

Rush River Watershed
Comprehensive Surface Water Resource Report
St. Croix, Pierce and Pepin Counties, Wisconsin



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**Wisconsin Department of Natural Resources
West Central Region
Lower Chippewa River Basin**

December, 2002

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March, 2002**

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Special Thanks

Thank you to John Koch, project coordinator for the Kiap-tu-Wish Chapter of Trout Unlimited and all the volunteers that made this project a great success. Also thanks to Arby Linder, President of the Eau Galle Rush River Sports Club and all club members that assisted with field sampling or provided access for field crews.

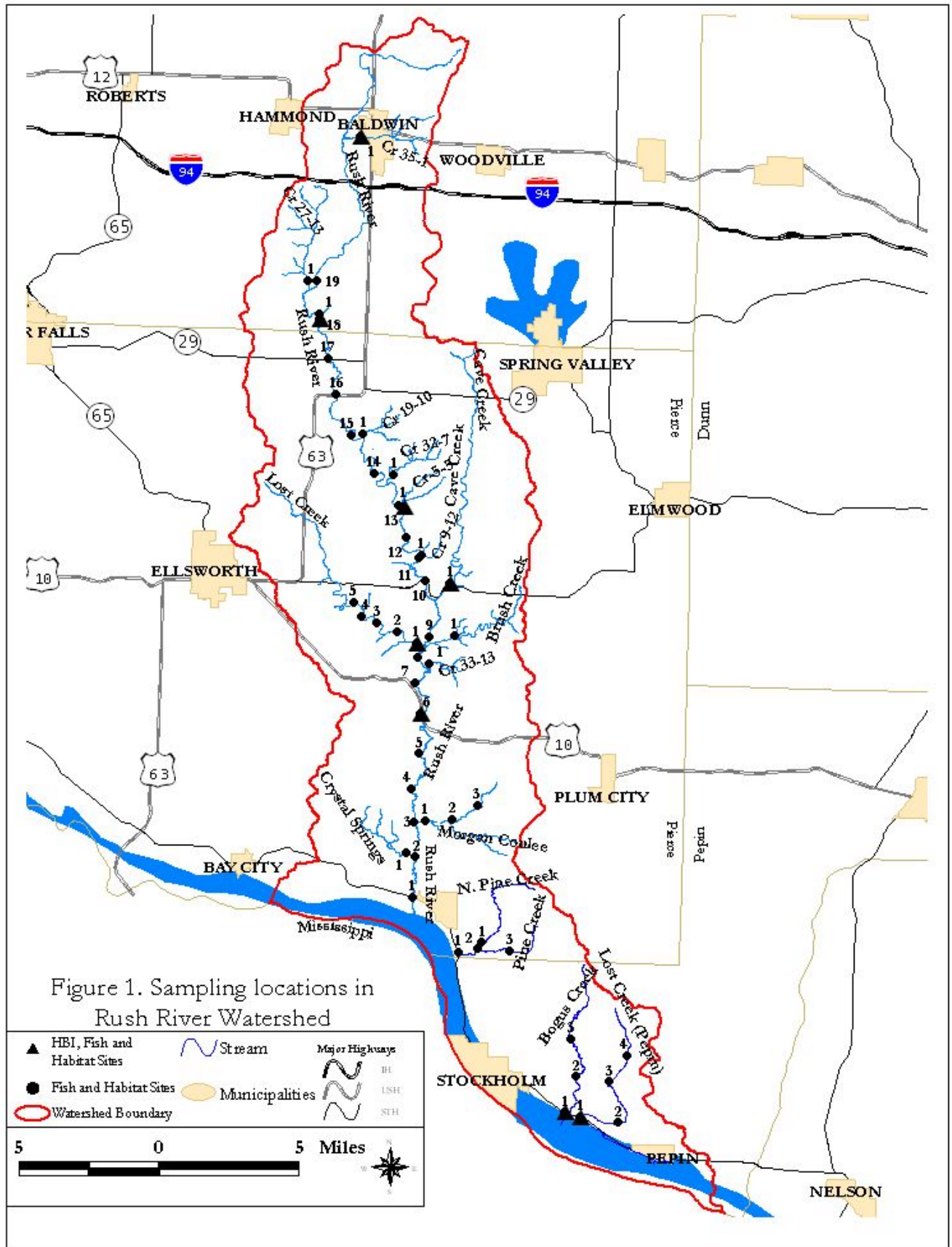
Introduction

As part of the Lower Chippewa Basin Comprehensive Surface Water Resources Monitoring Program, the Rush River Watershed was sampled during the 2000 field season. The Rush River watershed comprehensive stream survey was conducted to gather baseline data on fish habitat, sport and nongame fish communities, temperature regimes, and macroinvertebrate communities. The purpose of this report is to summarize the condition of surface water resources in the Rush River Watershed, document impairments, and recommend management goals and objectives aimed at protecting or improving it. This information will provide a foundation on which to base future management decisions such as: monitoring, fish stocking, trout stream classifications, fishing regulations, watershed projects, biodiversity, water regulation and zoning permits, outstanding and exceptional waters classification, fish habitat restoration, and acquisition goals and boundaries.

Watershed Description

The Rush River watershed is 289.6 square miles, with approximately 55.3 square miles (19.1%) in St. Croix County, 186.2 square miles (64.3%) in Pierce County and 48.1 square miles (16.6%) in Pepin County (**Figure 1**). The watershed drains rolling agricultural and wooded areas with many of the tributaries originating in steep coulees. The Rush River is the primary waterway with a base flow of approximately 130 cubic feet per second near its mouth. Lost Creek (Pierce Co.) and Cave Creek are major tributaries to the Rush River while Brush Creek, Crystal Springs and eight unnamed streams are minor tributaries. Lost Creek (Pepin Co.), Bogus Creek and Pine Creek are small streams in the watershed that drain directly into Lake Pepin on the Mississippi River.

The Rush River originates in south central St. Croix County. It flows south about 35 miles where it enters the Mississippi River in southeastern Pierce County. Prior to this survey, the watershed included six Class II trout waters encompassing 35.4 stream miles and one Class III trout water encompassing 0.5 stream miles (WDNR 1980). The majority of streams in the watershed, prior to this investigation were considered marginal coldwater streams or warmwater forage streams.



Summary of Water Resource Conditions

Historic Watershed Conditions

Notes from General Spinner (Gibbs, 1869) indicate that the Rush River was a wild and pristine river blessed with an abundance of trout. He states there are three famous trout streams on the Wisconsin side of Lake Pepin, one of them the Rush River which “being quite a river and affording abundance of large trout”. “The valley is narrow, and the bluffs high and romantic – broken by ravines and ledges, and covered with hardwood timber, with an occasional pine or cedar”. “There is good trouting on this stream for twenty miles, through a county mostly wild and very beautiful. The stream is rapid, with many deep, surging pools, and with gravelly shores where one can fish without going into the water”. “In June, 1866, I caught in one day, in Rush River, thirteen trout before breakfast, averaging half a pound each, a twenty-four pound basket full before dinner, and some thirty more before dark”. He goes on: “The patient and skillful angler will sometimes find trout in the Rush River weighing four or five pounds, and many that weigh two pounds”. Small streams in the watershed were fished for market, “Lost Creek, has furnished tons of netted fish for the St. Paul restaurants, and would not have a trout left if it were not for this noble Rush River to keep up the supply.”

Over the next 100 years the Rush River and its tributaries had undergone a dramatic transformation from pristine, forested coldwater trout streams to degraded marginal trout streams often requiring trout stocking to provide recreational fisheries. Prior to the 1850’s, the Rush River watershed was nearly 85% virgin deciduous forest, 12% prairies/brush and the rest water and wetlands. The highly protected watershed supported numerous spring fed coldwater streams and healthy native brook trout populations. However, during the late 1800’s through the early 1900’s, stream habitat and water quality were severely degraded by deforestation, logging and milling dams, agricultural activities, and wastewater effluent. Flooding and erosion were rampant and the Rush River became dependent on stocking to support a sport fishery. Over time the small dams became obsolete and washed out. Approximately 70 years of conservation practices that began around the 1930’s and included soil erosion and flood control programs, natural reforestation and wastewater treatment had resulted in major improvements in stream water quality and habitat. These activities along with improved farming practices have reduced flooding and improved infiltration. Beginning around the 1960’s, trout populations began to redevelop through stocking. Today, watershed conditions, infiltration rates and coldwater base flow have improved to the point that natural reproduction of trout is common in the tributaries and portions of the mainstem of the Rush River.

Current Watershed Problems

Water resource problems most common in the watershed today include: flashy stream flows, flooding and stream bank erosion, extensive sand bed loads, poor habitat and degraded thermal regimes. Some over-pasturing and ditching occurs on small streams in the watershed. Other problems in the watershed include manure runoff, cropland and gully erosion. Lost Creek in Pepin County lacks fish passage due to the extensive nature of man-made grade controls.

The primary causes of streambank erosion and bedload problems appear to be a combination of frequent flooding and unstable sediment deposition in the valley floors. Repeated flooding, unstable banks and upland erosion contribute to loss of fish cover through widening and stagnation of stream channels, sedimentation of pools and riffles and elimination of bank cover. Wide, sluggish stream channels, loss of bank cover and low groundwater recharge rates are primary factors contributing to elevated stream temperatures during summer months and freezing temperatures during winter months. Spawning habitat is lost through sedimentation (filling-in) of spawning substrate. This filling-in of spawning substrate in riffle areas impairs reproductive success of trout by reducing inter-gravel flow which is necessary to maintain suitable temperature and oxygen conditions for eggs and larval fish. Sedimentation of riffles also eliminates habitat for food organisms such as macroinvertebrates.

Many of the streams, including the main stem of the Rush River, have summer water temperatures that are above optimal for some coldwater aquatic species, especially trout. Elevated summer water temperatures may be caused by a number of factors including lack of stream shading, reduced infiltration and groundwater recharge, and a relatively shallow, wide stream morphometry. The elimination of streambank vegetation in the watershed reduces shading and increases solar radiation, which increases stream temperatures. Streambank erosion and resulting sedimentation of the bottom results in wider, shallower stream reaches which allows increased solar radiation and contributes to elevated summer water temperatures.

Current land use problems within the watershed continue to result in loss of habitat, sedimentation, and degraded thermal regimes. The cumulative effect of these impacts continue to limit the suitability of many portions of the Rush River watershed to support healthy, native coldwater aquatic communities.

New Threats to the Watershed

New threats to the watershed include urban growth, intensive farming, animal waste runoff and fishkills. Rapid urban development in the headwaters will result in an increase of impervious surfaces and stormwater runoff. Failure to address stormwater and infiltration may negatively alter stream temperature and habitat. The expansion of large dairy operations and the associated increase in herd and forage supply farms bring intensive farming practices back to the watershed. Lands taken out of production and placed in set-aside programs are now being tilled again. Gullies allowed to heal are now used as pasture and are showing signs of severe erosion. Nutrient and manure management present a challenge on soils and topography that is highly subject to runoff. Failure to apply best management practices will lead to degraded water quality and impaired sport fisheries. If done without regard to the health of the watershed, such intensive activity on the watershed has the potential to reverse gains made during the past 50 –75 years of soil and water conservation practices.

Overall Outlook

The overall outlook for stream quality in the Rush River Watershed is good. Many tributaries have experienced major improvements in native brook trout reproduction. Portions of the Rush River have significant natural reproduction and documented trout densities have never been higher than in recent history. Trout densities have improved throughout the river to provide one of the best trout fishing resources in the midwest and nation. Continued soil and water conservation practices, instream habitat improvement and installation of innovative Best Management Practices (BMPs) will have positive effects on the water resources of the Rush River Watershed. In addition, progressive management of stormwater, improved nutrient management rules and a sincere effort by large scale farm developers to select suitable sites and design environmentally friendly practices to limit runoff, infiltrate rainwater and protect water quality are essential to the preservation of the unique water resources in the Rush River Watershed.

Methods

Monitoring activities for this comprehensive watershed survey were initiated in June 2000 and completed

October 2000. The following is a summary of the methods used to collect information for this survey.

Fish Surveys

Fish surveys conducted at 49 sites on 18 streams in the summer of 2000 found predominately coldwater streams (**Figure 1**). Three trout species, (brook, brown and rainbow trout), eight warmwater game/panfish species and 34 additional non-game fish species were found. Currently, brown trout dominate the coldwater fishery in this watershed. White sucker, brook stickleback, blacknose dace, mottled sculpin and slimy sculpin were the most common forage species.

Surveys were conducted at approximately one site per mile of permanent stream. Each site was 35 times the mean stream width (MSW) in length. Single-run electrofishing surveys were conducted at each site to inventory the sport and nongame fish communities. Within each survey station, all fish species were identified and counted to determine the fish assemblage. This inventory was also used to calculate trout Catch per Unit Effort (CPUE), a measure of density or fish abundance. Trout collected were marked and released. If more than 20 trout \geq 4 inches per 100 meters were captured, a second electrofishing run was made. Based on the information from these two runs, a population estimate was calculated using Bailey's modification of the Peterson Estimate (Ricker, 1975). A coldwater Index of Biotic Integrity (IBI) (Lyons, et al, 1996) was then used to calculate the quality and health of the fish community.

On small streams, fish were collected using either one or two AbP-3 pulse DC backpack shockers. On larger streams, fish were collected using either one or two 235 Volt, 5 Amp DC generator-type stream shockers with 2 to 3 electrodes per shocker. All fish collected were identified to species and counted, and all game and panfish were measured to the nearest 0.1-inch.

Habitat Assessment

Habitat assessments were conducted at each fish survey site (**Figure 1**) following procedures outlined in Simonson et al. (1994). The habitat segment of each station was 35 times the mean stream width (MSW).

The assessments included measurement of stream flow, width, depth, substrate composition, and streambank characteristics. Stream flow was measured with a Swiffer 2100 flow meter. Fish habitat ratings were determined for each site according to Simonson et al. (1994) using the appropriate score sheet for the stream's width (> 10 or < 10 meters).

Macroinvertebrates

Aquatic macroinvertebrates were collected at eight sites in the watershed, during October 2000 (**Figure 1**). Sites were located on the main stem of the Rush River and on the larger tributaries. Samples were collected with a D-frame net using methods outlined in Hilsenhoff (1982). The samples were preserved in 70% ethanol and sent to UW-Stevens Point for sorting and identification. Results were reported using the Hilsenhoff Biotic Index (HBI) which provides a relative measure of organic loading to a stream.

Temperature

HOBO (Onset Computer Corp.) recording thermometers were placed in streams at 22 sites in the watershed (**Table 1**). The recording thermometers measured and recorded stream temperatures on a 30-minute interval between June 13th and September 22nd, 2000. To increase stream coverage, maximum/minimum thermometers were placed at 17 different locations and deployed for a period of five to six days during August.

Results and Discussion

The results and discussion section will present a picture of the condition of the entire watershed and the main stem as a whole. A detailed summary for each survey site is located in **Table 1** and **Appendices A-C**.

Table 1. Station summary for the Rush River Watershed in St. Croix, Pierce and Pepin Counties, Wisconsin. June, July, August and September, 2000.

Waterbody	Station	Habitat	Habitat	IBI-C	IBI-C	HBI	HBI	Trout CPIUF (no./mile)			P F >=4" (no./mile)			Max Min	Summer Water Temp (F)			Opening Day
		Score	Rating	Score	Rating	Score	Rating	Brook	Brown	Rainbow	Brook	Brown	Rainbow	W. Temp.	Max.	Min.	Mean	Vehicle Count
Rush River	1	32	Fair*	30	Fair			0	129	0	0	-	0		71.8	52.4	62.68	3
Rush River	2	24	Fair*	40	Fair			49	579	0	77	926	0					9
Rush River	3	48	Fair*	30	Fair			13	628	0	-	-	0					4
Rush River	4	44	Fair*	30	Fair			18	1647	0	24	2402	0		72.92	55.02	63.68	15
Rush River	5	48	Fair*	30	Fair			18	1530	0	19	3838	0					28
Rush River	6	52	Fair*	30	Fair	3.164	Excell	20	2194	0	15	3269	0		73.2	50.4	62.28	24
Rush River	7	60	Good*	30	Fair			33	1502	0	41	4090	0					4
Rush River	8	61	Good*	40	Fair			54	4136	0	63	7531	0		72.32	54.46	62.67	12
Rush River	9	61	Good*	40	Fair			88	4225	0	120	6840	0	67/57		57		12
Rush River	10	74	Good*	50	Fair			48	2613	0	70	7148	0		71	52.4	62.8	31
Rush River	11	73	Good*	50	Fair			103	4877	0	163	7960	0	66/57		57		16
Rush River	12	65	Good*	50	Fair			171	4011	16	200	5389	20	67/57		57		32
Rush River	13	81	Excell*	40	Fair	3.797	V. Good	57	2637	15	74	4482	18		72.92	54.74	63.7	23
Rush River	14	57	Fair*	50	Fair			190	6991	25	146	7712	38	66/55		55		14
Rush River	15	45	Fair*	60	Good			736	3366	10	690	5505	27	67/57		57		28
Rush River	16	48	Fair*	60	Good			466	3671	98	452	4407	104		77.4	49	60.18	18
Rush River	17	48	Fair	60	Good			814	2560	146	254	1935	143		74.6	48.2	59.38	11
Rush River	18	45	Fair	30	Fair	4.382	V. Good	169	116	26	-	-	-		77.4	50.4	62.87	3
Rush River	19	57	Good	50	Fair			456	48	0	-	-	0		76.6	53.8	62.56	0
Lost Ck (Pierce)	1	50	Good	70	Good	3.621	V. Good	306	1926	0	166	1191	0		71	46.8	58.5	4
Lost Ck (Pierce)	2	45	Fair	70	Good			564	2085	0	489	924	0					9
Lost Ck (Pierce)	3	63	Good	80	Good			851	396	0	401	107	0		69.92	51.67	59.46	2
Lost Ck (Pierce)	4	75	Excell	80	Good			1216	539	0	1107	64	0	61/52				5
Lost Ck (Pierce)	5	72	Good	90	Excell			2693	54	0	4043	45	0		69	47.6	55.68	7
Morgan Coulee	1	62	Good	70	Good			1197	0	0	1157	0	0	63/55				0
Morgan Coulee	2	57	Good	80	Good			44	0	0	-	0	0		82.2	48.2	59.78	0
Morgan Coulee	3	52	Good	70	Good			54	0	0	-	0	0					0
Cr. 33-13	1	53	Good	70	Good			68	0	0	-	0	0	63/53				0
Brush Creek	1	60	Good	0	V. Poor			0	0	0	0	0	0	75/62				0
Cave Creek	1	67	Good	60	Good	4.148	V. Good	643	1024	0	915	1312	0		67.6	50.4	57.75	4
Cr. 27-13	1	40	Fair	20	Poor			0	0	0	0	0	0					0
Cr. 19-10	1	55	Good	80	Good			749	198	0	900	-	0	67/55				0
Cr. 32-7	1	75	Excell	80	Good			642	138	0	-	-	0					0
Cr. 5-5	1	48	Fair	80	Good			1151	92	0	783	-	0	61/48				0
Cr. 9-12	1	63	Good	90	Excell			1900	0	0	1311	0	0					0
Cr. 35-1	1	38	Fair	10	Poor	4.341	V. Good	0	0	0	0	0	0		80.8	47.6	66.58	0
Cr. 35-9	1	67	Good	90	Excell			1152	256	16	923	-	0					0
Crystal Springs	1	55	Good	30	Fair			76	0	0	-	0	0		62.36	49.72	53.83	0
Bogus Creek	1	25	Fair	100	Excell	3.333	Excell	296	0	0	1295	0	0		67.00	49.00	57.54	0
Bogus Creek	2	45	Fair	90	Excell			1112	0	0	923	0	0	59/51				1
Bogus Creek	3	35	Fair	80	Good			253	0	0	-	0	0	56/47	62.36	47.76	50.79	0
Lost Ck (Pepin)	1	30	Fair	0	V. Poor	4.537	Good	0	0	0	0	0	0		78.8	51.8	65.9	0
Lost Ck (Pepin)	2	50	Good	0	V. Poor			0	0	0	0	0	0	70/56				0
Lost Ck (Pepin)	3	50	Good	0	V. Poor			0	0	0	0	0	0	61/52				0
Lost Ck (Pepin)	4	55	Good	0	V. Poor			0	0	0	0	0	0	57/52	69	51	57.5	0
Pine Creek	1	57	Fair*	80	Good			280	32	0	-	-	0					0
Pine Creek	2	43	Fair	90	Excell			3107	0	0	2354	0	0		60.8	46	50.99	1
Pine Creek	3	53	Good	90	Excell			1105	0	0	1567	0	0	60/51				0
Pine Creek N Br	1	45	Fair	40	Fair			184	0	0	-	0	0					0

* Habitat rating based on streams > 10m wide

Overall Watershed Condition and Recommendations

Index of Biotic Integrity

The Index of Biotic Integrity (IBI) ratings for streams in the watershed are shown in **Figure 2**. A guideline for interpreting coldwater IBI scores is located in **Table 2**. The entire Rush River watershed was scored as coldwater. IBI scores varied tremendously throughout the watershed, with most streams being “Fair” (37%) to “Good”(35%). The remaining sites ranked “Excellent” (14%), “Very Poor” (10%) and “Poor” (4%).

Table 2. Guidelines for interpreting coldwater Index of Biotic Integrity (IBI) scores (Lyons et al, 1996).

IBI Rating	Interpretation and Fish community attributes
Excellent	Comparable to the best situations with the least human disturbance; mottled or slimy sculpins are usually common; intolerant, native stenothermal coolwater species such as lampreys or reidside dace may also be present; brook trout are the primary top carnivores and are present in good numbers; exotic salmonids are absent or uncommon; tolerant species may be present in low to moderate numbers.
Good	Evidence for some environmental degradation and reduction in biotic integrity; either brook trout or sculpins may be uncommon or absent; exotic salmonids often dominate, keeping the abundance of top carnivores high; tolerant species may be common but do not dominate.
Fair	The stream reach has experienced moderate environmental degradation, and biotic integrity has been significantly reduced; total species richness is often relatively high, but intolerant and native stenothermal coldwater species are uncommon or absent; native stenothermal coolwater species and exotic salmonids may be moderately common, but tolerant eurythermal species or warm water species or both are usually more abundant.
Poor	Major environmental degradation has occurred, and biotic integrity has been severely reduced; total species richness may be relatively high, but intolerant species, top carnivores, and salmonids are absent; a few native stenothermal coolwater species such as brassy minnows or brook sticklebacks may persist in low numbers; tolerant eurythermal species or warm water species or both dominate.
Very Poor	Human disturbances and environmental degradation have decimated the natural coldwater fish assemblage; either only warm water and tolerant species remain, or fish abundance is so low (<25 fish captured) that the IBI cannot be calculated.

High quality coldwater streams (measured by the Coldwater IBI Rating System) in the region generally lack species diversity and are dominated by the native brook trout. The Rush River was comprised mainly of “Fair” ratings with only three sites in the upper reaches of the Rush River scoring as “Good”. The brown trout, a coldwater exotic, was the most prevalent trout species found throughout the Rush River. The Coldwater IBI Rating System is a measure of the health or quality of the native fish community and is not an indicator of the quality of the sport fishery. High densities of the dominant brown trout tend to out-compete the native brook trout. Therefore, the IBI scores are generally lower on the Rush River except where brook trout are more abundant as found in the headwaters. All stations on the Rush River, except station one, had brook trout and sculpins present, which are native cool or coldwater intolerant species. Their abundance is

Figure 2. Coldwater Index Biotic Integrity (IBI) ratings for sites in the Rush River Watershed

IBI Rating

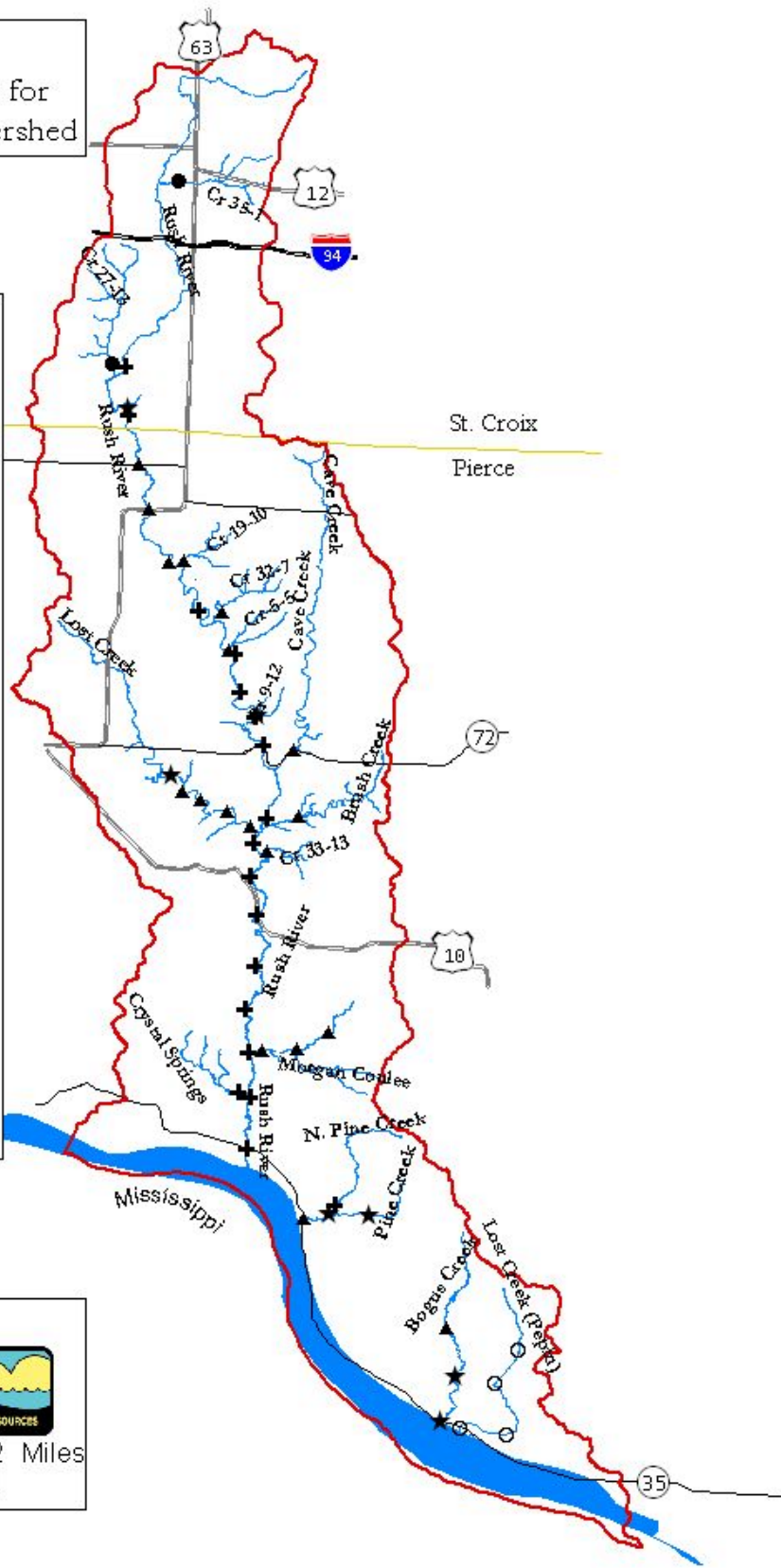
- ★ Excellent
- Very Good
- ▲ Good
- + Fair
- Poor
- Very Poor

Streams

Rush River Watershed

Major Roads

- IH
- USH
- STH



North arrow and scale bar (0 to 2 Miles). Wisconsin Dept. of Natural Resources logo.

heavily dependent on ground water. Overall, the eurothermal (a species adapted to a wide range of water temperatures) minnows were abundant throughout the Rush River with a combination of dominant species such as the blacknose dace and white sucker being most abundant. Intolerant rainbow darters and other eurotherms such as longnose dace and brook sticklebacks were also abundant.

Bogus Creek and Pine Creek each had two of three IBI sites score as “Excellent” and the third site as “Good”. These streams consist mainly of self-sustaining brook trout populations with few other fish species or numbers present. A few brown trout and/or eurothermal species were found near the mouth of Pine and Bogus Creeks resulting in a “Good” ranking. Lost Creek (Pierce County) had ratings of “Good” on all its sites except in the headwaters where IBI ratings were “Excellent”. Lost Creek had a mixture of brown and brook trout within its waters. The two sites near the mouth were dominated by the brown trout while the other three sites, near the headwaters, were dominated by brook trout. The gradual change from brown trout dominance in the downstream stretches to brook trout dominance in the headwaters resulted in the change from “Good” to “Excellent” IBI ratings. Cave Creek was rated “Good”, however significant brown trout populations negatively influenced the ranking. Morgan Coulee only rated “Good” because very few native intolerant coldwater species (brook trout) were present. Lost Creek (Pepin County) had the lowest IBI rating (“Very Poor”) of the major tributaries in the watershed. Only four fish species were sampled and the fish sampled were predominantly tolerant warmwater species such as fathead minnow and creek chubs.

The IBI ratings were quite variable among the minor tributaries. Creeks 27-13 and 35-1 ranked “Poor” while Brush Creek ranked “Very Poor”. These streams were dominated by tolerant eurotherms. Crystal Springs and North Branch of Pine Creek ranked “Fair”. These streams had a few brook trout and other coolwater species, however tolerant eurotherms prevailed. Creeks 33-13, 19-10, 32-7 and 5-5 all ranked “Good”. These streams primarily contained brook trout and sculpins, however their numbers were either low or brown trout were present. Creeks 9-12 and 35-9 ranked “Excellent”. These streams were dominated by brook trout.

Overall, the integrity of the coldwater fish community is improving. Native self sustaining coldwater fish populations appear to be recovering primarily in tributary streams where habitat degradation and thermal impacts over the past 100 or more years have created a shift from intolerant coldwater species to tolerant cool and warmwater species. As habitat and thermal conditions improve, we are observing a shift back toward intolerant coldwater species. The presence of self sustaining brown trout and the desire to preserve brown

trout angling in the Rush River will limit the ability of those streams to regain full native fish community integrity.

Trout Catch per unit Effort

Trout abundance values are a qualitative measure of trout CPUE or density. Trout abundance values for the watershed are shown in **Figure 3**. A guideline for interpreting trout abundance levels from this region of the state (Swim, et al, 1998) is found in **Table 3**. The vast majority of stream sites in the watershed have trout abundance levels which are “Moderate” (15 sites: 31%), “High” (6 sites: 12%) or “Very High” (15 sites: 31%). Only six sites (12%) had trout densities in the “Low” range. Seven of the sites (14 %) sampled had no trout present.

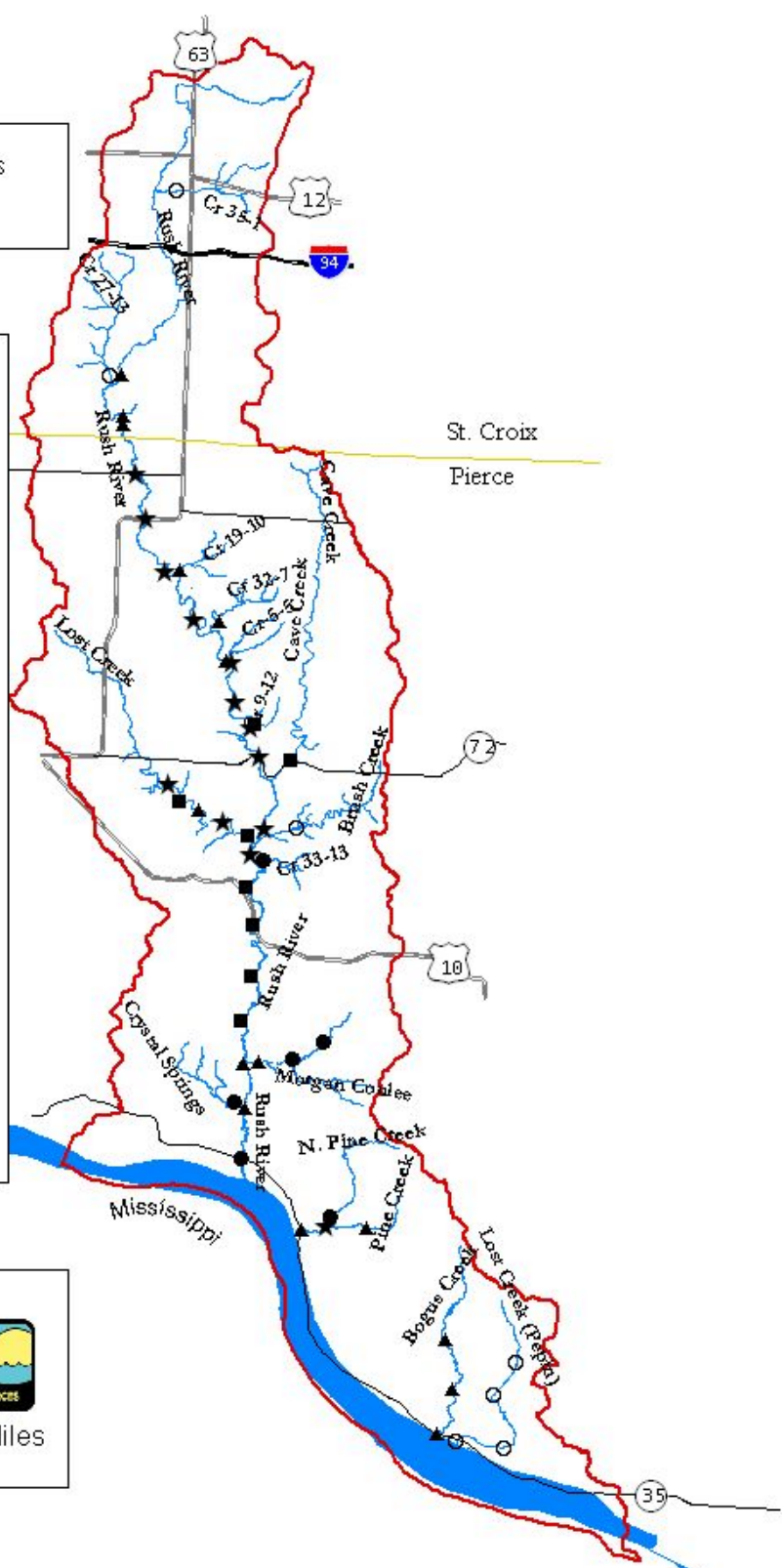
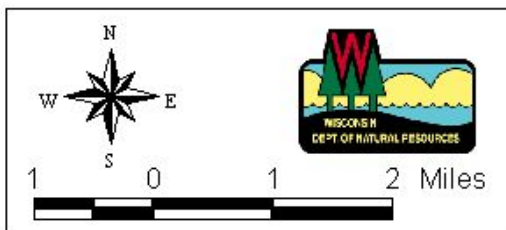
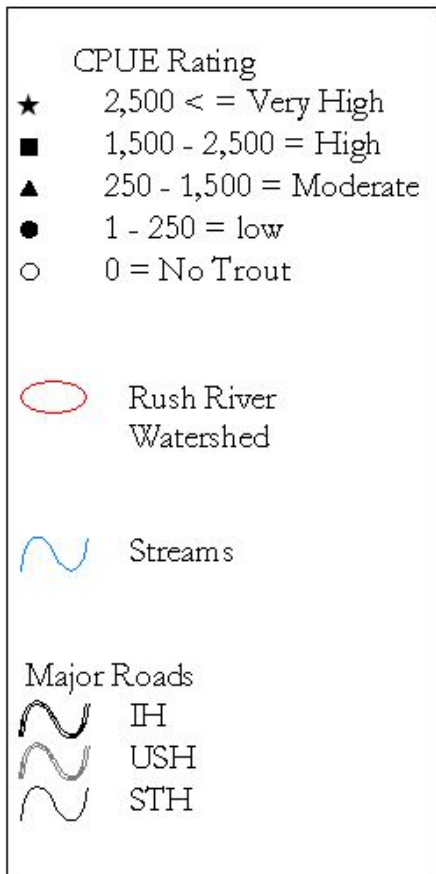
Table 3. General guidelines for interpreting trout abundance values during July and August in Pepin, Pierce and St. Croix County streams, Wisconsin.

Abundance Level	C.P.U.E.* No. / Mile (all sizes)	Pop. Est. No. / Mile (>= 4.0 in.)
Low	< 250	< 500
Moderate	250 - 1500	500 - 1500
High	> 1500	1500 - 3500
Very High	> 2500	> 3500

* C.P.U.E. - includes young of the year trout

Brown and rainbow trout densities in the Rush River have been heavily dependent on stocking, however significant levels of natural reproduction of brown and brook trout were noted during this survey. Engel and Holzer, 1992, found brown and rainbow trout populations to be primarily dependent on stocking at Martell and El Paso during 1986 through 1990. All brook trout populations are self-sustaining, however it is difficult to determine what portion of the brown trout population is supported by stocking throughout various locations in the river. Strong natural reproduction of brown trout was noted during this survey in the Rush River from Highway 29 (Site 17) to 690th Avenue (Stonehammer Rd., Site 14) In addition, brown trout reproduction in Lost Creek (Pierce Co.) and Cave Creek also appear to contribute to the Rush River. Rainbow trout show no signs of reproduction. Both brown and rainbow trout are currently stocked to supplement wild trout populations. Poor thermal regimes and “Fair” habitat limit trout densities in the headwaters and downstream of Highway 10.

Figure 3. Trout densities for sites in the Rush River Watershed



Lost Creek (Pierce County) and Cave Creek have strong brook and brown trout reproduction, which is reflected in overall densities being “Very High”, however both streams are extremely wide and shallow, lack pools and over-head cover for adult trout. Most small, tributary streams entering the Rush River contain high quality native brook trout populations. Crystal Springs and Creek 33-13 have “Low” densities which may be related to habitat or temperature problems. Creek 35-1 is a warmwater stream and Brush Creek becomes intermittent by late summer. Both Bogus and Pine Creek have “Moderate “ densities of native brook trout, and both would benefit from improved habitat conditions. Lost Creek (Pepin County) contained no trout. Extensive grade controls prevent any upstream passage of brook trout. The ability of this stream to support trout may be borderline at this time.

Habitat Ratings

Habitat ratings provide a measure of habitat quality and/or quantity available for fish to utilize within that segment of stream. The habitat ratings for the watershed are shown in **Figure 4**. Guidelines for interpreting habitat ratings are found in **Tables 4 and 5**. The watershed is dominated by “Good”(49%) to “Fair”(45%) habitat ratings with 6% as “Excellent”, suggesting that habitat quality and/or quantity is/are in good condition.

The Rush River was

Table 4. Guidelines for interpreting fish habitat ratings for streams < 10 m wide (Simonson, 1994).

Qualitative Rating	Dominant characteristics of physical habitat for each scoring category.
Excellent	Riparian zone well protected; no significant bank erosion; pools common, wide, deep, slow velocity habitat, balanced by other habitats; stream very deep and narrow; diverse habitats, meandering stream with deep bends and riffles common; fine sediments are rare or absent; cover/shelter for fish abundant.
Good	Riparian zone protected, but buffer width moderate; limited bank erosion; pools present, not frequent or overabundant; stream relatively deep and narrow; diverse habitats, bends and riffles present, but not abundant; fines present but limited, generally in stream margins or pools; cover common, but not extensive.
Fair	Riparian zone moderately disturbed, buffer narrow; moderate bank erosion; pools present, but either rare or overly dominant, few other habitats present; stream moderately deep and narrow; habitat diversity low, occasional riffles or bends; fines common in mid-channel areas, present in riffles and extensive in pools; occasional cover, limited to one or two areas.
Poor	Most of the riparian zone disturbed, buffer very narrow or absent; Extensive bank erosion; pools either absent or dominant, not balanced by other habitats; stream relatively wide and shallow; habitat monotonous, riffles or bends rare, generally continuous run habitat; fines extensive in all habitats; cover rare or absent.

Figure 4. Habitat ratings for sites in the Rush River Watershed

Habitat Rating

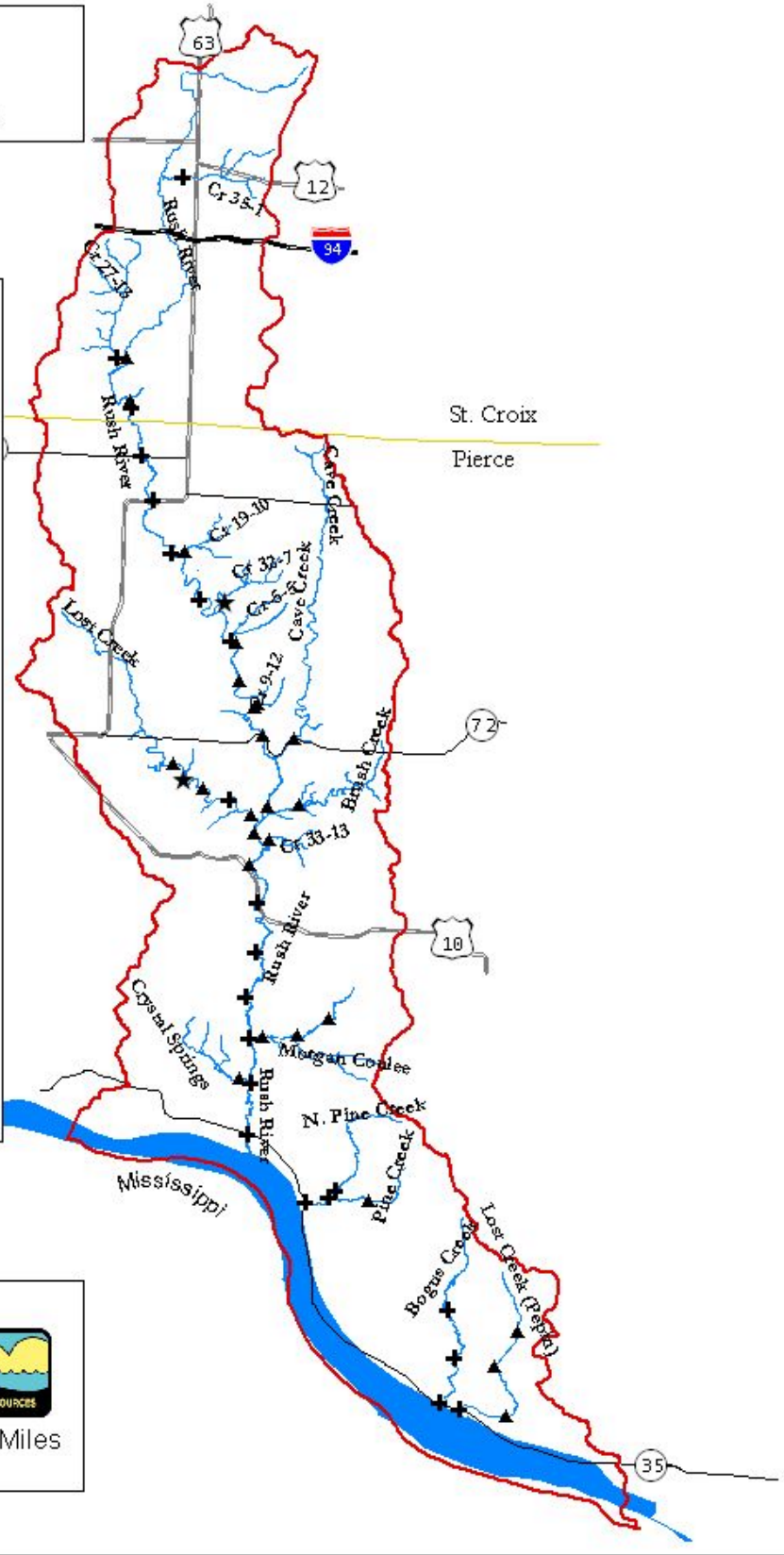
- ★ Excellent
- Very Good
- ▲ Good
- + Fair
- Poor
- Very Poor

Streams

- Streams
- Rush River Watershed

Major Roads

- IH
- USH
- STH



dominated by “Fair” (58 %) habitat ratings. “Good” ratings were found at 37% of the sites and “Excellent” ratings at 5%. The “Fair” sites were located at the lower and upper portions of the Rush River. The “Good” and “Excellent” sites were in the middle reaches of the Rush River.

Table 5. Guidelines for interpreting fish habitat ratings for streams > 10 m wide (Simonson, 1994).

Qualitative Rating	Dominant characteristics of physical habitat for each scoring category.
Excellent	No significant bank erosion; stream very deep; diverse habitats, meandering stream with deep bends and riffles common; extensive rocky substrate; cover/shelter for fish abundant.
Good	Limited bank erosion; stream relatively deep; diverse habitats, bends and riffles present, but not abundant; moderate rocky substrate; cover common, but not extensive.
Fair	Moderate bank erosion; stream moderately deep; habitat diversity low, occasional riffles or bends; limited rocky substrate; occasional cover, limited to one or two areas.
Poor	Extensive bank erosion; stream relatively shallow; habitat monotonous, riffles or bends rare, generally continuous run habitat; rocky substrate uncommon; cover rare or absent.

In the middle reaches, the banks have limited erosion and the river is deep with diverse habitat. It has many riffles and meanders with deep bends and good cover for fish to hide. Downstream of STH 10 bank erosion is more prevalent, the river has less fish habitat, fewer bends and riffles, and the substrate is more sandy. The headwater region contains many long, slow moving pools with limited habitat.

Lost Creek (Pierce County) had 60% of the sites ranked as “Good”, 20% as “Excellent” and 20% as “Fair”. Lost Creek suffers from the lack of pools and adult fish habitat. Violent floods frequently alter the streambed and coarse, mobile substrates limit the scouring of pools. Cave Creek which ranked “Good” experiences similar habitat problems throughout much of its course. Crystal Springs and Creek 33-13 lack fish cover and have excessive fine sediments, but habitat scores ranked “Good”. The lower end of Crystal Springs appears to have been ditched. Morgan Coulee also ranked “Good”, but it was ditched in the lower reaches and fine sediments plague its headwaters. Brush Creek offers little fish cover due primarily to a lack of flow. Creek 35-1 had “Fair” habitat, was 100 percent ditched, and lacked pool area and fish habitat. Creeks 32-7, 9-12 and 35-9 had sufficient buffers and “Good” to “Excellent” habitat scores. Creeks 19-10 and 5-5 ranked “Good” to “Fair” respectively. The habitat is somewhat impacted by pasturing. Creek 27-13 is also pastured and ditched resulting in a “Fair” habitat score.

All sites on Bogus Creek ranked “Fair”, limited fish cover and pool area along with abundant fine sediments impact habitat values. Habitat ranked “Fair to Good” on Pine Creek and its tributary, North Branch. Heavy grazing and bank erosion contribute fine sediments to the stream in the valley floor negatively impacting habitat. The headwaters of Pine Creek are protected by a wooded buffer. Lost Creek (Pepin Co.) ranked “Fair” to “Good”, however it has been ditched for much of its length, lacks pool area, cover for fish and often has excessive fine sediment loads.

Hilsenhoff Biotic Index

HBI provides a relative measure of organic loading to a stream. HBI scores for the watershed are shown in **Figure 5** and **Table 1**.

Table 6 is a guideline for interpreting HBI scores. Lost Creek in Pepin County showed some organic pollution. This may be the case in some other tributaries, however for the majority of sites monitored, organic pollution was slight or not apparent. As a whole, the Rush River watershed appears to have very little influence from organic pollution, however certain sites have proven to be a concern and may go undetected.

Table 6. Guidelines for interpreting HBI values (Hilsenhoff, 1987).

Water Quality	Degree of Organic Pollution
Excellent	No apparent organic pollution
Very Good	Possible slight organic pollution
Good	Some organic pollution
Fair	Fairly significant organic pollution
Fairly Poor	Significant organic pollution
Poor	Very significant organic pollution
Very Poor	Severe organic pollution (putrid!)

Stream Temperatures

Optimal water temperature for growth and survival of brook trout ranges from 51.8-60.8 °F (11-16 °C). The upper limiting (near lethal) water temperature is 74.8 °F (27.2 °C) (Raleigh, 1982, 1986). In the Rush River Watershed there are two streams, Pine Creek (Site 2) and Lost Creek (Pierce Co., Site 5), known to have high density, self sustaining brook trout populations. Water temperature data from these sites can be used to gauge whether or not other streams have the potential for brook trout reproduction. These streams have mean summer water temperatures between 51-56 °F (10.6-13.3 °C). Half of the stream sites monitored in the watershed have mean water temperatures above or barely optimal for brook trout growth and survival (**Table 1**). The headwaters of the Rush River, Lost Creek (Pepin Co.), Morgan Coulee, Creek 27-13 and 35-1 have maximum water temperatures that approach lethal limits for brook trout.

Figure 5. Hilsenhoff Biotic Index (HBI) ratings for sites in the Rush River Watershed

HBI Rating

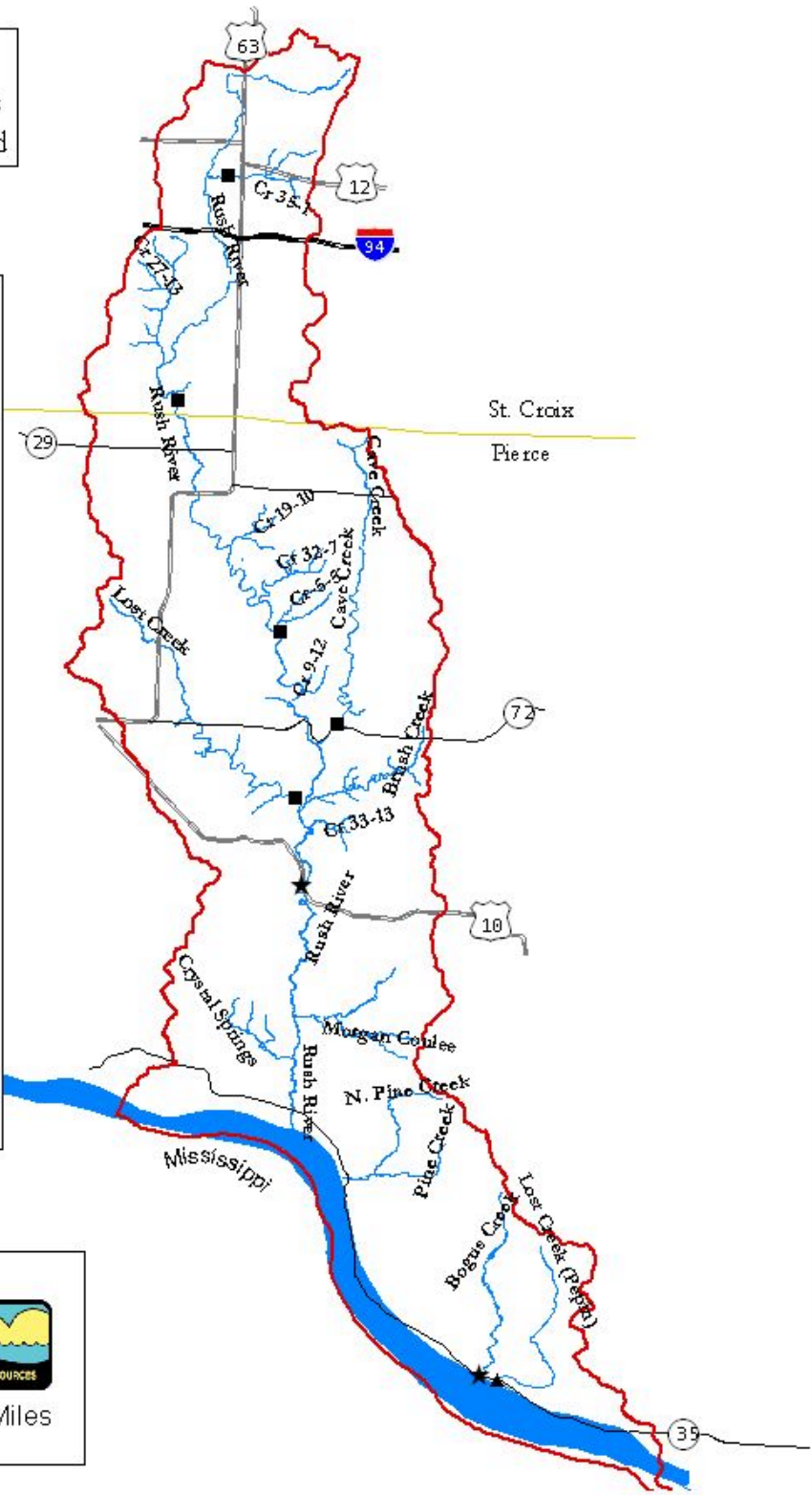
- ★ Excellent
- Very Good
- ▲ Good
- ✚ Fair
- Poor
- Very Poor

Streams

- Streams
- Rush River Watershed

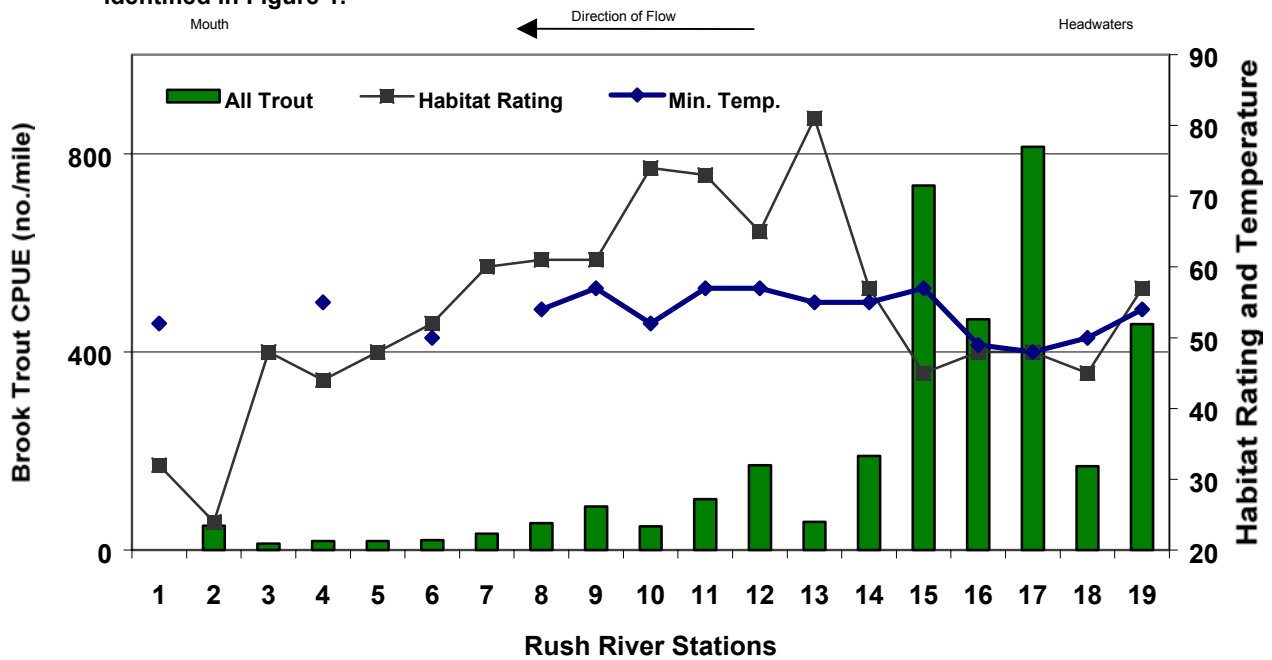
Major Roads

- IH
- USH
- STH



The headwaters of the Rush River (sites 16 –19), have maximum water temperatures reaching and exceeding the upper limit for brook trout, however Sites 16 and 17 fall within the range for growth and survival. Brook trout presence at each of these sites and throughout the Rush River is a product of isolated main channel springs and/or adjacent streams creating water temperatures suitable for reproduction or recruitment. Summer minimum water temperatures < 53 F° (11.7 C°) often indicate the presence of groundwater and brook trout abundance appears strongest in the vicinity of Stations 15 – 19 (**Figure 6**). Overall, the Rush River temperature profile in comparison to Lost and Pine Creek has higher mean summer water temperatures, which allow brook trout to survive, but limits significant reproduction to a few select sites or isolated springs within the river.

Figure 6. Brook Trout Catch per Unit Effort (no./mile), habitat ratings and minimum water temperatures for selected sites in Rush River during the summer of 2000. Station locations are identified in Figure 1.



Lost Creek (Pierce Co.), Bogus Creek, Crystal Springs and Cave Creek have water temperatures suitable for brook trout growth and survival throughout the entire stream, however brook trout reproduction is strongest in the headwaters of Lost Creek. Bogus Creek and Crystal Springs brook trout populations appear limited more by habitat than temperature. Morgan Coulee reaches lethal water temperatures for brook trout a short distance upstream from the mouth, however Site 1 supports modest brook trout reproduction and densities

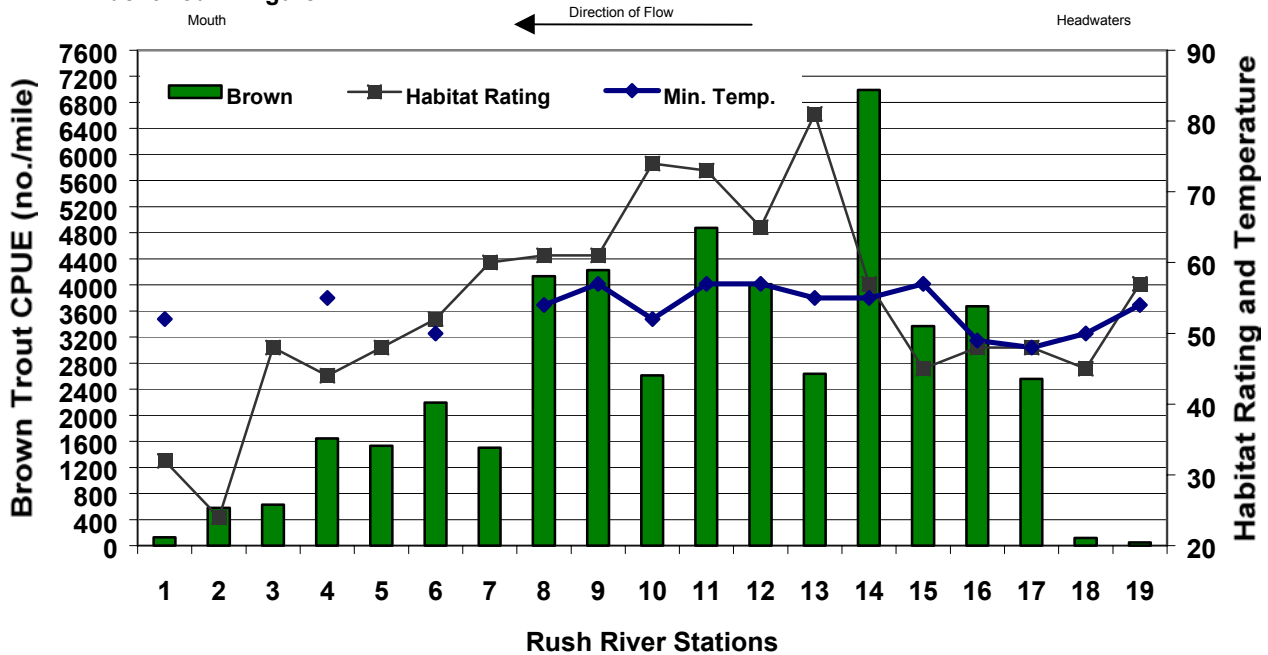
primarily due to heavy spring activity. Cardinal Springs enters Morgan Coulee in this area and provides significant amounts of coldwater to the stream.

Creek 35-1, Brush Creek and Creek 27-13 have high summer water temperatures and warmwater fish assemblages. Lost Creek (Pepin Co.) has water temperatures suitable for brook trout growth and survival, however brook trout are not found there. Temperatures suitable for reproduction may be limited to the headwaters. Poor habitat and numerous grade control structures prevent any fish passage via the Mississippi River. The majority of the small unnamed tributaries have water temperatures suitable for brook trout growth, survival and reproduction. Mean summer water temperatures in the low to mid 50's °F (10-14 °C) are common.

Optimal water temperatures for growth and survival for brown trout range from 53.6-66.2 °F (12-19 °C). Their upper limiting (near lethal) temperature is 81 °F (27.2 °C). According to the mean temperatures found in the watershed the majority of the waters are optimal for brown trout growth and survival. Bogus and Pine Creek and a number of unnamed tributaries have water temperatures colder than optimal for brown trout growth and survival. These cold streams have either no or low densities of brown trout and are dominated primarily by brook trout populations. Creek 35-1 (Baldwin Creek) and the headwaters of Morgan Coulee recorded temperatures reaching and exceeding the upper limiting temperature for brown trout. While the majority of streams have optimal temperatures for brown trout growth and survival, temperatures suitable for natural reproduction in the Rush River are not as well understood. Both Lost Creek (Pierce) and Cave Creek have significant levels of brown trout reproduction. Some unnamed tributaries also have some low levels of natural reproduction, however the main stem of the Rush River receives intensive stocking of brown trout and the contribution of natural versus stocked sources needs further study. **Figure 7** shows brown trout densities in relation to habitat and minimum summer water temperatures. Based on this temperature and density relationship and the fact that brook trout are 100% self-sustaining, significant brown trout reproduction occurs in the Rush River.

Habitat and temperature are both limiting factors of brook and brown trout abundance. **Figures 6 and 7** show a plot of brook and brown trout CPUE, habitat rating, and minimum water temperature at each station on the Rush River main stem. Either habitat and/or temperature impact trout density in the headwaters and lower reaches of the Rush River.

Figure 7. Brown Trout Catch per Unit Effort (no./mile), habitat ratings and minimum water temperatures for selected sites in Rush River during the summer of 2000. Station locations are identified in Figure 1.



Trout Stocking

For the most part, only the Rush River is stocked, however, fry and/or early spring fingerling stocking does occur in or near the mouths of several small tributaries. Stocking quota requests for the Rush River are approximately 35,000 brown trout fry, 20,000 spring and 20,000 fall fingerling brown trout per year. In addition, 50,000 rainbow trout fry and 5,000 fall fingerling rainbow trout are also stocked each year (Table 7). During recent years brown trout fry have been replaced by early spring fingerling (1.4 –1.8 inches). All trout are stocked throughout 23 miles of river with the aid of the Eau Galle Rush River Sports Club. During years of surplus or shortages in production the Rush River may have received more or less fish than the quota requested.

Table 7. Trout Stocking in the Rush River, Pierce County, 1991 through 2000.

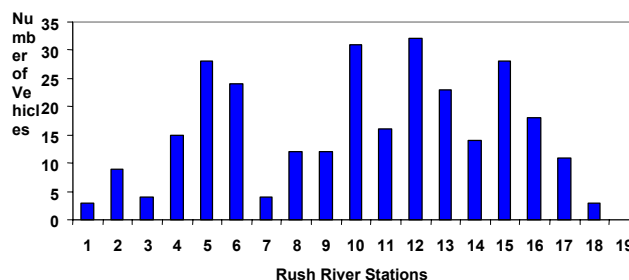
Year	Brown Trout					Rainbow Trout	
	Fry	Early Spring Fingerling	Spring Fingerling	Fall Fingerling		Fry	Fall Fingerling
2000	0	57000	20000	20000		50000	5000
1999	0	68750	20000	30000		50000	5000
1998	68000	95350	20000	20000		50000	5000
1997	60500	52530	20000	22000		50000	5000
1996	0	0	18500	23550		50000	5000
1995	207600	46300	20000	27000		50000	5000
1994	91000	0	20000	28295		50000	5000
1993	35000	0	20000	22000		50000	5000
1992	35000	0	20000	23431		50000	5000
1991	35000	0	27000	19254		50000	5000

Angler Use

The results from an opening day angler-use survey are summarized in **Table 1**. The Rush River main stem (**Figure 8**) received heavy fishing pressure. Fishing pressure in recent years has been heavy throughout the entire angling period, including the early catch and release season. Cave and Lost Creek (Pierce) also have heavy fishing pressure.

All other streams have light to no fishing pressure. Angler accessibility within the watershed is good due to the fact that numerous road crossings provide public access and the Eau Galle Rush River Sports Club works closely with landowners to keep trespass issues to a minimum.

Figure 8. Vehicle counts on the main stem of the Rush River on opening day of trout season.



Trout Fishing Regulations

The current trout regulation category for streams in the watershed is Category 4 (size limit on brown and rainbow trout 12” & brook trout 8”, bag limit 3) and can be found in the Wisconsin Trout Fishing Regulations and Guide (WDNR, 2001). This regulation is designed to protect the brook, brown and rainbow trout populations within the watershed and to simplify regulations for fishermen. This regulation has proven to be highly effective at maintaining and enhancing an outstanding sport fishery.

Trout Stream Classifications

Based on updated information gathered on fish communities, habitat, and temperatures, stream classifications were re-evaluated. Past and recently approved stream classifications for the entire watershed are summarized in **Tables 8 and 9**. Currently, most streams in the watershed are listed as coldwater streams (Voss et.al, 2001). Based on information from this survey, 11.8 miles have been upgraded to classified trout water from warmwater forage fish (WWFF). This includes upgrading: 4.2 miles of Rush River, 2.0 miles of Morgan Coulee Creek, 0.4 miles of Crystal Springs, 0.4 miles of Creek 9-12, 0.4 miles of Creek 19-10, 1.0 mile of Creek 33-13, and 0.2 miles of Creek 5-5 from WWFF to a Class II coldwater streams in Pierce County. Two streams in Pierce County were upgraded from Class II coldwater streams to a Class I coldwater streams. They are Lost Creek (5.3 miles) and Pine Creek (2.8 miles). Also there are two new additions to St. Croix County: (1) an upgrade of 3.0 miles of Rush River from WWFF to a Class II coldwater stream, and (2) an upgrade of 0.2 miles of Creek 35-9 from WWFF to a Class I coldwater stream. It should also be noted that many streams in the watershed have the potential to be upgraded in classification. “The State of the Lower Chippewa Basin” report (Voss et.al, 2001) Rush River Watershed tables contain detailed explanations, including exact locations of current and proposed stream classifications.

Table 8. Detailed explanation of current stream classifications* for the Rush River watershed.

Stream Name	Trout			Class I Portion	M	Class II Portion	M	Class III Portion	M	Public Lands
	BK	BN	RB							
Pierce County										
Rush River	n	n				Town rd. in S28, T25 N, R16 Wupstream	23.4			
Lost Creek	x	x				All	5.3			
Creek 32-7	n					All T27 N R16 W	1.2			
Creek 5-5	n					All T27 N R16 W	0.2			
Pine Creek	n					SW 1/4 S23, T24N, R16 Wupstream	1.1	Remainder		0.5
Totals (24.8 mi.)				Class I	0.0	Class II	31.2	Class III		0.5
Pepin County										
Bogus Creek	x					All	4.2			
Totals (4.2 mi.)				Class I	0.0	Class II	4.2	Class III		0.0
n - natural BK - Brook FB - Rainbow x - stocked BN - Brown										
*Information obtained from Department of Natural Resource publication 6-3600 (80)										

Watershed Problems

Problems found associated with each stream that affect the potential for improved classification are listed in *The State of the Lower Chippewa Basin*, Rush River Watershed tables. These tables also list the impacts that these problems have on each stream. Widespread problems in the watershed include streambank and cropland erosion, gully and streambank pasturing, and flooding. The negative impacts observed on almost every stream include: degradation of habitat, sedimentation, and elevated stream temperatures. The *State of the Lower Chippewa*

Table 9. Detailed explanation of proposed stream classifications for the Rush River watershed.

Stream Name	Trout			Class I Portion	M	Class II Portion	M	Class III Portion	M	Public Lands
	BK	BN	RB							
Pierce County										
Morgan Coluee	n					All	2.0			
Crystal Springs	n					All	0.4			
Lost Creek	n	n		All	5.3					
Pine Creek	n			All	2.8					
Rush River	n	rx	x			STH.35 upstream	27.6			
Creek 5-5	n					All T26N, R16W	0.4			
Creek 9-12	n					All T26N, R16W	0.4			
Creek 19-10	n					All T27N, R16W	0.4			
Creek 33-13	n					All T26N, R16W	1.0			
Creek 32-7	n					All T27N, R16W	1.2			
Totals: (33.4 mi.)				Class I	8.1	Class II	33.4	Class III	0.0	
Pepin County										
Bogus Creek	n					All	4.2			
Totals: (12.2 mi.)				Class I	0.0	Class II	4.2	Class III	0.0	
St. Croix County										
Rush River	n	rx	x			Upstream of County Line	3.0			
Creek 35-9	n			All T26N, R17W	0.2					
Totals: (3.2 mi.)				Class I	0.2	Class II	3.0	Class III	0.0	
Totals: (4.2 mi.)				Class I	5.8	Class II	8.0	Class III	0.0	
n - natural BK - Brook RB - Rainbow x - stocked BN - Brown										

Basin, Rush River Watershed tables also list the suggested watershed improvements (Management Category), the need for those improvements and the priority or rank given to those improvements. In many cases, streams with a need for significant improvement may not have the highest priority. Those portions of stream that have the best potential to improve quickly were ranked highest. The Department of Natural Resources and its partners need to improve, protect and enhance water quality, fish habitat, coldwater and sport fish communities and coldwater temperature regimes. This can be accomplished through: (1) land acquisition, (2) instream habitat improvements; (3) sediment reduction from excessive grazing, bank erosion and upland crop erosion; (4) pollution prevention from current and future sewage treatment plants; and (5) the installation of Best Management Practices (BMP) for barnyards, factory farms, commercial and residential development.

One important step in managing these problems is compiling historic and trend information on fish populations and habitat. Knowing if a stream has been improving or declining over the past twenty years can go a long way in showing how severely impacted the stream is and what kind of priority should be given to improving that stream. Implementation of a long-term comprehensive monitoring program will allow biologists to make wise decisions regarding the management of the Rush River Watershed.

Management Recommendations

1. The Department should discontinue all rainbow trout stocking in the Rush River. Rainbow trout stocking contributes very little to the overall trout population in the river. Rainbows were found at 32% of the sites on the main stem of the Rush River, but generally contributed less than 1% of the total trout population. Such a reduction in stocking would result in a cost savings to our hatchery system. Our major cooperators (Eau Galle Rush River Sports Club) in the area supports this recommendation.
2. The Department should conduct a research project to determine what percent of the legal brown trout population is supported by natural reproduction, early spring fingerling, late spring fingerling and fall fingerling stocking, in order to determine if and where stocking efforts can be reduced. The Rush River brown trout population has increased tremendously in recent years and appears less dependent on stocking. Historically the Rush River was highly dependent on stocking, when less than 1% of the trout population came from natural reproduction (Engel and Holzer, 1992). In order not to jeopardize successful stocking on such an outstanding resource, we recommend conducting a research project using oxytetracycline (OTC) as a marker to differentiate between natural reproduced and stocked trout. Other research options may also apply and should be considered.
3. The Department, in cooperation with its partnership groups, should begin an aggressive streambank easement and acquisition program on the Rush River, Pine Creek, Cave Creek and Lost Creek (Pierce Co.) in order to protect and enhance these resources. In addition, special emphasis should be given to providing guaranteed angler access and parking at all major road crossings. Currently, no state public easements are found on this heavily fished resource. Anglers currently depend on private access and liberal parking on township roads, however townships and landowners have expressed concerns over both parking and public access. A streambank easement program has been approved for the Rush River, Cave and Lost Creek.
4. The Department should work with St. Croix, Pierce, and Pepin County Land Conservation Offices and the local NRCS Office to obtain streambank buffers through the Conservation Reserve Environmental Program (CREP) on select streams throughout the watershed. In addition, the Waters Program should support restoration of wetlands and uplands in the headwaters of the Rush River Watershed through the

Western Prairie Habitat Restoration Area (WPHRA). Such activities will have direct and indirect benefits to the water quality, fish and aquatic life in the Rush River Watershed.

5. The Department should work with St. Croix, Pierce, and Pepin County Land Conservation Offices and the local NRCS Office to install Best Management Practices that reduce flooding, upland soil erosion, nutrient runoff and infiltrate stormwater from upland agricultural areas, factory farms, commercial and urban development areas. Such activities will help prevent sedimentation of waterways, protect and improve coldwater discharge, water quality, fish and aquatic life.
6. The Department should work with local clubs and St. Croix, Pierce, and Pepin County Land Conservation Offices on potential instream habitat restoration activities. By initiating these activities it is likely that spawning and nursery habitat, as well as overhead cover could be significantly enhanced and would aid in the recovery of the coldwater fish community.
7. The Department should work with local communities in sensitive headwater areas to address rapid urban development and the need for storm water management and expanded sewage treatment facilities in order to prevent pollution, reduce flooding and sedimentation of waterways and to encourage groundwater recharge. Such activities will help protect and enhance the Rush River and its outstanding trout fishing resource.
8. In order to protect, preserve and evaluate management projects in the Rush River Watershed, the Department should implement a long-term comprehensive wadable stream monitoring program to detect changes that show improvement or decline in resources. We recommend that approximately 15 representative sites be selected throughout the watershed to be sampled once every three to six years.

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Appendix A: Physical Characteristics of Rush River Watershed in St. Croix, Pierce, and Pepin Counties, Wisconsin
July, August & September, 2000.

STATION INFORMATION:												
Stream Name:	Rush River											
Station Number:	1	2	3	4	5	6	7	8	9	10	11	12
WBC	240300	240300	240300	240300	240300	240300	240300	240300	240300	240300	240300	240300
Sampling Date	06/12/00	06/12/00	06/12/00	06/12/00	06/13/00	06/13/00	06/14/00	06/13/00	06/13/00	06/14/00	06/15/00	06/14/00
River Mile	0.75	2.71	4.17	5.67	7.42	9.92	11.33	12.83	13.83	16.42	17.75	19.42
Township	24N	24N	25N	25N	25N	25N	25N	26N	26N	26N	26N	26N
Range	16W	16W	16W	16W	16W	16W	16W	16W	16W	16W	16W	16W
Section	16	4	33	28	16	9	4	33	28	16	9	8
1/4 Section	NW	SW	NW	NW	SE	NW	NW	NW	SE	SE	SW	NE
Start Latitude :N	44.5700	44.5925	44.6095	44.6272	44.6450	44.6655	44.6813	44.6946	44.7055	44.7342	44.7463	44.7551
Start Longitude :W	92.3285	92.3279	92.3297	92.3319	92.3275	92.3274	92.3317	92.3394	92.3227	92.3265	92.3315	92.3402
WATER CHARACTERISTICS:												
Time (24h):	0830	1100	1315	1530	1000	1130	1045	1530	1330	1315	1053	1315
Air Temperature (F):	60	72	79	74	66	70	78	72	76	64	68	72
Water Temperature (F):	60	58	60	64	57	59	60	66	64	62	58	62
Water Level:	Normal	Normal	Normal	Normal	Normal	Normal	Low	Normal	Normal	Normal	Normal	Normal
Flow (cfs):	130.00	120.10	102.30	95.20	119.30	83.20	59.50	79.90	56.80	53.50	47.70	45.30
Gadent (ft/mi):	4.00	5.10	5.10	5.10	8.00	7.75	7.75	12.12	14.08	21.86	18.52	14.98
CHANNEL & BASIN CHARACTERISTICS:												
Station Length (m):	676	630	6405	532	441	647	630	508	529	630	418	408
Basin Area (sq. mi):	2130					1690		1580				
Mean Stream Width (m):	193	180	183	152	126	185	181	145	151	180	120	115
Channel Condition	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural
% Channelization												
MEANDER DISTANCE (m):												
Between Bands	247	718	1168	2044	2805	0	0	200	0	0	0	0
Between Riffles	167.5	215.7	251.5	143.3	68.3	135	131.6	58.9	42.3	70.8	72	59.3
TOTAL LENGTH (m) / MEAN LENGTH (m):												
Riffles	53/17.7	110/36.7	140/70	110/36.7	195/39	233/58.3	129/32.2	157.5/26.3	341/68.2	293/41.9	97/24.3	119/39.7
Pools	0/0	0/0	108/51.5	99/49.5	140/46.6	341/170.5	117/58.5	87/43.5	130/65	89/29.7	161/40.3	82/82
Runs	338/169	545/272.5	400/100	331/110.3	181/45.3	150/37.5	552/92	164.5/27.4	163/40.8	323.7/40.5	143/28.6	209/69.7
FISH HABITAT RATING SCORE												
Riparian Buffer Width	>10m	>10m	>10m	>10m	>10m	>10m	>10m	>10m	>10m	>10m	>10m	>10m
Bank Erosion	—	—	—	—	—	—	—	—	—	—	—	—
Bank Stability	4	4	4	8	4	8	8	8	8	12	12	12
Pool Area	—	—	—	—	—	—	—	—	—	—	—	—
Maximum Thalweg Depth	8	8	16	8	8	8	16	8	8	25	16	8
Width/Depth Ratio	—	—	—	—	—	—	—	—	—	—	—	—
RR or BBR Ratio	12	4	12	12	12	12	12	12	12	12	12	12
% Fine Sediment	—	—	—	—	—	—	—	—	—	—	—	—
% Rocky Sediment	0	8	8	8	16	16	16	25	25	25	25	25
Cover for fish	8	0	8	8	8	8	8	8	8	0	8	8
TOTAL SCORE:	32	24	48	44	48	52	60	61	61	74	73	66
QUALITATIVE RATING:	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Good	Good	Good

Appendix A (cont.): Physical Characteristics of Rush River Watershed in St. Croix, Pierce, and Pepin Counties, Wisconsin
 July, August & September, 2000.

STATION INFORMATION:														
Stream Name	Rush River							Lost Creek (Elsvoeth)					Morgan Creek	
Station Number:	13	14	15	16	17	18	19	1	2	3	4	5	1	2
WBC	240300	240300	240300	240300	240300	240300	240300	244700	244700	244700	244700	244700	240700	240700
Sampling Date	06/15/00	06/19/00	06/19/00	06/19/00	06/19/00	06/27/00	06/27/00	06/07/00	06/07/00	06/07/00	06/07/00	06/07/00	06/06/00	06/06/00
River Mile	2075	2367	2650	2883	3067	3246	3496	038	171	308	413	479	042	142
Township	28N	27N	27N	27N	27N	28N	28N	28N	28N	28N	28N	28N	28N	28N
Range	18W	18W	17W	17W	17W	17W	17W	18W	18W	18W	18W	17W	18W	18W
Section	5	31	24	13	2	35	26	28	29	30	30	24	33	34
1/4 Section	NE	NE	SE	NW	SE	SW	NW	SW	SE	NE	NW	SE	NE	NE
Stat Latitude :N	44721	44788	44836	44825	44881	44869	44880	44721	44704	44718	44762	44725	44838	44812
Stat Longitude :W	92345	92360	92366	92394	92409	92408	92433	92325	92360	92306	92371	92365	92328	92306
WATER CHARACTERISTICS:														
Time (24hr)	142	080	104	130	140	120	140	090	100	110	135	145	095	110
Air Temperature (F)	64	72	74	80	84	67	-	64	68	69	66	68	65	74
Water Temperature (F)	58	57	58	62	64	65	-	52	54	54	52	53	51	49
Water Level	Normal	Normal	Normal	Normal	Normal	Normal	Normal	High	Normal	Normal	Normal	Normal	Normal	Normal
Flow (cfs)	4170	2300	2470	1740	1270	620	240	2310	660	770	580	540	220	160
Gadgets (lb/min)	1498	1504	1098	826	749	749	571	2817	4000	3008	3008	2395	4494	4494
CHANNEL & BASIN CHARACTERISTICS:														
Station Length (ft)	535	445	502	482	388	300	266	266	29	280	210	175	110	111
Basin Area (sq mi)	920					473		255						
Mean Stream Width (ft)	153	127	144	129	95	86	76	76	75	78	55	50	31	32
Channel Condition	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural	Natural
% Channelization														
MEANDERS (n):														
Between Bars	0	0	0	29	1615	0	23	0	0	0	0	0	0	0
Between Fills	1393	688	121	541	667	57	39	427	405	204	53	356	513	233
TOTAL LENGTH (ft) / MEAN LENGTH (ft):														
Fills	97/323	97/253	173/577	160/25	79/263	46/9	15/75	143/477	120/60	112/16	50/167	58/106	7/35	38/127
Pods	392/1307	115/383	302/755	114/114	60/15	182/364	234/78	0/0	0/0	8/8	0/0	84/42	63/21	34/113
Rrs	99/31	215/358	160/40	222/37	110/367	116/145	14/7	128/427	139/463	99/124	191/478	37/123	22/73	30/10
RSH HABITAT RAINING SCORE														
	>10m	>10m	>10m	>10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m
Riparian Buffer Width	-	-	-	-	5	0	10	10	0	15	15	15	10	10
Bank Erosion	-	-	-	-	10	15	10	15	15	15	15	15	15	10
Bank Stability	12	12	0	12	-	-	-	-	-	-	-	-	-	-
Pod Area	-	-	-	-	3	10	7	0	0	3	0	7	7	7
Minimum Fluvial Depth	16	8	8	0	-	-	-	-	-	-	-	-	-	-
Width:Depth Ratio	-	-	-	-	0	0	10	0	5	0	15	10	15	10
R/Ro:BB Ratio	12	12	12	12	15	15	15	15	15	15	15	15	5	15
% Fine Sediment	-	-	-	-	5	5	5	10	10	15	15	10	5	5
% Rocky Sediment	16	25	25	16	-	-	-	-	-	-	-	-	-	-
Cover for fish	25	0	0	8	0	0	0	0	0	0	0	0	5	0
TOTAL SCORE:														
	81	57	45	48	48	45	57	50	45	63	75	72	62	57
QUALITATIVE RATING:														
	Excellent	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Good	Excellent	Good	Good	Good

Appendix A (cont.): Physical Characteristics of Rush River Watershed in St. Croix, Pierce, and Pepin Counties, Wisconsin
 July, August & September, 2000.

STATION INFORMATION:														
Stream Name	Morgan Creek	C. 3-13	Bush C.	Cae C.	C. 27-13	C. 19-10	C. 327	C. 55	C. 9-12	C. 351	C. 359	Cy. Springs	Bugs Creek	→
Station Number:	3	1	1	1	1	1	1	1	1	1	1	1	1	2
WBC	24000	24400	24200	24200	24400	24300	24300	24300	24400	24400	24300	24000	23800	23800
Sampling Date	060600	060600	060600	060700	060800	060800	060800	060800	061500	060800	062700	060600	060500	060500
River Mile	263	017	117	092	033	013	067	002	004	075	013	033	050	250
Township	28N	28N	28N	28N	28N	27N	27N	28N	28N	28N	28N	28N	28N	28N
Range	18W	18W	18W	18W	17W	18W	18W	18W	18W	17W	17W	18W	18W	18W
Section	26	33	27	15	27	19	32	5	9	36	35	4	21	16
1/4 Section	SE	SE	SE	SW	NE	SW	NW	NE	SW	NE	NW	SW	NW	NE
Stat Latitude :N	446184	446192	447063	447333	448881	448094	447887	447731	447468	449335	448897	445929	444609	444490
Stat Longitude :W	922836	923214	923041	923078	924183	923741	923528	923470	923304	923814	924088	923380	922168	922082

WATER CHARACTERISTICS:														
Time(24hr)	120	140	140	140	130	080	110	080	127	145	140	090	120	100
Air Temperature(F)	76	74	70	80	85	85	--	64	62	87	72	64	68	73
Water Temperature(F)	52	57	66	55	70	55	--	48	50	76	49	48	56	52
Water Level:	Normal	Normal	Normal	Normal	Low	Normal	Normal	Normal	Normal	Normal	Normal	Normal	High	High
Flow(cfs)	110	080	030	440	040	070	180	120	020	100	060	140	940	800
Gadgets (l/min)	4494	6667	7784	4000	826	4848	6000	8547	16540	1504	4819	3000	1667	6000

CHANNEL & BASIN CHARACTERISTICS:														
Station Length(m)	90	71	81	25	35	105	70	53	82	91	100	85	38	100
Basin Area(sq mi)										40			110	
Main Stream Width(m)	26	20	23	67	10	29	20	15	23	26	12	24	99	43
Channel Condition	Natural	Natural	Natural	Natural	Ditched	Natural	Natural	Natural	Natural	Ditched	Natural	Natural	Natural	Natural
%Channelization					100%					100%				

MEANDER SPACE(m):														
Between Bars	36	0	0	0	0	0	0	0	0	0	193	0	165	406
Between Rifles	85	188	28	243	0	233	165	10	66	635	4	12	199	0

TOTAL LENGTH(m) / MEAN LENGTH(m):														
Rifles	27/9	24/8	22/11	189/423	0/0	20/67	10/25	47/94	44/11	11/11	16/53	3/15	114/114	0/0
Rods	41/136	19/95	36/18	63/315	72/72	65/217	32/106	71/35	16/4	9/45	19/63	65/163	12/12	0/0
Runs	42/14	19/19	20/10	37/14	28/28	14/14	30/15	15/75	2/2	68/227	41/82	31/7.5	289/1495	100/100

RSH HABITAT RAINING SCORE	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m	<10m
Riparian Buffer Width	15	15	10	10	0	0	15	0	15	5	15	10	10	15
Bank Erosion	10	10	15	15	15	15	15	15	10	10	15	10	5	10
Bank Stability	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pool Area	7	3	10	7	10	10	10	3	3	3	7	10	0	0
Minimum Trilobes Depth	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Width:Depth Ratio	5	10	5	5	15	10	10	15	5	10	10	10	10	5
R/Ro:BBR Ratio	15	10	10	15	0	15	15	10	15	5	15	15	0	15
%Fire Scorch	0	5	10	15	0	5	10	5	15	5	5	0	0	0
%Rudy Scorch	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cover for fish	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TOTAL SCORE:	52	53	60	67	40	55	75	48	68	38	67	55	25	45
QUALITATIVE RATING:	Good	Good	Good	Good	Fair	Good	Excellent	Fair	Good	Fair	Good	Good	Fair	Fair

Appendix A (cont.): Physical Characteristics of Rush River Watershed in St. Croix, Pierce, and Pepin Counties, Wisconsin
July, August & September, 2000.

STATION INFORMATION :										
Stream Name:	Bogus Creek				Lost Creek (Pepin)			Pine Creek		Pine Cr. N. Br.
Station Number:	3	1	2	3	4	1	2	3	1	
WBC:	2438900	2438300	2438300	2438300	2438300	2440000	2440000	2440000	2440100	
Sampling Date:	06/05/00	05/31/00	05/31/00	06/05/00	06/05/00	06/05/00	05/31/00	05/31/00	06/05/00	
River Mile:	4.33	0.67	2.17	4.33	5.67	0.17	1.00	2.25	0.21	
Township:	23N	23N	23N	23N	23N	24N	24N	24N	24N	
Range:	15W	15W	15W	15W	15W	16W	16W	16W	16W	
Section:	4	21	23	15	11	23	23	24	23	
1/4 Section:	SW	SE	SW	NE	NW	SW	SE	SE	NE	
Start Latitude :N	44.4996	44.4591	44.4567	44.4778	44.4926	44.5426	44.5441	44.5441	44.5443	
Start Longitude :W	92.2114	92.2026	92.1753	92.1831	92.1705	92.2948	92.2800	92.2575	92.2785	
WATER CHARACTERISTICS :										
Time (24 hr):	1130	0930	1115	0830	1000	1330	1335	1515	1420	
Air Temperature (F):	75	—	—	59	70	76	73	64	71	
Water Temperature (F):	54	58	60	49	55	58	54	56	66	
Water Level:	Normal	Normal	Normal	High	Normal	High	Normal	Normal	Normal	
Flow (cfs):	2.20	1.70	0.20	1.90	2.50	0.00	6.40	0.20	0.30	
Gradient (ft/mi.):	48.00	34.88	26.67	23.95	59.88	12.05	48.19	102.92	59.70	
CHANNEL & BASIN CHARACTERISTICS :										
Station Length (m):	70	70	105	70	70	392	195	95	70	
Basin Area (sq. mi.):		7.7								
Mean Stream Width (m):	2.1	2.0	3.0	2.0	2.0	11.2	5.6	2.7	2.0	
Channel Condition:	Natural	Natural	Ditched	Ditched	Natural	Natural	Natural	Natural	Natural	
% Channelization:			100%	100%						
MEAN DISTANCE (m) :										
Between Bends:	58	0	0	0	19	96	49	89	133	
Between Riffles:	9.4	0	0	0	0	27	40.7	19.5	26	
TOTAL LENGTH (m) / MEAN LENGTH (m) :										
Riffles:	33.5 / 11.2	0 / 0	0 / 0	24 / 24	0 / 0	7 / 7	51 / 17	49 / 9.8	6 / 6	
Pools:	0 / 0	0 / 0	105 / 105	6 / 6	3 / 3	200 / 100	51 / 17	12 / 6	56 / 56	
Runs:	25.5 / 6.4	70 / 70	0 / 0	40 / 13.3	65 / 32.5	185 / 46.3	93 / 31	66 / 13.2	0 / 0	
FISH HABITAT RATING SCORE										
Riparian Buffer Width:	< 10 m	< 10 m	< 10 m	< 10 m	< 10 m	> 10 m	< 10 m	< 10 m	< 10 m	
Bank Erosion:	0	10	10	0	15	—	0	10	0	
Bank Stability:	10	10	10	10	15	—	15	10	15	
Bank Stability:	—	—	—	—	—	12	—	—	—	
Pool Area:	0	0	10	0	0	—	3	3	0	
Maximum Thalweg Depth:	—	—	—	—	—	8	—	—	—	
Width:Depth Ratio:	5	10	10	15	10	—	5	10	15	
R/R or B:B Ratio:	15	0	5	10	10	12	15	15	10	
% Fine Sediment:	5	0	0	5	0	—	0	5	0	
% Rocky Sediment:	—	—	—	—	—	0	—	—	—	
Cover for fish:	0	0	5	10	5	25	5	0	5	
TOTAL SCORE :										
	35	30	50	50	55	57	43	53	45	
QUALITATIVE RATING :										
	Fair	Fair	Good	Good	Good	Fair	Fair	Good	Fair	

Appendix B: The Fish Assemblage for Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

STATION INFORMATION																					
Stream Name:	Rush River																				
Station Number:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
WIBC:	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300		
Sampling Date:	08/01/00	08/03/00	08/07/00	08/07/00	08/08/00	08/09/00	08/10/00	08/10/00	08/15/00	08/15/00	08/16/00	08/16/00	08/23/00	08/22/00	08/22/00	08/28/00	08/02/00	08/01/00	08/02/00		
River Mile:	0.75	2.71	4.17	5.67	7.42	9.92	11.33	12.83	13.83	16.42	17.75	19.42	20.75	23.67	26.50	28.83	30.67	32.46	34.96		
Station Length (m):	676	630	640.5	532	441	647	630	508	529	630	418	403	535	445	502	452	333	300	266		
Basin Area (sq. mi.):	213.0					169.0							92.0						47.3		
FISH SPECIES	CODE	* THE BOLDED SPECIES ARE INTOLERANT																			
Brown Trout	I21	55	227	251	549	419	885	601	1305	1390	1025	1267	1008	879	1942	1052	1049	389	32	8	
Brook Trout *	I23	20	6	8	6	9	14	18	30	20	28	44	20	54	232	134	70	28	77		
Rainbow Trout	I19												4	5	8	3	27	29	5		
Tiger Trout	I27							1								1	2				
Northern Pike	L02																				
Walleye	X22		1																		
Yellow Perch	X15	1																			
Largemouth Bass	W12	1																			
Smallmouth Bass *	W11	6	1		1																
Bluegill	W09																				
Green Sunfish	W05						2														
Pumpkinseed	W06																				
Blacknose Dace	M48	52	117	125	99	504	170	297	255	236	76	53	94	6	24	82		1	127	123	
Bluntnose Minnow	M45																			3	
Central Stoneroller	M06								1											14	
Common Shiner	M28																			152	
Creek Chub	M50				3	24	9	20	2											42	1
Fathead Minnow	M46			1														1		12	
Hornyhead Chub	M19																				
Longnose Dace	M49			32		8	22	29	102	45	4	37	5	16	4	1	1	47	27	8	
Southern Redbelly Dace	M43																			78	29
Redside Dace *	M09				6	1														5	
Mimic Shiner	M40	101		1																	
Emerald Shiner	M23	298	80	20																	
Spottin Shiner	M36	23																			
Common Carp	M12	2																			5
River Carpsucker	N05	1																			
Northern Hogsucker *	N13	2								1											
Silver Redhorse	N18	8			1	2															
Golden Redhorse	N21	9																			
Shorthead Redhorse	N22	5					3		1												
White Sucker	N09	116	399	138	271	537	1240	836	709	391	172	173	334	465	362	445	494	335	424	172	
Johnny Darter	X12	1		4	5		33													28	50
Logperch	X16	13	3																		
Rainbow Darter *	X07	4	23	16	10	23	22	101	59	14	3	9	14	13	12	29	20	61	5		
Fantail Darter	X10				8	6	11	52	48	21	5	24	19	6	4					37	1
Iowa Darter *	X09																				
Blackside Darter	X18		3																		
Brook Stickleback	U01		17	1	20	6	82	16	17	35			2	9	27	19	681	47	29	590	
Central Mudminnow	K01																2				1
Mottled Sculpin *	Z01		62	193	234	98	598	174	240	399	524	229	412	279	583	1325	786	714	63	470	
Slimy Sculpin *	Z02	185									1										235
Burbot	R01	7		1																	
Amer. Brook Lamprey *	A05					1	5		3							1					
Ammocete Lamprey		2	7	4	33	16	26	5		1											
Freshwater Drum	Y01	2					4														
COLDWATER IBI CALCULATIONS																					
No. of Intolerant Species	3	3	3	4	5	4	4	3	4	5	3	3	3	3	4	3	3	4	4		
Score	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20		
% Tolerant Individuals	17.1%	55.4%	33.1%	29.8%	64.4%	46.4%	56.7%	34.9%	23.8%	13.4%	12.6%	22.1%	27.5%	12.8%	16.6%	6.5%	20.4%	54.0%	17.0%		
Score	10	0	0	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10		
% Top Carnivores	12.2%	26.5%	32.1%	44.8%	26.2%	28.9%	30.5%	46.9%	53.8%	56.2%	72.1%	54.5%	52.8%	66.3%	40.5%	41.8%	27.1%	5.1%	4.7%		
Score	0	10	10	10	10	10	10	20	20	20	20	20	20	20	10	10	10	0	0		
% Native Stenothermal	24.0%	10.5%	24.9%	21.5%	6.8%	22.2%	10.3%	9.7%	17.7%	29.3%	14.3%	23.6%	17.9%	21.9%	49.6%	55.2%	57.4%	9.5%	77.2%		
Score	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	0	10		
% Brook Trout of Salmonids	0.0%	7.7%	20.0%	1.1%	1.2%	0.9%	2.1%	1.3%	2.0%	1.8%	2.1%	4.1%	2.1%	2.6%	18.0%	11.0%	37.8%	37.3%	90.5%		
Score	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	10	10	10	10		
OVERALL IBI SCORE	30	40	30	30	30	30	30	40	40	50	50	50	40	50	60	60	60	30	50		
OVERALL IBI RATING	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good	Good	Fair	Fair		

Appendix B (cont.): The Fish Assemblage for Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

STATION INFORMATION																				
Stream Name:	Lost Creek (Ellsworth)					Morgan Coulee			Cr. 33-13	Brush Cr.	Cave Cr.	Cr. 27-13	Cr. 19-10	Cr. 32-7	Cr. 5-5	Cr. 9-12				
Station Number:	1	2	3	4	5	1	2	3	1	1	1	1	1	1	1	1				
WIBC:	2441700	2441700	2441700	2441700	2441700	2440700	2440700	2440700	2441600	2442000	2442100	2444100	2443300	2443200	2443000	2444950				
Sampling Date:	07/12/00	07/11/00	07/12/00	07/12/00	07/12/00	07/05/00	07/05/00	07/05/00	07/05/00	07/11/00	07/11/00	07/13/00	08/01/00	08/01/00	07/12/00	07/13/00				
River Mile:	0.58	1.71	3.08	4.13	4.79	0.42	1.42	2.63	0.17	1.17	0.92	0.33	0.13	0.67	0.02	0.04				
Station Length (m):	266	259	280	210	175	110	111	100	100	100	245	100	105	100	100	100				
Basin Area (sq. mi.):	25.5																			
FISH SPECIES																				
CODE	* THE BOLDDED SPECIES ARE INTOLERANT																			
Brown Trout	I21	323	341	201	71	7										158	11	6	4	
Brook Trout *	I23	52	92	146	159	298	85	4	4	4						99	52	29	39	96
Rainbow Trout	I19																			
Tiger Trout	I27															1				
Northern Pike	L02																			
Walleye	X22																			
Yellow Perch	X15																			
Largemouth Bass	W12																			
Smallmouth Bass *	W11																			
Bluegill	W09																			
Green Sunfish	W05																			
Pumpkinseed	W06																			
Blacknose Dace	M48										52	2	2							
Bluntnose Minnow	M45												5							
Central Stoneroller	M06																			
Common Shiner	M28																			
Creek Chub	M50						9			2	34					16				
Fathead Minnow	M46															2				
Hornyhead Chub	M19																			
Longnose Dace	M49	12	1	1	1								60							
Southern Redbelly Dace	M43																13			
Redside Dace *	M09																2			
Mimic Shiner	M40																			
Emerald Shiner	M23																			
Spottin Shiner	M36																			
Common Carp	M12																			
River Carpsucker	N05																			
Northern Hogsucker *	N13																			
Silver Redhorse	N18																			
Golden Redhorse	N21																			
Shorthead Redhorse	N22																			
White Sucker	N09		1			2	31										23			
Johnny Darter	X12																4			
Logperch	X16																			
Rainbow Darter *	X07																			
Fantail Darter	X10																	1		
Iowa Darter *	X09																			33
Blackside Darter	X18																			
Brook Stickleback	U01				27		21	6	32	19	20					54	2			
Central Mudminnow	K01															145				
Mottled Sculpin *	Z01										11					723	2	208	57	
Slimy Sculpin *	Z02	664	1284	871	737	450	4													57
Burbot	R01																			
Amer. Brook Lamprey *	A05																			
Ammocete Lamprey																				
Freshwater Drum	Y01																			
COLDWATER IBI CALCULATIONS																				
No. of Intolerant Species	2	2	2	2	2	2	1	1	2	0	2	3	2	2	2	1				
Score	20	20	20	20	20	20	10	10	20	0	20	20	20	20	20	10				
% Tolerant Individuals	0.0%	10.0%	0.0%	0.0%	0.3%	27.8%	0.0%	0.0%	5.7%	81.1%	5.6%	42.5%	0.0%	0.0%	0.0%	0.0%				
Score	20	20	20	20	20	0	20	20	10	0	10	0	20	20	20	20				
% Top Carnivores	35.5%	24.9%	19.6%	23.2%	40.1%	54.3%	33.3%	8.6%	8.6%	0.0%	23.5%	0.0%	22.8%	34.5%	41.8%	100.0%				
Score	10	10	10	10	10	20	10	0	0	0	10	0	10	10	10	20				
% Native Stenothermal	68.2%	80.3%	93.7%	92.8%	98.8%	72.2%	100.0%	100.0%	94.3%	18.9%	74.4%	15.9%	95.2%	97.7%	96.9%	100.0%				
Score	10	10	20	20	20	10	20	20	20	0	10	0	20	20	20	20				
% Brook Trout of Salmonids	13.7%	21.3%	68.2%	69.3%	97.7%	100.0%	100.0%	100.0%	100.0%	0.0%	38.6%	0.0%	79.0%	93.3%	92.7%	100.0%				
Score	10	10	10	10	20	20	20	20	20	0	10	0	10	10	10	20				
OVERALL IBI SCORE	70	70	80	80	90	70	80	70	70	0	60	20	80	80	80	90				
OVERALL IBI RATING	Good	Good	Good	Good	Excell	Good	Good	Good	Good	V. Poor	Good	Poor	Good	Good	Good	Excell				

Appendix B (cont.): The Fish Assemblage for Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

STATION INFORMATION																			
Stream Name:	Cr. 35-1			Cr. 35-9			Cry. Springs			Bogus Creek			Lost Creek (Pepin)			Pine Creek			Pine Cr. N. Br.
Station Number:	1	1	1	1	2	3	1	2	3	4	1	2	3	1					
WIBC:	2444600	2443800	2440500	2438900	2438900	2438900	2438300	2438300	2438300	2438300	2440000	2440000	2440000	2440100					
Sampling Date:	07/11/00	08/02/00	08/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/07/00	07/10/00	07/10/00	07/10/00					
River Mile:	0.75	0.13	0.33	0.50	2.50	4.33	0.67	2.17	4.33	5.67	0.17	1.00	2.25	0.21					
Station Length (m):	100	100	100	343	150	100	100	105	100	100	392	195	100	100					
Basin Area (sq. mi.):	4.0			11.0			7.7												
FISH SPECIES																			
CODE	* THE BOLDED SPECIES ARE INTOLERANT																		
Brown Trout	I21		13											7					
Brook Trout *	I23		73		5		64		105		12			76	383	67	9		
Rainbow Trout	I19		1																
Tiger Trout	I27																		
Northern Pike	L02													1					
Walleye	X22																		
Yellow Perch	X15																		
Largemouth Bass	W12																		
Smallmouth Bass *	W11																		
Bluegill	W09													2					
Green Sunfish	W05																		
Pumpkinseed	W06													1					
Blacknose Dace	M48																2		
Bluntnose Minnow	M45																		
Central Stoneroller	M06																		
Common Shiner	M28																		
Creek Chub	M50	15		9						2	26								
Fathead Minnow	M46								38	17	30						18		
Hornyhead Chub	M19								3										
Longnose Dace	M49																		
Southern Redbelly Dace	M43																		
Redside Dace *	M09																		
Mimic Shiner	M40																		
Emerald Shiner	M23																		
Spottin Shiner	M36																		
Common Carp	M12																		
River Carpsucker	N05																		
Northern Hogsucker *	N13																		
Silver Redhorse	N18																		
Golden Redhorse	N21																		
Shorthead Redhorse	N22																		
White Sucker	N09	7		72					2					4			1		
Johnny Darter	X12																		
Logperch	X16													2					
Rainbow Darter *	X07													1					
Fantail Darter	X10																		
Iowa Darter *	X09																		
Blackside Darter	X18				2														
Brook Stickleback	U01	28	2	65				16	10					6			5		
Central Mudminnow	K01	4	1														1		
Mottled Sculpin *	Z01		24											6					
Slimy Sculpin *	Z02																		
Burbot	R01																		
Amer. Brook Lamprey *	A05																		
Ammocete Lamprey																			
Freshwater Drum	Y01																		
COLDWATER IBI CALCULATIONS																			
No. of Intolerant Species	0	2	1	2	1	1	0	0	0	---	3	1	1	1					
Score	0	20	10	20	10	10	0	0	0	---	20	10	10	10					
% Tolerant Individuals	48.1%	0.9%	59.4%	0.0%	0.0%	0.0%	75.5%	100.0%	100.0%	---	4.2%	0.0%	0.0%	62.9%					
Score	0	20	0	20	20	20	0	0	0	---	20	20	20	0					
% Top Carnivores	0.0%	76.1%	2.4%	95.5%	100.0%	40.7%	0.0%	0.0%	0.0%	---	82.1%	98.4%	100.0%	22.9%					
Score	0	20	0	20	20	10	0	0	0	---	20	20	20	10					
% Native Stenothermal	51.9%	86.7%	40.6%	95.5%	100.0%	100.0%	18.9%	0.0%	0.0%	---	80.0%	100.0%	100.0%	37.1%					
Score	10	20	0	20	20	20	0	0	0	---	10	20	20	0					
% Brook Trout of Salmonids	0.0%	83.7%	100.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%	---	90.9%	100.0%	100.0%	100.0%					
Score	0	10	20	20	20	20	0	0	0	---	10	20	20	20					
OVERALL IBI SCORE	10	90	30	100	90	80	0	0	0	No Fish	80	90	90	40					
OVERALL IBI RATING	Poor	Excell	Fair	Excell	Excell	Good	V. Poor	V. Poor	V. Poor	V. Poor	Good	Excell	Excell	Fair					

Appendix C: Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

STATION INFORMATION :														
Stream Name:	Rush River →													
Station Number:	1	2	3	4	5	6	7	8	9	10	11	12	13	
WIBC:	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	2440300	
Sampling Date:	08/01/00	08/03/00	08/07/00	08/07/00	08/08/00	08/09/00	08/10/00	08/10/00	08/15/00	08/15/00	08/16/00	08/16/00	08/23/00	
Recap Date:	---	08/08/00	---	08/09/00	08/14/00	08/14/00	08/14/00	08/14/00	08/17/00	08/17/00	08/21/00	08/21/00	08/29/00	
River Mile:	0.75	2.71	4.17	5.67	7.42	9.92	11.33	12.83	13.83	16.42	17.75	19.42	20.75	
Station Length (m):	676	630	640.5	532	441	647	630	508	529	630	418	403	535	
# of Acres:	3.22	2.80	2.90	2.00	1.37	2.96	2.81	1.82	1.97	2.80	1.23	1.15	2.02	
Shocking Equipment:	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	2 S.S.	
# of Electrodes:	6	6	6	6	6	6	6	6	6	6	6	6	6	
NUMBER CAPTURED														
Trout Species	Brown	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	
1st Run Total (<4"):	12	13 / 1	12 / 2	82 / 3	58 / 0	214 / 4	130 / 0	113 / 3	300 / 3	272 / 5	47 / 5	59 / 6	67 / 0	
# per Mile (CPE):	29	33 / 3	30 / 5	248 / 9	212 / 0	532 / 10	332 / 0	358 / 10	913 / 9	695 / 13	181 / 19	236 / 24	202 / 0	
1st Run Total (≥4"):	41	215 / 20	246 / 5	484 / 4	385 / 5	673 / 4	469 / 13	1185 / 14	1251 / 32	994 / 15	1223 / 23	949 / 37	841 / 19	
# per Mile (CPE):	98	549 / 51	618 / 13	1464 / 12	1405 / 18	1674 / 10	1198 / 33	3754 / 44	3806 / 97	2539 / 38	4709 / 89	3790 / 148	2530 / 57	
1st Run Total (all):	53	228 / 21	258 / 7	566 / 7	443 / 5	887 / 8	599 / 13	1298 / 17	1551 / 35	1266 / 20	1270 / 28	1008 / 43	908 / 19	
# per Mile (CPE):	126	582 / 54	648 / 18	1712 / 21	1617 / 18	2206 / 20	1530 / 33	4112 / 54	4719 / 106	3234 / 51	4890 / 108	4025 / 172	2731 / 57	
2nd Run Total (≥4"):		193 / 22		386 / 4	380 / 0	512 / 2	403 / 10	969 / 9	1362 / 21	1145 / 13	1240 / 25	776 / 32	833 / 17	
# per Mile (CPE):		493 / 56		1168 / 12	1387 / 0	1274 / 5	1029 / 26	3070 / 29	4144 / 64	2925 / 33	4774 / 96	3099 / 128	2506 / 51	
OTHER TROUT SPECIES														
Trout Species:													Rainbow	Rainbow
1st Run Total:													4	5
2nd Run Total:													4	3
Size Range													11.0-12.9"	9.0-14.9"
LENGTH DISTRIBUTIONS														
Trout Species	Brown	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	
Inch Group:														
1				8 / 0			7 / 0	3 / 0	3 / 0		2 / 0			
2				66 / 3	58 / 0	214 / 4	123 / 0	110 / 3	297 / 2	272 / 2	45 / 5	59 / 6	67 / 0	
3	12	13 / 1	12 / 2	41 / 0	98 / 1	158 / 2	62 / 0	153 / 0	229 / 0	177 / 1	56 / 0	95 / 1	87 / 0	
4	2	21 / 2	23 / 0	1 / 0	15 / 0	8 / 0	2 / 0	4 / 0	8 / 0	12 / 1	5 / 2	20 / 5	18 / 0	
5		1 / 0	4 / 0	1 / 0										
6	1			1 / 0			3 / 0	2 / 0	2 / 4	7 / 7	6 / 2	50 / 5	10 / 13	12 / 4
7	1	4 / 5	9 / 2	24 / 2	11 / 1	44 / 0	27 / 2	92 / 5	79 / 12	102 / 8	300 / 4	135 / 11	80 / 3	
8	4	31 / 3	59 / 3	134 / 2	53 / 2	126 / 0	121 / 1	349 / 2	320 / 0	302 / 2	390 / 0	301 / 0	178 / 5	
9	13	54 / 1	48 / 0	102 / 0	74 / 0	162 / 2	114 / 5	232 / 2	234 / 6	178 / 1	155 / 7	111 / 5	113 / 4	
10	6	3 / 5	11 / 0	13 / 0	41 / 0	32 / 0	24 / 4	35 / 1	37 / 2	33 / 0	28 / 5	47 / 1	46 / 3	
11		6 / 1	14 / 0	42 / 0	7 / 1	10 / 0	11 / 1	100 / 0	89 / 1	55 / 0	75 / 0	98 / 1	104 / 0	
12	2	42 / 1	37 / 0	67 / 0	23 / 0	35 / 0	50 / 0	103 / 0	124 / 0	81 / 0	68 / 0	70 / 0	105 / 0	
13	2	22 / 0	23 / 0	27 / 0	30 / 0	50 / 0	33 / 0	73 / 0	75 / 0	29 / 0	62 / 0	39 / 0	57 / 0	
14	2	15 / 0	7 / 0	14 / 0	18 / 0	28 / 0	19 / 0	20 / 0	27 / 0	10 / 0	15 / 0	12 / 0	24 / 0	
15	4	8 / 0	3 / 0	7 / 0	6 / 0	9 / 0	7 / 0	10 / 0	8 / 0	3 / 0	11 / 0	5 / 0	10 / 0	
16	4	2 / 0	7 / 0	5 / 0	2 / 0	4 / 0	1 / 0	3 / 0	4 / 0	3 / 0	4 / 0	1 / 0	4 / 0	
17	1	2 / 0		3 / 0	1 / 0	1 / 0	1 / 0	5 / 0	4 / 0	3 / 0	1 / 0	3 / 0	4 / 0	
18	1	1 / 0			3 / 0	1 / 0	2 / 0	3 / 0			2 / 0	2 / 0	6 / 0	
19		3 / 0		1 / 0	1 / 0	1 / 0			2 / 0				2 / 0	
20			1 / 0						1 / 0		1 / 0		1 / 0	
21														
22				1 / 0				1 / 0						
23					1 / 0									
24														
25														

Appendix C (cont.): Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

Trout Population Summaries													
Stream Name:	Rush River												
Station Number:	1	2	3	4	5	6	7	8	9	10	11	12	13
BROOK TROUT POPULATION ESTIMATES													
4" & Greater (PE):		33		8	5	6	16	20	40	27	42	53	24
STD:		3.35		0.00	0.74	1.67	1.64	2.89	5.17	4.74	5.26	7.29	2.23
Pounds per Acre:		3.10		0.80	0.84	0.26	1.76	1.68	3.62	1.32	6.42	7.06	2.86
Number per Mile:		84		24	19	15	41	63	120	70	162	212	74
6" & Greater (PE):		27		8	4	2	16	20	37	24	34	45	24
STD:		3.44		0.00	0.82	1.00	1.64	2.89	5.57	5.29	5.54	8.19	2.23
Pounds per Acre:		3.03		0.80	0.82	0.21	1.76	1.68	3.51	1.25	5.87	6.50	2.86
Number per Mile:		68		24	15	5	41	63	111	62	131	178	74
BROWN TROUT POPULATION ESTIMATES													
4" & Greater (PE):		356		811	1067	1350	1609	2497	2306	2784	2087	1371	1464
STD:		34.3		64.2	117.6	146.7	237.0	226.2	206.9	275.2	178.5	114.0	98.9
Pounds per Acre:		58.2		148.4	187.6	121.3	288.0	399.9	317.7	213.8	450.8	336.2	264.4
Number per Mile:		945		2458	3953	3374	4126	7803	6987	7139	8028	5482	4436
6" & Greater (PE):		271		646	490	779	669	1860	1507	1759	1632	1071	1123
STD:		24.5		59.9	45.7	79.4	70.6	202.3	146.3	196.5	166.4	114.5	87.8
Pounds per Acre:		56.9		144.8	169.3	113.0	97.8	384.6	301.6	231.8	435.8	336.2	257.2
Number per Mile:		694		1958	1815	1948	1716	5813	4568	4510	6276	4285	3403
RAINBOW TROUT POPULATION ESTIMATES													
4" & Greater (PE):													5
STD:													0.8
Pounds per Acre:													1.8
Number per Mile:													15
6" & Greater (PE):													5
STD:													0.8
Pounds per Acre:													1.8
Number per Mile:													15

Appendix C: Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

STATION INFORMATION :													
Stream Name:	Rush River						Lost Creek (Pierce)					Morgan Coulee	
Station Number:	14	15	16	17	18	19	1	2	3	4	5	1	2
WIBC:	2440300	2440300	2440300	2440300	2440300	2440300	2441700	2441700	2441700	2441700	2441700	2440700	2440700
Sampling Date:	08/22/00	08/22/00	08/28/00	08/02/00	08/01/00	08/02/00	07/12/00	07/11/00	07/12/00	07/12/00	07/12/00	07/05/00	07/05/00
Recap Date:	08/24/00	08/24/00	08/30/00	08/03/00	---	---	07/13/00	07/13/00	07/13/00	07/13/00	07/13/00	07/10/00	---
River Mile:	23.67	26.50	28.83	30.67	32.46	34.96	0.58	1.71	3.08	4.13	4.79	0.42	1.42
Station Length (m):	445	502	452	333	300	266	266	259	280	210	175	110	111
# of Acres:	1.40	1.78	1.44	0.78	0.63	0.50	0.50	0.48	0.54	0.29	0.21	0.08	0.09
Shocking Equipment:	2 S.S.	2 S.S.	2 S.S.	1 S.S.	1 S.S.	1 S.S.	1 S.S.	1 S.S.	1 S.S.	1 S.S.	1 S.S.	1 B.P.	1 B.P.
# of Electrodes:	6	6	6	3	3	2	3	3	2	2	2	1	1
NUMBER CAPTURED													
Trout Species	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brk	Brook
1st Run Total (<4"):	470 / 13	153 / 93	136 / 32	179 / 32	12 / 7	3 / 49	146 / 31	202 / 49	188 / 87	62 / 36	4 / 81	31	0
# per Mile (CPE):	1700 / 47	490 / 298	484 / 114	865 / 155	64 / 38	18 / 296	883 / 188	1255 / 304	1081 / 500	475 / 276	37 / 745	454	0
1st Run Total (≥4"):	1563 / 40	946 / 150	327 / 48	210 / 37	20 / 20	5 / 27	177 / 20	134 / 58	15 / 58	9 / 122	3 / 217	52	3
# per Mile (CPE):	5653 / 145	3033 / 481	1164 / 171	1015 / 179	107 / 107	30 / 163	1071 / 121	833 / 360	86 / 333	69 / 935	28 / 1996	761	43
1st Run Total (all):	2033 / 53	1099 / 243	463 / 80	389 / 69	32 / 27	8 / 76	323 / 51	336 / 107	203 / 145	71 / 158	7 / 298	83	3
# per Mile (CPE):	7352 / 192	3523 / 779	1649 / 285	1880 / 333	172 / 145	48 / 460	1954 / 309	2088 / 665	1167 / 833	544 / 1211	64 / 2740	1214	43
2nd Run Total (≥4"):	1567 / 37	948 / 133	318 / 46	157 / 27			130 / 14	127 / 44	15 / 40	3 / 52	2 / 312	51	
# per Mile (CPE):	5667 / 134	3039 / 426	1132 / 164	759 / 130			787 / 85	789 / 273	86 / 230	23 / 399	18 / 2869	746	
OTHER TROUT SPECIES													
Trout Species:	Rainbow	Rainbow	Rainbow	Rainbow	Rainbow								
1st Run Total:	8	7	27	29	5								
2nd Run Total:	6	8	24	22									
Size Range	8.0-13.9"	8.0-13.9"	8.0-13.9"	8.0-11.9"	8.7-11.7"								
LENGTH DISTRIBUTIONS													
Trout Species	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brn / Brk	Brk	Brook
Inch Group:													
1													
2	9 / 7	1 / 6	4 / 2	4 / 2	1 / 1	0 / 5	71 / 13	22 / 7	2 / 12	6 / 0	0 / 55	18	
3	461 / 6	152 / 86	132 / 30	175 / 30	11 / 6	3 / 44	75 / 18	180 / 42	186 / 75	56 / 36	4 / 26	13	
4	318 / 1	211 / 13	113 / 14	73 / 6	3 / 0	1 / 12	0 / 1	2 / 2	3 / 11	0 / 5	1 / 3	2	
5	46 / 10	40 / 28	17 / 4	9 / 3	0 / 3		7 / 7	2 / 22	1 / 18	0 / 24	0 / 47	3	
6	41 / 8	8 / 36	2 / 3	8 / 8	0 / 5		9 / 6	15 / 19	3 / 18	1 / 44	0 / 72	19	
7	313 / 7	71 / 23	14 / 5	23 / 11	4 / 8	0 / 2	38 / 5	25 / 7	5 / 10	1 / 12	0 / 24	20	
8	298 / 8	211 / 21	58 / 8	43 / 6	4 / 1	0 / 4	61 / 0	35 / 4	2 / 1	4 / 7	0 / 25	5	2
9	155 / 5	115 / 16	44 / 10	30 / 2	2 / 3	0 / 5	46 / 1	23 / 0	1 / 0	2 / 15	1 / 28		1
10	172 / 1	77 / 12	20 / 1	4 / 1		1 / 1	4 / 0	10 / 2		0 / 10	0 / 10	3	
11	119 / 0	109 / 1	26 / 3	6 / 0		0 / 3	2 / 0	0 / 2		1 / 3	0 / 7		
12	68 / 0	69 / 0	21 / 0	6 / 0			2 / 0	2 / 0		0 / 2	1 / 0		
13	16 / 0	24 / 0	4 / 0	3 / 0			4 / 0	3 / 0					
14	10 / 0	8 / 0	5 / 0	3 / 0	2 / 0		2 / 0	7 / 0			0 / 1		
15	5 / 0	2 / 0	1 / 0	1 / 0	1 / 0		2 / 0	6 / 0					
16			2 / 0	1 / 0	2 / 0			3 / 0					
17	1 / 0				2 / 0	1 / 0							
18	1 / 0	1 / 0											
19													
20						1 / 0							
21						1 / 0							
22								1 / 0					
23													
24													
25													

Appendix C (cont.): Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

Trout Population Summaries													
Stream Name:	Rush River					Lost Creek (Pierce)					Morgan Coulee		
Station Number:	14	15	16	17	18	19	1	2	3	4	5	1	2
BROOK TROUT POPULATION ESTIMATES													
4" & Greater (PE):	45	213	112	56			25	77	67	155	467	83	
STD:	4.38	18.39	14.35	6.35			4.40	12.21	9.31	19.40	64.09	14.23	
Pounds per Acre:	4.69	15.25	10.28	9.65			5.34	18.85	12.07	79.93	341.98	150.13	
Number per Mile:	160	685	399	264			149	482	395	1107	4243	1181	
6" & Greater (PE):	33	123	58	41			13	46	32	108	343	76	
STD:	4.04	14.94	5.38	7.08			3.38	10.71	9.90	19.26	64.82	15.91	
Pounds per Acre:	4.17	12.87	8.68	8.90			3.79	14.84	8.13	70.13	301.92	144.12	
Number per Mile:	118	398	208	193			78	286	187	771	3121	1084	
BROWN TROUT POPULATION ESTIMATES													
4" & Greater (PE):	2159	1595	1236	399			202	147	18	9	3		
STD:	200.7	158.2	172.9	54.9			24.2	12.6	1.9	1.3	0.5		
Pounds per Acre:	353.3	204.9	148.4	81.8			110.1	113.4	5.6	8.1	5.6		
Number per Mile:	7711	5146	4412	1900			1191	924	107	64	27		
6" & Greater (PE):	1432	926	461	177			194	143	14	9	3		
STD:	138.2	89.1	48.3	20.2			35.9	13.1	2.1	1.3	0.5		
Pounds per Acre:	331.7	188.2	122.7	70.0			108.7	105.9	5.1	8.1	5.6		
Number per Mile:	5114	2988	1646	840			1143	899	84	64	18		
RAINBOW TROUT POPULATION ESTIMATES													
4" & Greater (PE):	11	8	30	29									
STD:	1.2	1.5	6.4	6.7									
Pounds per Acre:	3.8	2.2	9.7	15.6									
Number per Mile:	38	24	105	138									
6" & Greater (PE):	11	8	30	24									
STD:	1.2	1.5	6.4	6.7									
Pounds per Acre:	3.8	2.2	9.7	15.6									
Number per Mile:	38	24	105	138									

Appendix C: Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

STATION INFORMATION :												
Stream Name:	Morgan C.	Cr. 33-13	Brush Cr.	Cave Cr.	Cr. 27-13	Cr. 19-10	Cr. 32-7	Cr. 5-5	Cr. 9-12	Cr. 35-1	Cr. 35-9	Cry. Springs
Station Number:	3	1	1	1	1	1	1	1	1	1	1	1
WIBC:	2440700	2441600	2442000	2442100	2444100	2443300	2443200	2443000	2444950	2444600	2443800	2440500
Sampling Date:	07/05/00	07/05/00	07/11/00	07/11/00	07/13/00	08/01/00	08/01/00	07/12/00	07/13/00	07/11/00	08/02/00	08/05/00
Recap Date:	---	---	---	07/12/00	---	08/02/00	---	07/12/00	07/13/00	---	08/02/00	
River Mile:	2.63	0.17	1.17	0.92	0.33	0.13	0.67	0.02	0.04	0.75	0.13	0.33
Station Length (m):	100	100	100	245	100	105	100	100	100	100	100	100
# of Acres:	0.06	0.05	0.06	0.41	0.02	0.08	0.05	0.04	0.06	0.06	0.03	0.06
Shocking Equipment:	1 B.P.	1 B.P.	1 B.P.	2 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.
# of Electrodes:	1	1	1	2	1	1	1	1	1	1	1	1
NUMBER CAPTURED												
Trout Species	Brook	Brook		Brn / Brk		Brn / Brk	Brn / Brk	Brn / Brk	Brk		Brn / Brk	Brook
1st Run Total (<4"):	0	1		47 / 14		7 / 20	6 / 6	3 / 6	40		13 / 36	3
# per Mile (CPE):	0	16		309 / 92		107 / 307	97 / 97	48 / 97	644		209 / 579	48
1st Run Total (≥4"):	3	2		111 / 84		4 / 28	0 / 22	1 / 32	55		0 / 36	1
# per Mile (CPE):	48	32		729 / 552		61 / 429	0 / 354	16 / 515	885		0 / 579	16
1st Run Total (all):	3	3		158 / 98		11 / 48	6 / 28	4 / 38	95		13 / 72	4
# per Mile (CPE):	48	48		1038 / 644		169 / 736	97 / 451	64 / 612	1529		209 / 1159	64
2nd Run Total (≥4"):				68 / 73		8 / 27		1 / 31	39		0 / 32	
# per Mile (CPE):				447 / 480		123 / 414		16 / 499	628		0 / 515	
OTHER TROUT SPECIES												
Trout Species:												Rainbow
1st Run Total:												1
2nd Run Total:												1
Size Range												6.9"
LENGTH DISTRIBUTIONS												
Trout Species	Brook	Brook		Brn / Brk		Brn / Brk	Brn / Brk	Brn / Brk	Brk		Brn / Brk	Brook
Inch Group:												
1									1			
2				8 / 7		2 / 0	2 / 4	1 / 2	37		3 / 9	2
3		1		39 / 7		7 / 18	4 / 2	2 / 4	2		10 / 27	1
4				1 / 3		3 / 3	0 / 5		19		0 / 7	1
5				6 / 39		0 / 20	0 / 11	0 / 13	25		0 / 16	
6	1			25 / 36		0 / 4	0 / 6	0 / 15	7		0 / 10	
7				40 / 10		0 / 1		1 / 3	2		0 / 2	
8	2	2		22 / 4		1 / 1		0 / 1			0 / 1	
9				5 / 1		0 / 1			1			
10									1			
11				2 / 1		0 / 1						
12				3 / 0								
13				2 / 0								
14				3 / 0								
15				1 / 0								
16												
17				1 / 0								
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Appendix C (cont.): Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

Trout Population Summaries												
Stream Name:	Morgan C.	Cr. 33-13	Brush Cr.	Cave Cr.	Cr. 27-13	Cr. 19-10	Cr. 32-7	Cr. 5-5	Cr. 9-12	Cr. 35-1	Cr. 35-9	Cry. Springs
Station Number:	3	1	1	1	1	1	1	1	1	1	1	1
BROOK TROUT POPULATION ESTIMATES												
4" & Greater (PE):				137		54		46	79		54	
STD:				25.71		10.11		10.87	15.28		8.76	
Pounds per Acre:				34.57		77.93		115.67	106.39		144.94	
Number per Mile:				915		900		769	1311		906	
6" & Greater (PE):				64		20		25	12		20	
STD:				17.61		6.22		10.70	3.28		7.44	
Pounds per Acre:				21.15		40.92		75.55	33.69		86.30	
Number per Mile:				429		333		408	203		333	
BROWN TROUT POPULATION ESTIMATES												
4" & Greater (PE):				197								
STD:				24.4								
Pounds per Acre:				127.4								
Number per Mile:				1312								
6" & Greater (PE):				188								
STD:				26.1								
Pounds per Acre:				127.3								
Number per Mile:				1252								

Appendix C: Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

STATION INFORMATION :											
Stream Name:	Bogus Creek			Lost Creek (Pepin)				Pine Creek			Pine Cr. N. Br.
Station Number:	1	2	3	1	2	3	4	1	2	3	1
WIBC:	2438900	2438900	2438900	2438300	2438300	2438300	2438300	2440000	2440000	2440000	2440100
Sampling Date:	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/05/00	07/07/00	07/10/00	07/10/00	07/10/00
Recap Date:	07/07/00	07/07/00							07/11/00	07/11/00	
River Mile:	0.50	2.50	4.33	0.67	2.17	4.33	5.67	0.17	1.00	2.25	0.21
Station Length (m):	105	150	100	100	105	100	100	392	195	100	100
# of Acres:	0.08	0.16	0.05	0.05	0.08	0.05	0.05	1.08	0.27	0.07	0.05
Shocking Equipment:	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 B.P.	1 S.S.	1 S.S.	1 B.P.	1 B.P.
# of Electrodes:	1	1	1	1	1	1	1	3	3	1	1
NUMBER CAPTURED											
Trout Species	Brook	Brook	Brook					Brn / Brk	Brn / Brk	Brook	Brook
1st Run Total (<4"):	1	44	8					0 / 20	0 / 161	6	0
# per Mile (CPE):	16	472	129					0 / 82	1329	97	0
1st Run Total (≥4"):	61	60	3					7 / 55	1 / 221	60	8
# per Mile (CPE):	982	644	48					29 / 226	8 / 1824	966	129
1st Run Total (all):	62	104	11					7 / 75	1 / 382	66	8
# per Mile (CPE):	998	1116	177					29 / 308	8 / 3153	1062	129
2nd Run Total (≥4"):	42	54							0 / 162	40	
# per Mile (CPE):	676	579							0 / 1337	644	
OTHER TROUT SPECIES											
Trout Species:											
1st Run Total:											
2nd Run Total:											
Size Range											
LENGTH DISTRIBUTIONS											
Trout Species	Brook	Brook	Brook					Brn / Brk	Brn / Brk	Brk	Brook
Inch Group:											
1											
2	1	43	6					0 / 18	0 / 160	6	
3	0	1	2					0 / 2	0 / 1		
4	2	10						0 / 6	0 / 22	22	
5	23	30						0 / 25	0 / 78	24	5
6	27	12						0 / 12	0 / 25	11	
7	5	6	1					0 / 7	1 / 36	3	1
8	1	1	2					3 / 2	0 / 47		2
9	3	1						3 / 0	0 / 13		
10								0 / 1			
11								1 / 0			
12								0 / 1			
13								0 / 1			
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Appendix C (cont.): Trout Population Parameters for the Rush River Watershed in St. Croix, Pierce & Pepin Counties, Wisconsin, July & August, 2000.

Trout Population Summaries											
Stream Name:	Bogus Creek →			Lost Creek (Pepin) →				Pine Creek →			Pine Cr. N. Br.
Station Number:	1	2	3	1	2	3	4	1	2	3	1
BROOK TROUT POPULATION ESTIMATES											
4" & Greater (PE):	89	85							287	96	
STD:	17.44	16.65							35.95	15.93	
Pounds per Acre:	12.34	37.69							121.74	105.06	
Number per Mile:	424	947							2394	1596	
6" & Greater (PE):	56	27							133	22	
STD:	19.55	8.43							16.95	10.14	
Pounds per Acre:	9.46	17.84							86.17	42.04	
Number per Mile:	266	298							1106	372	