*	Mindo5th	Wadeable	199	5.45	5.73	5.74	3.35	3.98	4.91	6.57	7.75	7.99
80	022	RAINBOW DARTER	*Etheostoma caeruleum*	Mindo5th	Wadeable	38	5.46	5.18	5.59	1.73	2.40	4.32	6.04	6.80	7.97
43	015	SUCKERMOUTH MINNOW	*Phenacobius mirabilis*	Mindo5th	Wadeable	69	5.48	5.45	5.54	2.26	2.69	4.49	6.77	7.54	7.91
40	016	WHITE SUCKER	*Catostomus commersoni*	Mindo5th	Wadeable	346	5.51	5.32	5.47	1.94	3.00	4.27	6.46	7.63	8.02
43	044	CENTRAL STONEROLLER	*Campostoma anomalum*	Mindo5th	Wadeable	207	5.53	5.70	5.73	2.62	3.27	4.80	6.81	7.87	8.10
43	013	CREEK CHUB	*Semotilus atromaculatus*	Mindo5th	Wadeable	225	5.56	5.56	5.70	2.27	3.10	4.53	6.76	7.87	8.04
47	008	STONECAT MADTOM	*Noturus flavus*	Mindo5th	Wadeable	80	5.70	5.86	5.79	3.21	3.97	5.29	7.05	7.91	8.08
40	009	BLACK REDHORSE	*Moxostoma duquesnei*	Mindo5th	Wadeable	32	5.71	5.60	6.30	1.14	1.48	5.38	7.29	7.54	8.02
77	004	SMALLMOUTH BASS	*Micropterus dolomieui*	Mindo5th	Wadeable	193	5.71	5.73	5.81	1.58	3.36	5.01	6.87	7.88	8.22
43	034	SAND SHINER	*Notropis stramineus*	Mindo5th	Wadeable	194	5.80	5.74	5.76	2.97	3.73	5.04	6.81	7.53	7.88
40	010	GOLDEN REDHORSE	*Moxostoma erythrurum*	Mindo5th	Wadeable	166	5.91	5.71	5.80	2.22	3.02	4.80	6.83	7.86	8.08
47	002	CHANNEL CATFISH	*Ictalurus punctatus*	Mindo5th	Wadeable	170	5.93	5.34	5.54	2.27	2.62	4.25	6.66	7.52	7.82
80	016	BANDED DARTER	*Etheostoma zonale*	Mindo5th	Wadeable	67	5.94	5.58	5.52	3.08	4.04	5.04	6.40	7.54	7.82
43	022	ROSYFACE SHINER	*Notropis rubellus*	Mindo5th	Wadeable	60	5.94	6.19	5.86	3.36	4.32	5.06	7.39	8.01	8.45
43	035	MIMIC SHINER	*Notropis volucellus*	Mindo5th	Wadeable	7	6.08	6.39	6.46	5.38	5.38	5.54	6.98	7.43	7.55
40	015	NORTHERN HOG SUCKER	*Hypentelium nigricans*	Mindo5th	Wadeable	118	6.11	5.75	5.81	2.27	2.97	4.80	6.81	8.08	8.60
40	005	QUILLBACK CARPSUCKER	*Carpiodes cyprinus*	Mindo5th	Wadeable	67	6.12	6.04	6.09	2.27	3.96	5.10	6.83	7.60	7.83
43	047	GRASS CARP	*Ctenopharyngodon idella*	Mindo5th	Wadeable	12	6.19	5.93	6.25	2.92	2.92	5.88	6.99	7.28	7.28
43	016	SOUTH. REDBELLY DACE	*Phoxinus erythrogaster*	Mindo5th	Wadeable	15	6.22	7.11	7.30	4.53	4.53	5.79	8.03	8.45	9.97
80	007	SLENDERHEAD DARTER	*Percina phoxocephala*	Mindo5th	Wadeable	43	6.33	5.70	6.01	1.99	2.27	4.89	6.81	7.61	7.88
80	024	FANTAIL DARTER	*Etheostoma flabellare*	Mindo5th	Wadeable	86	6.34	6.30	6.48	3.64	4.45	5.52	7.45	8.03	8.45
90	002	MOTTLED SCULPIN	*Cottus bairdi*	Mindo5th	Wadeable	5	6.52	6.26	6.30	5.35	5.35	5.67	6.75	7.28	7.28
01	007	AMER BROOK LAMPREY	*Lampetra appendix*	Mindo5th	Wadeable	5	6.56	6.85	6.58	5.71	5.71	6.26	7.51	8.25	8.25
43	033	BIGMOUTH SHINER	*Notropis dorsalis*	Mindo5th	Wadeable	83	6.59	6.30	6.52	3.96	4.44	5.13	7.41	8.00	8.14
43	020	EMERALD SHINER	*Notropis atherinoides*	Mindo5th	Wadeable	42	6.61	5.73	6.42	1.93	2.40	4.81	6.98	7.65	7.88
43	006	SILVER CHUB	*Macrhybopsis storeriana*	Mindo5th	Wadeable	14	6.72	6.52	6.83	4.81	4.81	5.72	6.99	7.53	7.53

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
40	011	SHORTHEAD REDHORSE	*Moxostoma macrolepidotum*	Mindo5th	Wadeable	89	6.75	6.56	6.66	3.00	4.76	5.72	7.53	8.03	8.69
43	027	RIVER SHINER	*Notropis blennius*	Mindo5th	Wadeable	10	6.85	6.77	7.53	4.00	4.00	6.86	7.65	7.82	7.82
43	026	COMMON SHINER	*Luxilus cornutus*	Mindo5th	Wadeable	49	7.10	7.06	7.30	5.01	5.38	6.02	7.91	8.45	8.78
43	011	WESTERN BLACKNOSE DACE	*Rhinichthys atratulus obtusus*	Mindo5th	Wadeable	28	7.38	7.29	7.84	4.82	5.25	6.47	8.08	8.62	8.87
40	007	HIGHFIN CARPSUCKER	*Carpiodes velifer*	Mindo5th	Wadeable	13	7.42	7.78	7.61	4.57	4.57	7.14	8.04	9.89	13.80
43	012	LONGNOSE DACE	*Rhinichthys cataractae*	Mindo5th	Wadeable	8	7.99	7.82	7.89	7.45	7.45	7.66	7.97	8.03	8.03
80	001	SAUGER	*Sander canadensis*	P299mean	Wadeable	5	3.64	4.94	5.46	2.33	2.33	2.33	6.57	8.74	8.74
43	041	BULLHEAD MINNOW	*Pimephales vigilax*	P299mean	Wadeable	22	4.38	4.98	5.86	1.66	1.66	2.33	7.02	7.56	7.60
77	005	SPOTTED BASS	*Micropterus punctulatus*	P299mean	Wadeable	22	4.52	4.99	5.39	2.33	2.63	3.16	6.34	7.30	9.39
40	003	BLACK BUFFALO	*Ictiobus niger*	P299mean	Wadeable	16	4.60	5.18	5.87	2.62	3.29	3.43	6.41	6.91	7.45
70	001	BROOK SILVERSIDE	*Labidesthes sicculus*	P299mean	Wadeable	43	4.69	5.45	5.19	2.33	2.46	3.23	6.76	8.36	9.53
80	004	DUSKY DARTER	*Percina sciera sciera*	P299mean	Wadeable	5	4.70	4.70	5.46	3.36	3.36	3.36	5.65	5.65	5.65
40	004	SMALLMOUTH BUFFALO	*Ictiobus bubalus*	P299mean	Wadeable	30	4.82	5.57	5.84	2.33	2.62	3.43	7.56	7.93	8.11
68	001	PIRATE PERCH	*Aphredoderus sayanus*	P299mean	Wadeable	31	4.95	4.84	5.65	0.70	2.19	3.31	6.27	6.90	7.56
77	012	REDEAR SUNFISH	*Lepomis microlophus*	P299mean	Wadeable	24	4.97	5.11	4.91	2.63	2.76	3.16	6.83	7.93	8.11
47	007	FLATHEAD CATFISH	*Pylodictis olivaris*	P299mean	Wadeable	11	5.08	4.73	4.80	2.19	2.27	3.00	6.49	7.57	8.57
20	003	GIZZARD SHAD	*Dorosoma cepedianum*	P299mean	Wadeable	117	5.11	5.80	5.68	2.76	3.19	4.68	7.43	7.95	8.67
10	004	LONGNOSE GAR	*Lepisosteus osseus*	P299mean	Wadeable	22	5.11	5.09	5.14	2.33	2.63	3.43	6.39	7.73	8.26
77	007	WARMOUTH SUNFISH	*Lepomis gulosus*	P299mean	Wadeable	45	5.16	5.35	5.47	2.79	3.16	3.59	6.41	7.63	7.95
74	001	WHITE BASS	*Morone chrysops*	P299mean	Wadeable	9	5.18	6.02	6.45	3.43	3.43	3.43	7.89	8.99	9.72
34	001	CENTRAL MUDMINNOW	*Umbra limi*	P299mean	Wadeable	20	5.26	6.28	6.29	4.13	4.85	5.31	6.61	8.12	9.22
77	001	WHITE CRAPPIE	*Pomoxis annularis*	P299mean	Wadeable	14	5.28	5.99	5.44	3.01	3.38	3.43	7.93	9.27	9.68
10	003	SPOTTED GAR	*Lepisosteus oculatus*	P299mean	Wadeable	8	5.47	6.01	5.61	3.43	3.43	4.10	7.92	9.39	9.39
10	002	SHORTNOSE GAR	*Lepisosteus platostomus*	P299mean	Wadeable	15	5.48	6.62	6.75	3.43	3.43	6.42	7.84	9.39	9.39
37	001	REDFIN PICKEREL	*Esox americanus vermiculatus*	P299mean	Wadeable	62	5.51	6.25	6.30	1.98	2.80	5.72	7.26	9.01	10.05
15	001	BOWFIN	*Amia calva*	P299mean	Wadeable	34	5.56	5.52	5.46	3.30	3.36	3.45	6.64	7.93	9.42
43	003	GOLDEN SHINER	*Notemigonus crysoleucas*	P299mean	Wadeable	105	5.63	5.97	5.93	2.90	3.43	4.96	6.84	8.67	9.68
40	002	BIGMOUTH BUFFALO	*Ictiobus cyprinellus*	P299mean	Wadeable	11	5.68	6.10	6.45	3.43	3.43	3.64	7.92	7.93	7.93
40	012	GREATER REDHORSE	*Moxostoma valenciennesi*	P299mean	Wadeable	5	5.76	7.89	8.10	5.13	5.13	7.36	9.05	9.05	9.05
40	018	SPOTTED SUCKER	*Minytrema melanops*	P299mean	Wadeable	72	5.77	5.67	5.72	2.95	3.34	4.91	6.39	7.70	8.99
43	045	COMMON CARP X GOLDFISH	*HYBRID*	P299mean	Wadeable	36	5.78	5.92	5.84	3.45	3.62	5.19	6.72	7.92	8.97
43	079	SILVER CARP	*Hypophthalmichthys molitrix*	P299mean	Wadeable	8	5.79	6.23	7.89	3.43	3.43	3.43	7.93	7.93	7.93
43	002	GOLDFISH	*Carassius auratus*	P299mean	Wadeable	40	5.89	5.65	5.31	3.12	4.08	4.94	6.61	7.73	8.22

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
43	023	REDFIN SHINER	*Lythrurus umbratilis*	P299mean	Wadeable	123	5.90	6.13	6.32	2.19	2.79	5.14	7.62	8.93	9.17
47	013	TADPOLE MADTOM	*Noturus gyrinus*	P299mean	Wadeable	62	5.92	5.70	5.97	2.80	3.36	4.69	6.84	7.74	8.52
85	001	FRESHWATER DRUM	*Aplodinotus grunniens*	P299mean	Wadeable	38	5.92	6.46	6.84	2.72	3.29	5.17	7.56	8.67	10.22
80	003	YELLOW PERCH	*Perca flavescens*	P299mean	Wadeable	40	5.94	6.23	5.79	3.99	4.64	5.41	6.98	8.53	9.27
43	031	STEELCOLOR SHINER	*Cyprinella whipplei*	P299mean	Wadeable	14	5.96	4.50	5.46	2.33	2.33	2.90	5.64	6.41	6.41
54	002	BLACKSTRIPE TOPMINNOW	*Fundulus notatus*	P299mean	Wadeable	202	5.96	6.30	6.42	2.86	3.46	5.07	7.57	8.68	9.11
77	011	LONGEAR SUNFISH	*Lepomis megalotis*	P299mean	Wadeable	121	5.99	5.61	6.29	2.19	2.64	3.43	7.03	8.03	8.96
40	008	SILVER REDHORSE	*Moxostoma anisurum*	P299mean	Wadeable	33	6.02	7.34	7.66	1.66	2.08	5.86	8.95	9.89	11.87
80	023	ORANGETHROAT DARTER	*Etheostoma spectabile*	P299mean	Wadeable	64	6.03	6.62	6.74	2.80	4.52	5.64	8.04	8.84	9.61
43	015	SUCKERMOUTH MINNOW	*Phenacobius mirabilis*	P299mean	Wadeable	69	6.05	6.42	6.44	2.32	3.75	5.49	7.89	8.53	8.92
77	013	PUMPKINSEED SUNFISH	*Lepomis gibbosus*	P299mean	Wadeable	79	6.09	6.21	6.09	3.45	3.84	5.10	6.80	8.74	9.49
47	004	YELLOW BULLHEAD	*Ameiurus natalis*	P299mean	Wadeable	290	6.14	6.29	6.40	2.90	3.46	5.17	7.55	8.68	9.22
80	011	LOGPERCH	*Percina caprodes*	P299mean	Wadeable	52	6.14	6.22	6.33	2.37	2.87	5.56	7.87	8.50	8.90
80	011	LOGPERCH	*Percina caprodes*	P299mean	Wadeable	52	6.14	6.22	6.33	2.37	2.87	5.56	7.87	8.50	8.90
77	006	LARGEMOUTH BASS	*Micropterus salmoides*	P299mean	Wadeable	360	6.14	6.46	6.54	2.91	3.73	5.20	7.80	8.74	9.22
77	008	GREEN SUNFISH	*Lepomis cyanellus*	P299mean	Wadeable	366	6.16	6.42	6.46	2.79	3.37	5.17	7.89	8.91	9.61
77	002	BLACK CRAPPIE	*Pomoxis nigromaculatus*	P299mean	Wadeable	108	6.20	6.26	6.26	3.42	3.80	5.10	7.47	8.62	9.26
43	039	SILVERJAW MINNOW	*Notropis buccatus*	P299mean	Wadeable	10	6.21	6.39	6.61	4.81	4.81	6.29	7.02	7.21	7.21
47	006	BLACK BULLHEAD	*Ameiurus melas*	P299mean	Wadeable	69	6.31	6.27	6.39	3.41	3.95	4.90	7.77	8.81	8.96
80	005	BLACKSIDE DARTER	*Percina maculata*	P299mean	Wadeable	123	6.37	6.04	5.86	2.76	3.36	4.81	7.06	8.47	8.99
43	001	COMMON CARP	*Cyprinus carpio*	P299mean	Wadeable	242	6.39	6.66	6.61	3.29	3.99	5.41	8.03	9.05	9.73
80	002	WALLEYE	*Sander vitreus*	P299mean	Wadeable	38	6.41	6.60	6.84	3.84	4.79	5.86	7.65	8.23	8.39
77	009	BLUEGILL SUNFISH	*Lepomis macrochirus*	P299mean	Wadeable	357	6.45	6.43	6.58	2.77	3.44	5.20	7.77	8.87	9.43
43	030	BIGEYE SHINER	*Notropis boops*	P299mean	Wadeable	10	6.46	6.06	5.64	3.64	3.64	5.31	6.32	9.39	9.39
37	003	NORTHERN PIKE	*Esox lucius*	P299mean	Wadeable	64	6.47	6.57	6.20	3.45	4.52	5.41	7.44	9.53	9.79
37	004	MUSKELLUNGE	*Esox masquinongy oh.*	P299mean	Wadeable	5	6.57	6.21	5.60	4.28	4.28	4.89	7.84	8.40	8.40
80	007	SLENDERHEAD DARTER	*Percina phoxocephala*	P299mean	Wadeable	43	6.58	6.59	6.75	1.66	2.33	5.65	8.03	8.96	9.62
77	010	ORANGESPOTTED SUNFISH	*Lepomis humilis*	P299mean	Wadeable	96	6.59	6.39	6.54	2.50	4.02	5.29	7.66	8.75	9.63
43	013	CREEK CHUB	*Semotilus atromaculatus*	P299mean	Wadeable	225	6.66	6.87	7.10	3.09	4.37	5.65	8.30	9.29	9.74
43	032	SPOTFIN SHINER	*Cyprinella spiloptera*	P299mean	Wadeable	182	6.73	6.42	6.40	2.98	3.45	5.42	7.74	8.81	9.38
43	044	CENTRAL STONEROLLER	*Campostoma anomalum*	P299mean	Wadeable	207	6.76	6.93	7.02	3.34	4.62	5.84	8.26	9.24	9.74
77	003	ROCK BASS	*Ambloplites rupestris*	P299mean	Wadeable	141	6.77	6.81	6.80	3.69	4.62	5.74	7.76	8.92	9.70
43	025	STRIPED SHINER	*Luxilus chrysocephalus*	P299mean	Wadeable	122	6.86	6.62	6.73	2.76	3.64	5.52	8.03	9.12	9.51

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
43	004	HORNYHEAD CHUB	*Nocomis biguttatus*	P299mean	Wadeable	194	6.86	7.11	7.28	4.37	4.80	6.07	8.34	9.14	9.72
40	005	QUILLBACK CARPSUCKER	*Carpiodes cyprinus*	P299mean	Wadeable	67	6.89	7.25	7.26	2.80	5.17	6.18	8.63	9.13	9.75
43	042	FATHEAD MINNOW	*Pimephales promelas*	P299mean	Wadeable	54	6.89	6.61	6.60	2.93	3.44	4.91	8.14	9.92	9.93
43	016	SOUTH. REDBELLY DACE	*Phoxinus erythrogaster*	P299mean	Wadeable	15	7.02	8.55	8.54	5.43	6.18	7.98	9.90	9.92	10.47
47	002	CHANNEL CATFISH	*Ictalurus punctatus*	P299mean	Wadeable	170	7.02	6.69	6.77	2.66	3.86	5.56	8.03	8.96	9.72
43	043	BLUNTNOSE MINNOW	*Pimephales notatus*	P299mean	Wadeable	364	7.05	6.64	6.71	2.90	3.97	5.56	7.98	8.96	9.63
43	028	SPOTTAIL SHINER	*Notropis hudsonius*	P299mean	Wadeable	25	7.10	6.64	5.85	4.22	4.75	5.46	8.37	8.74	9.79
43	034	SAND SHINER	*Notropis stramineus*	P299mean	Wadeable	194	7.15	6.86	6.90	3.48	4.62	5.85	8.03	8.96	9.45
43	047	GRASS CARP	*Ctenopharyngodon idella*	P299mean	Wadeable	12	7.20	7.17	7.57	3.43	3.43	6.75	7.93	9.79	9.79
47	008	STONECAT MADTOM	*Noturus flavus*	P299mean	Wadeable	80	7.22	7.21	7.50	3.67	5.28	6.18	8.36	9.21	9.62
80	014	JOHNNY DARTER	*Etheostoma nigrum*	P299mean	Wadeable	199	7.23	7.01	6.95	4.23	5.01	6.11	8.26	9.13	9.72
43	006	SILVER CHUB	*Macrhybopsis storeriana*	P299mean	Wadeable	14	7.24	7.09	7.39	5.17	5.17	6.37	7.93	8.36	8.36
40	016	WHITE SUCKER	*Catostomus commersoni*	P299mean	Wadeable	346	7.30	6.80	6.69	3.29	4.51	5.60	8.23	9.28	9.79
90	002	MOTTLED SCULPIN	*Cottus bairdi*	P299mean	Wadeable	5	7.31	7.75	7.95	6.37	6.37	6.78	8.49	9.29	9.29
80	024	FANTAIL DARTER	*Etheostoma flabellare*	P299mean	Wadeable	86	7.32	7.54	7.84	5.00	5.50	6.24	8.91	9.72	9.90
40	010	GOLDEN REDHORSE	*Moxostoma erythrurum*	P299mean	Wadeable	166	7.33	6.96	7.02	2.88	4.37	5.84	8.34	9.31	9.81
43	033	BIGMOUTH SHINER	*Notropis dorsalis*	P299mean	Wadeable	83	7.37	7.60	7.89	5.15	5.62	6.42	8.50	9.72	9.93
43	020	EMERALD SHINER	*Notropis atherinoides*	P299mean	Wadeable	42	7.40	6.62	7.41	2.68	3.16	5.46	7.93	8.63	9.13
40	009	BLACK REDHORSE	*Moxostoma duquesnei*	P299mean	Wadeable	32	7.44	7.11	7.95	2.33	2.63	6.98	8.99	9.79	9.89
77	004	SMALLMOUTH BASS	*Micropterus dolomieui*	P299mean	Wadeable	193	7.49	7.43	7.58	3.96	5.46	6.35	8.75	9.68	9.74
43	022	ROSYFACE SHINER	*Notropis rubellus*	P299mean	Wadeable	60	7.55	7.79	7.74	4.62	5.55	6.73	8.96	9.90	10.24
40	015	NORTHERN HOG SUCKER	*Hypentelium nigricans*	P299mean	Wadeable	118	7.56	7.14	7.30	2.33	4.51	6.23	8.67	9.61	9.90
80	022	RAINBOW DARTER	*Etheostoma caeruleum*	P299mean	Wadeable	38	7.68	6.67	6.87	2.33	3.16	5.61	7.84	9.36	9.88
43	035	MIMIC SHINER	*Notropis volucellus*	P299mean	Wadeable	7	7.71	7.83	7.39	7.05	7.05	7.13	8.64	9.16	9.22
40	011	SHORTHEAD REDHORSE	*Moxostoma macrolepidotum*	P299mean	Wadeable	89	7.88	7.68	7.93	3.29	5.73	6.74	8.89	9.77	9.96
43	027	RIVER SHINER	*Notropis blennius*	P299mean	Wadeable	10	7.88	7.89	8.45	5.46	5.46	8.36	8.51	8.67	8.67
80	016	BANDED DARTER	*Etheostoma zonale*	P299mean	Wadeable	67	7.99	7.24	7.34	4.36	5.50	6.73	7.93	8.70	9.79
80	025	LEAST DARTER	*Etheostoma microperca*	P299mean	Wadeable	5	8.33	8.20	7.84	7.55	7.55	7.55	8.44	10.22	10.22
43	011	WESTERN BLACKNOSE DACE	*Rhinichthys atratulus obtusus*	P299mean	Wadeable	28	8.65	8.52	8.53	5.17	6.43	8.15	9.12	10.13	10.80
40	007	HIGHFIN CARPSUCKER	*Carpiodes velifer*	P299mean	Wadeable	13	8.75	9.08	8.53	8.03	8.03	8.30	8.96	10.79	14.25
01	007	AMER BROOK LAMPREY	*Lampetra appendix*	P299mean	Wadeable	5	8.84	9.03	8.88	8.00	8.00	8.25	9.84	10.22	10.22
43	026	COMMON SHINER	*Luxilus cornutus*	P299mean	Wadeable	49	9.22	8.57	8.83	5.79	6.37	8.00	9.42	9.92	10.56
43	012	LONGNOSE DACE	*Rhinichthys cataractae*	P299mean	Wadeable	8	9.51	9.16	9.28	8.34	8.34	8.58	9.73	9.74	9.74

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
37	004	MUSKELLUNGE	*Esox masquinongy oh.*	P299min	Wadeable	5	1.33	2.05	1.39	0.10	0.10	0.10	4.26	4.48	4.48
43	079	SILVER CARP	*Hypophthalmichthys molitrix*	P299min	Wadeable	8	2.02	3.85	2.88	0.94	0.94	1.91	6.77	6.77	6.77
80	001	SAUGER	*Sander canadensis*	P299min	Wadeable	5	2.14	3.30	3.78	0.97	0.97	0.97	5.24	5.69	5.69
77	012	REDEAR SUNFISH	*Lepomis microlophus*	P299min	Wadeable	24	2.45	2.90	2.05	0.13	0.70	0.99	4.85	6.82	6.88
68	001	PIRATE PERCH	*Aphredoderus sayanus*	P299min	Wadeable	31	2.71	2.72	2.26	0.07	0.66	1.75	3.74	5.31	5.74
77	001	WHITE CRAPPIE	*Pomoxis annularis*	P299min	Wadeable	14	2.74	3.36	2.88	0.15	0.16	1.78	5.55	6.77	6.77
77	005	SPOTTED BASS	*Micropterus punctulatus*	P299min	Wadeable	22	2.78	3.02	3.22	0.76	0.91	2.04	3.78	4.83	5.18
70	001	BROOK SILVERSIDE	*Labidesthes sicculus*	P299min	Wadeable	43	2.94	3.43	2.90	0.90	1.59	2.04	4.95	5.54	6.29
80	002	WALLEYE	*Sander vitreus*	P299min	Wadeable	38	3.18	4.31	5.24	0.10	0.25	2.05	6.46	6.77	7.30
34	001	CENTRAL MUDMINNOW	*Umbra limi*	P299min	Wadeable	20	3.19	4.42	4.44	1.45	1.78	3.97	5.67	6.43	6.79
77	007	WARMOUTH SUNFISH	*Lepomis gulosus*	P299min	Wadeable	45	3.27	3.37	3.48	0.84	1.01	2.05	4.53	5.47	6.87
40	012	GREATER REDHORSE	*Moxostoma valenciennesi*	P299min	Wadeable	5	3.28	4.75	4.95	2.83	2.83	4.42	5.51	5.51	5.51
77	010	ORANGESPOTTED SUNFISH	*Lepomis humilis*	P299min	Wadeable	96	3.29	3.56	3.51	0.12	0.97	2.20	5.04	6.29	6.79
43	031	STEELCOLOR SHINER	*Cyprinella whipplei*	P299min	Wadeable	14	3.35	3.12	3.54	0.97	0.97	2.04	4.22	5.18	5.18
43	003	GOLDEN SHINER	*Notemigonus crysoleucas*	P299min	Wadeable	105	3.36	3.70	3.61	0.66	1.33	2.34	5.18	5.96	6.39
20	003	GIZZARD SHAD	*Dorosoma cepedianum*	P299min	Wadeable	117	3.38	3.93	3.91	0.76	1.34	2.10	5.64	6.77	7.05
80	004	DUSKY DARTER	*Percina sciera sciera*	P299min	Wadeable	5	3.45	3.45	3.78	2.94	2.94	2.94	3.80	3.80	3.80
80	003	YELLOW PERCH	*Perca flavescens*	P299min	Wadeable	40	3.46	4.05	4.25	0.18	1.93	2.92	5.21	5.79	6.07
15	001	BOWFIN	*Amia calva*	P299min	Wadeable	34	3.46	3.72	3.23	1.84	2.08	2.43	4.96	6.05	6.77
77	002	BLACK CRAPPIE	*Pomoxis nigromaculatus*	P299min	Wadeable	108	3.49	3.44	3.51	0.18	0.67	2.08	5.10	5.88	6.07
40	003	BLACK BUFFALO	*Ictiobus niger*	P299min	Wadeable	16	3.50	3.97	4.22	1.36	2.26	2.88	5.10	5.40	6.33
43	041	BULLHEAD MINNOW	*Pimephales vigilax*	P299min	Wadeable	22	3.51	3.70	4.13	0.97	1.13	1.20	5.31	6.58	6.87
43	001	COMMON CARP	*Cyprinus carpio*	P299min	Wadeable	242	3.52	4.31	4.44	0.23	1.13	2.53	5.85	7.12	7.77
10	004	LONGNOSE GAR	*Lepisosteus osseus*	P299min	Wadeable	22	3.52	3.36	3.33	0.76	0.91	1.78	4.64	6.11	6.41
10	003	SPOTTED GAR	*Lepisosteus oculatus*	P299min	Wadeable	8	3.57	3.15	2.89	1.74	1.74	2.31	4.00	5.09	5.09
47	006	BLACK BULLHEAD	*Ameiurus melas*	P299min	Wadeable	69	3.58	3.55	3.78	0.58	1.20	2.29	4.29	6.61	7.02
43	023	REDFIN SHINER	*Lythrurus umbratilis*	P299min	Wadeable	123	3.61	4.37	4.64	0.76	1.63	2.91	5.51	6.80	7.79
47	007	FLATHEAD CATFISH	*Pylodictis olivaris*	P299min	Wadeable	11	3.63	2.90	2.26	0.31	0.69	1.88	3.78	6.29	6.29
77	013	PUMPKINSEED SUNFISH	*Lepomis gibbosus*	P299min	Wadeable	79	3.64	4.09	4.48	0.37	1.14	2.52	5.64	6.05	6.78
40	004	SMALLMOUTH BUFFALO	*Ictiobus bubalus*	P299min	Wadeable	30	3.75	3.89	3.33	0.97	1.74	2.10	5.43	6.77	6.77
74	001	WHITE BASS	*Morone chrysops*	P299min	Wadeable	9	3.75	3.50	2.88	0.94	0.94	2.40	5.09	6.27	7.05
43	002	GOLDFISH	*Carassius auratus*	P299min	Wadeable	40	3.77	3.56	3.80	0.10	0.39	2.53	4.82	5.79	6.87
54	002	BLACKSTRIPE TOPMINNOW	*Fundulus notatus*	P299min	Wadeable	202	3.78	4.07	4.50	0.66	1.73	2.58	5.51	6.00	6.41

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77	011	LONGEAR SUNFISH	*Lepomis megalotis*	P299min	Wadeable	121	3.89	3.78	3.80	0.76	1.20	2.26	5.17	5.96	6.43
77	008	GREEN SUNFISH	*Lepomis cyanellus*	P299min	Wadeable	366	3.99	4.32	4.60	0.45	1.34	2.58	5.79	6.96	7.49
77	006	LARGEMOUTH BASS	*Micropterus salmoides*	P299min	Wadeable	360	3.99	4.21	4.44	0.39	1.16	2.53	5.73	6.80	7.47
40	018	SPOTTED SUCKER	*Minytrema melanops*	P299min	Wadeable	72	4.00	3.99	4.30	0.97	1.99	2.73	5.22	5.69	5.95
77	009	BLUEGILL SUNFISH	*Lepomis macrochirus*	P299min	Wadeable	357	4.01	4.27	4.52	0.35	1.14	2.63	5.87	6.94	7.55
47	004	YELLOW BULLHEAD	*Ameiurus natalis*	P299min	Wadeable	290	4.08	4.12	4.44	0.27	1.60	2.76	5.57	6.24	6.96
10	002	SHORTNOSE GAR	*Lepisosteus platostomus*	P299min	Wadeable	15	4.14	4.37	5.09	2.07	2.07	2.88	5.93	6.77	6.77
37	001	REDFIN PICKEREL	*Esox americanus vermiculatus*	P299min	Wadeable	62	4.15	4.45	4.92	0.86	1.20	3.32	5.96	6.33	6.71
47	013	TADPOLE MADTOM	*Noturus gyrinus*	P299min	Wadeable	62	4.28	3.94	4.48	0.12	1.74	2.76	5.31	5.93	6.14
43	043	BLUNTNOSE MINNOW	*Pimephales notatus*	P299min	Wadeable	364	4.37	4.61	4.94	0.82	1.88	3.18	5.98	7.12	7.76
43	039	SILVERJAW MINNOW	*Notropis buccatus*	P299min	Wadeable	10	4.41	4.76	4.56	3.32	3.32	4.35	5.11	6.46	6.46
40	002	BIGMOUTH BUFFALO	*Ictiobus cyprinellus*	P299min	Wadeable	11	4.46	4.29	4.19	1.95	1.95	2.88	6.35	6.77	6.77
80	011	LOGPERCH	*Percina caprodes*	P299min	Wadeable	52	4.50	4.60	5.09	0.97	2.04	3.54	5.61	6.85	7.46
80	011	LOGPERCH	*Percina caprodes*	P299min	Wadeable	52	4.50	4.60	5.09	0.97	2.04	3.54	5.61	6.85	7.46
43	025	STRIPED SHINER	*Luxilus chrysocephalus*	P299min	Wadeable	122	4.59	4.82	4.95	1.85	2.53	3.61	6.03	7.20	7.89
43	045	COMMON CARP X GOLDFISH	*HYBRID*	P299min	Wadeable	36	4.63	4.27	4.64	0.95	1.64	3.05	5.31	6.27	6.68
37	003	NORTHERN PIKE	*Esox lucius*	P299min	Wadeable	64	4.66	4.84	5.15	1.28	2.08	3.59	5.96	6.61	7.31
43	030	BIGEYE SHINER	*Notropis boops*	P299min	Wadeable	10	4.68	3.84	3.61	2.90	2.90	2.94	4.22	5.54	5.54
40	016	WHITE SUCKER	*Catostomus commersoni*	P299min	Wadeable	346	4.68	4.75	4.96	0.65	2.05	3.51	6.09	7.45	7.89
43	032	SPOTFIN SHINER	*Cyprinella spiloptera*	P299min	Wadeable	182	4.71	4.48	4.75	1.20	1.73	3.16	5.79	6.74	7.47
80	023	ORANGETHROAT DARTER	*Etheostoma spectabile*	P299min	Wadeable	64	4.74	4.97	5.31	1.95	2.28	3.54	6.75	7.42	7.89
77	003	ROCK BASS	*Ambloplites rupestris*	P299min	Wadeable	141	4.75	4.85	5.00	1.90	2.49	4.11	5.72	6.56	7.12
85	001	FRESHWATER DRUM	*Aplodinotus grunniens*	P299min	Wadeable	38	4.77	5.19	5.21	1.41	2.13	2.88	6.72	7.00	9.20
40	008	SILVER REDHORSE	*Moxostoma anisurum*	P299min	Wadeable	33	4.79	5.82	5.51	1.20	1.88	4.63	6.63	8.43	10.13
43	028	SPOTTAIL SHINER	*Notropis hudsonius*	P299min	Wadeable	25	4.81	4.77	5.09	2.14	3.51	4.10	5.47	5.97	7.47
43	042	FATHEAD MINNOW	*Pimephales promelas*	P299min	Wadeable	54	4.82	4.70	4.85	1.87	2.10	3.25	5.79	6.79	8.16
43	004	HORNYHEAD CHUB	*Nocomis biguttatus*	P299min	Wadeable	194	4.89	5.26	5.16	2.30	2.76	4.25	6.41	7.76	7.92
43	044	CENTRAL STONEROLLER	*Campostoma anomalum*	P299min	Wadeable	207	4.98	5.18	5.21	1.74	2.39	4.04	6.46	7.76	7.95
80	014	JOHNNY DARTER	*Etheostoma nigrum*	P299min	Wadeable	199	4.99	5.22	5.21	2.29	2.76	4.20	6.20	7.62	7.81
80	005	BLACKSIDE DARTER	*Percina maculata*	P299min	Wadeable	123	5.01	4.58	4.95	1.84	2.22	3.78	5.54	6.14	6.68
80	022	RAINBOW DARTER	*Etheostoma caeruleum*	P299min	Wadeable	38	5.01	4.72	5.04	1.40	2.04	3.55	5.96	6.47	7.89
43	013	CREEK CHUB	*Semotilus atromaculatus*	P299min	Wadeable	225	5.02	4.99	5.16	1.44	2.09	3.68	6.41	7.75	7.91
43	015	SUCKERMOUTH MINNOW	*Phenacobius mirabilis*	P299min	Wadeable	69	5.02	4.82	5.12	1.20	1.95	3.53	6.32	7.32	7.77

Family Code	Species Code	Common Name	Latin Name	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
80	025	LEAST DARTER	*Etheostoma microperca*	P299min	Wadeable	5	5.12	5.08	4.96	4.56	4.56	4.56	5.31	6.35	6.35
47	008	STONECAT MADTOM	*Noturus flavus*	P299min	Wadeable	80	5.14	5.41	5.40	2.29	2.76	4.64	6.92	7.77	7.89
77	004	SMALLMOUTH BASS	*Micropterus dolomieui*	P299min	Wadeable	193	5.19	5.17	5.19	0.38	2.10	4.15	6.73	7.76	8.07
43	034	SAND SHINER	*Notropis stramineus*	P299min	Wadeable	194	5.24	5.17	5.42	1.95	2.51	4.23	6.46	7.35	7.75
40	009	BLACK REDHORSE	*Moxostoma duquesnei*	P299min	Wadeable	32	5.30	5.07	5.47	0.78	0.97	3.78	7.05	7.47	7.85
80	016	BANDED DARTER	*Etheostoma zonale*	P299min	Wadeable	67	5.32	5.12	5.00	2.09	2.59	4.49	6.19	7.31	7.64
43	047	GRASS CARP	*Ctenopharyngodon idella*	P299min	Wadeable	12	5.47	4.88	5.79	0.94	0.94	2.88	6.77	7.12	7.12
40	010	GOLDEN REDHORSE	*Moxostoma erythrurum*	P299min	Wadeable	166	5.47	5.23	5.42	1.20	2.29	4.13	6.49	7.73	7.89
47	002	CHANNEL CATFISH	*Ictalurus punctatus*	P299min	Wadeable	170	5.51	4.69	5.01	0.97	1.43	2.88	6.29	7.35	7.59
43	022	ROSYFACE SHINER	*Notropis rubellus*	P299min	Wadeable	60	5.52	5.80	5.30	2.57	3.95	4.56	7.09	7.86	8.34
43	035	MIMIC SHINER	*Notropis volucellus*	P299min	Wadeable	7	5.57	6.06	6.05	4.92	4.92	5.05	6.87	7.25	7.35
40	015	NORTHERN HOG SUCKER	*Hypentelium nigricans*	P299min	Wadeable	118	5.66	5.29	5.42	1.20	2.29	4.15	6.72	7.89	8.39
40	005	QUILLBACK CARPSUCKER	*Carpiodes cyprinus*	P299min	Wadeable	67	5.70	5.48	5.76	2.09	2.32	4.22	6.59	7.45	7.61
80	007	SLENDERHEAD DARTER	*Percina phoxocephala*	P299min	Wadeable	43	5.82	5.01	5.42	0.96	1.15	4.13	6.41	7.47	7.75
43	016	SOUTH. REDBELLY DACE	*Phoxinus erythrogaster*	P299min	Wadeable	15	5.88	6.89	6.97	4.06	4.06	5.66	7.93	8.34	9.95
43	033	BIGMOUTH SHINER	*Notropis dorsalis*	P299min	Wadeable	83	6.03	5.47	5.93	1.37	2.30	4.20	7.12	7.81	8.04
80	024	FANTAIL DARTER	*Etheostoma flabellare*	P299min	Wadeable	86	6.05	5.81	5.95	2.90	3.61	4.61	7.19	7.88	8.34
90	002	MOTTLED SCULPIN	*Cottus bairdi*	P299min	Wadeable	5	6.26	5.97	5.74	5.19	5.19	5.45	6.49	7.07	7.07
43	020	EMERALD SHINER	*Notropis atherinoides*	P299min	Wadeable	42	6.33	5.18	5.93	1.56	2.01	3.78	6.77	7.47	7.75
40	011	SHORTHEAD REDHORSE	*Moxostoma macrolepidotum*	P299min	Wadeable	89	6.35	6.12	6.30	2.26	3.90	5.15	7.27	7.89	8.43
43	006	SILVER CHUB	*Macrhybopsis storeriana*	P299min	Wadeable	14	6.37	6.11	6.59	4.13	4.13	4.66	6.87	7.47	7.47
01	007	AMER BROOK LAMPREY	*Lampetra appendix*	P299min	Wadeable	5	6.47	6.74	6.49	5.55	5.55	6.15	7.35	8.25	8.25
43	027	RIVER SHINER	*Notropis blennius*	P299min	Wadeable	10	6.54	6.56	7.27	3.78	3.78	6.67	7.47	7.59	7.59
43	026	COMMON SHINER	*Luxilus cornutus*	P299min	Wadeable	49	6.85	6.76	6.97	4.39	4.66	5.55	7.77	8.34	8.53
43	011	WESTERN BLACKNOSE DACE	*Rhinichthys atratulus obtusus*	P299min	Wadeable	28	7.16	7.06	7.68	4.24	4.75	6.30	7.89	8.40	8.64
40	007	HIGHFIN CARPSUCKER	*Carpiodes velifer*	P299min	Wadeable	13	7.18	7.57	7.47	4.23	4.23	6.97	7.80	9.65	13.61
43	012	LONGNOSE DACE	*Rhinichthys cataractae*	P299min	Wadeable	8	7.89	7.66	7.77	7.19	7.19	7.48	7.85	7.93	7.93

Appendix 3. Weighted Stressor Values (WSVs) for 5th percentile dissolved oxygen for macroinvertebrate taxa.

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
84030	*Parachironomus directus*	MT	Mindo5th	Boatable	6	3.50	3.50	3.47	2.87	2.87	2.87	3.72	4.51	4.60
59570	*Oecetis nocturna*	F	Mindo5th	Boatable	5	3.66	3.79	4.28	1.43	1.43	2.53	4.88	5.73	5.73
77355	*Clinotanypus pinguis*	MT	Mindo5th	Boatable	7	3.74	4.53	3.62	0.78	1.20	2.87	6.46	9.13	9.67
83051	*Dicrotendipes simpsoni*	T	Mindo5th	Boatable	6	3.89	3.78	3.73	2.87	2.87	2.89	4.45	4.95	5.01
83045	*Dicrotendipes nervosus*		Mindo5th	Boatable	12	3.93	4.04	4.49	0.85	1.24	2.88	5.31	6.25	6.28
59550	*Oecetis inconspicua complex sp A (sensu Floyd, 1995)*	F	Mindo5th	Boatable	8	3.99	4.19	4.10	2.87	2.90	3.24	5.05	5.82	5.86
83050	*Dicrotendipes lucifer*	MT	Mindo5th	Boatable	7	4.02	4.21	4.45	0.78	1.29	3.57	5.22	6.16	6.36
84790	*Tribelos fuscicorne*	F	Mindo5th	Boatable	39	4.27	5.32	5.47	2.32	2.91	4.11	6.33	7.82	8.69
72700	*Anopheles sp*	F	Mindo5th	Boatable	13	4.29	4.95	4.38	1.65	2.58	3.41	6.52	7.38	9.24
83300	*Glyptotendipes (G.) sp*	MT	Mindo5th	Boatable	49	4.39	5.17	5.37	2.23	3.05	4.31	6.36	6.96	7.16
81200	*Nanocladius sp*	F	Mindo5th	Boatable	5	4.42	4.52	4.62	3.31	3.31	4.11	5.02	5.37	5.37
04601	*Glossiphoniidae*	MT	Mindo5th	Boatable	6	4.49	4.52	4.41	2.87	2.87	2.89	5.60	6.79	6.92
83700	*Microchironomus sp*	MT	Mindo5th	Boatable	8	4.54	4.16	4.41	0.78	1.41	3.31	5.41	6.27	6.28
03600	*Oligochaeta*	T	Mindo5th	Boatable	99	4.58	5.41	5.51	2.87	3.38	4.60	6.43	6.96	7.28
79020	*Tanypus neopunctipennis*	T	Mindo5th	Boatable	8	4.61	5.00	4.70	2.87	3.10	3.67	6.48	7.19	7.38
72501	*Culicidae*	MT	Mindo5th	Boatable	6	4.63	4.83	4.46	3.62	3.66	4.06	6.10	6.26	6.28
78650	*Procladius sp*	MT	Mindo5th	Boatable	77	4.65	5.42	5.48	2.87	3.04	4.39	6.42	6.96	8.08
08451	*Palaemonetes kadiakensis*	F	Mindo5th	Boatable	8	4.68	4.40	4.69	1.43	2.06	3.62	5.48	6.04	6.23
68300	*Cyphon sp*	MT	Mindo5th	Boatable	7	4.69	4.93	5.29	3.52	3.52	3.90	5.61	6.01	6.10
82201	*Tvetenia sp*	MI	Mindo5th	Boatable	5	4.70	5.97	6.01	4.42	4.42	5.13	6.92	7.26	7.26
11200	*Callibaetis sp*	MT	Mindo5th	Boatable	17	4.73	4.73	4.36	2.90	3.03	3.60	5.49	6.98	7.24
84020	*Parachironomus carinatus*	F	Mindo5th	Boatable	10	4.74	5.02	5.49	1.43	2.37	3.72	6.36	6.75	6.76
84800	*Tribelos jucundum*	MT	Mindo5th	Boatable	29	4.77	5.17	5.43	2.23	2.62	3.93	6.26	7.08	8.95
95100	*Physella sp*	T	Mindo5th	Boatable	54	4.84	5.48	5.47	2.87	3.25	4.61	6.46	6.98	7.44
22700	*Ischnura sp*		Mindo5th	Boatable	7	4.84	4.91	4.89	4.36	4.40	4.59	5.29	5.49	5.51
84520	*Polypedilum (Tripodura) halterale group*	MT	Mindo5th	Boatable	44	4.85	5.21	5.45	2.35	2.96	4.52	6.24	6.88	6.95
74501	*Ceratopogonidae*	T	Mindo5th	Boatable	15	4.87	4.94	5.35	2.42	2.87	4.11	6.17	6.56	6.58
11128	*Labiobaetis longipalpus*	MI	Mindo5th	Boatable	13	4.91	5.00	4.82	2.87	2.89	3.92	6.46	6.84	6.95
59500	*Oecetis sp*	F	Mindo5th	Boatable	8	4.92	5.06	5.19	3.29	3.52	4.30	5.64	6.56	6.92
51206	*Cyrnellus fraternus*	F	Mindo5th	Boatable	13	4.92	4.42	4.62	1.65	2.58	3.39	5.32	6.47	6.84
77115	*Ablabesmyia janta*	F	Mindo5th	Boatable	45	4.93	4.93	5.01	2.15	2.87	3.54	6.36	6.92	7.02
84700	*Stenochironomus sp*	F	Mindo5th	Boatable	52	4.93	5.33	5.64	2.44	3.19	4.47	6.39	6.78	6.93
06810	*Gammarus fasciatus*	F	Mindo5th	Boatable	10	4.94	5.69	5.91	3.52	3.97	4.83	6.56	6.99	7.11
86001	*Tabanidae*	F	Mindo5th	Boatable	6	4.99	4.88	4.86	3.29	3.37	4.06	5.79	6.37	6.44

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
94100	*Pleurocera sp*	MI	Mindo5th	Boatable	46	5.03	5.30	5.45	2.10	2.87	4.40	6.34	7.21	7.77
22325	*Argia tibialis*		Mindo5th	Boatable	49	5.11	5.41	5.67	2.89	3.30	4.25	6.38	6.95	7.46
84155	*Paralauterborniella nigrohalteralis*	F	Mindo5th	Boatable	15	5.11	4.63	4.38	2.52	3.29	3.73	5.80	6.57	6.84
83040	*Dicrotendipes neomodestus*	F	Mindo5th	Boatable	64	5.12	5.30	5.47	2.89	3.31	4.40	6.24	6.74	7.01
84785	*Tribelos atrum*		Mindo5th	Boatable	5	5.13	5.19	4.54	2.27	2.27	3.87	6.85	8.38	8.38
83400	*Harnischia sp*	F	Mindo5th	Boatable	28	5.13	5.24	5.40	2.96	3.39	4.41	5.96	6.87	7.11
82880	*Cryptotendipes sp*	F	Mindo5th	Boatable	26	5.16	5.01	4.96	2.89	3.32	4.06	6.10	6.84	6.92
85210	*Cladotanytarsus species group B*	MI	Mindo5th	Boatable	12	5.17	5.84	5.92	3.04	3.92	4.49	6.76	8.08	10.29
93200	*Hydrobiidae*	F	Mindo5th	Boatable	10	5.17	5.64	5.60	4.72	4.81	5.37	5.81	6.59	7.11
69410	*Stenelmis crenata*		Mindo5th	Boatable	13	5.19	5.95	5.77	2.59	3.97	5.37	7.14	7.43	7.99
84302	*Phaenopsectra punctipes*	F	Mindo5th	Boatable	10	5.19	4.92	5.27	2.97	3.13	4.45	5.60	6.08	6.37
06201	*Hyalella azteca*	F	Mindo5th	Boatable	46	5.21	5.62	5.74	2.97	3.79	5.34	6.34	7.10	7.25
13400	*Stenacron sp*	F	Mindo5th	Boatable	89	5.22	5.62	5.73	2.97	3.53	4.90	6.43	7.20	7.58
82600	*Axarus sp*	F	Mindo5th	Boatable	10	5.23	5.39	5.34	3.72	4.05	4.40	6.33	6.87	7.38
85800	*Tanytarsus sp*	F	Mindo5th	Boatable	74	5.25	5.28	5.48	2.49	2.96	4.36	6.34	6.97	7.33
17200	*Caenis sp*	F	Mindo5th	Boatable	59	5.27	5.63	5.97	2.87	3.30	4.36	6.75	7.28	8.30
84960	*Pseudochironomus sp*	F	Mindo5th	Boatable	9	5.27	5.51	5.78	3.31	3.61	4.69	6.61	6.85	6.92
85265	*Cladotanytarsus vanderwulpi group sp 5*	MI	Mindo5th	Boatable	8	5.28	5.55	5.74	4.99	5.01	5.10	5.84	6.01	6.07
97601	*Corbicula fluminea*	F	Mindo5th	Boatable	75	5.29	5.32	5.49	2.87	3.31	4.75	6.10	6.81	7.08
98001	*Pisidiidae*		Mindo5th	Boatable	56	5.29	5.39	5.59	2.53	3.00	4.52	6.35	6.90	7.35
52801	*Potamyia flava*	MI	Mindo5th	Boatable	17	5.30	6.04	6.08	3.28	4.16	4.96	6.86	7.49	9.56
52001	*Hydropsychidae*		Mindo5th	Boatable	23	5.32	6.02	6.34	3.65	4.79	5.35	6.78	7.24	7.56
68700	*Dubiraphia sp*	F	Mindo5th	Boatable	58	5.33	5.58	5.76	2.91	3.30	4.72	6.43	6.81	9.00
22300	*Argia sp*	F	Mindo5th	Boatable	72	5.37	5.61	5.56	3.00	3.60	4.67	6.43	7.02	8.80
57900	*Pycnopsyche sp*	MI	Mindo5th	Boatable	10	5.37	5.54	5.77	2.97	3.26	4.94	6.75	7.03	7.29
08200	*Orconectes sp*	F	Mindo5th	Boatable	31	5.38	5.71	5.82	3.56	4.48	5.29	6.58	6.97	7.23
78100	*Labrundinia sp*	F	Mindo5th	Boatable	5	5.39	5.48	5.39	4.72	4.72	4.94	5.86	6.73	6.73
98200	*Pisidium sp*	MT	Mindo5th	Boatable	10	5.40	5.74	5.61	3.52	4.25	5.16	6.87	7.25	7.26
82820	*Cryptochironomus sp*	F	Mindo5th	Boatable	83	5.40	5.49	5.51	2.89	3.47	4.47	6.56	7.12	8.21
53800	*Hydroptila sp*	F	Mindo5th	Boatable	34	5.40	5.42	5.60	3.04	4.06	4.72	6.21	6.89	7.23
96900	*Ferrissia sp*	F	Mindo5th	Boatable	7	5.40	5.32	5.77	2.89	3.19	4.63	5.96	6.78	6.97
84400	*Polypedilum sp*		Mindo5th	Boatable	16	5.41	5.65	5.86	2.58	3.42	5.12	6.59	7.21	7.28
77100	*Ablabesmyia sp*		Mindo5th	Boatable	5	5.42	5.09	4.72	4.40	4.40	4.51	5.39	6.87	6.87
52500	*Hydropsyche sp*		Mindo5th	Boatable	5	5.44	5.60	5.29	4.72	4.72	4.86	6.17	7.29	7.29

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
77120	*Ablabesmyia mallochi*	F	Mindo5th	Boatable	73	5.45	5.57	5.73	2.91	3.47	4.44	6.47	7.18	8.86
86200	*Tabanus sp*	F	Mindo5th	Boatable	6	5.46	4.91	4.86	1.43	1.53	2.39	6.28	9.33	9.67
68201	*Scirtidae*	F	Mindo5th	Boatable	7	5.48	4.59	4.40	2.87	2.87	3.27	5.77	6.20	6.28
68601	*Ancyronyx variegata*	F	Mindo5th	Boatable	24	5.50	5.57	5.93	2.98	3.53	4.56	6.49	6.97	7.32
84040	*Parachironomus frequens*	F	Mindo5th	Boatable	16	5.52	5.80	5.54	3.00	3.38	4.53	6.56	8.85	10.17
84210	*Paratendipes albimanus or P. duplicatus*	F	Mindo5th	Boatable	5	5.52	6.16	5.82	4.89	4.89	5.26	6.84	8.38	8.38
82730	*Chironomus (C.) decorus group*	T	Mindo5th	Boatable	7	5.52	5.58	5.73	5.04	5.11	5.40	5.79	5.86	5.87
82100	*Thienemanniella sp*		Mindo5th	Boatable	7	5.55	5.47	5.44	4.42	4.48	4.88	5.98	6.49	6.59
26700	*Macromia sp*	MI	Mindo5th	Boatable	9	5.55	5.86	5.57	0.78	1.66	4.28	7.64	10.26	10.66
78599	*Pentaneura sp*	F	Mindo5th	Boatable	5	5.56	5.73	5.44	5.34	5.34	5.36	6.03	6.70	6.70
01801	*Turbellaria*	F	Mindo5th	Boatable	29	5.56	5.51	5.39	4.53	4.66	5.01	5.80	6.67	6.89
84540	*Polypedilum (Tripodura) scalaenum group*	F	Mindo5th	Boatable	44	5.57	5.20	5.42	3.30	3.99	4.43	5.87	6.39	6.79
77750	*Hayesomyia senata or Thienemannimyia norena*	F	Mindo5th	Boatable	11	5.57	5.54	5.54	4.99	5.02	5.24	5.79	5.95	6.06
84580	*Robackia demeijerei*	MI	Mindo5th	Boatable	8	5.57	6.11	6.30	4.04	4.56	5.98	6.72	6.79	6.81
59100	*Ceraclea sp*	MI	Mindo5th	Boatable	8	5.57	5.75	6.23	3.31	3.70	4.77	6.59	7.29	7.51
11250	*Neocloeon sp. (Centroptilum sp, w/o hindwing pads)*	MI	Mindo5th	Boatable	39	5.59	5.74	6.08	3.06	3.41	4.70	6.74	7.29	8.30
77001	*Tanypodinae*		Mindo5th	Boatable	15	5.60	5.76	5.82	2.80	4.40	5.00	6.57	6.99	8.03
85500	*Paratanytarsus sp*	F	Mindo5th	Boatable	16	5.60	5.95	5.93	3.33	4.17	4.40	6.53	8.23	9.98
04935	*Erpobdella punctata punctata*	MT	Mindo5th	Boatable	6	5.62	5.27	5.56	1.43	1.72	4.28	7.29	7.49	7.51
69400	*Stenelmis sp*	F	Mindo5th	Boatable	104	5.63	5.65	5.74	2.94	3.55	5.00	6.43	6.99	7.60
52520	*Hydropsyche bidens*	MI	Mindo5th	Boatable	22	5.63	5.86	6.08	3.28	3.89	5.39	6.80	7.22	7.68
78140	*Labrundinia pilosella*	F	Mindo5th	Boatable	12	5.65	5.42	5.40	1.00	2.31	3.83	6.65	8.97	9.03
58505	*Helicopsyche borealis*	MI	Mindo5th	Boatable	8	5.66	6.24	5.72	5.22	5.28	5.45	6.34	8.74	9.67
84460	*Polypedilum (P.) fallax group*	F	Mindo5th	Boatable	7	5.67	5.74	6.70	2.39	2.72	4.68	6.76	6.94	6.99
81825	*Rheocricotopus (Psilocricotopus) robacki*	F	Mindo5th	Boatable	7	5.67	5.60	5.74	4.42	4.61	5.47	5.98	6.06	6.07
07850	*Cambarus (Lacunicambarus) diogenes diogenes*	T	Mindo5th	Boatable	9	5.69	5.37	6.21	2.97	3.19	3.67	6.47	6.68	6.75
80510	*Cricotopus (Isocladius) sylvestris group*	T	Mindo5th	Boatable	5	5.69	5.82	5.70	5.35	5.35	5.37	6.07	6.87	6.87
84060	*Parachironomus pectinatellae*	MI	Mindo5th	Boatable	7	5.70	5.70	6.10	4.36	4.38	4.59	6.23	7.26	7.51
84470	*Polypedilum (P.) illinoense*	T	Mindo5th	Boatable	101	5.71	5.57	5.73	2.94	3.59	4.70	6.48	7.04	7.44
84450	*Polypedilum (Uresipedilum) flavum*	F	Mindo5th	Boatable	90	5.71	5.73	5.76	3.31	4.10	5.04	6.54	7.07	7.51
77500	*Conchapelopia sp*	F	Mindo5th	Boatable	7	5.73	5.80	5.74	4.54	4.58	4.77	6.76	7.19	7.29
22001	*Coenagrionidae*	T	Mindo5th	Boatable	8	5.73	5.53	5.47	4.89	4.94	5.21	5.76	6.26	6.46
80410	*Cricotopus (C.) sp*	F	Mindo5th	Boatable	11	5.74	5.86	5.70	4.73	4.83	5.20	6.39	7.33	8.05
11400	*Centroptilum sp or Procloeon sp (formerly in Cloeon)*	F	Mindo5th	Boatable	12	5.74	5.88	5.74	3.67	4.37	5.10	6.58	7.53	8.74

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
11100	*Baetis sp*	F	Mindo5th	Boatable	16	5.76	5.82	5.82	4.15	4.45	5.14	6.68	7.20	7.25
13521	*Stenonema femoratum*	F	Mindo5th	Boatable	11	5.76	5.63	5.77	3.35	3.75	5.30	6.32	6.98	7.22
84300	*Phaenopsectra obediens group*	F	Mindo5th	Boatable	15	5.76	5.49	6.04	3.06	3.31	4.37	6.41	7.15	7.32
22600	*Enallagma sp*		Mindo5th	Boatable	32	5.77	5.56	5.43	3.02	3.66	4.90	6.22	7.13	8.89
87540	*Hemerodromia sp*	F	Mindo5th	Boatable	8	5.79	6.08	6.35	4.62	4.84	5.59	6.66	6.79	6.80
80420	*Cricotopus (C.) bicinctus*	T	Mindo5th	Boatable	34	5.84	6.09	5.94	4.51	5.03	5.39	6.92	7.30	7.97
84600	*Saetheria sp*	F	Mindo5th	Boatable	10	5.84	5.86	6.11	2.27	3.15	4.89	6.74	8.25	8.38
79100	*Thienemannimyia group*	F	Mindo5th	Boatable	86	5.85	5.76	5.84	2.95	4.04	4.94	6.59	7.15	8.49
18100	*Anthopotamus sp*	MI	Mindo5th	Boatable	16	5.85	6.44	5.77	4.95	5.02	5.47	7.05	9.03	9.48
93900	*Elimia sp*	MI	Mindo5th	Boatable	27	5.85	5.62	5.51	3.03	5.02	5.38	6.27	7.17	7.26
68075	*Psephenus herricki*	MI	Mindo5th	Boatable	12	5.86	6.36	5.94	5.22	5.27	5.59	6.58	7.97	10.28
85625	*Rheotanytarsus sp*	F	Mindo5th	Boatable	47	5.89	5.79	5.79	3.93	4.61	5.35	6.41	6.98	7.26
04960	*Erpobdella sp (= Mooreobdella)*	MT	Mindo5th	Boatable	8	5.91	6.06	5.63	4.83	4.95	5.32	7.25	7.28	7.29
82710	*Chironomus (C.) sp*	MT	Mindo5th	Boatable	72	5.91	5.58	5.79	2.87	3.30	4.40	6.65	7.22	8.35
11020	*Acerpenna pygmaea*	MI	Mindo5th	Boatable	13	5.92	5.84	5.67	3.27	4.55	5.31	6.55	7.25	7.28
51300	*Neureclipsis sp*	MI	Mindo5th	Boatable	25	5.92	6.00	6.21	4.12	4.62	5.38	6.71	6.81	7.12
76001	*Chironomidae*		Mindo5th	Boatable	6	5.95	5.94	6.46	2.27	2.58	5.34	6.73	8.21	8.38
11150	*Labiobaetis propinquus*	MI	Mindo5th	Boatable	18	5.95	5.96	6.35	3.34	4.30	5.39	6.75	7.07	7.27
11620	*Paracloeodes minutus*	MI	Mindo5th	Boatable	10	5.96	5.55	5.82	3.55	4.09	4.99	6.24	6.53	6.70
68901	*Macronychus glabratus*	F	Mindo5th	Boatable	65	5.96	5.88	5.97	3.30	4.28	5.43	6.56	7.11	7.77
68708	*Dubiraphia vittata group*	F	Mindo5th	Boatable	13	5.96	5.67	5.73	4.89	4.90	5.13	5.92	6.60	6.82
11130	*Baetis intercalaris*	F	Mindo5th	Boatable	93	5.97	5.79	5.81	2.91	4.12	5.31	6.57	7.17	7.49
24900	*Gomphus sp*	F	Mindo5th	Boatable	36	5.97	5.95	5.91	3.15	4.07	5.06	6.65	7.36	9.45
16700	*Tricorythodes sp*	MI	Mindo5th	Boatable	98	5.97	5.95	5.87	3.85	4.45	5.34	6.59	7.21	8.27
18619	*Ephemera simulans*	MI	Mindo5th	Boatable	6	5.99	7.39	6.42	5.47	5.50	5.73	9.67	10.56	10.66
22315	*Argia moesta*		Mindo5th	Boatable	12	5.99	6.04	5.94	3.41	3.99	5.34	6.65	7.90	9.41
13510	*Maccaffertium exiguum*	MI	Mindo5th	Boatable	39	6.00	6.09	6.21	3.77	4.33	5.39	6.73	7.20	8.64
52200	*Cheumatopsyche sp*	F	Mindo5th	Boatable	106	6.00	5.81	5.79	3.24	4.16	5.19	6.58	7.23	8.17
52570	*Hydropsyche simulans*	MI	Mindo5th	Boatable	66	6.02	5.81	5.88	3.55	4.14	4.90	6.58	7.23	7.69
24510	*ERPETOGOMPHUS DESIGNATUS*	F	Mindo5th	Boatable	10	6.03	5.97	6.25	2.87	3.88	5.73	6.81	7.06	7.15
82501	*Chironomini*		Mindo5th	Boatable	25	6.03	6.09	6.01	3.87	4.89	5.49	6.83	7.26	8.18
26705	*Macromia illinoiensis*	F	Mindo5th	Boatable	28	6.05	6.00	6.00	2.96	3.91	5.36	6.74	7.35	9.12
13561	*Maccaffertium pulchellum*	MI	Mindo5th	Boatable	42	6.05	6.19	6.20	3.85	4.12	5.39	6.75	7.85	9.29
82141	*Thienemanniella xena*	F	Mindo5th	Boatable	8	6.06	6.28	5.70	4.15	4.35	5.10	6.90	9.54	10.66

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
85200	*Cladotanytarsus sp*		Mindo5th	Boatable	28	6.08	5.80	6.03	3.86	4.12	5.13	6.59	6.93	7.35
21200	*Calopteryx sp*	F	Mindo5th	Boatable	5	6.09	5.87	6.04	4.72	4.72	5.52	6.24	6.75	6.75
98600	*Sphaerium sp*	F	Mindo5th	Boatable	23	6.10	5.91	5.71	4.66	4.86	5.35	6.75	7.24	7.27
05800	*Caecidotea sp*	T	Mindo5th	Boatable	31	6.11	6.24	6.10	4.73	5.06	5.77	6.80	7.19	8.32
12501	*Heptageniidae*		Mindo5th	Boatable	21	6.11	6.12	6.54	3.71	5.13	5.66	6.80	7.25	7.27
13500	*Maccaffertium sp*	MI	Mindo5th	Boatable	36	6.13	5.87	5.93	3.53	4.63	5.41	6.77	7.24	7.28
52530	*Hydropsyche depravata group*	F	Mindo5th	Boatable	11	6.13	6.45	6.21	4.30	4.48	5.45	7.12	9.14	10.53
18750	*Hexagenia limbata*	F	Mindo5th	Boatable	20	6.16	5.39	5.54	1.59	2.68	4.50	6.55	7.25	8.21
13120	*Nixe perfida*	MI	Mindo5th	Boatable	17	6.17	6.57	6.42	5.34	5.40	5.96	6.77	8.63	9.41
08240	*Orconectes (Crokerinus) propinquus*	F	Mindo5th	Boatable	22	6.18	6.34	6.09	4.54	4.69	5.42	6.97	8.00	10.06
59407	*Nectopsyche candida*	MI	Mindo5th	Boatable	52	6.19	5.82	5.83	3.03	4.05	5.25	6.50	7.12	7.50
80440	*Cricotopus (C.) trifascia*	F	Mindo5th	Boatable	18	6.19	6.41	6.49	4.71	5.18	6.04	6.99	7.28	7.79
74100	*Simulium sp*	F	Mindo5th	Boatable	60	6.19	6.28	6.16	4.67	5.05	5.41	6.81	7.33	8.53
21300	*Hetaerina sp*	F	Mindo5th	Boatable	26	6.21	6.15	6.09	4.61	5.23	5.43	6.44	6.75	9.29
80470	*Cricotopus (C.) or Orthocladius (O.) sp*		Mindo5th	Boatable	26	6.24	5.85	6.02	3.39	4.44	4.90	6.54	7.34	8.49
24501	*Gomphidae*	F	Mindo5th	Boatable	13	6.25	5.87	6.21	3.29	3.31	5.29	6.74	6.88	7.29
12200	*Isonychia sp*	MI	Mindo5th	Boatable	46	6.35	6.33	6.29	4.02	5.23	5.71	6.81	7.37	9.09
83150	*Endochironomus sp*	MT	Mindo5th	Boatable	5	6.35	5.15	5.22	2.87	2.87	3.18	7.03	7.51	7.51
52540	*Hydropsyche dicantha*	MI	Mindo5th	Boatable	14	6.37	6.45	6.32	2.69	4.19	5.31	7.11	9.76	10.46
13000	*Leucrocuta sp*	MI	Mindo5th	Boatable	18	6.38	6.17	6.22	4.22	5.25	5.71	6.75	7.25	7.78
80001	*Orthocladiinae*		Mindo5th	Boatable	8	6.43	6.46	6.47	4.90	5.05	5.61	7.13	8.04	8.38
59410	*Nectopsyche diarina*	MI	Mindo5th	Boatable	8	6.43	6.71	6.66	5.31	5.35	5.90	6.78	8.81	9.67
55510	*Brachycentrus sp*	MI	Mindo5th	Boatable	5	6.43	6.34	6.54	5.77	5.77	5.95	6.62	6.80	6.80
51600	*Polycentropus sp*	MI	Mindo5th	Boatable	11	6.48	6.61	6.18	5.32	5.36	5.73	6.66	9.23	9.63
11001	*Baetidae*		Mindo5th	Boatable	20	6.49	6.40	6.56	5.01	5.31	5.74	6.90	7.27	7.71
23909	*Boyeria vinosa*	F	Mindo5th	Boatable	33	6.49	6.22	6.10	4.07	4.61	5.50	6.73	7.51	9.56
25600	*Stylurus sp*	MI	Mindo5th	Boatable	12	6.49	6.05	6.26	4.15	4.24	5.30	6.93	7.09	7.34
84750	*Stictochironomus sp*	F	Mindo5th	Boatable	18	6.54	6.03	6.06	3.88	4.42	5.42	6.58	7.89	8.78
19100	*Ephoron sp*	MI	Mindo5th	Boatable	6	6.57	6.33	6.45	5.71	5.74	6.01	6.58	6.78	6.80
06700	*Crangonyx sp*	MT	Mindo5th	Boatable	5	6.57	6.49	5.79	3.52	3.52	5.18	7.72	10.66	10.66
13570	*Maccaffertium terminatum*	MI	Mindo5th	Boatable	47	6.58	6.34	6.24	4.46	5.01	5.57	6.79	7.49	9.13
85001	*Tanytarsini*		Mindo5th	Boatable	12	6.61	6.39	6.06	5.34	5.38	5.47	7.05	8.20	8.35
30800	*Pteronarcys sp*	MI	Mindo5th	Boatable	6	6.66	7.03	6.47	5.77	5.79	6.01	6.80	10.27	10.66
12924	*Heptagenia flavescens*	MI	Mindo5th	Boatable	8	6.66	6.53	6.50	4.62	4.86	5.75	7.09	8.47	8.94

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
06800	*Gammarus sp*	F	Mindo5th	Boatable	29	6.66	6.02	5.82	4.96	5.09	5.46	6.58	7.06	7.32
12912	*Heptagenia diabasia*	F	Mindo5th	Boatable	6	6.68	6.53	6.73	5.67	5.75	6.44	6.76	6.86	6.87
52565	*Hydropsyche phalerata*	MI	Mindo5th	Boatable	7	6.73	6.68	7.11	5.29	5.38	6.03	7.26	7.28	7.29
08280	*Orconectes (Gremicambarus) virilis*	F	Mindo5th	Boatable	24	6.75	6.30	6.39	2.80	3.50	5.86	6.76	8.95	9.53
52401	*Ceratopsyche sp*	MI	Mindo5th	Boatable	24	6.85	6.59	6.23	4.64	5.28	5.78	7.12	9.02	9.96
11101	*Plauditus sp*	MI	Mindo5th	Boatable	8	6.86	6.65	6.81	5.44	5.54	6.17	7.25	7.28	7.29
71900	*Tipula sp*	F	Mindo5th	Boatable	7	6.96	7.25	6.99	6.59	6.63	6.82	7.28	8.61	8.94
47600	*Sialis sp*	MT	Mindo5th	Boatable	12	7.02	5.76	6.09	3.08	3.73	4.65	6.50	7.48	8.82
13030	*Leucrocuta maculipennis*	MI	Mindo5th	Boatable	16	7.03	7.05	6.43	5.35	5.39	5.90	8.16	9.60	10.36
25300	*Ophiogomphus sp*	MI	Mindo5th	Boatable	6	7.04	7.40	6.42	5.47	5.50	5.78	9.67	10.56	10.66
48410	*Corydalus cornutus*	MI	Mindo5th	Boatable	28	7.04	6.16	6.23	2.72	3.87	5.43	6.77	8.47	9.76
11120	*Baetis flavistriga*	F	Mindo5th	Boatable	23	7.05	6.51	6.34	5.18	5.38	5.86	6.81	8.17	8.58
68160	*HELICHUS LITHOPHILUS*	F	Mindo5th	Boatable	17	7.10	5.90	5.97	3.09	3.36	4.43	6.74	9.12	10.31
59970	*Petrophila sp*	MI	Mindo5th	Boatable	14	7.35	6.50	5.94	5.34	5.37	5.47	6.56	9.76	10.46
06840	*Gammarus pseudolimnaeus*	F	Mindo5th	Boatable	14	7.40	6.28	6.32	4.59	5.24	5.77	6.76	7.24	8.12
19102	*Ephoron album*	MI	Mindo5th	Boatable	13	7.41	6.07	6.18	3.80	4.88	5.37	6.51	7.19	8.61
04964	*Erpobdella microstoma*	MT	Mindo5th	Boatable	6	7.46	6.67	6.51	2.39	2.79	6.42	7.51	10.35	10.66
52431	*Ceratopsyche morosa*	MI	Mindo5th	Boatable	5	7.49	6.31	6.54	4.89	4.89	5.27	6.97	8.12	8.12
78510	*Paramerina sp 1*	MI	Mindo5th	Boatable	6	7.59	7.25	6.78	4.90	4.94	5.33	9.04	10.50	10.66
27404	*Neurocordulia molesta*	F	Mindo5th	Boatable	6	7.63	6.89	6.85	2.87	3.25	6.70	7.38	10.33	10.66
34300	*Neoperla clymene complex*	I	Mindo5th	Boatable	8	7.66	6.78	6.24	5.31	5.34	5.55	8.16	9.01	9.04
83840	*Microtendipes pedellus group*	F	Mindo5th	Boatable	8	7.80	6.76	6.55	5.33	5.35	5.87	7.48	8.77	8.94
50315	*Chimarra obscura*	MI	Mindo5th	Boatable	12	8.14	7.07	6.54	5.39	5.44	5.75	8.10	9.96	10.56
84020	*Parachironomus carinatus*	F	P299mean	Boatable	10	5.41	5.97	6.65	1.67	2.53	4.69	7.37	7.98	8.29
84030	*Parachironomus directus*	MT	P299mean	Boatable	6	5.45	5.15	4.99	3.39	3.51	4.62	6.31	6.58	6.61
11128	*Labiobaetis longipalpus*	MI	P299mean	Boatable	13	5.52	7.07	7.35	4.63	4.67	6.80	7.90	8.26	8.79
59550	*Oecetis inconspicua complex sp A (sensu Floyd, 1995)*	F	P299mean	Boatable	8	5.66	5.84	5.53	3.94	4.18	4.86	6.74	8.00	8.53
82730	*Chironomus (C.) decorus group*	T	P299mean	Boatable	7	5.69	6.46	6.07	5.42	5.49	5.77	6.20	9.09	9.80
72700	*Anopheles sp*	F	P299mean	Boatable	13	5.73	6.82	6.84	2.01	3.49	5.41	8.71	9.42	9.92
98200	*Pisidium sp*	MT	P299mean	Boatable	10	5.81	6.92	6.27	5.00	5.08	5.56	8.18	9.42	10.08
52801	*Potamyia flava*	MI	P299mean	Boatable	17	5.92	7.65	7.37	4.64	4.97	6.73	8.79	9.97	10.50
83051	*Dicrotendipes simpsoni*	T	P299mean	Boatable	6	5.94	5.58	5.62	3.39	3.52	4.72	6.74	7.29	7.35
85265	*Cladotanytarsus vanderwulpi group sp 5*	MI	P299mean	Boatable	8	5.97	6.00	6.08	5.16	5.33	5.79	6.31	6.43	6.44
79020	*Tanypus neopunctipennis*	T	P299mean	Boatable	8	5.97	6.53	6.02	4.72	4.88	5.48	7.52	8.95	9.50

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
57900	*Pycnopsyche sp*	MI	P299mean	Boatable	10	5.99	6.94	6.74	3.94	4.92	5.93	7.89	9.44	10.89
84790	*Tribelos fuscicorne*	F	P299mean	Boatable	39	6.08	6.91	6.45	4.18	4.64	5.43	8.65	9.45	11.19
84785	*Tribelos atrum*		P299mean	Boatable	5	6.09	5.93	7.11	1.66	1.66	3.85	7.88	8.72	8.72
77355	*Clinotanypus pinguis*	MT	P299mean	Boatable	7	6.09	6.46	5.90	4.62	4.64	4.85	7.55	9.57	10.03
08451	*Palaemonetes kadiakensis*	F	P299mean	Boatable	8	6.10	6.01	6.38	1.67	2.67	5.36	7.20	8.27	8.53
69410	*Stenelmis crenata*		P299mean	Boatable	13	6.11	7.66	8.18	2.10	4.00	7.58	8.70	9.36	10.60
77750	*Hayesomyia senata or Thienemannimyia norena*	F	P299mean	Boatable	11	6.25	6.15	6.07	5.17	5.32	5.60	6.35	7.36	8.63
83045	*Dicrotendipes nervosus*		P299mean	Boatable	12	6.26	6.19	6.60	1.97	3.78	4.99	7.57	8.10	8.80
52001	*Hydropsychidae*		P299mean	Boatable	23	6.28	7.81	8.18	3.56	5.50	7.26	9.01	9.56	10.50
59570	*Oecetis nocturna*	F	P299mean	Boatable	5	6.31	5.84	6.78	1.67	1.67	5.37	6.93	7.35	7.35
84400	*Polypedilum sp*		P299mean	Boatable	16	6.34	7.06	7.36	2.18	3.51	5.76	8.66	10.19	10.71
77115	*Ablabesmyia janta*	F	P299mean	Boatable	45	6.36	6.52	6.73	3.80	4.24	5.36	7.52	7.97	9.00
86001	*Tabanidae*	F	P299mean	Boatable	6	6.38	6.37	5.75	5.36	5.36	5.36	6.73	9.01	9.26
86200	*Tabanus sp*	F	P299mean	Boatable	6	6.38	5.84	5.88	1.67	1.92	4.13	7.48	9.78	10.03
06810	*Gammarus fasciatus*	F	P299mean	Boatable	10	6.39	7.60	7.32	5.00	5.23	6.45	8.68	10.49	10.89
82600	*Axarus sp*	F	P299mean	Boatable	10	6.40	6.99	7.36	4.58	4.63	5.89	7.97	9.02	9.50
78650	*Procladius sp*	MT	P299mean	Boatable	77	6.42	7.21	7.11	4.36	5.05	5.92	8.00	9.48	10.50
83300	*Glyptotendipes (G.) sp*	MT	P299mean	Boatable	49	6.42	6.89	7.33	3.30	4.87	5.73	7.91	8.98	9.53
77001	*Tanypodinae*		P299mean	Boatable	15	6.42	6.95	7.24	2.39	4.58	5.89	8.15	9.37	10.06
84800	*Tribelos jucundum*	MT	P299mean	Boatable	29	6.44	6.53	6.73	1.67	4.02	5.36	7.44	8.76	11.93
83040	*Dicrotendipes neomodestus*	F	P299mean	Boatable	64	6.45	6.79	6.73	4.41	5.29	5.87	7.64	8.69	9.29
18100	*Anthopotamus sp*	MI	P299mean	Boatable	16	6.48	7.81	7.41	5.24	5.44	5.87	9.14	11.74	11.93
97601	*Corbicula fluminea*	F	P299mean	Boatable	75	6.51	6.85	6.87	4.32	5.16	5.94	7.81	8.68	9.17
84155	*Paralauterborniella nigrohalteralis*	F	P299mean	Boatable	15	6.57	6.62	6.87	2.50	5.00	5.43	7.96	9.02	9.28
04601	*Glossiphoniidae*	MT	P299mean	Boatable	6	6.60	6.60	6.90	4.72	4.77	5.25	7.91	7.94	7.94
94100	*Pleurocera sp*	MI	P299mean	Boatable	46	6.60	7.11	7.42	3.63	4.58	6.73	7.97	8.73	10.04
59100	*Ceraclea sp*	MI	P299mean	Boatable	8	6.61	6.96	6.72	3.39	4.14	6.20	8.16	9.84	10.09
68700	*Dubiraphia sp*	F	P299mean	Boatable	58	6.61	6.99	6.90	3.61	4.62	5.79	7.88	9.33	10.82
81825	*Rheocricotopus (Psilocricotopus) robacki*	F	P299mean	Boatable	7	6.61	6.97	6.73	6.07	6.08	6.24	7.60	8.18	8.29
22325	*Argia tibialis*		P299mean	Boatable	49	6.65	6.93	6.84	4.58	5.10	5.92	7.83	8.44	9.56
80510	*Cricotopus (Isocladius) sylvestris group*	T	P299mean	Boatable	5	6.66	7.22	6.34	5.73	5.73	5.82	8.59	10.08	10.08
83700	*Microchironomus sp*	MT	P299mean	Boatable	8	6.70	6.84	6.98	5.65	5.72	6.10	7.57	7.72	7.75
84960	*Pseudochironomus sp*	F	P299mean	Boatable	9	6.70	6.89	7.39	3.39	4.32	6.31	7.91	7.95	7.96
81200	*Nanocladius sp*	F	P299mean	Boatable	5	6.73	6.82	7.39	3.39	3.39	4.36	8.92	10.08	10.08

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
22300	*Argia sp*	F	P299mean	Boatable	72	6.74	7.25	7.34	4.58	5.22	6.27	7.92	9.49	10.66
03600	*Oligochaeta*	T	P299mean	Boatable	99	6.75	7.13	7.28	4.39	5.19	6.00	8.07	9.24	9.96
84040	*Parachironomus frequens*	F	P299mean	Boatable	16	6.76	7.39	6.79	3.76	4.62	6.04	8.25	11.81	12.79
11620	*Paracloeodes minutus*	MI	P299mean	Boatable	10	6.77	6.65	6.57	4.69	4.92	5.98	7.36	8.30	8.71
84540	*Polypedilum (Tripodura) scalaenum group*	F	P299mean	Boatable	44	6.77	6.75	6.72	4.71	5.32	5.74	7.63	8.54	8.79
26700	*Macromia sp*	MI	P299mean	Boatable	9	6.78	7.42	7.28	3.94	4.68	6.33	8.36	10.45	10.72
84700	*Stenochironomus sp*	F	P299mean	Boatable	52	6.81	7.02	7.30	4.14	4.87	6.16	7.82	8.86	10.00
84460	*Polypedilum (P.) fallax group*	F	P299mean	Boatable	7	6.81	6.80	6.84	4.13	4.44	5.97	8.00	8.62	8.71
68601	*Ancyronyx variegata*	F	P299mean	Boatable	24	6.83	6.78	6.91	3.70	5.28	5.95	7.72	8.11	9.33
74501	*Ceratopogonidae*	T	P299mean	Boatable	15	6.83	6.78	6.79	2.43	4.72	5.71	7.57	10.29	10.74
83400	*Harnischia sp*	F	P299mean	Boatable	28	6.83	7.03	7.28	5.15	5.36	5.84	7.77	8.93	9.41
82880	*Cryptotendipes sp*	F	P299mean	Boatable	26	6.84	6.92	7.05	5.15	5.36	6.07	7.66	8.08	9.28
85500	*Paratanytarsus sp*	F	P299mean	Boatable	16	6.84	7.44	7.23	4.66	5.73	6.71	8.54	8.72	10.12
78100	*Labrundinia sp*	F	P299mean	Boatable	5	6.84	6.96	7.28	5.79	5.79	6.51	7.41	7.66	7.66
85800	*Tanytarsus sp*	F	P299mean	Boatable	74	6.84	6.86	7.00	3.98	4.68	5.85	7.91	8.98	9.48
18619	*Ephemera simulans*	MI	P299mean	Boatable	6	6.85	8.07	7.20	6.51	6.54	6.78	10.03	10.65	10.72
07850	*Cambarus (Lacunicambarus) diogenes diogenes*	T	P299mean	Boatable	9	6.87	6.69	6.75	4.24	4.54	5.98	7.46	8.74	9.26
72501	*Culicidae*	MT	P299mean	Boatable	6	6.88	6.91	7.17	5.25	5.30	5.71	7.61	8.44	8.53
84520	*Polypedilum (Tripodura) halterale group*	MT	P299mean	Boatable	44	6.88	6.74	6.79	4.20	5.34	5.76	7.70	8.72	9.06
82201	*Tvetenia sp*	MI	P299mean	Boatable	5	6.92	8.48	8.18	6.68	6.68	7.74	9.54	10.08	10.08
95100	*Physella sp*	T	P299mean	Boatable	54	6.93	7.51	7.37	4.64	5.36	6.61	8.68	9.82	10.09
58505	*Helicopsyche borealis*	MI	P299mean	Boatable	8	6.97	7.60	7.43	6.12	6.24	6.64	8.25	9.58	10.03
69400	*Stenelmis sp*	F	P299mean	Boatable	104	7.00	7.13	7.12	4.20	4.97	5.95	7.98	9.26	10.42
11200	*Callibaetis sp*	MT	P299mean	Boatable	17	7.02	6.92	6.31	4.18	4.74	5.36	8.06	8.70	11.61
84600	*Saetheria sp*	F	P299mean	Boatable	10	7.02	7.10	7.33	1.66	3.97	6.71	8.72	9.17	9.37
85210	*Cladotanytarsus species group B*	MI	P299mean	Boatable	12	7.04	7.69	7.42	5.71	6.08	6.65	8.78	9.61	10.56
68201	*Scirtidae*	F	P299mean	Boatable	7	7.05	6.33	6.24	4.58	4.61	4.90	7.45	8.32	8.53
17200	*Caenis sp*	F	P299mean	Boatable	59	7.06	7.21	7.29	4.03	4.70	6.25	8.26	9.33	10.06
21200	*Calopteryx sp*	F	P299mean	Boatable	5	7.07	7.13	7.14	6.73	6.73	6.74	7.40	7.75	7.75
26705	*Macromia illinoiensis*	F	P299mean	Boatable	28	7.10	7.43	6.81	4.55	5.72	6.20	8.07	10.53	12.05
01801	*Turbellaria*	F	P299mean	Boatable	29	7.10	7.08	6.74	5.13	5.48	6.02	8.10	9.31	9.81
68901	*Macronychus glabratus*	F	P299mean	Boatable	65	7.11	7.20	7.11	4.28	5.42	6.26	8.01	9.37	10.40
83050	*Dicrotendipes lucifer*	MT	P299mean	Boatable	7	7.12	6.34	5.89	3.39	3.84	5.67	7.57	8.68	8.91
06201	*Hyalella azteca*	F	P299mean	Boatable	46	7.13	7.23	7.26	4.21	5.57	6.12	8.54	9.35	9.86

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
08200	*Orconectes sp*	F	P299mean	Boatable	31	7.14	7.49	7.76	4.60	5.47	6.66	8.47	9.27	10.24
84300	*Phaenopsectra obediens group*	F	P299mean	Boatable	15	7.15	6.86	7.03	3.60	4.24	5.95	7.95	8.54	9.26
82820	*Cryptochironomus sp*	F	P299mean	Boatable	83	7.16	7.15	7.11	4.46	5.12	6.08	7.96	9.16	10.05
84060	*Parachironomus pectinatellae*	MI	P299mean	Boatable	7	7.17	7.17	6.87	5.65	5.69	6.10	7.57	9.60	10.09
13400	*Stenacron sp*	F	P299mean	Boatable	89	7.17	7.28	7.33	4.23	5.36	6.21	8.01	9.26	10.12
22001	*Coenagrionidae*	T	P299mean	Boatable	8	7.19	8.18	8.64	5.74	6.04	7.03	9.29	9.67	9.80
05800	*Caecidotea sp*	T	P299mean	Boatable	31	7.19	7.57	7.82	5.48	6.01	6.74	8.58	9.30	9.78
22315	*Argia moesta*		P299mean	Boatable	12	7.19	7.30	7.20	3.66	5.30	6.64	8.25	9.49	9.95
59500	*Oecetis sp*	F	P299mean	Boatable	8	7.20	7.05	6.85	5.16	5.22	5.53	8.32	9.48	9.80
84302	*Phaenopsectra punctipes*	F	P299mean	Boatable	10	7.20	6.70	6.59	4.24	4.80	5.89	7.62	8.60	8.91
80420	*Cricotopus (C.) bicinctus*	T	P299mean	Boatable	34	7.20	7.51	7.62	5.59	5.73	6.24	8.74	9.36	9.48
12912	*Heptagenia diabasia*	F	P299mean	Boatable	6	7.21	7.83	7.71	6.75	6.75	6.84	8.71	9.20	9.26
51300	*Neureclipsis sp*	MI	P299mean	Boatable	25	7.21	7.56	7.33	5.19	5.71	6.09	8.79	9.37	10.44
98001	*Pisidiidae*		P299mean	Boatable	56	7.21	7.08	7.00	4.34	5.26	6.08	7.90	9.35	10.07
80410	*Cricotopus (C.) sp*	F	P299mean	Boatable	11	7.22	7.28	7.28	5.74	5.80	6.14	8.58	9.04	9.13
52520	*Hydropsyche bidens*	MI	P299mean	Boatable	22	7.23	7.38	7.58	4.66	5.46	6.27	8.59	8.99	9.22
85200	*Cladotanytarsus sp*		P299mean	Boatable	28	7.26	7.29	7.35	5.25	5.71	6.78	7.89	9.09	9.25
76001	*Chironomidae*		P299mean	Boatable	6	7.27	6.86	7.38	1.66	2.07	5.73	8.72	10.13	10.29
84580	*Robackia demeijerei*	MI	P299mean	Boatable	8	7.28	7.35	7.35	5.98	6.20	6.88	7.84	8.45	8.71
68300	*Cyphon sp*	MT	P299mean	Boatable	7	7.29	6.81	7.24	5.00	5.18	6.05	7.68	7.87	7.89
08240	*Orconectes (Crokerinus) propinquus*	F	P299mean	Boatable	22	7.29	7.50	7.33	5.41	6.33	6.78	7.99	8.99	10.31
68708	*Dubiraphia vittata group*	F	P299mean	Boatable	13	7.30	7.02	6.44	5.76	5.83	6.09	7.90	8.71	9.25
04960	*Erpobdella sp (= Mooreobdella)*	MT	P299mean	Boatable	8	7.31	7.42	7.80	5.46	5.66	6.68	8.08	8.58	8.76
77100	*Ablabesmyia sp*		P299mean	Boatable	5	7.31	6.99	7.39	4.58	4.58	6.61	7.73	8.10	8.10
16700	*Tricorythodes sp*	MI	P299mean	Boatable	98	7.34	7.54	7.38	5.24	5.74	6.51	8.54	9.46	10.55
84470	*Polypedilum (P.) illinoense*	T	P299mean	Boatable	101	7.34	7.26	7.29	4.65	5.36	6.12	8.10	9.30	10.08
77120	*Ablabesmyia mallochi*	F	P299mean	Boatable	73	7.34	7.33	7.37	4.04	5.20	6.42	8.06	9.42	10.86
87540	*Hemerodromia sp*	F	P299mean	Boatable	8	7.35	7.79	7.08	4.69	5.30	6.74	9.55	10.65	10.89
13510	*Maccaffertium exiguum*	MI	P299mean	Boatable	39	7.36	7.51	7.33	4.99	5.91	6.71	8.48	9.40	10.41
06700	*Crangonyx sp*	MT	P299mean	Boatable	5	7.38	7.32	6.78	5.00	5.00	6.30	8.21	10.72	10.72
79100	*Thienemannimyia group*	F	P299mean	Boatable	86	7.38	7.41	7.34	4.51	5.48	6.68	8.18	9.49	10.37
24510	*ERPETOGOMPHUS DESIGNATUS*	F	P299mean	Boatable	10	7.38	7.35	7.38	4.62	5.70	6.97	7.82	8.90	9.26
13561	*Maccaffertium pulchellum*	MI	P299mean	Boatable	42	7.39	7.53	7.33	5.09	5.84	6.71	8.10	9.66	11.20
84450	*Polypedilum (Uresipedilum) flavum*	F	P299mean	Boatable	90	7.42	7.27	7.08	4.58	5.26	6.09	8.29	9.65	10.29

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
52500	*Hydropsyche sp*		P299mean	Boatable	5	7.42	7.26	7.39	5.85	5.85	6.92	7.85	7.99	7.99
85625	*Rheotanytarsus sp*	F	P299mean	Boatable	47	7.45	7.22	7.11	5.09	5.59	6.15	8.13	9.01	9.84
82710	*Chironomus (C.) sp*	MT	P299mean	Boatable	72	7.45	7.44	7.38	4.63	5.33	6.38	8.54	9.41	10.27
82501	*Chironomini*		P299mean	Boatable	25	7.45	7.56	7.88	3.85	5.73	6.91	8.69	9.36	9.75
11150	*Labiobaetis propinquus*	MI	P299mean	Boatable	18	7.49	7.78	7.38	5.28	6.37	6.97	8.29	9.43	11.69
24501	*Gomphidae*	F	P299mean	Boatable	13	7.49	7.06	7.29	3.69	4.97	6.55	7.80	8.87	9.38
68075	*Psephenus herricki*	MI	P299mean	Boatable	12	7.49	7.76	7.59	6.16	6.39	6.90	8.32	9.70	10.58
04935	*Erpobdella punctata punctata*	MT	P299mean	Boatable	6	7.52	7.02	7.78	1.67	2.18	6.79	7.99	9.88	10.09
52570	*Hydropsyche simulans*	MI	P299mean	Boatable	66	7.53	7.49	7.35	4.66	5.73	6.73	8.18	9.49	10.75
53800	*Hydroptila sp*	F	P299mean	Boatable	34	7.54	7.29	7.34	3.56	5.25	6.51	8.53	9.41	10.03
24900	*Gomphus sp*	F	P299mean	Boatable	36	7.58	7.48	7.33	4.64	5.39	6.43	8.25	9.98	10.84
84750	*Stictochironomus sp*	F	P299mean	Boatable	18	7.62	7.98	7.74	6.08	6.74	7.11	8.72	10.01	11.27
06800	*Gammarus sp*	F	P299mean	Boatable	29	7.62	7.38	7.33	5.13	5.48	6.02	8.69	9.27	10.32
52200	*Cheumatopsyche sp*	F	P299mean	Boatable	106	7.62	7.32	7.26	4.51	5.36	6.27	8.29	9.37	10.37
22700	*Ischnura sp*		P299mean	Boatable	7	7.65	7.49	7.39	5.65	5.96	7.25	7.81	9.07	9.37
77500	*Conchapelopia sp*	F	P299mean	Boatable	7	7.65	7.65	7.61	6.07	6.31	7.31	8.07	8.93	9.13
80440	*Cricotopus (C.) trifascia*	F	P299mean	Boatable	18	7.65	7.80	7.90	5.96	6.20	6.68	8.76	9.22	10.24
11020	*Acerpenna pygmaea*	MI	P299mean	Boatable	13	7.67	7.47	7.80	4.49	5.57	6.56	8.26	9.22	9.25
22600	*Enallagma sp*		P299mean	Boatable	32	7.68	7.40	7.00	4.66	5.25	5.91	8.13	10.08	11.75
59407	*Nectopsyche candida*	MI	P299mean	Boatable	52	7.70	7.28	7.21	4.73	5.62	6.31	7.95	9.26	9.98
11250	*Neocloeon sp. (Centroptilum sp, w/o hindwing pads)*	MI	P299mean	Boatable	39	7.71	7.58	7.37	4.35	4.95	6.56	8.53	9.85	11.93
98600	*Sphaerium sp*	F	P299mean	Boatable	23	7.72	7.76	7.88	5.67	5.74	7.25	8.58	8.88	9.90
21300	*Hetaerina sp*	F	P299mean	Boatable	26	7.76	7.72	7.31	5.52	5.93	6.60	8.71	10.27	10.96
82100	*Thienemanniella sp*		P299mean	Boatable	7	7.79	7.99	7.83	6.39	6.45	6.83	8.98	9.89	10.08
12200	*Isonychia sp*	MI	P299mean	Boatable	46	7.81	7.96	7.84	5.21	6.00	6.78	8.76	10.26	11.10
52540	*Hydropsyche dicantha*	MI	P299mean	Boatable	14	7.81	7.65	7.76	2.25	4.29	6.51	8.97	10.74	10.86
93900	*Elimia sp*	MI	P299mean	Boatable	27	7.81	7.06	7.33	3.13	5.45	5.86	8.16	8.72	9.30
23909	*Boyeria vinosa*	F	P299mean	Boatable	33	7.81	7.34	7.14	5.41	5.77	6.57	7.86	9.42	10.62
11130	*Baetis intercalaris*	F	P299mean	Boatable	93	7.82	7.40	7.33	4.58	5.41	6.43	8.54	9.56	10.26
85001	*Tanytarsini*		P299mean	Boatable	12	7.82	7.88	8.07	5.79	6.16	7.22	8.70	9.02	9.12
51600	*Polycentropus sp*	MI	P299mean	Boatable	11	7.83	8.18	7.85	6.01	6.30	6.79	9.08	10.79	11.83
80001	*Orthocladiinae*		P299mean	Boatable	8	7.83	7.98	7.97	7.11	7.17	7.36	8.49	9.01	9.13
13120	*Nixe perfida*	MI	P299mean	Boatable	17	7.85	8.01	7.62	6.54	6.62	6.77	9.26	9.93	11.26
59410	*Nectopsyche diarina*	MI	P299mean	Boatable	8	7.85	8.18	7.75	6.75	6.93	7.49	9.08	9.76	10.03

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
25600	*Stylurus sp*	MI	P299mean	Boatable	12	7.85	7.35	7.00	5.48	6.23	6.73	7.84	9.41	9.49
18750	*Hexagenia limbata*	F	P299mean	Boatable	20	7.89	7.13	7.28	4.03	4.96	6.22	7.68	9.09	10.72
82141	*Thienemanniella xena*	F	P299mean	Boatable	8	7.92	8.13	7.94	5.46	5.83	7.08	9.41	10.53	10.72
11100	*Baetis sp*	F	P299mean	Boatable	16	7.93	7.99	7.74	6.33	6.48	6.74	8.89	10.01	10.65
83150	*Endochironomus sp*	MT	P299mean	Boatable	5	7.94	6.86	6.12	4.62	4.62	5.18	8.59	10.09	10.09
51206	*Cyrnellus fraternus*	F	P299mean	Boatable	13	7.96	6.61	7.05	2.11	4.03	5.90	7.91	8.61	8.86
74100	*Simulium sp*	F	P299mean	Boatable	60	7.96	8.12	7.87	5.99	6.55	7.19	9.00	10.09	10.81
12924	*Heptagenia flavescens*	MI	P299mean	Boatable	8	8.00	7.71	7.79	4.69	5.06	5.95	8.80	11.20	11.93
12501	*Heptageniidae*		P299mean	Boatable	21	8.02	8.07	8.10	4.45	6.95	7.58	9.05	9.74	10.56
13500	*Maccaffertium sp*	MI	P299mean	Boatable	36	8.03	7.49	7.71	3.78	5.49	7.08	8.57	9.33	10.05
13521	*Stenonema femoratum*	F	P299mean	Boatable	11	8.03	8.10	7.88	3.58	5.62	7.41	8.71	10.88	12.96
13570	*Maccaffertium terminatum*	MI	P299mean	Boatable	47	8.05	7.80	7.37	5.31	5.90	6.75	8.96	10.08	11.05
11400	*Centroptilum sp or Procloeon sp (formerly in Cloeon)*	F	P299mean	Boatable	12	8.10	7.87	7.63	5.93	5.96	6.81	8.60	10.13	11.67
93200	*Hydrobiidae*	F	P299mean	Boatable	10	8.12	7.60	7.15	5.85	6.12	6.73	8.68	9.94	10.08
80470	*Cricotopus (C.) or Orthocladius (O.) sp*		P299mean	Boatable	26	8.12	7.66	7.26	4.67	5.10	6.51	9.13	9.49	11.10
48410	*Corydalus cornutus*	MI	P299mean	Boatable	28	8.13	7.84	7.83	4.32	5.16	7.04	8.65	10.51	12.05
78599	*Pentaneura sp*	F	P299mean	Boatable	5	8.17	7.82	7.83	5.73	5.73	6.48	9.06	10.08	10.08
27404	*Neurocordulia molesta*	F	P299mean	Boatable	6	8.17	7.98	8.04	4.62	4.85	6.97	9.50	10.60	10.72
68160	*HELICHUS LITHOPHILUS*	F	P299mean	Boatable	17	8.19	7.22	7.37	3.58	4.33	6.18	8.06	9.88	10.48
25300	*Ophiogomphus sp*	MI	P299mean	Boatable	6	8.25	8.25	7.61	6.51	6.56	7.02	10.03	10.65	10.72
52565	*Hydropsyche phalerata*	MI	P299mean	Boatable	7	8.27	8.30	8.18	7.80	7.84	8.01	8.66	8.74	8.76
06840	*Gammarus pseudolimnaeus*	F	P299mean	Boatable	14	8.37	8.37	8.43	5.01	6.53	7.33	9.13	10.57	12.58
71900	*Tipula sp*	F	P299mean	Boatable	7	8.48	8.94	8.26	7.99	8.01	8.12	9.11	11.37	11.93
78140	*Labrundinia pilosella*	F	P299mean	Boatable	12	8.49	7.93	7.76	4.34	4.95	6.49	9.02	11.93	11.93
11101	*Plauditus sp*	MI	P299mean	Boatable	8	8.49	8.67	8.39	7.83	7.88	8.04	8.89	10.33	10.89
52431	*Ceratopsyche morosa*	MI	P299mean	Boatable	5	8.51	8.41	8.97	7.24	7.24	7.31	9.19	9.37	9.37
11001	*Baetidae*		P299mean	Boatable	20	8.65	8.46	8.57	6.42	7.17	7.82	9.03	10.13	10.89
11120	*Baetis flavistriga*	F	P299mean	Boatable	23	8.68	8.40	8.26	6.41	6.72	7.25	9.01	10.62	12.36
13000	*Leucrocuta sp*	MI	P299mean	Boatable	18	8.81	8.11	7.86	6.28	6.58	7.11	8.97	9.97	10.65
19100	*Ephoron sp*	MI	P299mean	Boatable	6	8.84	9.20	9.20	7.11	7.25	8.54	10.29	10.83	10.89
59970	*Petrophila sp*	MI	P299mean	Boatable	14	8.88	8.30	7.91	5.89	6.43	7.11	10.03	10.74	10.86
96900	*Ferrissia sp*	F	P299mean	Boatable	7	8.89	8.19	8.53	6.73	6.78	7.07	9.17	9.71	9.80
50315	*Chimarra obscura*	MI	P299mean	Boatable	12	8.91	8.47	8.14	6.56	6.87	7.24	9.29	11.08	11.81
04964	*Erpobdella microstoma*	MT	P299mean	Boatable	6	8.98	8.56	9.24	4.13	4.51	7.96	10.09	10.66	10.72

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
52401	*Ceratopsyche sp*	MI	P299mean	Boatable	24	9.03	8.01	7.83	5.30	6.47	7.02	8.89	10.74	11.20
08280	*Orconectes (Gremicambarus) virilis*	F	P299mean	Boatable	24	9.13	7.95	7.79	4.07	5.80	6.79	9.26	10.84	11.93
84210	*Paratendipes albimanus or P. duplicatus*	F	P299mean	Boatable	5	9.14	8.72	8.72	7.76	7.76	7.91	9.48	9.80	9.80
55510	*Brachycentrus sp*	MI	P299mean	Boatable	5	9.16	9.02	9.03	7.24	7.24	8.26	9.75	10.89	10.89
47600	*Sialis sp*	MT	P299mean	Boatable	12	9.17	7.35	7.16	4.01	4.39	5.75	8.68	10.78	11.77
30800	*Pteronarcys sp*	MI	P299mean	Boatable	6	9.25	9.17	9.20	7.05	7.21	8.59	10.29	10.68	10.72
13030	*Leucrocuta maculipennis*	MI	P299mean	Boatable	16	9.31	9.05	8.99	6.20	6.71	7.02	10.38	11.93	12.79
52530	*Hydropsyche depravata group*	F	P299mean	Boatable	11	9.34	8.27	7.29	4.79	5.90	6.75	9.47	11.69	13.03
19102	*Ephoron album*	MI	P299mean	Boatable	13	9.74	7.72	7.62	6.00	6.09	6.71	7.99	9.79	11.53
78510	*Paramerina sp 1*	MI	P299mean	Boatable	6	10.05	9.78	10.11	5.98	6.12	7.39	11.93	13.03	13.15
83840	*Microtendipes pedellus group*	F	P299mean	Boatable	8	10.07	9.22	8.34	7.11	7.15	7.29	11.11	12.79	13.15
34300	*Neoperla clymene complex*	I	P299mean	Boatable	8	10.23	9.35	8.90	7.62	7.66	8.02	10.72	11.93	11.93
84030	*Parachironomus directus*	MT	P299min	Boatable	6	3.06	3.04	3.22	1.76	1.84	2.56	3.44	4.00	4.06
77355	*Clinotanypus pinguis*	MT	P299min	Boatable	7	3.24	4.08	3.13	0.20	0.51	1.96	6.31	9.05	9.57
59570	*Oecetis nocturna*	F	P299min	Boatable	5	3.24	3.40	3.84	1.15	1.15	2.11	4.43	5.52	5.52
82600	*Axarus sp*	F	P299min	Boatable	10	3.38	4.40	3.92	2.03	2.68	3.44	5.84	6.51	6.96
81200	*Nanocladius sp*	F	P299min	Boatable	5	3.39	3.71	3.49	2.61	2.61	3.13	4.35	5.02	5.02
83051	*Dicrotendipes simpsoni*	T	P299min	Boatable	6	3.47	3.37	3.35	2.43	2.44	2.56	3.72	4.71	4.82
83045	*Dicrotendipes nervosus*		P299min	Boatable	12	3.50	3.58	4.03	0.30	0.87	2.50	4.93	5.40	6.02
59550	*Oecetis inconspicua complex sp A (sensu Floyd, 1995)*	F	P299min	Boatable	8	3.54	3.81	3.45	2.56	2.63	3.07	4.68	5.51	5.52
83050	*Dicrotendipes lucifer*	MT	P299min	Boatable	7	3.56	3.72	3.94	0.20	0.82	3.41	4.63	5.62	5.84
84790	*Tribelos fuscicorne*	F	P299min	Boatable	39	3.84	4.84	4.96	1.52	2.49	3.51	6.11	7.53	7.99
83300	*Glyptotendipes (G.) sp*	MT	P299min	Boatable	49	3.90	4.59	4.82	1.20	2.10	3.64	6.02	6.74	6.96
72700	*Anopheles sp*	F	P299min	Boatable	13	3.91	4.49	3.94	1.31	2.00	2.73	5.99	7.19	9.12
68300	*Cyphon sp*	MT	P299min	Boatable	7	3.91	4.36	4.56	2.21	2.44	3.60	5.15	5.66	5.79
08451	*Palaemonetes kadiakensis*	F	P299min	Boatable	8	3.98	3.89	4.11	1.15	1.81	3.40	4.93	5.07	5.09
93200	*Hydrobiidae*	F	P299min	Boatable	10	4.02	5.02	5.20	2.61	3.13	4.42	5.69	6.45	6.91
22700	*Ischnura sp*		P299min	Boatable	7	4.02	4.28	4.42	2.61	2.88	3.96	4.96	5.36	5.41
83700	*Microchironomus sp*	MT	P299min	Boatable	8	4.03	3.62	3.83	0.20	0.87	2.94	4.55	5.79	6.12
04601	*Glossiphoniidae*	MT	P299min	Boatable	6	4.06	4.12	3.90	2.43	2.44	2.56	5.09	6.66	6.83
03600	*Oligochaeta*	T	P299min	Boatable	99	4.08	4.92	5.15	1.96	2.55	3.90	6.03	6.74	7.05
52500	*Hydropsyche sp*		P299min	Boatable	5	4.08	4.87	4.56	2.61	2.61	3.97	6.04	7.08	7.08
84800	*Tribelos jucundum*	MT	P299min	Boatable	29	4.12	4.67	5.14	1.20	2.02	3.34	5.75	6.82	8.02
78650	*Procladius sp*	MT	P299min	Boatable	77	4.13	4.98	5.15	2.01	2.54	3.86	6.00	6.89	7.77

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
79020	*Tanypus neopunctipennis*	T	P299min	Boatable	8	4.14	4.47	4.31	2.56	2.73	3.29	5.52	6.68	6.96
96900	*Ferrissia sp*	F	P299min	Boatable	7	4.19	4.57	5.00	2.43	2.64	3.53	5.27	6.64	6.97
72501	*Culicidae*	MT	P299min	Boatable	6	4.20	4.44	3.95	3.13	3.17	3.49	6.03	6.11	6.12
11200	*Callibaetis sp*	MT	P299min	Boatable	17	4.22	4.19	3.94	1.92	2.26	3.04	5.11	6.50	6.91
95100	*Physella sp*	T	P299min	Boatable	54	4.23	4.98	5.20	1.96	2.46	3.87	6.08	6.69	7.31
84520	*Polypedilum (Tripodura) halterale group*	MT	P299min	Boatable	44	4.35	4.76	5.08	1.69	2.46	3.80	5.97	6.45	6.87
84020	*Parachironomus carinatus*	F	P299min	Boatable	10	4.36	4.52	5.00	1.15	2.23	3.44	5.84	6.15	6.29
11128	*Labiobaetis longipalpus*	MI	P299min	Boatable	13	4.39	4.38	4.34	1.83	2.12	2.81	5.88	6.39	6.86
59500	*Oecetis sp*	F	P299min	Boatable	8	4.40	4.55	4.42	2.46	2.82	3.77	5.39	6.49	6.83
84700	*Stenochironomus sp*	F	P299min	Boatable	52	4.43	4.86	5.24	1.93	2.45	3.69	6.04	6.48	6.60
82201	*Tvetenia sp*	MI	P299min	Boatable	5	4.43	5.56	5.33	4.17	4.17	4.81	6.44	7.03	7.03
77115	*Ablabesmyia janta*	F	P299min	Boatable	45	4.45	4.45	4.66	1.61	2.21	3.08	5.87	6.60	6.87
74501	*Ceratopogonidae*	T	P299min	Boatable	15	4.46	4.51	4.73	1.54	2.56	3.85	5.78	6.12	6.20
51206	*Cyrnellus fraternus*	F	P299min	Boatable	13	4.49	3.89	4.12	1.24	1.64	2.38	4.98	6.04	6.68
77100	*Ablabesmyia sp*		P299min	Boatable	5	4.50	4.14	4.01	2.61	2.61	3.14	4.91	6.36	6.36
84785	*Tribelos atrum*		P299min	Boatable	5	4.52	4.57	4.01	1.20	1.20	2.79	6.74	7.98	7.98
69410	*Stenelmis crenata*		P299min	Boatable	13	4.52	5.48	5.41	1.52	2.90	4.74	6.94	7.23	7.78
86001	*Tabanidae*	F	P299min	Boatable	6	4.55	4.43	4.66	2.46	2.55	3.40	5.49	5.85	5.89
84155	*Paralauterborniella nigrohalteralis*	F	P299min	Boatable	15	4.59	4.07	3.87	1.52	2.46	3.19	5.63	6.22	6.35
22325	*Argia tibialis*		P299min	Boatable	49	4.61	4.95	5.23	2.19	2.59	3.81	5.97	6.74	7.02
52801	*Potamyia flava*	MI	P299min	Boatable	17	4.63	5.39	5.68	1.85	2.21	4.29	6.56	7.32	9.50
83400	*Harnischia sp*	F	P299min	Boatable	28	4.63	4.74	4.88	2.46	2.66	3.69	5.67	6.50	7.07
84302	*Phaenopsectra punctipes*	F	P299min	Boatable	10	4.68	4.41	4.83	2.46	2.50	3.72	5.09	5.66	5.82
82880	*Cryptotendipes sp*	F	P299min	Boatable	26	4.69	4.51	4.62	2.45	2.57	3.40	5.68	6.22	6.45
13400	*Stenacron sp*	F	P299min	Boatable	89	4.70	5.23	5.41	2.45	2.92	4.43	6.08	6.94	7.42
94100	*Pleurocera sp*	MI	P299min	Boatable	46	4.70	4.86	5.28	1.19	1.93	3.49	6.06	7.02	7.58
85210	*Cladotanytarsus species group B*	MI	P299min	Boatable	12	4.71	5.47	5.62	2.54	3.17	3.91	6.48	8.07	10.26
06810	*Gammarus fasciatus*	F	P299min	Boatable	10	4.72	5.31	5.41	3.35	3.76	4.67	5.99	6.64	6.91
98001	*Pisidiidae*		P299min	Boatable	56	4.74	4.90	5.16	1.80	2.43	3.80	6.03	6.57	7.26
52001	*Hydropsychidae*		P299min	Boatable	23	4.77	5.56	5.99	2.12	3.18	5.00	6.66	7.04	7.36
85800	*Tanytarsus sp*	F	P299min	Boatable	74	4.78	4.86	5.08	1.79	2.53	3.72	6.06	6.82	6.97
83040	*Dicrotendipes neomodestus*	F	P299min	Boatable	64	4.79	4.89	5.05	2.36	2.76	3.88	5.81	6.39	6.85
17200	*Caenis sp*	F	P299min	Boatable	59	4.80	5.17	5.55	2.04	2.58	3.85	6.34	7.05	7.73
84960	*Pseudochironomus sp*	F	P299min	Boatable	9	4.80	5.00	5.51	2.61	2.89	3.74	6.11	6.65	6.83

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
77500	*Conchapelopia sp*	F	P299min	Boatable	7	4.84	5.14	5.57	2.61	2.89	4.11	6.20	6.91	7.08
06201	*Hyalella azteca*	F	P299min	Boatable	46	4.86	5.18	5.40	2.60	3.16	4.73	5.98	6.80	7.06
08200	*Orconectes sp*	F	P299min	Boatable	31	4.87	5.30	5.43	2.65	3.34	4.76	6.19	6.74	7.05
77120	*Ablabesmyia mallochi*	F	P299min	Boatable	73	4.90	5.07	5.36	2.06	2.72	3.83	6.09	6.88	8.00
84580	*Robackia demeijerei*	MI	P299min	Boatable	8	4.91	5.60	5.90	2.93	3.70	5.53	6.22	6.55	6.60
97601	*Corbicula fluminea*	F	P299min	Boatable	75	4.91	4.85	5.15	1.93	2.54	3.92	5.79	6.60	6.89
84400	*Polypedilum sp*		P299min	Boatable	16	4.94	5.15	5.45	1.62	2.68	4.15	6.32	6.99	7.07
84040	*Parachironomus frequens*	F	P299min	Boatable	16	4.94	5.28	5.16	2.11	2.97	3.92	6.18	7.86	9.84
22300	*Argia sp*	F	P299min	Boatable	72	4.96	5.14	5.37	2.23	2.89	3.98	6.06	6.87	7.94
22001	*Coenagrionidae*	T	P299min	Boatable	8	4.96	4.91	4.98	3.65	3.88	4.62	5.21	5.83	6.05
68700	*Dubiraphia sp*	F	P299min	Boatable	58	4.96	5.16	5.42	2.31	2.58	4.01	5.99	6.61	8.24
82820	*Cryptochironomus sp*	F	P299min	Boatable	83	4.97	5.08	5.32	2.35	2.60	3.90	6.20	6.92	7.93
68601	*Ancyronyx variegata*	F	P299min	Boatable	24	5.02	5.14	5.54	1.91	2.44	4.15	6.29	6.65	7.00
11250	*Neocloeon sp. (Centroptilum sp, w/o hindwing pads)*	MI	P299min	Boatable	39	5.03	5.23	5.69	2.04	2.65	4.18	6.37	6.97	7.73
53800	*Hydroptila sp*	F	P299min	Boatable	34	5.03	4.98	5.35	2.55	3.23	4.06	6.03	6.46	7.01
78140	*Labrundinia pilosella*	F	P299min	Boatable	12	5.03	4.83	4.99	0.43	1.84	3.03	6.14	8.12	8.36
84210	*Paratendipes albimanus or P. duplicatus*	F	P299min	Boatable	5	5.05	5.55	5.65	3.65	3.65	4.24	6.54	7.98	7.98
01801	*Turbellaria*	F	P299min	Boatable	29	5.06	5.09	5.07	3.60	3.91	4.72	5.68	6.16	6.40
57900	*Pycnopsyche sp*	MI	P299min	Boatable	10	5.08	5.08	5.38	2.21	2.50	4.34	6.29	6.83	7.08
84300	*Phaenopsectra obediens group*	F	P299min	Boatable	15	5.12	4.85	5.49	2.08	2.21	3.33	6.28	6.60	6.87
11400	*Centroptilum sp or Procloeon sp (formerly in Cloeon)*	F	P299min	Boatable	12	5.12	5.39	5.35	2.42	3.70	4.69	6.18	7.30	8.24
52520	*Hydropsyche bidens*	MI	P299min	Boatable	22	5.13	5.41	5.66	2.03	2.71	4.96	6.60	6.87	7.34
85500	*Paratanytarsus sp*	F	P299min	Boatable	16	5.14	5.52	5.59	2.83	3.51	4.06	6.34	7.83	9.84
24510	*ERPETOGOMPHUS DESIGNATUS*	F	P299min	Boatable	10	5.15	4.95	5.69	1.76	1.90	2.61	6.60	6.79	6.97
77001	*Tanypodinae*		P299min	Boatable	15	5.16	5.38	5.65	1.73	3.32	4.57	6.39	6.82	7.69
93900	*Elimia sp*	MI	P299min	Boatable	27	5.16	5.25	5.32	2.98	3.83	4.96	5.96	6.90	7.06
85265	*Cladotanytarsus vanderwulpi group sp 5*	MI	P299min	Boatable	8	5.17	5.45	5.63	4.82	4.86	5.02	5.74	5.92	5.98
81825	*Rheocricotopus (Psilocricotopus) robacki*	F	P299min	Boatable	7	5.17	4.78	5.49	2.03	2.46	4.37	5.59	5.66	5.68
13521	*Stenonema femoratum*	F	P299min	Boatable	11	5.18	5.07	5.10	2.95	3.15	4.53	6.03	6.62	7.02
69400	*Stenelmis sp*	F	P299min	Boatable	104	5.18	5.19	5.38	2.16	2.76	4.54	6.03	6.84	7.33
80410	*Cricotopus (C.) sp*	F	P299min	Boatable	11	5.18	5.37	5.47	2.70	3.70	5.00	5.98	6.91	7.83
68201	*Scirtidae*	F	P299min	Boatable	7	5.19	4.12	3.49	2.43	2.46	2.75	5.63	6.05	6.12
78100	*Labrundinia sp*	F	P299min	Boatable	5	5.21	5.32	5.32	4.42	4.42	4.72	5.73	6.62	6.62
82730	*Chironomus (C.) decorus group*	T	P299min	Boatable	7	5.21	5.21	5.57	3.65	3.91	5.01	5.69	5.77	5.79

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
86200	*Tabanus sp*	F	P299min	Boatable	6	5.22	4.61	4.46	1.15	1.23	1.90	6.12	9.23	9.57
82100	*Thienemanniella sp*		P299min	Boatable	7	5.23	5.12	5.02	4.17	4.22	4.52	5.83	6.06	6.08
21200	*Calopteryx sp*	F	P299min	Boatable	5	5.24	4.82	5.49	2.03	2.03	3.82	5.84	6.58	6.58
84060	*Parachironomus pectinatellae*	MI	P299min	Boatable	7	5.24	5.24	5.03	3.72	3.76	4.16	5.96	7.12	7.39
59100	*Ceraclea sp*	MI	P299min	Boatable	8	5.25	5.34	5.74	3.30	3.53	4.20	6.07	7.06	7.39
11100	*Baetis sp*	F	P299min	Boatable	16	5.25	5.28	5.40	2.71	3.05	4.72	6.12	6.99	7.05
78599	*Pentaneura sp*	F	P299min	Boatable	5	5.25	5.36	5.02	4.97	4.97	4.99	5.63	6.43	6.43
98200	*Pisidium sp*	MT	P299min	Boatable	10	5.26	5.55	5.54	3.35	4.09	5.02	6.36	7.05	7.06
84470	*Polypedilum (P.) illinoense*	T	P299min	Boatable	101	5.26	5.10	5.41	2.33	3.05	4.09	6.09	6.82	7.22
84540	*Polypedilum (Tripodura) scalaenum group*	F	P299min	Boatable	44	5.30	4.82	5.05	2.82	3.35	3.98	5.63	6.07	6.27
84450	*Polypedilum (Uresipedilum) flavum*	F	P299min	Boatable	90	5.30	5.28	5.43	2.21	3.34	4.66	6.08	6.72	7.39
04935	*Erpobdella punctata punctata*	MT	P299min	Boatable	6	5.31	4.98	5.20	1.15	1.42	3.84	7.08	7.36	7.39
80510	*Cricotopus (Isocladius) sylvestris group*	T	P299min	Boatable	5	5.31	5.45	5.47	4.73	4.73	4.95	5.86	6.36	6.36
26700	*Macromia sp*	MI	P299min	Boatable	9	5.32	5.59	5.43	0.20	1.23	4.01	7.62	10.21	10.63
11150	*Labiobaetis propinquus*	MI	P299min	Boatable	18	5.34	5.19	5.83	1.87	2.20	4.52	6.35	6.95	6.97
87540	*Hemerodromia sp*	F	P299min	Boatable	8	5.36	5.69	5.92	4.12	4.38	5.01	6.45	6.64	6.67
79100	*Thienemannimyia group*	F	P299min	Boatable	86	5.37	5.29	5.50	1.98	2.97	4.43	6.32	6.96	7.98
07850	*Cambarus (Lacunicambarus) diogenes diogenes*	T	P299min	Boatable	9	5.39	5.07	5.69	2.54	2.86	3.42	6.36	6.50	6.58
58505	*Helicopsyche borealis*	MI	P299min	Boatable	8	5.40	5.97	5.45	4.80	4.85	5.16	6.09	8.62	9.57
84460	*Polypedilum (P.) fallax group*	F	P299min	Boatable	7	5.41	5.47	6.41	1.90	2.30	4.48	6.54	6.77	6.82
22600	*Enallagma sp*		P299min	Boatable	32	5.41	5.10	5.19	2.63	3.18	4.38	5.78	7.10	7.94
52570	*Hydropsyche simulans*	MI	P299min	Boatable	66	5.42	5.30	5.45	2.17	3.32	4.34	6.35	6.97	7.34
82710	*Chironomus (C.) sp*	MT	P299min	Boatable	72	5.42	5.07	5.19	2.05	2.53	3.78	6.32	6.96	7.97
77750	*Hayesomyia senata or Thienemannimyia norena*	F	P299min	Boatable	11	5.42	5.38	5.39	4.83	4.90	5.08	5.69	5.87	5.97
68075	*Psephenus herricki*	MI	P299min	Boatable	12	5.45	5.95	5.61	4.58	4.73	5.17	6.13	7.61	10.20
85625	*Rheotanytarsus sp*	F	P299min	Boatable	47	5.45	5.34	5.49	2.86	3.66	4.96	6.05	6.73	7.06
84600	*Saetheria sp*	F	P299min	Boatable	10	5.45	5.39	5.86	1.20	2.07	4.43	6.41	7.95	7.98
24900	*Gomphus sp*	F	P299min	Boatable	36	5.47	5.44	5.54	2.33	2.84	4.50	6.14	6.97	9.22
18100	*Anthopotamus sp*	MI	P299min	Boatable	16	5.51	6.07	5.61	4.41	4.59	5.12	6.88	8.36	9.22
52200	*Cheumatopsyche sp*	F	P299min	Boatable	106	5.52	5.39	5.50	2.17	3.36	4.69	6.29	6.97	7.92
51300	*Neureclipsis sp*	MI	P299min	Boatable	25	5.52	5.45	5.69	3.06	3.88	4.83	6.47	6.62	6.73
13561	*Maccaffertium pulchellum*	MI	P299min	Boatable	42	5.55	5.66	5.78	2.64	3.37	4.69	6.41	7.28	8.87
12200	*Isonychia sp*	MI	P299min	Boatable	46	5.56	5.83	5.84	2.17	3.51	5.10	6.60	7.08	8.63
13510	*Maccaffertium exiguum*	MI	P299min	Boatable	39	5.56	5.66	5.77	2.53	3.69	4.96	6.38	6.97	8.44

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
68708	*Dubiraphia vittata group*	F	P299min	Boatable	13	5.56	5.29	5.57	2.88	4.07	4.92	5.84	6.37	6.40
11620	*Paracloeodes minutus*	MI	P299min	Boatable	10	5.57	5.09	5.35	2.21	3.17	4.82	5.82	6.19	6.43
11020	*Acerpenna pygmaea*	MI	P299min	Boatable	13	5.57	5.42	5.36	2.81	3.98	4.66	6.27	7.06	7.08
11130	*Baetis intercalaris*	F	P299min	Boatable	93	5.57	5.34	5.52	2.09	3.24	4.69	6.23	6.96	7.34
16700	*Tricorythodes sp*	MI	P299min	Boatable	98	5.58	5.50	5.58	2.74	3.54	4.96	6.29	6.97	7.95
80420	*Cricotopus (C.) bicinctus*	T	P299min	Boatable	34	5.58	5.82	5.69	4.22	4.70	5.09	6.82	7.06	7.74
68901	*Macronychus glabratus*	F	P299min	Boatable	65	5.61	5.48	5.57	2.17	3.32	4.96	6.33	6.91	7.41
22315	*Argia moesta*		P299min	Boatable	12	5.61	5.71	5.61	3.35	3.68	5.17	6.20	7.49	9.27
59407	*Nectopsyche candida*	MI	P299min	Boatable	52	5.62	5.34	5.56	2.23	2.89	4.76	6.14	6.93	7.35
76001	*Chironomidae*		P299min	Boatable	6	5.63	5.55	6.27	1.20	1.58	4.97	6.62	7.84	7.98
52530	*Hydropsyche depravata group*	F	P299min	Boatable	11	5.63	6.07	5.73	3.85	4.01	4.72	6.80	9.00	10.49
82501	*Chironomini*		P299min	Boatable	25	5.63	5.72	5.77	2.79	4.43	5.28	6.46	7.03	7.93
85200	*Cladotanytarsus sp*		P299min	Boatable	28	5.66	5.38	5.80	2.47	3.20	4.58	6.27	6.77	7.12
80470	*Cricotopus (C.) or Orthocladius (O.) sp*		P299min	Boatable	26	5.67	5.36	5.54	2.44	3.43	4.43	6.08	6.95	8.06
98600	*Sphaerium sp*	F	P299min	Boatable	23	5.68	5.47	5.33	3.52	4.34	4.96	6.30	7.04	7.07
26705	*Macromia illinoiensis*	F	P299min	Boatable	28	5.68	5.60	5.57	2.68	3.59	4.96	6.32	7.26	8.62
82141	*Thienemanniella xena*	F	P299min	Boatable	8	5.69	5.89	5.28	3.69	3.98	4.85	6.29	9.35	10.63
04960	*Erpobdella sp (= Mooreobdella)*	MT	P299min	Boatable	8	5.70	5.87	5.51	4.67	4.76	5.05	7.05	7.07	7.08
13500	*Maccaffertium sp*	MI	P299min	Boatable	36	5.71	5.47	5.56	2.71	3.38	5.03	6.42	7.02	7.06
21300	*Hetaerina sp*	F	P299min	Boatable	26	5.72	5.63	5.64	1.98	4.72	4.96	6.22	6.57	8.85
74100	*Simulium sp*	F	P299min	Boatable	60	5.74	5.80	5.71	3.67	4.30	5.00	6.51	7.07	8.16
13120	*Nixe perfida*	MI	P299min	Boatable	17	5.75	6.23	5.89	4.78	5.04	5.57	6.59	8.11	9.16
18619	*Ephemera simulans*	MI	P299min	Boatable	6	5.77	7.15	5.90	5.37	5.39	5.52	9.57	10.52	10.63
18750	*Hexagenia limbata*	F	P299min	Boatable	20	5.77	4.85	5.42	1.05	2.26	3.33	5.98	6.97	7.49
24501	*Gomphidae*	F	P299min	Boatable	13	5.79	5.08	5.73	2.09	2.37	3.13	6.47	6.69	6.91
12501	*Heptageniidae*		P299min	Boatable	21	5.80	5.73	6.08	2.98	4.51	5.24	6.63	7.04	7.07
80440	*Cricotopus (C.) trifascia*	F	P299min	Boatable	18	5.81	6.11	6.04	4.49	4.99	5.69	6.82	7.07	7.58
05800	*Caecidotea sp*	T	P299min	Boatable	31	5.82	5.88	5.89	3.69	4.57	5.34	6.54	6.96	7.93
08240	*Orconectes (Crokerinus) propinquus*	F	P299min	Boatable	22	5.85	5.94	5.74	3.52	4.16	4.80	6.60	7.83	9.99
83150	*Endochironomus sp*	MT	P299min	Boatable	5	5.87	4.59	4.96	1.76	1.76	2.29	6.62	7.39	7.39
13000	*Leucrocuta sp*	MI	P299min	Boatable	18	5.91	5.57	5.89	2.10	2.95	4.96	6.58	7.05	7.57
12924	*Heptagenia flavescens*	MI	P299min	Boatable	8	5.95	5.61	5.90	2.03	2.66	4.54	6.78	7.97	8.40
25600	*Stylurus sp*	MI	P299min	Boatable	12	5.96	5.66	6.04	3.44	3.71	4.70	6.71	6.96	6.97
80001	*Orthocladiinae*		P299min	Boatable	8	5.99	5.98	6.20	2.61	3.42	5.49	6.93	7.70	7.98

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
52540	*Hydropsyche dicantha*	MI	P299min	Boatable	14	6.02	6.04	5.89	1.62	3.11	4.96	6.91	9.68	10.42
55510	*Brachycentrus sp*	MI	P299min	Boatable	5	6.05	5.90	5.99	5.10	5.10	5.27	6.48	6.67	6.67
51600	*Polycentropus sp*	MI	P299min	Boatable	11	6.07	6.12	5.69	4.70	4.76	5.10	6.27	8.87	9.51
59410	*Nectopsyche diarina*	MI	P299min	Boatable	8	6.08	6.42	6.33	4.69	4.89	5.59	6.65	8.70	9.57
23909	*Boyeria vinosa*	F	P299min	Boatable	33	6.12	5.79	5.68	3.32	3.78	5.36	6.36	6.98	9.39
13570	*Maccaffertium terminatum*	MI	P299min	Boatable	47	6.12	5.88	5.77	3.14	4.36	5.20	6.54	7.32	8.58
11001	*Baetidae*		P299min	Boatable	20	6.14	6.03	6.16	4.49	4.68	5.22	6.75	7.07	7.50
08280	*Orconectes (Gremicambarus) virilis*	F	P299min	Boatable	24	6.14	5.70	5.86	1.99	2.19	5.09	6.51	8.04	9.07
47600	*Sialis sp*	MT	P299min	Boatable	12	6.26	5.13	5.69	2.63	2.73	3.60	6.13	6.77	7.82
06700	*Crangonyx sp*	MT	P299min	Boatable	5	6.28	6.20	5.52	3.35	3.35	4.96	7.17	10.63	10.63
84750	*Stictochironomus sp*	F	P299min	Boatable	18	6.31	5.63	5.79	2.90	3.96	5.14	6.39	7.56	7.99
52565	*Hydropsyche phalerata*	MI	P299min	Boatable	7	6.31	6.28	6.91	4.56	4.67	5.39	7.05	7.08	7.08
06800	*Gammarus sp*	F	P299min	Boatable	29	6.36	5.69	5.65	4.75	4.96	5.10	6.12	6.87	7.08
19100	*Ephoron sp*	MI	P299min	Boatable	6	6.36	5.89	6.11	4.80	4.85	5.33	6.32	6.64	6.67
12912	*Heptagenia diabasia*	F	P299min	Boatable	6	6.40	6.12	6.33	5.15	5.22	5.89	6.43	6.57	6.58
30800	*Pteronarcys sp*	MI	P299min	Boatable	6	6.41	6.63	6.03	5.10	5.12	5.33	6.67	10.23	10.63
85001	*Tanytarsini*		P299min	Boatable	12	6.42	6.14	5.78	4.98	5.06	5.34	6.87	7.93	7.97
13030	*Leucrocuta maculipennis*	MI	P299min	Boatable	16	6.51	6.61	5.92	4.65	5.00	5.54	7.48	9.45	10.31
52401	*Ceratopsyche sp*	MI	P299min	Boatable	24	6.52	6.28	5.87	4.18	4.68	5.43	6.93	8.52	9.89
11101	*Plauditus sp*	MI	P299min	Boatable	8	6.54	6.32	6.46	5.10	5.18	5.68	7.05	7.07	7.08
48410	*Corydalus cornutus*	MI	P299min	Boatable	28	6.64	5.59	5.78	1.70	2.08	4.76	6.38	7.99	9.68
71900	*Tipula sp*	F	P299min	Boatable	7	6.64	6.92	6.82	6.08	6.14	6.44	7.07	8.14	8.40
11120	*Baetis flavistriga*	F	P299min	Boatable	23	6.65	5.88	6.08	2.41	4.14	5.08	6.65	7.92	8.13
68160	*HELICHUS LITHOPHILUS*	F	P299min	Boatable	17	6.77	5.51	5.77	2.41	2.88	3.66	6.16	9.02	10.26
25300	*Ophiogomphus sp*	MI	P299min	Boatable	6	6.81	7.15	5.90	5.37	5.38	5.51	9.57	10.52	10.63
78510	*Paramerina sp 1*	MI	P299min	Boatable	6	6.84	6.38	6.26	2.61	2.80	4.52	8.00	10.37	10.63
19102	*Ephoron album*	MI	P299min	Boatable	13	6.89	5.60	5.59	2.58	4.19	4.96	6.41	6.98	8.13
06840	*Gammarus pseudolimnaeus*	F	P299min	Boatable	14	7.01	5.58	5.87	2.29	3.19	5.10	6.58	7.02	7.77
34300	*Neoperla clymene complex*	I	P299min	Boatable	8	7.04	5.69	5.33	2.03	2.83	4.75	7.48	8.28	8.40
59970	*Petrophila sp*	MI	P299min	Boatable	14	7.12	6.18	5.62	4.83	4.95	5.10	6.32	9.68	10.42
27404	*Neurocordulia molesta*	F	P299min	Boatable	6	7.22	6.46	6.70	1.76	2.19	6.01	6.97	10.26	10.63
04964	*Erpobdella microstoma*	MT	P299min	Boatable	6	7.23	6.34	6.22	1.90	2.28	5.69	7.39	10.31	10.63
52431	*Ceratopsyche morosa*	MI	P299min	Boatable	5	7.29	6.03	6.08	4.43	4.43	5.10	6.79	7.91	7.91
83840	*Microtendipes pedellus group*	F	P299min	Boatable	8	7.41	6.45	6.36	4.52	4.76	5.77	7.20	8.27	8.40

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
50315	*Chimarra obscura*	MI	P299min	Boatable	12	7.97	6.72	6.13	4.82	4.91	5.44	7.72	9.89	10.52
52430	*Ceratopsyche morosa group*	MI	Mindo5th	Wadeable	7	2.35	5.42	6.06	2.10	2.48	4.27	6.95	7.09	7.09
83051	*Dicrotendipes simpsoni*	T	Mindo5th	Wadeable	42	2.38	3.24	2.90	0.60	0.85	2.07	4.99	5.77	6.13
83050	*Dicrotendipes lucifer*	MT	Mindo5th	Wadeable	14	2.41	3.69	3.29	1.22	1.70	2.59	4.46	6.32	6.92
27307	*Epitheca (Epicordulia) princeps*	MT	Mindo5th	Wadeable	18	2.47	3.73	3.36	0.46	0.53	1.08	5.62	7.42	7.51
83100	*Einfeldia sp*		Mindo5th	Wadeable	6	2.49	5.24	6.25	0.24	0.64	4.19	6.77	7.65	7.75
83300	*Glyptotendipes (G.) sp*	MT	Mindo5th	Wadeable	110	2.52	4.59	5.09	0.85	2.04	2.97	6.03	7.02	7.45
04666	*Helobdella papillata*	MT	Mindo5th	Wadeable	5	2.53	3.31	3.52	0.10	0.10	2.60	4.53	5.20	5.20
28001	*Libellulidae*	MT	Mindo5th	Wadeable	15	2.67	3.28	2.66	0.53	0.60	1.69	5.23	5.93	7.12
84010	*Parachironomus "abortivus" (sensu Simpson & Bode, 1980)*	MT	Mindo5th	Wadeable	5	2.68	3.03	2.75	0.78	0.78	1.84	4.12	5.93	5.93
77355	*Clinotanypus pinguis*	MT	Mindo5th	Wadeable	50	2.72	4.23	4.35	0.96	1.38	2.66	5.52	6.92	7.06
96120	*Menetus (Micromenetus) dilatatus*	MT	Mindo5th	Wadeable	6	2.72	3.71	3.80	1.43	1.50	2.22	4.92	6.00	6.12
04685	*Placobdella ornata*	MT	Mindo5th	Wadeable	8	2.73	3.31	3.26	0.20	0.89	2.54	4.51	5.40	5.66
79000	*Tanypus sp*	T	Mindo5th	Wadeable	24	2.74	4.50	4.64	1.46	2.22	3.20	5.67	7.26	7.34
83045	*Dicrotendipes nervosus*		Mindo5th	Wadeable	32	2.81	4.21	3.95	0.31	1.04	2.43	6.06	7.27	7.64
83158	*Endochironomus nigricans*	MT	Mindo5th	Wadeable	28	2.90	4.68	4.34	1.64	2.26	3.37	5.67	7.48	8.56
12900	*Heptagenia sp*		Mindo5th	Wadeable	6	2.91	3.79	3.83	1.10	1.29	3.00	5.15	5.75	5.82
78600	*Pentaneura inconspicua*	F	Mindo5th	Wadeable	17	3.00	4.72	4.31	0.69	2.10	3.87	6.14	6.83	7.42
85821	*Tanytarsus glabrescens group sp 7*	F	Mindo5th	Wadeable	14	3.00	4.94	5.38	1.58	2.14	4.92	5.80	6.22	6.27
14600	*Choroterpes sp*	MI	Mindo5th	Wadeable	9	3.13	3.66	3.25	0.85	0.95	2.08	5.26	6.43	6.93
53501	*Hydroptilidae*	F	Mindo5th	Wadeable	11	3.14	3.90	4.00	1.15	1.70	2.49	5.41	6.11	6.54
77130	*Ablabesmyia rhamphe group*	MT	Mindo5th	Wadeable	17	3.15	4.09	4.40	0.34	0.98	2.36	5.88	6.11	6.17
59550	*Oecetis inconspicua complex sp A (sensu Floyd, 1995)*	F	Mindo5th	Wadeable	38	3.17	3.64	3.53	0.52	0.95	2.25	5.54	5.98	6.96
79020	*Tanypus neopunctipennis*	T	Mindo5th	Wadeable	28	3.20	3.61	3.31	0.24	0.96	1.99	5.82	6.34	6.78
95900	*Gyraulus sp*	MT	Mindo5th	Wadeable	14	3.20	4.15	4.45	0.43	1.54	2.75	5.38	6.21	7.17
83700	*Microchironomus sp*	MT	Mindo5th	Wadeable	10	3.23	3.60	3.04	1.08	1.75	2.75	5.31	5.83	6.23
28908	*Perithemis tenera*	T	Mindo5th	Wadeable	12	3.27	4.41	5.68	0.22	0.23	1.79	6.64	7.11	7.24
72420	*Chaoborus sp*	T	Mindo5th	Wadeable	15	3.29	2.57	2.52	0.22	0.24	0.69	3.73	4.50	6.57
04601	*Glossiphoniidae*	MT	Mindo5th	Wadeable	21	3.41	4.35	4.20	1.39	2.55	3.54	5.61	6.47	7.14
85625	*Rheotanytarsus sp*	F	Mindo5th	Wadeable	196	3.44	5.17	5.42	2.09	2.62	4.12	6.26	7.36	7.95
83000	*Dicrotendipes sp*	F	Mindo5th	Wadeable	48	3.44	5.32	5.38	2.21	2.68	4.27	6.63	7.66	8.27
48220	*Chauliodes rastricornis*	T	Mindo5th	Wadeable	11	3.49	4.18	4.27	0.33	1.55	3.11	5.90	6.12	6.14
96002	*Helisoma anceps anceps*	F	Mindo5th	Wadeable	25	3.58	4.33	4.71	0.39	0.50	2.46	6.51	7.30	7.54
04686	*Placobdella papillifera*	MT	Mindo5th	Wadeable	14	3.64	4.26	3.53	1.19	1.98	2.87	6.10	7.18	7.27

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
08451	*Palaemonetes kadiakensis*	F	Mindo5th	Wadeable	22	3.68	4.11	4.06	2.28	2.41	2.75	5.12	6.34	6.72
04664	*Helobdella stagnalis*	T	Mindo5th	Wadeable	25	3.69	4.81	5.10	1.82	2.19	3.29	6.09	6.59	8.10
84030	*Parachironomus directus*	MT	Mindo5th	Wadeable	5	3.79	4.69	3.94	2.87	2.87	2.91	6.47	7.63	7.63
11200	*Callibaetis sp*	MT	Mindo5th	Wadeable	77	3.81	4.12	4.14	0.54	1.15	2.84	5.49	6.81	7.23
84800	*Tribelos jucundum*	MT	Mindo5th	Wadeable	118	3.82	4.58	4.73	0.87	1.91	3.08	6.00	7.17	7.69
04901	*Erpobdellidae*	MT	Mindo5th	Wadeable	61	3.85	4.82	5.07	1.03	1.55	3.41	6.45	7.44	7.97
98100	*Musculium sp*	MT	Mindo5th	Wadeable	8	3.89	5.99	6.74	1.10	1.75	4.44	7.95	8.55	8.61
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	F	Mindo5th	Wadeable	5	3.92	3.57	4.00	0.78	0.78	2.92	4.49	5.19	5.19
24710	*Dromogomphus spinosus*	F	Mindo5th	Wadeable	5	3.96	4.26	4.39	0.64	0.64	3.29	5.87	6.44	6.44
59970	*Petrophila sp*	MI	Mindo5th	Wadeable	14	4.00	6.17	6.27	2.48	3.81	5.77	7.01	7.63	9.49
28955	*Plathemis lydia*	T	Mindo5th	Wadeable	13	4.00	4.07	4.49	0.27	0.38	3.38	5.28	6.01	6.94
78450	*Nilotanypus fimbriatus*	F	Mindo5th	Wadeable	8	4.00	6.50	6.51	2.10	2.62	4.99	7.23	10.92	12.47
83002	*Dicrotendipes modestus*	MT	Mindo5th	Wadeable	10	4.01	4.16	4.28	1.52	1.81	2.44	6.00	6.05	6.07
04935	*Erpobdella punctata punctata*	MT	Mindo5th	Wadeable	52	4.01	5.48	6.05	0.81	2.00	4.36	7.21	7.58	8.36
84888	*Xenochironomus xenolabis*	F	Mindo5th	Wadeable	15	4.02	4.24	4.08	0.30	0.55	2.45	6.33	7.26	7.52
84520	*Polypedilum (Tripodura) halterale group*	MT	Mindo5th	Wadeable	139	4.03	4.88	5.26	1.88	2.40	3.58	5.99	7.02	7.58
05900	*Lirceus sp*	MT	Mindo5th	Wadeable	22	4.04	4.42	3.81	0.83	1.41	2.74	5.67	8.16	11.28
04680	*Placobdella sp*	MT	Mindo5th	Wadeable	8	4.06	4.66	5.90	0.60	0.92	2.34	6.46	7.05	7.30
04930	*Erpobdella sp*	MT	Mindo5th	Wadeable	13	4.07	6.20	6.44	2.01	3.10	5.41	7.15	8.09	10.03
51206	*Cyrnellus fraternus*	F	Mindo5th	Wadeable	13	4.08	5.40	6.09	1.27	2.00	4.88	6.66	6.99	7.21
04660	*Helobdella sp*	MT	Mindo5th	Wadeable	19	4.09	4.23	4.36	0.73	0.89	2.26	5.99	6.61	7.80
96100	*Menetus (Micromenetus) sp*		Mindo5th	Wadeable	52	4.11	4.45	4.17	0.96	1.83	3.07	5.88	7.36	7.76
04960	*Erpobdella sp (= Mooreobdella)*	MT	Mindo5th	Wadeable	51	4.12	4.81	5.43	1.85	2.36	3.20	5.93	6.87	7.14
59570	*Oecetis nocturna*	F	Mindo5th	Wadeable	15	4.12	4.40	5.04	0.79	0.81	2.76	5.98	7.16	7.41
01801	*Turbellaria*	F	Mindo5th	Wadeable	190	4.13	4.89	5.24	1.08	2.08	3.82	6.08	7.11	7.77
83160	*Endochironomus subtendens*	MT	Mindo5th	Wadeable	21	4.13	4.97	5.13	1.52	2.34	3.74	6.18	6.99	7.58
98001	*Pisidiidae*		Mindo5th	Wadeable	211	4.15	4.86	5.27	0.96	2.23	3.53	6.19	7.11	7.49
72900	*Culex sp*	T	Mindo5th	Wadeable	11	4.15	3.86	3.47	0.25	0.66	2.29	6.23	7.42	7.59
98200	*Pisidium sp*	MT	Mindo5th	Wadeable	146	4.19	4.83	5.09	0.95	1.86	3.41	6.09	7.46	7.90
07850	*Cambarus (Lacunicambarus) diogenes diogenes*	T	Mindo5th	Wadeable	107	4.21	4.78	5.21	0.87	2.21	3.31	6.15	7.05	7.61
84060	*Parachironomus pectinatellae*	MI	Mindo5th	Wadeable	12	4.21	5.04	5.78	0.75	1.63	2.70	7.27	7.87	8.38
27500	*Somatochlora sp*	MT	Mindo5th	Wadeable	43	4.25	4.19	3.74	1.38	1.81	2.77	5.53	7.11	7.63
83900	*Nilothauma sp*	F	Mindo5th	Wadeable	9	4.26	4.57	4.23	0.85	1.47	2.74	7.28	7.71	7.77
22001	*Coenagrionidae*	T	Mindo5th	Wadeable	101	4.26	4.59	4.68	1.49	2.09	3.49	5.83	6.98	7.29

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
71700	*Pilaria sp*	F	Mindo5th	Wadeable	8	4.28	5.14	4.87	0.85	1.71	3.93	7.26	7.99	8.15
48200	*Chauliodes sp*	MT	Mindo5th	Wadeable	9	4.28	4.35	5.37	1.80	2.05	2.57	5.88	6.02	6.09
82600	*Axarus sp*	F	Mindo5th	Wadeable	24	4.28	5.09	5.51	2.19	2.81	4.00	6.27	7.05	7.24
67100	*Hydrobius sp*	F	Mindo5th	Wadeable	6	4.30	4.75	5.16	2.66	2.69	2.95	6.04	6.49	6.54
03600	*Oligochaeta*	T	Mindo5th	Wadeable	500	4.31	5.08	5.38	1.48	2.35	3.80	6.44	7.31	7.82
78400	*Natarsia sp*	F	Mindo5th	Wadeable	19	4.32	4.74	4.14	2.07	2.79	3.32	6.47	7.03	7.38
96900	*Ferrissia sp*	F	Mindo5th	Wadeable	57	4.32	5.02	5.21	2.35	2.62	3.88	6.04	7.05	7.59
23501	*Aeshnidae*		Mindo5th	Wadeable	9	4.34	4.45	3.98	2.40	2.42	2.50	6.10	7.51	7.55
28500	*Libellula sp*	MT	Mindo5th	Wadeable	20	4.34	4.48	4.46	1.25	1.76	3.00	5.62	7.45	7.47
59500	*Oecetis sp*	F	Mindo5th	Wadeable	49	4.35	4.80	5.27	1.10	2.21	3.47	6.23	7.15	8.44
17200	*Caenis sp*	F	Mindo5th	Wadeable	383	4.36	5.06	5.30	1.10	2.37	3.83	6.35	7.28	7.69
13510	*Maccaffertium exiguum*	MI	Mindo5th	Wadeable	47	4.37	5.42	5.79	1.50	3.76	5.03	6.43	6.84	7.17
74501	*Ceratopogonidae*	T	Mindo5th	Wadeable	51	4.37	4.71	5.12	0.86	1.61	2.90	6.34	7.12	7.48
78655	*Procladius (Holotanypus) sp*	MT	Mindo5th	Wadeable	44	4.37	4.12	4.32	1.23	1.68	2.32	5.71	6.24	6.98
83040	*Dicrotendipes neomodestus*	F	Mindo5th	Wadeable	362	4.38	4.96	5.13	1.14	2.22	3.63	6.30	7.20	7.72
06201	*Hyalella azteca*	F	Mindo5th	Wadeable	327	4.40	5.09	5.44	1.16	2.25	3.80	6.45	7.30	7.72
94603	*Pseudosuccinea columella*	MT	Mindo5th	Wadeable	18	4.40	4.26	3.92	1.80	2.79	3.31	5.52	6.49	6.93
94400	*Fossaria sp*	MT	Mindo5th	Wadeable	29	4.41	4.40	4.86	0.82	0.96	2.57	5.65	6.71	7.70
52570	*Hydropsyche simulans*	MI	Mindo5th	Wadeable	120	4.41	5.52	5.71	2.46	3.72	4.91	6.42	6.93	7.51
24107	*Nasiaeschna pentacantha*	MT	Mindo5th	Wadeable	20	4.47	3.97	3.68	0.36	0.73	2.53	6.06	6.95	7.25
60300	*Dineutus sp*	F	Mindo5th	Wadeable	30	4.49	5.04	5.23	1.17	2.25	2.75	7.17	7.76	8.43
77115	*Ablabesmyia janta*	F	Mindo5th	Wadeable	77	4.51	4.59	4.44	1.92	2.40	3.29	5.98	6.81	7.40
82730	*Chironomus (C.) decorus group*	T	Mindo5th	Wadeable	32	4.51	4.41	4.60	1.74	1.91	3.59	5.71	6.15	6.35
85400	*Micropsectra sp*	MT	Mindo5th	Wadeable	21	4.52	4.84	5.42	0.91	1.82	3.21	6.49	6.80	7.07
22700	*Ischnura sp*		Mindo5th	Wadeable	135	4.53	5.14	5.25	0.96	2.40	3.90	6.42	7.50	8.46
81200	*Nanocladius sp*	F	Mindo5th	Wadeable	30	4.54	4.81	4.52	2.07	2.15	2.73	6.96	7.70	8.02
87540	*Hemerodromia sp*	F	Mindo5th	Wadeable	31	4.55	5.77	5.52	2.45	3.49	4.32	7.20	8.33	8.61
85840	*Tanytarsus sepp*	F	Mindo5th	Wadeable	12	4.57	4.65	4.60	1.60	2.65	4.16	5.56	6.52	7.01
89001	*Sciomyzidae*	MT	Mindo5th	Wadeable	12	4.57	4.36	4.84	0.86	0.92	2.59	6.02	7.10	7.39
77750	*Hayesomyia senata or Thienemannimyia norena*	F	Mindo5th	Wadeable	50	4.58	4.68	4.97	1.52	2.16	3.63	5.87	6.32	6.66
84960	*Pseudochironomus sp*	F	Mindo5th	Wadeable	55	4.59	4.94	4.90	2.17	2.44	3.95	6.09	7.08	7.52
78650	*Procladius sp*	MT	Mindo5th	Wadeable	388	4.61	5.07	5.38	1.61	2.45	3.83	6.32	7.23	7.61
11400	*Centroptilum sp or Procloeon sp (formerly in Cloeon)*	F	Mindo5th	Wadeable	46	4.61	4.54	4.72	0.74	1.28	3.19	5.84	6.87	7.72
84750	*Stictochironomus sp*	F	Mindo5th	Wadeable	235	4.62	5.20	5.52	1.01	2.40	3.93	6.50	7.45	8.35

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
84020	*Parachironomus carinatus*	F	Mindo5th	Wadeable	15	4.62	4.91	5.31	1.09	1.80	4.03	6.07	6.76	7.86
78140	*Labrundinia pilosella*	F	Mindo5th	Wadeable	64	4.63	4.91	5.04	2.01	2.57	3.32	6.35	7.18	7.88
79400	*Zavrelimyia sp*	F	Mindo5th	Wadeable	7	4.63	4.99	5.70	1.51	1.87	3.34	6.65	7.62	7.84
11110	*Acentrella parvula*	I	Mindo5th	Wadeable	18	4.65	5.52	5.54	1.20	2.75	4.38	6.90	7.21	10.37
72501	*Culicidae*	MT	Mindo5th	Wadeable	24	4.66	4.63	5.20	0.49	0.92	2.95	6.17	6.99	8.04
23704	*Anax junius*	MT	Mindo5th	Wadeable	15	4.69	4.39	4.36	0.52	0.85	2.42	6.01	8.61	10.01
77110	*Ablabesmyia annulata*	F	Mindo5th	Wadeable	14	4.69	4.82	4.37	2.65	2.85	3.53	5.31	7.87	9.04
78200	*Larsia sp*	MT	Mindo5th	Wadeable	26	4.69	4.79	5.29	0.64	0.97	4.27	6.26	7.00	7.34
34300	*Neoperla clymene complex*	I	Mindo5th	Wadeable	5	4.70	5.36	5.30	3.25	3.25	4.22	6.42	7.70	7.70
24700	*Dromogomphus sp*	F	Mindo5th	Wadeable	38	4.73	5.11	5.30	2.38	2.92	3.75	6.41	7.36	7.58
95501	*Planorbidae*	MT	Mindo5th	Wadeable	9	4.73	5.30	5.44	0.85	2.31	4.99	6.43	7.11	7.17
77140	*Ablabesmyia peleensis*		Mindo5th	Wadeable	14	4.73	5.05	5.43	0.68	2.20	4.31	6.20	7.40	8.22
13010	*Leucrocuta hebe*	MI	Mindo5th	Wadeable	12	4.74	5.10	5.04	2.69	2.86	4.19	5.81	7.63	7.67
23700	*Anax sp*	MT	Mindo5th	Wadeable	14	4.75	5.16	5.49	1.12	2.30	3.17	6.98	7.80	8.48
04687	*Placobdella parasitica*	MT	Mindo5th	Wadeable	11	4.75	3.97	3.74	2.21	2.34	3.08	5.26	5.58	5.65
47600	*Sialis sp*	MT	Mindo5th	Wadeable	76	4.76	4.75	5.36	1.02	2.41	3.29	6.06	6.76	7.23
82141	*Thienemanniella xena*	F	Mindo5th	Wadeable	26	4.76	5.12	5.01	3.07	3.32	4.35	5.70	7.08	7.21
86001	*Tabanidae*	F	Mindo5th	Wadeable	51	4.76	5.16	5.75	1.13	2.07	4.17	6.42	7.21	7.48
95100	*Physella sp*	T	Mindo5th	Wadeable	425	4.76	5.20	5.43	1.71	2.42	4.09	6.43	7.45	7.92
85710	*Stempellinella sp*	MI	Mindo5th	Wadeable	17	4.79	5.11	5.30	1.40	2.48	4.26	6.29	6.93	7.19
78599	*Pentaneura sp*	F	Mindo5th	Wadeable	31	4.79	4.64	4.63	1.46	2.29	3.84	5.54	6.49	7.26
57900	*Pycnopsyche sp*	MI	Mindo5th	Wadeable	29	4.82	4.78	5.26	1.07	1.64	3.86	6.05	6.76	7.19
18750	*Hexagenia limbata*	F	Mindo5th	Wadeable	79	4.83	4.90	5.02	1.83	2.52	3.97	6.03	6.99	7.59
08240	*Orconectes (Crokerinus) propinquus*	F	Mindo5th	Wadeable	38	4.83	5.40	5.61	1.41	3.73	4.72	6.43	6.99	8.08
89601	*Muscidae*		Mindo5th	Wadeable	8	4.83	4.88	4.67	3.47	3.49	3.69	5.90	6.82	7.08
84540	*Polypedilum (Tripodura) scalaenum group*	F	Mindo5th	Wadeable	182	4.83	4.82	5.03	1.78	2.43	3.52	6.10	6.92	7.46
13521	*Stenonema femoratum*	F	Mindo5th	Wadeable	102	4.83	5.36	5.67	1.95	2.42	4.35	6.86	7.31	7.89
77500	*Conchapelopia sp*	F	Mindo5th	Wadeable	45	4.83	4.92	5.62	1.10	1.74	3.61	6.38	7.09	7.51
89501	*Ephydridae*	F	Mindo5th	Wadeable	11	4.84	4.99	4.92	3.08	3.09	3.78	6.29	6.91	7.45
77120	*Ablabesmyia mallochi*	F	Mindo5th	Wadeable	395	4.85	5.17	5.46	1.70	2.66	4.09	6.40	7.17	7.63
59001	*Leptoceridae*		Mindo5th	Wadeable	10	4.85	4.70	4.85	1.10	2.14	3.74	6.30	6.51	6.66
80410	*Cricotopus (C.) sp*	F	Mindo5th	Wadeable	40	4.86	5.71	5.77	2.31	2.87	4.62	6.86	8.26	8.82
80350	*Corynoneura sp*		Mindo5th	Wadeable	8	4.87	5.09	5.72	1.51	1.99	3.91	6.50	6.89	6.91
68201	*Scirtidae*	F	Mindo5th	Wadeable	55	4.87	5.17	5.55	1.39	2.87	3.92	6.13	6.92	7.64

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
80510	*Cricotopus (Isocladius) sylvestris group*	T	Mindo5th	Wadeable	44	4.87	4.90	5.11	0.83	1.74	4.09	6.37	7.50	8.01
83400	*Harnischia sp*	F	Mindo5th	Wadeable	55	4.89	4.89	5.01	2.42	2.73	3.47	5.80	7.48	7.70
72700	*Anopheles sp*	F	Mindo5th	Wadeable	99	4.90	5.06	5.50	1.28	2.34	3.74	6.29	7.30	7.73
84302	*Phaenopsectra punctipes*	F	Mindo5th	Wadeable	64	4.90	4.75	5.12	0.63	1.79	3.36	6.10	7.10	7.69
85800	*Tanytarsus sp*	F	Mindo5th	Wadeable	380	4.90	5.06	5.31	1.57	2.41	3.74	6.33	7.26	7.93
97601	*Corbicula fluminea*	F	Mindo5th	Wadeable	240	4.90	4.98	5.29	1.59	2.41	3.92	6.11	7.04	7.58
85230	*Cladotanytarsus mancus group*	F	Mindo5th	Wadeable	6	4.92	4.96	5.03	4.30	4.32	4.50	5.19	5.69	5.74
82880	*Cryptotendipes sp*	F	Mindo5th	Wadeable	128	4.92	5.11	5.27	2.19	2.54	3.68	6.52	7.23	7.93
22325	*Argia tibialis*		Mindo5th	Wadeable	121	4.92	5.14	5.44	1.89	2.82	4.05	6.35	6.95	7.37
98600	*Sphaerium sp*	F	Mindo5th	Wadeable	107	4.93	5.50	5.75	1.51	2.74	5.02	6.56	7.29	7.91
78100	*Labrundinia sp*	F	Mindo5th	Wadeable	38	4.94	5.10	5.37	0.80	2.43	3.59	6.50	7.39	7.74
77100	*Ablabesmyia sp*		Mindo5th	Wadeable	32	4.94	5.50	5.58	2.44	2.92	4.56	6.98	7.61	7.82
22600	*Enallagma sp*		Mindo5th	Wadeable	260	4.94	5.10	5.38	1.13	2.46	3.95	6.30	7.29	7.73
08220	*Orconectes (Gremicambarus) immunis*	T	Mindo5th	Wadeable	13	4.95	4.36	4.81	1.67	2.37	3.29	5.60	6.24	6.66
85814	*Tanytarsus glabrescens group*	F	Mindo5th	Wadeable	6	4.95	4.42	4.93	1.98	2.04	2.62	5.74	6.30	6.36
13400	*Stenacron sp*	F	Mindo5th	Wadeable	372	4.96	5.33	5.71	1.68	2.65	4.29	6.58	7.31	7.76
51600	*Polycentropus sp*	MI	Mindo5th	Wadeable	25	4.97	5.23	5.38	2.41	3.10	4.42	6.06	7.55	7.63
06810	*Gammarus fasciatus*	F	Mindo5th	Wadeable	24	4.98	5.44	5.69	1.80	2.96	4.78	6.25	7.99	8.80
84155	*Paralauterborniella nigrohalteralis*	F	Mindo5th	Wadeable	54	4.98	4.94	5.14	1.89	2.44	3.41	6.36	7.20	7.94
84000	*Parachironomus sp*	MT	Mindo5th	Wadeable	19	4.98	4.46	5.08	0.46	1.15	2.29	6.17	7.28	7.58
68300	*Cyphon sp*	MT	Mindo5th	Wadeable	53	4.99	4.68	5.12	0.68	1.99	3.47	5.74	6.94	7.29
11130	*Baetis intercalaris*	F	Mindo5th	Wadeable	373	5.00	5.65	5.78	2.59	3.54	4.84	6.58	7.45	7.95
59700	*Triaenodes sp*	MI	Mindo5th	Wadeable	28	5.00	5.14	5.16	2.55	3.23	4.16	5.99	6.37	7.76
84700	*Stenochironomus sp*	F	Mindo5th	Wadeable	184	5.00	5.21	5.64	1.41	2.43	3.77	6.57	7.26	7.65
84470	*Polypedilum (P.) illinoense*	T	Mindo5th	Wadeable	487	5.01	5.33	5.55	1.84	2.74	4.21	6.56	7.45	7.97
87400	*Stratiomys sp*	MT	Mindo5th	Wadeable	10	5.02	4.61	5.14	0.10	0.46	1.74	6.77	7.88	8.61
87501	*Empididae*	F	Mindo5th	Wadeable	10	5.02	5.80	6.58	1.10	1.92	5.71	7.10	7.65	7.99
13561	*Maccaffertium pulchellum*	MI	Mindo5th	Wadeable	57	5.02	5.74	5.88	2.73	4.47	5.25	6.54	7.05	7.48
26700	*Macromia sp*	MI	Mindo5th	Wadeable	23	5.03	5.36	5.85	2.33	3.03	4.18	6.76	7.18	7.73
84790	*Tribelos fuscicorne*	F	Mindo5th	Wadeable	108	5.04	5.31	5.57	1.10	2.25	3.54	6.95	7.86	8.46
84450	*Polypedilum (Uresipedilum) flavum*	F	Mindo5th	Wadeable	420	5.04	5.57	5.70	2.35	3.18	4.50	6.73	7.52	8.16
93200	*Hydrobiidae*	F	Mindo5th	Wadeable	131	5.04	4.95	5.20	1.43	2.60	3.97	5.99	7.16	7.55
23618	*Aeshna umbrosa*	T	Mindo5th	Wadeable	12	5.06	5.71	5.61	3.38	3.92	4.49	6.73	7.77	8.49
28208	*Erythemis simplicicollis*	MT	Mindo5th	Wadeable	9	5.06	5.06	4.66	3.87	4.08	4.45	5.50	6.78	7.49

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
70000	*Diptera*		Mindo5th	Wadeable	5	5.07	5.01	4.89	2.52	2.52	3.44	6.81	7.26	7.26
84300	*Phaenopsectra obediens group*	F	Mindo5th	Wadeable	82	5.11	5.03	5.25	1.49	2.37	3.78	6.38	7.18	7.46
13570	*Maccaffertium terminatum*	MI	Mindo5th	Wadeable	84	5.12	5.78	6.08	2.10	3.69	5.29	6.76	7.36	7.57
82710	*Chironomus (C.) sp*	MT	Mindo5th	Wadeable	319	5.12	5.28	5.54	1.56	2.48	3.95	6.71	7.43	8.01
18619	*Ephemera simulans*	MI	Mindo5th	Wadeable	14	5.14	4.92	5.17	1.46	2.70	4.39	6.01	6.28	6.44
22319	*Argia sedula*		Mindo5th	Wadeable	8	5.14	4.70	4.66	3.33	3.34	3.59	5.87	5.97	6.00
11250	*Neocloeon sp. (Centroptilum sp, w/o hindwing pads)*	MI	Mindo5th	Wadeable	169	5.15	5.19	5.46	1.67	2.40	4.04	6.60	7.30	7.61
85500	*Paratanytarsus sp*	F	Mindo5th	Wadeable	220	5.18	5.13	5.33	1.66	2.42	3.74	6.51	7.43	8.23
82820	*Cryptochironomus sp*	F	Mindo5th	Wadeable	420	5.20	5.28	5.50	2.08	2.70	4.17	6.56	7.46	7.89
83150	*Endochironomus sp*	MT	Mindo5th	Wadeable	23	5.21	5.38	5.71	2.22	2.71	3.53	6.72	8.51	8.73
04964	*Erpobdella microstoma*	MT	Mindo5th	Wadeable	85	5.22	4.90	5.31	0.58	1.08	3.77	6.42	7.44	7.96
53800	*Hydroptila sp*	F	Mindo5th	Wadeable	210	5.23	5.42	5.69	2.24	2.99	4.23	6.58	7.47	7.91
23804	*Basiaeschna janata*	F	Mindo5th	Wadeable	38	5.23	5.51	6.19	1.92	2.62	3.90	6.99	7.51	7.81
06700	*Crangonyx sp*	MT	Mindo5th	Wadeable	49	5.24	4.85	5.26	0.87	2.45	4.04	5.74	6.69	7.69
13120	*Nixe perfida*	MI	Mindo5th	Wadeable	64	5.25	5.67	5.67	2.86	4.19	4.83	6.42	7.30	7.64
19102	*Ephoron album*	MI	Mindo5th	Wadeable	11	5.26	5.45	5.69	3.39	3.68	4.71	6.15	6.70	6.75
80420	*Cricotopus (C.) bicinctus*	T	Mindo5th	Wadeable	176	5.26	5.40	5.60	1.91	2.85	4.20	6.73	7.60	8.01
68700	*Dubiraphia sp*	F	Mindo5th	Wadeable	356	5.27	5.24	5.53	1.76	2.60	4.21	6.44	7.26	7.69
94100	*Pleurocera sp*	MI	Mindo5th	Wadeable	63	5.28	5.38	5.75	2.26	2.88	4.51	6.29	7.09	7.51
82885	*Cryptotendipes pseudotener*	F	Mindo5th	Wadeable	5	5.29	4.33	5.01	1.74	1.74	2.81	5.67	6.28	6.28
05800	*Caecidotea sp*	T	Mindo5th	Wadeable	292	5.31	5.40	5.70	2.07	2.56	4.32	6.75	7.46	8.02
86200	*Tabanus sp*	F	Mindo5th	Wadeable	37	5.31	5.22	5.68	2.56	3.00	3.71	6.47	7.22	8.12
85001	*Tanytarsini*		Mindo5th	Wadeable	72	5.32	5.67	5.43	2.76	3.43	4.38	6.70	7.99	8.60
84210	*Paratendipes albimanus or P. duplicatus*	F	Mindo5th	Wadeable	116	5.32	5.09	5.34	1.18	2.22	3.50	6.46	7.60	7.83
25600	*Stylurus sp*	MI	Mindo5th	Wadeable	10	5.34	5.42	5.60	3.60	3.66	3.90	6.75	7.50	7.75
08280	*Orconectes (Gremicambarus) virilis*	F	Mindo5th	Wadeable	163	5.36	5.40	5.71	1.92	2.93	4.50	6.73	7.40	7.66
12200	*Isonychia sp*	MI	Mindo5th	Wadeable	95	5.37	5.83	5.89	3.37	4.24	5.06	6.81	7.31	8.34
13030	*Leucrocuta maculipennis*	MI	Mindo5th	Wadeable	26	5.39	5.53	5.62	2.85	4.24	4.70	6.26	7.08	7.31
24900	*Gomphus sp*	F	Mindo5th	Wadeable	79	5.39	5.34	5.54	1.93	3.26	4.10	6.77	7.30	7.67
68601	*Ancyronyx variegata*	F	Mindo5th	Wadeable	102	5.42	5.54	5.73	2.37	3.30	4.86	6.57	7.04	7.64
11155	*Iswaeon anoka*	MI	Mindo5th	Wadeable	10	5.42	5.85	5.61	2.66	3.30	4.38	6.20	9.37	12.47
59410	*Nectopsyche diarina*	MI	Mindo5th	Wadeable	130	5.43	5.65	5.81	2.87	3.66	4.49	6.75	7.43	8.15
11020	*Acerpenna pygmaea*	MI	Mindo5th	Wadeable	87	5.44	5.53	5.72	1.74	3.27	4.59	6.69	7.30	7.72
78130	*Labrundinia neopilosella*		Mindo5th	Wadeable	7	5.45	5.05	5.12	3.18	3.42	4.43	5.57	6.75	7.03

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
25410	*Progomphus obscurus*	MT	Mindo5th	Wadeable	54	5.46	5.30	5.56	2.15	2.94	4.23	6.58	7.50	7.79
22300	*Argia sp*	F	Mindo5th	Wadeable	245	5.47	5.40	5.59	2.36	3.04	4.35	6.46	7.30	7.74
82800	*Cladopelma sp*	T	Mindo5th	Wadeable	21	5.47	5.09	4.74	1.58	2.23	2.97	7.03	8.88	10.47
87601	*Dolichopodidae*	MT	Mindo5th	Wadeable	6	5.48	5.16	4.93	3.57	3.59	3.79	6.36	7.30	7.40
59520	*Oecetis cinerascens*	F	Mindo5th	Wadeable	11	5.49	5.05	5.71	0.92	2.11	4.63	5.88	6.58	7.02
08310	*Procambarus (Ortmannicus) acutus acutus*	T	Mindo5th	Wadeable	7	5.49	4.89	5.35	1.81	2.14	3.86	6.08	6.66	6.76
68708	*Dubiraphia vittata group*	F	Mindo5th	Wadeable	86	5.49	5.63	5.87	2.23	3.64	4.40	6.56	7.17	8.28
16700	*Tricorythodes sp*	MI	Mindo5th	Wadeable	293	5.51	5.65	5.77	2.49	3.70	4.83	6.52	7.40	8.17
84460	*Polypedilum (P.) fallax group*	F	Mindo5th	Wadeable	68	5.51	5.45	5.87	1.81	2.52	4.04	6.76	7.30	8.22
12501	*Heptageniidae*		Mindo5th	Wadeable	74	5.53	6.06	6.11	3.56	4.14	5.37	7.01	7.56	8.25
84580	*Robackia demeijerei*	MI	Mindo5th	Wadeable	19	5.54	5.84	6.05	1.06	3.13	5.55	6.76	7.77	8.04
85210	*Cladotanytarsus species group B*	MI	Mindo5th	Wadeable	95	5.54	5.23	5.42	1.90	2.52	3.96	6.50	7.26	7.75
84100	*Paracladopelma sp*		Mindo5th	Wadeable	23	5.54	5.44	5.49	1.99	3.23	4.40	6.25	7.31	9.24
68160	*HELICHUS LITHOPHILUS*	F	Mindo5th	Wadeable	61	5.54	5.40	5.58	1.83	3.07	4.48	6.63	7.39	7.99
70501	*Tipulidae*		Mindo5th	Wadeable	20	5.55	5.75	6.09	2.49	3.63	5.09	6.62	7.63	8.21
06800	*Gammarus sp*	F	Mindo5th	Wadeable	135	5.57	5.76	5.91	2.44	3.43	4.54	6.92	7.90	8.42
93900	*Elimia sp*	MI	Mindo5th	Wadeable	72	5.58	5.57	5.74	2.11	3.36	4.84	6.41	7.26	7.91
84040	*Parachironomus frequens*	F	Mindo5th	Wadeable	19	5.59	5.73	5.79	4.05	4.24	5.17	6.28	7.20	7.69
22315	*Argia moesta*		Mindo5th	Wadeable	19	5.59	5.53	5.35	3.65	3.73	4.32	6.52	7.34	8.18
18100	*Anthopotamus sp*	MI	Mindo5th	Wadeable	16	5.60	5.65	5.64	2.33	2.99	5.29	6.17	7.21	9.50
81825	*Rheocricotopus (Psilocricotopus) robacki*	F	Mindo5th	Wadeable	72	5.61	5.55	5.76	2.59	2.98	4.70	6.53	7.54	8.00
13000	*Leucrocuta sp*	MI	Mindo5th	Wadeable	58	5.62	5.79	5.92	3.56	3.93	5.30	6.46	6.99	8.38
59400	*Nectopsyche sp*	MI	Mindo5th	Wadeable	18	5.63	5.78	5.86	1.89	3.40	5.05	6.72	7.30	9.25
xx016	*Trepobates sp*		Mindo5th	Wadeable	5	5.64	5.38	5.65	3.97	3.97	4.32	6.14	6.95	6.95
68075	*Psephenus herricki*	MI	Mindo5th	Wadeable	27	5.65	5.71	5.75	3.53	3.97	4.58	6.29	7.21	8.00
15000	*Paraleptophlebia sp*	F	Mindo5th	Wadeable	5	5.66	4.96	5.54	2.40	2.40	3.43	6.34	6.93	6.93
52001	*Hydropsychidae*		Mindo5th	Wadeable	105	5.67	6.09	6.07	3.59	4.35	5.28	6.99	7.70	8.46
69400	*Stenelmis sp*	F	Mindo5th	Wadeable	452	5.68	5.40	5.68	2.19	2.87	4.33	6.60	7.41	7.90
85265	*Cladotanytarsus vanderwulpi group sp 5*	MI	Mindo5th	Wadeable	17	5.68	5.19	5.70	2.57	3.59	4.63	5.88	6.09	6.74
52200	*Cheumatopsyche sp*	F	Mindo5th	Wadeable	491	5.69	5.49	5.70	2.20	2.97	4.44	6.61	7.46	8.03
74100	*Simulium sp*	F	Mindo5th	Wadeable	303	5.72	5.80	5.89	2.38	3.51	4.88	6.98	7.69	8.44
24510	*ERPETOGOMPHUS DESIGNATUS*	F	Mindo5th	Wadeable	9	5.72	5.12	4.86	2.87	3.42	4.35	6.27	6.61	6.81
72340	*Dixella sp*	F	Mindo5th	Wadeable	6	5.73	5.48	5.69	4.50	4.50	4.55	6.08	6.32	6.35
79100	*Thienemannimyia group*	F	Mindo5th	Wadeable	439	5.77	5.53	5.71	2.26	3.08	4.48	6.75	7.51	8.03

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
82100	*Thienemanniella sp*		Mindo5th	Wadeable	19	5.77	5.64	5.31	2.90	3.62	4.57	7.10	8.03	8.39
06501	*Gammaridae*		Mindo5th	Wadeable	10	5.77	6.19	6.85	2.27	3.13	5.37	7.04	8.26	8.69
84600	*Saetheria sp*	F	Mindo5th	Wadeable	49	5.77	5.83	5.97	2.26	3.16	4.78	7.06	7.57	8.40
85201	*Cladotanytarsus species group A*	F	Mindo5th	Wadeable	24	5.79	5.78	6.02	2.40	3.19	4.57	7.00	7.87	8.86
11150	*Labiobaetis propinquus*	MI	Mindo5th	Wadeable	129	5.80	5.68	5.72	2.65	3.73	4.84	6.63	7.43	7.84
69410	*Stenelmis crenata*		Mindo5th	Wadeable	72	5.81	5.93	6.00	3.36	4.36	5.33	6.83	7.33	7.93
23909	*Boyeria vinosa*	F	Mindo5th	Wadeable	176	5.81	5.66	5.76	2.60	3.59	4.80	6.76	7.48	8.17
08250	*Orconectes (Procericambarus) rusticus*	F	Mindo5th	Wadeable	10	5.82	4.60	5.17	2.10	2.26	3.34	5.94	6.48	6.90
19107	*Ephoron leukon*	MI	Mindo5th	Wadeable	10	5.83	5.58	5.67	2.30	3.51	4.89	6.20	7.57	7.70
82501	*Chironomini*		Mindo5th	Wadeable	167	5.85	5.89	5.89	2.50	3.58	4.93	6.98	7.97	8.47
11015	*Acerpenna sp*	MI	Mindo5th	Wadeable	9	5.86	4.85	5.31	0.11	1.21	3.19	6.42	7.70	8.23
85200	*Cladotanytarsus sp*		Mindo5th	Wadeable	127	5.86	5.56	5.86	1.60	2.78	4.71	6.61	7.24	8.28
58505	*Helicopsyche borealis*	MI	Mindo5th	Wadeable	80	5.86	5.81	5.95	2.59	4.34	5.32	6.52	7.58	8.03
59100	*Ceraclea sp*	MI	Mindo5th	Wadeable	15	5.86	5.51	5.54	2.94	3.90	4.40	6.47	7.50	7.51
92500	*Viviparidae*		Mindo5th	Wadeable	5	5.86	4.73	4.86	2.09	2.09	3.85	6.05	6.30	6.30
13540	*Maccaffertium mediopunctatum*	MI	Mindo5th	Wadeable	17	5.87	6.10	6.24	4.00	4.56	5.20	7.06	7.46	7.87
52500	*Hydropsyche sp*		Mindo5th	Wadeable	41	5.87	6.10	6.06	4.19	4.80	5.41	6.82	7.33	7.76
68901	*Macronychus glabratus*	F	Mindo5th	Wadeable	207	5.89	5.90	5.97	3.34	4.21	5.26	6.74	7.45	7.73
08200	*Orconectes sp*	F	Mindo5th	Wadeable	202	5.90	5.80	5.85	2.60	3.59	4.92	6.81	7.78	8.33
77001	*Tanypodinae*		Mindo5th	Wadeable	130	5.90	5.88	5.88	2.40	3.57	4.92	6.95	7.98	8.49
83840	*Microtendipes pedellus group*	F	Mindo5th	Wadeable	150	5.94	6.00	6.20	2.40	3.47	5.13	7.17	7.82	8.43
84400	*Polypedilum sp*		Mindo5th	Wadeable	130	5.96	5.91	6.02	2.27	3.29	4.97	7.15	8.03	8.62
12924	*Heptagenia flavescens*	MI	Mindo5th	Wadeable	5	5.98	6.05	6.09	5.35	5.35	5.41	6.64	6.81	6.81
11620	*Paracloeodes minutus*	MI	Mindo5th	Wadeable	37	5.99	5.50	5.72	2.08	2.88	4.63	6.73	7.29	7.59
52540	*Hydropsyche dicantha*	MI	Mindo5th	Wadeable	23	6.01	6.00	6.06	3.65	4.67	5.35	6.77	7.58	8.02
59407	*Nectopsyche candida*	MI	Mindo5th	Wadeable	68	6.01	5.85	5.95	3.56	3.93	5.05	6.78	7.40	7.51
80470	*Cricotopus (C.) or Orthocladius (O.) sp*		Mindo5th	Wadeable	120	6.03	5.81	5.73	2.83	3.38	4.68	6.91	7.77	8.59
60400	*Gyrinus sp*	F	Mindo5th	Wadeable	31	6.06	5.93	5.68	3.30	3.90	5.02	7.27	8.07	8.60
84440	*Polypedilum (Uresipedilum) aviceps*	MI	Mindo5th	Wadeable	13	6.06	5.48	6.06	0.65	2.53	5.15	6.46	7.36	8.02
21001	*Calopterygidae*	F	Mindo5th	Wadeable	8	6.06	5.96	6.23	3.34	3.75	4.81	6.92	8.07	8.46
96310	*Planorbula armigera*		Mindo5th	Wadeable	6	6.06	6.40	6.19	5.10	5.15	5.62	6.37	8.70	8.96
21300	*Hetaerina sp*	F	Mindo5th	Wadeable	136	6.07	6.05	6.04	3.57	4.50	5.30	6.81	7.55	8.40
76001	*Chironomidae*		Mindo5th	Wadeable	60	6.10	5.73	5.77	2.34	2.70	4.34	6.81	7.97	8.41
48410	*Corydalus cornutus*	MI	Mindo5th	Wadeable	66	6.10	6.07	6.30	3.20	3.85	5.33	7.01	7.60	8.43

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
26705	*Macromia illinoiensis*	F	Mindo5th	Wadeable	85	6.15	5.53	5.73	2.80	3.29	4.35	6.91	7.50	7.73
78510	*Paramerina sp 1*	MI	Mindo5th	Wadeable	42	6.18	5.72	5.70	2.89	3.23	4.70	6.98	7.69	8.11
81400	*Orthocladius sp*		Mindo5th	Wadeable	6	6.19	5.36	5.85	2.74	2.75	2.85	6.80	7.95	8.08
71900	*Tipula sp*	F	Mindo5th	Wadeable	77	6.20	6.21	6.06	4.60	4.87	5.61	7.10	8.01	8.36
59405	*Nectopsyche albida*		Mindo5th	Wadeable	6	6.20	6.43	6.08	5.87	5.88	5.94	6.13	8.23	8.46
69420	*Stenelmis sexlineata*		Mindo5th	Wadeable	9	6.23	5.84	5.84	3.75	4.16	5.12	6.79	7.25	7.53
69225	*Optioservus fastiditus*	MI	Mindo5th	Wadeable	14	6.25	6.35	6.58	4.08	4.44	5.07	7.28	7.93	8.33
52530	*Hydropsyche depravata group*	F	Mindo5th	Wadeable	148	6.26	6.05	6.06	3.95	4.74	5.32	6.89	7.47	7.89
34500	*Perlesta placida complex*	F	Mindo5th	Wadeable	22	6.28	5.88	6.32	2.83	3.40	4.38	7.26	7.64	8.23
71100	*Hexatoma sp*	MI	Mindo5th	Wadeable	15	6.28	6.03	6.24	3.72	5.12	5.68	6.50	6.80	7.69
84612	*Saetheria tylus*	F	Mindo5th	Wadeable	9	6.29	6.22	6.09	5.44	5.48	5.65	6.62	7.08	7.30
24501	*Gomphidae*	F	Mindo5th	Wadeable	28	6.30	6.17	6.60	2.63	4.46	5.64	6.98	7.44	8.20
55510	*Brachycentrus sp*	MI	Mindo5th	Wadeable	17	6.36	6.79	6.54	5.43	5.68	5.91	7.35	8.02	9.64
50315	*Chimarra obscura*	MI	Mindo5th	Wadeable	53	6.37	6.01	6.09	2.55	3.89	5.28	6.98	7.56	7.88
07701	*Cambaridae*		Mindo5th	Wadeable	20	6.37	6.34	6.62	2.05	3.12	5.67	7.44	8.27	9.47
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	MI	Mindo5th	Wadeable	8	6.39	5.95	5.62	5.01	5.06	5.33	6.78	7.09	7.17
51001	*Polycentropodidae*		Mindo5th	Wadeable	5	6.40	6.38	5.89	5.38	5.38	5.61	6.97	8.45	8.45
11100	*Baetis sp*	F	Mindo5th	Wadeable	42	6.40	6.15	5.96	3.28	4.35	5.37	7.16	8.30	8.55
84785	*Tribelos atrum*		Mindo5th	Wadeable	44	6.41	6.42	6.29	3.40	3.72	5.26	7.82	8.39	9.27
11001	*Baetidae*		Mindo5th	Wadeable	119	6.42	6.19	6.08	3.35	3.78	5.29	7.27	8.25	8.60
84200	*Paratendipes sp*	F	Mindo5th	Wadeable	5	6.48	6.75	6.58	6.04	6.04	6.08	7.51	7.55	7.55
86100	*Chrysops sp*	F	Mindo5th	Wadeable	20	6.50	6.39	6.16	4.45	4.86	5.53	6.85	8.19	9.48
52431	*Ceratopsyche morosa*	MI	Mindo5th	Wadeable	34	6.50	6.33	6.53	3.65	4.95	5.43	7.15	8.01	8.59
21200	*Calopteryx sp*	F	Mindo5th	Wadeable	99	6.51	6.08	6.11	3.49	4.38	5.26	6.85	7.64	8.32
68702	*Dubiraphia bivittata*	F	Mindo5th	Wadeable	14	6.52	6.61	6.40	3.86	5.24	5.82	7.31	8.62	9.71
84280	*Phaenopsectra sp or Tribelos sp*	F	Mindo5th	Wadeable	10	6.53	6.48	6.99	4.38	4.82	5.38	7.31	7.60	7.75
51300	*Neureclipsis sp*	MI	Mindo5th	Wadeable	34	6.53	6.29	6.45	3.89	4.79	5.80	7.23	7.55	7.68
81650	*Parametriocnemus sp*	F	Mindo5th	Wadeable	14	6.55	6.47	6.90	2.47	3.80	5.93	7.65	8.50	8.85
11101	*Plauditus sp*	MI	Mindo5th	Wadeable	14	6.55	6.11	5.97	2.91	4.03	5.13	6.96	8.64	9.71
11120	*Baetis flavistriga*	F	Mindo5th	Wadeable	217	6.64	6.29	6.36	3.96	4.57	5.45	7.11	7.90	8.44
52401	*Ceratopsyche sp*	MI	Mindo5th	Wadeable	172	6.66	6.29	6.18	4.00	4.77	5.52	7.09	8.00	8.46
12912	*Heptagenia diabasia*	F	Mindo5th	Wadeable	60	6.67	5.96	6.10	3.02	3.65	5.25	6.87	7.71	8.02
81630	*Parakiefferiella sp*	F	Mindo5th	Wadeable	7	6.67	6.59	7.06	4.23	4.44	5.40	7.85	8.38	8.46
13500	*Maccaffertium sp*	MI	Mindo5th	Wadeable	59	6.67	6.15	6.08	3.61	4.84	5.55	6.84	7.87	8.54

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
06840	*Gammarus pseudolimnaeus*	F	Mindo5th	Wadeable	85	6.67	6.38	6.58	3.79	4.40	5.76	7.40	7.91	8.23
81810	*Rheocricotopus sp*	F	Mindo5th	Wadeable	15	6.68	6.42	6.20	3.69	3.99	5.40	7.91	8.62	8.67
83800	*Microtendipes sp*	F	Mindo5th	Wadeable	21	6.70	6.35	6.20	3.24	5.04	5.65	6.99	8.20	9.36
80001	*Orthocladiinae*		Mindo5th	Wadeable	86	6.76	6.30	6.51	2.38	3.77	5.31	7.49	8.25	8.47
99001	*Unionidae*		Mindo5th	Wadeable	6	6.79	6.74	7.27	1.74	2.15	5.81	7.91	10.21	10.46
52520	*Hydropsyche bidens*	MI	Mindo5th	Wadeable	6	6.81	6.46	6.53	5.43	5.48	5.97	6.81	7.42	7.49
19100	*Ephoron sp*	MI	Mindo5th	Wadeable	10	6.83	6.47	6.34	5.51	5.62	5.89	7.26	7.43	7.55
70700	*Dicranota sp*	MI	Mindo5th	Wadeable	10	6.89	6.76	7.14	4.20	4.35	5.55	8.03	8.26	8.45
94500	*Lymnaea sp (old name, =Lymnaeidae)*		Mindo5th	Wadeable	12	6.92	7.00	7.11	5.04	5.43	6.26	7.62	8.59	8.90
13100	*Nixe sp*	MI	Mindo5th	Wadeable	8	6.94	6.05	6.18	2.10	3.06	5.69	6.82	8.39	8.96
86401	*Atherix lantha*	MI	Mindo5th	Wadeable	6	6.98	7.47	6.71	6.08	6.12	6.44	8.43	10.28	10.48
70600	*Antocha sp*	MI	Mindo5th	Wadeable	14	7.06	6.73	6.58	5.57	5.65	6.10	7.26	7.78	8.30
34100	*Acroneuria sp*	MI	Mindo5th	Wadeable	5	7.09	5.22	5.30	1.10	1.10	3.64	6.93	8.96	8.96
80204	*Brillia flavifrons group*	F	Mindo5th	Wadeable	67	7.14	6.74	6.86	4.31	4.92	6.05	7.64	8.34	8.52
82201	*Tvetenia sp*	MI	Mindo5th	Wadeable	11	7.15	7.49	7.31	5.73	5.93	7.06	8.25	9.08	9.94
69200	*Optioservus sp*	MI	Mindo5th	Wadeable	56	7.18	6.60	6.58	3.88	4.94	5.79	7.30	8.07	8.80
48620	*Nigronia serricornis*	F	Mindo5th	Wadeable	6	7.19	7.21	7.01	4.48	4.66	6.26	8.45	9.86	10.02
80440	*Cricotopus (C.) trifascia*	F	Mindo5th	Wadeable	85	7.20	6.38	6.50	3.42	4.35	5.41	7.33	8.08	8.64
11113	*Baetis brunneicolor*	MI	Mindo5th	Wadeable	18	7.43	6.75	6.95	4.53	5.40	6.15	7.65	7.98	8.12
80700	*Eukiefferiella sp*		Mindo5th	Wadeable	31	7.50	7.11	7.45	5.19	5.43	6.29	7.98	8.44	8.46
23600	*Aeshna sp*	MT	Mindo5th	Wadeable	6	8.04	7.63	7.50	5.55	5.62	6.28	8.49	10.28	10.48
52430	*Ceratopsyche morosa group*	MI	P299mean	Wadeable	7	2.53	6.42	6.46	2.18	2.83	5.69	7.69	8.90	9.19
83100	*Einfeldia sp*		P299mean	Wadeable	6	3.08	6.55	7.45	0.31	0.93	6.45	8.43	9.14	9.21
83051	*Dicrotendipes simpsoni*	T	P299mean	Wadeable	42	3.14	4.42	4.30	1.17	1.68	3.17	5.70	6.90	8.01
83050	*Dicrotendipes lucifer*	MT	P299mean	Wadeable	14	3.23	4.81	4.44	2.95	3.08	3.41	5.49	7.78	7.95
83300	*Glyptotendipes (G.) sp*	MT	P299mean	Wadeable	110	3.31	6.06	6.29	2.40	3.16	4.44	7.53	9.04	9.79
04666	*Helobdella papillata*	MT	P299mean	Wadeable	5	3.46	4.60	4.69	0.25	0.25	3.19	6.04	8.71	8.71
79000	*Tanypus sp*	T	P299mean	Wadeable	24	3.58	5.87	6.09	2.21	3.90	5.10	7.06	7.81	8.22
28908	*Perithemis tenera*	T	P299mean	Wadeable	12	3.64	5.38	6.55	0.36	0.62	3.33	7.32	8.36	8.64
27307	*Epitheca (Epicordulia) princeps*	MT	P299mean	Wadeable	18	3.73	5.76	4.70	1.99	2.70	3.67	8.22	9.78	10.73
12900	*Heptagenia sp*		P299mean	Wadeable	6	3.88	5.16	5.06	2.76	2.82	3.29	7.03	7.69	7.76
77355	*Clinotanypus pinguis*	MT	P299mean	Wadeable	50	3.91	5.94	6.09	2.90	3.42	4.45	7.19	8.84	9.48
83045	*Dicrotendipes nervosus*		P299mean	Wadeable	32	3.92	5.25	5.29	0.83	1.77	3.35	7.37	8.05	8.45
96120	*Menetus (Micromenetus) dilatatus*	MT	P299mean	Wadeable	6	3.95	6.28	6.56	2.91	3.13	5.10	6.80	9.44	9.74

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14600	*Choroterpes sp*	MI	P299mean	Wadeable	9	3.98	4.48	3.64	2.19	2.42	3.06	6.32	6.87	7.22
85821	*Tanytarsus glabrescens group sp 7*	F	P299mean	Wadeable	14	3.98	6.33	6.35	3.41	5.17	5.85	6.66	7.47	9.23
53501	*Hydroptilidae*	F	P299mean	Wadeable	11	4.01	5.24	5.46	2.21	2.53	3.27	6.91	7.83	8.67
72420	*Chaoborus sp*	T	P299mean	Wadeable	15	4.26	3.92	3.67	0.42	0.75	2.67	4.83	8.22	8.38
85625	*Rheotanytarsus sp*	F	P299mean	Wadeable	196	4.27	6.70	6.79	3.23	3.95	5.26	7.99	9.17	9.71
59550	*Oecetis inconspicua complex sp A (sensu Floyd, 1995)*	F	P299mean	Wadeable	38	4.28	5.06	5.05	0.91	1.57	3.49	6.78	7.78	8.96
98100	*Musculium sp*	MT	P299mean	Wadeable	8	4.35	7.45	8.47	2.76	2.94	5.24	9.18	10.61	11.05
28001	*Libellulidae*	MT	P299mean	Wadeable	15	4.38	5.24	5.13	1.90	2.46	3.69	6.28	8.20	9.61
78450	*Nilotanypus fimbriatus*	F	P299mean	Wadeable	8	4.46	7.59	7.54	2.18	3.06	6.17	8.80	12.45	13.54
77130	*Ablabesmyia rhamphe group*	MT	P299mean	Wadeable	17	4.49	5.86	6.07	3.33	3.71	5.16	6.54	7.56	8.16
04686	*Placobdella papillifera*	MT	P299mean	Wadeable	14	4.52	5.75	6.33	3.37	3.43	3.53	7.65	8.26	8.85
48220	*Chauliodes rastricornis*	T	P299mean	Wadeable	11	4.55	5.24	6.01	0.86	2.04	3.71	6.50	7.71	8.21
83000	*Dicrotendipes sp*	F	P299mean	Wadeable	48	4.55	6.82	7.00	3.14	4.16	5.79	8.48	9.29	9.99
83700	*Microchironomus sp*	MT	P299mean	Wadeable	10	4.63	5.23	4.70	3.14	3.22	3.41	6.67	8.51	9.36
59970	*Petrophila sp*	MI	P299mean	Wadeable	14	4.69	7.80	7.90	2.83	5.13	6.51	8.35	10.56	13.53
79020	*Tanypus neopunctipennis*	T	P299mean	Wadeable	28	4.78	5.71	6.69	0.71	3.05	3.58	7.66	8.79	9.21
04601	*Glossiphoniidae*	MT	P299mean	Wadeable	21	4.79	5.67	6.04	2.13	3.52	4.44	7.08	8.04	8.63
51206	*Cyrnellus fraternus*	F	P299mean	Wadeable	13	4.82	6.47	7.03	2.78	2.88	5.75	7.88	8.43	8.59
84010	*Parachironomus "abortivus" (sensu Simpson & Bode, 1980)*	MT	P299mean	Wadeable	5	4.85	5.24	5.39	3.58	3.58	4.03	6.49	6.60	6.60
08451	*Palaemonetes kadiakensis*	F	P299mean	Wadeable	22	4.85	5.32	5.09	3.15	3.25	3.67	6.45	7.59	7.74
95900	*Gyraulus sp*	MT	P299mean	Wadeable	14	4.87	6.01	5.76	3.62	3.76	4.75	6.99	8.74	9.56
78600	*Pentaneura inconspicua*	F	P299mean	Wadeable	17	5.02	6.76	6.80	3.63	4.39	5.05	7.88	9.53	10.38
67100	*Hydrobius sp*	F	P299mean	Wadeable	6	5.04	5.48	5.91	2.93	2.98	3.45	7.27	7.39	7.40
05900	*Lirceus sp*	MT	P299mean	Wadeable	22	5.10	5.72	5.13	1.38	2.62	4.16	7.25	9.16	11.81
13010	*Leucrocuta hebe*	MI	P299mean	Wadeable	12	5.16	5.50	5.35	2.98	3.29	4.60	6.59	7.83	8.00
84800	*Tribelos jucundum*	MT	P299mean	Wadeable	118	5.16	5.69	5.78	1.68	2.98	4.13	7.36	8.48	9.26
84030	*Parachironomus directus*	MT	P299mean	Wadeable	5	5.18	5.90	6.41	3.43	3.43	4.40	7.11	8.20	8.20
84888	*Xenochironomus xenolabis*	F	P299mean	Wadeable	15	5.18	5.47	5.32	0.60	0.75	3.60	7.42	9.57	11.06
27500	*Somatochlora sp*	MT	P299mean	Wadeable	43	5.25	5.08	5.17	1.81	2.40	3.55	5.88	8.14	9.06
83002	*Dicrotendipes modestus*	MT	P299mean	Wadeable	10	5.26	5.65	6.13	2.18	2.54	4.90	6.39	8.07	9.05
78400	*Natarsia sp*	F	P299mean	Wadeable	19	5.30	5.66	5.85	3.20	3.49	4.43	6.97	7.67	7.89
83900	*Nilothauma sp*	F	P299mean	Wadeable	9	5.30	5.47	5.33	2.19	2.30	3.56	7.53	8.50	8.52
82600	*Axarus sp*	F	P299mean	Wadeable	24	5.33	6.37	6.35	3.08	3.53	4.80	7.95	8.41	9.55
71700	*Pilaria sp*	F	P299mean	Wadeable	8	5.34	6.38	6.59	2.19	2.89	4.82	8.50	8.98	9.06

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04935	*Erpobdella punctata punctata*	MT	P299mean	Wadeable	52	5.34	7.07	7.69	2.28	3.70	6.05	8.57	9.82	10.50
84520	*Polypedilum (Tripodura) halterale group*	MT	P299mean	Wadeable	139	5.34	6.14	6.31	2.82	3.18	4.75	7.66	8.61	9.06
98001	*Pisidiidae*		P299mean	Wadeable	211	5.36	6.17	6.35	2.10	3.24	4.64	7.79	8.72	9.39
72900	*Culex sp*	T	P299mean	Wadeable	11	5.38	5.18	4.45	0.89	2.40	3.57	6.93	9.23	11.36
04930	*Erpobdella sp*	MT	P299mean	Wadeable	13	5.41	7.41	7.61	3.48	4.41	6.65	8.83	9.49	10.43
85814	*Tanytarsus glabrescens group*	F	P299mean	Wadeable	6	5.44	5.01	5.21	3.03	3.07	3.45	6.09	7.00	7.10
87540	*Hemerodromia sp*	F	P299mean	Wadeable	31	5.44	7.02	7.03	4.23	4.77	5.70	8.46	9.70	9.91
96900	*Ferrissia sp*	F	P299mean	Wadeable	57	5.47	6.47	6.73	2.98	3.50	5.12	7.87	8.70	9.78
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	F	P299mean	Wadeable	5	5.50	5.70	5.46	4.32	4.32	5.13	6.42	7.18	7.18
23501	*Aeshnidae*		P299mean	Wadeable	9	5.50	5.91	6.00	2.90	3.00	3.38	8.50	8.79	8.92
96100	*Menetus (Micromenetus) sp*		P299mean	Wadeable	52	5.51	5.57	5.69	1.95	2.65	3.67	7.17	8.51	8.85
79400	*Zavrelimyia sp*	F	P299mean	Wadeable	7	5.51	6.01	5.78	3.67	3.70	4.03	6.87	9.76	10.47
82730	*Chironomus (C.) decorus group*	T	P299mean	Wadeable	32	5.51	5.62	6.04	2.26	3.19	4.82	6.72	7.31	7.79
78140	*Labrundinia pilosella*	F	P299mean	Wadeable	64	5.53	5.97	5.90	1.85	3.12	4.38	8.05	8.51	9.31
08220	*Orconectes (Gremicambarus) immunis*	T	P299mean	Wadeable	13	5.55	5.03	5.41	3.14	3.16	3.63	5.91	6.50	6.78
48200	*Chauliodes sp*	MT	P299mean	Wadeable	9	5.60	5.83	5.72	3.30	3.36	4.47	6.83	8.87	9.20
98200	*Pisidium sp*	MT	P299mean	Wadeable	146	5.62	6.31	6.30	1.87	3.18	4.72	8.21	9.18	10.20
85400	*Micropsectra sp*	MT	P299mean	Wadeable	21	5.63	6.26	7.01	2.34	2.72	4.24	7.97	8.86	9.37
77115	*Ablabesmyia janta*	F	P299mean	Wadeable	77	5.67	5.85	5.65	3.44	3.62	4.55	6.99	8.27	9.06
77750	*Hayesomyia senata or Thienemannimyia norena*	F	P299mean	Wadeable	50	5.67	6.01	6.04	3.26	4.25	5.06	6.86	7.77	8.74
96002	*Helisoma anceps anceps*	F	P299mean	Wadeable	25	5.69	6.11	6.70	1.44	2.90	3.87	7.71	9.32	10.09
07850	*Cambarus (Lacunicambarus) diogenes diogenes*	T	P299mean	Wadeable	107	5.71	6.06	6.36	1.58	2.95	4.59	7.58	8.77	9.74
13521	*Stenonema femoratum*	F	P299mean	Wadeable	102	5.78	6.74	7.21	2.58	3.30	5.41	8.29	9.57	10.15
11400	*Centroptilum sp or Procloeon sp (formerly in Cloeon)*	F	P299mean	Wadeable	46	5.82	6.09	6.27	2.13	2.95	4.76	7.28	9.32	9.86
03600	*Oligochaeta*	T	P299mean	Wadeable	500	5.82	6.58	6.80	2.92	3.55	5.17	8.04	9.06	9.73
74501	*Ceratopogonidae*	T	P299mean	Wadeable	51	5.83	6.43	6.60	2.23	3.29	4.53	8.63	9.28	9.63
13510	*Maccaffertium exiguum*	MI	P299mean	Wadeable	47	5.84	7.05	7.11	4.98	5.25	5.96	8.04	8.87	9.26
84540	*Polypedilum (Tripodura) scalaenum group*	F	P299mean	Wadeable	182	5.88	6.04	6.24	2.64	3.19	4.69	7.50	8.43	8.90
59700	*Triaenodes sp*	MI	P299mean	Wadeable	28	5.89	6.02	6.23	3.26	3.82	5.14	6.81	7.47	8.58
78655	*Procladius (Holotanypus) sp*	MT	P299mean	Wadeable	44	5.89	5.82	6.08	2.69	3.24	4.82	6.73	7.82	9.75
83040	*Dicrotendipes neomodestus*	F	P299mean	Wadeable	362	5.90	6.48	6.56	2.84	3.52	5.09	8.01	9.18	9.76
52570	*Hydropsyche simulans*	MI	P299mean	Wadeable	120	5.90	7.08	7.13	3.85	5.01	6.11	8.00	9.23	10.03
47600	*Sialis sp*	MT	P299mean	Wadeable	76	5.92	5.98	6.11	1.98	3.27	4.48	7.46	8.81	9.45
24107	*Nasiaeschna pentacantha*	MT	P299mean	Wadeable	20	5.93	5.19	5.24	1.03	1.51	3.55	7.14	8.34	9.31

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
19102	*Ephoron album*	MI	P299mean	Wadeable	11	5.94	7.12	6.29	4.38	4.45	5.60	8.10	11.19	14.12
04685	*Placobdella ornata*	MT	P299mean	Wadeable	8	5.95	5.58	5.55	3.17	3.25	3.52	6.35	9.48	10.64
68201	*Scirtidae*	F	P299mean	Wadeable	55	5.96	6.57	6.96	3.45	3.71	5.11	8.00	8.59	8.85
83158	*Endochironomus nigricans*	MT	P299mean	Wadeable	28	5.96	6.58	6.26	3.50	3.76	4.98	8.43	9.62	10.13
60300	*Dineutus sp*	F	P299mean	Wadeable	30	5.97	6.41	6.15	2.76	3.15	3.93	8.52	10.37	11.05
04680	*Placobdella sp*	MT	P299mean	Wadeable	8	5.97	6.81	7.28	3.60	3.85	4.84	8.23	9.69	10.22
87601	*Dolichopodidae*	MT	P299mean	Wadeable	6	6.00	5.85	5.52	4.11	4.20	5.09	7.04	7.72	7.80
18100	*Anthopotamus sp*	MI	P299mean	Wadeable	16	6.00	6.95	6.78	3.15	5.43	5.70	8.31	9.62	10.30
01801	*Turbellaria*	F	P299mean	Wadeable	190	6.02	6.76	6.85	3.10	4.06	5.46	8.35	9.35	9.90
57900	*Pycnopsyche sp*	MI	P299mean	Wadeable	29	6.02	6.38	6.51	2.71	3.79	5.21	7.20	8.70	9.40
04901	*Erpobdellidae*	MT	P299mean	Wadeable	61	6.03	6.50	6.90	2.47	3.45	4.75	8.31	9.11	10.42
59001	*Leptoceridae*		P299mean	Wadeable	10	6.03	5.90	5.38	2.76	3.67	4.83	7.36	8.38	9.29
81200	*Nanocladius sp*	F	P299mean	Wadeable	30	6.04	5.96	6.57	2.40	3.03	3.50	7.64	8.54	9.48
85710	*Stempellinella sp*	MI	P299mean	Wadeable	17	6.05	6.22	6.74	2.45	3.18	5.63	7.37	7.88	7.99
17200	*Caenis sp*	F	P299mean	Wadeable	383	6.05	6.66	6.75	2.92	3.60	5.22	8.16	9.24	10.08
72501	*Culicidae*	MT	P299mean	Wadeable	24	6.05	6.09	6.13	2.25	3.36	4.61	7.50	8.74	9.74
80410	*Cricotopus (C.) sp*	F	P299mean	Wadeable	40	6.06	7.12	7.28	3.04	3.88	5.96	8.74	9.81	10.37
83400	*Harnischia sp*	F	P299mean	Wadeable	55	6.06	6.26	6.29	3.15	3.43	4.56	7.99	8.92	9.17
82141	*Thienemanniella xena*	F	P299mean	Wadeable	26	6.07	6.33	6.46	3.60	4.54	5.17	7.44	8.05	8.87
13400	*Stenacron sp*	F	P299mean	Wadeable	372	6.07	6.65	6.87	3.11	3.59	5.38	8.04	9.03	9.89
82885	*Cryptotendipes pseudotener*	F	P299mean	Wadeable	5	6.10	5.63	5.42	3.98	3.98	4.67	6.80	7.22	7.22
08310	*Procambarus (Ortmannicus) acutus acutus*	T	P299mean	Wadeable	7	6.11	5.59	6.06	2.09	2.40	4.21	6.76	7.75	7.99
77140	*Ablabesmyia peleensis*		P299mean	Wadeable	14	6.12	6.25	6.53	1.14	4.02	5.15	8.06	8.25	8.45
84155	*Paralauterborniella nigrohalteralis*	F	P299mean	Wadeable	54	6.14	6.14	6.11	2.95	3.16	4.56	7.89	9.03	9.36
04687	*Placobdella parasitica*	MT	P299mean	Wadeable	11	6.14	5.11	5.33	1.38	2.26	4.14	6.00	7.64	7.81
59570	*Oecetis nocturna*	F	P299mean	Wadeable	15	6.15	6.54	6.36	3.51	3.71	4.74	7.69	9.06	10.63
13570	*Maccaffertium terminatum*	MI	P299mean	Wadeable	84	6.16	7.20	7.18	4.32	5.13	6.36	8.07	9.18	9.84
06201	*Hyalella azteca*	F	P299mean	Wadeable	327	6.17	6.74	6.89	3.12	3.59	5.34	8.21	9.39	10.08
84700	*Stenochironomus sp*	F	P299mean	Wadeable	184	6.18	6.39	6.65	2.67	3.45	5.17	7.81	8.75	9.27
22325	*Argia tibialis*		P299mean	Wadeable	121	6.19	6.39	6.70	3.17	3.93	5.18	7.77	8.48	9.21
84302	*Phaenopsectra punctipes*	F	P299mean	Wadeable	64	6.20	6.26	6.29	2.26	3.30	4.58	7.62	9.41	10.57
77120	*Ablabesmyia mallochi*	F	P299mean	Wadeable	395	6.22	6.63	6.84	2.97	3.58	5.28	7.98	9.03	9.60
84060	*Parachironomus pectinatellae*	MI	P299mean	Wadeable	12	6.22	6.87	7.27	1.53	2.91	4.15	9.33	10.53	11.41
06501	*Gammaridae*		P299mean	Wadeable	10	6.23	7.60	8.00	4.89	5.17	7.07	8.53	8.91	8.98

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
24700	*Dromogomphus sp*	F	P299mean	Wadeable	38	6.23	6.87	6.86	3.65	4.00	5.19	7.89	9.52	10.45
78650	*Procladius sp*	MT	P299mean	Wadeable	388	6.23	6.66	6.81	3.14	3.67	5.18	8.07	9.21	9.80
85265	*Cladotanytarsus vanderwulpi group sp 5*	MI	P299mean	Wadeable	17	6.24	6.03	6.09	3.06	4.77	5.60	6.44	7.64	8.52
72700	*Anopheles sp*	F	P299mean	Wadeable	99	6.24	6.69	6.98	2.75	3.38	5.13	8.16	9.24	10.14
23804	*Basiaeschna janata*	F	P299mean	Wadeable	38	6.26	6.68	7.03	2.53	3.57	5.17	8.48	9.43	9.88
26700	*Macromia sp*	MI	P299mean	Wadeable	23	6.27	6.82	7.20	3.02	3.27	5.35	8.61	9.24	9.74
11155	*Iswaeon anoka*	MI	P299mean	Wadeable	10	6.27	6.94	6.90	2.93	3.70	4.70	7.95	10.77	13.54
34300	*Neoperla clymene complex*	I	P299mean	Wadeable	5	6.29	8.03	9.05	5.31	5.31	5.55	9.73	10.76	10.76
84300	*Phaenopsectra obediens group*	F	P299mean	Wadeable	82	6.29	6.46	6.71	2.74	3.60	5.12	7.74	8.81	9.67
06810	*Gammarus fasciatus*	F	P299mean	Wadeable	24	6.30	6.52	6.38	3.13	3.81	5.31	7.60	8.97	10.35
82880	*Cryptotendipes sp*	F	P299mean	Wadeable	128	6.31	6.59	6.57	3.40	3.86	5.17	8.00	9.06	9.61
11200	*Callibaetis sp*	MT	P299mean	Wadeable	77	6.31	6.14	6.06	3.08	3.52	4.29	7.59	9.33	10.13
80510	*Cricotopus (Isocladius) sylvestris group*	T	P299mean	Wadeable	44	6.32	6.61	6.33	3.72	4.27	5.50	7.87	8.80	9.82
22001	*Coenagrionidae*	T	P299mean	Wadeable	101	6.32	6.50	6.46	3.16	3.82	5.12	7.97	9.24	9.76
77100	*Ablabesmyia sp*		P299mean	Wadeable	32	6.32	6.96	7.43	3.17	3.34	5.88	8.27	9.29	9.47
13561	*Maccaffertium pulchellum*	MI	P299mean	Wadeable	57	6.33	7.14	7.14	4.49	5.37	6.43	8.04	8.89	9.27
94603	*Pseudosuccinea columella*	MT	P299mean	Wadeable	18	6.33	5.63	5.67	2.39	3.16	3.67	7.44	8.45	8.69
84020	*Parachironomus carinatus*	F	P299mean	Wadeable	15	6.34	6.67	6.75	3.50	4.11	6.08	7.58	8.80	9.06
23618	*Aeshna umbrosa*	T	P299mean	Wadeable	12	6.34	7.27	6.93	5.10	5.59	6.07	8.50	9.71	9.90
98600	*Sphaerium sp*	F	P299mean	Wadeable	107	6.34	7.20	7.50	3.34	4.67	6.10	8.51	8.91	10.16
80350	*Corynoneura sp*		P299mean	Wadeable	8	6.34	6.68	7.27	3.64	3.94	5.75	7.48	8.42	8.81
70000	*Diptera*		P299mean	Wadeable	5	6.34	6.45	6.39	4.00	4.00	4.85	7.70	9.72	9.72
11130	*Baetis intercalaris*	F	P299mean	Wadeable	373	6.36	7.12	7.15	3.98	4.79	6.00	8.33	9.26	9.82
06700	*Crangonyx sp*	MT	P299mean	Wadeable	49	6.37	6.29	6.45	3.12	4.24	5.22	7.22	8.09	9.09
84100	*Paracladopelma sp*		P299mean	Wadeable	23	6.37	6.58	6.30	3.36	3.75	5.53	7.87	8.60	10.34
84790	*Tribelos fuscicorne*	F	P299mean	Wadeable	108	6.40	6.60	6.47	2.07	3.60	4.92	8.42	9.37	10.05
13030	*Leucrocuta maculipennis*	MI	P299mean	Wadeable	26	6.41	6.76	6.78	4.30	4.74	5.52	7.40	8.30	10.04
86001	*Tabanidae*	F	P299mean	Wadeable	51	6.41	6.74	6.97	3.27	3.74	5.61	8.19	8.92	9.19
08240	*Orconectes (Crokerinus) propinquus*	F	P299mean	Wadeable	38	6.42	7.19	7.12	5.03	5.13	6.11	7.96	9.16	10.07
08250	*Orconectes (Procericambarus) rusticus*	F	P299mean	Wadeable	10	6.42	5.99	5.81	2.18	3.19	4.69	7.29	9.14	9.51
97601	*Corbicula fluminea*	F	P299mean	Wadeable	240	6.43	6.52	6.69	2.98	3.53	5.23	7.91	8.82	9.38
85800	*Tanytarsus sp*	F	P299mean	Wadeable	380	6.43	6.53	6.64	2.91	3.55	5.13	8.05	9.18	9.76
18619	*Ephemera simulans*	MI	P299mean	Wadeable	14	6.45	6.69	6.78	3.21	4.79	6.35	7.65	8.46	8.46
89601	*Muscidae*		P299mean	Wadeable	8	6.46	6.40	6.41	3.67	4.12	5.43	7.58	8.37	8.66

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84750	*Stictochironomus sp*	F	P299mean	Wadeable	235	6.46	6.70	6.89	2.97	3.71	5.42	8.02	9.19	9.99
89501	*Ephydridae*	F	P299mean	Wadeable	11	6.47	6.54	6.58	3.29	3.49	5.41	7.14	9.43	11.30
68300	*Cyphon sp*	MT	P299mean	Wadeable	53	6.47	6.25	6.34	1.72	3.11	5.10	7.86	8.69	9.27
51600	*Polycentropus sp*	MI	P299mean	Wadeable	25	6.48	6.52	6.34	3.09	3.64	5.12	8.01	9.20	9.80
78100	*Labrundinia sp*	F	P299mean	Wadeable	38	6.48	6.62	6.98	2.58	3.38	5.13	8.15	9.28	10.22
84460	*Polypedilum (P.) fallax group*	F	P299mean	Wadeable	68	6.51	6.62	6.76	3.14	3.55	5.37	7.92	8.88	9.80
84450	*Polypedilum (Uresipedilum) flavum*	F	P299mean	Wadeable	420	6.52	7.11	7.16	3.91	4.70	5.91	8.38	9.39	10.00
95501	*Planorbidae*	MT	P299mean	Wadeable	9	6.53	7.26	7.83	2.66	4.00	6.48	8.54	9.23	9.48
11110	*Acentrella parvula*	I	P299mean	Wadeable	18	6.55	7.12	7.22	3.14	3.68	4.70	8.51	9.77	12.12
22600	*Enallagma sp*		P299mean	Wadeable	260	6.55	6.78	6.88	3.15	3.69	5.28	8.23	9.39	10.64
15000	*Paraleptophlebia sp*	F	P299mean	Wadeable	5	6.56	5.64	6.96	2.46	2.46	3.84	7.23	7.25	7.25
87501	*Empididae*	F	P299mean	Wadeable	10	6.58	7.34	7.65	2.76	4.84	6.96	8.36	8.92	8.96
82800	*Cladopelma sp*	T	P299mean	Wadeable	21	6.58	6.57	6.34	3.10	3.66	4.65	8.22	10.59	10.98
85840	*Tanytarsus sepp*	F	P299mean	Wadeable	12	6.58	6.93	6.62	4.98	5.49	6.35	7.73	8.38	9.54
11250	*Neocloeon sp. (Centroptilum sp, w/o hindwing pads)*	MI	P299mean	Wadeable	169	6.58	6.66	6.84	2.75	3.55	5.30	8.08	9.24	10.08
22700	*Ischnura sp*		P299mean	Wadeable	135	6.62	7.11	7.23	3.31	3.95	5.78	8.62	9.61	11.05
85500	*Paratanytarsus sp*	F	P299mean	Wadeable	220	6.63	6.58	6.81	2.85	3.55	5.32	7.99	9.18	9.70
11015	*Acerpenna sp*	MI	P299mean	Wadeable	9	6.63	6.67	6.99	3.83	3.87	5.94	7.62	8.72	8.80
13120	*Nixe perfida*	MI	P299mean	Wadeable	64	6.65	7.10	6.96	4.19	5.02	6.12	7.99	9.35	10.68
05800	*Caecidotea sp*	T	P299mean	Wadeable	292	6.66	6.83	7.15	3.14	3.56	5.68	8.19	9.22	9.74
84600	*Saetheria sp*	F	P299mean	Wadeable	49	6.66	6.95	7.21	3.42	3.88	5.85	8.10	8.83	9.42
77500	*Conchapelopia sp*	F	P299mean	Wadeable	45	6.66	6.73	7.10	3.20	3.98	6.05	7.74	8.62	9.42
12200	*Isonychia sp*	MI	P299mean	Wadeable	95	6.68	7.42	7.54	4.61	5.12	6.41	8.54	9.48	10.09
19107	*Ephoron leukon*	MI	P299mean	Wadeable	10	6.68	6.97	6.34	5.01	5.08	5.50	8.01	9.69	10.76
12501	*Heptageniidae*		P299mean	Wadeable	74	6.68	7.54	7.78	3.59	5.10	6.73	8.60	9.80	10.20
87400	*Stratiomys sp*	MT	P299mean	Wadeable	10	6.69	6.36	6.71	0.25	2.11	5.24	8.43	9.08	9.61
84470	*Polypedilum (P.) illinoense*	T	P299mean	Wadeable	487	6.70	6.93	7.07	3.42	4.19	5.63	8.33	9.34	10.02
68700	*Dubiraphia sp*	F	P299mean	Wadeable	356	6.71	6.75	6.96	3.14	3.95	5.34	8.17	9.21	9.78
81825	*Rheocricotopus (Psilocricotopus) robacki*	F	P299mean	Wadeable	72	6.71	6.87	7.11	3.18	4.55	5.99	7.94	9.04	9.39
84040	*Parachironomus frequens*	F	P299mean	Wadeable	19	6.73	7.44	6.93	4.70	4.99	6.38	8.30	9.91	11.95
93200	*Hydrobiidae*	F	P299mean	Wadeable	131	6.73	6.49	6.45	3.14	3.46	5.13	7.99	9.35	9.80
18750	*Hexagenia limbata*	F	P299mean	Wadeable	79	6.74	6.64	6.80	3.57	4.16	5.54	7.93	8.85	9.56
68708	*Dubiraphia vittata group*	F	P299mean	Wadeable	86	6.76	7.11	7.03	4.15	4.76	6.00	8.35	9.19	10.10
84000	*Parachironomus sp*	MT	P299mean	Wadeable	19	6.76	6.61	7.09	3.25	3.67	5.44	8.02	8.53	8.65

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
82820	*Cryptochironomus sp*	F	P299mean	Wadeable	420	6.77	6.85	6.94	3.30	3.96	5.46	8.32	9.37	10.05
28208	*Erythemis simplicicollis*	MT	P299mean	Wadeable	9	6.80	7.48	7.19	4.99	5.00	5.14	9.24	11.12	11.55
85230	*Cladotanytarsus mancus group*	F	P299mean	Wadeable	6	6.82	6.79	6.87	6.07	6.12	6.54	7.18	7.21	7.22
23700	*Anax sp*	MT	P299mean	Wadeable	14	6.83	7.29	7.72	3.85	4.77	5.85	8.69	8.92	9.54
59500	*Oecetis sp*	F	P299mean	Wadeable	49	6.83	6.73	6.92	2.76	3.73	4.86	8.60	9.63	10.69
80420	*Cricotopus (C.) bicinctus*	T	P299mean	Wadeable	176	6.84	7.00	7.07	3.48	4.21	5.58	8.49	9.34	10.16
08280	*Orconectes (Gremicambarus) virilis*	F	P299mean	Wadeable	163	6.86	7.11	7.27	3.51	4.34	5.97	8.49	9.39	10.36
24710	*Dromogomphus spinosus*	F	P299mean	Wadeable	5	6.87	6.44	7.19	0.98	0.98	4.98	8.66	9.26	9.26
82710	*Chironomus (C.) sp*	MT	P299mean	Wadeable	319	6.90	6.85	7.06	3.15	3.62	5.43	8.40	9.37	10.08
22300	*Argia sp*	F	P299mean	Wadeable	245	6.90	6.88	7.03	3.29	4.20	5.49	8.05	9.06	9.82
84210	*Paratendipes albimanus or P. duplicatus*	F	P299mean	Wadeable	116	6.92	6.78	6.96	2.98	3.50	5.28	8.29	9.73	10.49
78200	*Larsia sp*	MT	P299mean	Wadeable	26	6.93	7.14	7.49	2.82	4.83	6.20	8.26	9.70	10.26
94400	*Fossaria sp*	MT	P299mean	Wadeable	29	6.92	6.73	6.96	1.56	2.78	4.72	8.74	10.75	11.55
77110	*Ablabesmyia annulata*	F	P299mean	Wadeable	14	6.93	7.04	6.93	3.62	3.76	6.07	8.46	9.75	10.54
68160	*HELICHUS LITHOPHILUS*	F	P299mean	Wadeable	61	6.94	6.75	6.84	3.64	4.46	5.64	8.05	8.96	9.21
68601	*Ancyronyx variegata*	F	P299mean	Wadeable	102	6.94	6.95	7.12	3.49	4.58	6.11	8.05	9.06	9.31
84580	*Robackia demeijerei*	MI	P299mean	Wadeable	19	6.95	7.18	7.21	3.83	4.40	6.81	8.16	9.06	9.33
59520	*Oecetis cinerascens*	F	P299mean	Wadeable	11	6.95	7.63	6.74	4.64	4.86	6.21	8.07	12.44	14.22
85210	*Cladotanytarsus species group B*	MI	P299mean	Wadeable	95	6.97	6.91	7.06	3.47	3.67	5.62	8.25	9.39	10.58
70501	*Tipulidae*		P299mean	Wadeable	20	6.98	7.30	7.11	4.37	4.90	6.31	8.35	9.75	10.07
06800	*Gammarus sp*	F	P299mean	Wadeable	135	6.98	7.22	7.44	4.04	4.69	5.73	8.58	9.72	10.14
13540	*Maccaffertium mediopunctatum*	MI	P299mean	Wadeable	17	7.01	7.40	7.14	5.06	5.32	6.33	8.22	10.03	10.31
04960	*Erpobdella sp (= Mooreobdella)*	MT	P299mean	Wadeable	51	7.02	6.57	7.03	1.99	3.17	4.87	8.35	9.06	10.00
53800	*Hydroptila sp*	F	P299mean	Wadeable	210	7.02	7.14	7.17	3.89	4.46	6.09	8.30	9.35	9.98
59400	*Nectopsyche sp*	MI	P299mean	Wadeable	18	7.03	7.02	7.24	3.21	4.48	6.23	7.80	8.71	9.94
68075	*Psephenus herricki*	MI	P299mean	Wadeable	27	7.05	7.11	7.29	4.22	5.04	5.76	8.31	8.80	10.23
59100	*Ceraclea sp*	MI	P299mean	Wadeable	15	7.06	6.65	6.51	3.73	4.56	5.28	8.27	9.06	9.83
78130	*Labrundinia neopilosella*		P299mean	Wadeable	7	7.06	6.58	6.45	3.71	4.03	5.57	7.78	8.86	9.08
52200	*Cheumatopsyche sp*	F	P299mean	Wadeable	491	7.06	6.99	7.10	3.44	4.30	5.83	8.33	9.35	10.01
85201	*Cladotanytarsus species group A*	F	P299mean	Wadeable	24	7.07	7.05	7.25	3.12	3.29	5.67	8.69	9.45	10.01
25600	*Stylurus sp*	MI	P299mean	Wadeable	10	7.09	7.44	7.41	5.36	5.41	6.75	8.45	9.47	9.72
23909	*Boyeria vinosa*	F	P299mean	Wadeable	176	7.09	7.06	7.06	3.45	4.81	6.08	8.17	9.27	10.07
24900	*Gomphus sp*	F	P299mean	Wadeable	79	7.12	6.84	6.89	3.25	4.43	5.53	8.19	9.11	9.56
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	MI	P299mean	Wadeable	8	7.12	6.98	7.17	5.56	5.65	6.12	7.46	8.41	8.74

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
89001	*Sciomyzidae*	MT	P299mean	Wadeable	12	7.13	6.57	6.59	3.62	3.86	4.28	8.42	9.75	10.54
22315	*Argia moesta*		P299mean	Wadeable	19	7.13	7.08	7.34	4.73	5.12	6.18	7.96	8.99	9.11
16700	*Tricorythodes sp*	MI	P299mean	Wadeable	293	7.13	7.34	7.22	4.42	5.12	6.25	8.37	9.46	10.60
94100	*Pleurocera sp*	MI	P299mean	Wadeable	63	7.14	7.07	7.55	2.79	4.21	6.40	8.39	8.94	9.44
83150	*Endochironomus sp*	MT	P299mean	Wadeable	23	7.17	7.16	7.40	3.85	3.92	4.50	9.53	10.19	10.66
07701	*Cambaridae*		P299mean	Wadeable	20	7.19	7.23	7.71	3.03	3.32	6.01	8.42	9.59	10.19
13000	*Leucrocuta sp*	MI	P299mean	Wadeable	58	7.19	7.24	7.14	4.23	5.06	6.40	8.33	9.10	10.18
69400	*Stenelmis sp*	F	P299mean	Wadeable	452	7.20	6.96	7.14	3.37	4.20	5.75	8.34	9.37	10.09
11150	*Labiobaetis propinquus*	MI	P299mean	Wadeable	129	7.21	7.18	7.21	3.93	4.75	6.19	8.18	9.35	10.48
08200	*Orconectes sp*	F	P299mean	Wadeable	202	7.21	7.27	7.53	3.66	4.58	6.18	8.52	9.52	10.11
86200	*Tabanus sp*	F	P299mean	Wadeable	37	7.22	6.58	6.78	3.52	3.65	4.92	8.27	9.31	9.54
21001	*Calopterygidae*	F	P299mean	Wadeable	8	7.23	7.87	7.71	6.61	6.76	7.12	8.60	9.27	9.51
48410	*Corydalus cornutus*	MI	P299mean	Wadeable	66	7.23	7.59	7.82	4.03	5.12	6.74	8.74	9.55	10.23
68901	*Macronychus glabratus*	F	P299mean	Wadeable	207	7.25	7.37	7.29	4.79	5.34	6.39	8.35	9.35	9.94
60400	*Gyrinus sp*	F	P299mean	Wadeable	31	7.26	7.85	8.23	4.26	5.72	6.68	9.39	9.82	10.46
78599	*Pentaneura sp*	F	P299mean	Wadeable	31	7.27	7.33	7.14	4.22	4.53	5.86	8.71	10.03	11.33
69420	*Stenelmis sexlineata*		P299mean	Wadeable	9	7.28	7.19	7.01	5.05	5.46	6.21	7.78	9.73	10.64
85001	*Tanytarsini*		P299mean	Wadeable	72	7.29	7.39	7.49	3.53	4.82	6.20	8.57	9.48	10.13
52001	*Hydropsychidae*		P299mean	Wadeable	105	7.29	7.67	7.76	4.80	5.60	6.84	8.64	9.74	10.19
84785	*Tribelos atrum*		P299mean	Wadeable	44	7.29	7.52	7.78	3.40	4.55	6.22	8.61	9.66	11.05
95100	*Physella sp*	T	P299mean	Wadeable	425	7.29	6.86	7.02	3.16	3.67	5.47	8.42	9.51	10.38
24501	*Gomphidae*	F	P299mean	Wadeable	28	7.32	7.26	7.70	2.88	4.69	6.75	8.34	9.27	9.40
72340	*Dixella sp*	F	P299mean	Wadeable	6	7.34	6.87	6.61	5.31	5.39	6.06	8.15	8.41	8.44
86100	*Chrysops sp*	F	P299mean	Wadeable	20	7.34	7.60	7.12	5.56	6.06	6.79	8.02	10.63	10.65
82100	*Thienemanniella sp*		P299mean	Wadeable	19	7.35	7.39	7.28	3.72	4.18	6.25	8.59	9.83	11.11
84960	*Pseudochironomus sp*	F	P299mean	Wadeable	55	7.36	7.05	7.02	2.99	4.00	5.76	8.62	9.48	11.30
25410	*Progomphus obscurus*	MT	P299mean	Wadeable	54	7.38	6.72	7.04	3.38	3.57	5.60	8.01	9.07	9.49
79100	*Thienemannimyia group*	F	P299mean	Wadeable	439	7.39	7.12	7.22	3.55	4.45	5.88	8.43	9.39	10.11
83160	*Endochironomus subtendens*	MT	P299mean	Wadeable	21	7.40	7.34	7.30	4.08	4.74	6.16	8.89	9.70	10.29
83840	*Microtendipes pedellus group*	F	P299mean	Wadeable	150	7.43	7.53	7.66	3.53	4.75	6.41	8.72	9.85	10.64
69410	*Stenelmis crenata*		P299mean	Wadeable	72	7.44	7.71	7.88	4.60	5.82	6.99	8.65	9.80	10.21
12924	*Heptagenia flavescens*	MI	P299mean	Wadeable	5	7.45	7.69	7.82	5.93	5.93	7.05	8.51	8.88	8.88
04964	*Erpobdella microstoma*	MT	P299mean	Wadeable	85	7.45	6.82	6.96	2.77	3.30	5.23	8.59	9.61	10.48
81400	*Orthocladius sp*		P299mean	Wadeable	6	7.45	7.15	7.83	3.93	4.10	5.68	8.30	9.21	9.32

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
80470	*Cricotopus (C.) or Orthocladius (O.) sp*		P299mean	Wadeable	120	7.45	7.28	7.29	3.71	4.61	6.14	8.51	9.43	10.19
81810	*Rheocricotopus sp*	F	P299mean	Wadeable	15	7.46	7.47	7.81	4.83	4.89	6.26	8.48	9.17	9.58
21200	*Calopteryx sp*	F	P299mean	Wadeable	99	7.46	7.24	7.53	4.39	5.32	6.39	8.19	8.53	9.30
85200	*Cladotanytarsus sp*		P299mean	Wadeable	127	7.46	7.15	7.16	3.26	4.63	6.22	8.52	9.67	10.27
28955	*Plathemis lydia*	T	P299mean	Wadeable	13	7.47	6.28	6.64	0.80	2.92	4.67	8.03	9.38	10.13
99001	*Unionidae*		P299mean	Wadeable	6	7.48	7.61	7.61	3.98	4.29	7.07	8.83	10.38	10.55
11620	*Paracloeodes minutus*	MI	P299mean	Wadeable	37	7.49	7.38	7.52	3.74	4.37	6.46	8.28	9.21	10.75
21300	*Hetaerina sp*	F	P299mean	Wadeable	136	7.52	7.48	7.44	4.33	5.29	6.33	8.52	9.31	10.53
84440	*Polypedilum (Uresipedilum) aviceps*	MI	P299mean	Wadeable	13	7.54	7.10	7.20	3.72	4.09	6.65	8.35	9.38	9.39
76001	*Chironomidae*		P299mean	Wadeable	60	7.55	7.30	7.69	3.32	4.22	5.83	8.57	9.76	10.24
55510	*Brachycentrus sp*	MI	P299mean	Wadeable	17	7.56	8.30	8.36	6.51	6.95	7.20	9.22	9.73	10.33
74100	*Simulium sp*	F	P299mean	Wadeable	303	7.57	7.45	7.58	4.06	4.90	6.30	8.54	9.72	10.21
12912	*Heptagenia diabasia*	F	P299mean	Wadeable	60	7.57	7.00	6.99	3.51	4.49	5.95	8.18	8.71	9.66
04660	*Helobdella sp*	MT	P299mean	Wadeable	19	7.58	6.66	7.26	1.12	2.14	4.18	8.64	9.47	12.22
82501	*Chironomini*		P299mean	Wadeable	167	7.59	7.66	7.69	4.61	5.21	6.56	8.70	9.78	10.38
11100	*Baetis sp*	F	P299mean	Wadeable	42	7.61	7.56	7.48	5.16	5.73	6.68	8.53	9.59	10.30
84400	*Polypedilum sp*		P299mean	Wadeable	130	7.61	7.53	7.69	3.36	4.78	6.34	8.76	9.72	10.55
06840	*Gammarus pseudolimnaeus*	F	P299mean	Wadeable	85	7.62	7.72	7.80	4.77	5.64	6.75	8.81	9.74	10.30
34500	*Perlesta placida complex*	F	P299mean	Wadeable	22	7.63	7.07	7.23	3.24	4.16	5.82	8.48	9.76	9.84
93900	*Elimia sp*	MI	P299mean	Wadeable	72	7.64	7.45	7.56	4.65	5.45	6.40	8.57	9.72	10.51
84200	*Paratendipes sp*	F	P299mean	Wadeable	5	7.65	8.14	8.38	6.82	6.82	6.90	9.06	9.74	9.74
77001	*Tanypodinae*		P299mean	Wadeable	130	7.66	7.67	7.80	4.00	5.13	6.64	8.70	10.00	10.65
13100	*Nixe sp*	MI	P299mean	Wadeable	8	7.67	7.24	7.70	2.18	3.37	6.73	8.63	9.39	9.61
81650	*Parametriocnemus sp*	F	P299mean	Wadeable	14	7.68	7.67	8.06	3.77	4.58	6.42	9.57	9.96	10.27
59410	*Nectopsyche diarina*	MI	P299mean	Wadeable	130	7.69	7.54	7.32	4.37	5.10	6.35	8.62	9.96	10.68
78510	*Paramerina sp 1*	MI	P299mean	Wadeable	42	7.71	7.38	7.44	3.54	4.81	6.23	8.83	9.64	9.88
84612	*Saetheria tylus*	F	P299mean	Wadeable	9	7.73	7.94	8.19	5.60	6.00	7.55	8.59	9.13	9.40
48620	*Nigronia serricornis*	F	P299mean	Wadeable	6	7.73	7.99	8.01	5.12	5.28	6.74	9.92	10.11	10.13
23704	*Anax junius*	MT	P299mean	Wadeable	15	7.74	7.86	8.39	3.49	3.58	6.15	10.13	10.65	11.11
52500	*Hydropsyche sp*		P299mean	Wadeable	41	7.75	7.96	8.00	5.77	6.00	6.87	8.89	9.91	10.32
52540	*Hydropsyche dicantha*	MI	P299mean	Wadeable	23	7.76	7.50	7.66	3.56	5.77	6.45	8.84	9.47	10.26
59407	*Nectopsyche candida*	MI	P299mean	Wadeable	68	7.77	7.48	7.62	5.20	5.45	6.39	8.38	9.20	10.13
26705	*Macromia illinoiensis*	F	P299mean	Wadeable	85	7.79	7.08	7.19	3.54	4.47	5.59	8.37	9.22	10.18
92500	*Viviparidae*		P299mean	Wadeable	5	7.79	6.38	6.23	4.62	4.62	5.47	7.30	8.33	8.33

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
04664	*Helobdella stagnalis*	T	P299mean	Wadeable	25	7.81	7.24	7.47	3.51	4.15	6.04	8.58	10.65	11.29
34100	*Acroneuria sp*	MI	P299mean	Wadeable	5	7.85	5.97	5.63	2.76	2.76	4.53	7.45	9.61	9.61
28500	*Libellula sp*	MT	P299mean	Wadeable	20	7.85	7.37	7.47	4.11	4.72	5.55	8.99	10.11	10.93
52530	*Hydropsyche depravata group*	F	P299mean	Wadeable	148	7.86	7.75	7.69	5.24	6.03	6.79	8.66	9.72	10.14
68702	*Dubiraphia bivittata*	F	P299mean	Wadeable	14	7.89	8.67	8.56	7.03	7.03	7.76	9.72	10.20	10.66
96310	*Planorbula armigera*		P299mean	Wadeable	6	7.90	8.55	8.68	6.62	6.67	7.13	9.61	10.50	10.60
50315	*Chimarra obscura*	MI	P299mean	Wadeable	53	7.95	7.61	8.06	4.29	5.19	6.49	8.83	9.60	10.07
24510	*ERPETOGOMPHUS DESIGNATUS*	F	P299mean	Wadeable	9	7.95	7.69	7.65	4.99	5.70	6.96	8.31	10.01	10.48
83800	*Microtendipes sp*	F	P299mean	Wadeable	21	7.96	7.75	7.98	4.46	5.88	6.67	8.93	9.80	10.25
70700	*Dicranota sp*	MI	P299mean	Wadeable	10	7.98	8.09	8.48	4.28	5.17	6.92	9.72	9.86	9.92
51001	*Polycentropodidae*		P299mean	Wadeable	5	7.99	7.90	7.66	6.41	6.41	6.89	8.82	9.92	9.92
11120	*Baetis flavistriga*	F	P299mean	Wadeable	217	8.01	7.85	7.76	5.19	5.88	6.96	8.77	9.82	10.53
52520	*Hydropsyche bidens*	MI	P299mean	Wadeable	6	8.02	7.86	7.33	5.93	5.96	6.27	8.83	11.21	11.47
11020	*Acerpenna pygmaea*	MI	P299mean	Wadeable	87	8.08	7.18	7.47	3.83	4.74	6.01	8.46	9.39	10.08
11101	*Plauditus sp*	MI	P299mean	Wadeable	14	8.15	7.96	8.34	4.31	6.19	6.68	8.81	10.18	10.51
80204	*Brillia flavifrons group*	F	P299mean	Wadeable	67	8.15	8.09	8.14	5.67	6.12	7.10	9.02	9.81	10.61
52401	*Ceratopsyche sp*	MI	P299mean	Wadeable	172	8.15	7.87	7.84	5.06	5.88	6.86	8.83	9.83	10.46
13500	*Maccaffertium sp*	MI	P299mean	Wadeable	59	8.17	7.80	7.66	4.43	5.87	6.86	8.97	9.91	10.39
81630	*Parakiefferiella sp*	F	P299mean	Wadeable	7	8.17	8.24	8.30	6.86	6.90	7.16	8.90	10.09	10.36
51300	*Neureclipsis sp*	MI	P299mean	Wadeable	34	8.17	7.77	7.77	5.18	5.77	6.75	8.69	9.80	10.71
19100	*Ephoron sp*	MI	P299mean	Wadeable	10	8.19	7.88	7.94	6.41	6.42	7.19	8.46	9.32	9.72
52431	*Ceratopsyche morosa*	MI	P299mean	Wadeable	34	8.20	8.27	8.23	6.40	6.46	7.16	9.19	10.15	10.56
71100	*Hexatoma sp*	MI	P299mean	Wadeable	15	8.20	7.74	7.83	6.32	6.35	6.81	8.29	9.39	10.01
71900	*Tipula sp*	F	P299mean	Wadeable	77	8.23	8.11	7.93	6.03	6.21	7.05	8.88	10.58	10.96
xx016	*Trepobates sp*		P299mean	Wadeable	5	8.33	7.98	7.69	6.41	6.41	6.77	8.85	10.68	10.68
58505	*Helicopsyche borealis*	MI	P299mean	Wadeable	80	8.36	7.87	7.82	5.32	6.23	6.84	8.73	10.15	10.71
84280	*Phaenopsectra sp or Tribelos sp*	F	P299mean	Wadeable	10	8.38	7.89	8.54	4.52	5.21	6.20	9.21	10.00	10.02
59405	*Nectopsyche albida*		P299mean	Wadeable	6	8.48	8.64	8.59	8.15	8.16	8.25	8.78	9.41	9.48
80001	*Orthocladiinae*		P299mean	Wadeable	86	8.48	8.08	8.28	4.80	5.85	7.16	9.03	9.98	10.41
80440	*Cricotopus (C.) trifascia*	F	P299mean	Wadeable	85	8.51	8.14	8.33	5.84	6.18	7.12	9.08	9.90	10.43
11001	*Baetidae*		P299mean	Wadeable	119	8.52	7.99	8.23	4.50	5.34	7.02	8.87	9.96	10.93
23600	*Aeshna sp*	MT	P299mean	Wadeable	6	8.60	8.25	7.77	6.06	6.12	6.66	10.61	10.65	10.65
69225	*Optioservus fastiditus*	MI	P299mean	Wadeable	14	8.60	8.33	8.39	6.42	6.45	7.15	9.19	9.95	10.16
94500	*Lymnaea sp (old name, =Lymnaeidae)*		P299mean	Wadeable	12	8.62	8.45	8.18	7.04	7.10	7.56	9.24	10.13	10.91

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
80700	*Eukiefferiella sp*		P299mean	Wadeable	31	8.79	8.42	8.53	5.79	6.60	7.94	9.17	9.81	9.92
70600	*Antocha sp*	MI	P299mean	Wadeable	14	8.85	8.19	8.37	5.61	6.01	6.92	9.72	9.96	10.27
22319	*Argia sedula*		P299mean	Wadeable	8	8.94	7.69	7.07	4.37	4.41	4.54	9.77	13.21	14.38
69200	*Optioservus sp*	MI	P299mean	Wadeable	56	9.05	8.28	8.40	6.11	6.39	7.28	9.30	10.08	10.49
11113	*Baetis brunneicolor*	MI	P299mean	Wadeable	18	9.11	8.11	7.77	5.27	6.01	7.25	9.32	9.87	11.86
82201	*Tvetenia sp*	MI	P299mean	Wadeable	11	9.18	9.22	9.72	7.17	7.33	8.38	10.10	10.63	11.01
86401	*Atherix lantha*	MI	P299mean	Wadeable	6	9.88	9.54	9.54	7.64	7.76	8.84	10.65	11.01	11.05
84010	*Parachironomus "abortivus" (sensu Simpson & Bode, 1980)*	MT	P299min	Wadeable	5	1.92	2.39	1.78	0.16	0.16	1.26	3.49	5.64	5.64
04666	*Helobdella papillata*	MT	P299min	Wadeable	5	2.16	2.87	3.09	0.10	0.10	2.10	4.17	4.23	4.23
96120	*Menetus (Micromenetus) dilatatus*	MT	P299min	Wadeable	6	2.17	2.29	1.75	0.09	0.14	0.60	3.47	5.80	6.06
04685	*Placobdella ornata*	MT	P299min	Wadeable	8	2.19	2.82	3.01	0.10	0.61	1.84	3.84	4.79	5.12
27307	*Epitheca (Epicordulia) princeps*	MT	P299min	Wadeable	18	2.20	3.38	2.97	0.18	0.34	0.67	5.22	7.11	7.31
85840	*Tanytarsus sepp*	F	P299min	Wadeable	12	2.20	3.70	3.34	0.14	0.45	2.84	5.47	6.45	6.94
83050	*Dicrotendipes lucifer*	MT	P299min	Wadeable	14	2.21	3.23	2.89	0.75	1.02	1.71	4.01	6.08	6.81
83051	*Dicrotendipes simpsoni*	T	P299min	Wadeable	42	2.22	2.89	2.61	0.46	0.61	1.45	3.84	5.61	5.91
95900	*Gyraulus sp*	MT	P299min	Wadeable	14	2.23	3.26	3.89	0.03	0.09	1.60	4.52	5.69	6.24
28001	*Libellulidae*	MT	P299min	Wadeable	15	2.26	2.78	1.89	0.34	0.40	0.91	4.68	5.65	6.96
52430	*Ceratopsyche morosa group*	MI	P299min	Wadeable	7	2.27	5.15	5.61	2.05	2.40	3.91	6.71	6.97	7.02
12900	*Heptagenia sp*		P299min	Wadeable	6	2.31	3.33	3.23	0.76	0.89	2.06	5.08	5.59	5.65
83300	*Glyptotendipes (G.) sp*	MT	P299min	Wadeable	110	2.36	4.08	4.50	0.50	1.02	2.47	5.61	6.82	7.02
83100	*Einfeldia sp*		P299min	Wadeable	6	2.39	4.94	6.04	0.23	0.56	3.53	6.41	7.29	7.39
77355	*Clinotanypus pinguis*	MT	P299min	Wadeable	50	2.42	3.80	4.01	0.48	0.91	2.10	5.31	6.25	6.96
83158	*Endochironomus nigricans*	MT	P299min	Wadeable	28	2.42	4.23	4.11	0.77	1.87	2.61	5.39	7.21	8.23
79000	*Tanypus sp*	T	P299min	Wadeable	24	2.42	4.00	4.20	0.42	1.62	2.46	5.34	7.08	7.15
83045	*Dicrotendipes nervosus*		P299min	Wadeable	32	2.49	3.80	3.40	0.26	0.64	1.93	5.60	7.08	7.29
59550	*Oecetis inconspicua complex sp A (sensu Floyd, 1995)*	F	P299min	Wadeable	38	2.50	3.17	2.99	0.19	0.56	1.60	4.41	5.58	6.92
83700	*Microchironomus sp*	MT	P299min	Wadeable	10	2.55	3.05	2.79	0.67	1.19	1.96	4.47	5.03	5.03
78600	*Pentaneura inconspicua*	F	P299min	Wadeable	17	2.65	4.27	4.23	0.61	1.88	2.78	6.09	6.52	6.82
14600	*Choroterpes sp*	MI	P299min	Wadeable	9	2.73	3.31	2.94	0.66	0.70	1.72	4.90	6.21	6.66
85821	*Tanytarsus glabrescens group sp 7*	F	P299min	Wadeable	14	2.76	4.48	5.16	0.49	1.90	3.47	5.69	6.16	6.19
79020	*Tanypus neopunctipennis*	T	P299min	Wadeable	28	2.77	3.08	2.59	0.22	0.54	1.31	5.12	6.03	6.14
53501	*Hydroptilidae*	F	P299min	Wadeable	11	2.79	3.42	3.78	0.80	1.28	2.04	4.81	5.93	6.27
04601	*Glossiphoniidae*	MT	P299min	Wadeable	21	2.86	3.72	3.48	0.97	1.49	2.88	4.21	6.37	7.05
48220	*Chauliodes rastricornis*	T	P299min	Wadeable	11	2.98	3.65	3.34	0.20	1.29	2.38	5.29	5.86	5.95

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
77130	*Ablabesmyia rhamphe group*	MT	P299min	Wadeable	17	3.03	3.86	4.12	0.06	0.47	2.01	5.81	6.04	6.13
72420	*Chaoborus sp*	T	P299min	Wadeable	15	3.09	2.27	2.08	0.13	0.23	0.47	3.42	4.10	6.41
96002	*Helisoma anceps anceps*	F	P299min	Wadeable	25	3.10	3.93	4.41	0.15	0.32	1.74	5.95	7.23	7.49
28908	*Perithemis tenera*	T	P299min	Wadeable	12	3.14	4.03	4.35	0.11	0.19	1.51	6.42	7.08	7.17
04901	*Erpobdellidae*	MT	P299min	Wadeable	61	3.14	4.25	4.33	0.58	0.99	2.54	6.04	7.10	7.82
83000	*Dicrotendipes sp*	F	P299min	Wadeable	48	3.18	4.88	4.94	1.62	2.05	3.40	6.22	7.34	8.07
85625	*Rheotanytarsus sp*	F	P299min	Wadeable	196	3.20	4.65	4.96	0.88	1.71	3.46	5.95	7.07	7.78
08451	*Palaemonetes kadiakensis*	F	P299min	Wadeable	22	3.21	3.68	3.61	1.48	1.89	2.63	4.68	5.90	6.61
04664	*Helobdella stagnalis*	T	P299min	Wadeable	25	3.27	4.40	4.81	1.43	1.62	2.66	5.74	6.30	8.10
85230	*Cladotanytarsus mancus group*	F	P299min	Wadeable	6	3.29	3.79	4.23	0.60	0.86	3.20	4.88	5.50	5.57
84800	*Tribelos jucundum*	MT	P299min	Wadeable	118	3.30	4.12	4.08	0.66	1.30	2.64	5.51	6.63	7.42
04686	*Placobdella papillifera*	MT	P299min	Wadeable	14	3.40	3.89	3.42	0.60	1.03	2.06	5.93	6.79	7.06
11200	*Callibaetis sp*	MT	P299min	Wadeable	77	3.41	3.57	3.39	0.20	0.52	2.05	5.16	6.53	7.09
82600	*Axarus sp*	F	P299min	Wadeable	24	3.46	4.30	4.57	1.67	2.08	2.92	5.43	6.51	7.01
01801	*Turbellaria*	F	P299min	Wadeable	190	3.48	4.40	4.85	0.40	1.13	2.82	5.79	7.00	7.64
71700	*Pilaria sp*	F	P299min	Wadeable	8	3.50	3.97	3.72	0.35	0.44	1.98	5.99	7.87	8.05
83002	*Dicrotendipes modestus*	MT	P299min	Wadeable	10	3.50	3.64	3.43	0.15	1.10	2.09	5.51	5.83	5.98
84030	*Parachironomus directus*	MT	P299min	Wadeable	5	3.52	4.41	3.54	2.56	2.56	2.80	6.07	7.45	7.45
84520	*Polypedilum (Tripodura) halterale group*	MT	P299min	Wadeable	139	3.52	4.37	4.54	0.83	1.43	2.91	5.72	6.88	7.23
04960	*Erpobdella sp (= Mooreobdella)*	MT	P299min	Wadeable	51	3.54	4.29	4.84	1.07	1.52	2.65	5.51	6.49	7.01
22001	*Coenagrionidae*	T	P299min	Wadeable	101	3.56	4.01	4.09	0.40	1.04	2.51	5.48	6.60	7.05
24710	*Dromogomphus spinosus*	F	P299min	Wadeable	5	3.57	3.86	4.07	0.63	0.63	2.54	5.63	5.89	5.89
98001	*Pisidiidae*		P299min	Wadeable	211	3.58	4.34	4.61	0.64	1.31	2.80	5.80	6.87	7.30
98100	*Musculium sp*	MT	P299min	Wadeable	8	3.59	5.71	6.43	0.76	1.41	4.08	7.77	8.37	8.39
85400	*Micropsectra sp*	MT	P299min	Wadeable	21	3.60	4.06	4.84	0.58	0.83	2.06	5.99	6.37	6.76
81231	*Nanocladius (N.) crassicornus or N. (N.) "rectinervis"*	F	P299min	Wadeable	5	3.66	3.09	3.66	0.16	0.16	2.58	3.96	4.48	4.48
28955	*Plathemis lydia*	T	P299min	Wadeable	13	3.68	3.56	3.37	0.19	0.22	3.00	4.49	5.80	6.76
04660	*Helobdella sp*	MT	P299min	Wadeable	19	3.69	3.73	3.65	0.53	0.61	1.52	5.49	5.98	7.47
04680	*Placobdella sp*	MT	P299min	Wadeable	8	3.69	4.32	5.79	0.40	0.62	1.42	6.23	7.02	7.30
96100	*Menetus (Micromenetus) sp*		P299min	Wadeable	52	3.70	4.12	3.60	0.59	1.29	2.65	5.60	7.32	7.65
59500	*Oecetis sp*	F	P299min	Wadeable	49	3.70	4.25	4.04	0.92	1.74	2.74	5.70	6.90	8.33
84888	*Xenochironomus xenolabis*	F	P299min	Wadeable	15	3.71	4.00	3.61	0.21	0.55	2.22	6.07	7.18	7.36
05900	*Lirceus sp*	MT	P299min	Wadeable	22	3.72	4.11	3.49	0.50	0.85	2.63	5.54	7.87	10.73
04935	*Erpobdella punctata punctata*	MT	P299min	Wadeable	52	3.72	5.00	5.51	0.30	0.64	3.48	6.95	7.34	8.25

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
59570	*Oecetis nocturna*	F	P299min	Wadeable	15	3.73	3.98	4.88	0.28	0.65	2.33	5.58	6.95	6.97
28500	*Libellula sp*	MT	P299min	Wadeable	20	3.74	3.66	3.54	0.51	1.00	1.59	4.70	7.08	7.23
84060	*Parachironomus pectinatellae*	MI	P299min	Wadeable	12	3.74	4.54	5.12	0.49	1.03	2.22	6.71	7.64	8.07
78400	*Natarsia sp*	F	P299min	Wadeable	19	3.75	4.30	3.53	1.53	2.46	2.74	6.30	6.87	7.20
07850	*Cambarus (Lacunicambarus) diogenes diogenes*	T	P299min	Wadeable	107	3.76	4.28	4.68	0.57	1.30	2.55	5.85	6.88	7.36
83160	*Endochironomus subtendens*	MT	P299min	Wadeable	21	3.77	4.62	4.80	1.15	1.89	3.29	5.90	6.81	7.48
78450	*Nilotanypus fimbriatus*	F	P299min	Wadeable	8	3.78	6.12	6.29	2.05	2.53	4.75	6.86	9.86	11.10
59970	*Petrophila sp*	MI	P299min	Wadeable	14	3.80	5.82	5.70	2.40	3.61	5.36	6.72	7.59	9.47
96900	*Ferrissia sp*	F	P299min	Wadeable	57	3.80	4.46	4.69	1.45	2.07	3.21	5.54	6.66	7.13
98200	*Pisidium sp*	MT	P299min	Wadeable	146	3.81	4.35	4.32	0.55	1.28	2.63	5.71	7.19	7.80
03600	*Oligochaeta*	T	P299min	Wadeable	500	3.82	4.60	4.94	0.65	1.61	3.19	6.03	7.06	7.64
83900	*Nilothauma sp*	F	P299min	Wadeable	9	3.85	4.19	3.66	0.66	1.15	2.40	6.90	7.43	7.48
89601	*Muscidae*		P299min	Wadeable	8	3.85	3.99	4.24	0.27	0.67	2.54	5.85	6.33	6.41
94400	*Fossaria sp*	MT	P299min	Wadeable	29	3.86	3.82	4.25	0.53	0.73	1.81	5.37	6.05	7.50
23501	*Aeshnidae*		P299min	Wadeable	9	3.87	3.94	2.64	2.04	2.06	2.09	5.43	7.30	7.35
51206	*Cyrnellus fraternus*	F	P299min	Wadeable	13	3.88	5.11	5.94	0.96	1.83	4.45	6.28	6.88	6.90
17200	*Caenis sp*	F	P299min	Wadeable	383	3.90	4.57	4.85	0.64	1.57	3.21	6.00	7.00	7.45
04930	*Erpobdella sp*	MT	P299min	Wadeable	13	3.90	5.97	6.06	1.92	2.81	5.05	7.05	7.94	10.00
06201	*Hyalella azteca*	F	P299min	Wadeable	327	3.90	4.59	4.95	0.57	1.58	2.97	6.06	7.07	7.64
83040	*Dicrotendipes neomodestus*	F	P299min	Wadeable	362	3.90	4.46	4.63	0.60	1.32	2.94	5.96	7.02	7.52
34300	*Neoperla clymene complex*	I	P299min	Wadeable	5	3.91	4.84	5.18	2.90	2.90	3.43	5.88	6.98	6.98
78655	*Procladius (Holotanypus) sp*	MT	P299min	Wadeable	44	3.92	3.58	3.72	0.10	0.16	2.07	5.48	6.16	6.67
27500	*Somatochlora sp*	MT	P299min	Wadeable	43	3.94	3.83	3.47	0.94	1.27	2.48	5.34	7.00	7.41
81200	*Nanocladius sp*	F	P299min	Wadeable	30	3.94	4.29	4.05	0.60	1.20	2.07	6.76	7.47	7.82
72900	*Culex sp*	T	P299min	Wadeable	11	3.95	3.53	3.29	0.13	0.45	1.45	5.62	7.35	7.41
04687	*Placobdella parasitica*	MT	P299min	Wadeable	11	3.95	3.37	3.34	1.34	1.77	2.64	4.29	5.04	5.31
94603	*Pseudosuccinea columella*	MT	P299min	Wadeable	18	3.98	3.81	3.36	1.51	2.49	2.69	4.85	6.15	6.60
74501	*Ceratopogonidae*	T	P299min	Wadeable	51	3.99	4.28	4.54	0.25	0.77	2.34	5.79	7.02	7.29
82730	*Chironomus (C.) decorus group*	T	P299min	Wadeable	32	4.00	3.76	4.02	0.51	0.77	2.29	5.48	5.84	6.05
84960	*Pseudochironomus sp*	F	P299min	Wadeable	55	4.02	4.29	4.37	0.98	1.89	2.97	5.70	6.41	7.06
78650	*Procladius sp*	MT	P299min	Wadeable	388	4.04	4.55	4.85	0.81	1.80	3.25	5.94	6.96	7.38
22700	*Ischnura sp*		P299min	Wadeable	135	4.04	4.59	4.81	0.50	1.32	3.17	5.99	7.30	8.22
67100	*Hydrobius sp*	F	P299min	Wadeable	6	4.05	4.55	4.96	2.64	2.64	2.66	5.78	6.22	6.27
77110	*Ablabesmyia annulata*	F	P299min	Wadeable	14	4.07	4.23	4.02	1.24	1.88	3.14	4.85	7.19	8.62

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
48200	*Chauliodes sp*	MT	P299min	Wadeable	9	4.07	4.12	5.11	1.31	1.62	2.34	5.81	5.90	5.94
84020	*Parachironomus carinatus*	F	P299min	Wadeable	15	4.08	4.32	4.85	0.77	1.31	3.44	5.48	6.29	7.60
24700	*Dromogomphus sp*	F	P299min	Wadeable	38	4.10	4.52	4.57	1.87	2.15	3.04	6.00	6.91	7.34
95501	*Planorbidae*	MT	P299min	Wadeable	9	4.11	4.77	5.36	0.59	1.42	3.74	6.26	6.90	7.02
60300	*Dineutus sp*	F	P299min	Wadeable	30	4.11	4.69	5.09	0.87	1.42	2.26	6.75	7.45	8.31
78140	*Labrundinia pilosella*	F	P299min	Wadeable	64	4.12	4.48	4.76	1.02	1.76	2.65	6.06	6.98	7.66
13510	*Maccaffertium exiguum*	MI	P299min	Wadeable	47	4.12	5.05	5.52	0.97	3.12	4.30	5.96	6.58	6.96
78599	*Pentaneura sp*	F	P299min	Wadeable	31	4.14	3.92	4.06	0.13	1.16	2.53	5.25	6.17	6.97
84750	*Stictochironomus sp*	F	P299min	Wadeable	235	4.14	4.72	4.97	0.67	1.60	3.33	6.11	7.17	8.06
77115	*Ablabesmyia janta*	F	P299min	Wadeable	77	4.15	4.17	3.81	1.39	1.89	2.83	5.61	6.65	7.00
52570	*Hydropsyche simulans*	MI	P299min	Wadeable	120	4.16	5.08	5.42	1.78	3.14	4.29	6.03	6.68	7.29
95100	*Physella sp*	T	P299min	Wadeable	425	4.17	4.69	4.93	0.86	1.81	3.34	6.05	7.19	7.78
77500	*Conchapelopia sp*	F	P299min	Wadeable	45	4.18	4.31	4.97	0.10	0.50	2.74	6.09	6.87	7.33
92500	*Viviparidae*		P299min	Wadeable	5	4.20	3.98	4.25	1.60	1.60	3.26	4.71	5.96	5.96
11400	*Centroptilum sp or Procloeon sp (formerly in Cloeon)*	F	P299min	Wadeable	46	4.21	4.18	4.45	0.54	0.96	2.69	5.41	6.30	7.13
24107	*Nasiaeschna pentacantha*	MT	P299min	Wadeable	20	4.22	3.65	3.37	0.21	0.51	2.35	5.64	6.43	7.08
28208	*Erythemis simplicicollis*	MT	P299min	Wadeable	9	4.23	4.12	4.43	1.32	2.06	3.18	4.73	6.25	7.13
85710	*Stempellinella sp*	MI	P299min	Wadeable	17	4.24	4.44	5.10	1.11	2.00	3.26	5.82	6.69	7.05
77750	*Hayesomyia senata or Thienemannimyia norena*	F	P299min	Wadeable	50	4.25	4.16	4.50	0.15	1.50	2.64	5.69	6.18	6.60
89001	*Sciomyzidae*	MT	P299min	Wadeable	12	4.25	4.09	4.69	0.60	0.66	2.11	5.89	6.71	7.23
86001	*Tabanidae*	F	P299min	Wadeable	51	4.27	4.69	5.19	0.78	1.76	3.43	5.91	7.07	7.23
23700	*Anax sp*	MT	P299min	Wadeable	14	4.27	4.65	5.02	0.44	1.44	2.53	6.79	7.74	8.47
13010	*Leucrocuta hebe*	MI	P299min	Wadeable	12	4.28	4.70	4.59	2.64	2.65	3.76	5.18	7.45	7.64
47600	*Sialis sp*	MT	P299min	Wadeable	76	4.28	4.25	4.66	0.73	1.76	2.66	5.65	6.45	6.91
51600	*Polycentropus sp*	MI	P299min	Wadeable	25	4.29	4.70	4.92	1.94	2.29	3.59	5.52	6.98	7.35
87540	*Hemerodromia sp*	F	P299min	Wadeable	31	4.30	5.38	5.00	2.10	2.61	4.04	6.97	8.29	8.36
13521	*Stenonema femoratum*	F	P299min	Wadeable	102	4.31	4.84	5.12	1.00	2.02	3.54	6.41	7.10	7.73
78200	*Larsia sp*	MT	P299min	Wadeable	26	4.31	4.42	4.60	0.15	0.53	3.51	5.92	6.72	7.16
82141	*Thienemanniella xena*	F	P299min	Wadeable	26	4.32	4.58	4.59	2.25	2.90	3.48	5.47	6.96	7.09
89501	*Ephydridae*	F	P299min	Wadeable	11	4.32	4.52	3.54	2.45	2.73	3.22	5.97	6.82	7.33
72501	*Culicidae*	MT	P299min	Wadeable	24	4.34	4.31	4.71	0.31	0.64	2.50	5.97	6.91	7.97
85800	*Tanytarsus sp*	F	P299min	Wadeable	380	4.35	4.56	4.79	0.79	1.66	3.19	5.96	7.02	7.83
77120	*Ablabesmyia mallochi*	F	P299min	Wadeable	395	4.35	4.66	4.96	0.88	1.81	3.38	6.03	6.95	7.41
83150	*Endochironomus sp*	MT	P299min	Wadeable	23	4.36	4.65	5.09	0.44	0.97	2.54	6.24	8.24	8.49

Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
22325	*Argia tibialis*		P299min	Wadeable	121	4.36	4.61	4.95	0.83	2.02	3.34	5.82	6.80	7.06
59001	*Leptoceridae*		P299min	Wadeable	10	4.36	4.22	4.60	0.76	1.65	2.83	5.74	6.14	6.46
23618	*Aeshna umbrosa*	T	P299min	Wadeable	12	4.38	4.83	5.19	0.27	1.62	3.76	5.77	7.49	8.26
79400	*Zavrelimyia sp*	F	P299min	Wadeable	7	4.38	4.70	5.46	0.81	1.26	3.18	6.44	7.28	7.46
84470	*Polypedilum (P.) illinoense*	T	P299min	Wadeable	487	4.39	4.82	5.11	0.87	1.90	3.44	6.22	7.18	7.79
84540	*Polypedilum (Tripodura) scalaenum group*	F	P299min	Wadeable	182	4.39	4.38	4.50	0.83	1.86	2.89	5.85	6.66	7.24
18750	*Hexagenia limbata*	F	P299min	Wadeable	79	4.39	4.43	4.54	1.04	1.93	3.31	5.62	6.75	6.97
77140	*Ablabesmyia peleensis*		P299min	Wadeable	14	4.40	4.72	5.02	0.53	1.56	3.98	5.76	7.21	8.17
23704	*Anax junius*	MT	P299min	Wadeable	15	4.41	4.01	3.65	0.26	0.48	2.04	5.51	8.39	9.96
82880	*Cryptotendipes sp*	F	P299min	Wadeable	128	4.42	4.59	4.58	0.94	1.96	3.06	6.06	7.06	7.91
72700	*Anopheles sp*	F	P299min	Wadeable	99	4.42	4.60	4.85	0.77	1.91	3.20	6.04	7.06	7.44
93200	*Hydrobiidae*	F	P299min	Wadeable	131	4.43	4.45	4.57	0.33	1.95	3.21	5.55	7.02	7.30
83400	*Harnischia sp*	F	P299min	Wadeable	55	4.44	4.40	4.23	1.99	2.47	3.21	5.51	6.41	7.39
22600	*Enallagma sp*		P299min	Wadeable	260	4.44	4.56	4.70	0.65	1.89	3.19	5.81	7.01	7.46
80510	*Cricotopus (Isocladius) sylvestris group*	T	P299min	Wadeable	44	4.45	4.31	4.48	0.16	1.01	2.90	5.75	7.33	7.92
11110	*Acentrella parvula*	I	P299min	Wadeable	18	4.45	5.23	4.95	1.09	2.65	4.38	6.67	7.06	9.49
84700	*Stenochironomus sp*	F	P299min	Wadeable	184	4.46	4.72	5.18	0.85	1.85	3.24	6.12	6.96	7.39
97601	*Corbicula fluminea*	F	P299min	Wadeable	240	4.47	4.49	4.85	0.62	1.60	3.25	5.79	6.82	7.27
87400	*Stratiomys sp*	MT	P299min	Wadeable	10	4.47	4.10	4.50	0.10	0.37	0.84	6.36	7.61	8.39
08240	*Orconectes (Crokerinus) propinquus*	F	P299min	Wadeable	38	4.47	4.97	5.32	0.36	2.39	4.37	6.30	6.76	7.86
84155	*Paralauterborniella nigrohalteralis*	F	P299min	Wadeable	54	4.49	4.42	4.31	0.99	1.97	2.92	5.85	7.05	7.71
26700	*Macromia sp*	MI	P299min	Wadeable	23	4.49	4.80	4.83	0.88	2.00	3.20	6.62	6.91	7.54
84302	*Phaenopsectra punctipes*	F	P299min	Wadeable	64	4.49	4.32	4.84	0.56	1.13	2.92	5.75	6.69	7.44
57900	*Pycnopsyche sp*	MI	P299min	Wadeable	29	4.49	4.35	5.10	0.74	1.07	3.21	5.83	6.46	6.74
80350	*Corynoneura sp*		P299min	Wadeable	8	4.52	4.71	5.40	0.81	1.45	3.68	6.06	6.45	6.61
08220	*Orconectes (Gremicambarus) immunis*	T	P299min	Wadeable	13	4.52	3.82	3.47	0.96	1.59	3.01	5.13	6.08	6.25
22319	*Argia sedula*		P299min	Wadeable	8	4.53	4.05	3.79	2.53	2.64	3.05	5.34	5.54	5.55
84450	*Polypedilum (Uresipedilum) flavum*	F	P299min	Wadeable	420	4.53	5.06	5.30	1.31	2.43	3.79	6.41	7.34	7.99
06810	*Gammarus fasciatus*	F	P299min	Wadeable	24	4.54	5.03	5.24	1.38	2.58	3.74	5.95	7.86	8.70
98600	*Sphaerium sp*	F	P299min	Wadeable	107	4.55	5.07	5.31	0.72	2.05	4.32	6.30	7.14	7.87
68201	*Scirtidae*	F	P299min	Wadeable	55	4.57	4.77	5.20	1.02	2.52	3.41	5.89	6.77	7.34
13400	*Stenacron sp*	F	P299min	Wadeable	372	4.57	4.86	5.31	0.91	1.97	3.51	6.28	7.13	7.57
11130	*Baetis intercalaris*	F	P299min	Wadeable	373	4.57	5.13	5.41	1.58	2.56	4.03	6.30	7.24	7.76
80410	*Cricotopus (C.) sp*	F	P299min	Wadeable	40	4.58	5.35	5.52	2.05	2.09	4.39	6.54	7.95	8.68

Taxa Code	Taxa Name	OH Tolerance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
77100	*Ablabesmyia sp*		P299min	Wadeable	32	4.59	5.16	5.41	2.04	2.20	4.13	6.77	7.36	7.71
82710	*Chironomus (C.) sp*	MT	P299min	Wadeable	319	4.59	4.78	5.09	0.72	1.80	3.37	6.31	7.12	7.81
78130	*Labrundinia neopilosella*		P299min	Wadeable	7	4.60	4.28	4.68	2.59	2.71	3.28	5.18	5.55	5.64
59700	*Triaenodes sp*	MI	P299min	Wadeable	28	4.60	4.71	4.85	2.03	2.52	3.70	5.62	5.98	7.54
78100	*Labrundinia sp*	F	P299min	Wadeable	38	4.60	4.74	4.95	0.54	1.95	3.32	6.27	7.12	7.58
85814	*Tanytarsus glabrescens group*	F	P299min	Wadeable	6	4.60	3.93	4.65	0.50	0.69	2.43	5.68	5.70	5.70
70000	*Diptera*		P299min	Wadeable	5	4.60	4.59	4.52	2.08	2.08	2.64	6.61	7.05	7.05
84000	*Parachironomus sp*	MT	P299min	Wadeable	19	4.62	3.95	4.48	0.10	0.12	1.88	6.00	7.19	7.46
84300	*Phaenopsectra obediens group*	F	P299min	Wadeable	82	4.63	4.41	4.59	0.64	1.31	3.15	5.85	6.96	7.27
18619	*Ephemera simulans*	MI	P299min	Wadeable	14	4.64	4.41	4.90	1.00	1.85	3.69	5.61	5.86	6.05
68300	*Cyphon sp*	MT	P299min	Wadeable	53	4.64	4.26	4.68	0.56	1.59	3.04	5.37	6.27	7.11
84790	*Tribelos fuscicorne*	F	P299min	Wadeable	108	4.68	4.88	5.03	0.75	1.35	3.10	6.74	7.70	8.26
19102	*Ephoron album*	MI	P299min	Wadeable	11	4.68	5.01	5.42	2.56	2.94	4.18	5.91	6.51	6.57
59410	*Nectopsyche diarina*	MI	P299min	Wadeable	130	4.68	5.07	5.40	0.48	2.42	4.03	6.30	7.12	7.75
84210	*Paratendipes albimanus or P. duplicatus*	F	P299min	Wadeable	116	4.69	4.63	4.90	0.65	1.73	2.90	6.13	7.34	7.73
82820	*Cryptochironomus sp*	F	P299min	Wadeable	420	4.69	4.78	4.99	1.08	2.06	3.40	6.14	7.19	7.77
11250	*Neocloeon sp. (Centroptilum sp, w/o hindwing pads)*	MI	P299min	Wadeable	169	4.70	4.66	5.02	0.94	1.68	3.27	6.17	6.96	7.39
04964	*Erpobdella microstoma*	MT	P299min	Wadeable	85	4.70	4.36	4.57	0.30	0.67	3.02	5.98	6.98	7.94
85500	*Paratanytarsus sp*	F	P299min	Wadeable	220	4.70	4.62	4.85	0.84	1.66	2.93	6.12	7.23	7.96
80420	*Cricotopus (C.) bicinctus*	T	P299min	Wadeable	176	4.71	4.84	5.11	0.85	1.60	3.45	6.38	7.38	7.78
08280	*Orconectes (Gremicambarus) virilis*	F	P299min	Wadeable	163	4.72	4.83	5.12	1.07	1.90	3.57	6.20	7.09	7.45
11020	*Acerpenna pygmaea*	MI	P299min	Wadeable	87	4.72	4.98	5.22	0.93	2.09	3.67	6.34	7.13	7.66
85001	*Tanytarsini*		P299min	Wadeable	72	4.74	5.16	5.09	2.04	2.48	3.66	6.41	7.71	8.34
53800	*Hydroptila sp*	F	P299min	Wadeable	210	4.75	4.91	5.13	0.94	2.08	3.48	6.32	7.28	7.77
13561	*Maccaffertium pulchellum*	MI	P299min	Wadeable	57	4.75	5.33	5.61	1.39	3.46	4.92	6.29	6.66	7.31
23804	*Basiaeschna janata*	F	P299min	Wadeable	38	4.75	5.05	5.63	1.23	2.27	3.28	6.77	7.33	7.47
87501	*Empididae*	F	P299min	Wadeable	10	4.78	5.58	6.40	0.76	1.42	5.21	7.01	7.55	7.79
93900	*Elimia sp*	MI	P299min	Wadeable	72	4.79	4.98	5.19	0.96	2.05	3.99	6.08	7.03	7.81
94100	*Pleurocera sp*	MI	P299min	Wadeable	63	4.79	4.83	5.35	1.10	1.90	3.88	6.01	6.80	7.21
13570	*Maccaffertium terminatum*	MI	P299min	Wadeable	84	4.82	5.38	5.78	1.07	2.87	4.68	6.43	7.24	7.38
05800	*Caecidotea sp*	T	P299min	Wadeable	292	4.83	4.91	5.34	0.87	1.87	3.54	6.41	7.20	7.88
70501	*Tipulidae*		P299min	Wadeable	20	4.83	5.05	5.11	1.44	2.73	3.70	6.33	7.43	8.10
68700	*Dubiraphia sp*	F	P299min	Wadeable	356	4.84	4.79	5.12	0.88	2.06	3.46	6.06	6.98	7.38
85210	*Cladotanytarsus species group B*	MI	P299min	Wadeable	95	4.85	4.61	4.86	0.96	1.32	3.47	6.06	6.98	7.46

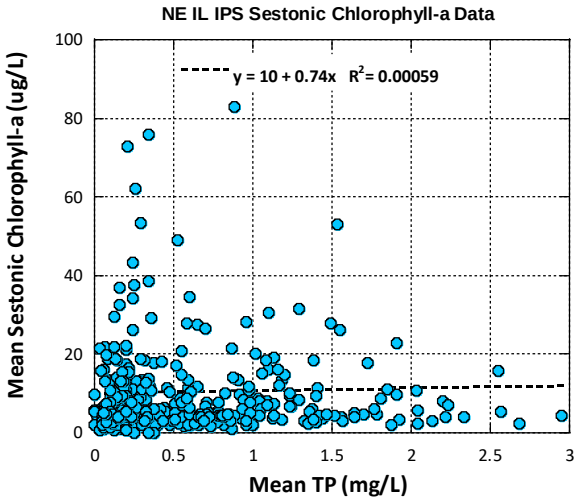
Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
xx016	*Trepobates sp*		P299min	Wadeable	5	4.86	4.56	4.26	3.48	3.48	3.74	5.18	6.45	6.45
86200	*Tabanus sp*	F	P299min	Wadeable	37	4.88	4.84	5.19	2.04	2.54	3.45	6.09	6.93	7.77
13120	*Nixe perfida*	MI	P299min	Wadeable	64	4.88	5.25	5.41	2.57	3.15	4.44	6.09	6.98	7.27
06700	*Crangonyx sp*	MT	P299min	Wadeable	49	4.91	4.38	4.81	0.64	1.77	3.43	5.50	5.98	7.68
25410	*Progomphus obscurus*	MT	P299min	Wadeable	54	4.92	4.80	5.31	1.04	1.94	3.48	6.22	7.16	7.44
13030	*Leucrocuta maculipennis*	MI	P299min	Wadeable	26	4.93	5.01	5.32	2.15	2.68	4.40	5.83	6.73	7.02
25600	*Stylurus sp*	MI	P299min	Wadeable	10	4.95	4.56	4.25	0.94	2.02	3.14	6.58	7.22	7.39
22315	*Argia moesta*		P299min	Wadeable	19	4.97	4.87	5.19	1.06	2.51	3.45	6.22	7.06	8.01
24900	*Gomphus sp*	F	P299min	Wadeable	79	4.97	4.88	4.95	0.88	2.25	3.48	6.58	7.03	7.41
82800	*Cladopelma sp*	T	P299min	Wadeable	21	5.01	4.55	4.54	0.74	1.40	2.42	5.66	8.82	10.45
22300	*Argia sp*	F	P299min	Wadeable	245	5.01	4.93	5.16	1.68	2.29	3.66	6.09	6.99	7.49
52001	*Hydropsychidae*		P299min	Wadeable	105	5.01	5.56	5.55	2.51	3.40	4.32	6.72	7.64	8.24
82885	*Cryptotendipes pseudotener*	F	P299min	Wadeable	5	5.02	3.74	3.98	0.84	0.84	2.11	5.41	6.20	6.20
68601	*Ancyronyx variegata*	F	P299min	Wadeable	102	5.02	5.07	5.43	1.13	2.77	4.18	6.30	6.91	7.55
16700	*Tricorythodes sp*	MI	P299min	Wadeable	293	5.04	5.13	5.39	1.42	2.59	4.11	6.29	7.06	7.96
12200	*Isonychia sp*	MI	P299min	Wadeable	95	5.04	5.40	5.60	2.87	3.32	4.43	6.58	7.12	8.03
68708	*Dubiraphia vittata group*	F	P299min	Wadeable	86	5.05	5.15	5.37	1.55	2.59	3.98	6.45	7.02	8.07
68075	*Psephenus herricki*	MI	P299min	Wadeable	27	5.09	5.08	5.18	1.74	3.37	4.00	6.01	6.85	8.00
82100	*Thienemanniella sp*		P299min	Wadeable	19	5.09	5.04	4.54	1.06	1.90	4.06	6.80	7.89	8.21
12501	*Heptageniidae*		P299min	Wadeable	74	5.09	5.59	5.73	2.56	3.62	4.64	6.72	7.38	8.08
13000	*Leucrocuta sp*	MI	P299min	Wadeable	58	5.10	5.33	5.42	2.62	2.99	4.33	6.31	6.71	8.23
87601	*Dolichopodidae*	MT	P299min	Wadeable	6	5.11	4.81	4.60	3.34	3.35	3.40	5.70	7.08	7.23
68160	*HELICHUS LITHOPHILUS*	F	P299min	Wadeable	61	5.11	4.91	5.35	0.96	2.36	3.58	6.14	7.26	7.87
11155	*Iswaeon anoka*	MI	P299min	Wadeable	10	5.13	5.52	5.46	2.64	3.06	4.38	5.85	8.51	11.10
69410	*Stenelmis crenata*		P299min	Wadeable	72	5.14	5.43	5.49	2.67	3.38	4.64	6.54	7.16	7.84
06800	*Gammarus sp*	F	P299min	Wadeable	135	5.14	5.38	5.61	2.06	2.81	4.11	6.59	7.77	8.22
74100	*Simulium sp*	F	P299min	Wadeable	303	5.15	5.29	5.50	1.29	2.61	4.09	6.67	7.59	8.16
52200	*Cheumatopsyche sp*	F	P299min	Wadeable	491	5.19	5.00	5.29	1.20	2.07	3.78	6.34	7.20	7.86
81825	*Rheocricotopus (Psilocricotopus) robacki*	F	P299min	Wadeable	72	5.20	5.05	5.40	1.41	2.08	3.91	6.16	7.35	7.90
69400	*Stenelmis sp*	F	P299min	Wadeable	452	5.21	4.90	5.18	1.16	2.06	3.52	6.35	7.11	7.76
84460	*Polypedilum (P.) fallax group*	F	P299min	Wadeable	68	5.21	5.12	5.63	1.29	1.89	3.52	6.46	7.08	7.69
84100	*Paracladopelma sp*		P299min	Wadeable	23	5.22	5.07	5.33	1.62	2.62	3.88	5.82	6.97	8.68
08310	*Procambarus (Ortmannicus) acutus acutus*	T	P299min	Wadeable	7	5.23	4.65	4.99	1.45	1.85	3.82	5.76	6.43	6.56
59520	*Oecetis cinerascens*	F	P299min	Wadeable	11	5.23	4.68	5.41	0.73	1.64	4.01	5.54	6.28	6.90

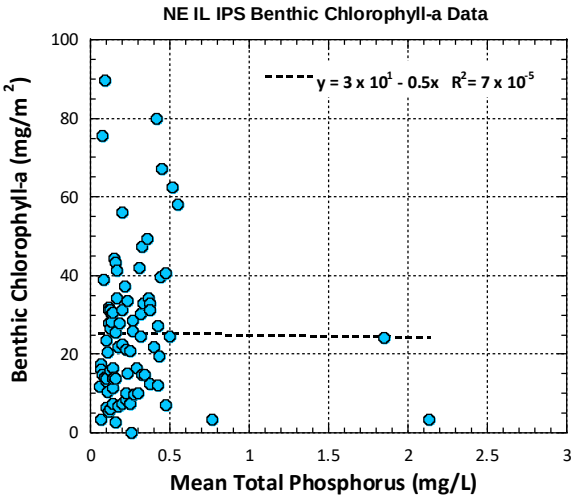
Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
84040	*Parachironomus frequens*	F	P299min	Wadeable	19	5.23	5.22	5.49	2.86	3.74	4.54	5.91	6.69	7.23
79100	*Thienemannimyia group*	F	P299min	Wadeable	439	5.28	5.04	5.32	1.04	2.29	3.83	6.41	7.28	7.88
18100	*Anthopotamus sp*	MI	P299min	Wadeable	16	5.31	5.40	5.47	1.99	2.22	5.02	5.85	7.01	9.42
11150	*Labiobaetis propinquus*	MI	P299min	Wadeable	129	5.32	5.14	5.41	1.57	2.57	4.17	6.31	7.19	7.47
59400	*Nectopsyche sp*	MI	P299min	Wadeable	18	5.33	5.21	5.25	1.24	2.06	4.40	6.66	7.08	9.18
19107	*Ephoron leukon*	MI	P299min	Wadeable	10	5.33	5.09	5.19	2.06	3.03	4.52	6.03	6.69	6.98
24510	*ERPETOGOMPHUS DESIGNATUS*	F	P299min	Wadeable	9	5.34	4.51	4.43	1.97	2.45	3.18	5.79	6.33	6.60
84580	*Robackia demeijerei*	MI	P299min	Wadeable	19	5.34	5.58	5.73	0.52	2.53	5.35	6.58	7.55	7.68
15000	*Paraleptophlebia sp*	F	P299min	Wadeable	5	5.35	4.64	5.33	1.89	1.89	3.06	6.05	6.66	6.66
72340	*Dixella sp*	F	P299min	Wadeable	6	5.36	4.98	5.34	3.61	3.66	4.10	5.61	5.87	5.90
08250	*Orconectes (Procericambarus) rusticus*	F	P299min	Wadeable	10	5.37	4.15	4.63	2.05	2.07	2.81	5.16	5.95	6.52
84600	*Saetheria sp*	F	P299min	Wadeable	49	5.40	5.36	5.73	1.08	2.23	4.11	6.72	7.37	8.02
82501	*Chironomini*		P299min	Wadeable	167	5.41	5.44	5.50	1.92	2.81	4.29	6.71	7.79	8.34
06501	*Gammaridae*		P299min	Wadeable	10	5.42	5.87	6.59	1.94	2.42	4.96	7.03	8.09	8.43
11620	*Paracloeodes minutus*	MI	P299min	Wadeable	37	5.42	4.96	5.43	0.99	1.84	3.94	6.39	7.17	7.43
58505	*Helicopsyche borealis*	MI	P299min	Wadeable	80	5.44	5.40	5.55	2.02	3.60	4.63	6.33	7.26	7.88
23909	*Boyeria vinosa*	F	P299min	Wadeable	176	5.44	5.16	5.40	1.45	2.67	4.10	6.40	7.23	7.96
52500	*Hydropsyche sp*		P299min	Wadeable	41	5.46	5.62	5.61	3.46	3.90	4.83	6.52	7.20	7.61
85200	*Cladotanytarsus sp*		P299min	Wadeable	127	5.47	5.17	5.47	0.89	2.12	4.21	6.40	7.00	8.21
77001	*Tanypodinae*		P299min	Wadeable	130	5.47	5.44	5.43	2.04	2.82	4.29	6.69	7.81	8.43
11015	*Acerpenna sp*	MI	P299min	Wadeable	9	5.48	4.57	4.91	0.01	1.03	2.95	6.02	7.43	8.04
85201	*Cladotanytarsus species group A*	F	P299min	Wadeable	24	5.49	5.51	5.88	2.12	2.62	4.25	6.67	7.61	8.84
08200	*Orconectes sp*	F	P299min	Wadeable	202	5.50	5.38	5.44	2.07	2.88	4.30	6.46	7.58	8.22
85265	*Cladotanytarsus vanderwulpi group sp 5*	MI	P299min	Wadeable	17	5.51	4.93	5.38	2.24	2.68	4.38	5.81	5.97	6.66
68901	*Macronychus glabratus*	F	P299min	Wadeable	207	5.51	5.48	5.66	2.56	3.34	4.83	6.46	7.18	7.64
13540	*Maccaffertium mediopunctatum*	MI	P299min	Wadeable	17	5.52	5.73	5.79	3.13	3.89	4.85	6.81	7.28	7.69
83840	*Microtendipes pedellus group*	F	P299min	Wadeable	150	5.53	5.60	5.91	2.06	2.86	4.57	6.85	7.71	8.20
60400	*Gyrinus sp*	F	P299min	Wadeable	31	5.53	5.31	5.47	1.36	2.43	4.57	6.90	7.79	8.38
59100	*Ceraclea sp*	MI	P299min	Wadeable	15	5.54	5.21	5.27	2.70	3.50	4.16	6.14	6.95	7.28
84400	*Polypedilum sp*		P299min	Wadeable	130	5.55	5.46	5.51	1.74	2.60	4.26	6.78	7.84	8.43
80470	*Cricotopus (C.) or Orthocladius (O.) sp*		P299min	Wadeable	120	5.55	5.26	5.17	1.88	2.76	4.06	6.66	7.70	8.34
76001	*Chironomidae*		P299min	Wadeable	60	5.55	5.19	5.09	1.67	2.08	3.79	6.56	7.80	8.16
52540	*Hydropsyche dicantha*	MI	P299min	Wadeable	23	5.57	5.60	5.72	2.58	3.42	4.91	6.61	7.33	7.70
59407	*Nectopsyche candida*	MI	P299min	Wadeable	68	5.57	5.35	5.70	1.95	3.30	4.43	6.51	7.11	7.40

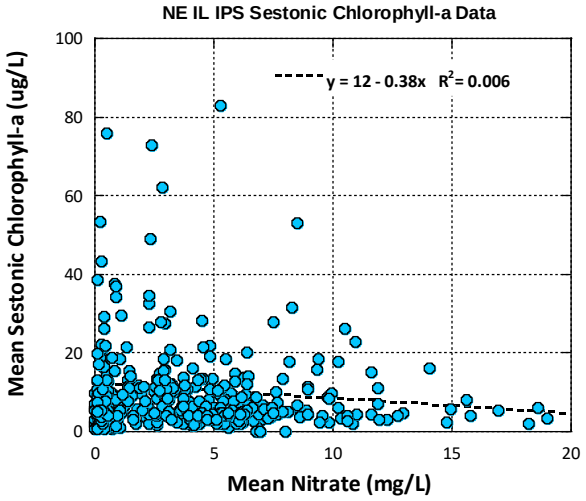
Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
21300	*Hetaerina sp*	F	P299min	Wadeable	136	5.65	5.58	5.52	2.63	3.82	4.85	6.50	7.33	8.20
84440	*Polypedilum (Uresipedilum) aviceps*	MI	P299min	Wadeable	13	5.67	5.05	5.76	0.48	2.33	4.04	6.13	6.88	7.47
52530	*Hydropsyche depravata group*	F	P299min	Wadeable	148	5.67	5.56	5.69	3.08	3.48	4.67	6.60	7.25	7.68
81400	*Orthocladius sp*		P299min	Wadeable	6	5.68	4.85	4.93	2.07	2.12	2.57	6.72	7.77	7.89
12924	*Heptagenia flavescens*	MI	P299min	Wadeable	5	5.68	5.79	5.94	4.95	4.95	4.96	6.52	6.60	6.60
84612	*Saetheria tylus*	F	P299min	Wadeable	9	5.70	5.72	5.94	4.40	4.58	5.03	6.37	6.85	7.14
26705	*Macromia illinoiensis*	F	P299min	Wadeable	85	5.70	5.08	5.49	1.91	2.53	3.64	6.58	7.14	7.41
59405	*Nectopsyche albida*		P299min	Wadeable	6	5.71	5.52	5.16	4.18	4.19	4.26	5.90	8.20	8.45
48410	*Corydalus cornutus*	MI	P299min	Wadeable	66	5.72	5.72	5.81	2.77	3.62	5.19	6.72	7.46	8.32
71900	*Tipula sp*	F	P299min	Wadeable	77	5.74	5.66	5.61	2.97	4.02	4.85	6.69	7.66	8.14
96310	*Planorbula armigera*		P299min	Wadeable	6	5.74	6.08	5.80	4.96	4.99	5.22	6.00	8.41	8.68
21001	*Calopterygidae*	F	P299min	Wadeable	8	5.76	5.60	5.82	2.81	3.17	4.15	6.81	8.02	8.45
69420	*Stenelmis sexlineata*		P299min	Wadeable	9	5.77	5.22	4.85	3.21	3.44	3.95	6.45	7.12	7.47
68702	*Dubiraphia bivittata*	F	P299min	Wadeable	14	5.82	6.14	5.81	2.51	4.07	5.24	7.23	8.61	9.70
78510	*Paramerina sp 1*	MI	P299min	Wadeable	42	5.84	5.35	5.36	2.18	2.81	4.52	6.70	7.31	7.98
69225	*Optioservus fastiditus*	MI	P299min	Wadeable	14	5.91	6.04	6.41	3.60	4.04	4.30	6.97	7.82	8.22
81650	*Parametriocnemus sp*	F	P299min	Wadeable	14	5.95	5.94	6.33	1.45	2.71	5.09	7.27	8.37	8.61
06840	*Gammarus pseudolimnaeus*	F	P299min	Wadeable	85	6.00	5.90	6.22	2.21	3.34	5.19	7.14	7.75	8.00
84785	*Tribelos atrum*		P299min	Wadeable	44	6.00	6.00	5.93	2.61	3.32	4.29	7.67	8.21	9.08
24501	*Gomphidae*	F	P299min	Wadeable	28	6.02	5.88	6.32	2.57	3.95	5.11	6.77	7.35	8.12
50315	*Chimarra obscura*	MI	P299min	Wadeable	53	6.03	5.61	5.74	2.08	3.53	4.78	6.76	7.35	7.75
21200	*Calopteryx sp*	F	P299min	Wadeable	99	6.04	5.69	5.73	2.78	3.38	4.83	6.65	7.46	8.27
51001	*Polycentropodidae*		P299min	Wadeable	5	6.05	6.03	5.43	4.92	4.92	5.27	6.66	8.34	8.34
34500	*Perlesta placida complex*	F	P299min	Wadeable	22	6.06	5.62	5.99	2.65	3.12	4.38	6.75	7.40	8.07
71100	*Hexatoma sp*	MI	P299min	Wadeable	15	6.07	5.76	5.91	3.31	4.52	5.29	6.40	6.71	7.52
11100	*Baetis sp*	F	P299min	Wadeable	42	6.08	5.79	5.75	2.18	3.83	4.84	7.02	8.14	8.36
11001	*Baetidae*		P299min	Wadeable	119	6.08	5.72	5.55	2.07	3.32	4.31	6.99	8.16	8.44
07701	*Cambaridae*		P299min	Wadeable	20	6.09	6.02	6.22	1.51	2.60	5.27	7.05	8.01	9.29
81810	*Rheocricotopus sp*	F	P299min	Wadeable	15	6.15	5.90	5.36	3.00	3.32	4.57	7.68	8.36	8.41
83820	*Microtendipes "caelum" (sensu Simpson & Bode, 1980)*	MI	P299min	Wadeable	8	6.15	5.63	5.39	3.98	4.29	5.06	6.56	6.89	7.02
11101	*Plauditus sp*	MI	P299min	Wadeable	14	6.15	5.52	5.29	1.55	3.28	4.29	6.76	8.38	9.65
51300	*Neureclipsis sp*	MI	P299min	Wadeable	34	6.16	5.82	6.12	3.22	3.63	4.92	6.87	7.24	7.36
81630	*Parakiefferiella sp*	F	P299min	Wadeable	7	6.16	6.21	6.85	4.03	4.04	4.34	7.69	8.34	8.45
55510	*Brachycentrus sp*	MI	P299min	Wadeable	17	6.19	6.56	6.41	5.15	5.25	5.66	7.10	7.54	9.47

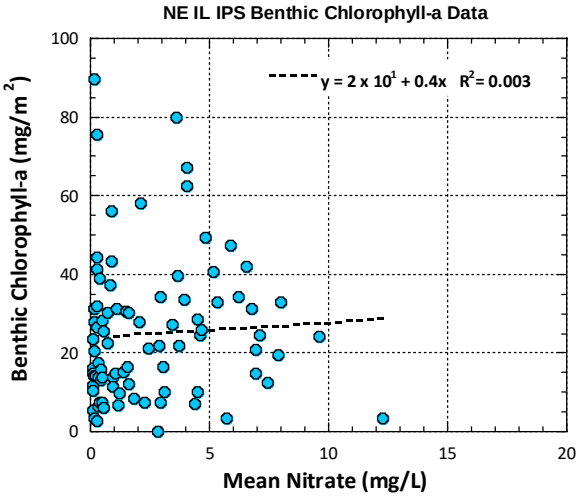
Taxa Code	Taxa Name	OH Toler-ance	Parameter	Size Name	Samples	Weighted Mean	Mean	Median	5th %tile	10th %tile	25th %tile	75th %tile	90th %tile	95th %tile
11120	*Baetis flavistriga*	F	P299min	Wadeable	217	6.20	5.75	5.96	2.40	3.68	4.74	6.79	7.72	8.23
52431	*Ceratopsyche morosa*	MI	P299min	Wadeable	34	6.20	5.98	6.43	2.38	4.24	4.86	6.85	7.89	8.33
84280	*Phaenopsectra sp or Tribelos sp*	F	P299min	Wadeable	10	6.23	6.15	6.73	4.24	4.25	4.85	7.22	7.31	7.39
86100	*Chrysops sp*	F	P299min	Wadeable	20	6.23	6.05	5.88	3.53	4.35	4.91	6.57	8.05	9.34
52401	*Ceratopsyche sp*	MI	P299min	Wadeable	172	6.25	5.85	5.79	2.92	3.75	4.95	6.87	7.76	8.34
12912	*Heptagenia diabasia*	F	P299min	Wadeable	60	6.26	5.49	5.74	2.54	2.98	4.39	6.51	7.53	7.74
84200	*Paratendipes sp*	F	P299min	Wadeable	5	6.31	6.51	6.30	5.94	5.94	5.96	7.18	7.19	7.19
19100	*Ephoron sp*	MI	P299min	Wadeable	10	6.33	5.76	5.74	3.78	4.21	4.95	6.77	7.20	7.35
13500	*Maccaffertium sp*	MI	P299min	Wadeable	59	6.37	5.79	5.76	2.89	4.31	5.13	6.58	7.49	8.35
83800	*Microtendipes sp*	F	P299min	Wadeable	21	6.46	6.00	6.03	2.45	4.27	5.15	6.68	8.09	9.30
99001	*Unionidae*		P299min	Wadeable	6	6.46	6.45	7.08	0.84	1.31	5.51	7.77	10.16	10.43
80001	*Orthocladiinae*		P299min	Wadeable	86	6.46	5.89	6.23	1.90	3.33	4.64	7.19	8.03	8.34
52520	*Hydropsyche bidens*	MI	P299min	Wadeable	6	6.53	6.13	6.13	4.96	5.04	5.77	6.60	7.11	7.17
86401	*Atherix lantha*	MI	P299min	Wadeable	6	6.55	7.19	6.31	5.81	5.82	5.91	8.31	10.26	10.48
94500	*Lymnaea sp (old name, =Lymnaeidae)*		P299min	Wadeable	12	6.66	6.73	6.70	4.85	5.10	5.86	7.49	8.42	8.64
70700	*Dicranota sp*	MI	P299min	Wadeable	10	6.69	6.57	6.95	4.10	4.15	5.26	7.89	8.14	8.34
80204	*Brillia flavifrons group*	F	P299min	Wadeable	67	6.73	6.30	6.46	3.50	4.07	5.25	7.55	7.96	8.33
34100	*Acroneuria sp*	MI	P299min	Wadeable	5	6.74	4.87	5.18	0.76	0.76	3.12	6.54	8.68	8.68
13100	*Nixe sp*	MI	P299min	Wadeable	8	6.78	5.82	5.99	2.05	2.79	5.18	6.76	8.18	8.68
80440	*Cricotopus (C.) trifascia*	F	P299min	Wadeable	85	6.81	5.93	5.98	2.25	3.48	4.85	7.09	7.89	8.44
70600	*Antocha sp*	MI	P299min	Wadeable	14	6.84	6.45	6.36	5.15	5.25	5.79	7.05	7.71	8.20
48620	*Nigronia serricornis*	F	P299min	Wadeable	6	6.86	6.91	6.68	3.91	4.10	5.83	8.34	9.84	10.01
82201	*Tvetenia sp*	MI	P299min	Wadeable	11	6.90	7.26	7.22	5.24	5.57	6.51	8.14	9.01	9.93
69200	*Optioservus sp*	MI	P299min	Wadeable	56	6.91	6.23	6.33	2.82	4.29	5.49	7.10	7.79	8.58
11113	*Baetis brunneicolor*	MI	P299min	Wadeable	18	7.06	6.20	6.37	3.54	4.56	5.31	7.27	7.74	7.86
80700	*Eukiefferiella sp*		P299min	Wadeable	31	7.24	6.79	7.19	4.65	4.88	5.91	7.79	8.18	8.34
23600	*Aeshna sp*	MT	P299min	Wadeable	6	7.93	7.51	7.46	5.26	5.35	6.20	8.20	10.25	10.48

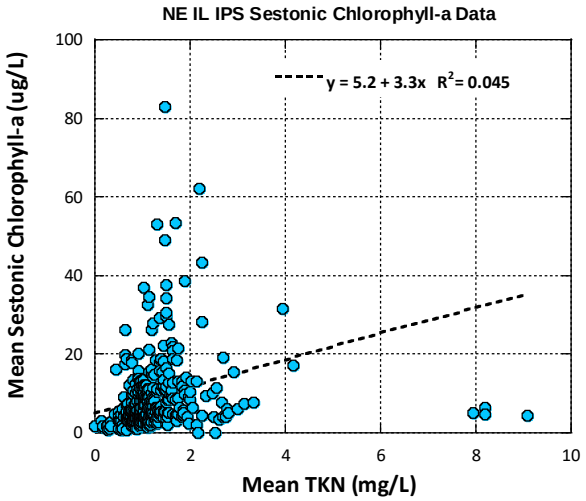
Appendix 4. Plots of sestonic chlorophyll a (left) and benthic chlorophyll a (right) versus nutrient parameters (nitrate, total phosphorus and TKN) at sites that are part of the NE IL IPS.

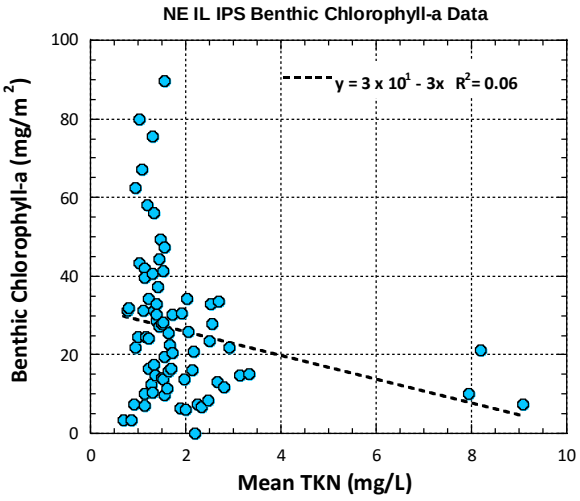

NE IL IPS Sestonic Chlorophyll-a Data
y = 10 + 0.74x R²= 0.00059
Mean Sestonic Chlorophyll-a (ug/L)
Mean TP (mg/L)


NE IL IPS Benthic Chlorophyll-a Data
y = 3 x 10¹ - 0.5x R²= 7 x 10⁻⁵
Benthic Chlorophyll-a (mg/m²)
Mean Total Phosphorus (mg/L)

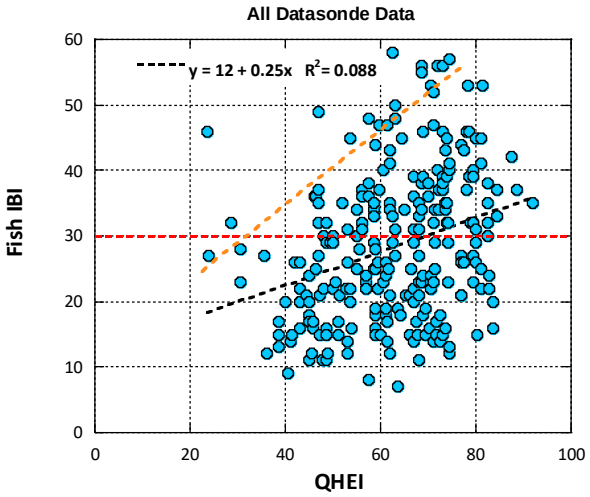

NE IL IPS Sestonic Chlorophyll-a Data
y = 12 - 0.38x R²= 0.006
Mean Sestonic Chlorophyll-a (ug/L)
Mean Nitrate (mg/L)

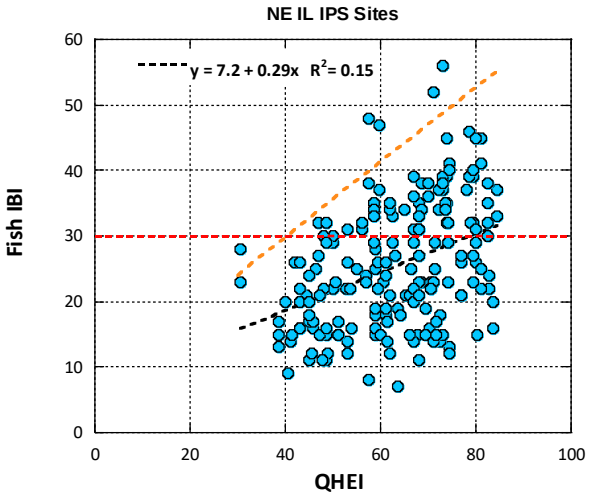

NE IL IPS Benthic Chlorophyll-a Data
y = 2 x 10¹ + 0.4x R²= 0.003
Benthic Chlorophyll-a (mg/m²)
Mean Nitrate (mg/L)

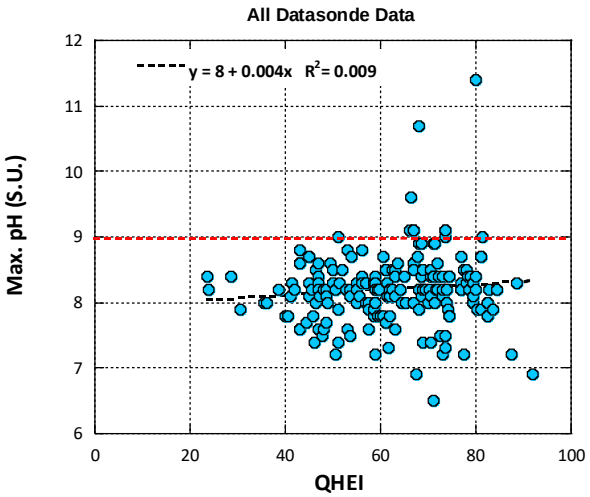

NE IL IPS Sestonic Chlorophyll-a Data
y = 5.2 + 3.3x R²= 0.045
Mean Sestonic Chlorophyll-a (ug/L)
Mean TKN (mg/L)

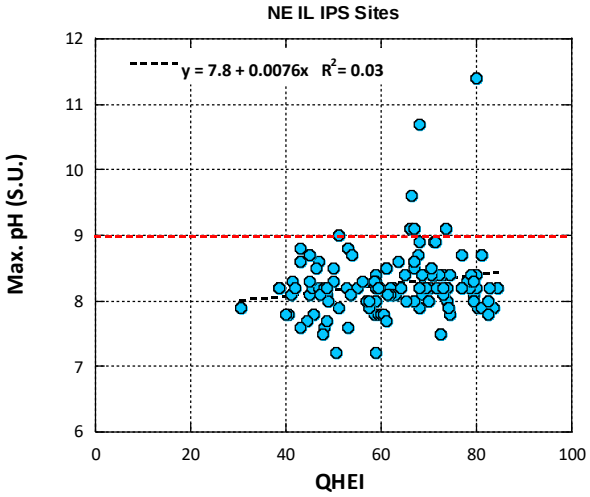

NE IL IPS Benthic Chlorophyll-a Data
y = 3 x 10¹ - 3x R²= 0.06
Benthic Chlorophyll-a (mg/m²)
Mean TKN (mg/L)

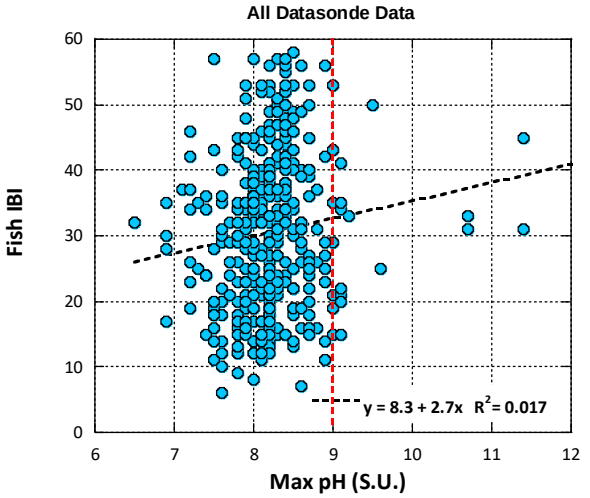
Appendix 5. Plots of QHEI versus fIBI (top), QHEI versus Max. pH (middle) and Max. pH versus fIBI (bottom) from statewide sites (left) or NE IL IPS sites (right) with continuous data samples for pH.

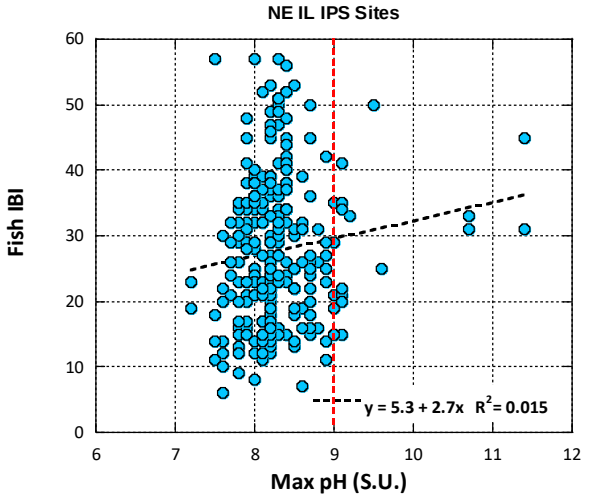

All Datasonde Data
y = 12 + 0.25x R²= 0.088
Fish IBI
QHEI


NE IL IPS Sites
y = 7.2 + 0.29x R²= 0.15
Fish IBI
QHEI

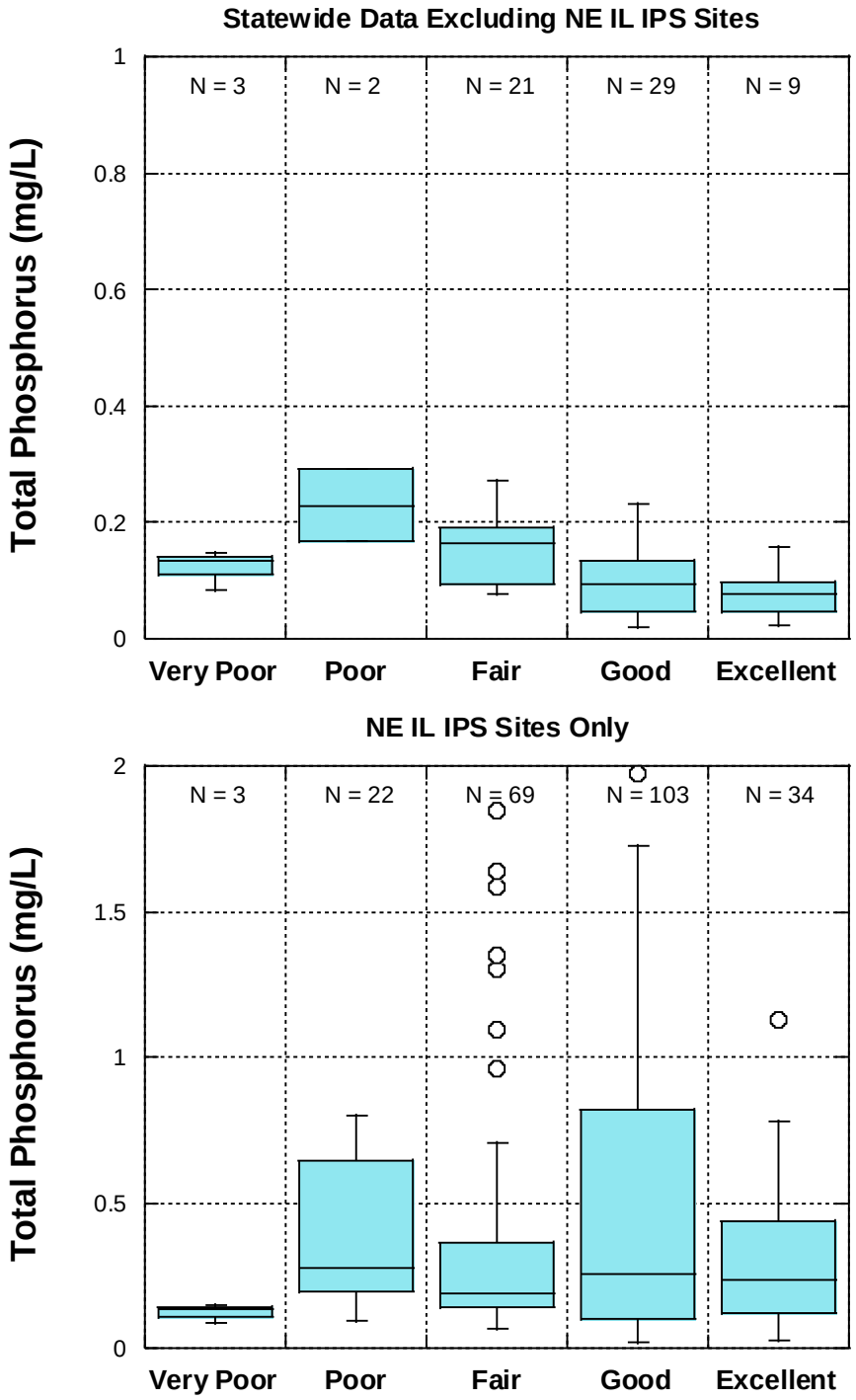

All Datasonde Data
y = 8 + 0.004x R²= 0.009
Max. pH (S.U.)
QHEI


NE IL IPS Sites
y = 7.8 + 0.0076x R²= 0.03
Max. pH (S.U.)
QHEI


All Datasonde Data
y = 8.3 + 2.7x R²= 0.017
Fish IBI
Max pH (S.U.)


NE IL IPS Sites
y = 5.3 + 2.7x R²= 0.015
Fish IBI
Max pH (S.U.)

Appendix 6. Box and whisker plots of total phosphorus versus narrative ranges of the QHEI at Statewide sites with a largely agricultural footprint (top) and NE IL IPS sites with largely an urban land use footprint (bottom).


Statewide Data Excluding NE IL IPS Sites
Total Phosphorus (mg/L)
1
0.8
0.6
0.4
0.2
0
N = 3
N = 2
N = 21
N = 29
N = 9
Very Poor
Poor
Fair
Good
Excellent
NE IL IPS Sites Only
Total Phosphorus (mg/L)
2
1.5
1
0.5
0
N = 3
N = 22
N = 69
N = 103
N = 34
Very Poor
Poor
Fair
Good
Excellent