

The Condition of Rivers and Streams in Minnesota

Based on Probabilistic Surveys, 1995-2011



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Executive summary

Environmental monitoring is essential for investigating the quality, quantity, and overall health of Minnesota's aquatic resources. The Minnesota Pollution Control Agency's (MPCA) biological monitoring program implements a comprehensive monitoring approach on rivers and streams that includes measures of the fish and aquatic macroinvertebrate communities, water chemistry, and in-stream habitat. Since 1996 the MPCA has employed these measures in probabilistic surveys that enable researchers to monitor a relatively few number of sites to characterize the condition of rivers and streams throughout the entire state of Minnesota. From 1996-2005, and again in 2010-2011, the MPCA conducted two extensive statewide probabilistic stream surveys. The data from these two surveys provide valuable insight on current stream and river conditions and on the in-stream and watershed level environmental variables that influence aquatic communities (i.e. fish and macroinvertebrates). To investigate regional patterns we divided the state into three geographic regions (Omernik's level II ecoregions); a northern ecoregion known as the Mixed Wood Shield; a central ecoregion known as the Mixed Wood Plains; and a southern ecoregion called the Temperate Prairies. Each ecoregion is distinct from one another due to differences in soils, vegetation, topography and land use. The regional subpopulations allowed us to take a closer look at how each ecoregion compares to each other and to the state as a whole. The survey design also allowed for a direct comparison of the biological data with other watershed and site level variables. Therefore a secondary objective was to evaluate how the chemical and physical properties of the stream and its watershed influence biological conditions.

The most recent survey results from 2010-2011 indicate that the condition of Minnesota's rivers and streams range widely from very good to poor in a north and east to a south and west pattern consistent with the three ecoregions. One of the most pronounced ecoregional differences is the amount of land in each watershed that is devoted to agricultural land use practices. The fertile soils and gentle topography of the Temperate Prairies and Mixed Wood Plains ecoregions of Minnesota are well suited for agriculture, making this form of land use by far the most prevalent of any land use type. Consequently, over 80% of a typical watershed in the Temperate Prairies and 50% of a typical watershed in the Mixed Wood Plains ecoregion are used for some form of agriculture. In contrast, other forms of watershed disturbance such as urbanization and mining comprise a much smaller amount of the overall watershed area throughout the state.

One of the most direct and seemingly consequential aspects of modern agricultural land use is the need for efficient overland drainage. Stream channelization to promote drainage is conducted for many reasons, including facilitating urban development, but the overwhelming dominance of agricultural land use throughout the watersheds of the Temperate Prairies and Mixed Wood Plains ecoregions means that streams in these regions are often disproportionately impacted by drainage practices. Statewide, the 2010 survey indicated that relatively high percentages (44%) of streams in Minnesota have been altered to promote drainage with fewer (17%) channelized streams in the Mixed Wood Shield ecoregion and higher percentages (65%) in the Temperate Prairies ecoregion. Stream channelization, while benefiting agriculture, directly compromises habitat by altering the sinuosity, riffle/run/pool sequences, substrate composition, and many other components of stream habitat. These direct physical changes to the stream combined with the watershed wide hydrologic changes that occur with drainage can impact habitat for aquatic macroinvertebrates and fish. The Minnesota Stream Habitat Assessment (MSHA), a habitat rating system used by the MPCA to gage habitat quality for fish and macroinvertebrates, was used to assign ratings of Good, Fair, and Poor for all sampled streams. The most recent survey indicated that approximately 30% of streams in the state have poor habitat and that the percentages are dramatically different by ecoregion with 6% of the streams in the Mixed Wood Shield having poor habitat and over 50% of streams in the Temperate Prairies having poor habitat. Nutrient concentrations in Minnesota streams mirror the results of the physical habitat percentages. Nitrogen (NO₂+NO₃)

concentrations are estimated to never exceed the proposed draft standards in the Mixed Wood Shield but are estimated to exceed the draft standards in about half (49%) of the streams in the Temperate Prairies ecoregion. Similarly, about 8% of the streams exceed the draft phosphorus standards in the Mixed Wood Shield ecoregion compared to 46% in the Temperate Prairies ecoregion.

The physical and chemical differences in stream quality also appear to influence the composition of aquatic communities that reside in Minnesota streams. Statewide, fish communities are estimated to be in good condition in 50% of stream miles while macroinvertebrate communities' fare slightly worse with only 41.5% of these communities in good condition. Fish communities that are in good condition range from 66% of streams in the Mixed Wood Shield to 37% in the Temperate Prairies ecoregion while macroinvertebrate communities that are in good condition range from 52% in the Mixed Wood Shield to 30% in the Temperate Prairies ecoregion.

Differences in stream condition between the first statewide survey conducted during a 10 year span from 1996 -2005 and the second survey statewide survey in 2010 – 2011 were difficult to detect. The designs of these surveys were similar in that they both used the probabilistic site selection process, but they differed both in time span and the spatial intensity of the sampling effort. Overall the results were noticeably mixed. The only habitat parameter that was consistently different between the surveys was the amount of bank erosion, which decreased significantly statewide and in all ecoregions. Associated with the reductions in bank erosion was a corresponding decrease in Total Suspended Solids (TSS) statewide and in both the Mixed Wood Shield and Temperate Prairies ecoregions. In terms of the aquatic communities, fish community parameters were similar to slightly improving between surveys, but many macroinvertebrate community attributes indicated a decline in condition including the number of Ephemeroptera Plecoptera and Trichoptera (EPT) taxa, number of intolerant and tolerant taxa, and the overall taxa count. A third probabilistic survey that will be conducted in 2015 will enable us to determine if the changes noted between these two surveys are an artifact of the survey design differences, a temporary shift, or are in fact a longer term trend.

The probability of a monitoring location obtaining a passing index of biotic integrity (IBI) score varies by ecoregion, and is therefore inextricably linked to prevailing land use patterns that impact the biology through direct (e.g. channelization) or indirect mechanisms (e.g. agricultural and urban runoff) that alter the physical and chemical composition of streams. In general the probability of meeting biological community expectations increases from southwest to northeast Minnesota, corresponding to the ecoregion and land uses patterns. The conditional probability results initially show that small percentages of agricultural development within a watershed lead to relatively large decreases in the probability of meeting biological expectations, before leveling off. Then at approximately 80% agricultural land use a second inflection point occurs where once again the likelihood that a river or stream will meet biological expectations is dramatically reduced. Impervious surfaces show a more dramatic decrease in biological expectations, than agriculture, even at very low levels (less than 3%). Strong negative relationships were also observed between the biology and some chemistry variables including phosphorus, TSS, conductivity. Strong relationships between the biology and Dissolved Oxygen (DO) were observed at both high and low concentrations. The probability of obtaining a good fish or macroinvertebrates IBI score decreased with both low and high concentrations of DO, suggesting that the range of DO is also an important indicator of biological health. Habitat condition as indicated by the MSHA score was positively correlated with fish and macroinvertebrate IBI scores. Among the habitat variables tested, substrate composition (i.e. the presence of coarse substrate material) was the strongest predictor of biological condition.

These surveys have provided a baseline assessment of the condition of rivers and streams in Minnesota. Furthermore, the observed ecoregional differences illustrate the impacts of land use on stream health and shed light on the water quality challenges that each region faces. Ultimately, the health of the aquatic communities that reside in these systems is a product of not one factor but the interactions of

many factors, natural and anthropogenic, which act on streams by changing their physical and/or chemical composition. Describing the health of aquatic communities and how they change through time is particularly challenging because the factors that influence their condition are most often co-occurring, multifaceted, and interdependent. The MPCA will conduct a third probabilistic survey in 2015 to assess the status of the state's rivers and streams. This third survey will mimic the 2010-2011 survey in its design, allowing a better assessment of the temporal trends. Having combined these surveys give us a perspective not gained by many states other than Minnesota, and has laid the foundation for future surveys and gaining a better understanding of the complex relationship between our water resources and the factors that influence their condition.

Introduction

Environmental monitoring is essential in investigating the quality, quantity, and overall health of environmental resources such as rivers and streams. In Minnesota, the Minnesota Pollution Control Agency (MPCA) has performed biological monitoring including the collection of data on fish, aquatic macroinvertebrates, water chemistry, and habitat characteristics for over 20 years. These data are used in concert with data collected by other entities to help characterize conditions found throughout the state, and provide information on the possible stressors that impact the quality of Minnesota's waters. The objective of this report is to compare the differences between two biological monitoring datasets collected by the MPCA. The first set was collected by major drainage basin from 1996-2005 and the second set by major ecoregion from 2010-2011. Both sets of data utilized a probabilistic survey methodology to select sampling locations throughout the state of Minnesota. This type of survey can be used to extrapolate conditions to areas that have not been sampled. Probabilistic surveys are vital to make population estimates for large geographical areas, because sampling every lake, stream, or wetland would require an immense amount of time and money (Larsen, 1997).

The MPCA has collected stream data since 1996 using a probabilistic survey design originally developed by the Environmental Monitoring and Assessment Program (EMAP) of the U.S. Environmental Protection Agency (EPA) for the purpose of conducting national surveys. The MPCA also developed its own sampling protocols to adequately address the unique habitats and stream conditions found in Minnesota. The initial monitoring framework called for an assessment of Minnesota's 10 major basins to be sampled and assessed one at a time complemented with targeted poor and good sites to develop a dataset to be used for statewide Index of Biological Integrity (IBI) development. Monitoring started by sampling approximately 50 EMAP sites in the St. Croix River basin in 1996 (Niemela et al., 2004). Monitoring continued until all 10 basins had been sampled by 2005 (Table 1). A total of 435 sites were sampled across the state using this basin by basin approach (Figure 1).

In 2006, the MPCA piloted a new water quality monitoring strategy in the Snake River watershed in the St. Croix basin (<http://www.pca.state.mn.us/index.php/water/water-types-and-programs/surface-water/watershed-approach/index.html>); the new strategy focused on sampling all HUC 8 level watersheds in Minnesota over the course of 10 years, averaging about eight watersheds per year. The new Intensive Watershed Monitoring (IWM) strategy requires a high density of sampling for biology and conventional pollutants. To complement the IWM sampling strategy, the MPCA opted to use a framework based on Omernik ecoregion level II (Commission for Environmental Cooperation, 1997) for the 2010-2011 probabilistic survey, instead of the former basin by basin approach (Figure 1). This new framework provides an unbiased estimate of statewide condition, unbiased time trends, and a cheaper way to determine the extent of the presence of new and emerging chemicals. The level II ecoregions roughly divide the state into three regions: a northern region known as the Mixed Wood Shield (MWS); a central region known as the Mixed Wood Plains (MWP); and a southern region called the Temperate Prairies (TP). Each ecoregion has varying levels of human disturbance and encompasses different

primary land use practices, ecological structures, and geological composition (Table 2). The use of the new ecoregion-based survey began in 2010 and is scheduled to occur once every five years, with 150 sites statewide including 50 sites in each ecoregion.

This report characterizes the condition of rivers and streams in Minnesota utilizing the datasets collected from the two MPCA probabilistic surveys. The early survey conducted by the MPCA (1996 to 2005) organized by major basins was grouped into three ecoregions to provide an overall assessment for the state and for each ecoregion, comparable to the later ecoregion survey. The results from the two surveys were contrasted and compared, providing estimates of stream conditions and a preliminary indication of temporal changes for Minnesota's rivers and streams. Lastly, we examined the relationship between numerous in-stream and watershed level environmental variables and the condition of aquatic communities (i.e. fish and macroinvertebrates) in streams.

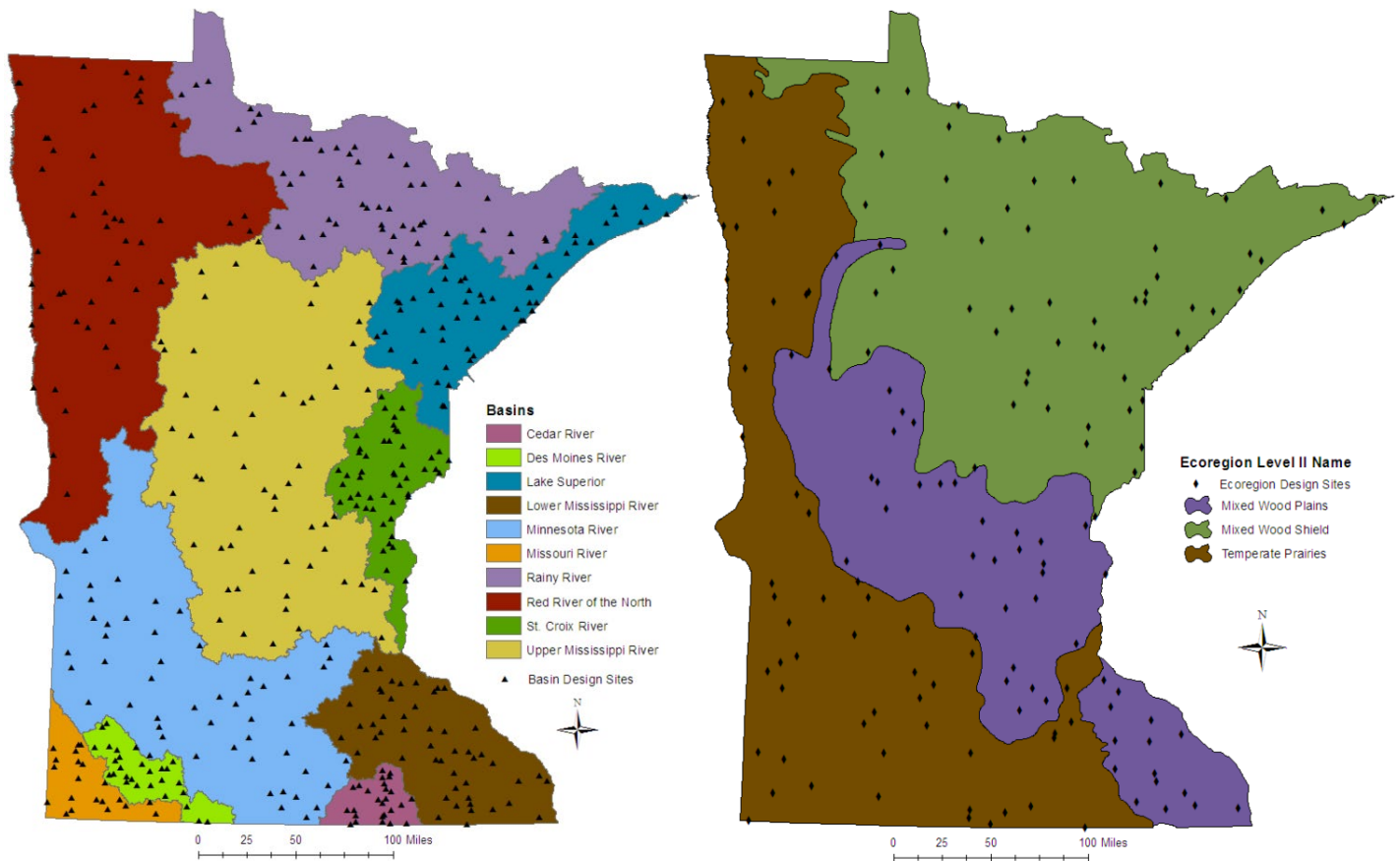


Figure 1. Site locations for the basin (left) and ecoregion (right) surveys

Table 1. Basins and number of sites sampled between 1996 and 2005

Basin	Years sampled	# of sites sampled
St. Croix River	1996,1998	46
Lake Superior	1997,1998	54
Upper Mississippi River	1999-2000	57
Minnesota River	2001	53
Cedar River	2004	26
Des Moines River	2004	27
Lower Mississippi River	2004	50
Missouri River	2004	21
Rainy River	2005	51
Red River	2005	50

Table 2. Ecoregion descriptions (Commission for Environmental Cooperation, 1997)

Ecoregion name	Description
Mixed Wood Shield (MWS)	Located in northeastern Minnesota and into Canada on Precambrian bedrock of the Canadian Shield. The exposed granitic bedrock is a remnant of the last glaciations that contributed to shallow, nutrient-poor soils and plentiful lakes and wetlands. This area is not dominated by agriculture, unlike the other two regions, because of the shallow nutrient poor soils.
Mixed Wood Plains (MWP)	Located in the center of the state and most southeast corner. The area contains deciduous and conifer forests and glacial deposits sediments with varying parent materials. There are fewer wetlands than in the MWS, but contains many lakes. This region includes more urban areas and dairy farming than either of the other two regions.
Temperate Prairies (TP)	Located in the southern and western parts of the state with flat topography and varied soil textures often high in calcium carbonate. Numerous small lakes are found in the southern part of this area, as well as a few remaining prairie pothole wetlands. Land use is strongly dominated by livestock and row crops because of the rich, productive soils.

Methods

Site selection

Potential site locations are selected using the National Hydrography Dataset (NHDplus) line work and a method of generalized random-tessellation stratification (GRTS) (Stevens & Olsen, 2004). The NHDplus lines are similar to a map of possible water-carrying channels such as rivers and streams. All lines in NHDplus are assigned a code that indicates channel type (e.g. natural, canal, ditch, pipeline, etc.). For these surveys, channels coded for pipelines and coastlines were excluded; all other channel types were included. Randomly selected sites are generated on the appropriate NHDplus linework using the GRTS. In order to be able to estimate conditions for an entire given area, all stream sizes need to be sampled in proportion to the frequency in which stream orders naturally occur. The GRTS allows for this stratification as well as maintaining spatial balance between generated points (Stevens, 2004). Surveys such as one done on the Mid-Atlantic Coastal Plain used the GRTS design along with calculated weights based on probabilities of a point being generated at a given location and the number of target sites to extrapolate population estimates from sampled sites (Ator et al., 2003). Similar studies in Wisconsin and Arizona have used the regional EMAP to conduct random surveys in streams to be able to assess biological, physical, and chemical conditions (Condon et al., 2007, and Miller et al., 2009).

Sites are visited sequentially off the list of generated site locations until the desired number of sampleable sites is reached. A sufficient number of overdraw sites are provided in anticipation that not all the sites on the list will prove to be sampleable. For a site to be considered sampleable it first must be "target", meaning it must be on a defined channel with water present in greater than 50% of the reach. Sites can be moved 30 meters or less in the channel to meet this sampling criterion. Commonly, sites are considered "non-target" due to discrepancies between NHDplus linework and the true channel location. Often the linework will be drawn through wetlands where there are no true stream channels or where what was once a channel has been moved.

Not all target sites are sampleable. Some common reasons why targeted sites cannot be sampled are because of landowner permission denial, the site is inaccessible, or it is unsafe to sample because of geological features such as waterfalls. Non-target and non-sampleable sites are replaced with the next available site on the potential site list until the number of sampled sites reaches the desirable sample number.

Sampling protocol

The four components of the field work were the collection of fish and aquatic macroinvertebrate community samples, habitat observations, and water chemistry analysis. Fish were sampled using electrofishing equipment of varying sizes (backpack, stream shocker, miniboom, or boom shocker) based on stream width and depth. Macroinvertebrates were collected with a D-net using a multi-habitat collection approach. Quantitative habitat data was collected using a transect-based approach with the use of tape measures and measurement rods (Simonson et al, 1994). Further habitat information was gathered using a qualitative survey developed by the MPCA - the Minnesota Stream Habitat Assessment (MSHA) which can be found at: <http://www.pca.state.mn.us/index.php/view-document.html?gid=6088> (Minnesota Pollution Control Agency, March 2007). Stream water chemistry was characterized with hand held meters following the manufacturer's recommendations for sampling and calibration. One time water chemistry grab samples were collected and lab analyzed for phosphorus, Total Suspended Solids (TSS), nitrogen (nitrite and nitrate), and total ammonia. Because water chemistry sampling is a one-time grab sample in these surveys, the data alone is not sufficient for use in performing Clean

Water Act waterbody assessments. However, when the entire dataset is evaluated and compared to the current standards/acceptable levels for each parameter, a snapshot of baseline water chemistry conditions on a broad scale (i.e. basin level and ecoregions) can be obtained. Further information and all standard operating procedures for these components can be found on the biological monitoring section of the MPCA website at: <http://www.pca.state.mn.us/index.php/water/water-monitoring-and-reporting/biological-monitoring/biological-monitoring-of-water-in-minnesota.html> (Minnesota Pollution Control Agency, July 2013).

The ecoregion based survey in 2010 included additional water chemistry parameters including pesticides and pharmaceuticals and personal care products to enhance understanding of the possible distribution of contaminants that are not currently monitored in the IWM framework. Pharmaceuticals and personal care products samples were processed by the Minnesota Department of Health. The agricultural herbicide and pesticide samples were collected in two ecoregions (i.e. the MWP and TP) that receive the most agricultural activity. The methods used to collect these samples can be found at <http://www.mda.state.mn.us/monitoring/>.

Threshold establishment

To interpret the results of the surveys, thresholds for each of the sampling parameters were based on both existing or proposed MPCA standards and criteria. Individual water chemistry values for each parameter (found in appendices 1 and 2) should not be considered a formal assessment of any particular site. In aggregation, the results do provide an understanding of the overall condition of the entire population of rivers and streams.

Index of biological integrity

Fish IBI (MPCA-2, 2013) and macroinvertebrate (MPCA-3, 2013) IBI scores were calculated for each site and compared to biological thresholds designed to protect aquatic life. The Minnesota IBI framework for fish and invertebrates classifies streams into 9 classes based on stream size, region, temperature and gradient (Table 2). Impairment thresholds (MPCA-1, 2013) were used to distinguish sites that support aquatic life from those that are potentially impaired for aquatic life use. In addition to the waterbody classification distinctions, tiered uses based on each stream's potential to support biological communities were used following the Tiered Aquatic Life Use (TALU) concepts described by the EPA (USEPA, 2005) which are still in development at the MPCA. In the TALU framework streams can be categorized as "modified" if they have limited habitat due to channelization. All IBI scores for sites on a channelized stream were compared to the modified threshold in Table 3; if the stream was natural the IBI scores were compared to the general thresholds.

Table 3. Fish and invertebrate IBI thresholds, general thresholds are applied to natural streams; modified thresholds are only applied when streams are ditched or channelized

Group	Class	Class Name	General	Modified	
Fish	1	Southern Rivers	39		
	2	Southern Streams	45	34	
	3	Southern Headwaters	51	44	
	4	Northern Rivers	35		
	5	Northern Streams	50	34	
	6	Northern Headwaters	40	25	
	7	Low Gradient Streams	40	15	
	10	Southern Coldwater	45		
	11	Northern Coldwater	37		
	Invertebrates	1	Northern Forest Rivers	51	
		2	Prairie Forest Rivers	31	
3		Northern Forest Streams RR	50		
4		Northern Forest Streams GP	52	42	
5		Southern Streams RR	36	27	
6		Southern Forest Streams GP	47	34	
7		Prairie Streams GP	38	28	
8		Northern Coldwater	26		
9		Southern Coldwater	46		

Water chemistry

The criteria used to evaluate TSS concentrations were derived from the regional water quality criteria for TSS mg/L draft report (Markus, 2011). Similar to the methods used for phosphorus, the northern and southern draft standards were used to create the acceptable range of TSS as seen in Table 4. The north region has lower average concentrations of TSS due to the more minimal impact from human development than in the south, thus the north is used as the threshold between Good and Fair, and the southern threshold is used to define the difference between Fair and Poor.

The criteria used to evaluate nitrogen concentrations were taken from the draft Aquatic Life Water Quality Standards Technical Support Documents for Nitrate Triennial Water Quality Standard Amendments (Monson, 2011). The divisions between good and poor nitrogen concentrations are a draft cold water chronic value of 3.1 mg/L and a draft warm water value of 4.9 mg/L, both based on a four-day duration. Streams with a nitrogen concentration higher than the designated value were given a rating of Poor while concentrations lower than the designated values were classified as Good.

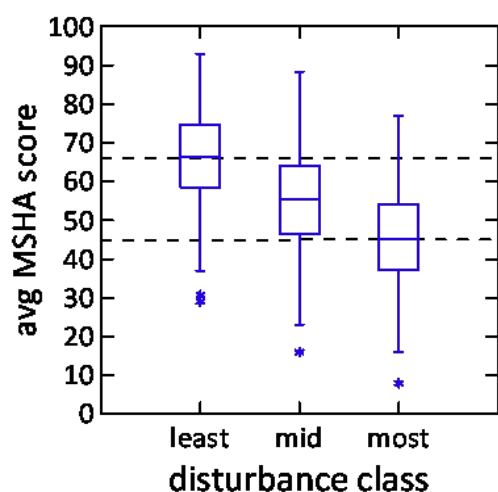
The criteria used to evaluate phosphorus concentrations are from the draft Minnesota Nutrient Criteria Development for Rivers (Heiskary, 2010). Values for these draft standards were developed to protect streams from eutrophication, as well as for the protection of downstream water bodies, such as lakes and larger rivers. Good, Fair, and Poor thresholds for phosphorus were derived using the draft standards (Table 3). Sites meeting the proposed standard for northern streams were considered Good and sites that did not meet the proposed standard for southern streams were considered Poor. Sites between the two proposed standards were given a Fair rating.

Table 4. Draft values used to determine general water quality conditions (All values are mg/L)

	Good	Fair	Poor
TSS	<15	15-65	>65
Phosphorus	< 0.055	0.055 - 0.150	> 0.150
Nitrogen Warm Water	≤ 4.9	----	> 4.9
Nitrogen Cold Water 2A	≤ 3.1	----	> 3.1

Habitat

Land use percentages were calculated with Geographic Information System (GIS) land use and watershed area layers. Sinuosity and gradient were calculated using GIS and available topographic maps and areal imagery. Qualitative habitat data were collected and scored according to procedures in the Minnesota Pollution Control Agency's MSHA methods (<http://www.pca.state.mn.us/index.php/view-document.html?gid=6088>).



Good, Fair, or Poor thresholds for the qualitative habitat assessment were developed by examining MSHA scores at three levels of disturbance. Disturbance levels were quantified using a watershed disturbance index known as the Human Disturbance Score (HDS) developed by the MPCA (Minnesota Pollution Control Agency July 19, 2013). Over 1,700 sites across the state were used to set the criteria. MSHA values above the median of least disturbed sites were considered Good, MSHA values below the median for most disturbed sites were considered Poor, and values falling in between these thresholds were considered Fair.

Figure 2. Box plot of MSHA scores - Good= > 66 - Fair - < 45 = Poor

Statistical methods

The statistical programs "R" (R Development Core Team, 2008) and "spsurvey" (Kincaid, 2012) were used to determine the percentages of stream miles for both categorical and continuous variables. The categorical variables were summarized either as a percent or total number of stream miles (condition estimates), using pie charts to visually depict the results. Change analysis was conducted to calculate the confidence intervals and the standard deviation to then use a two tailed Z-test to test for significant difference between the categorical data. Cumulative distribution functions (CDFs) and percentile estimation were used to summarize the results of the quantitative variables. Line graphs with associated confidence limits were created to estimate conditions within the state and in each ecoregion. The various methods used can be found in Table 5.

CDFs were compared directly using the mean Eigen value corrected CDF test. This test makes use of the full range of values to test for significance differences between the CDFs. Further analyses were done to examine biological responses to chemical or physical factors, such as nutrient levels and MSHA scores. CDF tests once again were used to identify where significant differences occurred between sites that meet and did not meet their designated thresholds. Additionally, condition probability analyses (CPAs) were utilized to calculate the probability of meeting biological thresholds given a specific condition, (e.g.

the probability of attaining a passing IBI score, if the habitat score is greater than or equal to a given value). The CPA graphs in this study are depicted as line graphs with the variable of interest (i.e. habitat, water chemistry, land use, etc.) on the X-axis and the probability of meeting the IBI thresholds for fish and macroinvertebrates on the Y-axis.

Table 5. Statistical analysis done

	Data type	Info derived	Package used
Condition estimation	Categorical	Estimates stream miles, total estimated percentage of stream miles, and 95% confidence intervals for all categorical data.	sp survey
Change analysis	Categorical	Calculates the confidence intervals and standard error for the condition estimates to be used to calculate p-values with a two tailed z-test	sp-survey
Percentile estimation	Quantitative	Calculates the 5, 10, 25, 50, 75, 90, and 95 percentiles. In addition to calculating the mean, variance, standard deviation, and 95% confidence limits for each variable.	sp survey
CDF estimation	Quantitative	Gives the estimated number of stream miles for everything less than or equal to variable value listed. The tabular form of the GDF graphs.	sp survey
CDF graphs	Quantitative	Depict the value of stream metrics and the percent of stream miles that include all values equal to or less than that variable, along with the 95% confidence intervals	sp survey
CDF tests	Quantitative	CDF comparisons between two sub-populations or geographic regions, based on a set parameters or indicators. Provide a Mean Eigen value and a p value to test for significant differences based on the data range.	sp survey
Conditional Probability Analysis	Quantitative	Determines the probability of meeting satisfactory IBI scores if X is equal to, greater than, or less than a given value for a given parameter	CADStat, JGR

Results

Due to the large number of variables studied during the survey this section depicts only a few of the variables tested. The full lists are in tables in Appendix 1 and 2. Variables that are displayed here were chosen for their ability to adequately summarize conditions.

Condition estimations

Site conditions

The categorical variables analyzed indicate both differences and similarities between the makeup and results of the two surveys. Graphs presenting the results are broken down to show the estimated conditions in percentages of stream miles for both the three ecoregions and as a general statewide view. Graphs such as stream order and site status illustrate the results from the EMAP site selection process itself. For example, stream order is a factor in site selection, and site status is an indication of the accuracy of the NHD linework from which the sites were selected. Thresholds described above were used for some variables to depict an estimated percentage of stream miles that either meet or do not meet the aforementioned criteria. Other graphs such as channel condition depict general estimated conditions.

Overall, 50 to 60% of original sites generated using the GRTS design were considered target sites (Figure 2). Non-target sites occur when the generated point falls on a location that is either not a stream or the stream channel does not contain sufficient amounts of water (i.e. water must be in at least 50% of the reach). In both the basin and ecoregion surveys, the top reasons for non-target sites is attributed to sites being located in wetlands, followed by sites falling in areas where no waterbody is present. In Figure 3 the TP charts depict a difference in the percentages of non-target sites between the surveys. This difference was found to be significant, but it may be due to the difference in flow regimes and or the accuracy of that region within the NHDs linework.

Site Status

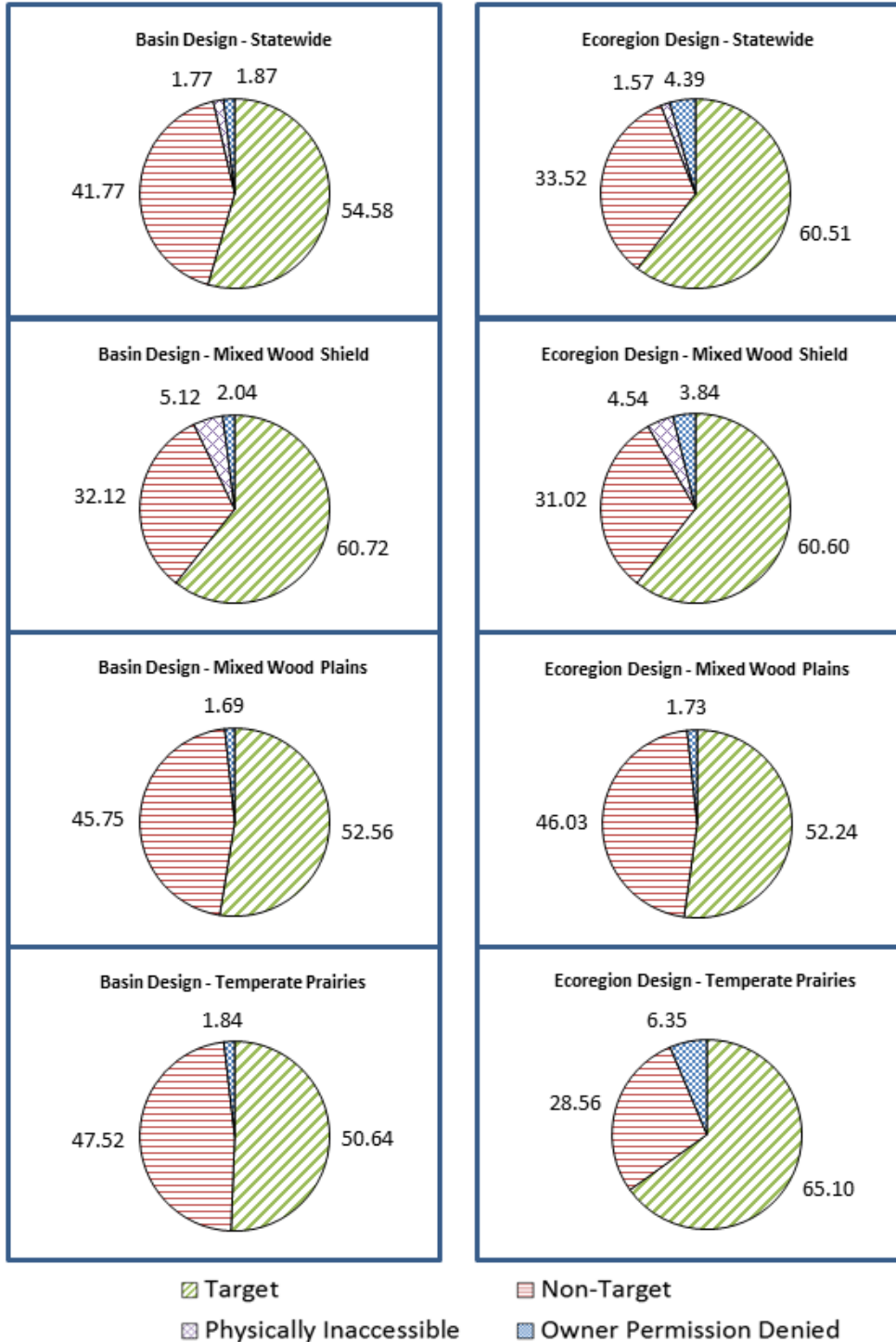


Figure 3. Site status, estimated percent of stream miles for the basin and ecoregion

The target sites are stratified by stream order (i.e. 1, 2, 3, and 4+), to ensure enough larger streams would be sampled. First order streams are the most plentiful in any watershed, so it is expected that all graphs in Figure 4 should show that first order streams have highest percentage of stream miles. The two surveys are very similar among both the statewide and ecoregion percentages.

Stream Order



Figure 4. Stream order, estimated percent of stream miles

The MSHA scores summarize and integrate many stream habitat variables, such as substrate types and riparian conditions. Generally the better the habitat for fish and aquatic macroinvertebrates, the better the MSHA score. For example, sites with many substrate types and a high degree of channel morphology (riffle, run, pool), score better than sites with more homogenous features. Sites are categorized as Good, Fair, Poor, or Not Assessed (Figure 4). Sites that were not assessed were generally in large rivers where habitat data was not collected prior to 2008.

Generally speaking, habitat scores were fairly similar between time periods. Both samples indicate that about 20% of streams have good, diverse habitat, about 30% of streams have habitat that does not meet expectations, and the rest fall somewhere in between. As expected, the more northern streams in the MWS ecoregion have better habitat characteristics than the other ecoregions. The TP ecoregion has the highest percentage of poorly scoring streams, ranging from 50 to 57%. Streams in this region have finer substrates, their riparian zones are narrower, and fish cover is relatively sparse in contrast to streams in northern Minnesota. Some of the loss of habitat can be explained by the relatively high percentage of streams that have been channelized or ditched in the TP ecoregion.

Ditching is a common practice in areas where soil has a low drainage capacity, and is often used by agricultural producers to extend growing seasons. In Figure 5, this is illustrated in both surveys with ecoregions having higher agricultural land use also having higher percentages of channelized stream miles. The percentage of channelized streams in northern Minnesota is somewhat more surprising. Although agriculture is not a dominant land use in northern Minnesota, between 12 and 18% of the streams have still been channelized. A large percent of the ditching in northern Minnesota occurred around the 1900s when agriculture started to take root in this area. The efforts to drain the land were largely unsuccessful as the vast amounts of wetlands, shorter growing seasons, and thin topsoil made crop farming impractical. Recovery of these historically channelized streams has been slow as they still display the poor habitat characteristics that are indicative of their more agricultural counterparts in the south and west.

The statewide and ecoregion estimates indicate that the percentage of channelized streams is different between the two surveys. Statewide there is a about a 10% difference that was tested as significantly different using the two-tailed Z-test. The largest difference in the ecoregions occurred in the Temperate Prairies with close to a 10% rise in channelized streams leaving only 34.5% of stream channels to be considered natural within that ecoregion, this difference was not significant.

MSHA Ratings

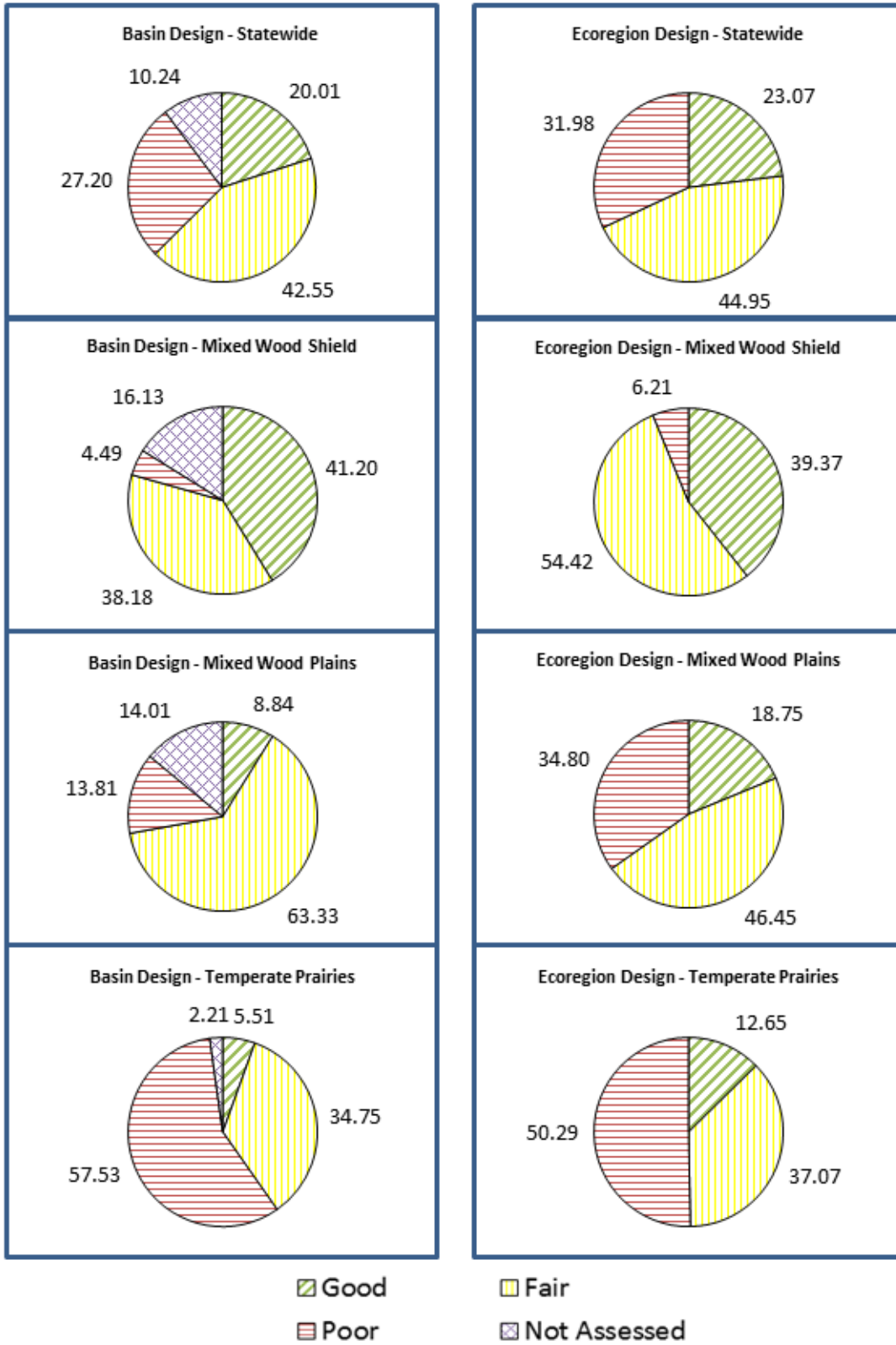


Figure 5. MSHA, estimated percentage of stream miles

Channel Condition

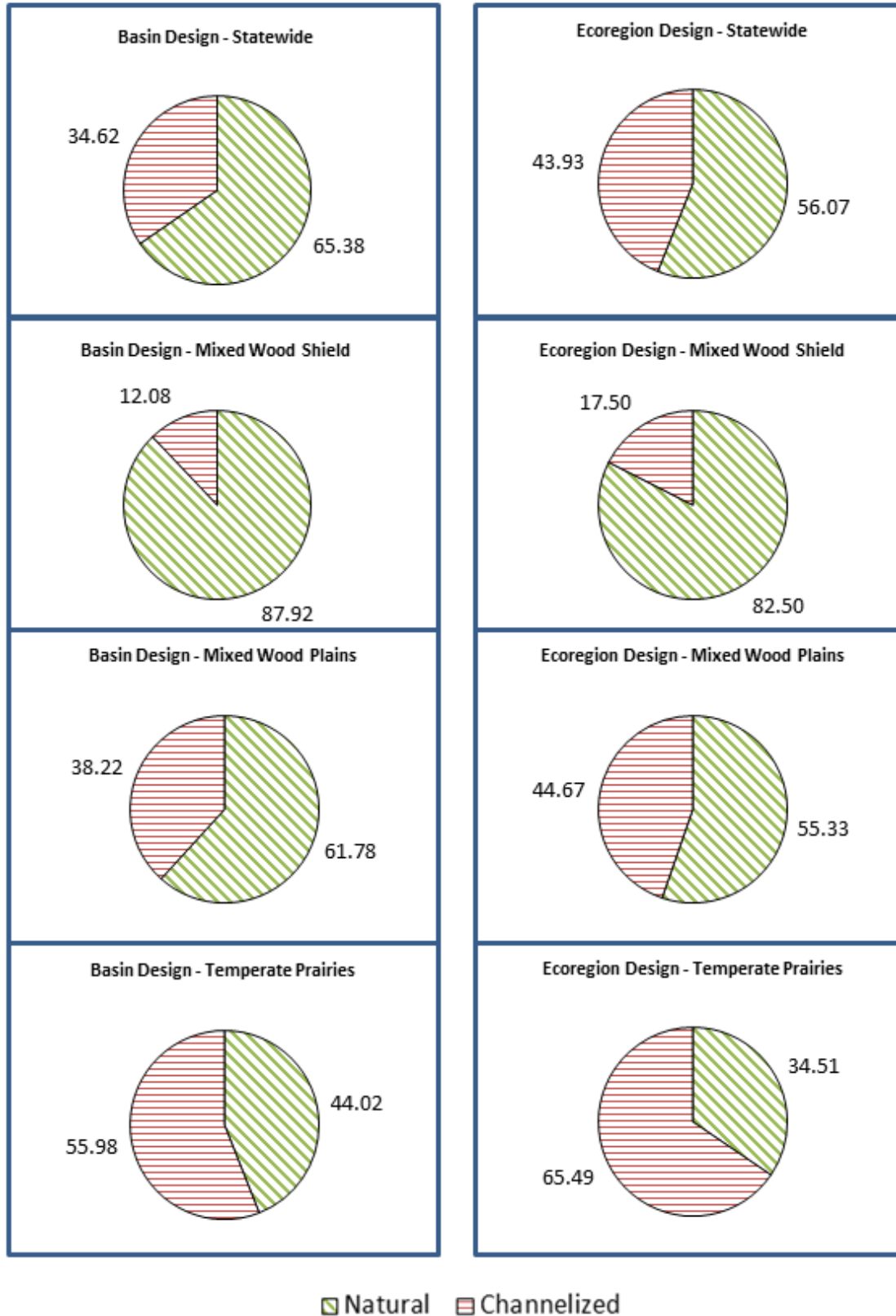


Figure 6. Channel condition estimated percentage of stream miles

Water chemistry

All water chemistry samples collected during these surveys represent one-time grab samples taken during base flow conditions. Therefore, the estimates do not represent the more extreme values that may be found during high runoff events. In addition, nutrient and TSS values can be attributed to both natural geological and anthropogenic differences so it is necessary to calibrate our expectations for these parameters for different ecoregions of the state. For these parameters, the criteria used to define the thresholds for Good, Fair, and Poor were derived from an analysis of ecoregion data to ensure that the estimates take into account natural regional variation due to soil type, topography, etc.

Total suspended solids (TSS) originate from sediments being uplifted and moved within the channel, from overland flow, and from bank instability causing sloughing and mass sediment wasting. Poor TSS values were found in about 10% of streams in the MWP and TP ecoregions in the earlier basin level survey. The ecoregion survey all around had higher estimates for stream rated good. In all but the MWS these differences were significantly different (Figure 6).

Phosphorus and nitrogen levels provide an indication of the amount of nutrients that are entering into the stream system. The statewide and ecoregion patterns observed in the estimates for nitrogen and phosphorus coincide with expectations for these parameters (Figure 7, Figure 8). Nutrient values in northern streams are typically rated as Good. However, progressing southward up to nearly 50% of streams have nutrient levels that are considered Poor. The MWS chart depicts a difference in estimated conditions with higher estimates under the Fair category and few Good estimates for phosphorus. With Fair levels at 36% of the sites in the earlier survey and 54% Fair in the later survey, when tested these differences were found to be significant for both Fair and Good estimates. Overall, in the later ecoregion survey for phosphorus there are fewer streams rated as Good and more sites rated as Poor than in the earlier basin survey.

TSS rating

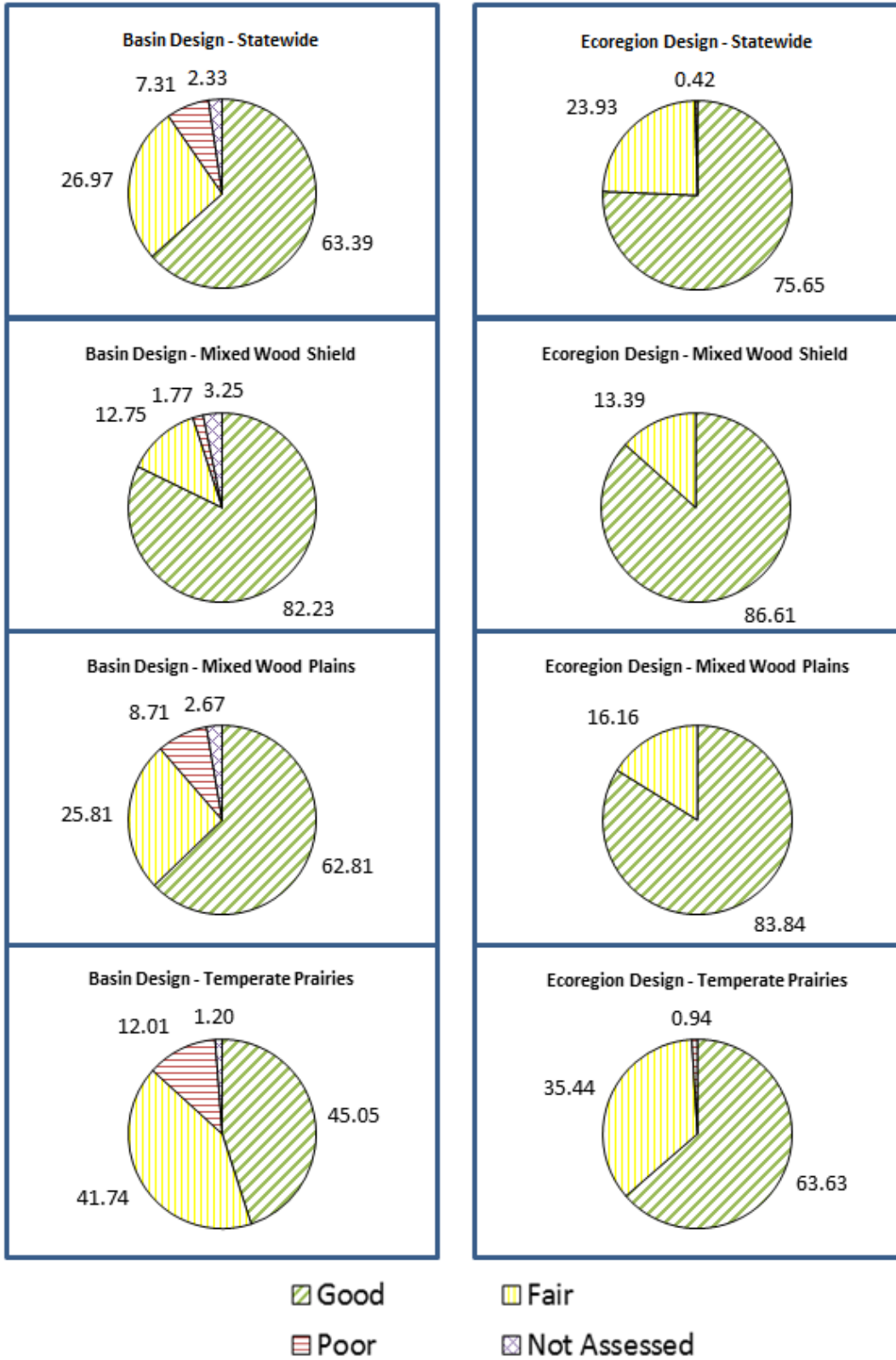


Figure 7. Total suspended solids estimated percentage of stream miles

Nitrogen Ratings

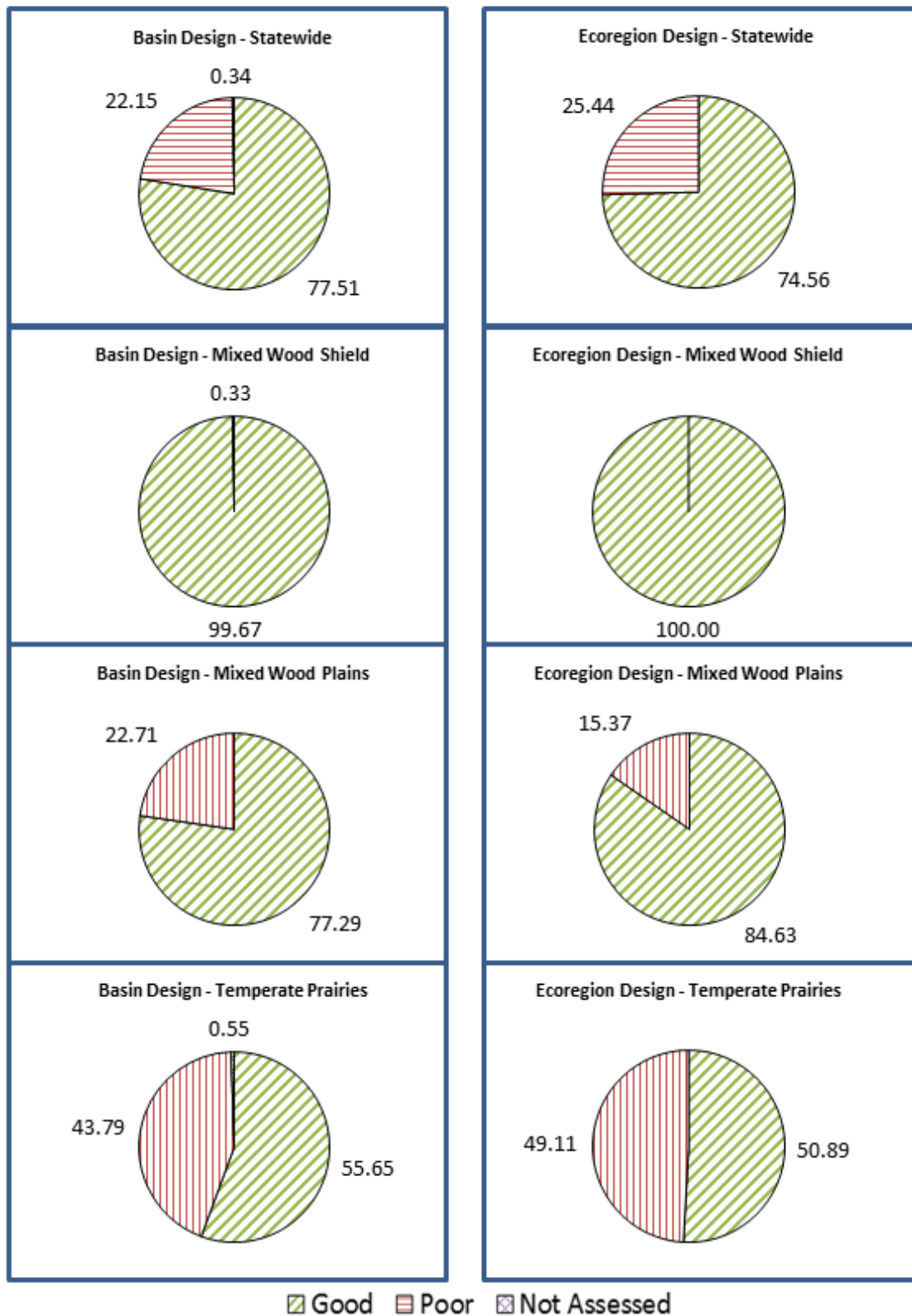


Figure 8. Nitrogen estimated percentage of stream miles

Phosphorus Ratings

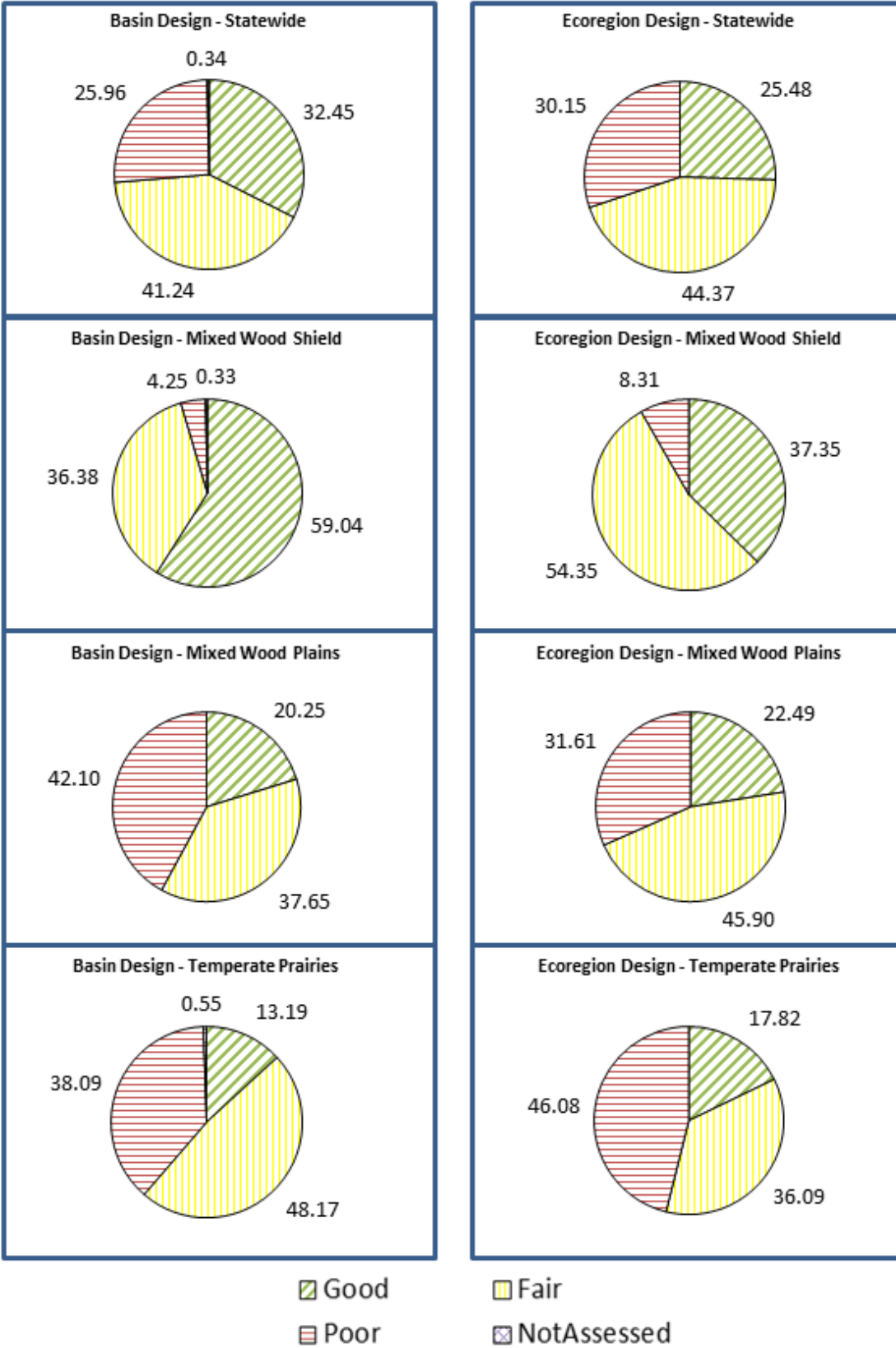


Figure 9. Phosphorus estimated percentage of stream miles

Biological

The statewide estimates indicate that the fish communities meet or exceed the criteria and are considered healthy about 33 to 38% of the time (Figure 9). The percentages of stream miles with healthy fish communities were higher in the later ecoregion survey in every ecoregion and statewide. The MWS had the highest estimated miles meeting expectations with 41 to 54%. Only about 31 to 40% of streams in the MWP met or exceeded the criteria, followed by the TP with 24%. The percentage of stream miles that met macroinvertebrate expectations statewide was around 33 to 35% with decreasing percentages from north to the south (Figure 10). The percentage of statewide stream miles with healthy invertebrate communities was lower in the later ecoregion survey, with a substantial decline in healthy communities in the MWS ecoregion.

Taken together, only 20 to 25% of stream miles met both fish and macroinvertebrate expectations (Figure 11). However, a large percentage of sites could not be assessed using both biological indicators because at least one of the indicators was not sampled. In most of these cases, the macroinvertebrate information was missing because the sampling sites at the time of sampling (August-September) were either dry or stagnant. Ecoregion differences follow the same north-south pattern of better to worse that is common to most other parameters. In general, the percentages of stream miles meeting both biological expectations improved slightly statewide and substantially for the MWP and TP ecoregions between the two surveys. For the MWS ecoregion the percentage meeting expectations for both bioindicators dropped from 40% to 34%. The percentage of MWS streams not meeting expectations increased from 37% to 54%.

Fish IBI Ratings

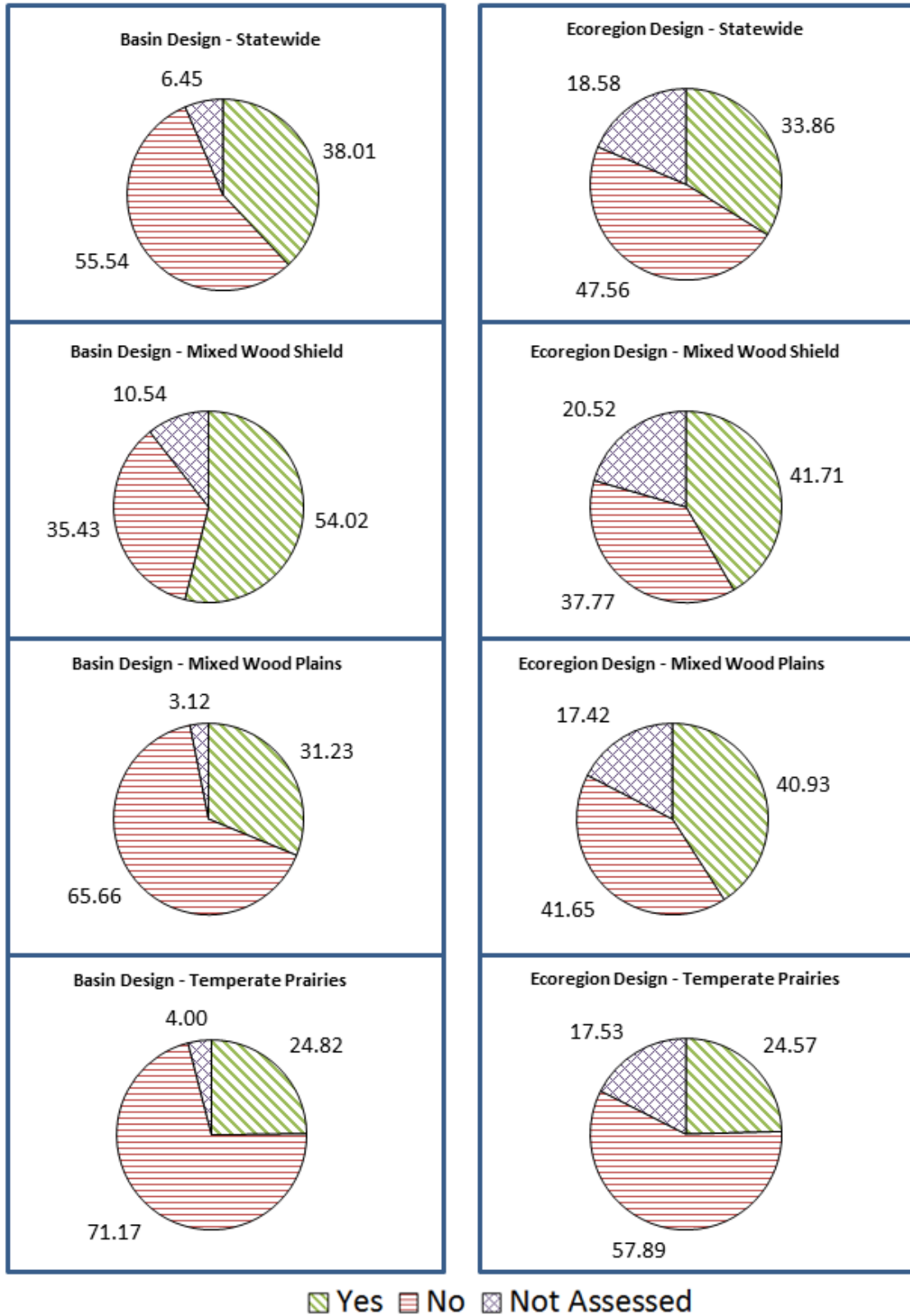


Figure 10. Estimated percentage of stream miles that meet fish IBI thresholds

Macroinvertebrate IBI Ratings

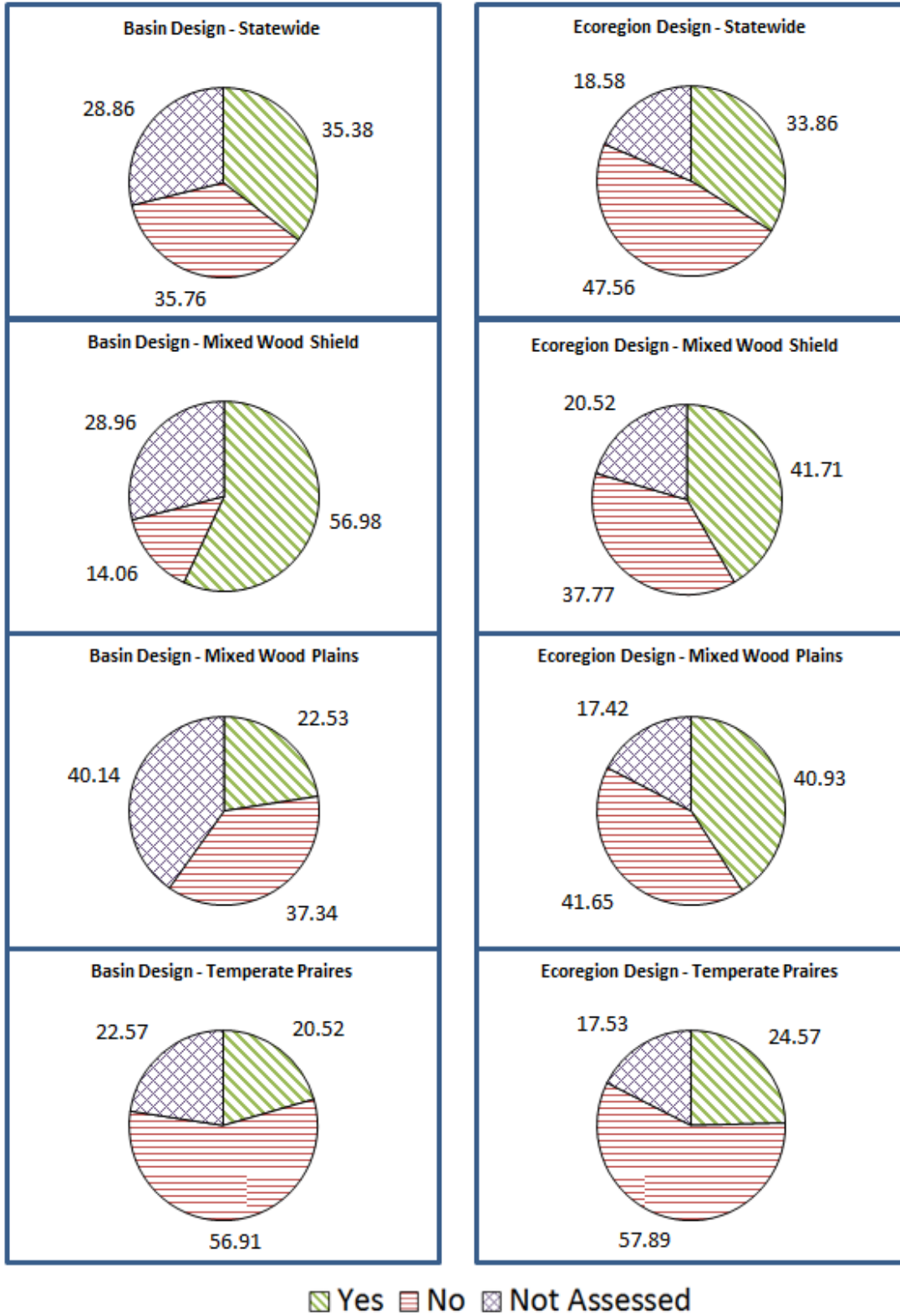


Figure 11. Estimated percentage of stream miles that meet macroinvertebrate IBI thresholds

Combined Fish and Macroinvertebrate IBI Ratings



Figure 12. Estimated percentage of stream miles that meet both fish and macroinvertebrate IBI thresholds at a single site

Cumulative distribution functions

Cumulative distribution functions (CDFs) describe the cumulative percentage of stream miles for the variables described below. CDFs were used to summarize the results of the quantitative variables, and to identify where significant differences occurred between sites that met and did not meet their designated thresholds. CDFs for each ecoregion are presented on the same graph to compare ecoregion variation for each parameter. Differences between CDFs are considered significant when the confidence interval lines do not overlap. Due to the larger sample sizes, the basin design graphs have smaller confidence intervals and therefore a greater ability to discern differences between ecoregions.

Minnesota habitat assessment

MSHA scores are qualitatively assigned in the field to evaluate stream habitat conditions; as scores increase sites are thought to support more robust biological communities. The MSHA CDFs for each ecoregion indicate clear differences in habitat between each ecoregion, particularly for the MWS ecoregion which is significantly shifted to the right indicating that a greater percentage of sites have high MSHA scores (Figure 12). The habitat is considered poor if the MSHA score falls below 45. Approximately 55% of TP streams had a score below 45, while only 15% of MWP and less than 5% within the MWS did. This is comparable to the condition estimates presented in the previous section (Figure 5).

Where the MSHA score is an indicator of in-stream habitat conditions, the percent disturbance measure indicates the degree to which humans have altered the landscape within the upstream watershed of each sampling site. CDFs shifted to the right indicate that the watershed disturbance is higher. The CDF graphs indicate that watershed disturbance varies dramatically by ecoregion. As shown in Figure 13, 95% of streams in the TP have over 50% disturbance in their watershed, contrasting sharply with the MWP and MWS ecoregions at about 20% and 5% respectively. The two graphs between the surveys are similar because the land use data used to calculate percent disturbance did not change between time periods; the largest difference is in the size of the confidence intervals.

Human disturbance score

The human disturbance score or HDS is a measure of anthropogenic impacts at the site as well as within the upstream watershed of each site. It is similar to the MSHA in that it describes riparian conditions, but it also takes it into account watershed characteristics similar to the percent disturbance score. As HDS increases, the overall conditions at the sampling site and within the watershed are also likely to increase. As shown in figure 15 the MWS has generally higher HDS with only 5% of stream miles estimated to score below 55. This percentage is much lower than either the MWP at 70% or TP with 90-95% indicating that most of the stream miles do not have an HDS above 55. Like the MSHA and percent watershed disturbance CDFs, the ecoregion HDS CDFs are significantly different from one another. These differences again show a gradient within Minnesota where conditions are best in the northeast and become more disturbed moving southwest.

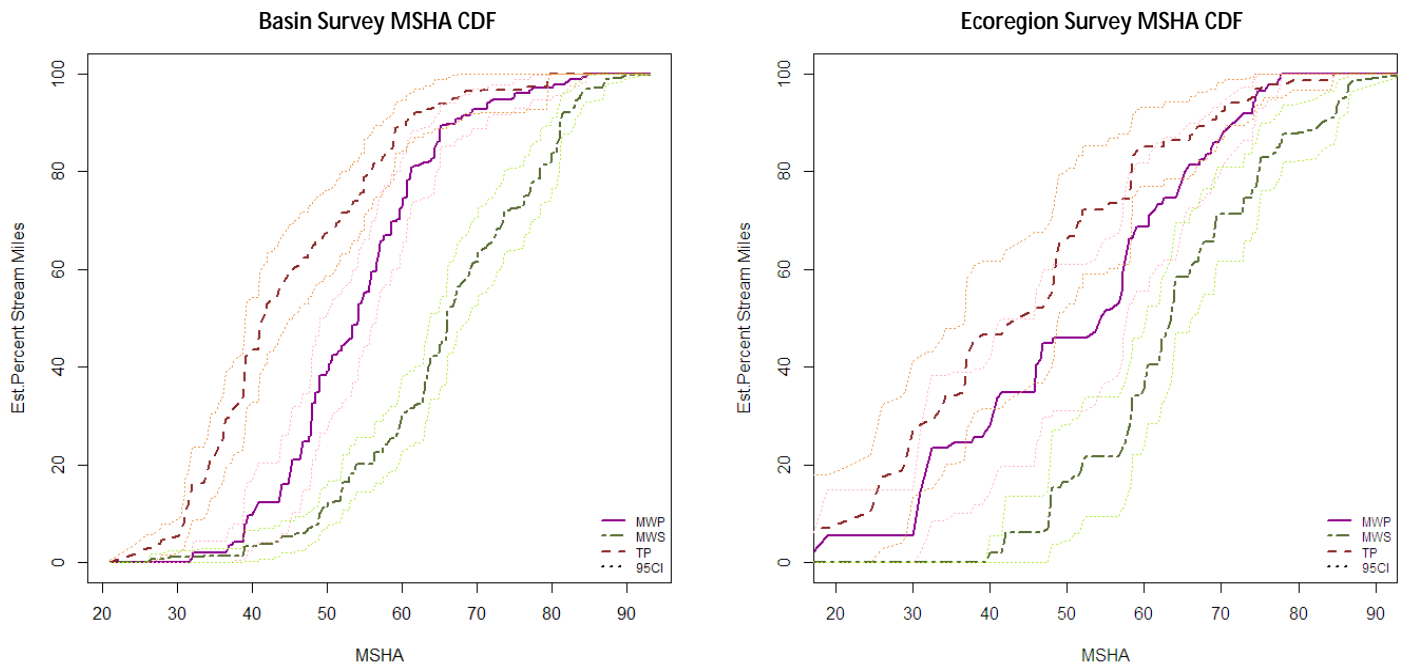


Figure 13. MSHA score, estimated percent of stream miles with MSHA values that are equal to, or greater than a given value

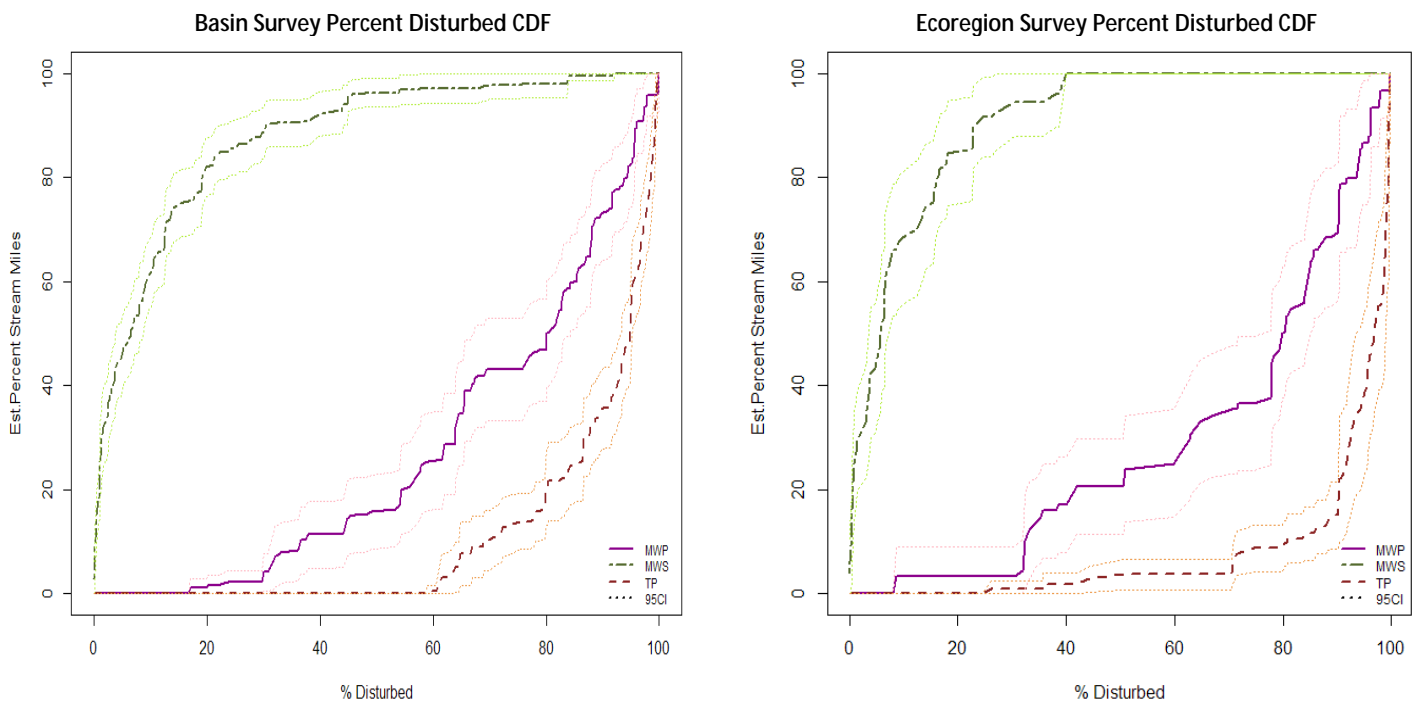


Figure 14. Percent disturbance within site reach watershed, estimated percent of stream miles with disturbance percentage equal to, or greater than a given value

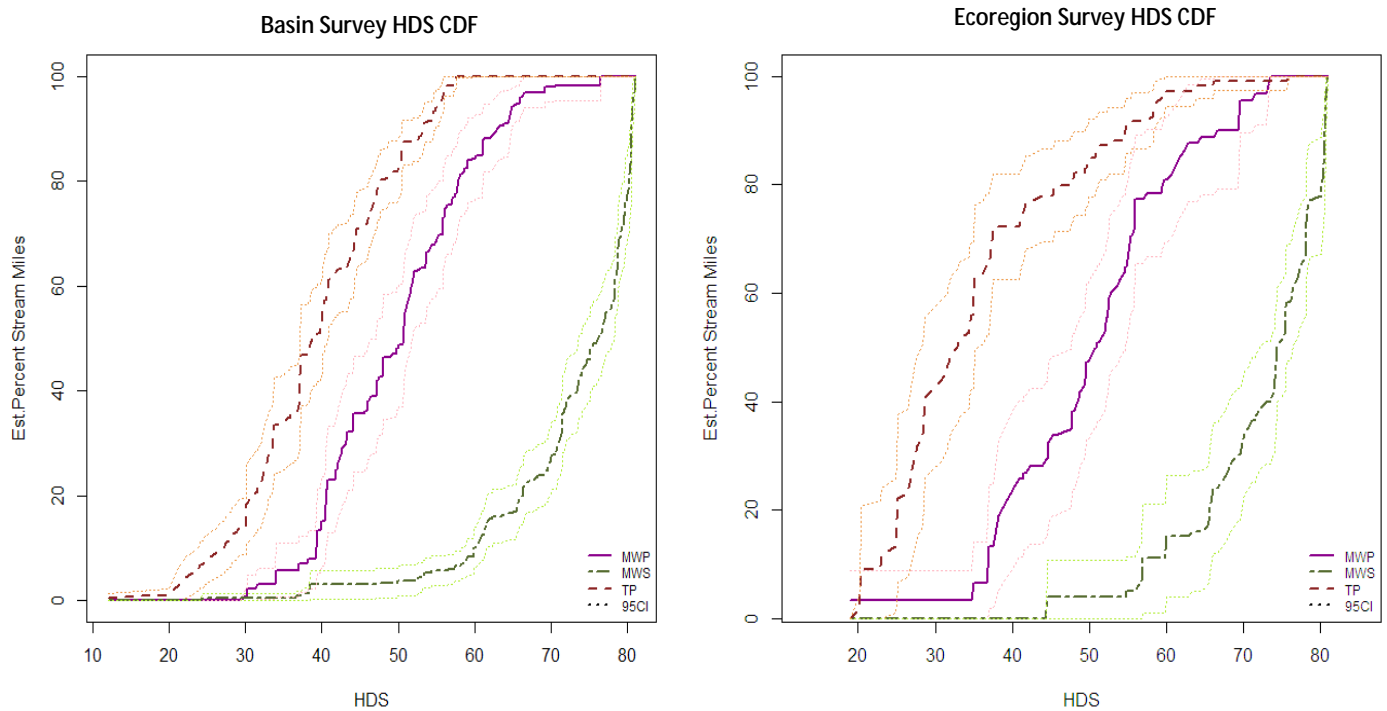


Figure 15. Human disturbance score, estimated percent of stream miles with human disturbance values equal to, or greater than a given value

Watershed land use

The two main categories of watershed disturbance are agriculture and urbanization. Within these broad categories of disturbance are many potential stressors to water resources such as impervious surfaces, artificial drainage, and riparian loss.

The CDF graphs indicate that agriculture in general has much more of a widespread influence on the watersheds of the state's streams. The TP ecoregion is dominated by agricultural land use. Nearly 50% of stream miles have watersheds with over 80% agricultural land use (Figure 16). This is in contrast with the MWS ecoregion where nearly 100% of stream miles have under 50% agricultural land use in their watersheds.

Urban land use on the other hand is not predominant in any of the ecoregions as a whole, with most watersheds having less than 10% urban area. The CDFs for the MWP and TP ecoregions not only have crossing confidence intervals, the CDF lines also run close and cross one another indicating that the percentage of urban land use are similar between the two ecoregions. Urban land use in Minnesota is heavily concentrated within the Twin Cities metropolitan area. The higher percentages of urban land use in the TP and MWP ecoregions are no doubt strongly influenced by the Twin Cities as the ecoregional divide splits this large area of urbanization. In contrast, few large cities exist in the MWS with the notable exception being the Duluth area. The MWS is the only one of the three regions that appears to be significantly different as it has the least amount of urban land use. Similar to the disturbance percentage graphs, both surveys used the same datasource to calculate agriculture and urban land use percentages.

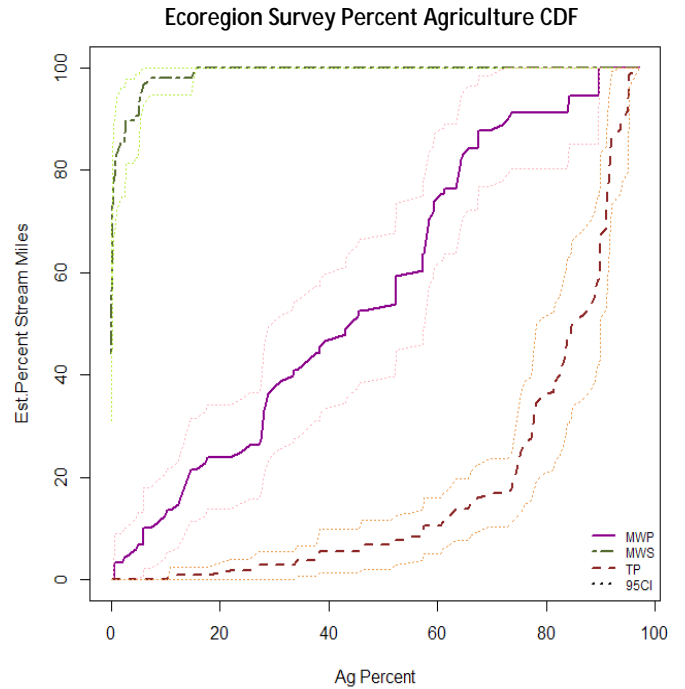
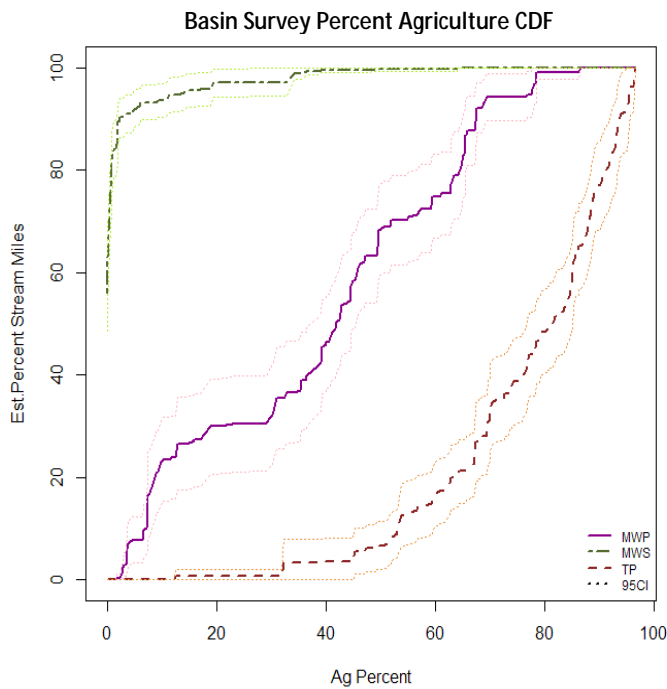


Figure 16. Percent agriculture land use in watershed, estimated percent of stream miles with percent agriculture land use values equal to, or greater than a given value

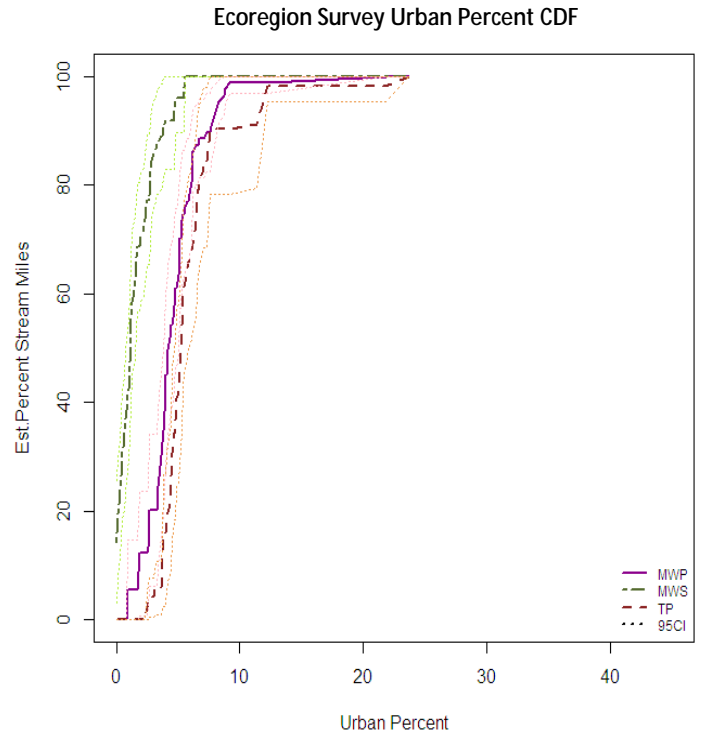
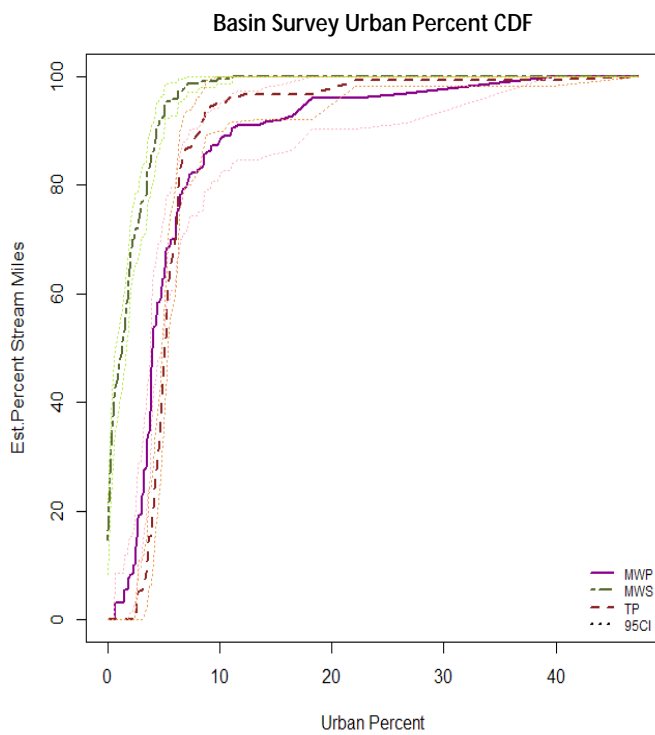


Figure 17. Percent urban land use in watershed, estimated percent of stream miles with percent urban land use values equal to, or greater than a given value

Water chemistry

Dissolved oxygen

Both low and high DO levels can be a good indicator of potential water quality problems. High DO levels can be a result of excess nutrients creating an overgrowth of vegetation. The excessive plant growth creates DO super-saturation during sunny hours of the day through the release of oxygen during photosynthesis. However, under these conditions oxygen levels can plummet once the sun sets and plants begin to respire, creating a stressful cycle of oxygen extremes for biota. Low DO levels can also be a result of decaying organic matter or high inputs of groundwater with naturally low levels of DO. Most sites studied fall between 5 and 10 mg/l (Figure 19) of DO. The three ecoregions are nearly indistinguishable from one another with similar values and overlapping confidence intervals, although there appears to be more variability in the ecoregion design with smaller sample size.

pH

Most stream miles in both the basin and ecoregion designs have pH readings between 7 and 8. The ecoregion design indicates that streams are slightly more alkaline with greater numbers of stream miles between 7.5 and 8.5. Both designs suggest that streams in the MWS are slightly more acidic, possibly an indication of the riparian wetland complexes within the ecoregion.

Conductivity

Natural conductivity levels in streams generally reflect the type of soils and land use in the stream's watershed. Conductivity varies among each ecoregion with the MWS having the lowest readings of the three regions and the TP having the highest average readings (Figure 19). In the TP ecoregion conductivity values rarely drop below 40 $\mu\text{mhos/cm}$ and over 15% of stream miles have values over 1000 $\mu\text{mhos/cm}$. In contrast, conductivity values in the MWS are often below 100 $\mu\text{mhos/cm}$ and are very rarely above 500 $\mu\text{mhos/cm}$.

Nitrogen

Levels of nitrogen in the MWS are between 0 mg/l and less than 1 mg/l with a mean concentration just above the detection limit of .5mg/l. The values for the MWP have mean value between 2.3 mg/l and 2.9 mg/l. The TP region has a mean concentration of 6.5 mg/l in the basin sample and 6.6 mg/l in the ecoregion sample, the highest values of both surveys. The draft threshold for nitrogen is 4.9 mg/L. About 50 to 55% of stream miles in the TP region would be meeting this threshold, depending on which survey is used. This agrees with the condition estimates which indicate that approximately 50 to 55% of streams in the TP region would meet the draft nitrogen standard.

Phosphorus

Phosphorus levels in the MWS are lower than in the other regions with less than 10% of stream miles estimated to have levels considered poor. In contrast, phosphorus levels are estimated to be poor in the MWP and TP regions in 30-45% of the stream miles respectively. The overlapping confidence intervals suggest that there is little to no discernible difference between the MWP and TP. There is more separation between the CDF lines for phosphorus levels in the MWP and TP in the ecoregion survey due to the smaller sample size but the confidence intervals still overlap. In contrast, the confidence intervals in for the MWS are often separated, suggesting that the MWS is significantly different than the other regions, particularly the TP.

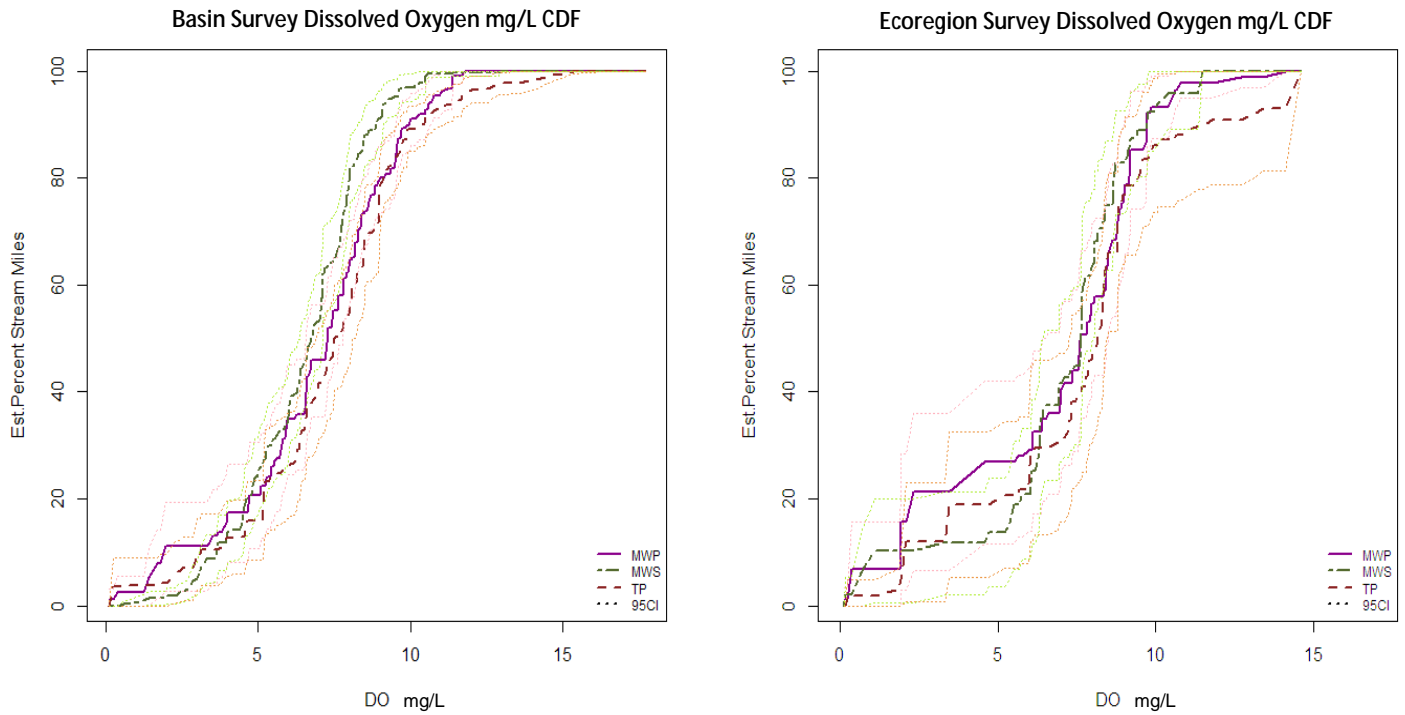


Figure 18. Dissolved oxygen concentrations, estimated percent of stream miles with dissolved oxygen concentrations equal to, or greater than a given concentrations

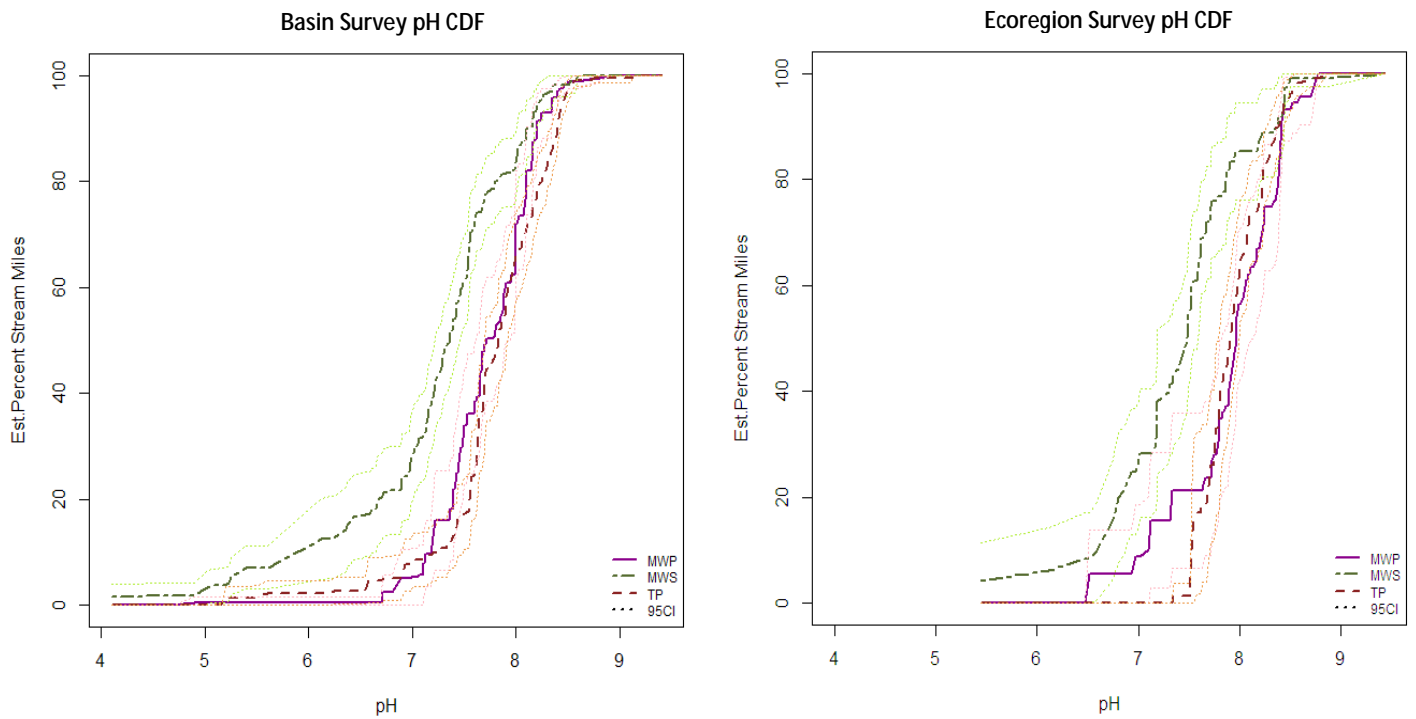


Figure 19. pH, estimated percent of stream miles with pH values equal to, or greater than a given value

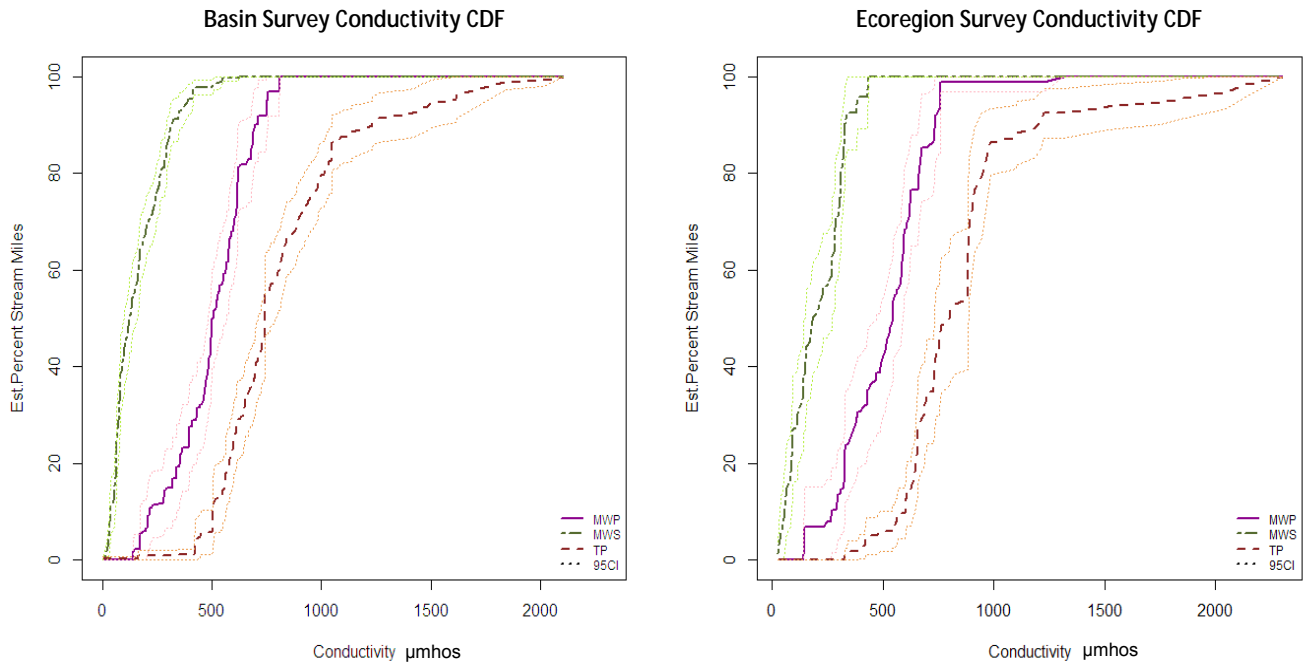


Figure 20. Conductivity, estimated percent of stream miles with conductivity values equal to, or greater than a given value

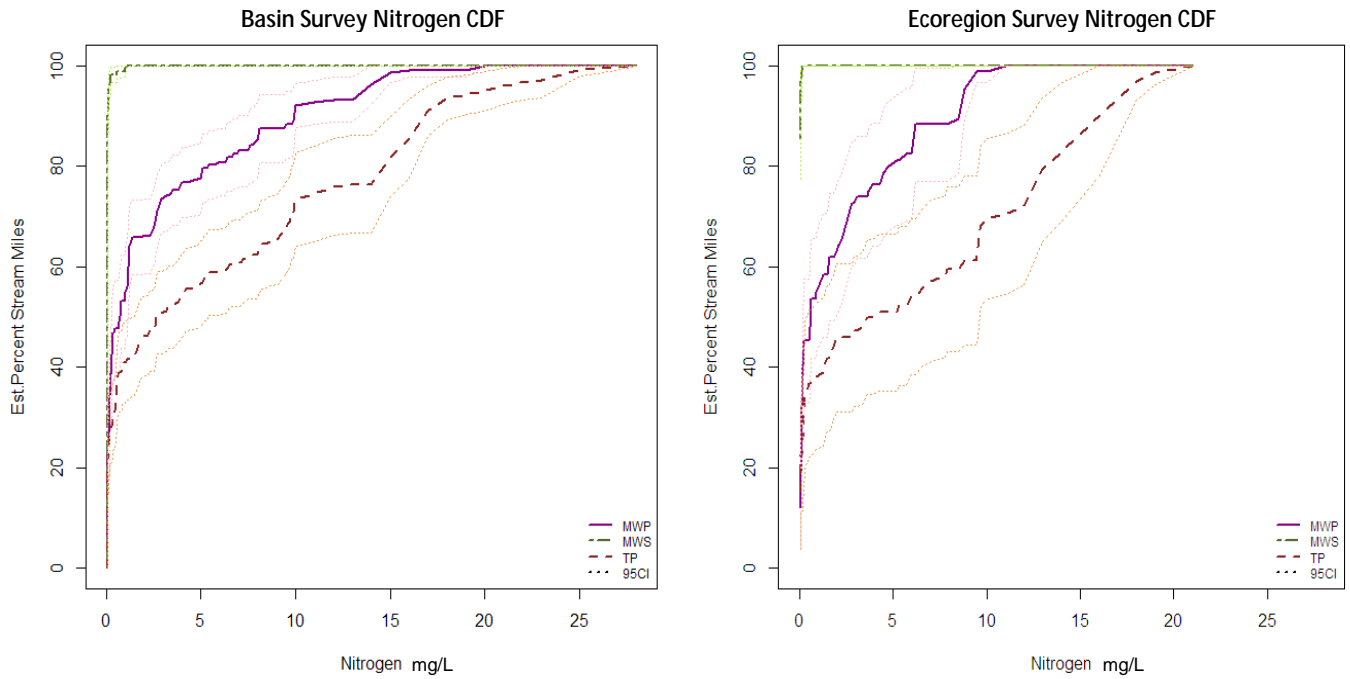


Figure 21. Nitrogen concentrations, estimated percent of stream miles with nitrogen concentrations equal to, or greater than a given concentration

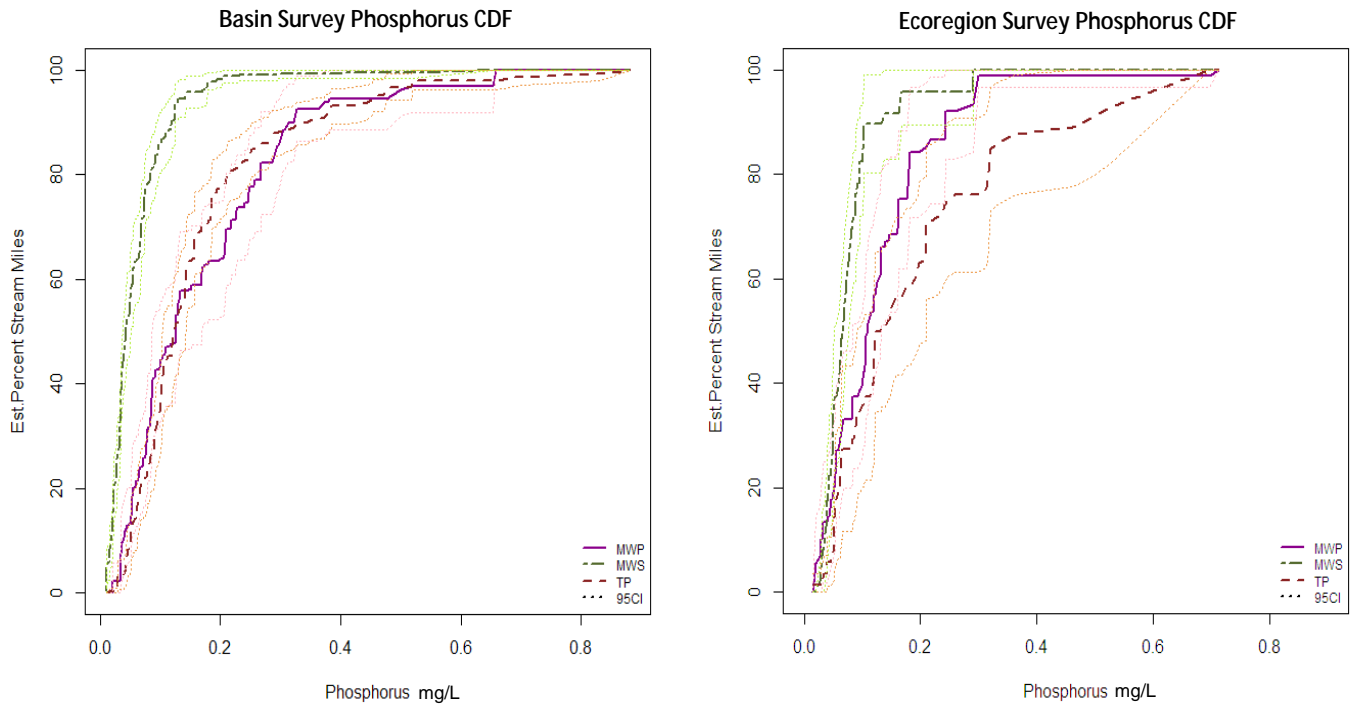


Figure 22. Phosphorus concentrations, estimated percent of stream miles with phosphorus concentration equal to, or greater than a given concentration

Biological

The number of tolerant fish and macroinvertebrate species is influenced by the quality of water and habitat conditions. As conditions degrade the percentage of tolerant species will generally increase as they are better adapted to survive a range of conditions. Both basin and ecoregion results suggest that there is a greater chance of seeing tolerant fish and macroinvertebrate species in the TP ecoregion. In contrast to the IBI score, the numbers of tolerant species in the MWS and MWP ecoregions are nearly indistinguishable from one another, particularly for the macroinvertebrates.

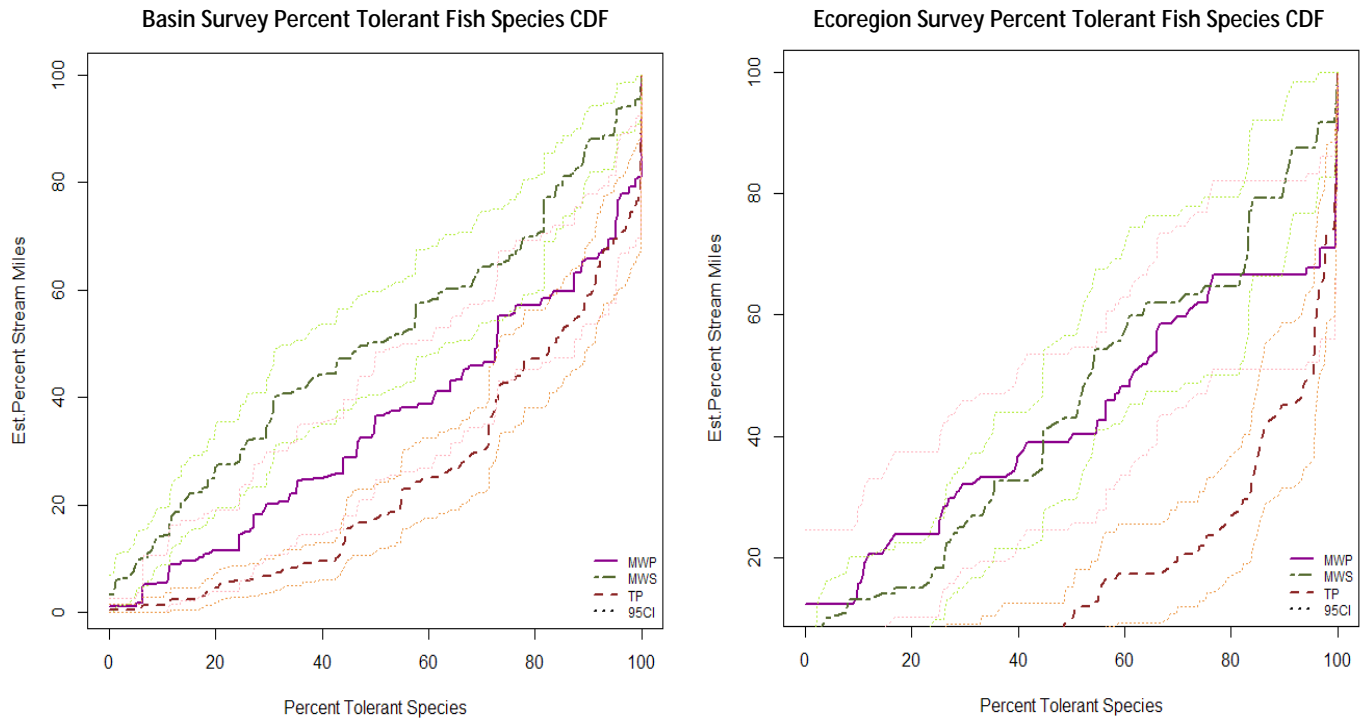


Figure 23. Percent tolerant fish species per site, estimated percent of stream miles with percent tolerant fish values equal to, or greater than a given value

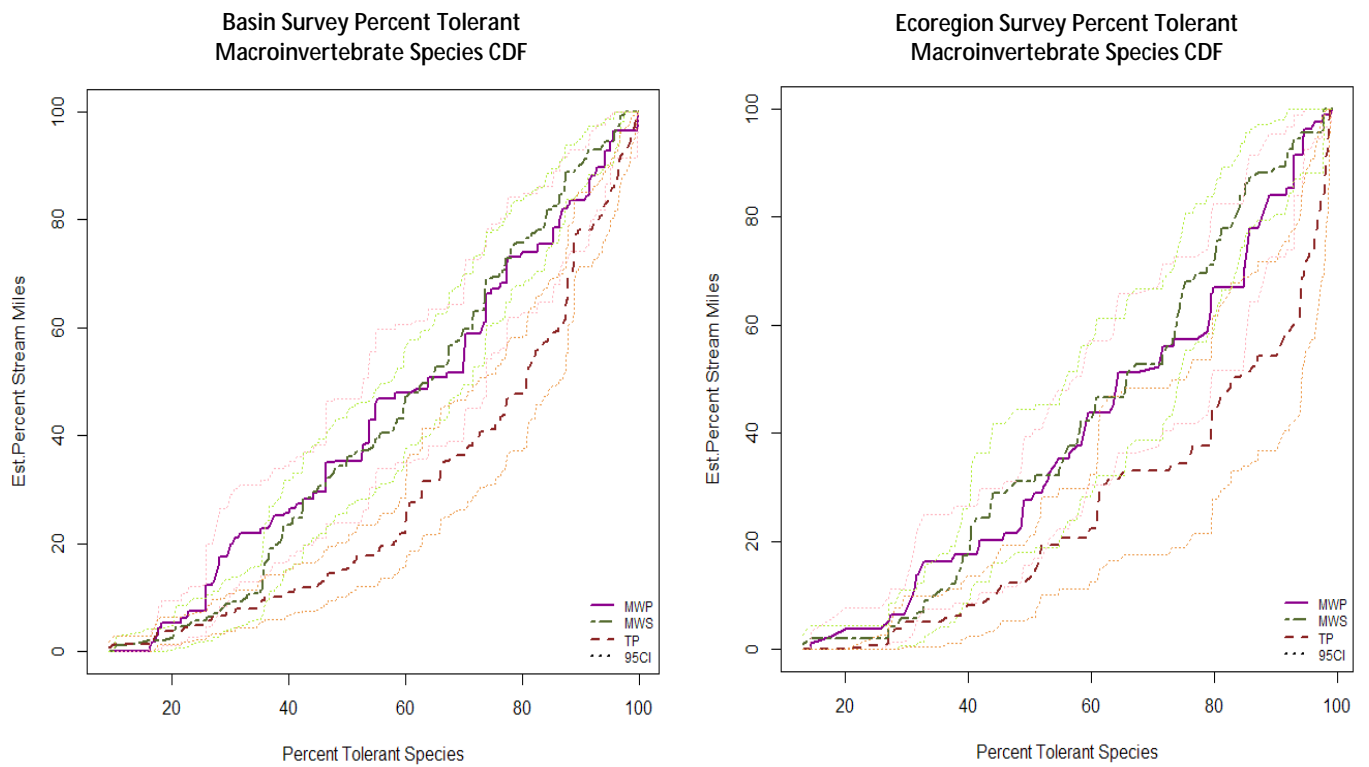


Figure 24. Percent tolerant macroinvertebrate species per site, estimated percent of stream miles with percent tolerant macroinvertebrate values equal to, or greater than a given value

Cumulative distribution functions test

The mean Eigen value corrected CDF test looks for differences between the ranges of two different data sets. We calculated the differences between the basin and ecoregion survey surveys using a 99% confidence interval (Table 6).

The percent of forest in the watershed was significantly greater in the ecoregion survey than in the basin survey. However, since the land use metrics were all calculated using the same GIS layer any significant differences are caused by the variation in site selection between the designs and the weights that are assigned to each site that are used to extrapolate the results to the state wide stream population.

Only two habitat variables were found to be significantly different when looking at the larger state wide picture. Those variables were mean bank erosion and width to depth ratio. With both variables, higher mean values were calculated for the basin survey than the ecoregion survey. Of these two variables only mean bank erosion was found to be significantly different for statewide and for all three ecoregions. Width to depth was only significantly different on the statewide scale. From an ecoregion standpoint, there were more significant differences detected in the MWS ecoregion including the number of substrates types [↓] at a site, the percentage of fine sediments [↑], and the percentage of run [↑] that encompassed the stream channel. In the TP ecoregion there was significant differences between surveys for gradient and HDS. It is not likely that gradient should have changed over this time period. Rather, this result may be due to the difference in the study designs (i.e. spatial intensity, basin or ecoregion framework) and highlights the importance of maintaining a consistent sampling strategy when conducting long term monitoring.

Water chemistry data for conductivity, total ammonia, phosphorus, and TSS all had some indication of significant differences between the two surveys. Conductivity levels were higher statewide scale in the ecoregion survey. Higher levels of total ammonia were found in the ecoregion samples for the MWS, MWP and statewide estimates but there was not a significant difference in the TP ecoregion. Phosphorus levels were higher in the MWS in the ecoregion survey.

Biological differences between surveys were minimal for nearly all fish variables tested however they were prevalent amongst the macroinvertebrate variables. The “dominant two percent” fish variable was the only fish variable to test significantly different and only in the MWP. All of the macroinvertebrate variables that were significantly different suggested a decrease in the health of the community. Decreases in variables such as the taxa count, intolerant taxa, EPT taxa, and long lived taxa may have also impacted the drop in the overall macroinvertebrate IBI (M-IBI) score (Figure 10). Taxa count was the only variable that was found to be significantly different in all three regions and statewide. The MWP had the fewest significant differences between surveys in contrast to the statewide and MWS where the majority of variables were found to be significantly different between the surveys. We would expect that some of the metrics would be correlated with one another. For example, the number of intolerant taxa and tolerant taxa is linked to lower taxa numbers in general. Because there was no significant difference found in the percent tolerant taxa, it would suggest that the ratio of tolerant and intolerant taxa within samples did not change.

Table 6. CDF test comparison of significance differences among the basin and ecoregion designs. Arrows mark where significant differences were found between surveys. An up arrow indicates that the parameter increased from the first survey to the second survey. A down arrow indicates the opposite is true. NA indicates that not enough information was available to test for significant differences

Watershed Land Use Metrics				
	State	MWS	MWP	TP
Ag Percent	---	---	---	---
Disturbed Percent	---	---	---	---
Ditch Percent	↑	↑	---	---
Drainage Square Miles	---	---	---	---
Forest Percent	↓	---	---	---
Impervious Percent	---	---	---	---
Range Percent	---	---	---	---
Urban Percent	---	---	---	---
Wetland Percent	---	---	---	---
Habitat Characteristics Metrics				
	State	MWS	MWP	TP
Forest in 100 Meters	---	---	---	---
Gradient	---	---	---	↓
HDS	---	---	---	↓
Mean Bank Erosion	↓	↓	↓	↓
Mean Thalweg Depth	---	---	---	---
MSHA	---	---	---	---
# Substrate Types	---	↓	---	---
Percent Ag Land use 100M Buffer	---	---	---	---
Percent Cover for Fish	---	---	---	---
Percent Disturbed in 100M	---	---	---	---
Percent Fine Sediments	---	↑	---	---
Percent Pool	---	---	---	---
Percent Riffle	---	---	---	---
Percent Rock	---	---	---	---
Percent Run	---	↑	---	---
Percent Woody Debris	---	---	---	---
Sinuosity	---	---	---	---
Width to Depth Ratio	↓	---	---	---

Water Chemistry				
	State	MWS	MWP	TP
Conductivity	↑	---	---	---
DO	---	---	---	---
Total ammonia	↑	↑	↑	---
Nitrogen	---	NA	---	---
pH	---	---	---	---
Phosphorus	---	↑	---	---
Temperature of water	---	---	---	---
TSS	↓	↓	---	↓
Fish Metrics				
	State	MWS	MWP	TP
Count of Taxa	---	---	---	---
Dominant Two Percent	---	---	↓	---
Fish DELT Percent	---	NA	---	---
Sensitive Taxa	---	---	---	---
Tolerant Individuals Percent	---	---	---	---
Macroinvertebrate Metrics				
	State	MWS	MWP	TP
EPT Taxa	↓	↓	---	---
EPT Percent	---	---	---	↓
Intolerant Taxa	↓	↓	---	↓
Long Lived Taxa	↓	↓	---	↓
Taxa Count	↓	↓	↓	↓
Tolerant Taxa	↓	↓	---	---
Tolerant Percent	---	---	---	---

Factors influencing biological condition

Biological cumulative distribution functions test

Within each survey the data was divided between sites that meet IBI thresholds and those that do not. Then the CDF tests were applied, but this time to test if there were physical or chemical differences among streams that meet or do not meet biological thresholds. These tests were done using a 99.9% confidence interval. Variables that tested as having significant differences between meeting and not meeting IBI thresholds were placed in Table 7, along with an arrow indicating if the mean values were higher or lower for the sites that meet IBI thresholds.

In general, indicators that were found to be significant for fish and macroinvertebrate communities in the ecoregion study were also found to be significant in the basin study. However, due to the larger sample size, the basin study was more often able to identify differences among parameters that either did or did not meet biological thresholds. In general, CDF differences were most often associated with

watershed land use (forest and agricultural use), and habitat factors related to substrate and geomorphology. The CDFs for the two main indices that the MPCA uses to describe the physical characteristics of a site (MSHA score) and the anthropogenic disturbances in the watershed (HDS) were both significantly different. For both MSHA and HDS, the estimated mean percentage of stream miles was higher for sites that passed IBI thresholds than when IBI thresholds were not met. The results suggest that when watershed and in-stream disturbances are minimal fish and macroinvertebrate communities will typically perform better. Variables such as HDS and MSHA are positive metrics in that an increase in their scores reflects a more undisturbed condition. Other metrics, like road crossing density and disturbances in the buffer zone are negative, where higher values for these variables are often associated with a poor IBI score. The differences between CDFs for many of the watershed land use and habitat metrics illustrates the importance of habitat quality and the impact that land use can have on aquatic communities.

Table 7. Watershed land use and habitat variables that were associated with IBI scores that were above their respective impairment thresholds. B indicates that a significant difference was noted in the basin survey, an E indicates that a significant difference was noted in the ecoregion survey. Arrows indicate whether or not the relationship was positive (up arrow) or negative (down arrow).

Significant Variables	Fish	Macroinvertebrate
Watershed Land Use		
Agriculture Percent	B,E ↓	B,E ↓
Disturbed Percent	B,E ↓	B,E ↓
Ditch Percent	B,E ↓	B,E ↓
Drain Square Miles	B,E ↑	E ↓
Forest Percent	B,E ↑	B,E ↑
Impervious Percent	B ↓	B,E ↓
Road Crossing Density	B ↓	B,E ↓
Urban Percent	B ↓	B,E ↓
Habitat Characteristics		
CV Depth	----	B ↑
Forest in 100 Meters	B,E ↑	B,E ↑
HDS	B,E ↑	B,E ↑
Mean Thalweg Depth	----	B ↑
Mean Depth Fine Sediments	B ↓	----
Mean Width	----	B,E ↑
MSHA	B,E ↑	B,E ↑
Number_Stream_Features100M	B,E ↑	----
Percent Agriculture in 30 Meters	B,E ↓	B,E ↓
Percent Boulder	B,E ↑	B,E ↑
Percent Cover for Fish	B,E ↓	E ↓
Percent Disturbed in 30 Meters	----	B,E ↓
Percent Disturbed in 100 Meters	B,E ↓	B,E ↓

Percent Fine sediments	B,E ↓	B,E ↓
Percent Pool	B ↑	----
Percent Rock	B,E ↑	B,E ↑
Percent Run	B ↓	----
Percent Woody	----	B,E ↑
Percent Riffle	B,E ↑	B,E ↑
Width to Depth Ratio	E ↑	B,E ↑
Water Chemistry		
Conduct	B,E ↓	B,E ↓
DO	B ↑	B ↑
Nitrogen	B ↓	B ↓
pH	----	E ↑
Phosphorus	B,E ↓	B,E ↓
TSS	----	B ↓

Condition probability analysis

Conditional probability analysis can help determine the chance of meeting biological thresholds given a specific set of conditions or stressors. The graphs are directional in that the probabilities are dependent on the specific inquiry.

A conditional probability analysis of fish IBI (F-IBI) and M-IBI by latitude and longitude indicates that the probability of meeting the biological thresholds increase from south to north (i.e. increasing latitude), and from west to east (i.e. decreasing longitude). The longitudinal relationship appears to be stronger for both assemblages indicating that the west to east gradient in Minnesota has more influence on IBI scores than does the north to south gradient. Together this analysis reveals that sites located in the southwest part of the state are less likely to pass IBI thresholds than those in the northeast for both fish and macroinvertebrates. This is likely due to land use differences that have similar gradients.

Watershed drainage area is known to influence aquatic communities, particularly for fish. For example, fish species richness tends to increase with increasing drainage area up to about 500 mi² and then level off thereafter. Streams with very small drainage areas (i.e. headwater environments) are particularly harsh environments for aquatic organisms. The physical, chemical, and hydrologic extremes in headwaters force aquatic communities to become highly adaptable and/or mobile. In addition, headwater environments are more susceptible to the negative human influences of habitat destruction and pollution. Larger rivers on the other hand are less susceptible to these natural variations as well as impacts due to anthropogenic disturbances. They have natural buffering capacities or stability that tends to mediate the extremes and allow for the development of aquatic organisms that are niche specialists (e.g. dependent on a specific habitat or food source). The conditional probability analysis for drainage area tends to support the assumption that headwater environments are more susceptible to human influences. The probability of meeting the IBI thresholds for both fish and macroinvertebrates increases with drainage area before leveling off at about 500 mi².

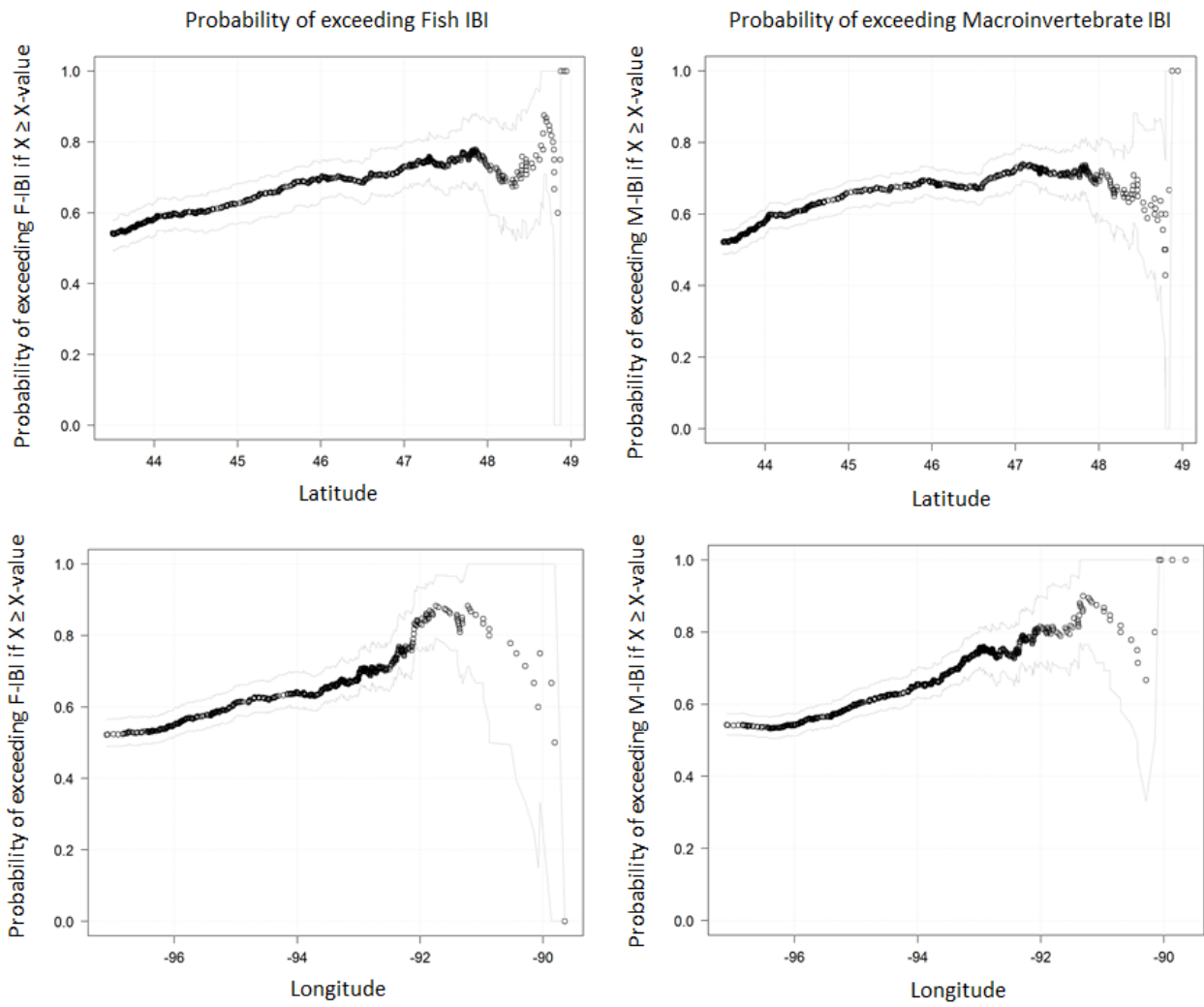


Figure 25. Conditional probability latitude and longitude influences on fish and macroinvertebrate IBIs

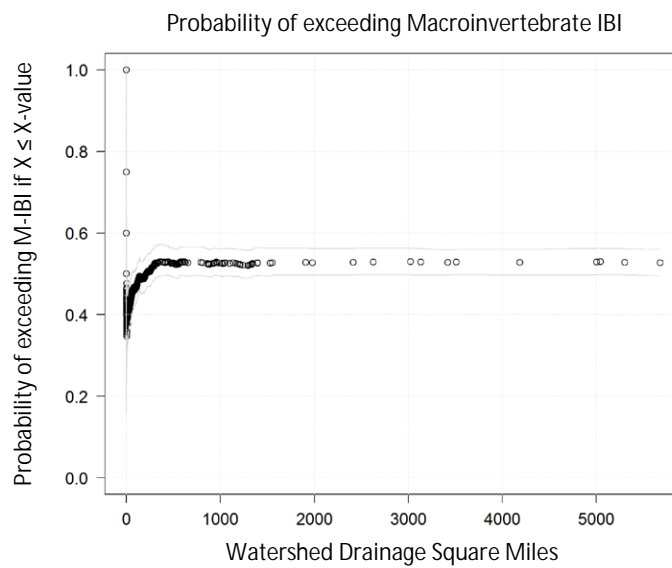
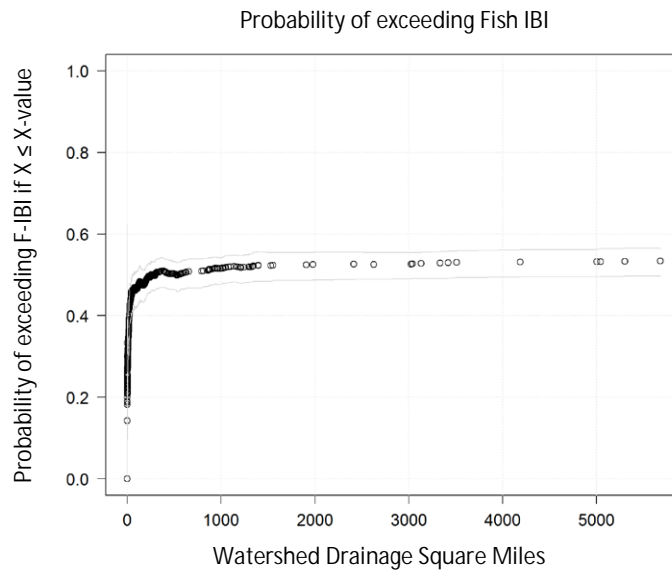


Figure 26. Drainage area and probability of passing biological IBI thresholds

Watershed land use

The probability for both fish and macroinvertebrate scores to meet IBI thresholds drops as watershed disturbance increases. Sites with very little watershed disturbance most often meet the biological criteria. Both fish and macroinvertebrate curves drop sharply at about 80% disturbance, suggesting a possible critical level not to be exceeded if protection of aquatic communities is a priority. Watershed disturbance can be further divided into major subgroups including urban, agriculture, and forests. Both urban and agricultural land uses have a strong negative impact on aquatic communities.

Though the percentage of urban influence in the watersheds of the sites studied are generally low (<5%), the probability of passing fish and invertebrate IBIs decreased from about 55 to 35% as land use approached 5% urban (Figure 27). The effects on aquatic communities from impervious surfaces, a common impact of urbanization, are even more striking. As little as 1% impervious surfaces in the watershed lowers the probability of meeting the F-IBI and M-IBI significantly. Fish communities appear to be more susceptible to impervious surfaces with a rather dramatic decrease in meeting F-IBI scores at levels of imperviousness exceeding 1.5%.

The agricultural conditional probability curves are similar to the watershed disturbance curves. However the agricultural graphs in Figure 29 have two inflection points where the probabilities of meeting biological thresholds decrease at high rates. The first inflection occurs before 2%, the second occurs at approximately 80%. After the second inflection point there is little chance of finding acceptable aquatic communities. Once the agricultural land use reaches about 95%, the probability flattens to 0% probability of meeting biological thresholds. Related to agricultural land use is channelization or ditching of streams. The channelization graph does not show an inflection point but shows a steady decrease in the probability of meeting thresholds (Figure 31).

Forested areas are often less disturbed areas, so it is no surprise that the general trend is that as the percent forested area increases so does the probability that IBI thresholds are met. The greatest increases in probability are from 0 to 10% forest.

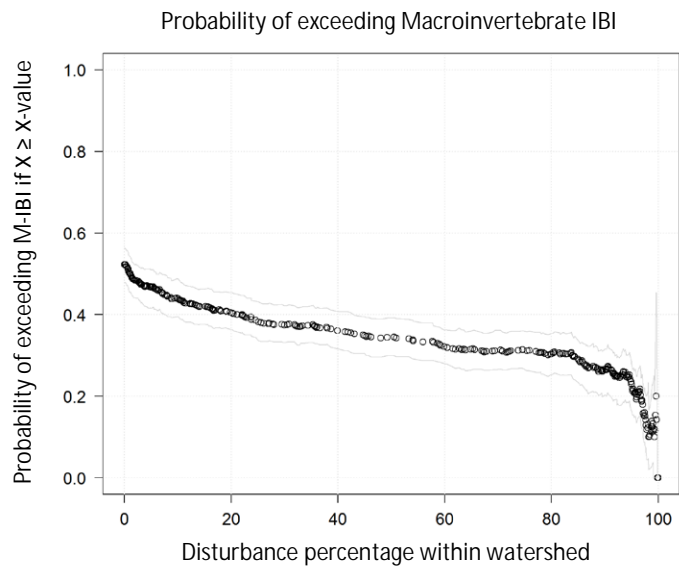
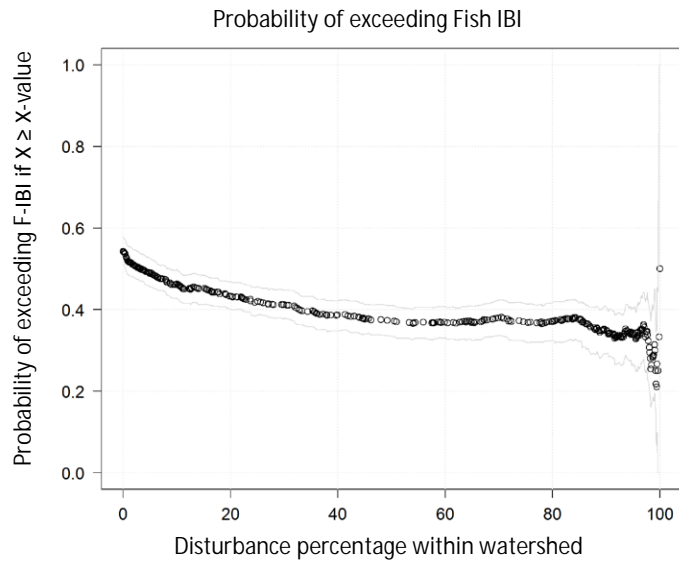


Figure 27. Disturbed percentages with probability of passing IBI thresholds

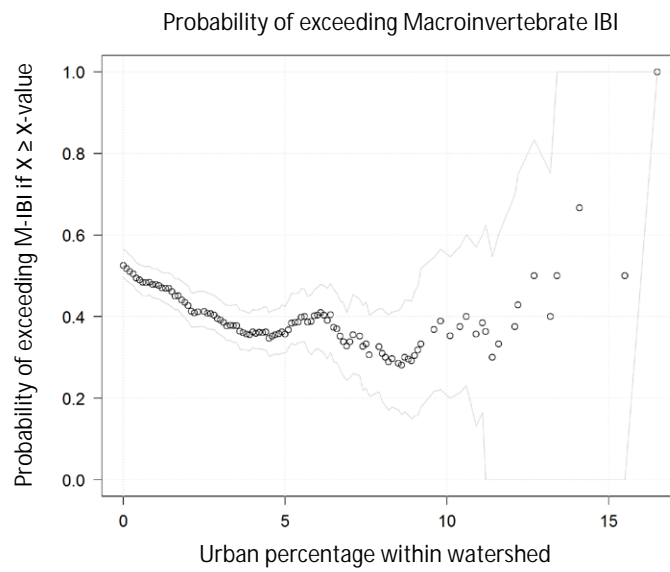
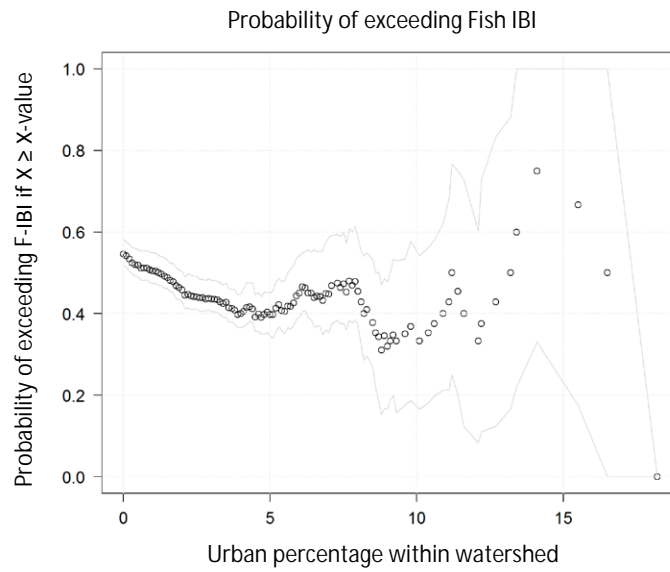


Figure 28. Urban land use percentage and probability of passing biological IBI thresholds

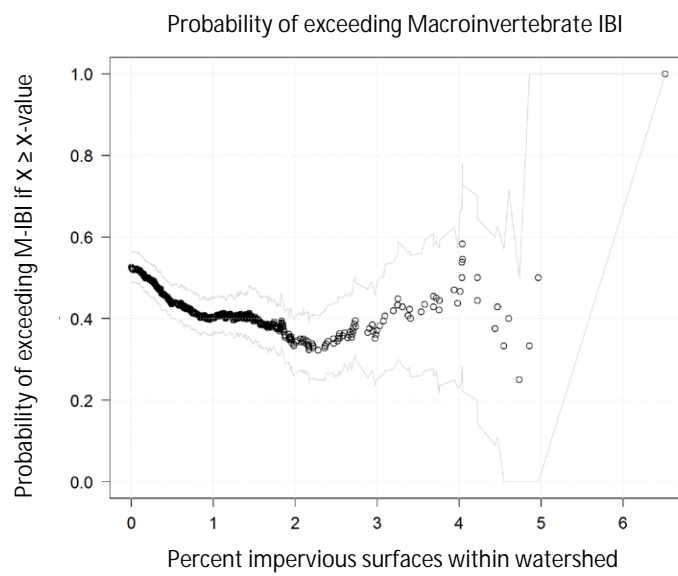
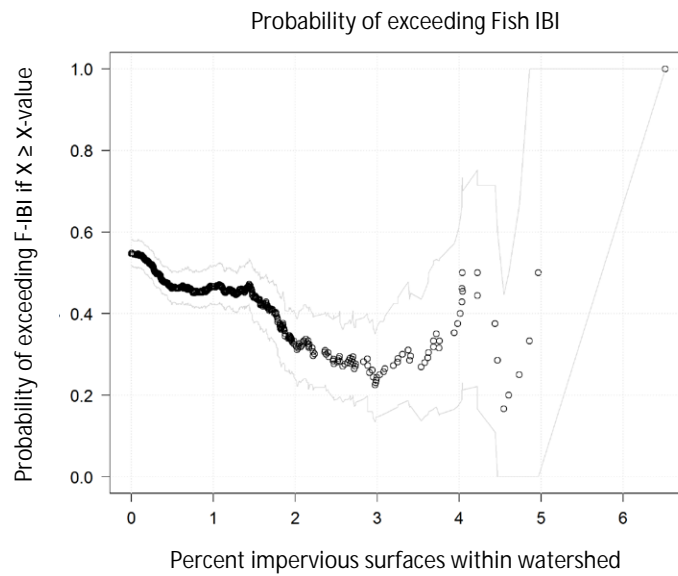


Figure 29. Impervious percentage in watershed and probability of passing biological IBI thresholds

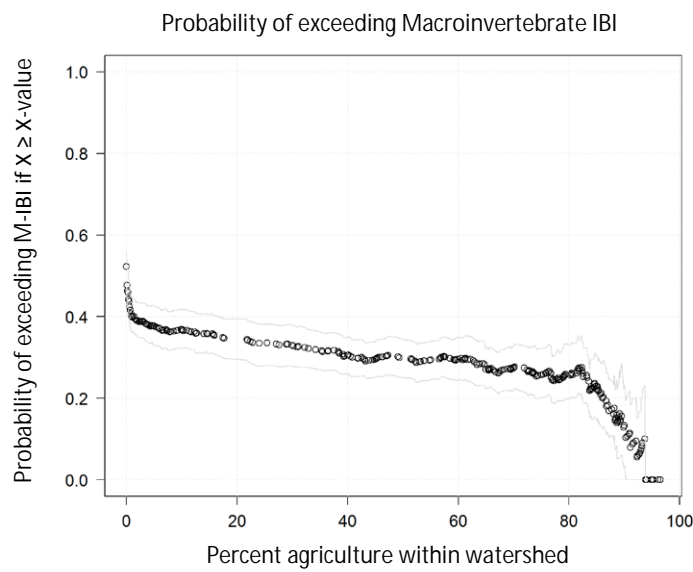
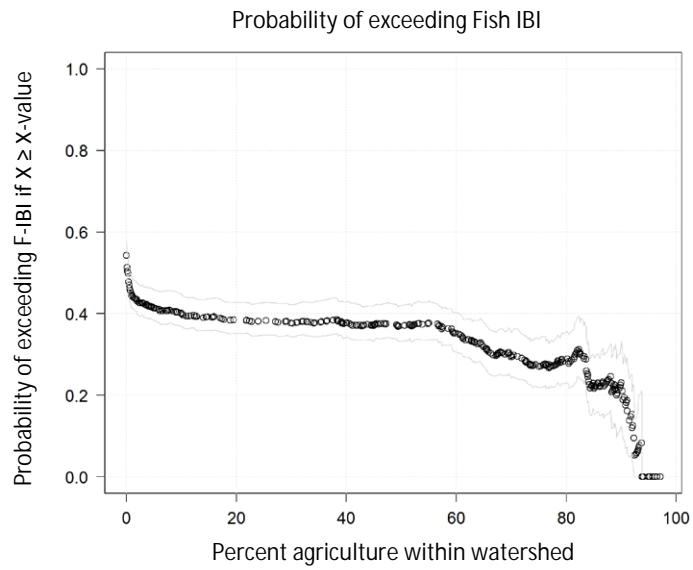


Figure 30. Agriculture land use percentage and probability of passing biological IBI thresholds

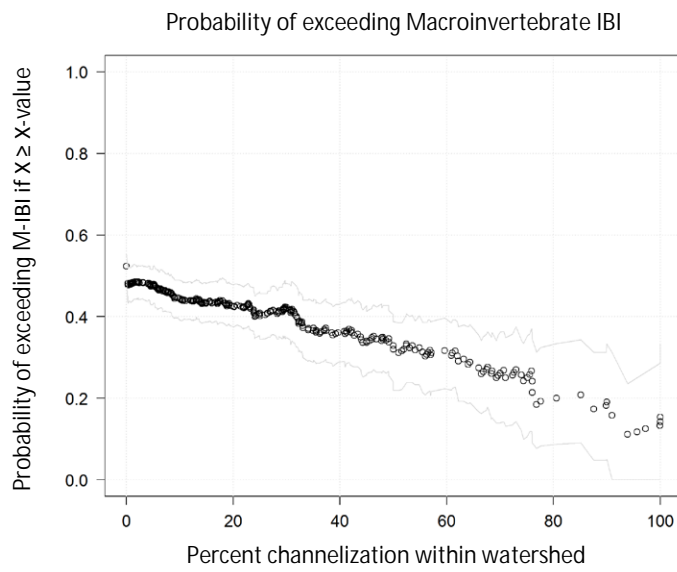
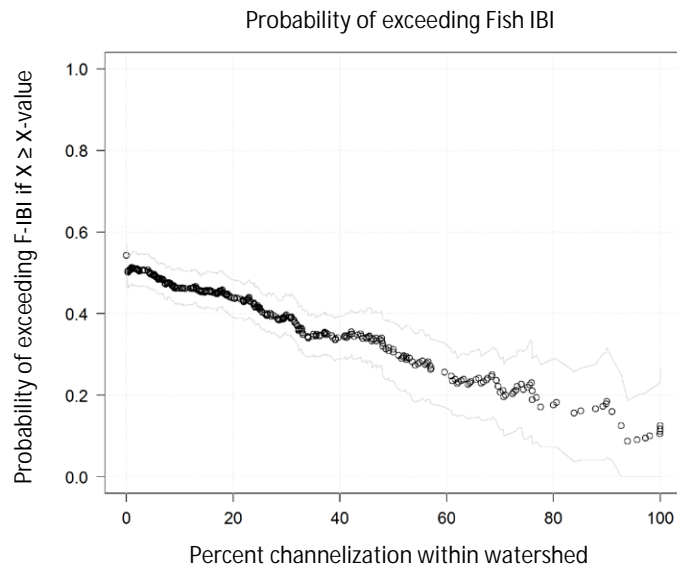


Figure 31. Channelized percentage and probability of passing biological IBI thresholds

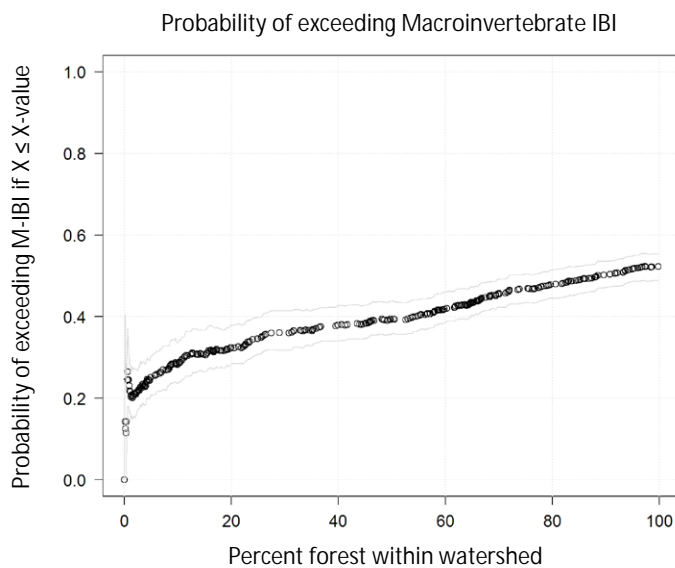
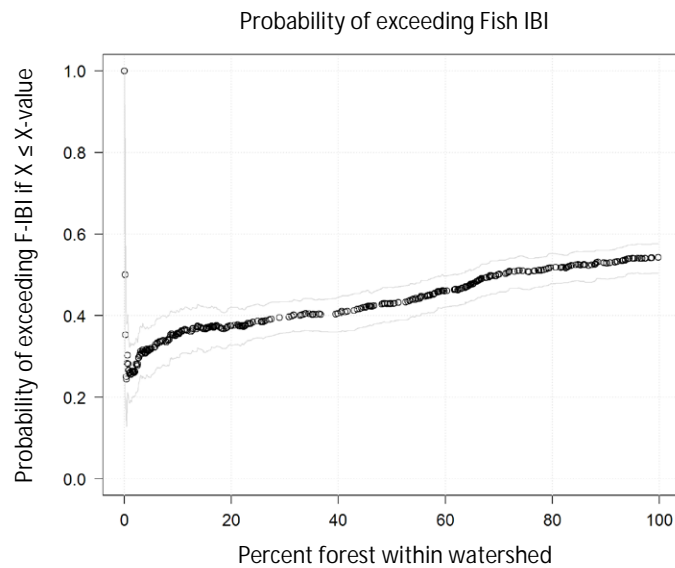


Figure 32. Forested land use percentage and probability of passing biological IBI thresholds

Habitat

The MSHA score integrates all aspects of stream habitat (substrate, cover, stream morphology, riparian condition, etc.) into a single score. High MSHA scores suggest that a stream has all the necessary habitat components of undisturbed streams and is therefore likely to have the necessary habitat to support healthy fish and macroinvertebrate populations. The conditional probability graphs indicate a very strong positive relationship between the MSHA score and the probability of meeting biological thresholds for fish and macroinvertebrates. Streams with MSHA scores above 75 have greater than an 80% chance of meeting biological thresholds for both fish and macroinvertebrates. The HDS is more focused on watershed level anthropogenic disturbances, although there are components of the HDS

that look at disturbances in the riparian zone. Similar to the MSHA score, as the HDS increases the probability that both fish and invertebrates will meet thresholds also increases, albeit not quite as dramatically as the MSHA. This may suggest that instream habitat has a stronger relationship with biological condition than watershed level indicators like the HDS. Consequently, a focus to maintain quality in-stream habitat where it exists and improve it where it does not, should be a priority for water managers.

Stream morphological characteristics appear to have only a modest influence on the probability of meeting an IBI threshold. This may be due to the fact that each IBI is calibrated to a unique stream type (i.e. headwater streams, low gradient streams, etc.) so that natural differences in stream morphology have already been accounted for. However, streams that lack riffles altogether, or nearly so, are less able to meet the biological thresholds. The conditional probability curve is most steep where riffles comprise less than 20% of the sampling site. The prevalence of runs elicits the opposite effect on biological performance. Streams largely dominated by runs (>60%) have the steepest negative probability curves for both fish and macroinvertebrates.

Substrate types are a reflection of the underlying geological material and the streams hydrology, but may also reflect sedimentation due to human disturbance in the watershed. The conditional probability curve for the percent of fine particles indicates that when a site is dominated by fine particles its chance of meeting thresholds is diminished. This change becomes most pronounced when the percentage of the substrate at a site is more than 85% dominated by fines. Sediments dominated by rocky substrate have the opposite relationship with a greater probability of meeting thresholds. In fact, streams with greater than 90% rocky substrates have an 80 to 90% chance of meeting the biological thresholds. These graphs illustrate the importance of minimizing sedimentation in Minnesota's rivers and streams. Fine particles from overland runoff and bank erosion can infiltrate the interstitial spaces of larger particles reducing shelter for both fish and macroinvertebrates, smothering eggs, and reducing the available spawning habitat for gravel spawning fish species.

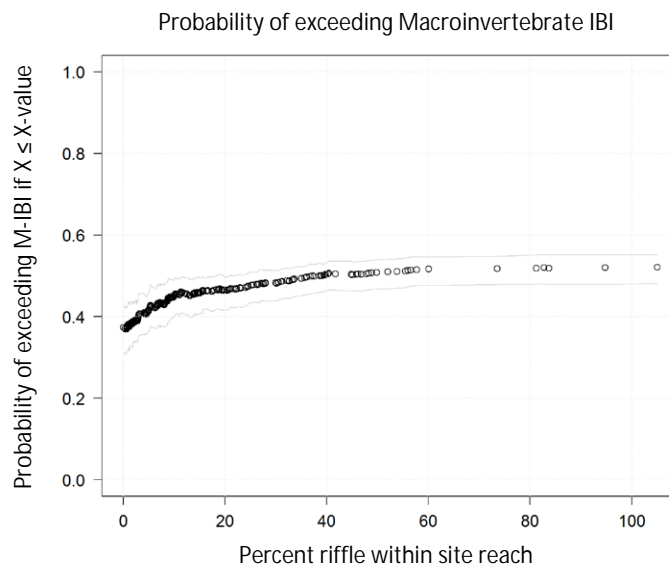
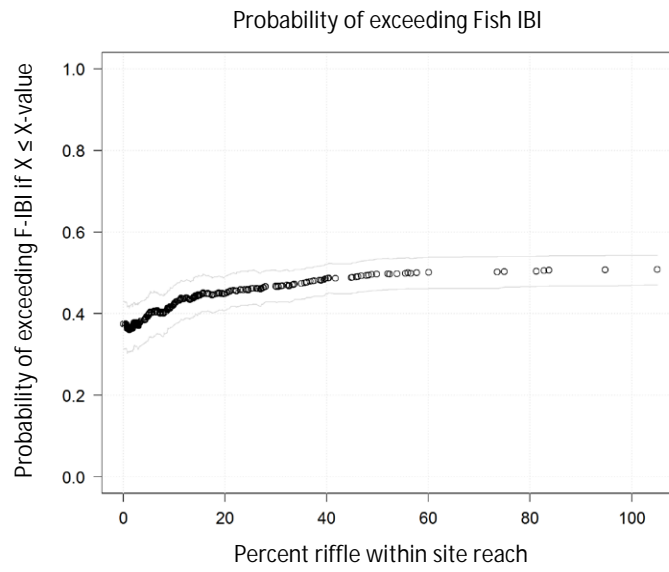


Figure 33. Percentage of stream reach that is riffle and probability of passing biological IBI thresholds

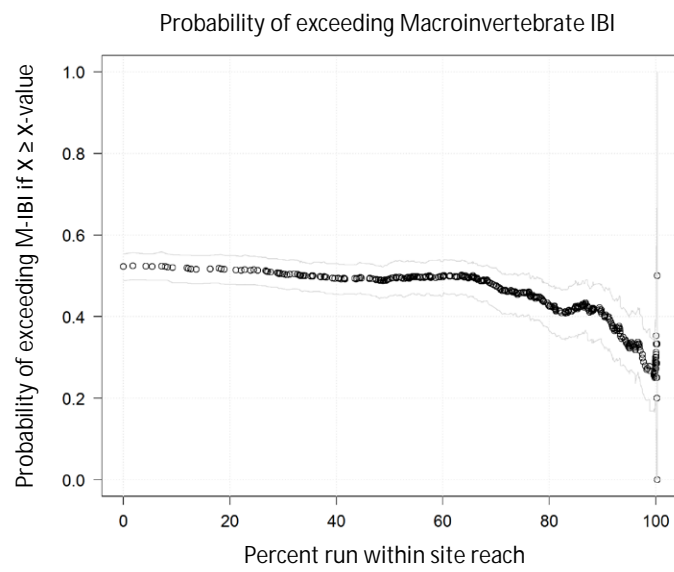
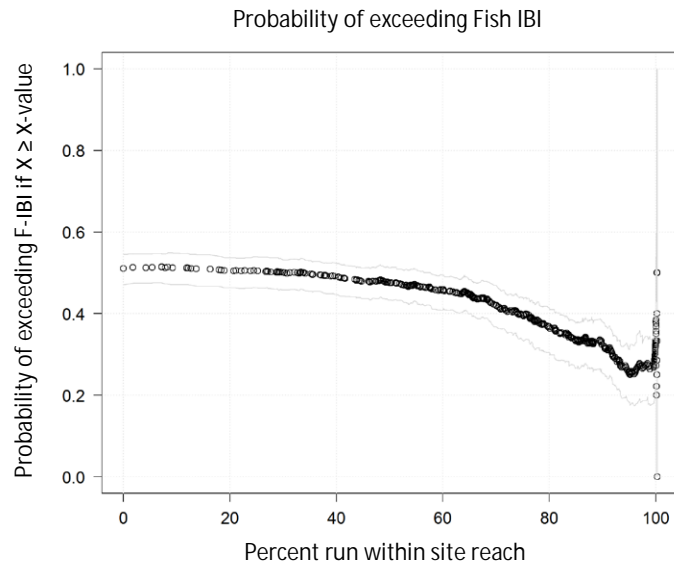


Figure 34. Percentage of stream reach that is run and probability of passing biological IBI thresholds

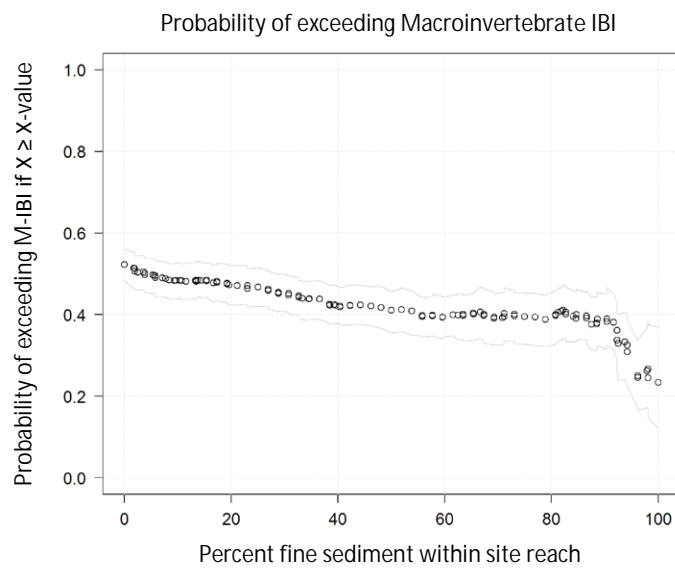
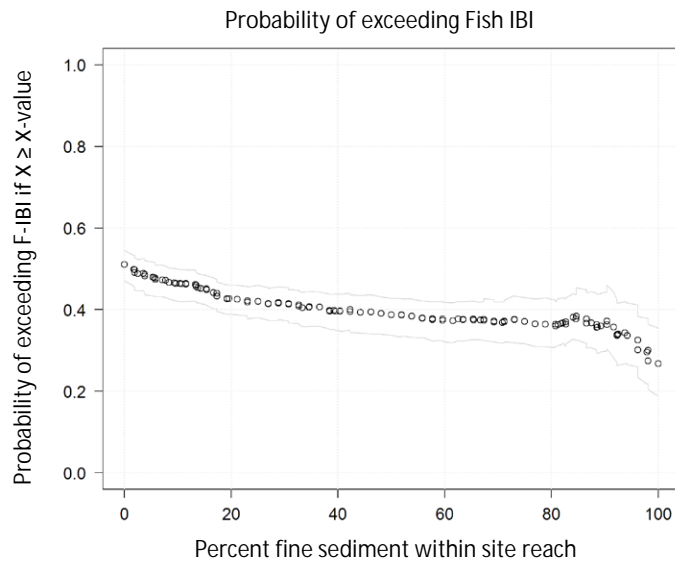


Figure 35. Percent fines of sediment composition and probability of passing biological IBI thresholds

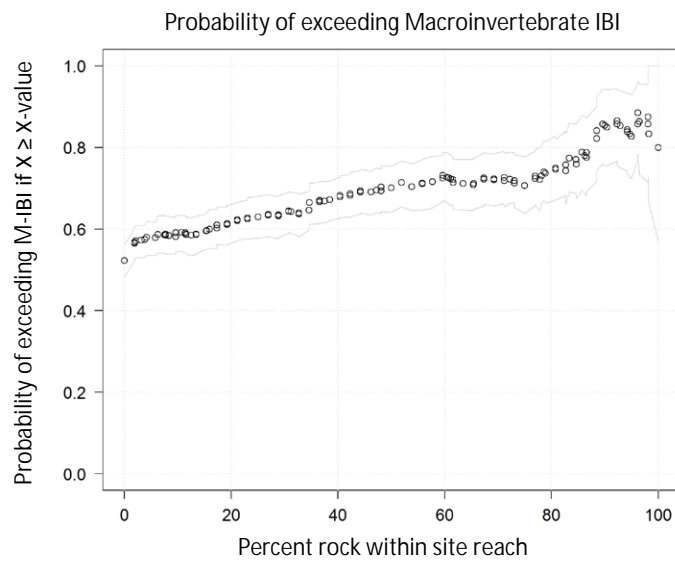
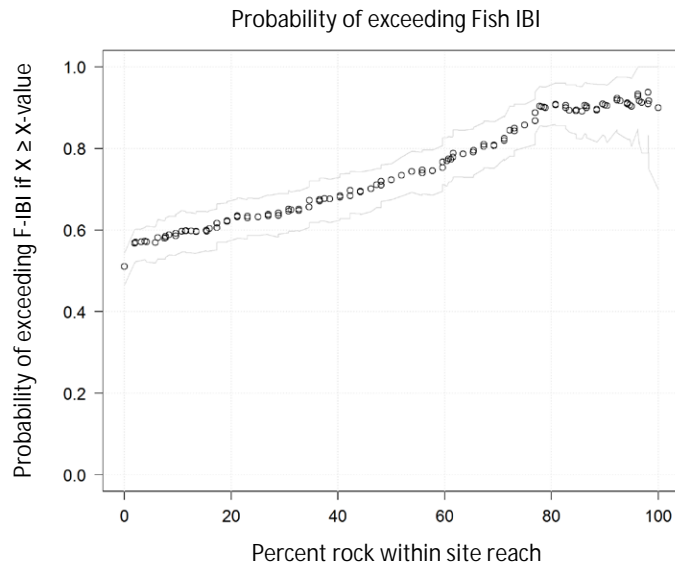


Figure 36. Percent rock in sediment composition and probability of passing biological IBI thresholds

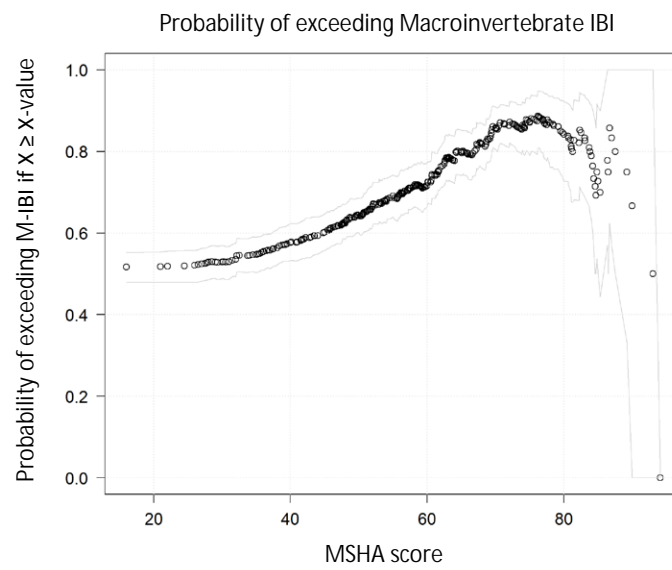
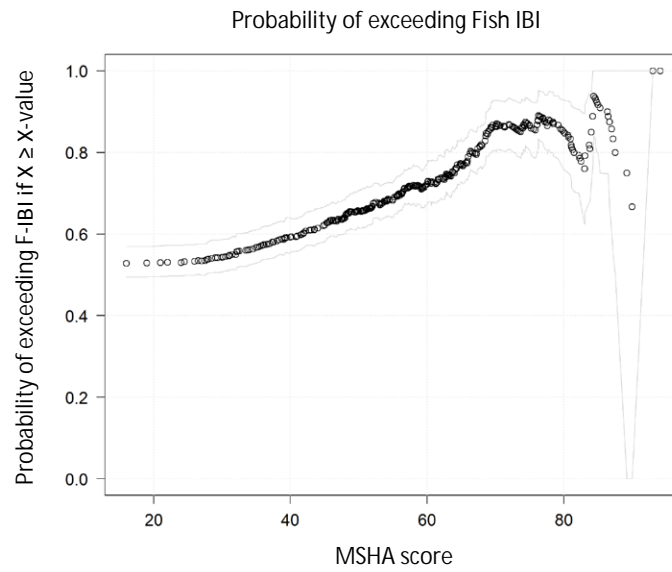


Figure 37. MSHA and probability of passing biological IBI thresholds

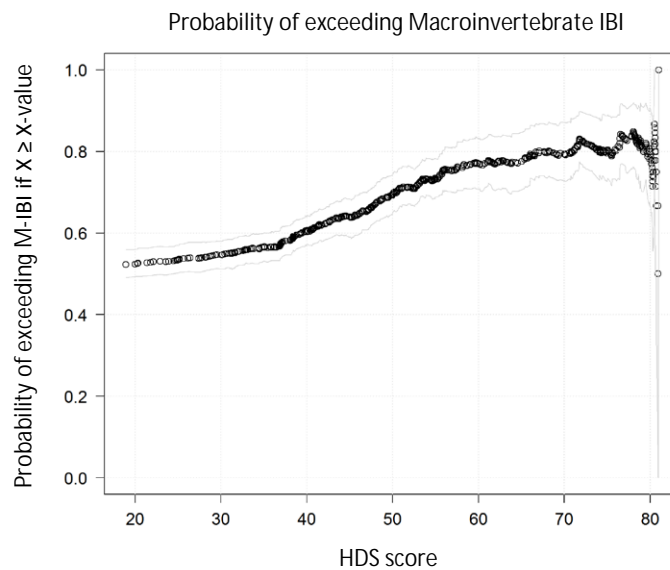
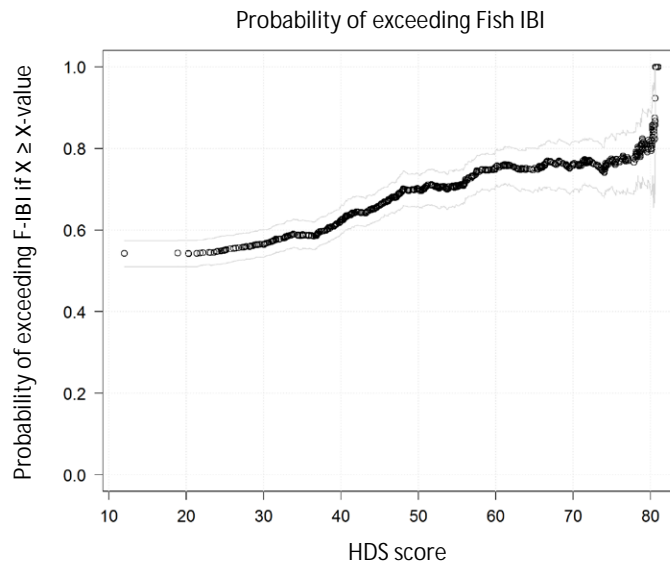


Figure 38. HDS and probability of passing biological IBI thresholds

Water chemistry

Dissolved oxygen (DO) levels are one of the most important chemical factors that influence the composition of aquatic communities in Minnesota streams. Streams with naturally low levels of DO, often due to the influence of riparian wetlands, are very common throughout northern Minnesota. These streams have a characteristic fauna comprised of fish and macroinvertebrate species that are very tolerant of low DO levels. On the other hand, Minnesota has an abundance of high gradient streams as well, and many of them are coldwater streams with species that require a fairly high minimum level of DO (7 mg/l is the state standard for coldwater streams in Minnesota). Though the state standards are based on daily minimum values of DO, wide fluctuations in daily DO levels (i.e. DO flux) can also be problematic. High DO flux is an indication of nutrient enrichment and stress on stream communities.

For this reason conditional probability curves were developed for DO to compute the probability of meeting the biological thresholds if the DO was less than a given value and also when the DO was more than a given value. The probability of meeting biological thresholds for both fish and macroinvertebrates appears to diminish below and above DO levels of 8 to 9 mg/l. Furthermore, by the time the DO levels reach 5mg/l, the state minimum standard for warm water streams, the probability of meeting the biological thresholds is reduced from greater than 50% to just over 30%. However, due to the fact that this data was derived from a single grab sample at each site during most any time of the day or evening, it does not suggest that the DO standards currently in rule are not fully protective of aquatic communities in Minnesota streams. The data does indicate that there is a fairly narrow optimum level of DO for fish and macroinvertebrates in Minnesota streams and that the suitability of a stream to support robust biological assemblages diminishes quite rapidly on either side of that narrow range of DO values (Figure 39).

Phosphorus (Figure 40) and nitrogen (Figure 41) levels in water samples are an indication of nutrient enrichment. The probability of meeting biological thresholds falls steeply with increasing levels of phosphorus. For both biological assemblages the probability of meeting biological thresholds falls to less than 20% at phosphorus levels of 0.2 mg/l. Nitrogen is similar to phosphorus although the reduction in probabilities is initially not as steep, falling only slightly up to nitrogen values of 10 mg/l, with steeper declines thereafter. As conductivity and TSS (Figure 42) levels increase, the probability of meeting thresholds decreases. Conductivity concentrations have a steeper slope that levels off at lower probabilities than that of the invertebrates. On the other hand, invertebrates seem slightly more affected by TSS than fish as the slope is steeper between 0 and 50, and the few sites that are above 150 have a 0% probability of meeting the biological thresholds.

Dissolved organic carbon (DOC) is an important part of the carbon cycle within a natural riverine system. At high concentrations it can reduce light penetration making photosynthesis harder for some aquatic plants. An example is dark brown stained waters from naturally forming tannic acids. DOC (Figure 43) has a fairly strong negative association with biological performance. The probability of f-IBI scores meeting the threshold drops continuously, beginning at about 20 mg/l before bottoming out at concentrations greater than 40mg/l where the probability of meeting the fish biological threshold is zero. Macroinvertebrates did not show a change in M-IBI with a change in DOC, so they are not shown.

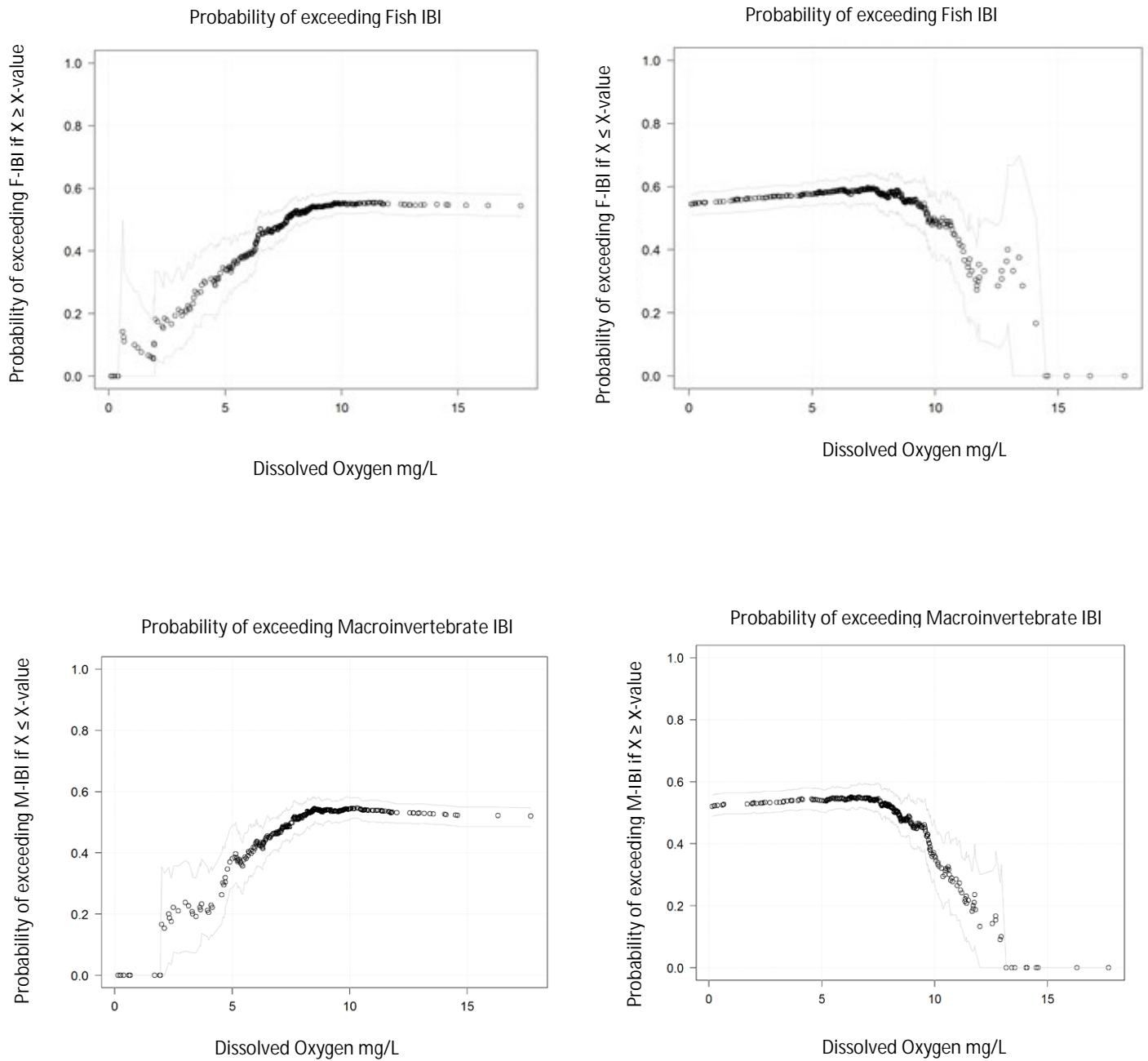


Figure 39. Dissolved oxygen (mg/L) levels and probability of passing biological IBI thresholds

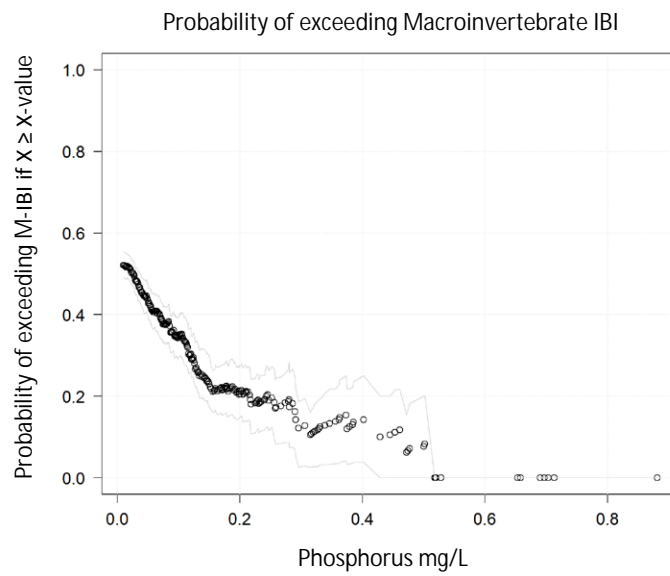
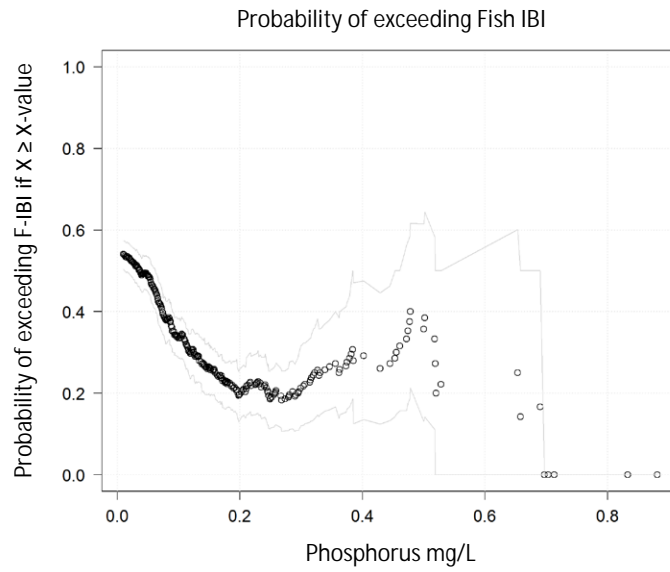


Figure 40. Phosphorus mg/L concentration and probability of passing biological IBI thresholds

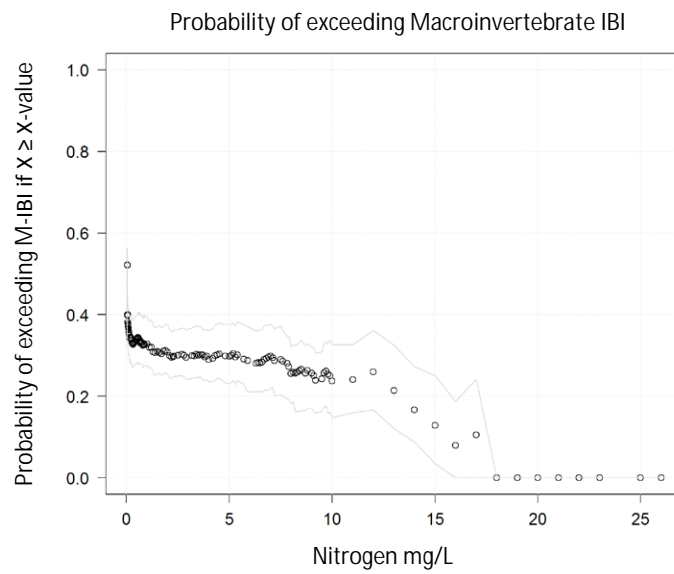
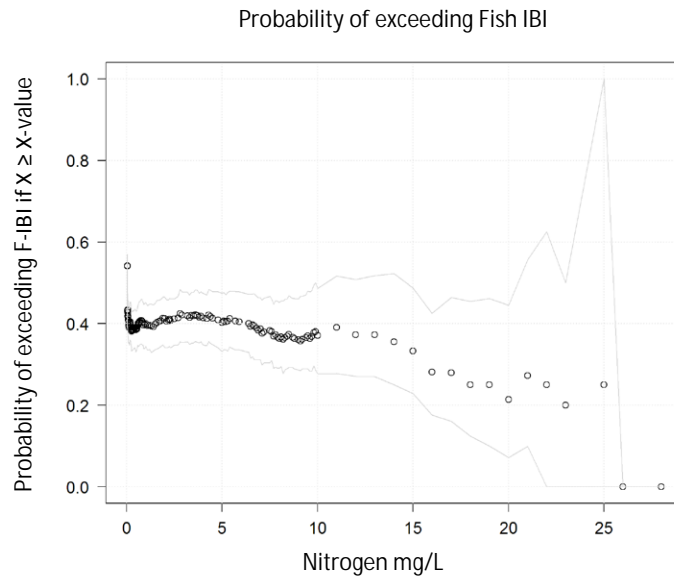


Figure 41. Nitrogen mg/L, concentrations and probability of passing biological IBI thresholds

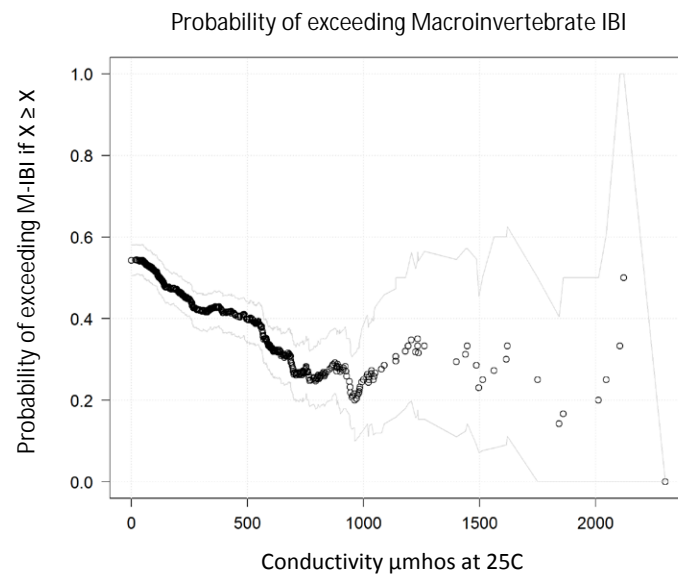
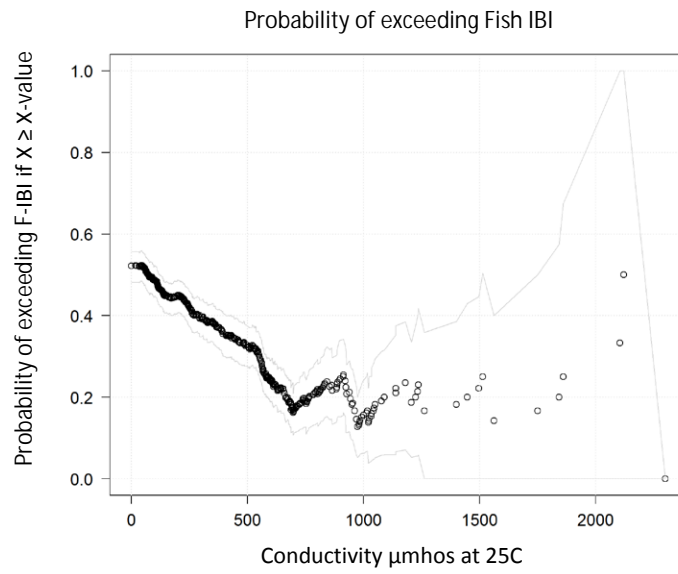


Figure 42. Conductivity (μmhos at 25C) and probability of passing biological IBI thresholds

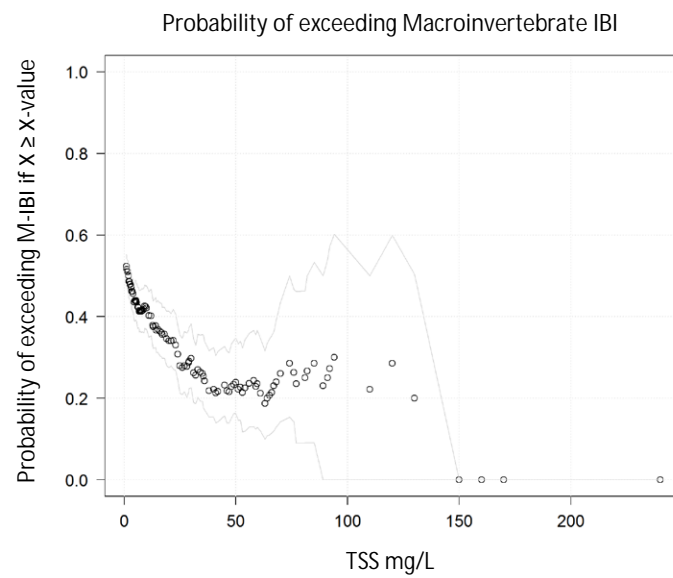
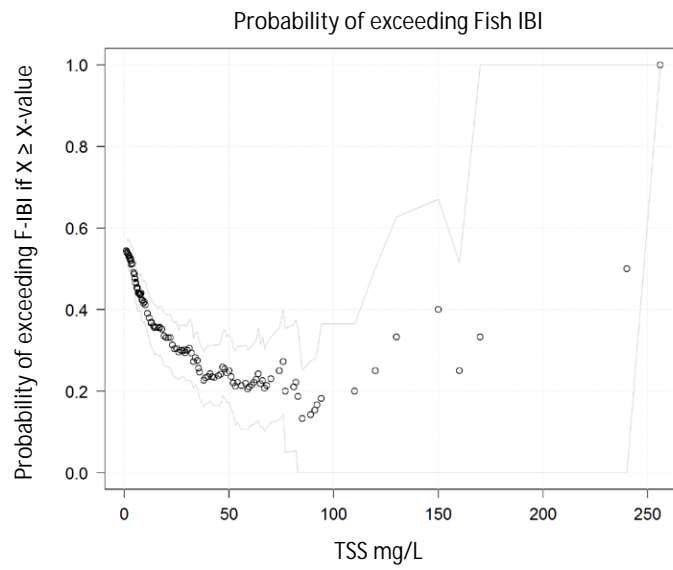


Figure 43. TSS concentrations (mg/L) and probability of passing biological IBI thresholds

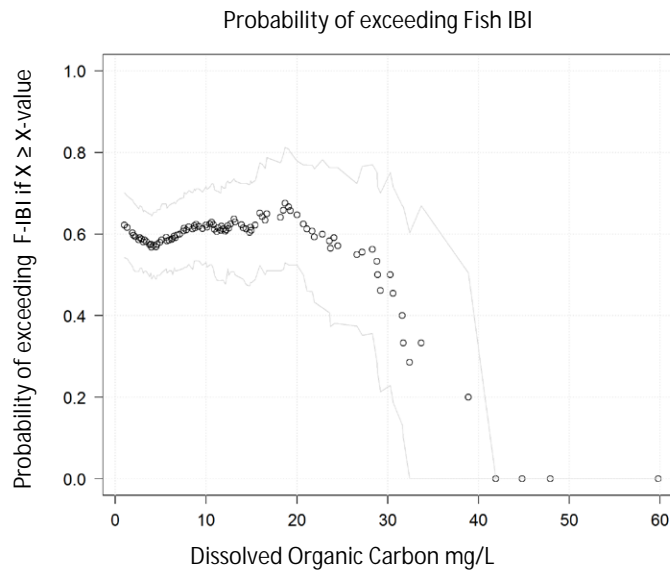


Figure 44. DOC (mg/L) levels and probability of passing fish IBI thresholds

Discussion

The original intent of both surveys was to gain an understanding of the general biological, chemical, and physical condition of Minnesota's flowing waters. Through the utilization of a random survey design and statistical methods that allow for extrapolation to the greater population of streams with a known level of confidence, we were able to estimate the condition of all streams in the state and within each major ecoregion. By aggregating data from earlier basin level random surveys, we were able to contrast conditions in streams between two study periods, with the later ecoregion survey providing the most current estimates of conditions. Finally, we were able to evaluate the factors that were most related to biological community health, and determine the probability of streams attaining their biological thresholds for fish and macroinvertebrates as environmental factors varied.

Overall, there were few differences between surveys. The only habitat parameter that was consistently different between the surveys was the amount of bank erosion, which decreased significantly statewide and in all ecoregions. Associated with the reductions in bank erosion was a corresponding decrease in TSS statewide and in both the Mixed Wood Shield (MWS) and Temperate Prairies (TP) ecoregions. In terms of the aquatic communities, fish community parameters were similar to slightly improving between surveys, but many macroinvertebrate community attributes indicated a decline in condition including the number of EPT taxa, number of intolerant and tolerant taxa, and the overall taxa count. While the two sampling survey designs were similar in that both survey designs used sites selected at random and nearly all sampling protocols were identical, they differed in the spatial intensity of sampling as well as temporally. Because the basin surveys occurred over a 10 year period and the ecoregion survey occurred within a single year, changes in weather and flow patterns may have influenced the results. The weather pattern in 2010 when most of the ecoregion samples were collected was particularly wet, possibly reducing the number sites that were non-target due to dry or partially dry stream beds. Also, because there had been about two-thirds fewer samples in the ecoregion based survey, the estimates had wider confidence intervals, making this design less sensitive to differences between time periods and ecoregions. The lower sampling size in the ecoregion survey may have also

reduced the overall range of values for any given variable because there is less chance of sampling the extremes within the population. This may explain the apparently erroneous differences that occurred between survey results when, for example, data taken from the same GIS layers for both surveys were compared to one another. Since this data was taken from the same data layer for both surveys, no differences would have been expected.

In at least one case the sampling protocols differed between surveys. The change in protocol involved the allocation of kick net samples by habitat type (riffle, woody debris, aquatic vegetation) during macroinvertebrate sampling. From 1996 to 1998 the number of kick net samples within each habitat type was based on the proportion of those habitat types at each site. From 1999 to the present, kick net samples were distributed equally among the habitat types. The St. Croix and the Lake Superior basins, located primarily in the MWS, were surveyed using the earlier method. The shift towards a more equal distribution of effort may have resulted in an overall reduction in the number of samples taken within riffles, therefore it is reasonable to assume that the number and proportion of riffle dwelling macroinvertebrate species would have also been reduced, resulting in a reduction in key metrics that involve those species, and consequently a lower overall IBI score. It is anticipated that the MPCA will employ the ecoregion sampling strategy with an equivalent number of sites (approximately 150) during the random survey in 2015. Maintaining a consistent survey design and sampling protocol make future comparisons easier and more reliable.

The physical, chemical, and biological characteristics of stream conditions throughout the three ecoregions in Minnesota are a reflection of many different natural and anthropogenic factors coming together to influence stream biology, habitat, and water chemistry. The most vivid differences between ecoregions were often between the MWS and TP with the MWP often forming a sort of transition zone between the two extremes. The MWS has more undisturbed land than that of the other regions with many wetlands and forests and less agriculture and urban development, leading to better overall conditions. With less anthropogenic disturbance in the MWS, there are more intact stream miles. Streams in the heavily disturbed TP ecoregion often had higher percentages of stream miles with high nutrient levels and disturbances ratings, and more channelized stream miles. Consequently, this ecoregion also had the lowest percentage of stream miles that met either fish or invertebrate IBI thresholds.

Finally, we found that the degree that monitoring sites either met or did not meet their biological thresholds was associated with specific habitat, water chemistry and land use variables. Variables most closely associated with in-stream habitat appeared to be more influential on stream biology than did factors more associated with land use. However, many chemical variables were also important and although the results of these surveys should not be used to judge the impairment status of any particular sampling site, researchers and managers may be able to use these relationships to define stress points related to biological condition.

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Appendix

Appendix 1. Variable abbreviations and explanations

For a completed data set for these variables go to

\\X1600\vol1\Databases\Water_Quality\Biological_Monitoring\Streams\Projects\Lueck\EMAP\Report Data Table.xlsx

Table name	Explanation
FieldNum	Site field number assigned by MPCA
siteID	Site ID provided by EPA
DrainSqM	Drainage area in square miles for each site
WBName	Water body name
Latitude	Latitude in Decimal Degrees (NAD-83)
Longitude	Longitude in Decimal Degrees (NAD-83)
ER2Name	Ecogregion level 2 names
Strahler	Strahler stream order (1-6)
Class	Stream class (Coldwater, Warmwater, Class 7)
Site Status	Site Status - Target Site, Non-Target Site, Land Owner Permission Denied, Physically inaccessible
Disturbed Percent	Percent disturbed land use in the watershed
AgPercent	Percent agriculture in the watershed
RangePercent	Percent rangeland in the watershed
UrbanPercent	Percent urban in the watershed
ForestPercent	Percent forest in the watershed
WetlandPercent	Percent wetland in the watershed
ImpervPercent	Percent impervious surface in the watershed
AgRiparianPercent	Percent agriculture within stream riparian of the site (30 meters)
DitchPercent	Percent of ditched streams in watershed
PctAgLT100M	Percent agriculture within 100 meters of streams in the watershed
PctForestLT100M	Percent forest within 100 meters of streams in the watershed
PctDisturbedLT100M	Percent disturbed within 100 meters of streams in the watershed
RoadXDensity	Number of Road Crossings per Stream Kilometer
PctDistLU	Percent Disturbed Land Use Within 100 Meters of Stream Bank
ChanCon	Channel condition either NA = Natural OC = Channelized
MDepth	Mean Stream Depth (cm)
MThalDepth	Mean Stream Thalweg Depth (cm)
MWidth	Mean Stream Width (m)
Gradient	Gradient (m/km)
Sinuosity	Sinuosity (Total Length/Straight-Line Length)
numstreamftsper100	Number of Stream Features per 100 Meters
PctRiffle	Percent Riffle
PctPool	Percent Pool

PctRun	Percent Run
WD Ratio	Width to Depth Ratio
NumSubTypes	Number of Substrate Types
PctFines	Percent Fine Substrates (i.e. Smaller Than Gravel)
MDepthFine	Mean Depth of Fines (cm)
Pct Embed	Percent Substrate Embeddedness
PctRock	Percent Coarse Substrates (i.e. Gravel or Larger)
PctBoulder	Percent Boulder
CVDepth	Coefficient of Variation of Depth
PctCover	Percent Stream Cover
PctOverVeg	Percent Overhanging Vegetation
PctEmerMac	Percent Emergent Macrophytes
PctSubMac	Percent Submergent Macrophytes
PctWoody	Percent Woody Debris
PctUnderCut	Percent Undercut Bank
MBankEros	Mean Bank Erosion (m)
MSHA	Score Based on MPCA's Stream Habitat Assessment (MSHA)
MSHA_Rating	Ratings based examining the distribution of MSHA scores across
HDS	Human Disturbance Score
TOC	Total organic carbon
DOC	Dissolved organic carbon
TempH2O	Water temperature (°C) during fish sample
pH	pH
DO	Dissolved Oxygen (mg/L)
Phos	Total Phosphorus (mg/L)
Nitrogen	Nitrite/Nitrate (mg/L)
T_Ammonia	Total Ammonia (mg/L)
Conduct	Conductivity (µmhos/cm)
TSS	Total Suspended Solids (mg/L)
TSS Rating	Good= < 15 mg/L, Fair= 15- 65mg/L, Poor= > 65 mg/L
Nitrogen Rating	Warm water value 49 mg/L, Cold water 2A 3,1 mg/L
Phosphorus Rating	Good <0,055 mg/L, Fair 0.055-0,150 mg/L, Poor >0,158 mg/L
Fish Visit	Date that Fish, Habitat, and Water Chemistry Sampling Was Conducted (mm/dd/yyyy)
FishIBI	Fish IBI (0-100)
MeetsFishThreshold	Yes or No, Based on thresholds established for each fish class
Count of Taxa	Number of Fish Taxa
Sensitive	Number of Intolerant Fish Taxa
Hdw	Number of Headwater Fish Taxa
Minnow	Number of Minnow Taxa
Darter	Number of Darter Taxa
Insect	Number of Invertivore Fish Taxa
BenInsect	Number of Benthic Invertivore Fish Taxa

Omnivore	Number of Omnivore Fish Taxa
GameFishTaxa	Number of Game Fish Taxa
NumPerMeter-Tolerant	Number of Fish per Meter without Tolerant Fish Taxa
DomTwoPct	Percent of Individual Fish that are of the dominant two taxa
TolPct	Percent of Individual Fish that are Tolerant Taxa
FishDELTpct	Percent of Individual Fish with DELT Anomalies
PiscivorePct	Percent of individual fish that are Piscivores
SLithopPct	Percent of Individual Fish that are Simple Lithophilic Spawners
Invert Visit	Inverts Date That Macroinvertebrate Sampling Was Conducted (mm/dd/yyyy)
MIBI	Macro invertebrate IBI (0-100)
MeetsInvertThreshold	Yes or No, Based on thresholds established for each invert class
TaxaCount	Number of Macro invertebrate Taxa
Tolerant	Number of Tolerant Macro invertebrate Taxa
VeryTolerant	Number of Very Tolerant Macro invertebrate Taxa
EPT	Number of Ephemeroptera/Plecoptera/Tricoptera Taxa
Ephemeroptera	Number of Ephemeroptera Taxa
Plecoptera	Number of Plecoptera Taxa
Tricoptera	Number of Tricoptera Taxa
Chironomidae Ch	Number of Chironomidae Taxa
TaxaCountAllChir	Number of Macro Invertebrate Taxa—All Chironomidae Taxa included
IntolerantCh	Number of Intolerant Macroinvertebrate Taxa-All Chironomidae Taxa included
PredatorCh	Number of Predator Macroinvertebrate Taxa-All Chironomidae Taxa included
ClingerCh	Number of clinger Macroinvertebrate Taxa-All Chironomidae Taxa Included
ScraperCh	Number of Scraper Macroinvertebrate Taxa-All Chironomidae Taxa Included
Collector-filtererCh	Number of Collector-Filterer Macroinvertebrate Taxa-All Chironomidae Taxa Included
Collector-gathererCh	Number of collector-Gatherer Macroinvertebrate Taxa-All Chironomidae Taxa included
TanytarsiniCh	Number of Tanytarsini Macroinvertebrate Taxa-All Chironomidae Taxa included
LongLivedCh	Number of Long-lived Macroinvertebrate Taxa-All Chironomidae Taxa included
InvertTolerantPct	Percent of Individual Macro Invertebrates That Are Tolerant Taxa
VeryTolerant Pct	Percent of Individual Macro Invertebrates That Are Very Tolerant Taxa
EPT Pct	Percent of Individual Macro Invertebrates That Are Ephemeroptera/ Plecoptera/ Tricoptera
EphemeropteraPct	Percent of Individual Macroinvertebrates That Are Ephemeroptera
PlecopteraPct	Percent of Individual Macroinvertebrates That Are Plecoptera
TricopteraPct	Percent of Individual Macroinvertebrates That Are Tricoptera
ChironomidaeChPct	Percent of Individual Macroinvertebrates That Are Chironomidae
AmphipodaPct	Percent of Individual Macro Invertebrates That Are Amphipoda
PredatorPct	Percent of Individual Macroinvertebrates That Are Predators
ScraperPct	Percent of Individual Macroinvertebrates That Are Scrapers
Collector-filtererPct	Percent of Individual Macroinvertebrates That Are Collector-Filterers

Collector_gathererPct	Percent of Individual Macroinvertebrates That Are Collector-Gatherers
MeetsBothIBI	Meeting both Fish and Invert thresholds - Yes, No, or Not Assessed
IBIBoth	Meets both, Fish only, Invert only, or Not assessed
oversamp	Oversample
division	division
Intended#	Intended number of samples (Nest1)
nest1_wt	original draw weights
Basin	Major Basin site is in
WeightCat	Weight category with ecoregion, basin, and stream order 1,2,3, 4+
final_wgt	Final weights used to extrapolate estimates

Appendix 2. CDF test p-values

Bold p-values are valued found to be significantly different.

Watershed Land Use Metrics				
	State	MWS	MWP	TP
AgPercent	0.08235	0.03385	0.03350	0.18092
DisturbedPercent	0.03973	0.38212	0.95898	0.09906
DitchPercent	0.00354	0.00616	0.36153	0.11261
DrainSqMile	0.67453	0.84434	0.42795	0.39584
ForestPercent	0.00324	0.16913	0.40830	0.07837
ImpervPercent	0.57909	0.99741	0.42600	0.31704
RangePercent	0.11915	0.09732	0.06881	0.77926
RoadCrossingDensity	0.45568	0.09988	0.89162	0.05200
UrbanPercent	0.73691	0.47097	0.21325	0.90081
WetlandPercent	0.93557	0.01042	0.01082	0.14217
Habitat Characteristics Metrics				
	State	MWS	MWP	TP
CVDepth	0.34579	0.15136	0.01317	0.06143
Forestin100M	0.02599	0.37972	0.94675	0.08851
Gradient	0.06434	0.78407	0.92334	0.00859
HDS	0.28545	0.55074	0.57924	0.00073
MBankEros	0.00001	0.00666	0.00023	0.00003
Mean_Depth	0.36484	0.47843	0.02514	0.90179
MeanDepthFines	0.01333	0.46440	0.16091	0.01523
MeanThalweg_depth	0.25240	0.63561	0.03884	0.77434
MeanWidth	0.45439	0.28398	0.15109	0.50518
MSHA	0.56727	0.62811	0.54151	0.95702
Number_Stream_Features100M	0.04946	0.28436	0.00342	0.62869
NumSubTypes	0.12167	0.00217	0.02927	0.34538
PctAgLT	0.19432	0.45195	0.65575	0.14748
PctBoulder	0.02161	0.06341	0.04287	0.11216
PctCover	0.03110	0.88513	0.09741	0.24928

PctDistLU	0.30909	NA	0.85050	0.09821
PctDisturbedin100M	0.01974	0.32140	0.83609	0.02298
PctEmbedsubstrate	0.06190	0.94788	0.96481	0.03367
PctEmerMac	0.06152	0.18119	0.11747	0.20185
PctFines	0.75888	0.00046	0.17033	0.01414
PctOverVeg	0.48599	0.96605	0.86209	0.03775
PctPool	0.12480	0.23295	0.07697	0.14318
PctRock	0.95674	0.05855	0.82359	0.05529
PctRun	0.11257	0.00696	0.32882	0.06179
PctSubMac	0.14341	0.13133	0.14011	0.02364
PctUnderCut	0.01268	0.25348	0.00063	0.61888
PctWoody	0.34210	0.97847	0.11818	0.19116
PerRiffle	0.08185	0.45547	0.52331	0.34754
Sinuosity	0.08063	0.05248	0.06790	0.93983
WidthtoDepthRatio	0.00224	0.57953	0.55377	0.27381
Water Chemistry				
	State	MWS	MWP	TP
Conduct	0.00375	0.01963	0.33088	0.19208
DO	0.13648	0.20812	0.78177	0.27152
NH3	0.00001	0.00000	0.00045	0.76589
Nitrogen	0.29925	NA	0.77892	0.78110
ph	0.27427	0.73765	0.02644	0.48443
Phos	0.22555	0.00011	0.67626	0.19371
TempH2O	0.12300	0.37687	0.64590	0.43763
TSS	0.00910	0.00000	0.01474	0.00343
Fish Metrics				
	State	MWS	MWP	TP
Count_of_Taxa	0.04537	0.02366	0.28686	0.29659
Benthic Insectivore	0.06702	0.13414	0.38297	0.13558
Darter	0.00496	0.00259	0.50324	0.12373
DomTwoPct	0.90242	0.64651	0.00773	0.81244
FishDELTpct	0.05038	NA	0.49963	0.29105
GameFish	0.26594	0.01595	0.60461	0.13650
HeadwaterSp	0.10176	0.13025	0.39141	0.03227
Insectivores	0.08083	0.12224	0.10174	0.32255
Minnnow	0.31428	0.34159	0.88291	0.08976
#PerMeter_WO_tolerantSp	0.03389	0.02453	0.13343	0.15847
Omnivore	0.00966	NA	0.08648	0.01390
PiscivorePct	0.72013	0.89096	0.71186	0.34025
Sensitive	0.25185	0.05165	0.03490	0.61873
SLithopPct	0.28216	0.29977	0.26519	0.95150
TolPct	0.11452	0.23081	0.27803	0.12984

Macroinvertebrate Metrics

	State	MWS	MWP	TP
Amphipoda %	0.11246	0.13302	0.46665	0.00051
ChironomidaeCh	0.61556	0.36879	0.59747	0.19179
ChironomidaeCh%	0.10374	0.00228	0.27234	0.92548
ClingerCh	0.23011	0.05572	0.40515	0.94637
Collector_filtererCh	0.11609	0.04250	0.94413	0.95058
Collector_gathererCh	0.00417	0.40724	0.00049	0.05216
CollectORfiltererPct	0.01618	0.01102	0.40529	0.12537
CollectORGathererPct	0.00666	0.37865	0.16413	0.00083
Ephemeroptera	0.00108	0.08752	0.34659	0.00000
Ephemeroptera Pct	0.02045	0.19666	0.98417	0.00000
EPT	0.00017	0.00089	0.89084	0.01007
EPT Pct	0.11374	0.08074	0.90357	0.00001
Intolerant Ch	0.00000	0.00059	0.04639	0.00005
Long Lived Ch	0.00000	0.00000	0.01198	0.00001
Predator Ch	0.00000	0.00000	0.10091	0.00137
Predator Pct	0.58415	0.00337	0.01086	0.58862
Scraper Ch	0.01593	0.20747	0.22926	0.33192
Scraper Pct	0.34195	0.33084	0.87198	0.51804
Tanytharsini Ch	0.31878	0.49977	0.32017	0.25888
Taxa Count	0.00000	0.00000	0.00168	0.00710
Tolerant	0.00036	0.00447	0.09992	0.05323
Tolerant Pct	0.29192	0.61530	0.47304	0.61055
Trichoptera	0.00316	0.00001	0.84171	0.34370
Trichoptera Pct	0.22152	0.25876	0.87525	0.90820
Very Tolerant	0.00010	0.01403	0.03813	0.02041

Appendix 3. Change estimate values

Significant differences indicated by bold numbers. When lower and upper confidence intervals do not overlap the estimated difference (DiffEst) is significant.

Change estimations is an alternative to the CDF test for finding significant differences between the basin survey and ecoregion survey. The differences between the surveys is based closer to the mean or average value found for each data set in comparison to the CDF test which looks at data range. The difference estimates use a 99% confidence interval to predict significant differences between the two surveys. In many of the indicators used significant differences are aligned with the results found in the CDF test results. There are a few discrepancies. These discrepancies between the CDF test and change estimate analysis were not investigated due to the time restraints on the project. However since the data had been analyzed and may prove to be beneficial for future surveys, it was included here in the appendix.

	State			MWS			MWP			TP		
Indicator	DiffEst	LCB99%	UCB99%	DiffEst	LCB99%	UCB99%	DiffEst	LCB99%	UCB99%	DiffEst	LCB99%	UCB99%
AgPercent	5.953	-1.703	13.609	-1.050	-2.641	0.540	3.995	-6.686	14.675	3.910	-2.083	9.903
DisturbedPercent	3.428	-4.058	10.914	-2.876	-7.937	2.186	-1.230	-10.739	8.279	2.922	-0.766	6.610
DitchPercent	9.405	-0.536	19.345	8.278	-4.358	20.915	-5.158	-18.218	7.903	12.782	-4.637	30.201
DrainSqMile	-106.674	-665.849	452.501	266.976	-237.423	771.374	-601.201	-3003.139	1800.736	-153.900	-683.226	375.427
ForestPercent	-4.650	-10.742	1.441	-4.966	-14.604	4.672	1.077	-5.908	8.062	-0.771	-2.635	1.094
ImpervPercent	-0.099	-0.456	0.259	0.085	-0.290	0.460	-0.498	-1.155	0.159	-0.148	-0.830	0.534
RangePercent	-2.189	-5.036	0.659	-1.439	-5.563	2.684	-3.476	-11.221	4.270	-1.005	-3.846	1.836
RoadCrossingDensity	-0.026	-0.116	0.063	-0.114	-0.207	-0.022	0.035	-0.196	0.266	-0.004	-0.148	0.140
UrbanPercent	-0.289	-1.379	0.802	-0.264	-0.930	0.401	-1.749	-4.398	0.901	0.010	-1.869	1.888
WetlandPercent	1.296	-2.970	5.562	NA	NA	NA	-0.706	-5.188	3.775	-1.542	-3.400	0.316
CVDepth	-2.852	-8.205	2.500	-5.155	-13.352	3.042	-14.853	-23.964	-5.741	5.016	-3.473	13.505
Forestin100M	-4.059	-9.850	1.733	-2.618	-12.823	7.587	0.203	-6.457	6.863	-1.722	-3.456	0.011
Gradient	-0.929	-2.216	0.357	-2.623	-5.445	0.198	0.973	-2.030	3.976	-0.113	-0.548	0.322
HDS	-3.334	-7.688	1.020	-0.580	-4.352	3.192	0.415	-5.199	6.030	-3.770	-7.830	0.291
MBankEros	-0.146	-0.191	-0.101	-0.037	-0.067	-0.007	-0.133	-0.210	-0.057	-0.250	-0.348	-0.151
Mean_Depth	2.870	-2.866	8.607	3.409	-5.035	11.853	10.672	-0.277	21.621	-0.928	-10.212	8.357
MeanDepthFines	-4.947	-7.536	-2.359	-5.218	-9.642	-0.793	-5.549	-9.959	-1.139	-4.406	-8.485	-0.327
MeanThalweg_depth	-2.010	-15.673	11.652	3.585	-11.252	18.422	-11.544	-60.915	37.827	-0.441	-13.891	13.009

MeanWidth	0.196	-1.353	1.745	0.164	-2.507	2.836	1.298	-1.857	4.452	-0.145	-2.428	2.138
MSHA	-2.168	-6.578	2.241	-1.784	-6.197	2.629	-3.282	-10.334	3.770	-0.934	-8.137	6.270
# Stream_Features100M	-0.875	-2.356	0.606	0.383	-2.136	2.902	-3.196	-5.812	-0.579	-0.375	-2.329	1.579
NumSubTypes	-0.411	-0.867	0.045	-0.410	-1.106	0.286	-0.604	-1.527	0.318	-0.288	-1.029	0.454
PctAgLT	6.289	-1.747	14.325	-0.974	-2.008	0.060	1.939	-8.711	12.588	6.404	-2.609	15.418
PctBoulder	-0.675	-2.933	1.583	-0.675	-7.087	5.736	-0.622	-1.732	0.488	-0.335	-1.607	0.938
PctCover	7.354	-4.210	18.918	1.552	-14.933	18.037	1.054	-22.371	24.479	14.394	-4.372	33.161
PctDistLU	5.379	-6.013	16.771	-8.814	-13.624	-4.004	6.154	-15.139	27.446	9.545	-4.226	23.316
PctDisturbedin100M	4.297	-3.656	12.251	-2.535	-7.024	1.953	-3.823	-15.085	7.438	6.280	-0.731	13.291
PctEmbeddedsubstrate	11.702	0.236	23.167	4.830	-10.485	20.145	4.413	-14.424	23.250	18.378	-1.115	37.871
PctEmerMac	-1.060	-7.182	5.063	3.799	-3.174	10.771	-0.424	-7.554	6.706	-5.961	-17.379	5.457
PctFines	2.387	-5.543	10.317	6.179	-8.705	21.062	-0.315	-16.556	15.926	-0.367	-11.344	10.611
PctPool	-7.796	-12.816	-2.776	-7.287	-15.040	0.466	-9.426	-16.178	-2.674	-6.650	-15.116	1.816
PctPverVeg	4.553	-3.866	12.971	-4.506	-9.397	0.384	-1.307	-18.568	15.954	13.636	-1.206	28.479
Percent_Riffle	-0.068	-4.182	4.047	0.092	-8.725	8.909	-2.193	-8.325	3.938	1.520	-3.741	6.780
PctRock	-2.213	-10.300	5.875	-5.792	-21.117	9.534	1.284	-14.586	17.154	-0.189	-11.487	11.108
PctRun	4.648	-2.474	11.770	6.425	-3.499	16.348	4.674	-10.305	19.652	1.702	-9.433	12.837
PctSubMac	6.749	-1.113	14.611	4.274	-5.124	13.672	5.819	-6.243	17.881	8.980	-4.839	22.800
PctUnderCut	-0.391	-1.209	0.427	-0.083	-1.989	1.824	-0.964	-1.746	-0.182	-0.296	-1.337	0.745
PctWoody	-1.098	-3.594	1.397	-1.123	-7.178	4.933	-1.315	-4.664	2.034	-0.089	-1.260	1.083
PerRiffle	-0.068	-4.182	4.047	0.092	-8.725	8.909	-2.193	-8.325	3.938	1.520	-3.741	6.780
Sinuosity	0.002	-0.091	0.096	0.048	-0.100	0.195	0.075	-0.106	0.257	-0.080	-0.242	0.082
WidthtoDepthRatio	-1.278	-2.976	0.420	NA	NA	NA	0.304	-3.108	3.715	-1.158	-3.399	1.082

	State			MWS			MWP			TP		
Indicator	DiffEst	LCB99Pct	UCB99Pct	DiffEst	LCB99Pct	UCB99Pct	DiffEst	LCB99Pct	UCB99Pct	DiffEst	LCB99Pct	UCB99Pct
Conduct	73.411	-2.243	149.064	42.401	0.584	84.217	12.361	-67.066	91.788	47.389	-77.207	171.985
DO	0.337	-0.581	1.255	0.468	-0.658	1.593	-0.071	-1.603	1.460	0.319	-1.461	2.100
NH3	0.001	0.000	0.002	0.002	0.000	0.003	0.001	0.000	0.003	0.000	-0.002	0.002
Nitrogen	0.281	-1.411	1.972	-0.019	-0.038	0.000	-0.563	-2.053	0.926	0.082	-3.439	3.603
ph	0.196	0.044	0.349	0.187	-0.144	0.519	0.164	-0.105	0.433	0.162	0.009	0.315
Phos	-0.025	-0.137	0.086	0.018	-0.007	0.042	-0.041	-0.101	0.018	-0.076	-0.350	0.198
TempH2O	-0.162	-1.210	0.885	-0.021	-1.535	1.494	0.301	-1.525	2.128	-0.767	-2.614	1.081
TSS	-12.864	-23.222	-2.505	-0.055	-4.320	4.210	-24.524	-51.948	2.900	-19.709	-40.117	0.699
BenInsect	-0.306	-0.833	0.222	-0.669	-1.404	0.065	0.558	-0.729	1.846	-0.444	-1.289	0.402
Count_of_Taxa	-1.160	-2.790	0.470	-2.017	-4.219	0.185	0.169	-3.743	4.081	-1.161	-3.841	1.518
Darter	-0.193	-0.462	0.076	-0.495	-0.960	-0.031	0.191	-0.359	0.741	-0.161	-0.571	0.249
DomTwoCHPct	5.307	0.005	10.609	6.580	-0.401	13.561	2.589	-7.338	12.515	4.585	-4.496	13.666
FishDELTpct	-0.203	-0.498	0.092	-0.404	-0.907	0.099	-0.247	-1.007	0.513	0.029	-0.327	0.385
GameFish	-0.316	-0.800	0.169	-0.853	-1.610	-0.096	-0.447	-1.627	0.732	0.065	-0.653	0.783
HeadwaterSp	-0.183	-0.515	0.149	-0.323	-0.999	0.354	-0.273	-0.781	0.234	-0.056	-0.502	0.389
Insectivores	-0.547	-1.412	0.317	-1.169	-2.297	-0.042	0.704	-1.323	2.730	-0.682	-2.073	0.709
Minnow	-0.462	-1.195	0.271	-0.530	-1.623	0.563	-0.222	-1.876	1.433	-0.570	-1.781	0.641
#/Meter WO tolerantSp	-0.212	-0.375	-0.049	-0.309	-0.575	-0.043	-0.010	-0.300	0.279	-0.242	-0.526	0.043
Omnivore	-0.362	-0.629	-0.095	-0.334	-0.679	0.010	-0.382	-0.960	0.197	-0.387	-0.847	0.072
PiscivorePct	0.031	-2.629	2.690	0.734	-5.266	6.735	0.866	-4.748	6.480	-0.713	-2.937	1.510
Sensitive	-0.119	-0.649	0.410	-0.292	-1.215	0.632	0.477	-0.753	1.707	-0.255	-0.886	0.376
SLithopPct	3.221	-2.692	9.134	7.148	-3.605	17.900	3.020	-8.745	14.784	0.461	-7.596	8.518
TolPct	3.342	-4.520	11.204	4.931	-8.641	18.502	-8.189	-27.682	11.305	7.364	-0.911	15.640

	State			MWS			MWP			TP		
Indicator	DiffEst	LCB99Pct	UCB99Pct	DiffEst	LCB99Pct	UCB99Pct	DiffEst	LCB99Pct	UCB99Pct	DiffEst	LCB99Pct	UCB99Pct
AmphipodaPct	-1.998	-5.473	1.477	4.183	-2.172	10.539	3.372	-4.794	11.538	-9.061	-14.020	-4.103
Chironomidae	-2.278	-9.742	5.185	-8.383	-18.518	1.752	-0.196	-11.581	11.188	2.209	-11.591	16.009
ChironomidaeCh	-0.311	-1.892	1.270	-1.453	-4.112	1.207	-0.125	-2.664	2.414	0.856	-1.444	3.155
ClingerCh	-1.484	-2.992	0.024	-2.539	-4.635	-0.442	-0.362	-3.064	2.341	-0.575	-2.595	1.445
Collector_filtererCh	-0.611	-1.208	-0.014	-0.914	-1.727	-0.102	-0.060	-1.062	0.942	-0.455	-1.374	0.464
Collector_gathererCh	-1.910	-3.239	-0.580	-1.133	-3.677	1.410	-1.772	-3.701	0.156	-2.214	-3.834	-0.594
CollectORfiltererPct	-3.925	-8.173	0.324	-5.777	-12.050	0.496	-5.548	-15.516	4.419	-1.331	-7.550	4.889
CollectORGathererPct	-4.675	-11.169	1.819	5.636	-2.639	13.911	-3.758	-13.100	5.583	-13.117	-25.343	-0.891
Ephemeroptera	-1.057	-1.617	-0.497	-0.617	-1.416	0.183	-0.242	-1.291	0.806	-1.588	-2.410	-0.767
EphemeropteraPct	-3.130	-7.356	1.097	3.134	-3.717	9.985	-2.003	-9.372	5.366	-8.303	-14.500	-2.107
EPT	-2.476	-3.663	-1.289	-3.054	-4.823	-1.285	-0.686	-2.900	1.527	-2.176	-3.646	-0.707
EPTPct	-5.052	-11.026	0.922	-1.461	-10.290	7.368	-1.604	-11.870	8.662	-8.384	-17.208	0.440
IntolerantCh	-2.021	-2.752	-1.291	-3.101	-4.545	-1.657	-0.898	-1.966	0.170	-1.218	-2.058	-0.379
LongLivedCh	-2.282	-2.857	-1.707	-3.459	-4.465	-2.453	-1.637	-2.731	-0.542	-1.320	-2.008	-0.632
PredatorCh	-2.901	-3.936	-1.866	-5.066	-6.477	-3.655	-1.491	-2.817	-0.166	-1.403	-3.230	0.424
PredatorPct	-0.797	-3.107	1.512	-4.646	-7.392	-1.900	2.612	-0.426	5.650	1.075	-3.429	5.579
ScraperCh	-0.625	-1.201	-0.048	-0.812	-1.934	0.311	-0.567	-1.629	0.496	-0.402	-1.150	0.347
ScraperPct	5.787	-1.435	13.010	4.023	-2.070	10.115	0.526	-10.506	11.559	8.723	-5.608	23.054
TanytharsiniCh	0.016	-0.431	0.462	-0.137	-0.876	0.603	0.226	-0.471	0.924	0.173	-0.468	0.815
TaxaCount	-5.937	-7.832	-4.042	-8.116	-11.611	-4.621	-4.447	-7.580	-1.314	-4.075	-6.582	-1.568
Tolerant	-2.343	-3.558	-1.127	-2.394	-4.677	-0.112	-2.154	-3.856	-0.452	-2.334	-4.170	-0.498
TolerantPct	4.085	-2.189	10.360	2.309	-6.488	11.107	4.735	-6.017	15.487	4.377	-5.467	14.221
Trichoptera	-1.184	-1.844	-0.524	-2.169	-3.209	-1.129	-0.304	-1.547	0.939	-0.410	-1.145	0.326
TrichopteraPct	-1.742	-4.823	1.338	-4.299	-9.444	0.846	0.456	-4.673	5.585	-0.040	-4.672	4.592
VeryTolerant	-1.443	-2.258	-0.627	-1.668	-3.070	-0.266	-0.951	-1.992	0.089	-1.519	-2.799	-0.239

Appendix 4.

Condition estimates comparison of significant differences among the basin and ecoregion surveys – X marks where significant differences were found, NA indicates where not enough information was available to test for significant differences.

Watershed Land Use Metrics				
	State	MWS	MWP	TP
AqPercent	---	---	---	---
DisturbedPercent	---	---	---	---
DitchPercent	---	---	---	---
DrainSqMile	---	---	---	---
ForestPercent	---	---	---	---
ImpervPercent	---	---	---	---
RangePercent	---	---	---	---
UrbanPercent	---	---	---	---
WetlandPercent	---	NA	---	---
Habitat Characteristics Metrics				
	State	MWS	MWP	TP
Forest in 100M	---	---	---	---
Gradient	---	---	---	---
HDS	---	---	---	---
MBankEros	X	X	X	X
Mean_Depth	---	---	---	---
MSHA	---	---	---	---
NumSubTypes	---	---	---	---
% AqLT	---	---	---	---
% Cover	---	---	---	---
% Disturbed in 100M	---	---	---	---
% Fines	---	---	---	---
% Pool	X	---	X	---
% Riffle	---	---	---	---
% Rock	---	---	---	---
% Run	---	---	---	---
% Woody	---	---	---	---
Sinuosity	---	---	---	---
Width/Depth Ratio	---	NA	---	---
Water Chemistry				
	State	MWS	MWP	TP
Conduct	---	X	---	---
DO	---	---	---	---
NH3	X	X	X	---
Nitrogen	---	---	---	---
ph	X	---	---	X
Phos	---	---	---	---
TempH2O	---	---	---	---
TSS	X	---	---	---
Fish Metrics				
	State	MWS	MWP	TP
Count of Taxa	---	---	---	---
Dominant Two percent	X	---	---	---
Fish DELT %	---	---	---	---
Sensitive taxa	---	---	---	---
Tolerant %	---	---	---	---

Macroinvertebrate Metrics				
	State	MWS	MWP	TP
EPT	X	X	---	X
EPT %	---	---	---	---
Intolerant taxa	X	X	---	X
Long Lived taxa	X	X	X	X
Taxa Count	X	X	X	X
Tolerant taxa	X	X	X	X
Tolerant %	---	---	---	---

Appendix 5. Fish community CDF test p-values

	Basin	Ecoregion
Fish Indicator	p_Value	p_Value
Watershed Land Use Metrics		
AgPercent	5.45E-13	9.56E-07
DisturbedPercent	8.88E-16	6.64E-06
DitchPercent	3.54E-07	5.82E-06
DrainSqMile	9.62E-09	0.000124
ForestPercent	6.77E-15	1.08E-08
ImpervPercent	8.49E-05	----
RoadCrossingDensity	0.000272	----
UrbanPercent	4.65E-05	----
Habitat Characteristics Metrics		
Forestin100M	3.28E-13	2.07E-07
HDS	4.55E-15	3.19E-06
MeanDepthFines	1.55E-15	----
MSHA	0	3.83E-07
Number_Stream_Features100M	1.67E-05	1.46E-06
PctAgLT	1.17E-13	1.52E-06
PctBoulder	1.07E-11	0.000692
PctCover	8.65E-05	9.54E-05
PctDisturbedin100M	7.49E-10	0.000166
PctFines	2.64E-11	0.000878
PctPool	8.54E-07	----
PctRock	2.95E-14	2.57E-05
PctRun	3.9E-06	----
Percent_Riffle	6.3E-09	5.55E-08
WidthtoDepthRatio	----	0.000987
Water Chemistry		
Conduct	5.6E-08	2.11E-07
DO	2.93E-05	----
Nitrogen	6.31E-07	----
Phos	3.41E-08	0.000198

Appendix 6. Invertebrate CDF test p-values

	Basin	Ecoregion
Invertebrate Indicator	p_Value	p_Value
Watershed Land Use Metrics		
AgPercent	1.11E-16	7.22E-15
DisturbedPercent	0	2.83E-10
DitchPercent	0.000168	3.42E-07
DrainSqMile	----	0.000402
ForestPercent	0	1.11E-16
ImpervPercent	2.58E-07	0.000435
RoadCrossingDensity	3.07E-11	1.58E-05
UrbanPercent	2.03E-09	5.18E-07
Habitat Characteristics Metrics		
CVDepth	0.000112	
Forestin100M	0	2.22E-16
HDS	0	1.51E-12
MeanThalweg_depth	0.000319	----
MeanWidth	1.26E-05	3.38E-05
MSHA	0	2.75E-14
PctAgLT	0	1.2E-14
PctBoulder	7.31E-05	0.000865
PctCover	----	5.72E-05
PctDistLU	6.42E-13	6.98E-10
PctDisturbedin100M	0	1.75E-13
PctFines	0.000803	2.26E-05
PctRock	3.46E-05	4E-07
PctWoody	2.1E-08	3.48E-05
Percent_Riffle	0.000533	2.24E-10
WidthtoDepthRatio	0.000643	0.000289
Water Chemistry		
Conduct	0	1.56E-12
DO	3.64E-05	----
Nitrogen	1.16E-07	----
ph	----	0.000179
Phos	1.45E-06	3.9E-07
TSS	1.43E-05	----

Appendix 7. Site location information and weighting

FieldNum	WBName	Latitude	Longitude	Ecoregion Name	Strahler	Class	Site Status	Weight Category	final_wgt
96SC001		45.89737	-93.55553	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC002	Snake River	46.06189	-93.21952	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC003	Snake River	46.06017	-93.22044	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC004	Little Ann River	45.96874	-93.42882	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC005	Trib. to Spring Lake	45.89666	-93.25932	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC006	Knife River	46.03536	-93.38002	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503
96SC007	Snake River	46.01766	-93.23882	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC008	Knife River (Dry Run)	46.06915	-93.46773	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC009		45.81034	-93.03199	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_St. Croix_1st	197.9187653
96SC010	Snake River	45.79031	-93.10694	Mixed Wood Plains	5	2B	Target	Mixed Wood Plains_St. Croix_4th+	77.0298947
96SC011	Mud Creek	45.87203	-93.1351	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_St. Croix_3rd	32.79658587
96SC012	Snake River	45.84354	-92.88971	Mixed Wood Plains	5	2B	Target	Mixed Wood Plains_St. Croix_4th+	77.0298947
96SC013	Mission Creek	45.89317	-92.98041	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_St. Croix_2nd	72.92070279
96SC014		45.48745	-93.10021	Mixed Wood Plains	2	2B	Permission denied	Mixed Wood Plains_St. Croix_2nd	72.92070279
96SC015	Rush Creek	45.67968	-92.98907	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_St. Croix_3rd	32.79658587
96SC016	unnamed ditch to Hay Creek	45.53867	-92.93325	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_St. Croix_1st	197.9187653
96SC017	Groundhouse River	45.84109	-93.44743	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503
96SC018	Snake River	45.81262	-93.27988	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_St. Croix_4th+	77.0298947
96SC019	Snake River	45.79367	-93.18112	Mixed Wood Plains	5	2B	Target	Mixed Wood Plains_St. Croix_4th+	77.0298947
96SC020		45.71892	-93.45634	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_St. Croix_1st	197.9187653
96SC021	Ann River	45.87213	-93.34392	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_St. Croix_3rd	32.79658587
96SC022	Rock Creek	45.71852	-92.91021	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_St. Croix_3rd	32.79658587
96SC023	Goose Creek	45.59389	-92.89985	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_St. Croix_3rd	32.79658587
96SC024	Sunrise River	45.34659	-92.95895	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_St. Croix_2nd	72.92070279
96SC025	North Branch Sunrise River	45.51219	-92.89282	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_St. Croix_3rd	32.79658587
96SC026		45.38503	-92.69394	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_St. Croix_2nd	72.92070279

96SC027	County Ditch #7	45.48991	-92.99101	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_St. Croix_1st	197.9187653
96SC028	St Croix River	45.26927	-92.75368	Mixed Wood Shield	6	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC029	Lower Tamarack River	46.05412	-92.39616	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503
96SC030	St Croix River	45.88046	-92.72937	Mixed Wood Shield	6	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC031		45.87977	-92.7751	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC032	Kettle River	45.96045	-92.82336	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC033	Kettle River	45.90114	-92.7309	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC034	Bear Creek	46.01359	-92.74487	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC035		46.42465	-92.94721	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC036	Trib. to Dead Moose River	46.52159	-92.97184	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC037	Upper Tamarack River	46.14237	-92.29416	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503
96SC038	McDermott Creek	46.20655	-92.39439	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC039	West Branch Kettle River	46.60136	-93.01392	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC040	Kettle River	46.45577	-92.87349	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503
96SC041		46.49466	-92.6556	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC042	Gillespie Brook	46.52108	-92.79198	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC043	Pine River	46.28036	-92.92781	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC044	Trib. to Burnam Creek	46.2857	-92.98711	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC045	Cane Creek	46.24622	-92.78165	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC046	Kettle River	46.36704	-92.86101	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC047	Kettle River	46.39817	-92.87971	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC048	Kettle River	46.35323	-92.8402	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC049	Trib. to Snake River	46.20026	-93.25423	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC050	Snake River	46.32376	-93.27618	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503
96SC051	Trib. to Chelsey Brook	46.17343	-93.17561	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC052	Snake River	46.22272	-93.24182	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503
96SC053	Kettle River	46.03673	-92.87197	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_St. Croix_4th+	25.70166
96SC054	Deer Creek	46.05361	-92.88169	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC055	Bear Creek	46.11166	-92.7907	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC056	Lower Tamarack River	46.07927	-92.42779	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_St. Croix_3rd	31.54614503

96SC057		46.19387	-92.7165	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC058	East Fork Crooked Creek	46.07914	-92.55502	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_St. Croix_2nd	80.63209429
96SC059		46.15937	-92.47709	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_St. Croix_1st	97.77550448
96SC060		44.79937	-92.8198	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_St. Croix_1st	197.9187653
97LS001	unnamed creek	47.54153	-92.31159	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS002	St Louis River	47.45257	-92.3109	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS003	St Louis River	47.46101	-92.09245	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS004		47.57551	-92.15341	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS005	Embarrass River	47.62714	-92.2361	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS006		47.37803	-92.88072	Mixed Wood Shield	NA	2A	Non-Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS007		47.35351	-92.81513	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS008		47.47263	-92.74821	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS009	Skunk Creek	47.2277	-91.53174	Mixed Wood Shield	1	2A	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS010	Beaver River	47.27146	-91.39485	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS011	Trib. to Lake Superior	47.21094	-91.36749	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS012	unnamed creek	47.14388	-91.48925	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS013		47.09686	-92.06422	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS014	Cloquet River	47.17129	-91.96724	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS015	Berry Creek	47.29341	-91.90066	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS016	Cloquet River	47.30968	-91.79668	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS017		47.33502	-91.93282	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS018	St Louis River	47.43925	-92.14463	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907

97LS019	South Branch Whiteface River	47.28468	-92.09267	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS020	Trib. to Shiver Creek	47.36835	-92.05091	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS021	East Swan River	47.2343	-92.80354	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS022	Trib. to East Swan River	47.28235	-92.81148	Mixed Wood Shield	1	2A	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS023	East Swan River	47.29747	-92.84359	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS024	unnamed creek	47.10464	-92.34288	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS025	Bug Creek	47.17399	-92.18311	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS026	Us-Kab-Wan-Ka River	47.01326	-92.34256	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS027	St Louis River	47.31351	-92.66757	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS028	Paleface River	47.26878	-92.36609	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS029	St Louis River	47.36904	-92.46737	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS030	Trib. to Little Whiteface	47.08428	-92.56287	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS031		47.03242	-92.72274	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS032		47.15661	-93.11086	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS033	Floodwood River	46.94583	-92.91112	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS034	Vaara Creek	47.07273	-92.97887	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS035		47.04217	-93.0563	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS036	Trib. to Lester River	46.89748	-92.0099	Mixed Wood Shield	1	2A	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS037	Trib. to Lester River	46.94814	-92.0759	Mixed Wood Shield	1	2A	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS038	East Branch Amity Creek	46.86378	-92.04708	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507

97LS039	Trib. to Midway River	46.81214	-92.31206	Mixed Wood Shield	1	2A	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS040		46.91936	-92.332	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS041	Gooseberry River	47.14279	-91.45988	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS042	Trib. to Stewart River	47.09504	-91.67897	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS043		46.39092	-92.45269	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS044		46.49766	-92.53874	Mixed Wood Shield	NA	2A	Non-Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS045	Nemadji River	46.53029	-92.33361	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS046	Rock Creek	46.53538	-92.3527	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS047	Mission Creek	46.68533	-92.28569	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS048	Crystal Creek	46.70672	-92.40637	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS049		46.84406	-92.83324	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS050	Trib. to Stoney Brook	46.85999	-92.64625	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS051	Temperance River	47.69763	-90.8751	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS052	Poplar River	47.69712	-90.70368	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS053	Poplar River	47.70161	-90.70383	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS054	Hockamin Creek	47.38227	-91.37659	Mixed Wood Shield	1	2A	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS055	Beaver River	47.27245	-91.31752	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS056	Schoolhouse Creek	47.46498	-91.17221	Mixed Wood Shield	1	2A	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS057	Cross River	47.62204	-90.97359	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS058	East Branch Beaver River	47.38202	-91.39846	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507

97LS059	West Branch Baptism River	47.53034	-91.31521	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS060	Cascade River	47.83343	-90.53323	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS061		47.78729	-90.76331	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS062	Temperance River	47.75135	-90.87618	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS063	Pigeon River	48.00552	-89.6477	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Lake Superior_4th+	94.02260335
97LS064	Kemo Lake Outlet	47.89609	-90.42478	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS065	South Brule River	47.94347	-90.43316	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
97LS066	Kadunce River	47.82892	-90.14926	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Lake Superior_2nd	216.2142507
97LS067		47.95051	-89.81026	Mixed Wood Shield	1	2A	Permission denied	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS068	Trib. to Tom Lake	47.94007	-90.08049	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS069		48.00465	-90.5796	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Lake Superior_1st	408.2916937
97LS070	Reservation River	47.87913	-89.86306	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Lake Superior_3rd	134.0565907
99UM001	Moose Creek	47.71597	-94.37437	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM002	unnamed creek	46.35034	-95.26299	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM003	Little Elk River	46.08582	-94.4882	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Upper Mississippi_3rd	150.9034737
99UM004	unnamed creek	45.24389	-93.21798	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM005	unnamed creek	45.33592	-94.37907	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM006	Grant Creek	47.49114	-94.98813	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM007	unnamed creek	46.59601	-95.11783	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM008		46.05535	-94.88186	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042

99UM009	Trib. to Rum River	45.26251	-93.40639	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM010	South Fork Crow River	44.91912	-93.87605	Temperate Prairies	5	2B	Target	Temperate Prairies_Upper Mississippi_4th+	108.1543652
99UM011	Fish Creek	46.97812	-95.4101	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM012	Trib. to Bear Creek	46.30532	-95.05601	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM013	County Ditch #4	45.67929	-93.60711	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM014		45.28377	-94.41934	Mixed Wood Plains	2	2B	Permission denied	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM015	unnamed ditch	46.67187	-93.50588	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM016		47.37746	-93.28198	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM017	Mississippi River	44.85958	-93.00777	Mixed Wood Plains	8	2B	Target	Mixed Wood Plains_Upper Mississippi_4th+	404.2539019
99UM018	Bogus Brook	45.73833	-93.51109	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM019	unnamed creek	45.99003	-94.93232	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM020	County Ditch #13	44.81221	-94.15025	Temperate Prairies	2	2B	Target	Temperate Prairies_Upper Mississippi_2nd	219.1196397
99UM021	Turtle River	47.55211	-94.61251	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Upper Mississippi_3rd	150.9034737
99UM022	Farnham Creek	46.50713	-94.79366	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM023	Hillman Creek	45.97072	-94.00387	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM024	unnamed creek	45.20462	-93.08264	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM025	Trib. to Crow River, North Fork	45.15433	-94.01125	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM026	SchoolCraft River	47.31309	-94.94706	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Upper Mississippi_4th+	305.5924243
99UM027	Home Brook	46.46906	-94.40754	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Upper Mississippi_3rd	150.9034737
99UM028	Battle Brook	45.50139	-93.61548	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344

99UM029	Trib. to Sauk River	45.49662	-94.70526	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM030	unnamed ditch	46.65208	-93.15937	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM031	Fish Hook River	46.91932	-95.05258	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Upper Mississippi_3rd	150.9034737
99UM032		46.15819	-95.06633	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM033	unnamed creek	45.66159	-93.75188	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM034	Mississippi River	45.40453	-94.01215	Mixed Wood Plains	6	2B	Target	Mixed Wood Plains_Upper Mississippi_4th+	404.2539019
99UM035	unnamed ditch	46.59786	-93.76498	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM036	Island Lake Creek	47.41504	-93.72506	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM037	Pine River	46.61597	-94.0682	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Upper Mississippi_4th+	305.5924243
99UM038	Elk River	45.37821	-93.76975	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Upper Mississippi_4th+	404.2539019
99UM039	Long Prairie River	46.01292	-94.9906	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM040	County Ditch #23	44.97914	-94.7111	Temperate Prairies	1	2B	Target	Temperate Prairies_Upper Mississippi_1st	912.1186269
99UM041	unnamed creek	46.98552	-93.32022	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM042	Arvig Creek	46.7058	-94.36327	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM043	Trib. to Zuleger Creek	45.78353	-94.14326	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM044	South Two River	45.64559	-94.51517	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM045	Grove Creek	45.19817	-94.62801	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM046		47.01477	-93.89481	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM047	Trib. to Shell River	46.91625	-95.36414	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM048	Platte River	45.92666	-94.25674	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Upper Mississippi_4th+	404.2539019

99UM049		45.66186	-95.10232	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM050	North Fork Crow River	45.51745	-95.00312	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Upper Mississippi_4th+	404.2539019
99UM051	unnamed ditch	46.81848	-93.57098	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM052		44.76329	-94.16137	Temperate Prairies	NA	class7	Non-Target	Temperate Prairies_Upper Mississippi_2nd	219.1196397
99UM053		45.97283	-94.49365	Mixed Wood Shield	1	class7	Permission denied	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM054	Trib. to Fairfield Creek	45.88325	-95.23643	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM055	Trib. to Crow River, North Fork	45.20048	-94.52947	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM056	Trib. to Swan River	47.15015	-93.25523	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Upper Mississippi_2nd	144.1066769
99UM057		46.85139	-94.67877	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM058	Little Rock Creek	45.87271	-94.14576	Mixed Wood Plains	2	2A	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM059		45.13092	-93.26196	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM060	Twelvemile Creek	45.06223	-94.01806	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Upper Mississippi_3rd	168.6209344
99UM061	Hay Creek	47.28507	-93.14539	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Upper Mississippi_3rd	150.9034737
99UM062	Crow Wing River	46.3258	-94.58758	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Upper Mississippi_4th+	305.5924243
99UM063		45.58938	-94.01796	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM064	Trib. to Sauk River	45.51737	-94.6064	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM065	unnamed ditch to Mississippi R	46.55338	-93.85298	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM066	Mississippi River	47.27383	-93.785	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Upper Mississippi_1st	394.2938726
99UM067	Skunk River	46.09823	-93.89825	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Upper Mississippi_2nd	272.8218389
99UM068		45.51242	-93.5769	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042

99UM069		45.54203	-95.14017	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Upper Mississippi_1st	481.3417042
99UM070	South Fork Crow River	44.8784	-94.453	Temperate Prairies	4	2B	Target	Temperate Prairies_Upper Mississippi_4th+	108.1543652
01MN001	County Ditch #22	45.44484	-96.14459	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN002		43.98764	-94.43507	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN003	Judicial Ditch # 8	45.24749	-95.78862	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN004	Co. Ditch #70	43.70282	-93.88253	Temperate Prairies	1	2B	Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN005	unnamed trib. to Co. Ditch #3	45.03162	-95.13097	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN006	Trib. to Dutch Charley Creek	44.19091	-95.31427	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN007	Highwater Creek	43.98404	-95.40188	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN008	East Creek	44.80982	-93.58485	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN009		44.89073	-96.02736	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN010	Minnesota River	44.41588	-94.69632	Temperate Prairies	7	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN011	Spring Creek	44.96903	-95.6861	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN012	Middle Branch Rush River	44.50381	-94.23469	Temperate Prairies	4	class7	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN013	Trib. to Yellow Medicine, North Branch	44.59514	-96.24579	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN014	Rice Creek	43.74074	-94.02315	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN015	Perch Creek	43.97317	-94.34133	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN016		45.98974	-95.73935	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Minnesota_1st	858.8412564
01MN017		44.82202	-96.37213	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN018		44.47456	-94.66131	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN019	unnamed trib. to Emily Creek	45.09599	-96.05961	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN020	unnamed trib. to Minnesota River.	44.23273	-93.93835	Temperate Prairies	1	2B	Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN021	Canby Creek	44.70456	-96.2797	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN022	Brush Creek	43.55534	-93.77549	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN023	unnamed ditch to Storm Lake	44.12691	-94.38386	Temperate Prairies	1	2B	Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN024		45.26534	-95.2906	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN025	East Fork Beaver Creek	44.78948	-94.90842	Temperate Prairies	2	class7	Target	Temperate Prairies_Minnesota_2nd	188.0439179

01MN026	Pell Creek	44.25081	-95.32616	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN027		44.23975	-96.18981	Temperate Prairies	2	2B	Permission denied	Temperate Prairies_Minnesota_2nd	188.0439179
01MN028	Co. Ditch #42	44.55432	-94.37029	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN029		44.51635	-95.97516	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN030	Judicial Ditch #51	43.89048	-93.7937	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN031		44.07011	-95.10344	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN032	Muddy Creek	45.5434	-95.93771	Temperate Prairies	4	class7	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN033	South Fork Yellow Bank River	45.11468	-96.38887	Temperate Prairies	5	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN034	Cottonwood River	44.22891	-94.77944	Temperate Prairies	5	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN035	unnamed ditch	45.09551	-95.38015	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN036	Cobb Creek Ditch	43.7871	-93.55724	Temperate Prairies	2	class7	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN037	Ten Mile Creek (Jud. Ditch #1)	44.8356	-95.89618	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN038	Judicial Ditch #30	44.33697	-94.95221	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN039	Cobb River	44.02337	-93.99199	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN040	Trib. to Le Suer River	43.97094	-93.37469	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN041	Chetomba Creek	44.87323	-95.38003	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN042	Cottonwood River	44.34457	-95.62086	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN043		44.35821	-96.33638	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN044	Sand Creek	44.64965	-93.61406	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN045	Judicial Ditch #20	44.65083	-95.89787	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN046	Blue Earth River	43.72444	-94.15387	Temperate Prairies	5	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN047	Watonwan River	43.98273	-94.9193	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN048		45.78507	-95.43594	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Minnesota_1st	858.8412564
01MN049		44.73452	-96.42792	Temperate Prairies	4	2B	Permission denied	Temperate Prairies_Minnesota_4th+	143.1175772
01MN050	Minnesota River	44.37067	-94.51919	Temperate Prairies	7	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772

01MN051	Stony Run	45.29213	-96.33878	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN052	Watonwan River	44.05527	-94.53227	Temperate Prairies	5	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN053	Judicial Ditch #33	44.5373	-95.40674	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN054	East Branch Blue Earth River	43.62653	-93.67392	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN055	Boiling Springs Creek	44.66318	-95.3081	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN056	Highwater Creek	44.12105	-95.27092	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN057	Coon Creek	44.3512	-96.04929	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN058	unnamed trib. to Sand Creek	44.70951	-93.54999	Temperate Prairies	2	2B	Target	Temperate Prairies_Minnesota_2nd	188.0439179
01MN059	Lac Qui Parle River	44.95847	-96.02286	Temperate Prairies	6	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN060	Judicial Ditch #1	44.45742	-94.39599	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN061	Ten Mile Creek	44.91759	-95.87703	Temperate Prairies	3	2B	Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN062	High Island Creek	44.57676	-93.98517	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN063		44.73125	-96.01406	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_3rd	133.7722815
01MN064	East Branch Blue Earth River	43.62757	-94.03454	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN065	Minnesota River	44.26008	-94.35771	Temperate Prairies	7	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN066		45.99338	-95.86534	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Minnesota_1st	858.8412564
01MN067		45.09064	-96.22896	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_1st	1118.643251
01MN068		44.70451	-94.68191	Temperate Prairies	2	2B	Permission denied	Temperate Prairies_Minnesota_2nd	188.0439179
01MN069	Pomme de Terre River	45.19846	-96.07399	Temperate Prairies	4	2B	Target	Temperate Prairies_Minnesota_4th+	143.1175772
01MN070		44.14704	-93.67218	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Minnesota_1st	1118.643251
04CD001	Rose Creek	43.65098	-92.81104	Temperate Prairies	3	2B	Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD002	Cedar River	43.56581	-93.00011	Temperate Prairies	5	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD003	Cedar River	43.87964	-92.92665	Temperate Prairies	3	2B	Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD004	County Ditch No. 16	43.60781	-93.36476	Temperate Prairies	1	2B	Target	Temperate Prairies_Cedar_1st	99.56942983
04CD005		43.67318	-92.88379	Temperate Prairies	2	2B	Permission denied	Temperate Prairies_Cedar_2nd	70.93944179

04CD006	Turtle Creek	43.68657	-93.05021	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD007		43.70624	-93.38201	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD008	Little Cedar River	43.51369	-92.755	Temperate Prairies	3	2B	Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD009	Trib. to Cedar River	43.7998	-92.98403	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD010	Turtle Creek	43.66116	-93.00322	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD011		43.74612	-93.12441	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD012	Rose Creek	43.6082	-92.91851	Temperate Prairies	3	2B	Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD013	County Ditch No. 30	43.77716	-93.30578	Temperate Prairies	2	2B	Target	Temperate Prairies_Cedar_2nd	70.93944179
04CD014		43.55741	-92.81258	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD015	Shell Rock River	43.52886	-93.2764	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD016	Little Cedar River	43.89922	-92.99983	Temperate Prairies	3	2B	Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD017	Shell Rock River	43.57348	-93.27782	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD018	Cedar River	43.84459	-93.00162	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD019		43.58558	-92.90078	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD020		43.53161	-93.44584	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD021		43.90148	-92.86035	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD022		43.78019	-92.88478	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD023	Cedar River	43.76701	-92.96342	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD024	Cedar River	43.52727	-93.00032	Temperate Prairies	5	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD025	unnamed trib. to Cedar River	43.5803	-92.9861	Temperate Prairies	3	2B	Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD026		43.61273	-92.99781	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD027	Deer Creek	43.75364	-93.15221	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD028	County Ditch No. 17	43.50766	-93.32843	Temperate Prairies	2	2B	Target	Temperate Prairies_Cedar_2nd	70.93944179
04CD029		43.84202	-92.82456	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD030		43.53445	-92.65249	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD031	Otter Creek	43.51144	-92.9196	Temperate Prairies	3	2B	Target	Temperate Prairies_Cedar_3rd	20.50907731
04CD032		43.78769	-92.80275	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Cedar_1st	99.56942983
04CD033	Roberts Creek	43.74815	-92.91614	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD034	Knolvold Branch	43.7901	-93.24137	Temperate Prairies	2	2B	Target	Temperate Prairies_Cedar_2nd	70.93944179
04CD035	unnamed trib. to Rose Creek	43.69537	-92.70467	Temperate Prairies	1	2B	Target	Temperate Prairies_Cedar_1st	99.56942983

04CD036	Trib. to Cedar River, East Fork	43.8513	-92.93194	Temperate Prairies	2	2B	Target	Temperate Prairies_Cedar_2nd	70.93944179
04CD037	Shell Rock River	43.60775	-93.29153	Temperate Prairies	4	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04CD038	Cedar River	43.69295	-92.96744	Temperate Prairies	5	2B	Target	Temperate Prairies_Cedar_4th+	8.930973665
04DM001	Beaver Creek	44.01255	-95.74041	Temperate Prairies	4	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04DM002	Trib. to Des Moines River	43.88886	-95.21718	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM003	Judicial Ditch No. 12	43.82321	-95.63455	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM004	Jack Creek	43.76311	-95.52506	Temperate Prairies	4	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04DM005	Judicial Ditch No. 11	43.52095	-94.8836	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM006	County Ditch #26	44.17938	-95.90033	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM007		43.98362	-95.58753	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_1st	151.359433
04DM008	Trib. to Jack Creek	43.78707	-95.62789	Temperate Prairies	1	2B	Target	Temperate Prairies_Des Moines_1st	151.359433
04DM009	unnamed stream	43.93707	-95.75345	Temperate Prairies	3	class7	Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM010	Judicial Ditch No. 66	43.61919	-95.00403	Temperate Prairies	1	2B	Target	Temperate Prairies_Des Moines_1st	151.359433
04DM011	unnamed ditch	43.69268	-95.22739	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM012	Beaver Creek	44.03612	-95.82377	Temperate Prairies	4	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04DM013	Des Moines River	43.86876	-95.39571	Temperate Prairies	5	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04DM014		43.89456	-95.78783	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_1st	151.359433
04DM015	Beaver Creek	44.02842	-95.9739	Temperate Prairies	3	2B	Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM016		43.76517	-95.40637	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_1st	151.359433
04DM017		43.59733	-94.88275	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_1st	151.359433
04DM018	Heron Lake Outlet	43.80445	-95.26753	Temperate Prairies	5	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019

04DM019	Trib. to Des Moines River	43.94091	-95.15585	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM020	Des Moines River	43.89186	-95.26881	Temperate Prairies	6	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04DM021	Judicial Ditch No. 10	43.51204	-94.79489	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM022	Trib. to Jack Creek	43.88599	-95.69497	Temperate Prairies	3	2B	Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM023		43.97806	-95.96429	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM024	Des Moines River	43.79026	-95.09411	Temperate Prairies	6	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04DM025	Jack Creek	43.76744	-95.37864	Temperate Prairies	4	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04DM026	County Ditch No. 48	44.2047	-95.85681	Temperate Prairies	3	2B	Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM027	Des Moines River	43.91911	-95.47716	Temperate Prairies	1	2B	Target	Temperate Prairies_Des Moines_1st	151.359433
04DM028		43.77111	-95.68048	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_1st	151.359433
04DM029	Trib. to Lime Lake	43.96509	-95.71247	Temperate Prairies	3	class7	Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM030	Devil's Run (County Ditch # 4)	44.03607	-95.54627	Temperate Prairies	1	2B	Target	Temperate Prairies_Des Moines_1st	151.359433
04DM031		43.87027	-95.57266	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM032	unnamed ditch	43.84026	-95.76637	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM033	Trib. to Jack Creek	43.80477	-95.58096	Temperate Prairies	3	2B	Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM034		43.53221	-94.57351	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Des Moines_3rd	37.04975135
04DM035	Jack Creek	43.83279	-95.8066	Temperate Prairies	2	2B	Target	Temperate Prairies_Des Moines_2nd	35.37001531
04DM043	Des Moines River	43.7192	-95.04529	Temperate Prairies	6	2B	Target	Temperate Prairies_Des Moines_4th+	38.97297019
04LM001	Trib. to Trout Brook	44.36026	-92.66667	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM002		43.80122	-92.00117	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206

04LM003	Trib. to Zumbro River, South Fork	44.07769	-92.50182	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM004	Pine Creek	44.54643	-92.90216	Temperate Prairies	2	2A	Target	Temperate Prairies_Lower Mississippi_2nd	94.13019687
04LM005	North Fork Whitewater River	44.03764	-92.25775	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM006	Root River	43.80696	-92.14283	Mixed Wood Plains	5	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM007	Wells Creek	44.4956	-92.36151	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM008	Trib. to Zumbro River, North Fork	44.29196	-92.77828	Mixed Wood Plains	1	2B	Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM009		43.62588	-91.57324	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM010	Trib. to Salem Creek	43.9915	-92.79536	Temperate Prairies	2	2B	Target	Temperate Prairies_Lower Mississippi_2nd	94.13019687
04LM011	Trib. to Forestville Creek	43.64208	-92.24696	Mixed Wood Plains	2	2A	Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM012		44.27249	-91.96171	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM013		44.21815	-92.24349	Mixed Wood Plains	NA	2A	Non-Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM014	Straight River	44.2171	-93.23107	Temperate Prairies	5	2B	Target	Temperate Prairies_Lower Mississippi_4th+	130.0526023
04LM015		44.58465	-93.20891	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Lower Mississippi_2nd	94.13019687
04LM016	Money Creek	43.81312	-91.60149	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM017		43.85924	-92.74427	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM018	Beaver Creek	43.5605	-92.43285	Temperate Prairies	3	2B	Target	Temperate Prairies_Lower Mississippi_3rd	51.24601295
04LM019		43.87291	-91.48512	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM020	South Fork Whitewater River	43.982	-92.05829	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM021	Willow Creek	43.64886	-92.10254	Mixed Wood Plains	3	2A	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM022	Judicial Ditch No. 1	44.13343	-93.42666	Temperate Prairies	1	2B	Target	Temperate Prairies_Lower Mississippi_1st	506.1281867

04LM023		44.63381	-92.8515	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Lower Mississippi_2nd	94.13019687
04LM024	Willow Creek	43.97268	-92.45133	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM025	North Branch Root River	43.88028	-92.26376	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM026		43.74896	-92.57381	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM027		44.05583	-92.60025	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM028	Trib. to Zumbro River, Middle Fork	44.17396	-93.01694	Temperate Prairies	1	2B	Target	Temperate Prairies_Lower Mississippi_1st	506.1281867
04LM029	South Branch Vermillion River	44.63628	-93.02933	Temperate Prairies	3	2B	Target	Temperate Prairies_Lower Mississippi_3rd	51.24601295
04LM030	Trib. to Winnebago Creek	43.54948	-91.394	Mixed Wood Plains	1	2A	Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM031	Wells Creek	44.46514	-92.46448	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM032	Rush Creek	43.94278	-91.86603	Mixed Wood Plains	3	2A	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM033	Straight River	44.02598	-93.26107	Temperate Prairies	3	2B	Target	Temperate Prairies_Lower Mississippi_3rd	51.24601295
04LM034	Pine Creek	43.81039	-91.31144	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM035	Middle Fork Whitewater River	44.03039	-92.11539	Mixed Wood Plains	3	2A	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM036		43.76345	-91.89784	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM037	Spring Creek	44.53533	-92.65447	Mixed Wood Plains	3	2A	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM038	Little Cannon River	44.42038	-92.91391	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM039		43.7219	-91.995	Mixed Wood Plains	NA	2A	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM040		43.78012	-92.31663	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM041		44.16781	-91.84815	Mixed Wood Plains	2	2B	Permission denied	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM042	Silver Spring Creek	44.18177	-92.35827	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273

04LM043		44.07807	-92.93675	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Lower Mississippi_3rd	51.24601295
04LM044	Wolf Creek	44.37986	-93.3402	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM045		43.51979	-91.52131	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Lower Mississippi_1st	506.1281867
04LM046	Spring Creek	44.49035	-93.02646	Temperate Prairies	2	2B	Target	Temperate Prairies_Lower Mississippi_2nd	94.13019687
04LM047		43.75689	-91.66245	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM048	Upper Iowa River	43.50248	-92.14043	Temperate Prairies	4	2B	Target	Temperate Prairies_Lower Mississippi_4th+	130.0526023
04LM049	East Indian Creek	44.20585	-92.04279	Mixed Wood Plains	3	2A	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM050		44.27366	-92.47945	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM051	Trib. to Zumbro River, North Fork	44.23329	-93.10236	Temperate Prairies	2	2B	Target	Temperate Prairies_Lower Mississippi_2nd	94.13019687
04LM052	Vermillion River	44.62908	-93.16926	Temperate Prairies	3	2A	Target	Temperate Prairies_Lower Mississippi_3rd	51.24601295
04LM053	Trib. to Zumbro River, Middle Fork	44.13864	-93.07586	Temperate Prairies	1	2B	Target	Temperate Prairies_Lower Mississippi_1st	506.1281867
04LM054	North Branch Middle Fork Zumbro River	44.19392	-92.78008	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM055	Cannon River	44.5296	-92.81147	Mixed Wood Plains	5	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM056	Badger Run	43.96993	-92.39787	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM057	Watson Creek	43.69839	-92.11472	Mixed Wood Plains	2	2A	Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM058	Spring Valley Creek	43.70105	-92.35236	Mixed Wood Plains	2	2A	Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM059	Prairie Creek	44.46803	-93.00797	Temperate Prairies	3	2B	Target	Temperate Prairies_Lower Mississippi_3rd	51.24601295
04LM060	Riceford Creek	43.65126	-91.70318	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM061	Pine Creek	43.8474	-91.38739	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM062		44.0935	-92.21788	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206

04LM063		44.26125	-93.38478	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM064		44.39033	-92.56522	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM065		43.90703	-91.86725	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_2nd	140.535273
04LM066	Pine Island Creek	44.19844	-92.51397	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM067		43.7908	-91.27455	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM068	South Fork White Water River	44.00959	-91.97659	Mixed Wood Plains	4	2A	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM069	South Fork Root River	43.61076	-91.86959	Mixed Wood Plains	3	2A	Target	Mixed Wood Plains_Lower Mississippi_3rd	84.9649189
04LM070	Wells Creek	44.49189	-92.42816	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM071	Trib. to Zumbro River	44.2878	-92.99189	Temperate Prairies	2	2B	Target	Temperate Prairies_Lower Mississippi_2nd	94.13019687
04LM072	Middle Branch Root River	43.76511	-92.24786	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Lower Mississippi_4th+	87.46947681
04LM073		43.98176	-92.65429	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM074	Trib. to Willow Creek	43.60581	-92.09406	Mixed Wood Plains	1	2A	Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04LM075		44.18991	-92.08641	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Lower Mississippi_1st	347.4032206
04MS001		43.60719	-95.17961	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS002	Ash Creek	43.53962	-96.23807	Temperate Prairies	3	2B	Target	Temperate Prairies_Missouri_3rd	80.37005066
04MS003	Trib. of Rock River	43.65432	-95.69169	Temperate Prairies	1	2B	Target	Temperate Prairies_Missouri_1st	242.1752168
04MS004		43.7106	-96.25121	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS005	Split Rock Creek	43.87291	-96.38307	Temperate Prairies	4	2B	Target	Temperate Prairies_Missouri_4th+	38.65240005
04MS006		43.79666	-95.93686	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS007		43.6976	-96.33805	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS008	Trib. to Kanaranzi Creek	43.77263	-95.85404	Temperate Prairies	1	2B	Target	Temperate Prairies_Missouri_1st	242.1752168
04MS009	Rock River	43.99298	-96.16736	Temperate Prairies	3	2B	Target	Temperate Prairies_Missouri_3rd	80.37005066
04MS010	Rock River	43.91805	-96.13264	Temperate Prairies	4	2B	Target	Temperate Prairies_Missouri_4th+	38.65240005

04MS011	Trib. to Rock River, West Branch	43.58202	-95.81738	Temperate Prairies	2	2B	Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS012	East Branch Rock River	44.04052	-96.13686	Temperate Prairies	3	2B	Target	Temperate Prairies_Missouri_3rd	80.37005066
04MS013		43.98893	-96.44289	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS014	Trib. to Little Sioux River	43.64287	-95.3883	Temperate Prairies	1	2B	Target	Temperate Prairies_Missouri_1st	242.1752168
04MS015		43.79781	-96.10214	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS016	Rock River	43.56511	-96.18588	Temperate Prairies	5	2B	Target	Temperate Prairies_Missouri_4th+	38.65240005
04MS017		44.07781	-96.32839	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS018	Skunk Creek (Judicial Ditch #13)	43.55909	-95.32216	Temperate Prairies	2	2B	Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS019	Rock River	43.65725	-96.18791	Temperate Prairies	5	2B	Target	Temperate Prairies_Missouri_4th+	38.65240005
04MS020	Kanaranzi Creek	43.65279	-95.93034	Temperate Prairies	4	2B	Target	Temperate Prairies_Missouri_4th+	38.65240005
04MS021	Pipestone Creek	44.0106	-96.39389	Temperate Prairies	3	2B	Target	Temperate Prairies_Missouri_3rd	80.37005066
04MS022		43.85097	-96.2292	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS023		43.75909	-96.43665	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS024		44.12102	-96.43624	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS025	Trib. to Okabena Lake	43.61189	-95.63575	Temperate Prairies	2	2B	Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS026	Chanarambie Creek	43.90076	-96.08387	Temperate Prairies	4	2B	Target	Temperate Prairies_Missouri_4th+	38.65240005
04MS027	Springwater Creek	43.61905	-96.43389	Temperate Prairies	3	2B	Target	Temperate Prairies_Missouri_3rd	80.37005066
04MS028		44.18193	-96.39176	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS029		43.55478	-95.08166	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_1st	242.1752168
04MS030		43.56937	-96.31697	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS031	Split Rock Creek	43.92327	-96.36392	Temperate Prairies	2	2B	Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS032	Rock River	43.79755	-96.12479	Temperate Prairies	5	2B	Target	Temperate Prairies_Missouri_4th+	38.65240005
04MS033		43.8601	-96.17352	Temperate Prairies	4	2B	Permission denied	Temperate Prairies_Missouri_4th+	38.65240005
04MS034	Trib. to Kanaranzi Creek, East Branch	43.64135	-95.87493	Temperate Prairies	2	2B	Target	Temperate Prairies_Missouri_2nd	84.17387324
04MS035	East Branch Rock River	44.04316	-96.11319	Temperate Prairies	3	2B	Target	Temperate Prairies_Missouri_3rd	80.37005066
05RD001		45.72447	-96.56853	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD002	County Ditch No. 4	48.62238	-96.34581	Temperate Prairies	2	2B	Target	Temperate Prairies_Red_2nd	336.8868461
05RD003	Poplar River	47.79274	-96.04679	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Red_3rd	57.68051456

05RD004	Two Rivers	48.79708	-97.1006	Temperate Prairies	5	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD005	unnamed trib. to Wild Rice River	47.24267	-96.18166	Temperate Prairies	2	2B	Target	Temperate Prairies_Red_2nd	336.8868461
05RD006		46.83336	-96.49306	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD007	Roseau River	48.54407	-95.34055	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Red_1st	1169.738825
05RD008	Twelvemile Creek	45.84738	-96.36255	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD009	Wild Rice River	47.34629	-95.70183	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Red_3rd	57.68051456
05RD010	Red River	46.60642	-96.76848	Temperate Prairies	5	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD011		48.18103	-96.62764	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_2nd	336.8868461
05RD012	Clearwater River	47.8535	-95.46041	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Red_4th+	30.32565357
05RD013	Rabbit River	46.12578	-96.52783	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD014	Middle River	48.32343	-96.67292	Temperate Prairies	3	2B	Target	Temperate Prairies_Red_3rd	151.854075
05RD015		47.27525	-95.99958	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD016	Pelican River	46.78698	-95.87181	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Red_3rd	57.68051456
05RD017	Cormorant River	47.90179	-94.52913	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Red_2nd	664.9981379
05RD018	Sandhill River	47.59085	-96.79116	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD019		46.25173	-96.32415	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Red_1st	449.7275068
05RD020	County Ditch No. 15	48.29903	-96.23212	Temperate Prairies	1	2B	Target	Temperate Prairies_Red_1st	679.3438481
05RD021	South Cormorant River	47.79034	-94.47157	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Red_3rd	60.1258544
05RD022		47.25175	-96.48439	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD023		46.48688	-96.49883	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_3rd	151.854075
05RD024		47.89191	-96.60368	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD025		48.83021	-97.05417	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD026	Hill River	47.69766	-95.83572	Mixed Wood Plains	3	2B	Target	Mixed Wood Plains_Red_3rd	57.68051456
05RD027	Roseau River	48.91274	-95.89385	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Red_4th+	30.32565357
05RD028		48.63891	-95.53315	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Red_1st	1169.738825
05RD029	Clearwater River	47.8981	-96.06857	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Red_4th+	15.57393428
05RD030	Red River	47.05869	-96.82122	Temperate Prairies	7	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD031		47.55248	-95.35505	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Red_3rd	60.1258544
05RD032	Spring Creek	47.11152	-95.94354	Temperate Prairies	1	2B	Target	Temperate Prairies_Red_1st	679.3438481

05RD033	County Ditch No. 6-A	46.4518	-96.41391	Temperate Prairies	1	2B	Target	Temperate Prairies_Red_1st	679.3438481
05RD034	Red Lake River	48.10343	-96.12517	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Red_4th+	30.32565357
05RD035		46.03628	-96.22655	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD036	Wild Rice River	47.19692	-96.72487	Temperate Prairies	5	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD037	South Branch Buffalo River	46.60247	-96.53544	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD038		47.96302	-96.70467	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_2nd	336.8868461
05RD039	Roseau River	48.94595	-96.37297	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Red_4th+	30.32565357
05RD040	Trib. to Hill River	47.68882	-95.6632	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Red_2nd	114.3529425
05RD041		47.73046	-96.38807	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_2nd	336.8868461
05RD042	Tamarac River	48.41452	-96.73518	Temperate Prairies	3	2B	Target	Temperate Prairies_Red_3rd	151.854075
05RD043	Hay Creek (County Ditch #7)	48.87919	-95.71804	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Red_3rd	60.1258544
05RD044		47.58718	-95.57838	Mixed Wood Plains	NA	2B	Non-Target	Mixed Wood Plains_Red_1st	449.7275068
05RD045	Trib. to Buffalo River	46.92225	-96.00676	Temperate Prairies	2	2B	Target	Temperate Prairies_Red_2nd	336.8868461
05RD046	Lost River	47.84515	-95.88709	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Red_4th+	15.57393428
05RD047	Red River	47.35547	-96.83665	Temperate Prairies	7	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD048		46.36791	-96.61296	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD049		48.70032	-96.69133	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD050		45.72955	-96.49628	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_2nd	336.8868461
05RD051	Trib. to Roseau River, South Fork	48.74658	-95.75962	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Red_4th+	30.32565357
05RD052	Sand Hill River	47.53244	-95.91259	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD053	North Branch Two Rivers	48.79901	-97.08216	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD054	Blackduck River	47.84696	-94.69107	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Red_3rd	60.1258544
05RD055	Judicial Ditch No. 51	47.30876	-96.48495	Temperate Prairies	3	2B	Target	Temperate Prairies_Red_3rd	151.854075
05RD056		46.94719	-96.37647	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD057	Red Lake River	47.86567	-96.41671	Mixed Wood Plains	6	2B	Target	Mixed Wood Plains_Red_4th+	15.57393428
05RD058	Roseau River	48.7837	-95.72662	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Red_4th+	30.32565357
05RD059	Marsh Creek	47.41726	-95.99205	Temperate Prairies	3	2B	Target	Temperate Prairies_Red_3rd	151.854075
05RD060	Stiner Creek	47.0558	-96.21273	Temperate Prairies	3	2B	Target	Temperate Prairies_Red_3rd	151.854075
05RD061	Lost River	47.85136	-95.96773	Mixed Wood Plains	4	2B	Target	Mixed Wood Plains_Red_4th+	15.57393428

05RD062		47.54965	-96.7354	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD063		46.38396	-96.4801	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_3rd	151.854075
05RD064		48.40722	-96.25748	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_3rd	151.854075
05RD065	South Fork Roseau River	48.70566	-95.7264	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Red_3rd	60.1258544
05RD066	Mosquito Creek	47.41211	-95.43134	Mixed Wood Plains	2	2B	Target	Mixed Wood Plains_Red_2nd	114.3529425
05RD067		47.01384	-96.73724	Temperate Prairies	5	2B	Permission denied	Temperate Prairies_Red_4th+	160.2064298
05RD068		47.57235	-95.43083	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Red_1st	1169.738825
05RD069	South Branch Wild Rice River	47.10145	-96.33046	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD070		46.53769	-96.3322	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_2nd	336.8868461
05RD171	Red Lake River	48.03376	-96.20593	Mixed Wood Plains	5	2B	Target	Mixed Wood Plains_Red_4th+	15.57393428
05RD172		45.70129	-96.1179	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD173	Marsh River	47.29427	-96.5379	Temperate Prairies	1	2B	Target	Temperate Prairies_Red_1st	679.3438481
05RD174		46.70512	-96.77048	Temperate Prairies	3	2B	Permission denied	Temperate Prairies_Red_3rd	151.854075
05RD175	Snake River	48.18947	-96.78914	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD176		48.93694	-96.32408	Mixed Wood Shield	5	2B	Physically Inaccessible	Mixed Wood Shield_Red_4th+	30.32565357
05RD177		47.83521	-95.21267	Mixed Wood Shield	3	2B	Permission denied	Mixed Wood Shield_Red_3rd	60.1258544
05RD178		47.86505	-96.58256	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD179	Tamarac River	48.41073	-96.76261	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RD180		45.61345	-96.17423	Temperate Prairies	NA	2B	Non-Target	Temperate Prairies_Red_1st	679.3438481
05RD181	South Branch Two Rivers	48.66483	-96.24609	Temperate Prairies	4	2B	Target	Temperate Prairies_Red_4th+	160.2064298
05RN001	Little Fork River	47.99187	-93.22537	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN002	Sturgeon River	48.21321	-93.89214	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN003	West Two River	47.7806	-92.29052	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN004		48.11938	-91.98836	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN005		48.67141	-94.66845	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN006		47.58163	-94.02067	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN007		48.49007	-93.24516	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN008		47.77351	-91.26641	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_4th+	53.06984974

05RN009		48.7477	-94.82246	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN010	Rice River	47.81149	-92.65948	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN011		47.88982	-93.89649	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN012		47.99061	-91.00848	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN013	East Fork Rapid River	48.64051	-94.38107	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN014		48.43827	-93.17805	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN015	Black River	48.46369	-93.81231	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN016		47.93243	-91.48472	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN017	Trib. to Warroad River, East Branch	48.76819	-95.26451	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN018	Little Fork River	47.84155	-92.77452	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN019	unnamed trib. to Big Fork River	47.77194	-93.66246	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN020	Sturgeon River	47.65357	-92.91992	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN021	Vermilion River	48.13981	-92.5445	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN022	Black River	48.46283	-93.86192	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN023		48.30978	-93.05842	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN024	Stony River	47.64685	-91.57919	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN025	North Branch Rapid River	48.52987	-94.61352	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN026	Beaver Brook	48.35748	-93.36521	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN027		47.95556	-91.15854	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN028		47.91776	-94.17783	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN029	Trib. to Pike River	47.60856	-92.40767	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN030	Trib. to Long Lake	48.28512	-92.73818	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN031	Little Fork River	48.13211	-93.46367	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN032		47.84764	-93.01293	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN033	Dumbbell River	48.13914	-94.02342	Mixed Wood Shield	2	2A	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN034	East Branch Sturgeon River	47.60781	-92.76804	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN035		48.18836	-92.03007	Mixed Wood Shield	3	2B	Physically Inaccessible	Mixed Wood Shield_Rainy_3rd	70.040735
05RN036		48.61227	-94.95711	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407

05RN037	Beaver Brook	48.40502	-93.51693	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN038		47.79536	-91.42374	Mixed Wood Shield	3	2A	Physically Inaccessible	Mixed Wood Shield_Rainy_3rd	70.040735
05RN039	Rapid River	48.58149	-94.442	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN040		48.17197	-92.897	Mixed Wood Shield	NA	2A	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN041		47.79648	-94.04533	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN042	Dumbbell River	47.71635	-91.19884	Mixed Wood Shield	3	2A	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN043	Ash River	48.34501	-92.90542	Mixed Wood Shield	4	2A	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN044	Little Fork River	48.18122	-93.48451	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN045	Willow River	47.95972	-92.92902	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN046	Big Fork River	47.88547	-93.59445	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN047	Bowstring River	47.54357	-93.76276	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN048	Clear Creek	48.1342	-92.68842	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN049		48.57337	-94.10218	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN050	Trib. to Bear River	48.3844	-93.68351	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN051		47.82591	-91.7256	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN052	Little Fork River	47.96972	-93.17583	Mixed Wood Shield	5	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN053	Hay Creek	48.2144	-94.10181	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN054		47.63768	-92.47102	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN055		48.41896	-92.60871	Mixed Wood Shield	3	2B	Physically Inaccessible	Mixed Wood Shield_Rainy_3rd	70.040735
05RN056		48.63471	-94.66869	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN057		48.33994	-93.40185	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN058	Bear Island River	47.80162	-91.89091	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN059	Sturgeon River	47.76284	-92.8825	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN060	Big Fork River	47.85076	-93.51262	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN061	McNiven Creek	47.57595	-92.76407	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN062		48.2432	-92.45065	Mixed Wood Shield	4	2B	Physically Inaccessible	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN063	Black River	48.46679	-93.97999	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN064		48.394	-93.86191	Mixed Wood Shield	1	2B	Physically Inaccessible	Mixed Wood Shield_Rainy_1st	334.2923407

05RN065	August Creek	47.77139	-91.5828	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN066	Sturgeon River	47.81696	-92.99985	Mixed Wood Shield	4	2B	Target	Mixed Wood Shield_Rainy_4th+	53.06984974
05RN067		48.17198	-93.72925	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN068	Rice River	47.71118	-92.61452	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN069	Trib. to Range Line Creek	48.13727	-92.16282	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN070		48.38418	-94.65078	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN171	Beaver Brook	48.30097	-93.26709	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN172		47.68904	-91.48003	Mixed Wood Shield	NA	2A	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN173	Trib. to Zippel Creek, West Branch	48.86929	-94.95959	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN174	Trib. to Little Fork River	47.86383	-92.54634	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN175	Big Fork River	47.75693	-93.88549	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN176		47.94483	-90.90003	Mixed Wood Shield	1	2B	Physically Inaccessible	Mixed Wood Shield_Rainy_1st	334.2923407
05RN177		48.26918	-92.69619	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN178		48.19389	-93.35021	Mixed Wood Shield	2	2B	Physically Inaccessible	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN179		48.06072	-90.7173	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN180	Trib. to Willow River	47.9764	-93.04321	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN181		48.1366	-93.82875	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN182		47.65114	-92.46268	Mixed Wood Shield	NA	2B	Non-Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN183	Trib. to Picket Lake	48.0319	-91.84099	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN184	Silver Creek	48.67552	-94.48494	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN185	Moose Brook	47.83089	-94.157	Mixed Wood Shield	1	2B	Target	Mixed Wood Shield_Rainy_1st	334.2923407
05RN186	Rat Root River	48.4087	-93.31418	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN187		47.73882	-91.20418	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
05RN188	Willow Creek	48.8415	-95.10164	Mixed Wood Shield	2	2B	Target	Mixed Wood Shield_Rainy_2nd	83.75793227
05RN189	Little Fork River	47.8469	-92.58574	Mixed Wood Shield	3	2B	Target	Mixed Wood Shield_Rainy_3rd	70.040735
10EM001	Unnamed ditch	43.50587	-96.36319	Temperate Prairies	2	2B	Target	Missouri_2nd	599.8054
10EM002	Little Whiteface River	46.9799	-92.80398	Mixed Wood Shield	1	2B	Target	Lake Superior_1st	1050.920083
10EM003	Lac qui Parle River	44.9425	-96.02348	Temperate Prairies	6	2B	Target	Minnesota_4th+	311.6175238

10EM004	Nemadji River	46.51183	-92.4326	Mixed Wood Shield	3	2A	Target	Lake Superior_3rd	351.9390769
10EM005	Wild Rice River	47.30633	-95.97372	Temperate Prairies	4	2B	Target	Red_4th+	311.6175238
10EM006	Trib. to Lake Christina	46.09314	-95.65945	Mixed Wood Plains	NA	NA	Non-Target	Minnesota_1st	839.09555
10EM007	County Ditch 38	44.31518	-95.1069	Temperate Prairies	1	2B	Target	Minnesota_1st	2334.925846
10EM008	Unnamed creek	46.15003	-93.90983	Mixed Wood Shield	NA	NA	Non-Target	Upper Mississippi_1st	1050.920083
10EM009	Unnamed ditch	48.28753	-93.68734	Mixed Wood Shield	NA	NA	Non-Target	Rainy_1st	1050.920083
10EM010	Unnamed creek	45.19329	-94.57397	Mixed Wood Plains	NA	NA	Non-Target	Upper Mississippi_2nd	498.0406364
10EM011	Straight River	44.14779	-93.24574	Temperate Prairies	4	2B	Target	Lower Mississippi_4th+	311.6175238
10EM012	Baptism River	47.36356	-91.22147	Mixed Wood Shield	4	2A	Target	Lake Superior_4th+	234.1952778
10EM013	Long Lake Creek	47.44845	-92.52875	Mixed Wood Shield	NA	NA	Non-Target	Lake Superior_1st	1050.920083
10EM014	Champepadan Creek	43.70975	-96.12845	Temperate Prairies	3	2B	Target	Missouri_3rd	438.7255
10EM015	Spring Valley Creek	43.68772	-92.38942	Mixed Wood Plains	2	2A	Target	Lower Mississippi_2nd	498.0406364
10EM016	Yellow Medicine River, North Branch	44.58284	-96.23358	Temperate Prairies	3	2B	Target	Minnesota_3rd	438.7255
10EM017	Warroad River, East Branch	48.79785	-95.25602	Mixed Wood Shield	1	2B	Target	Rainy_1st	1050.920083
10EM018	Trib. to Sand Creek	47.15691	-92.8112	Mixed Wood Shield	1	2B	Target	Lake Superior_1st	1050.920083
10EM019	Unnamed ditch	44.60886	-94.69567	Temperate Prairies	1	2B	Target	Minnesota_1st	2334.925846
10EM020	Unnamed creek	45.19156	-93.56735	Mixed Wood Plains	NA	NA	Non-Target	Upper Mississippi_1st	839.09555
10EM021	Unnamed creek	47.59895	-95.65579	Mixed Wood Plains	1	2B	Target	Red_1st	839.09555
10EM022	Redeye River	46.63682	-95.03306	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM023	Wolf Creek	44.41804	-93.32245	Mixed Wood Plains	3	2B	Target	Lower Mississippi_3rd	174.3946471
10EM024	Kettle River	46.38943	-92.88247	Mixed Wood Shield	4	2B	Target	St. Croix_4th+	234.1952778
10EM025	Big Fork River	47.82064	-93.54455	Mixed Wood Shield	4	2B	Target	Rainy_4th+	234.1952778
10EM026	Pike Creek	45.9757	-94.46451	Mixed Wood Plains	2	2B	Target	Upper Mississippi_2nd	498.0406364
10EM027	Cannon River	44.34306	-93.60536	Mixed Wood Plains	4	2B	Target	Lower Mississippi_4th+	177.2181
10EM028	Blue Earth River, West Branch	43.56382	-94.11388	Temperate Prairies	3	2B	Target	Minnesota_3rd	438.7255
10EM029	Pine Creek	47.24697	-91.74415	Mixed Wood Shield	2	2B	Target	Lake Superior_2nd	519.75925
10EM030	Trib. to Cottonwood River	44.30485	-95.65725	Temperate Prairies	1	NA	Permission denied	Minnesota_1st	2334.925846
10EM031	Trib. to Dry Run Creek	44.24829	-92.66495	Mixed Wood Plains	NA	NA	Non-Target	Lower Mississippi_1st	839.09555
10EM032	Red River of the North	47.39133	-96.83871	Temperate Prairies	7	2B	Target	Red_4th+	311.6175238

10EM033	Rainy River	48.70293	-94.33846	Mixed Wood Shield	6	2B	Target	Rainy_4th+	234.1952778
10EM034	Trib. to Root River	43.76899	-91.77478	Mixed Wood Plains	NA	NA	Non-Target	Lower Mississippi_1st	839.09555
10EM035	Judicial Ditch 8	44.75002	-94.10369	Temperate Prairies	2	2B	Target	Upper Mississippi_2nd	599.8054
10EM036	Rum River	45.5669	-93.38167	Mixed Wood Plains	5	2B	Target	Upper Mississippi_4th+	177.2181
10EM037	Unnamed ditch	48.33815	-95.1849	Mixed Wood Shield	1	2B	Target	Rainy_1st	1050.920083
10EM038	Buffalo Creek	46.31205	-94.1873	Mixed Wood Shield	NA	NA	Non-Target	Upper Mississippi_1st	1050.920083
10EM039	Unnamed ditch	44.55749	-93.74182	Mixed Wood Plains	1	2B	Target	Minnesota_1st	839.09555
10EM040	Extortion Creek	48.05908	-90.78788	Mixed Wood Shield	NA	NA	Non-Target	Rainy_1st	1050.920083
10EM041	St Louis River	46.74653	-92.48662	Mixed Wood Shield	6	2B	Target	Lake Superior_4th+	234.1952778
10EM042	Long Prairie River	45.9749	-95.13761	Mixed Wood Plains	4	2B	Target	Upper Mississippi_4th+	177.2181
10EM043	Whitewater River, trib. to South Fork	44.07686	-91.99559	Mixed Wood Plains	NA	NA	Non-Target	Lower Mississippi_1st	839.09555
10EM044	Steer Creek	45.63124	-96.82678	Temperate Prairies	NA	NA	Non-Target	Red_1st	2334.925846
10EM045	Embarrass River	47.67706	-92.13913	Mixed Wood Shield	3	2B	Target	Lake Superior_3rd	351.9390769
10EM046	Chetomba Creek	44.86923	-95.34162	Temperate Prairies	4	class7	Target	Minnesota_4th+	311.6175238
10EM047	Trib. to Trout Brook	44.3755	-92.6553	Mixed Wood Plains	2	2B	Target	Lower Mississippi_2nd	498.0406364
10EM048	Red Lake River	47.89385	-96.35271	Temperate Prairies	6	2B	Target	Red_4th+	311.6175238
10EM049	Hill River	47.56872	-95.53068	Mixed Wood Plains	NA	NA	Non-Target	Red_1st	839.09555
10EM050	Unnamed creek	46.55504	-95.20827	Mixed Wood Plains	NA	NA	Non-Target	Upper Mississippi_2nd	498.0406364
10EM051	Blue Earth River	44.03715	-94.10091	Temperate Prairies	5	2B	Target	Minnesota_4th+	311.6175238
10EM052	Trib. to St Francis River	45.5847	-93.88519	Mixed Wood Plains	NA	NA	Non-Target	Upper Mississippi_1st	839.09555
10EM053	South Cormorant River	47.79272	-94.4602	Mixed Wood Shield	2	2B	Target	Red_2nd	519.75925
10EM054	Silver Creek	45.78371	-95.03246	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM055	Crow River	45.08134	-93.75719	Mixed Wood Plains	6	2B	Target	Upper Mississippi_4th+	177.2181
10EM056	Brule River	47.81435	-90.05179	Mixed Wood Shield	4	2A	Target	Lake Superior_4th+	234.1952778
10EM057	Water Hen Creek	47.36054	-92.24716	Mixed Wood Shield	2	2B	Target	Lake Superior_2nd	519.75925
10EM058	Minnesota River	45.21914	-96.21856	Temperate Prairies	7	2B	Target	Minnesota_4th+	311.6175238
10EM059	Whitewater River, North Fork	44.12087	-92.25927	Mixed Wood Plains	3	2B	Target	Lower Mississippi_3rd	174.3946471
10EM060	Otter Tail River	46.26731	-96.59442	Temperate Prairies	4	2B	Target	Red_4th+	311.6175238
10EM061	Bear Creek	47.9072	-92.22222	Mixed Wood Shield	NA	NA	Non-Target	Rainy_2nd	519.75925

10EM062	Yellow Medicine River, South Branch	44.46461	-96.07716	Temperate Prairies	3	2B	Target	Minnesota_3rd	438.7255
10EM063	Lower Tamarack River	46.06227	-92.3857	Mixed Wood Shield	3	2B	Target	St. Croix_3rd	351.9390769
10EM064	County Ditch 27	48.66623	-96.98701	Temperate Prairies	3	2B	Target	Red_3rd	438.7255
10EM065	Unidentified Stream	48.51294	-92.91634	Mixed Wood Shield	NA	NA	Non-Target	Rainy_1st	1050.920083
10EM066	Swan River	47.00368	-93.2048	Mixed Wood Shield	4	2B	Target	Upper Mississippi_4th+	234.1952778
10EM067	Unnamed ditch	45.12401	-96.1853	Temperate Prairies	3	2B	Target	Minnesota_3rd	438.7255
10EM068	St Croix River	45.74473	-92.8091	Mixed Wood Shield	6	2B	Target	St. Croix_4th+	234.1952778
10EM069	Unnamed trib. to Hay Creek	46.86865	-96.10504	Mixed Wood Plains	2	2B	Target	Red_2nd	498.0406364
10EM070	Long Prairie River	46.00572	-95.20137	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM071	Watonwan River, trib. to North Fork	44.01979	-94.99741	Temperate Prairies	2	2B	Target	Minnesota_2nd	599.8054
10EM072	Pine River	46.27033	-92.90231	Mixed Wood Shield	4	2B	Target	St. Croix_4th+	234.1952778
10EM073	Little Fork River	48.16811	-93.4824	Mixed Wood Shield	5	2B	Target	Rainy_4th+	234.1952778
10EM074	County Ditch 12	45.69419	-94.2869	Mixed Wood Plains	NA	NA	Non-Target	Upper Mississippi_1st	839.09555
10EM075	Medford Creek	44.18194	-93.2311	Temperate Prairies	2	2B	Target	Lower Mississippi_2nd	599.8054
10EM076	Skunk Creek	47.21706	-91.51506	Mixed Wood Shield	2	2A	Target	Lake Superior_2nd	519.75925
10EM077	Knife River	46.95129	-91.80759	Mixed Wood Shield	4	2A	Target	Lake Superior_4th+	234.1952778
10EM078	Jack Creek	43.77263	-95.74034	Temperate Prairies	3	class7	Target	Des Moines_3rd	438.7255
10EM079	Root River	43.74789	-91.89319	Mixed Wood Plains	5	2B	Target	Lower Mississippi_4th+	177.2181
10EM080	Unnamed ditch	44.78766	-96.26812	Temperate Prairies	NA	NA	Non-Target	Minnesota_1st	2334.925846
10EM081	County Ditch 13	48.81938	-95.87718	Temperate Prairies	NA	NA	Non-Target	Red_1st	2334.925846
10EM082	Mississippi River	47.24074	-93.71914	Mixed Wood Shield	5	2B	Target	Upper Mississippi_4th+	234.1952778
10EM083	Trib. to Little Rock Creek	44.42794	-94.63697	Temperate Prairies	3	2B	Target	Minnesota_3rd	438.7255
10EM084	Elk River	45.42509	-93.88001	Mixed Wood Plains	4	2B	Target	Upper Mississippi_4th+	177.2181
10EM085	Clearwater River	47.6864	-95.17198	Mixed Wood Plains	3	2A	Target	Red_3rd	174.3946471
10EM086	Swan Creek	46.4115	-94.76141	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM087	Chub Creek	44.51082	-93.11052	Temperate Prairies	4	2B	Target	Lower Mississippi_4th+	311.6175238
10EM088	Rice River	46.52584	-93.31691	Mixed Wood Shield	3	2B	Target	Upper Mississippi_3rd	351.9390769
10EM089	Unnamed creek	47.86315	-93.89669	Mixed Wood Shield	NA	NA	Non-Target	Rainy_1st	1050.920083
10EM090	Mississippi River	45.46033	-94.10035	Mixed Wood Plains	6	2B	Target	Upper Mississippi_4th+	177.2181

10EM091	Unnamed ditch	43.8243	-92.66653	Temperate Prairies	NA	NA	Non-Target	Lower Mississippi_1st	2334.925846
10EM092	Otter Creek	43.50389	-92.92179	Temperate Prairies	3	2B	Target	Cedar_3rd	438.7255
10EM093	St Louis River	47.47032	-92.12002	Mixed Wood Shield	3	2B	Target	Lake Superior_3rd	351.9390769
10EM094	Cottonwood River	44.23235	-95.21727	Temperate Prairies	5	2B	Target	Minnesota_4th+	311.6175238
10EM095	Zumbro River, Middle Fork, South Branch	44.12646	-92.60993	Mixed Wood Plains	4	2B	Target	Lower Mississippi_4th+	177.2181
10EM096	Unnamed ditch	47.13188	-96.2888	Temperate Prairies	NA	NA	Non-Target	Red_2nd	599.8054
10EM097	Bartons Brook	48.54989	-94.43602	Mixed Wood Shield	3	2B	Target	Rainy_3rd	351.9390769
10EM098	Trib. to Thompson Creek	43.73731	-91.41284	Mixed Wood Plains	NA	NA	Non-Target	Lower Mississippi_1st	839.09555
10EM099	County Ditch 13A	44.52471	-94.49458	Temperate Prairies	1	2B	Target	Minnesota_1st	2334.925846
10EM100	Rum River	45.33882	-93.36207	Mixed Wood Plains	5	2B	Target	Upper Mississippi_4th+	177.2181
10EM101	Leech Lake River	47.24139	-94.17579	Mixed Wood Shield	4	2B	Target	Upper Mississippi_4th+	234.1952778
10EM102	Platte River	46.09096	-94.10224	Mixed Wood Shield	3	2B	Target	Upper Mississippi_3rd	351.9390769
10EM103	Unnamed ditch	44.65461	-93.66534	Mixed Wood Plains	1	2B	Target	Minnesota_1st	839.09555
10EM104	Unidentified Stream	48.02534	-91.35365	Mixed Wood Shield	2	2B	Target	Rainy_2nd	519.75925
10EM105	Unnamed creek	47.05951	-92.30277	Mixed Wood Shield	2	NA	Physically Inaccessible	Lake Superior_2nd	519.75925
10EM106	Pomme de Terre River	45.73329	-95.85687	Temperate Prairies	3	2B	Target	Minnesota_3rd	438.7255
10EM107	Zumbro River	44.27197	-92.2378	Mixed Wood Plains	6	2B	Target	Lower Mississippi_4th+	177.2181
10EM108	Unnamed creek	46.50821	-96.24572	Mixed Wood Plains	NA	NA	Non-Target	Red_1st	839.09555
10EM109	Portage River	48.14667	-92.07672	Mixed Wood Shield	3	2B	Target	Rainy_3rd	351.9390769
10EM110	Unnamed creek	45.14365	-95.2053	Temperate Prairies	2	class7	Target	Minnesota_2nd	599.8054
10EM111	Hay Creek	44.4837	-92.5727	Mixed Wood Plains	3	2A	Target	Lower Mississippi_3rd	174.3946471
10EM112	Burnham Creek	47.77013	-96.76411	Temperate Prairies	4	2B	Target	Red_4th+	311.6175238
10EM113	Mississippi River	47.33944	-95.21011	Mixed Wood Shield	3	2B	Target	Upper Mississippi_3rd	351.9390769
10EM114	Unnamed creek	46.75384	-95.15219	Mixed Wood Plains	2	NA	Permission denied	Upper Mississippi_2nd	498.0406364
10EM115	Unnamed ditch	44.2301	-94.56227	Temperate Prairies	2	2B	Target	Minnesota_2nd	599.8054
10EM116	Unnamed ditch	45.62904	-93.64094	Mixed Wood Plains	1	2B	Target	Upper Mississippi_1st	839.09555
10EM117	Unnamed creek	47.73274	-94.05752	Mixed Wood Shield	2	2B	Target	Rainy_2nd	519.75925
10EM118	Little Swan River	45.96504	-94.6878	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471

10EM119	Unnamed ditch	43.60834	-93.74063	Temperate Prairies	1	2B	Target	Minnesota_1st	2334.925846
10EM120	Brule River	47.92185	-90.28924	Mixed Wood Shield	4	2B	Target	Lake Superior_4th+	234.1952778
10EM121	Water Hen Creek	47.30543	-92.36075	Mixed Wood Shield	3	2B	Target	Lake Superior_3rd	351.9390769
10EM122	Chippewa River, East Branch	45.39847	-95.43677	Mixed Wood Plains	3	2B	Target	Minnesota_3rd	174.3946471
10EM123	Root River, North Branch	43.835	-92.18487	Mixed Wood Plains	4	2B	Target	Lower Mississippi_4th+	177.2181
10EM124	Unnamed ditch	44.00173	-96.29419	Temperate Prairies	3	2B	Target	Missouri_3rd	438.7255
10EM125	Willow River	47.07224	-93.88583	Mixed Wood Shield	2	2B	Target	Upper Mississippi_2nd	519.75925
10EM126	Mud Creek	44.65153	-96.10262	Temperate Prairies	4	2B	Target	Minnesota_4th+	311.6175238
10EM127	Hay Creek	46.24203	-92.31065	Mixed Wood Shield	2	2B	Target	St. Croix_2nd	519.75925
10EM128	Unnamed ditch	48.40136	-96.73623	Temperate Prairies	2	2B	Target	Red_2nd	599.8054
10EM129	Trib. To Little Fork River	48.4669	-93.59675	Mixed Wood Shield	3	2B	Target	Rainy_3rd	351.9390769
10EM130	Unnamed creek	47.42958	-92.90136	Mixed Wood Shield	NA	NA	Non-Target	Lake Superior_1st	1050.920083
10EM131	Crow River, North Fork	45.1771	-94.22447	Mixed Wood Plains	5	2B	Target	Upper Mississippi_4th+	177.2181
10EM132	St Croix River	45.32873	-92.70383	Mixed Wood Plains	6	2B	Target	St. Croix_4th+	177.2181
10EM133	Shell River	46.90578	-95.27247	Mixed Wood Shield	2	2B	Target	Upper Mississippi_2nd	519.75925
10EM134	Mission Creek	46.5181	-94.07851	Mixed Wood Shield	NA	NA	Non-Target	Upper Mississippi_1st	1050.920083
10EM135	Mississippi River	44.83161	-93.01051	Mixed Wood Plains	8	2B	Target	Upper Mississippi_4th+	177.2181
10EM136	Mississippi River	46.54933	-93.69068	Mixed Wood Shield	5	2B	Target	Upper Mississippi_4th+	234.1952778
10EM137	Big Fork River	47.96433	-93.7801	Mixed Wood Shield	4	2B	Target	Rainy_4th+	234.1952778
10EM138	Elk River	45.71003	-94.00657	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM139	Zumbro River, North Fork	44.26455	-93.06235	Temperate Prairies	4	2B	Target	Lower Mississippi_4th+	311.6175238
10EM140	Trib. to Donaldson Creek	43.5289	-91.84183	Mixed Wood Plains	NA	NA	Non-Target	Lower Mississippi_1st	839.09555
10EM141	Brophy Creek	47.06698	-91.90578	Mixed Wood Shield	1	2A	Target	Lake Superior_1st	1050.920083
10EM142	Chanarambie Creek, North Branch	43.9558	-96.02782	Temperate Prairies	2	2B	Target	Missouri_2nd	599.8054
10EM143	Willow Creek	43.6307	-92.0963	Mixed Wood Plains	3	2A	Target	Lower Mississippi_3rd	174.3946471
10EM144	Coon Creek	47.24457	-96.32609	Temperate Prairies	2	2B	Target	Red_2nd	599.8054
10EM145	Unnamed creek	48.56733	-95.49606	Mixed Wood Shield	NA	NA	Non-Target	Red_1st	1050.920083
10EM146	Root River, South Fork	43.65571	-91.79433	Mixed Wood Plains	4	2A	Target	Lower Mississippi_4th+	177.2181
10EM147	Unnamed ditch	44.92409	-94.77786	Temperate Prairies	1	2B	Target	Upper Mississippi_1st	2334.925846

10EM148	Rush Creek	45.67806	-92.91224	Mixed Wood Plains	3	2B	Target	St. Croix_3rd	174.3946471
10EM149	Red Lake River	47.96764	-95.35209	Mixed Wood Shield	5	2B	Target	Red_4th+	234.1952778
10EM150	Little Partridge River	46.34481	-94.97512	Mixed Wood Plains	4	2B	Target	Upper Mississippi_4th+	177.2181
10EM151	Unnamed ditch	44.50726	-93.46709	Mixed Wood Plains	1	2B	Target	Minnesota_1st	839.09555
10EM152	Houghtaling Creek	47.62819	-91.09656	Mixed Wood Shield	1	2A	Target	Lake Superior_1st	1050.920083
10EM153	Unnamed creek	48.17553	-93.04221	Mixed Wood Shield	1	2B	Target	Rainy_1st	1050.920083
10EM154	Unnamed creek	45.36197	-94.45173	Mixed Wood Plains	NA	NA	Non-Target	Upper Mississippi_1st	839.09555
10EM155	Zumbro River, South Fork	43.92643	-92.61273	Mixed Wood Plains	4	2B	Target	Lower Mississippi_4th+	177.2181
10EM156	Judicial Ditch 13	43.52067	-93.89433	Temperate Prairies	2	2B	Target	Minnesota_2nd	599.8054
10EM157	Trappers Creek	47.36598	-91.70857	Mixed Wood Shield	NA	NA	Non-Target	Lake Superior_1st	1050.920083
10EM158	Unnamed ditch	43.93809	-95.44745	Temperate Prairies	NA	NA	Non-Target	Des Moines_1st	2334.925846
10EM159	Trib. to Zumbro River	44.26786	-92.38172	Mixed Wood Plains	NA	NA	Non-Target	Lower Mississippi_1st	839.09555
10EM160	Unnamed trib. to Red Lake River	47.77677	-96.91198	Temperate Prairies	2	2B	Target	Red_2nd	599.8054
10EM161	Williams Creek	48.79834	-94.91479	Mixed Wood Shield	1	2B	Target	Rainy_1st	1050.920083
10EM162	Unnamed creek	43.62912	-91.35436	Mixed Wood Plains	2	2A	Target	Lower Mississippi_2nd	498.0406364
10EM163	Blue Earth River	43.62536	-94.10808	Temperate Prairies	4	2B	Target	Minnesota_4th+	311.6175238
10EM164	Rum River	45.4024	-93.3564	Mixed Wood Plains	5	2B	Target	Upper Mississippi_4th+	177.2181
10EM165	Grant Creek	47.51088	-95.02394	Mixed Wood Shield	2	2B	Target	Upper Mississippi_2nd	519.75925
10EM166	Unnamed creek	45.9804	-94.30824	Mixed Wood Plains	2	2B	Target	Upper Mississippi_2nd	498.0406364
10EM167	Elm Creek	45.15673	-93.43799	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM168	Two Island River	47.57284	-90.97189	Mixed Wood Shield	2	2A	Target	Lake Superior_2nd	519.75925
10EM169	Unnamed creek	46.96353	-92.71862	Mixed Wood Shield	1	2B	Target	Lake Superior_1st	1050.920083
10EM170	Unnamed creek	45.86331	-95.99196	Temperate Prairies	2	2B	Target	Red_2nd	599.8054
10EM171	Trout Creek	44.17066	-91.92527	Mixed Wood Plains	3	2A	Target	Lower Mississippi_3rd	174.3946471
10EM172	Stony Creek	46.75869	-96.60592	Temperate Prairies	4	2B	Target	Red_4th+	311.6175238
10EM173	Unidentified steam	47.99566	-92.22192	Mixed Wood Shield	3	NA	Physically Inaccessible	Rainy_3rd	351.9390769
10EM174	Unnamed ditch	45.12211	-95.67107	Temperate Prairies	3	2B	Target	Minnesota_3rd	438.7255
10EM175	Cannon River	44.56378	-92.72762	Mixed Wood Plains	5	2B	Target	Lower Mississippi_4th+	177.2181
10EM176	Black River	48.10573	-96.42644	Temperate Prairies	2	2B	Target	Red_2nd	599.8054

10EM177	Wild Rice River	47.32786	-95.93864	Temperate Prairies	4	2B	Target	Red_4th+	311.6175238
10EM178	Otter Tail River	46.77861	-95.69077	Mixed Wood Plains	2	2B	Target	Red_2nd	498.0406364
10EM179	Des Moines River	43.70619	-95.04099	Temperate Prairies	6	2B	Target	Des Moines_4th+	311.6175238
10EM180	Groundhouse River, West Fork	45.89756	-93.55505	Mixed Wood Shield	NA	NA	Non-Target	St. Croix_1st	1050.920083
10EM181	Unnamed trib. to Tamarac River	48.17241	-94.45532	Mixed Wood Shield	1	2B	Target	Red_1st	1050.920083
10EM182	Unnamed trib. to Crow River, North Fork	45.43798	-94.78216	Mixed Wood Plains	NA	NA	Non-Target	Upper Mississippi_1st	839.09555
10EM183	County Ditch 66	43.65619	-93.48255	Temperate Prairies	2	2B	Target	Cedar_2nd	599.8054
10EM184	Unnamed trib. to Lake Superior	47.98027	-89.71057	Mixed Wood Shield	2	2A	Target	Lake Superior_2nd	519.75925
10EM185	Paleface River	47.29548	-92.2543	Mixed Wood Shield	1	2B	Target	Lake Superior_1st	1050.920083
10EM186	Unnamed ditch	45.25612	-95.31773	Temperate Prairies	1	2B	Target	Minnesota_1st	2334.925846
10EM187	Unnamed creek	43.89094	-92.20716	Mixed Wood Plains	1	2B	Target	Lower Mississippi_1st	839.09555
10EM188	Unnamed ditch	44.28816	-96.39394	Temperate Prairies	NA	NA	Non-Target	Minnesota_1st	2334.925846
10EM189	Unnamed ditch	46.78102	-93.53054	Mixed Wood Shield	2	2B	Target	Upper Mississippi_2nd	519.75925
10EM190	Spring Creek	44.6998	-95.93031	Temperate Prairies	4	2B	Target	Minnesota_4th+	311.6175238
10EM191	Unnamed creek	46.58384	-92.29455	Mixed Wood Shield	1	2B	Target	Lake Superior_1st	1050.920083
10EM192	Two Rivers, South Branch	48.73893	-96.67831	Temperate Prairies	4	2B	Target	Red_4th+	311.6175238
10EM193	Black River	48.46326	-93.87516	Mixed Wood Shield	3	2B	Target	Rainy_3rd	351.9390769
10EM194	Swan River	47.28955	-93.30835	Mixed Wood Shield	4	2B	Target	Upper Mississippi_4th+	234.1952778
10EM195	Crow River, South Fork	44.87236	-94.06496	Mixed Wood Plains	4	2B	Target	Upper Mississippi_4th+	177.2181
10EM196	Battle Brook	45.50462	-93.61466	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM197	Thief River	48.18722	-96.174	Temperate Prairies	4	2B	Target	Red_4th+	311.6175238
10EM198	Redeye River	46.48756	-94.88863	Mixed Wood Plains	3	2B	Target	Upper Mississippi_3rd	174.3946471
10EM199	Trib. To Minnesota River	44.86987	-93.18819	Mixed Wood Plains	NA	NA	Non-Target	Minnesota_2nd	498.0406364
10EM200	Willow River	46.7113	-93.55514	Mixed Wood Shield	2	2B	Target	Upper Mississippi_2nd	519.75925

Appendix 8. Water chemistry concentrations

Field #	Temp H2O (°C)	TOC (mg/L)	DOC (mg/L)	pH	DO (mg/L)	Phosphorus (mg/L)	Nitrogen (mg/L)	Total Ammonia (mg/L)	Conductivity (µmhos/cm)	TSS (mg/L)
96SC001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC002	20.3	NA	NA	7.34	7.1	0.065	< 0.05	0.02	110.8	2
96SC003	20.3	NA	NA	7.34	7.1	0.065	< 0.05	0.02	110.8	2
96SC004	20.6	NA	NA	8.14	6.5	0.124	0.06	0.03	104.7	21
96SC005	16.3	NA	NA	6.98	1.4	0.194	< 0.05	0.87	103.5	4.4
96SC006	21	NA	NA	7.65	10.6	NA	NA	NA	262	3.6
96SC007	12	NA	NA	7.67	8.7	0.017	< 0.05	< 0.02	262.8	2.4
96SC008	22	NA	NA	7.26	0.6	0.171	< 0.05	0.03	198	10
96SC009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC010	22.4	NA	NA	7.11	5.3	0.087	0.21	0.04	147.3	8.8
96SC011	23.7	NA	NA	8.23	3.7	0.147	0.08	0.05	225.1	9.6
96SC012	25	NA	NA	8.9	8.6	0.053	0.1	0.06	198	6
96SC013	22.7	NA	NA	8.42	3.7	0.1	< 0.05	< 0.02	215	14
96SC014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC015	26.7	NA	NA	6.99	6	0.064	< 0.05	0.03	293	10
96SC016	25	NA	NA	7.36	0.4	0.314	< 0.05	0.22	340	770
96SC017	26.8	NA	NA	7.38	8.4	0.075	0.05	0.03	183	2.4
96SC018	21.9	NA	NA	7.06	9.6	0.045	0.18	< 0.02	229	4
96SC019	19.5	NA	NA	7.11	5.6	0.085	0.3	0.03	187	9.6
96SC020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC021	22.5	NA	NA	8.49	9.7	0.048	< 0.05	< 0.02	293	3.2
96SC022	20.2	NA	NA	8.35	11.2	0.079	0.77	< 0.02	537	4
96SC023	NA	NA	NA	8.2	8.9	0.092	0.68	0.04	356	24
96SC024	20	NA	NA	7.9	6.6	0.041	0.18	0.05	353	2
96SC025	18.3	NA	NA	8.9	NA	0.107	1.9	< 0.02	362.8	2.4
96SC026	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

96SC027	21.5	NA	NA	7.42	8.7	0.109	0.24	0.1	409.3	4.4
96SC028	21.7	NA	NA	7.7	7.2	< 0.01	0.15	0.03	140	22
96SC029	19.6	NA	NA	7.73	7.9	0.038	< 0.05	0.02	136.2	1.6
96SC030	14.6	NA	NA	7.57	9.8	0.026	0.046	< 0.02	141.7	2.6
96SC031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC032	21	NA	NA	7.6	6.7	0.054	0.07	< 0.02	112	5.2
96SC033	20.1	NA	NA	8.05	7.9	0.05	< 0.05	0.02	147	1.6
96SC034	24.8	NA	NA	7.76	6.4	0.073	0.07	0.03	119.6	6.4
96SC035	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC036	24.5	NA	NA	6.99	4	0.11	< 0.05	0.12	120	5.6
96SC037	24.9	NA	NA	7.82	7.5	0.05	< 0.05	0.03	76.2	3.2
96SC038	14.5	NA	NA	8	7.5	0.087	< 0.05	< 0.02	65.6	36
96SC039	18	NA	NA	6.61	2.7	0.051	< 0.05	0.11	66.2	48
96SC040	19.2	NA	NA	7.3	7.6	0.06	0.06	< 0.02	117.2	2
96SC041	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC042	19.3	NA	NA	6.78	5.7	0.085	< 0.05	0.05	71.5	24
96SC043	20.2	NA	NA	7.5	NA	0.133	< 0.05	0.02	167.8	76
96SC044	19.2	NA	NA	7.46	6.3	0.05	0.06	0.05	200.3	< 1
96SC045	16.3	NA	NA	6.65	5.3	0.114	< 0.05	< 0.02	60.1	20
96SC046	21.1	NA	NA	7.37	7.6	0.061	< 0.05	0.02	138.8	5.6
96SC047	19.5	NA	NA	7.41	7.1	0.057	< 0.05	0.04	130	< 1
96SC048	21	NA	NA	7.42	6.5	0.126	< 0.05	0.02	135.9	18
96SC049	16.4	NA	NA	7.15	5	0.103	0.07	0.1	153	3.6
96SC050	18.6	NA	NA	5.16	6.3	0.07	< 0.05	0.04	84.7	8
96SC051	18.2	NA	NA	7.54	8.1	0.103	0.17	< 0.02	233.6	12
96SC052	18.5	NA	NA	7.04	6.5	0.073	< 0.05	0.03	92.8	5.2
96SC053	19.9	NA	NA	NA	7.6	0.049	< 0.05	< 0.02	113.3	4.8
96SC054	24.5	NA	NA	7.58	5.9	0.13	0.1	0.07	120.4	6.4
96SC055	13.5	NA	NA	7.43	7.9	0.085	< 0.05	0.03	194	2.8
96SC056	22.3	NA	NA	8.06	8.2	0.048	< 0.05	0.04	114.8	1.4

96SC057	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC058	18.4	NA	NA	8.2	7.9	0.034	< 0.05	< 0.02	166.9	4.8
96SC059	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
96SC060	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS001	17.9	NA	NA	7.55	7.9	0.092	< 0.05	0.03	80.7	1.6
97LS002	19.6	NA	NA	7.59	7.2	0.02	< 0.05	< 0.02	389.5	1.6
97LS003	22.7	NA	NA	6.72	6.3	0.034	< 0.05	< 0.02	548	3
97LS004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS005	21.4	NA	NA	7.34	6.75	0.049	< 0.05	< 0.02	243.7	11
97LS006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS009	20.4	NA	NA	7.61	7.75	0.016	< 0.05	0.02	134	1.2
97LS010	18.6	NA	NA	7.15	8.45	0.016	< 0.05	0.03	90.2	1.2
97LS011	16.4	NA	NA	7.61	9.25	0.031	0.12	0.02	98.3	2.8
97LS012	21	NA	NA	7.39	8	0.119	< 0.05	< 0.02	84.1	34
97LS013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS014	12.4	NA	NA	8.03	8.9	0.016	< 0.05	< 0.02	102	1
97LS015	21.6	NA	NA	7.51	8.3	0.028	< 0.05	0.03	68.2	6
97LS016	23.6	NA	NA	7.23	7.85	0.024	< 0.05	< 0.02	110.5	< 1
97LS017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS018	25.1	NA	NA	7.54	6.75	0.032	< 0.05	< 0.02	75	4.4
97LS019	18	NA	NA	NA	6.7	0.033	0.06	0.03	72.8	2.8
97LS020	15.5	NA	NA	7.43	4.9	0.022	< 0.05	< 0.02	62	19
97LS021	21.9	NA	NA	7.53	6.3	0.078	0.23	0.04	237.8	23
97LS022	18.5	NA	NA	7.29	4.55	0.074	< 0.05	0.02	65	9.6
97LS023	21.1	NA	NA	8.23	12.95	0.056	1	< 0.02	626	2.4
97LS024	17.1	NA	NA	7.02	3.1	0.039	< 0.05	< 0.02	27.8	1.2
97LS025	20.3	NA	NA	7.22	4.6	0.058	< 0.05	0.09	78	5
97LS026	18.5	NA	NA	6.42	8.45	0.076	< 0.05	< 0.02	131.5	23

97LS027	19.2	NA	NA	7.53	7.6	0.034	< 0.05	< 0.02	287.5	3.2
97LS028	17	NA	NA	7.23	5.5	0.035	< 0.05	< 0.02	95.8	2
97LS029	20.2	NA	NA	7.62	8.45	0.022	< 0.05	< 0.02	258.5	1.2
97LS030	18.9	NA	NA	6.12	4.9	0.084	< 0.05	0.09	71.4	22
97LS031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS032	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS033	19.6	NA	NA	7.05	5.85	0.074	< 0.05	0.04	140.4	4.4
97LS034	19	NA	NA	7.67	5.35	0.065	< 0.05	0.05	80.1	2.4
97LS035	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS036	17.2	NA	NA	8.1	7.8	0.037	< 0.05	< 0.02	123.6	2
97LS037	25.7	NA	NA	7.14	5.05	0.05	< 0.05	0.11	81	5.2
97LS038	16.4	NA	NA	7.43	8.9	0.037	< 0.05	< 0.02	205	2.4
97LS039	19.2	NA	NA	7.16	6.65	0.074	0.06	0.05	161.5	36
97LS040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS041	22.8	NA	NA	7.73	7.65	0.024	< 0.05	0.02	133.2	8.4
97LS042	17	NA	NA	7.2	4	0.034	< 0.05	< 0.02	64	1.2
97LS043	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS044	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS045	17	NA	NA	8.19	9.45	0.098	0.15	< 0.02	232	85
97LS046	15.8	NA	NA	7.25	6.65	0.042	< 0.05	0.05	420.6	10
97LS047	15.5	NA	NA	7.69	10.3	0.022	< 0.05	< 0.02	64.3	34
97LS048	12.5	NA	NA	7.49	3.7	0.043	< 0.05	0.03	179.1	3.6
97LS049	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS050	12.1	NA	NA	4.1	6.05	0.042	0.05	0.08	190	2.4
97LS051	15.9	NA	NA	7.28	8.95	0.01	< 0.05	< 0.02	54.5	< 1
97LS052	22.2	NA	NA	7.31	7.05	0.017	0.07	0.03	63.7	2
97LS053	22.2	NA	NA	7.31	7.05	0.017	0.07	0.03	63.7	2
97LS054	15.6	NA	NA	6.66	6.4	0.023	< 0.05	0.06	56.5	2.4
97LS055	21	NA	NA	7.48	8	0.023	< 0.05	< 0.02	83.8	6
97LS056	14.4	NA	NA	7.54	8	0.011	0.1	0.04	76	< 1

97LS057	18.7	NA	NA	7.36	8.5	0.02	< 0.05	< 0.02	59.7	2.4
97LS058	17.1	NA	NA	7.8	8	0.02	< 0.05	0.03	55.2	6.4
97LS059	21.7	NA	NA	7.47	4.55	0.035	< 0.05	0.03	61	< 1
97LS060	16.5	NA	NA	7.68	8.65	0.013	< 0.05	< 0.02	62.2	< 1
97LS061	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS062	22.1	NA	NA	7.8	7.6	0.021	< 0.05	< 0.02	36.3	2.8
97LS063	21.4	NA	NA	8.22	10.55	0.014	< 0.05	< 0.02	100	4.8
97LS064	20.7	NA	NA	7.36	7.7	0.011	< 0.05	0.02	36	1.4
97LS065	23.2	NA	NA	7.86	6.85	0.013	< 0.05	0.02	34.1	2
97LS066	18.8	NA	NA	7.47	8.48	0.034	< 0.05	0.02	76.3	27
97LS067	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS068	18.4	NA	NA	7.55	6.85	0.034	< 0.05	0.03	34.8	6.4
97LS069	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
97LS070	20.2	NA	NA	8.1	7.8	0.011	< 0.05	0.06	153	1.2
99UM001	19.6	NA	NA	6.38	5.7	0.07	< 0.05	< 0.02	267.5	5.6
99UM002	17	NA	NA	7.67	5.8	0.035	< 0.05	< 0.02	618	2
99UM003	17.4	NA	NA	7.84	7.4	0.069	0.09	< 0.02	311.8	1.2
99UM004	21.8	NA	NA	7.88	5.95	0.268	0.3	0.27	474	33
99UM005	16.5	NA	NA	8.09	7.45	0.209	10	0.07	753	6.1
99UM006	13	NA	NA	5.06	3.15	0.04	< 0.05	0.03	308.1	1.6
99UM007	15.7	NA	NA	7.49	3.95	0.035	< 0.05	0.03	433	< 1
99UM008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM009	15	NA	NA	7.65	7.8	0.053	1.2	< 0.02	622	3.3
99UM010	21.1	NA	NA	8.75	10.75	0.375	1.7	0.04	671	68
99UM011	22.5	NA	NA	8.01	5.25	0.022	< 0.05	0.05	284.2	2
99UM012	20	NA	NA	6.71	1.7	0.247	< 0.05	0.12	480.5	23
99UM013	16.1	NA	NA	7.71	7.1	0.124	0.58	0.04	508	2.8
99UM014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM015	23.9	NA	NA	7.22	6.05	0.179	< 0.05	0.05	413.7	6.4
99UM016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

99UM017	24	NA	NA	8.35	7.3	0.327	1.2	< 0.02	500	82
99UM018	21.5	NA	NA	7.45	7.2	0.203	< 0.05	< 0.02	247	2.1
99UM019	20.4	NA	NA	8.1	7.25	0.295	0.18	< 0.02	497.4	3.3
99UM020	23.3	NA	NA	7.76	6.3	0.25	9.4	0.15	887	43
99UM021	22	NA	NA	7.56	1.25	0.033	< 0.05	< 0.02	305	2.4
99UM022	25	NA	NA	7.47	5.25	0.052	< 0.05	< 0.02	338.3	2
99UM023	24.6	NA	NA	7.72	5.55	0.17	< 0.05	< 0.02	218.6	5.2
99UM024	19.4	NA	NA	7.22	1.95	0.304	< 0.05	< 0.02	173.7	15
99UM025	22	NA	NA	7.2	4.7	0.658	0.32	< 0.02	809	15
99UM026	23.2	NA	NA	7.06	7.75	0.035	< 0.05	< 0.02	310	2.8
99UM027	23.5	NA	NA	8.03	8.25	0.066	< 0.05	< 0.02	320	2.4
99UM028	17.1	NA	NA	7.65	6.55	0.059	0.7	< 0.02	321.1	2.7
99UM029	19.7	NA	NA	7.45	5.45	0.5	2.5	0.14	710	390
99UM030	19.5	NA	NA	6.7	2.4	0.107	< 0.05	< 0.02	98.1	6.4
99UM031	22.9	NA	NA	8.52	8.2	0.021	< 0.05	< 0.02	268	2
99UM032	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM033	17.4	NA	NA	7.43	NA	0.036	< 0.05	< 0.02	554	2
99UM034	21.4	NA	NA	8	7.65	0.077	0.21	0.02	283.4	13
99UM035	19.3	NA	NA	8.2	6.4	0.076	0.14	0.7	150	6.8
99UM036	22.1	NA	NA	8.02	5.15	0.036	< 0.05	0.05	252.4	14
99UM037	11.6	NA	NA	8.6	10.5	0.143	< 0.05	0.05	161.9	1.2
99UM038	23	NA	NA	8.2	6.6	0.126	0.77	0.05	395	NA
99UM039	23.3	NA	NA	7.95	6.7	0.079	0.12	< 0.02	461.8	4.7
99UM040	20.8	NA	NA	7.56	0.25	0.103	2.7	0.06	1050	29
99UM041	24.3	NA	NA	7.97	6.6	0.083	0.13	0.22	212.7	2.8
99UM042	22.5	NA	NA	7.31	5.2	0.653	1.1	0.02	197.1	NA
99UM043	16.4	NA	NA	8.16	6.75	0.209	1.4	0.03	396	2
99UM044	28.6	NA	NA	8.15	8.2	0.133	0.16	0.06	523	12
99UM045	25.3	NA	NA	7.5	8.2	0.373	0.66	< 0.02	365.6	120
99UM046	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

99UM047	22.5	NA	NA	6.98	7.1	0.028	< 0.05	< 0.02	352.5	1.6
99UM048	21.3	NA	NA	6.89	1.4	0.126	< 0.05	0.05	207.5	4.4
99UM049	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM050	29	NA	NA	8	6.6	0.086	2.7	0.08	577	8
99UM051	23.7	NA	NA	6.37	3.65	0.093	< 0.05	0.04	78.2	NA
99UM052	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM053	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM054	19.3	NA	NA	7.11	0.1	0.249	< 0.05	0.07	498.3	6
99UM055	22.4	NA	NA	8.24	9.35	0.084	1.1	< 0.02	537	3.1
99UM056	22.9	NA	NA	7.15	5.9	0.028	0.07	0.04	242.6	1.6
99UM057	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM058	23.6	NA	NA	7.46	5.1	0.227	0.19	0.04	355	7.6
99UM059	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM060	21.6	NA	NA	7.5	3.5	0.257	0.36	0.07	528	4
99UM061	19.2	NA	NA	8.02	6.05	0.028	< 0.05	< 0.02	390.5	18
99UM062	22.2	NA	NA	8.26	7.1	0.055	0.25	< 0.02	377.4	4.4
99UM063	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM064	18.5	NA	NA	8.16	8	0.218	2.9	< 0.02	756	66
99UM065	25	NA	NA	6.36	4.5	0.045	0.05	0.27	35	NA
99UM066	18.8	NA	NA	7.56	2.85	0.036	< 0.05	0.07	262.5	2.4
99UM067	17.6	NA	NA	7.13	4	0.054	< 0.05	< 0.02	141.5	2
99UM068	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM069	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99UM070	22.4	NA	NA	8.14	6.05	0.445	4.2	0.14	698	240
01MN001	19.9	NA	NA	7.71	8.45	0.083	1.9	0.09	1616	25
01MN002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN003	20.7	NA	NA	7.93	9.5	0.041	0.27	< 0.05	953	2.4
01MN004	15.7	NA	NA	7.64	9	0.143	15	0.49	744	18
01MN005	23.1	NA	NA	7.87	3.15	0.881	0.65	0.35	1090	70
01MN006	25.5	NA	NA	8.15	7.65	0.073	15	0.05	1486	15

01MN007	25.1	NA	NA	8	12.9	0.122	7.5	0.06	970	14
01MN008	20.2	NA	NA	7.91	8.25	0.094	0.49	< 0.05	713	8.4
01MN009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN010	23.34	NA	NA	8.44	8	NA	NA	NA	878	52
01MN011	24.5	NA	NA	8.16	9.1	0.052	5	< 0.05	1400	9.2
01MN012	27.1	NA	NA	8.34	9.65	0.112	11	< 0.05	835	5.6
01MN013	20.7	NA	NA	7.86	8.05	0.068	4	0.09	1620	18
01MN014	22.9	NA	NA	8.35	9.2	0.134	12	< 0.05	614	18
01MN015	31.8	NA	NA	8.42	6.4	0.21	9.1	< 0.05	862	11
01MN016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN019	25.2	NA	NA	7.5	3.8	0.097	< 0.05	< 0.05	2012	30
01MN020	24.1	NA	NA	7.83	6.6	0.186	0.54	0.06	506	22
01MN021	20.5	NA	NA	7.96	6.4	0.054	0.8	0.16	1035	8.4
01MN022	23.2	NA	NA	8.2	9	0.101	9.7	< 0.05	668	12
01MN023	24.8	NA	NA	7.71	5.2	0.157	17	0.07	743	6
01MN024	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN025	25.2	NA	NA	8.11	15.35	0.102	2.3	< 0.05	1192	4.4
01MN026	18.8	NA	NA	8.36	8.9	0.69	0.87	< 0.05	1234	6
01MN027	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN028	21.3	NA	NA	7.92	9.5	0.051	20	< 0.05	769	4.8
01MN029	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN030	25.8	NA	NA	8.18	7.8	0.046	17	< 0.05	646	22
01MN031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN032	24.1	NA	NA	7.64	1.8	0.833	0.14	< 0.05	1440	13
01MN033	29.1	NA	NA	8.06	8.45	0.085	0.6	< 0.05	940	11
01MN034	24.4	NA	NA	8.4	7	0.138	7.2	< 0.05	1139	41
01MN035	30.8	NA	NA	7.92	4.6	0.327	6.5	0.23	1025	92
01MN036	27.1	NA	NA	8.52	10.6	0.099	16	< 0.05	601	38

01MN037	16.7	NA	NA	8	7.4	0.078	9.5	< 0.05	1563	6
01MN038	21.5	NA	NA	7.55	2.3	0.13	9.8	0.09	885	4.4
01MN039	23.7	NA	NA	8.38	8.55	0.286	9.8	< 0.05	570	74
01MN040	18	NA	NA	8.07	6.95	0.123	8.2	< 0.05	700	8.4
01MN041	25	NA	NA	8.4	12.7	0.029	3.8	< 0.05	1022	7.2
01MN042	20	NA	NA	8.34	10.5	0.12	0.56	< 0.05	1237	46
01MN043	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN044	23.7	NA	NA	8.54	9.7	0.455	1.7	< 0.05	843	6.8
01MN045	24.5	NA	NA	8.04	14.5	0.03	19	< 0.05	2105	1.2
01MN046	28.3	NA	NA	8.47	7.25	0.306	3.9	0.09	688	130
01MN047	19.5	NA	NA	8.29	8.35	0.13	1.7	0.09	896	24
01MN048	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN049	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN050	24.1	NA	NA	8.43	9.2	0.286	< 0.05	< 0.05	898	83
01MN051	26.8	NA	NA	8.56	8.1	0.474	1.1	0.06	703	6.8
01MN052	27.6	NA	NA	8.23	6.45	0.28	5.2	< 0.05	843	61
01MN053	25.7	NA	NA	7.99	11.7	0.046	9.6	0.1	985	6.8
01MN054	23.9	NA	NA	8.38	7.15	0.134	11	0.07	700	48
01MN055	23.8	NA	NA	8.44	7.25	0.131	8.1	< 0.05	914	40
01MN056	21.2	NA	NA	8.49	7.8	0.084	1.8	< 0.05	1017	15
01MN057	28.9	NA	NA	9.13	7.25	0.379	0.18	< 0.05	606	82
01MN058	21.9	NA	NA	8.25	6.3	0.52	5.4	0.05	832	26
01MN059	25.7	NA	NA	8.09	5.95	0.195	1.7	< 0.05	1262	35
01MN060	28.9	NA	NA	8.45	14.05	0.054	6.3	< 0.05	699	3.2
01MN061	18.1	NA	NA	7.98	9.3	0.076	8.1	< 0.05	1447	3.2
01MN062	20.5	NA	NA	8.31	8.3	0.107	< 0.05	< 0.05	924	16
01MN063	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN064	24.4	NA	NA	8.28	7.5	0.083	0.59	< 0.05	562	24
01MN065	23.9	NA	NA	8.42	8.03	0.246	0.1	< 0.05	942	54
01MN066	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

01MN067	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN068	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
01MN069	18.8	NA	NA	8.4	9.6	0.097	< 0.05	< 0.05	805	41
01MN070	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD001	16.45	NA	NA	8.33	NA	0.055	17	< 0.05	610	6
04CD002	22.45	NA	NA	8.1	11	0.281	8.3	< 0.05	610	16
04CD003	18	NA	NA	7.69	6.35	0.184	6.8	0.06	449	10
04CD004	18.08	NA	NA	6.9	6.4	0.225	12	< 0.05	599	9.2
04CD005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD006	21.79	NA	NA	7.91	9.75	0.172	6.9	< 0.05	602	47
04CD007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD008	23	NA	NA	7.15	7.55	0.116	17	< 0.05	560	17
04CD009	16.05	NA	NA	7.15	6.85	0.163	25	0.12	568	4.4
04CD010	19.4	NA	NA	7.49	7.15	0.252	8	< 0.05	641	110
04CD011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD012	17	NA	NA	7.9	8.15	0.057	13	< 0.05	527	6.4
04CD013	18.15	NA	NA	7.67	8.4	0.2	6.6	< 0.05	605	38
04CD014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD015	22.4	NA	NA	9.2	11.8	0.245	1.2	< 0.05	367	45
04CD016	22.16	NA	NA	8.03	13.55	0.032	21	< 0.05	708	2.4
04CD017	22.23	NA	NA	9.4	17.7	0.329	0.17	0.07	304	68
04CD018	20.48	NA	NA	8.11	NA	0.061	12	< 0.05	590	7.2
04CD019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD021	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD022	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD023	19.06	NA	NA	7.96	8.7	0.112	13	< 0.05	555	6.8
04CD024	18.51	NA	NA	8.21	11.75	0.279	5.7	< 0.05	612	28
04CD025	18.6	NA	NA	7.941	9.95	0.032	9	< 0.05	450	2
04CD026	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

04CD027	18.64	NA	NA	7.66	8.1	0.127	13	< 0.05	671	29
04CD028	17.3	NA	NA	7.2	6.6	0.1	5.1	0.05	0.57	21
04CD029	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD031	20.7	NA	NA	6.8	9.7	0.042	15	< 0.05	463	2
04CD032	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04CD033	20.23	NA	NA	7.8	11.65	0.053	15	< 0.05	563	3.2
04CD034	16.74	NA	NA	7.43	4.15	0.125	16	< 0.1	749	20
04CD035	17.21	NA	NA	7.34	7.45	0.03	23	< 0.05	619	8
04CD036	24.85	NA	NA	8.2	10.25	0.095	22	< 0.05	634	5.6
04CD037	21.299	NA	NA	9.1	8.8	0.159	0.56	< 0.05	338	40
04CD038	20.8	NA	NA	7.96	7.7	0.123	8.1	< 0.05	534	11
04DM001	20.6	NA	NA	8.1	7.75	0.165	13	< 0.05	1034	63
04DM002	28.89	NA	NA	5.51	0.65	0.472	< 0.05	1.27	346	17
04DM003	19.7	NA	NA	8.3	8	0.087	18	< 0.1	1042	13
04DM004	28	NA	NA	8.2	7	0.235	12	< 0.05	1046	110
04DM005	20.12	NA	NA	7.09	8.9	0.075	0.35	< 0.05	868	4
04DM006	17.2	NA	NA	7.75	8	0.274	10	0.06	982	31
04DM007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM008	17	NA	NA	7.38	8.1	0.141	28	< 0.05	1233	62
04DM009	25.4	NA	NA	8.07	6.25	0.151	3.6	< 0.05	961	28
04DM010	14.89	NA	NA	7.93	7.95	0.24	4.2	0.15	510	120
04DM011	26.4	NA	NA	7.61	4.9	0.296	8.4	0.14	980	70
04DM012	23	NA	NA	7.77	NA	0.156	12	< 0.05	1000	42
04DM013	21	NA	NA	8.4	7.55	0.339	1.5	< 0.05	738	89
04DM014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM015	25	NA	NA	8.13	16.3	0.127	3.3	< 0.05	757	21
04DM016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM018	17.31	NA	NA	8.15	5.6	0.703	< 0.05	< 0.05	784	46

04DM019	16.74	NA	NA	7.59	5.2	0.19	1.8	0.09	629	23
04DM020	18.8	NA	NA	6.9	11.35	0.317	0.54	< 0.05	682	53
04DM021	22	NA	NA	8.2	9.6	0.081	20	< 0.05	865	2.4
04DM022	26.04	NA	NA	8.11	NA	0.23	9	< 0.05	1023	91
04DM023	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM024	22.4	NA	NA	7.9	12.55	0.322	1	< 0.05	678	33
04DM025	24.4	NA	NA	8.25	7	0.198	12	< 0.05	970	94
04DM026	16.46	NA	NA	7.8	8.4	0.216	7.1	0.05	962	33
04DM027	16.52	NA	NA	8.02	8.25	0.147	3.3	< 0.05	816	59
04DM028	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM029	25	NA	NA	7.2	7.3	0.202	1.7	0.05	771	16
04DM030	22	NA	NA	7.4	3.95	0.519	0.46	0.25	786	11
04DM031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM032	19.4	NA	NA	7.8	7.1	0.202	13	< 0.05	900	42
04DM033	24	NA	NA	7.9	5.6	0.267	8.7	< 0.05	1012	74
04DM034	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04DM035	18	NA	NA	5.1	6.6	0.362	11	< 0.05	855	12
04DM043	22	NA	NA	7.9	11.75	0.281	1.8	< 0.05	701	28
04LM001	18.7	NA	NA	7.81	10.6	0.104	9.5	0.07	696	17
04LM002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM003	16.73	NA	NA	7.85	7.9	0.079	4	< 0.05	591	5
04LM004	12.2	NA	NA	7.9	9	0.058	9.5	< 0.05	583	8
04LM005	11.2	NA	NA	7.6	11.4	0.087	15	< 0.05	688	7.2
04LM006	19.6	NA	NA	4.9	8.95	0.099	7.6	0.06	567	17
04LM007	13.3	NA	NA	7.86	9.2	0.087	2.9	< 0.05	585	32
04LM008	15.3	NA	NA	8	8.3	0.13	5.1	< 0.05	680	42
04LM009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM010	19.16	NA	NA	8.22	11.7	0.015	26	< 0.05	536	3
04LM011	14.4	NA	NA	8	10.75	0.065	7.9	< 0.05	611	< 1
04LM012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

04LM013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM014	19.8	NA	NA	8.1	8.05	0.252	4.8	< 0.05	802	7.6
04LM015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM016	15.2	NA	NA	8.1	8.85	0.088	1	< 0.05	548	18
04LM017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM018	19.23	NA	NA	7.8	11.15	0.042	22	< 0.05	555	1.6
04LM019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM020	16.23	NA	NA	7.67	9.7	0.072	16	< 0.05	692	6.8
04LM021	13.9	NA	NA	8.02	10.7	0.072	6.7	< 0.05	614	9.6
04LM022	17.27	NA	NA	7.57	9.9	0.121	18	0.15	727	6.8
04LM023	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM024	16.5	NA	NA	7.8	8.85	0.085	3.2	< 0.05	606	24
04LM025	17.3	NA	NA	7.87	9.55	0.092	9.9	< 0.05	581	12
04LM026	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM027	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM028	11.2	NA	NA	6.93	9	0.044	25	< 0.05	612	3.2
04LM029	14.52	NA	NA	7.96	9	0.062	5.4	< 0.05	569	5.2
04LM030	9.41	NA	NA	7.4	9.55	0.021	1.2	< 0.05	488	17
04LM031	17	NA	NA	8.1	8.5	0.118	3.4	< 0.05	492	34
04LM032	11	NA	NA	7.7	8.65	0.174	6.4	< 0.05	600	25
04LM033	13	NA	NA	7.86	8.45	0.106	7.7	< 0.05	742	8.4
04LM034	18.9	NA	NA	8.15	8.65	0.131	1	< 0.05	517	32
04LM035	17	NA	NA	8.1	8.85	0.228	6.4	0.07	583	22
04LM036	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM037	12	NA	NA	8.1	9.75	0.076	5.4	< 0.05	522	10
04LM038	21.45	NA	NA	7.66	10	0.039	5.9	< 0.05	599	8.4
04LM039	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM041	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM042	14.2	NA	NA	7.4	11.75	0.041	20	< 0.05	579	4.4

04LM043	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM044	23.2	NA	NA	7.62	6.25	0.241	0.44	0.07	322	27
04LM045	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM046	17.3	NA	NA	7.62	8.8	0.092	9.8	< 0.05	740	9.6
04LM047	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM048	16.8	NA	NA	7.72	10.95	0.067	10	< 0.05	503	10
04LM049	17.2	NA	NA	8.18	8	0.066	2.7	< 0.05	531	6
04LM050	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM051	22.5	NA	NA	7.79	6.45	0.047	18	< 0.05	642	5.6
04LM052	15.92	NA	NA	8.06	8.85	0.09	1.8	< 0.05	634	6
04LM053	18.33	NA	NA	6.58	NA	0.062	16	< 0.05	654	7.2
04LM054	24	NA	NA	7.4	8.200001	0.052	14	< 0.05	566	3.2
04LM055	19.5	NA	NA	7.9	9	0.181	4.8	0.05	567	6
04LM056	18.3	NA	NA	7.7	9.6	0.081	12	< 0.1	682	9.6
04LM057	12	NA	NA	8.03	9.5	0.152	14	< 0.05	665	42
04LM058	12.75	NA	NA	7.89	10.5	0.1	14	< 0.05	603	2.4
04LM059	16.09	NA	NA	7.52	8.3	0.078	7.5	< 0.05	686	25
04LM060	18	NA	NA	8.4	11.1	0.036	3.9	< 0.05	496	12
04LM061	21.75	NA	NA	8.4	10.2	0.093	1	< 0.05	459	23
04LM062	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM063	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM064	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM065	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM066	19.68	NA	NA	8.71	11	0.065	14	< 0.05	602	4
04LM067	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM068	16	NA	NA	8.2	9.55	0.518	11	< 0.05	689	5.2
04LM069	13.92	NA	NA	7.95	9.7	0.133	7.6	< 0.05	629	11
04LM070	11.4	NA	NA	8	10	0.083	3.5	< 0.05	511	26
04LM071	16.4	NA	NA	8.1	7.9	0.142	8.7	< 0.05	575	1.6
04LM072	15.42	NA	NA	8.46	8.35	0.072	7	< 0.05	564	4

04LM073	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04LM074	13.86	NA	NA	7.53	8.4	0.169	8.1	< 0.05	615	12
04LM075	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS002	13.9	NA	NA	7.7	NA	0.082	16	< 0.05	951	15
04MS003	16.7	NA	NA	7	4.65	0.477	10	< 0.05	517	160
04MS004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS005	18.66	NA	NA	8.39	10.45	0.205	0.6	< 0.19	581	32
04MS006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS008	12.79	NA	NA	7.24	8.1	0.1	21	0.06	992	7.2
04MS009	16.5	NA	NA	8.4	8.55	0.258	2.2	< 0.05	815	63
04MS010	23	NA	NA	7.9	6.6	0.206	4.2	< 0.05	709	47
04MS011	14.8	NA	NA	8.2	9.05	0.078	17	< 0.05	833	24
04MS012	26.7	NA	NA	8	6.5	0.111	3.6	0.1	754	23
04MS013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS014	21.28	NA	NA	7.34	3.95	0.169	10	0.2	983	54
04MS015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS016	19	NA	NA	8.39	7.35	0.2	5.2	< 0.05	689	56
04MS017	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS018	21.1	NA	NA	8.09	8.75	0.101	15	< 0.05	812	20
04MS019	30	NA	NA	8.5	7.05	0.21	5.3	< 0.05	724	77
04MS020	25	NA	NA	8.1	10.45	0.08	15	< 0.05	744	11
04MS021	21	NA	NA	7.6	6.25	0.213	9.2	< 0.13	795	81
04MS022	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS023	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS024	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS025	20.1	NA	NA	6.72	9.45	0.064	16	< 0.05	888	8
04MS026	18.85	NA	NA	8.22	11.15	0.104	2.3	< 0.05	800	11
04MS027	15.12	NA	NA	8.31	11.15	0.153	6.4	< 0.05	921	23

04MS028	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS029	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS031	18.38	NA	NA	8.31	10.2	0.429	0.39	< 0.05	975	26
04MS032	24.6	NA	NA	8.2	6.15	0.346	3.2	< 0.05	684	170
04MS033	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
04MS034	21.1	NA	NA	7.49	9.35	0.06	22	< 0.05	1078	9.6
04MS035	22.7	NA	NA	7.5	7.8	0.158	3.2	0.05	763	26
05RD001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD002	23.55	NA	NA	7.62	2.3	0.03	< 0.05	< 0.05	551	< 1
05RD003	18.8	NA	NA	7.82	8.1	0.256	< 0.05	< 0.05	505	6
05RD004	23	NA	NA	6.25	9.11	0.079	< 0.05	< 0.05	698	12
05RD005	19.64	NA	NA	8.16	6.9	0.12	< 0.05	< 0.05	596	14
05RD006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD007	20.79	NA	NA	6.12	7.14	0.068	< 0.05	< 0.05	171	2.8
05RD008	26.7	NA	NA	7.91	6.25	0.211	< 0.05	0.06	1497	67
05RD009	22.32	NA	NA	8	10.3	0.064	< 0.05	< 0.05	432	1.6
05RD010	12.87	NA	NA	8.3	9.68	0.233	0.09	< 0.05	668	66
05RD011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD012	27.3	NA	NA	8.39	11.4	0.1	0.1	0.14	415	13
05RD013	21.4	NA	NA	7.57	5.6	0.453	0.36	0.1	1140	9.6
05RD014	22.69	NA	NA	7.63	6.4	0.092	< 0.05	< 0.05	676	22
05RD015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD016	25.52	NA	NA	8.5	9.89	0.043	< 0.05	0.09	428	2
05RD017	19.56	NA	NA	8.17	9.1	0.125	< 0.05	< 0.05	295	8
05RD018	25.26	NA	NA	8.17	7.36	0.126	0.1	< 0.05	584	50
05RD019	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD020	24.68	NA	NA	7.44	3	0.052	< 0.05	< 0.05	425	< 1
05RD021	24.6	NA	NA	6.75	6.6	0.111	< 0.05	< 0.05	274	4.8
05RD022	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

05RD023	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD024	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD025	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD026	26.2	NA	NA	7.78	5.72	0.199	< 0.05	< 0.05	482	54
05RD027	19.52	NA	NA	8.16	6.34	0.168	< 0.05	< 0.05	499	31
05RD028	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD029	26.08	NA	NA	8.4	9.32	0.115	< 0.05	< 0.05	461	2.4
05RD030	14.29	NA	NA	8.4	9.78	0.385	1.4	0.09	794	53
05RD031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD032	22.4	NA	NA	7.68	7.5	0.106	0.15	< 0.05	563	14
05RD033	22.28	NA	NA	7.63	8.5	0.092	< 0.05	< 0.05	828	32
05RD034	22.7	NA	NA	8.32	10.15	0.033	< 0.05	< 0.05	254	2
05RD035	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD036	22.91	NA	NA	8.36	8.49	0.066	< 0.05	< 0.05	569	22
05RD037	28.84	NA	NA	7.78	5.4	0.384	0.35	0.07	162	NA
05RD038	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD039	19.4	NA	NA	7.35	6.99	0.11	< 0.05	< 0.05	394	8
05RD040	22.3	NA	NA	7.8	1.7	0.382	0.14	0.06	511	34
05RD041	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD042	21.2	NA	NA	5.6	8.09	0.066	< 0.05	< 0.05	445	3.6
05RD043	17.29	NA	NA	7.28	8	0.096	< 0.05	< 0.05	408	15
05RD044	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD045	24.4	NA	NA	5.2	4.6	0.147	< 0.05	0.08	598	4
05RD046	22.14	NA	NA	8.2	5.88	0.115	< 0.05	< 0.05	551	4.8
05RD047	21.72	NA	NA	8.48	8.27	0.356	0.84	< 0.05	714	150
05RD048	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD049	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD050	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD051	23.31	NA	NA	7.75	2	0.402	< 0.05	< 0.05	509	24
05RD052	16.4	NA	NA	7.95	5.8	0.177	0.32	0.11	725	58

05RD053	18.58	NA	NA	7.98	8.45	0.063	< 0.05	< 0.05	693	16
05RD054	26.15	NA	NA	7.79	8.9	0.092	0.14	0.25	327	5.6
05RD055	24	NA	NA	8.2	12	0.267	< 0.05	< 0.05	928	11
05RD056	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD057	21.14	NA	NA	8.39	8.44	0.033	< 0.05	< 0.05	254	6.8
05RD058	18.2	NA	NA	8.1	7.3	0.037	< 0.05	< 0.05	362	1.6
05RD059	28.7	NA	NA	8.31	6.8	0.181	0.17	0.07	426	46
05RD060	23	NA	NA	7.7	2.5	0.213	< 0.05	< 0.05	580	NA
05RD061	19	NA	NA	7.85	7.87	0.042	< 0.05	< 0.05	578	3.2
05RD062	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD063	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD064	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD065	17	NA	NA	8	6.5	0.036	< 0.05	< 0.05	533	2.6
05RD066	14.25	NA	NA	7.36	3.4	0.206	< 0.05	< 0.05	448	6.4
05RD067	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD068	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD069	22.28	NA	NA	7.62	7.12	0.188	< 0.05	< 0.05	644	6.8
05RD070	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD171	24.58	NA	NA	7.83	7.14	0.038	< 0.05	< 0.05	261	2.4
05RD172	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD173	20.2	NA	NA	7.9	5.24	4.47	< 0.05	0.83	1843	330
05RD174	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD175	29.9	NA	NA	8.41	10.48	0.089	< 0.05	< 0.05	765	27
05RD176	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD177	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD178	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD179	21	NA	NA	7.833	7.79	0.065	< 0.05	< 0.05	449	11
05RD180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RD181	25.13	NA	NA	7.16	11.41	0.132	< 0.05	0.07	510	46
05RN001	20.7	NA	NA	8.1	8.4	0.037	< 0.05	< 0.05	242	3.2

05RN002	27.2	NA	NA	7.4	4.8	0.055	0.13	< 0.05	115	3.2
05RN003	19.3	NA	NA	6.6	4.7	0.034	< 0.05	< 0.05	138	NA
05RN004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN010	19.6	NA	NA	7.24	7.6	0.053	< 0.05	< 0.05	113	6.4
05RN011	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN012	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN013	15.6	NA	NA	7.27	6.8	0.032	< 0.05	< 0.05	112	7.6
05RN014	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN015	22.8	NA	NA	6.98	4.8	0.052	< 0.05	< 0.05	136	7.3
05RN016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN017	17.25	NA	NA	7.71	2	0.022	0.05	< 0.05	326	2
05RN018	18.89	NA	NA	7.28	6.4	0.053	< 0.05	< 0.05	132	7.2
05RN019	21.4	NA	NA	7	4.9	0.061	< 0.05	< 0.05	120	2.4
05RN020	24.9	NA	NA	7.02	7.3	0.02	< 0.05	< 0.05	127	1.2
05RN021	19.44	NA	NA	6.97	8.2	0.019	< 0.05	< 0.05	111	2.4
05RN022	21.89	NA	NA	7.18	6.3	0.052	< 0.05	0.05	117	2.8
05RN023	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN024	25.51	NA	NA	7.12	6.2	0.027	0.08	0.05	52	< 1
05RN025	20.53	NA	NA	6.95	8	0.033	< 0.05	< 0.05	233	1.6
05RN026	23.5	NA	NA	4.7	5.6	0.099	< 0.05	< 0.05	242	9.6
05RN027	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN028	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN029	19.22	NA	NA	5.4	2.7	0.076	< 0.05	0.1	42	28
05RN030	25	NA	NA	6.9	6	0.051	< 0.05	< 0.05	69	2.8
05RN031	18.82	NA	NA	7.83	7.8	0.028	< 0.05	< 0.05	258	10

05RN032	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN033	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN034	27.2	NA	NA	6.9	5.6	0.053	< 0.05	0.06	124	3.2
05RN035	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN036	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN037	25.8	NA	NA	8.11	8.3	0.087	< 0.05	< 0.05	211	5.2
05RN038	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN039	24.43	NA	NA	7.69	6.4	0.075	< 0.05	< 0.05	226	1.2
05RN040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN041	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN042	19.9	NA	NA	6.9	8.4	0.013	< 0.05	< 0.05	91	< 1
05RN043	25.45	NA	NA	6.9	5.5	0.085	< 0.05	< 0.05	293	23
05RN044	17.9	NA	NA	8.03	8.5	0.021	< 0.05	< 0.05	261	2
05RN045	25.1	NA	NA	6.5	4.1	0.113	< 0.05	< 0.05	66	4
05RN046	21	NA	NA	8.3	8.6	NA	NA	NA	238	1.2
05RN047	19.8	NA	NA	7.4	NA	0.03	< 0.05	< 0.05	218	5.6
05RN048	26.8	NA	NA	6.55	7.5	0.045	< 0.05	< 0.05	48	3.2
05RN049	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN050	18.72	NA	NA	6.43	6.2	0.026	< 0.05	< 0.05	67	3.2
05RN051	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN052	19.1	NA	NA	8.2	9	0.026	< 0.05	< 0.05	211	2
05RN053	22	NA	NA	7.1	4.6	0.039	< 0.05	< 0.05	109	2
05RN054	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN055	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN056	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN057	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN058	16	NA	NA	6.9	3	0.029	< 0.05	< 0.05	92	1.2
05RN059	23.1	NA	NA	7.66	6.8	0.029	< 0.05	< 0.05	231	5.6
05RN060	25	NA	NA	8	7.4	0.045	< 0.05	< 0.05	215	1.2
05RN061	21.9	NA	NA	5.23	4.9	0.074	< 0.05	< 0.05	49	31

05RN062	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN063	20.78	NA	NA	6.99	5.5	0.069	< 0.05	< 0.05	102	22
05RN064	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN065	17.9	NA	NA	6.71	4.4	0.025	< 0.05	< 0.05	97	1.2
05RN066	18.9	NA	NA	7.9	8.8	0.029	< 0.05	< 0.05	249	2.8
05RN067	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN068	23.5	NA	NA	6.2	4.6	0.038	< 0.05	< 0.05	55	NA
05RN069	16.9	NA	NA	5.25	3.7	0.042	< 0.05	0.18	23	4.7
05RN070	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN171	23.9	NA	NA	7.51	6.6	0.077	< 0.05	< 0.05	243	5.6
05RN172	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN173	15.76	NA	NA	7.3	6.9	0.082	0.97	< 0.05	273	5.2
05RN174	18.7	NA	NA	5.4	3.3	0.097	< 0.05	< 0.05	37	76
05RN175	26.1	NA	NA	7.16	5.1	0.05	< 0.05	< 0.05	205	1.6
05RN176	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN177	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN178	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN179	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN180	15.48	NA	NA	8.06	9.6	0.034	< 0.05	< 0.05	547	8.4
05RN181	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN182	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN183	15.6	NA	NA	5	NA	0.055	0.06	0.07	19	14
05RN184	14.22	NA	NA	6.4	7.9	0.029	< 0.05	< 0.05	91	6.4
05RN185	24.53	NA	NA	8.36	9.64	0.02	< 0.05	< 0.05	304	5.2
05RN186	20.86	NA	NA	7.18	3.3	0.231	< 0.05	0.16	232	65
05RN187	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
05RN188	21.8	NA	NA	7.33	10.14	0.296	< 0.05	< 0.05	348	20
05RN189	21.8	NA	NA	6.99	3.63	0.129	< 0.05	< 0.05	217	35
10EM001	22.5	2.5	2.9	7.8	8.29	0.09	19	< 0.05	764	47
10EM002	21.5	27	27.2	7.62	8.65	0.102	0.05	< 0.1	305	28.8

10EM003	23.4	7.8	8.1	8.09	6.18	0.247	< 0.05	< 0.05	884	51
10EM004	17.9	28	29.2	7.91	9.14	0.084	< 0.05	< 0.1	139.3	12.8
10EM005	24.3	12	13.1	8.23	7.81	0.149	< 0.05	< 0.1	394	58
10EM006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM007	27.3	5.1	4.9	7.95	8.8	0.21	9.7	< 0.05	886	18
10EM008	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM009	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM010	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM011	22.1	4	3.8	8.31	9.5	0.259	4.3	< 0.05	686	8
10EM012	18.4	12	11.3	9.43	9.43	0.028	< 0.05	< 0.1	115.3	< 4
10EM013	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM014	18.2	3	4	8.4	7.85	0.104	5.3	< 0.05	739	20
10EM015	13.6	1.4	1.3	7.8	9.2	0.046	9.5	< 0.05	585	1.2
10EM016	22.8	6	6.2	8.43	9.41	0.059	0.44	< 0.05	1206	5.2
10EM017	19.8	22	23.6	7.87	7.67	0.063	< 0.05	< 0.1	271	< 4
10EM018	11.9	66	59.8	5.45	8.08	0.03	< 0.05	< 0.1	37.5	< 4
10EM019	14.5	2.8	3.1	7.52	8.37	0.063	18	< 0.05	912	1.2
10EM020	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM021	19.2	30	26.6	6.52	1.94	0.243	0.112	< 0.1	145	4.8
10EM022	27.2	18	16.2	8.04	7.92	0.146	0.072	< 0.1	520	4.8
10EM023	16.2	12	12.6	8.36	8.83	0.055	0.05	< 0.05	1312	44
10EM024	18.3	34	33.7	7.62	8.38	0.059	< 0.07	< 0.05	112.1	2.4
10EM025	21.8	30	31.7	7.25	5.34	0.082	< 0.05	< 0.1	171.5	6.8
10EM026	21.3	NA	NA	8.22	9.19	0.12	0.132	< 0.1	546	9.2
10EM027	25.1	19	18.5	7.1	0.15	0.713	< 0.05	0.09	415	< 1
10EM028	23.2	4.7	5.1	8.09	8.12	0.145	7.9	< 0.05	659	30
10EM029	19.7	14	13.9	7.34	7.79	0.137	< 0.05	0.149	141.8	< 4
10EM030	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM031	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM032	24.2	8.1	8.7	8.35	7.52	0.478	0.484	< 0.1	687	256

10EM033	20.9	14	13.2	7.66	8.73	0.039	< 0.05	< 0.1	87	8
10EM034	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM035	21.4	17	15.4	7.58	0.24	0.119	0.18	1.3	804	6.4
10EM036	24	12	10.9	7.96	7	0.105	0.15	< 0.05	246	12
10EM037	18.7	48	47.9	7.18	1.11	0.08	< 0.05	< 0.1	324	< 4
10EM038	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM039	22	13	14.1	7.97	4.58	0.299	2.7	< 0.05	759	18
10EM040	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM041	21	34	30.3	7.48	7.64	0.068	0.196	< 0.1	183.5	< 4
10EM042	20.1	7.2	6.8	8.43	7.1	0.063	< 0.05	< 0.05	492	18
10EM043	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM044	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM045	22.4	41	41.9	6.89	3.32	0.081	< 0.05	< 0.1	209.9	14.4
10EM046	20.2	7.7	8	8.1	6.93	0.209	11	< 0.05	1102	33
10EM047	16.8	5.3	5.7	8.25	6.99	0.18	1.6	< 0.05	659	1.6
10EM048	15.1	NA	NA	8.56	10.65	0.052	< 0.05	< 0.1	342	6.6
10EM049	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM050	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM051	21.5	5.1	4.6	8.23	8.96	0.121	1.3	< 0.05	541	49
10EM052	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM053	17.7	NA	NA	7.67	7.69	0.076	< 0.05	< 0.1	289	< 4
10EM054	15.6	9.6	10.8	7.79	7.38	0.083	2.26	< 0.1	728	8.8
10EM055	14	NA	NA	7.99	8.42	0.13	0.59	< 0.05	539	30
10EM056	19	8.3	8.9	7.3	9.36	0.047	< 0.05	< 0.1	59.5	< 4
10EM057	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM058	26.7	9.3	8.3	8.27	5.68	0.312	0.05	< 0.05	1104	36
10EM059	19.2	2.4	2.2	8.17	8.63	0.14	8.5	< 0.05	563	30
10EM060	11.9	NA	NA	8.5	10.06	0.034	0.084	< 0.1	425	35.5
10EM061	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM062	19	4.4	4.2	8.24	9.81	0.029	0.26	< 0.05	944	4.4

10EM063	22.8	32	30.6	7.55	7.96	0.066	< 0.07	< 0.05	84.3	4.8
10EM064	24.4	14	15	8.3	8.39	0.461	0.06	< 0.1	1514	59.6
10EM065	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM066	22.5	21	21.1	7.6	6.5	0.089	< 0.05	< 0.1	263	4.8
10EM067	22.6	6.9	7.6	8	8.49	0.502	0.87	0.39	2121	6.4
10EM068	25.8	12	12.4	8.35	8.74	0.053	0.08	< 0.05	130	6.4
10EM069	16.9	14	15.4	7.73	6.12	0.181	< 0.05	< 0.1	593	< 4
10EM070	24.7	6.9	6.2	8.78	12.7	0.027	< 0.05	< 0.05	469	3.2
10EM071	21.2	4.1	3.9	7.97	7.27	0.088	8.8	< 0.05	757	5.6
10EM072	18.3	22	21.1	7.51	8.02	0.071	< 0.05	< 0.05	141.8	2
10EM073	21.8	41	44.8	7.4	7.1	0.101	0.056	< 0.1	151.3	16.8
10EM074	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM075	22.3	3.5	3.4	8.44	8.28	0.084	12	< 0.05	603	2.4
10EM076	16.9	12	10.8	8.19	9.77	0.037	< 0.05	< 0.1	228	4.4
10EM077	25.4	15	15.9	8.5	8.2	0.071	< 0.05	< 0.1	141.6	< 4
10EM078	22	6.4	6.8	8.1	8.17	0.239	2.9	< 0.05	798	26
10EM079	21.6	1.5	3.4	8.24	7.64	0.055	5.2	< 0.05	509	10
10EM080	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM081	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM082	22.5	11	11.9	7.49	6.3	0.059	0.05	< 0.1	280	< 4
10EM083	14.7	4.1	4.5	8	9.93	0.051	21	< 0.05	944	4
10EM084	24.6	9.2	9.6	8.42	8.42	0.115	0.57	< 0.05	349	26
10EM085	24.6	NA	NA	8.52	8.8	0.055	< 0.05	< 0.1	468	< 4
10EM086	21.8	14	14.1	7.78	6.6	0.067	0.05	< 0.05	333	4
10EM087	25	13	12.2	8.13	6.9	0.04	1.5	< 0.05	558	15
10EM088	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM089	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM090	27.5	9.7	9.2	8.38	8.77	0.062	0.21	< 0.05	324	4
10EM091	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM092	20.4	2	2	8.03	8.02	0.066	7	< 0.05	422	2.8

10EM093	24.6	28	28.3	6.87	6.43	0.043	< 0.05	< 0.1	61.6	< 4
10EM094	23.5	5.4	6.8	8.23	9.58	0.15	3.6	< 0.05	1180	23
10EM095	18.1	3.6	3.9	8.4	8.5	0.178	3.7	< 0.05	618	20
10EM096	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM097	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM098	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM099	23.2	11	11.2	7.82	14.58	0.121	16	< 0.05	985	2.4
10EM100	24.6	12	10.4	7.91	6.42	0.115	0.25	< 0.05	265	2.4
10EM101	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM102	24.5	15	14.8	8.43	9.77	0.049	0.05	< 0.05	152	1.2
10EM103	19	6.1	5.9	8.4	9.72	0.106	8.8	< 0.05	674	4
10EM104	12	5.5	6.5	7.6	10.37	0.064	< 0.05	< 0.1	56.1	13
10EM105	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM106	18.3	8.5	9.7	8.23	7.22	0.1	0.09	< 0.05	601	22
10EM107	24.5	2.4	3.2	8.16	8.43	0.102	4.4	< 0.05	530	13
10EM108	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM109	14.8	21	21.7	6.58	10.04	0.042	< 0.05	< 0.1	23.3	< 4
10EM110	18	5.3	6.1	7.63	1.92	0.197	6	< 0.05	890	1.2
10EM111	18.1	1	1	8.6	14.09	0.049	3.9	< 0.05	582	3.2
10EM112	23.6	13	14.1	8.31	7.8	0.196	< 0.05	< 0.1	637	8
10EM113	19.8	NA	NA	8.22	8.16	0.062	0.06	< 0.1	380	< 4
10EM114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM115	24.7	4.8	5.9	8.19	9.03	0.192	2	< 0.05	697	2.8
10EM116	15.1	27	26.6	7.12	2.34	0.163	0.61	< 0.05	329	< 1
10EM117	22.8	21	20.3	6.93	0.19	0.103	< 0.05	< 0.1	308	< 4
10EM118	20.4	13	14.4	7.83	8.37	0.095	0.193	0.129	387	9.6
10EM119	19	2.3	2.2	7.77	6.05	0.053	13	< 0.05	655	8
10EM120	21.5	7.8	7.5	7.72	9.08	0.033	< 0.05	< 0.1	44.8	< 4
10EM121	21.3	28	24.5	7.31	8.33	0.035	< 0.05	< 0.1	124	< 4
10EM122	15.2	NA	NA	8.06	8.85	0.041	0.08	< 0.05	489	4.4

10EM123	17.2	1.7	1.9	8.17	8.78	0.124	4.5	< 0.05	607	12
10EM124	18.1	2.7	2.6	7.87	13.17	0.015	10	< 0.05	824	2
10EM125	19	21	19.1	7.02	5.79	0.092	< 0.05	< 0.1	316	10
10EM126	26.1	6	5.6	8.06	13.41	0.241	1.7	< 0.05	1750	10
10EM127	21.4	38	38.9	6.75	6.29	0.089	< 0.05	< 0.05	62.9	5.6
10EM128	20	22	21.1	7.98	5.22	0.363	0.076	< 0.1	674	8.4
10EM129	17.5	34	32.4	7	7.61	0.049	< 0.05	< 0.1	89.8	6.6
10EM130	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM131	15.8	8.7	8.5	8.11	8.55	0.1	0.89	< 0.05	500	17
10EM132	25.1	16	14.9	7.64	6.42	0.061	0.11	< 0.05	139.8	4.4
10EM133	18.8	8.9	8.8	7.96	8.38	0.048	< 0.05	< 0.1	337	< 4
10EM134	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM135	26	7.7	7.2	8.37	7.98	0.178	3.1	< 0.05	595	26
10EM136	23	18	24.1	7.73	7.44	0.06	0.092	< 0.1	254	< 4
10EM137	12.3	22	22.8	7.83	9.2	0.061	< 0.05	< 0.1	202.6	8.8
10EM138	19.9	22	21.9	7.75	5.66	0.125	0.26	< 0.05	379	2.8
10EM139	18.3	2.8	2.9	8.7	8.9	0.052	7.8	< 0.05	696	9.2
10EM140	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM141	16.4	20	20	7.46	6.95	0.04	0.05	< 0.1	152	< 4
10EM142	19.4	3.2	5.6	7.91	7.32	0.159	6.6	< 0.05	754	64
10EM143	17.4	1.3	1.3	8.38	10.79	0.051	11	< 0.05	598	4.4
10EM144	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM145	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM146	16.7	1.2	1.3	8.34	8.51	0.065	4.8	< 0.05	514	11
10EM147	19.4	8.7	7.8	7.71	2.11	0.697	0.3	0.23	885	15
10EM148	15.8	12	11.6	7.98	8.47	0.101	0.16	< 0.05	327	8.8
10EM149	13.5	NA	NA	8.49	9.19	0.036	< 0.05	< 0.1	282	6
10EM150	21.9	19	19.3	7.8	5.97	0.16	0.05	< 0.05	579	5.6
10EM151	23	19	18.2	7.33	0.38	0.02	0.17	0.12	736	4.4
10EM152	20.1	34	28.9	7.19	6.06	0.069	< 0.05	< 0.1	85.5	5.33

10EM153	19.7	30	28.8	6.8	7.65	0.051	< 0.05	< 0.1	90.3	< 4
10EM154	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM155	21.6	1.8	1.9	8.41	9.68	0.055	5.7	< 0.05	554	10
10EM156	19.9	2.8	2.7	7.88	7.91	0.048	14	< 0.05	656	11
10EM157	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM158	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM159	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM160	12.2	11	12.1	8.08	7.35	0.528	0.193	< 0.1	1224	7.8
10EM161	21.1	21	20.7	8.45	11.49	0.049	< 0.05	< 0.1	432	< 4
10EM162	23.2	1.1	1.3	8.75	10.62	0.028	1.3	< 0.05	430	3.2
10EM163	24.3	4.3	6.6	8.23	7.62	0.152	3.4	< 0.05	688	16
10EM164	26.2	12	10.6	8.03	7.38	0.109	0.24	< 0.05	267	4
10EM165	19.8	13	10	7.72	6.38	0.073	< 0.05	< 0.1	386	< 4
10EM166	14	NA	NA	6.97	1.92	0.084	NA	0.07	374	2.8
10EM167	18.1	12	12.7	7.86	7.84	0.209	0.06	< 0.05	544	6.8
10EM168	21.9	19	20	6.47	7.64	0.027	< 0.05	< 0.1	52.2	< 4
10EM169	15.1	NA	NA	7.52	5.5	0.167	< 0.05	0.106	283	34
10EM170	19	11	12.5	8	8.84	0.176	1.4	< 0.1	2300	4
10EM171	12.6	1	1	8.06	9.84	0.054	2	< 0.05	526	12
10EM172	23	NA	NA	8.34	7.68	0.133	< 0.05	< 0.1	643	18
10EM173	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM174	21.1	7.3	7.1	7.34	1.91	0.04	1.8	< 0.05	2046	2.4
10EM175	19.6	6.1	5.7	8.44	7.97	0.217	2.8	< 0.05	594	12
10EM176	19.8	15	16.7	8.36	9.57	0.121	0.084	< 0.1	566	< 4
10EM177	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM178	23.4	NA	NA	7.9	9.02	0.032	< 0.05	< 0.1	294	< 4
10EM179	22.9	NA	NA	8.47	8.43	0.315	< 0.05	< 0.05	609	52
10EM180	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM181	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM182	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

10EM183	20.2	4	3.8	7.84	11.34	0.092	14	< 0.05	630	1.6
10EM184	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM185	27.2	32	31.7	6.7	0.66	0.096	< 0.05	0.128	180.8	5.2
10EM186	20.4	22	21.9	7.55	3.46	0.32	< 0.05	< 0.05	736	2.4
10EM187	15	1.7	1.6	7.95	7.6	0.132	6.2	< 0.05	624	3.6
10EM188	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM189	15.8	30	27.2	6.11	4.7	0.042	< 0.05	< 0.05	309	1.6
10EM190	22.5	10	10.4	7.88	8.42	0.331	3.6	< 0.05	1860	2.8
10EM191	20.9	16	16.5	7.49	6.33	0.291	0.056	< 0.1	328	30
10EM192	26.1	18	18.7	8.53	11.77	0.23	< 0.05	< 0.1	485	< 4
10EM193	21.4	52	12.1	7.17	7.29	0.089	< 0.05	< 0.1	114.8	5.4
10EM194	24.4	12	11.7	7.78	6.31	0.085	< 0.05	< 0.1	310	< 4
10EM195	16.7	11	10.1	8.42	8.93	0.29	2.1	< 0.05	752	52
10EM196	23	6.5	6.3	7.66	7.83	0.11	NA	< 0.05	307	7.6
10EM197	23.5	22	23.7	8.87	8.15	0.116	< 0.05	< 0.1	329	38.8
10EM198	16.3	33	31.6	8.09	8.06	0.054	0.1	< 0.05	442	6.8
10EM199	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10EM200	24.9	NA	NA	8.38	8.68	0.075	0.132	< 0.1	225	< 4