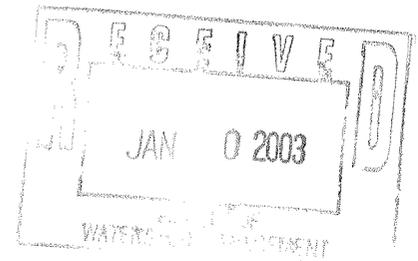


DATE: December 19, 2002

FILE REF: Caves Creek 001

TO: Jeffery Haack, NER - Water Resources Engineer
Dave Bartz, NER - Fishery Biologist
Lisa Helmuth - WT
Ron Martin - WT

FROM: Scott Provost, NER ~~Scott~~
Water Resource Specialist



SUBJECT: Request for revised stream classification for Caves Creek, Marquette County.

Stream Classification for Caves Creek, Marquette County

Introduction

Caves Creek (WIBIC # 166100) is currently classified as a Cold Water Community (COLD) and Exceptional Resource Water (ERW) supporting a Class I trout population. However, during the Westfield Creek Waddle Baseline Monitoring project, data was discovered that shows the ERW classification is sub-standard for this stream and the classification should be upgraded to Outstanding Resource Water (ORW).

Caves Creek originates from a small spring pond in western Marquette County in the Town of Springfield. Land use in the area is primarily forested with agriculture common in the watershed. There is little development along the shoreline, leaving the stream corridor largely untouched. The stream has a gradient of 9.3 ft/mile (WCD, 1963) and appears to have good water quality.

Many springs are present along the shoreline and can be found sporadically along the entire reach. These springs discharge cold groundwater that helps supports a healthy trout fishery and provides unique habitats such as calcareous fens. According to the Marquette County Plat Book (2000), 864 acres are owned by the state for public access to the stream and other recreational opportunities on adjacent land. In addition to the fee title ownership, the Department has two permanent easements for fishing only.

Methods

The Westfield Creek Waddle Baseline Monitoring Project was slated to run over a two-year period (2001-2002) to evaluate streams in the Montello River Watershed (UF-13). Fish communities, habitat and macroinvertebrates were evaluated as described in the Baseline Monitoring protocols (WDNR, 2000).

Fish Community Assessment: Fish surveys were completed as described in *Guidelines for Assessing Fish Communities of Waddle Streams In Wisconsin* (WDNR, 2000). Fish surveys were conducted by using a stream shocker; Fishery Biologist - Dave Bartz and Technician - Dave Paynter assisted with the stream shocking.

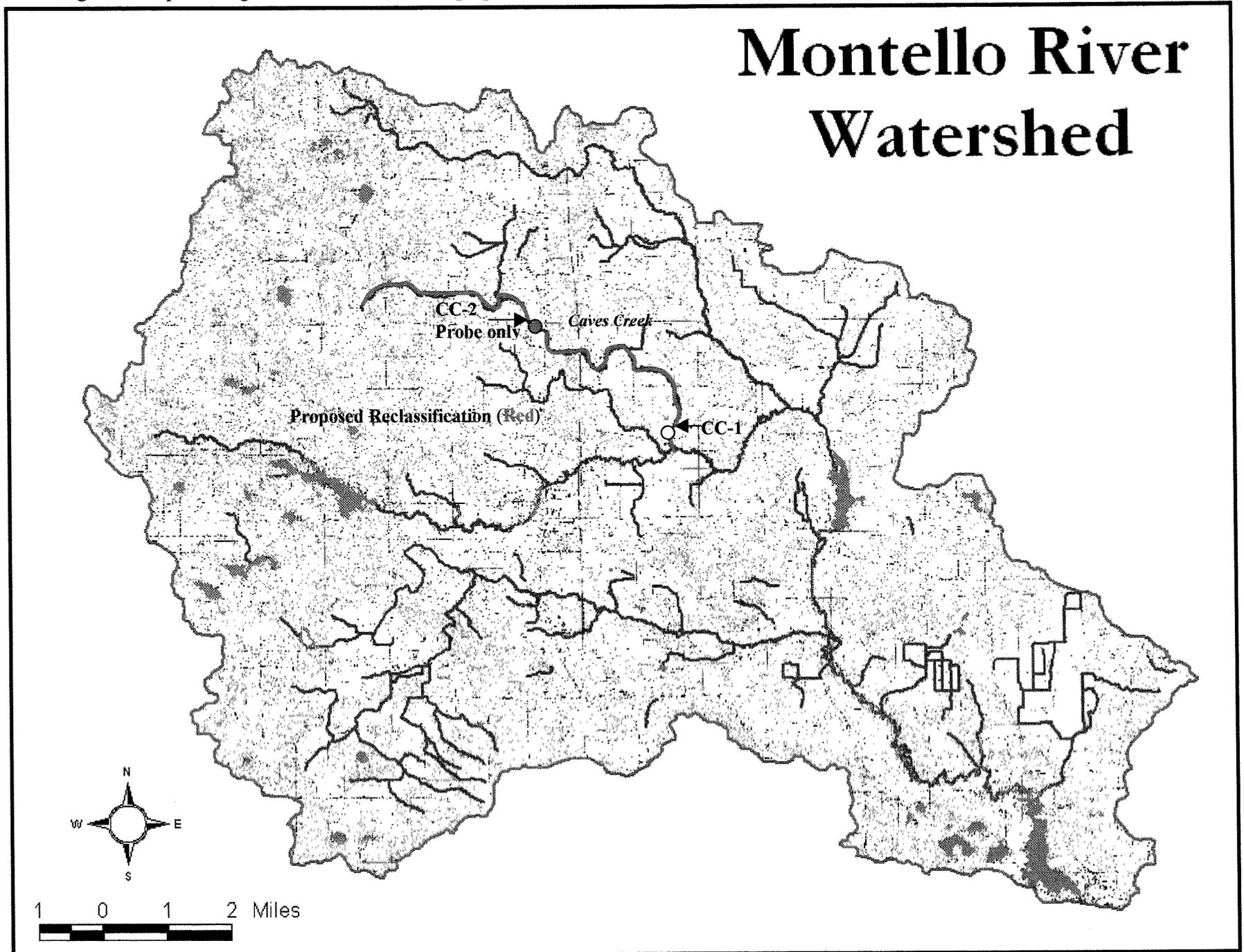
Habitat Assessment: Habitat was evaluated as described in *Guidelines for Evaluating Habitat of Waddle Streams* (WDNR, 2000). LTE staff assisted with the procedures. Instantaneous flows were measured with a Swoffer Instruments, Inc. Model 2100 Series Current Velocity Meter. Data was evaluated and scored according to the Fish Habitat Rating – Streams (FHR-Streams) as described in *Guidelines For Evaluating Fish Habitat in Wisconsin Streams* (Simonson, Lyons, Kanehl, 1994).

Macroinvertebrates Community Assessment: Macroinvertebrates were collected in the fall of 2001 by using methods described in *Guidelines for Collecting Macroinvertebrates Samples for Waddle Streams* (WDNR, 2000). Samples were delivered to the University of Wisconsin – Stevens Point, Aquatic Entomology Lab for identification. After identification was completed, a Hilsenhoff Biotic Index (HBI) was calculated and a rating assigned. It is important to note the HBI was designed for riffle areas. All stations with were void of substantial riffle areas. The HBI may have generated scores that would show a more poor rating than actual.

Water Quality Assessment: Instantaneous dissolved oxygen concentrations and temperatures were evaluated during the habitat evaluations, which were completed in August 2002, using *YSI 55 Dissolved Oxygen Meter*. In addition to dissolved oxygen monitoring, long-term daily temperatures were monitored using *Onset* temperature loggers. These were programmed to record stream temperatures on an hourly basis from 5 April 2002 to 22 October 2002.

One habitat station, CC-1 was evaluated for fish, habitat, macroinvertebrates and temperature. Station number CC-1 was located upstream of the County Trunk E bridge in the Town of Newton. This station was located at this point due to the proximity of Westfield Creek. Tributaries such as Caves Creek are important to coldwater species in Westfield Creek - they provide refuge for fish during periods of high temperatures on Westfield Creek. A second site (CC-2) was located several miles upstream to monitor water temperature (see Figure 1, for location of sites). Caves Creek has an extensive amount of completed trout habitat improvement projects. Thus, finding an accessible reach that was undisturbed to conduct another complete station was unsuccessful.

Figure 1. Map showing locations of stations and proposed reclassification.



Results

Habitat station CC-1 was assessed and described below. CC-1 had temperatures monitored and will be discussed later.

Caves Creek Station #1 (CC-1)

This portion of the stream travels through a wooded area with a substantial riparian buffer consisting of wooded wetlands and wet meadows. There are also numerous springs present, which provides cold water to the stream. Throughout the entire stream reach, residential development is very limited and does not encroach past the stream terrace and into the riparian buffer area leaving a good corridor for wildlife and undeveloped floodplain.

Fish Assessment:

Fish assessment was conducted on 10 September 2002. Total number of fish captured in the station was 209 over a station length of 152.6 m (500.7ft.). The dominant sport fish species in the station were brook trout (n=63). Common shiner (n=67), white sucker (n=22) and creek chub (n=20) were the dominant forage species. One other intolerant species of fish was found – mottled sculpin (n=16). The coldwater IBI calculated a score of 50, which rates as *fair*.

On 24 September 2002 a recapture run was conducted to estimate fish per mile. Dave Paynter calculated 789.6 trout/mile. Mean brook trout size was 131 mm (5.18 in.) and the maximum length was 325 mm (12.8 in). During the first shocking run 8 brook trout were young of the year fish.

Habitat Assessment:

Caves Creek (CC-1) scored in the *excellent* range (77) for habitat according to the FHR-Streams method. The streambed is mostly composed of sand, silt and detritus, with moderate portions of the stream bank exposed and subject to erosion. The lack of rocky substrate had the largest impact on the score. The conditions of the streambed are a function of the geology of the area, therefore lack of rocky substrate are to be expected.

The width of contiguous riparian buffer, bend to bend ratio and cover for fish scored in the excellent range (see table 1 for results of the habitat rating). The stream has 85-100% canopy cover consisting mainly of deciduous trees. Throughout the entire length of the habitat station there was no artificial habitat improvement structures observed. Hence, the habitat score is a reflection of the existing natural conditions. One property owner, who owns 160 acres, surrounds this station. Some of this property is agriculture, however the majority of the land is forested and well buffered against land use practices that may have non-point source issues.

Table 1. Score summary for habitat rating.

Habitat Item	Calculated Value	Score	Rating
Riparian Buffer	>10.0 m	15	Excellent
Bank Erosion	0.38 m of bare soil	10	Good
Pool Area	37%	7	Good
Width:Depth ratio	9.7	10	Good
Bend:Bend ratio	6.45	15	Excellent
Fine Sediments	27.4%	5	Fair
Cover for Fish	20.6 %	15	Excellent
	Total	77	Excellent

Macroinvertebrate Assessment:

The macroinvertebrate assessment yielded a HBI score of 3.989, which rates as very good. The assessment showed 10 orders and 23 families, and 100% of the invertebrates had HBI tolerances of 6 or less. The absence of riffle area may skew the HBI resulting a rating more poor than actual stream conditions.

Water Quality and Characteristics:

Habitat and water quality evaluation was conducted on 28 August 2002. Water stage height appeared to be normal. Stream flow was at 0.241m³/s (8.52 cfs). The average depth at the flow cross section was 0.21 m (0.70 feet) and average velocity was at 0.36 m/s (1.18 ft/s). Water temperature was 15.9°C (60.6° F) and air temperature was 17.8°C (64.0 ° F). The concentration of dissolved oxygen (DO) was 9.50 mg/l, (95.9% saturation). Primary production of DO is probably low due to the lack of submerged macrophytes. There were no measurable submerged macrophytes for fish cover found in the stream. The remainder of the fish cover was primarily overhanging vegetation, woody debris and natural undercut banks. Groundwater and natural mixing are the primary sources of DO at this station.

Temperature:

Comparison of the 6-month temperature monitoring project yielded data pertinent to re-classification of Caves Creek. Probe CC-1 was placed downstream of the start of habitat station CC-1 about 70 meters (see figure 2.). Stream temps show that only during the peak warm periods of the year average daily temperatures are near or above the lethal limit for brook trout and are not continuous. During these short periods, trout may find thermal refuge in microclimate areas such as, cooler pools or springs that are common along the stream. Daily minimum temperatures were below the lethal limit so the diurnal fluctuation of temperature also provides relief for coldwater species. Young of the year trout as well as mottled sculpin are present, which indicate conditions suitable for coldwater species.

Another temperature probe was placed several miles upstream near the CTH CH Bridge. Land use in this area is primarily agriculture, but the riparian buffers are sufficient to protect the stream. Most of the stream bank is heavily vegetated with grasses and shrubs making passage very difficult. The stream is well shaded and buffered against temperature despite the open

areas. Temperature data yield similar result as CC-1, but had many more days where stream temperatures were cooler. Habitat improvement projects have been completed downstream of this site and would not be effecting temperatures; therefor the cooler stream temperatures are a result of natural conditions.

Figure 1. Stream temperatures for Caves Creek near habitat station CC-1, April through October 2002.

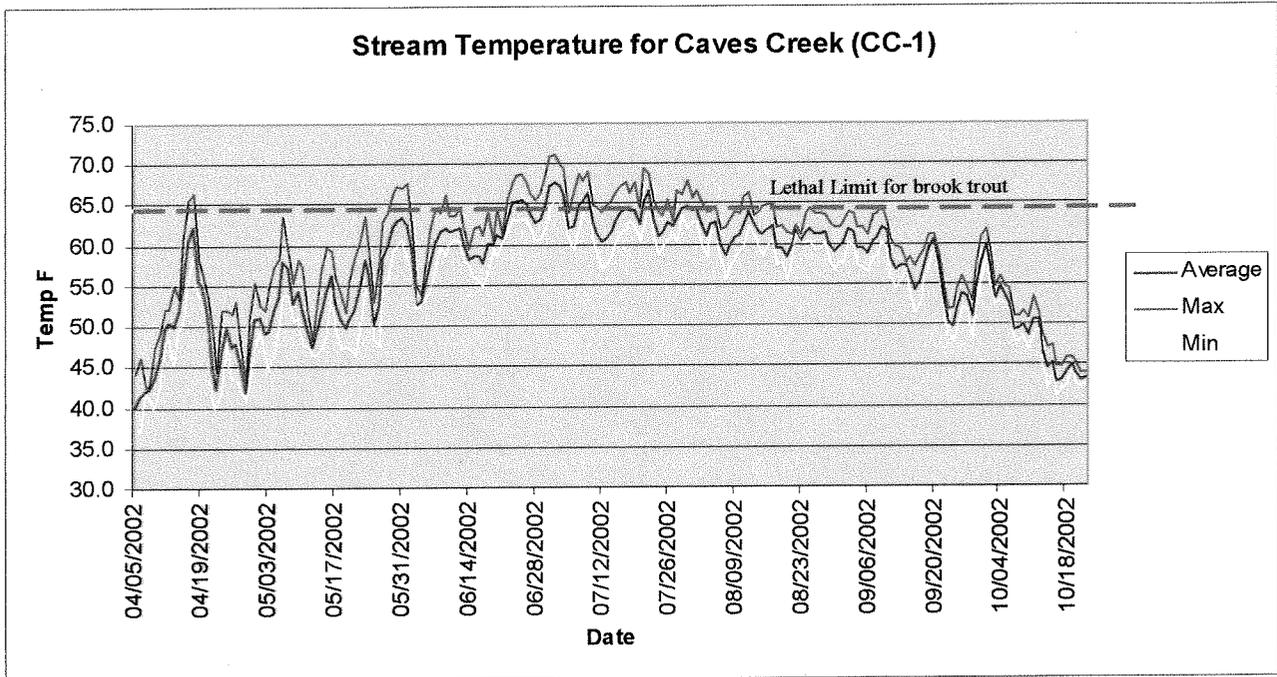
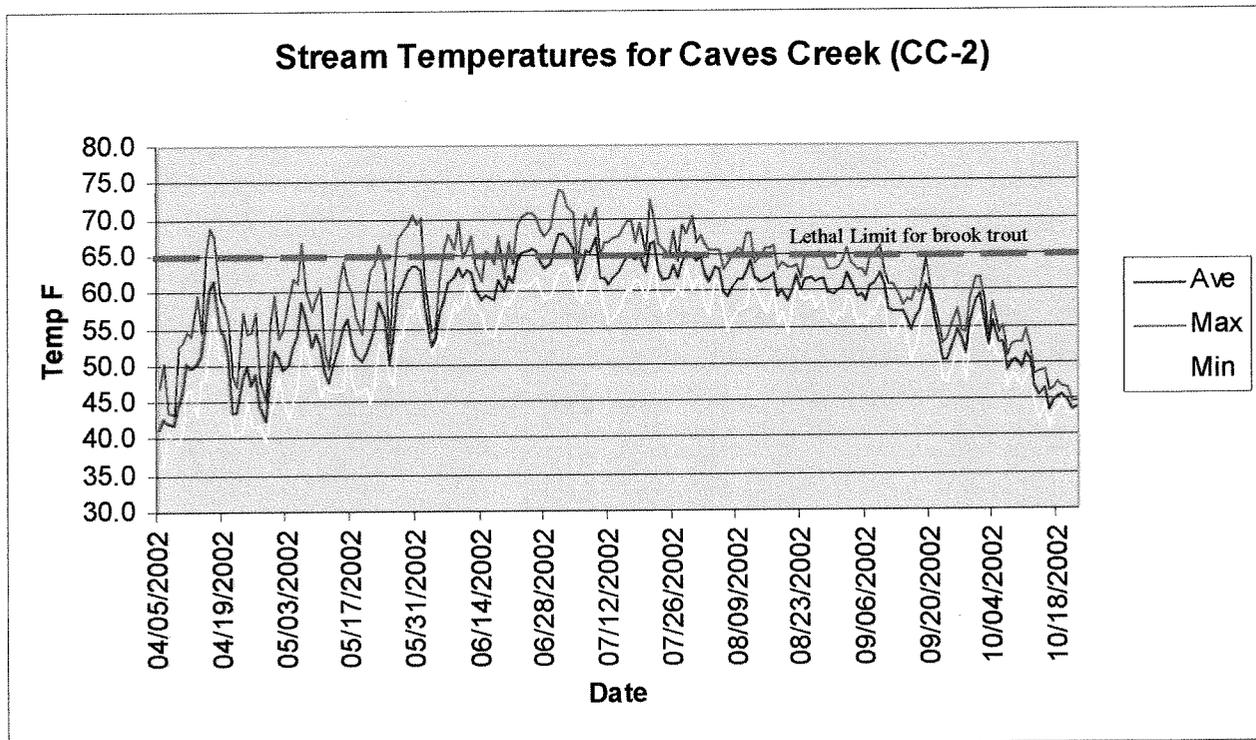


Figure 3. Stream temperatures for Caves Creek (CC-2) upstream of habitat station CC-1. Probes were located upstream habitat improvement structures.



Discussion:

Currently Caves Creek is classified as a Cold water community (COLD) and an ERW. The results of the Westfield Creek Waddle Baseline Monitoring Project have shown that the stream meets the criterion for an ORW because the stream does not have a threat to it.

Data from the State of the Upper Fox River Basin Report (2001) shows the stream to have NPS as a threat with habitat (lack of cover, sedimentation, scouring, etc.) and sedimentation as an impact. Due to the established riparian buffers and the land owned by the State, the stream is not threatened and should be upgraded to ORW. The coldwater fish community, habitat and macroinvertebrates present show excellent water quality and that the stream is reaching its potential. Caves Creek would benefit the most by being re-classified as an ORW. Table 2 summarizes the proposed changes.

Table 2. Summary of proposed changes

Stream	Existing Classification		Miles	Proposed Classification		Miles
Caves	COLD ^b	ERW	12.1	COLD	ORW	12.1

b = Trout stream identified in the "blue" Wisconsin Trout Streams Book

The Guidance For Completing The Outstanding And Exceptional Resource Water Worksheet for Streams has been completed by Provost and Bartz. Please find in Appendix I the complete form.

References:

Wisconsin Conservation Department. 1963. **Surface Water Resources of Marquette County.** Wisconsin Department of Natural Resources. Madison, Wisconsin. pp.68.

Wisconsin Department of Natural Resources. 2000. **Guidelines for Assessing Fish Communities of Waddle Streams in Wisconsin.** Bureau of Fisheries Management, WDNR. Madison, Wisconsin. pp. 12.

Wisconsin Department of Natural Resources. 2000. **Guidelines for Collecting Macroinvertebrate Samples from Waddle Streams.** Bureau of Fisheries Management, WDNR. Madison, Wisconsin. pp. 12.

Wisconsin Department of Natural Resources. 2000. **Guidelines for Evaluating Habitat of Waddle Streams.** Bureau of Fisheries Management, WDNR. Madison, Wisconsin. pp. 23.

Simonson, T.D.; Lyons, J.; Kanehl, P.D. 1994. **Guidelines for Evaluating Fish Habitat in Wisconsin Streams.** United States Department Agriculture. General Technical Report NC-164. St. Paul, Minnesota. pp. 36.

Wisconsin Department of Natural Resources. 2001. **The State of the Upper Fox River Basin Report.** Wisconsin Department of Natural Resources. Madison, Wisconsin. pp.100.

APPENDIX I

Guidance For Completing The Outstanding And Exceptional Resource Waters
Worksheet For Streams.

GUIDANCE FOR COMPLETING THE OUTSTANDING AND EXCEPTIONAL RESOURCE WATERS WORKSHEET FOR STREAMS

Completion of the ORW worksheets should be a joint effort between DNR district Water Resources and Fisheries staff. There is no need to fill out a worksheet for each stream or stream reach in the district. The idea is to narrow down the list to those that you think might qualify as Outstanding and Exceptional Resource Waters (based on the decision process flow chart) and complete a worksheet for each stream reach on this much smaller list. We are using these worksheets (and the criteria they contain) to ensure a statewide, consistent, and systematic process for generating a list of Outstanding or Exceptional Resource Waters to be presented to the Natural Resources Board for inclusion in the antidegradation rule, while still relying upon the expertise and professional judgement of local resource managers.

The list of Outstanding and Exceptional Resource Waters will be periodically re-evaluated (approximately every 5 years).

The worksheet consists of a list of criteria in 4 categories. In order for a stream reach to qualify as an ORW, it should meet at least one criterion in each category. Thus, the stream reach should exhibit outstanding resource values associated with the fishery, recreation or preservation use, and good water quality, as well as be free of actual or potential pollution impacts.

In order to qualify as an ERW, a waterbody must meet at least one criterion in each category except for the last one--i.e., it would not necessarily be free of actual or potential pollution impacts. Thus, the key difference between an ORW and an ERW is whether or not there are actual or potential pollution impacts.

For each category, check the boxes of the criteria which apply to the stream reach. For each criterion that applies, please provide a very brief (one line, if possible) supporting statement or justification on the line to the right. If necessary, you can also write on the back of the page. The types of information required for each criterion are discussed below. You may provide additional comments and documentation, if you think it is appropriate.

For certain unique stream reaches which do not meet at least one criteria in each category, there is the opportunity for you to justify why these should be included on the ORW or ERW list.

IMPORTANT FISHERY

Excellent Population Levels/Standing Stocks

Sport fish populations that are unusually abundant (in about the top 10%) compared to similar species assemblages in the region. Use the Fish Management Reference Book or your own best data, if possible. List species and any additional supporting information.

[] Outstanding Size Structure of Stocks

Sport fish populations that have a high proportion of the population that are "quality" size. Use standard proportional stock density and compare to other regional populations if possible. List species and stock density information.

Trophy Fishery

Waters known to have an unusually high number of sport fish that are of trophy (or very large) size. List species and any additional supporting information.

Outstanding Ecological Diversity

Waters known to have an unusually high diversity of fish species compared to other similar waters in the region. List number of species and regional average, if known.

[] Endangered, Threatened or Watch List Species or Unique Strains

Waters which contain both a documented population and suitable habitat. Judgement should be used as to the regional significance of threatened or watch list species population levels. List the species, which list it is on, and any additional supporting information.

SIGNIFICANT RECREATION OR PRESERVATION USE

Provides Outstanding Fishing Experience

Fisheries that provide outstanding catch rates, high angler use, and high size distribution of the catch. Also, waters known for other outstanding environmental/social factors associated with the fishery, e.g., aesthetics, solitude, fly fishable, etc. List the appropriate factors.

Provides Other Outstanding Recreational Experiences or Special Uses

Waters supporting outstanding or unique public uses or recreational activities, for example tubing or whitewater canoeing. List the uses or activities and any supporting information.

Public Fishing Grounds

Waters contained or partially contained in designated public fishing grounds. Provide names of public fishing ground and general location.

[] State or Federal Wildlife Refuge

Waters contained, partially contained in, or bordering a state or federal wildlife refuge. Provide name(s) of wildlife refuge and general location.

State Scientific or Natural Area

Waters contained, partially contained in, or bordering a state scientific or natural area. Provide name(s) of scientific or natural area and general location.

Largely Wild and Undeveloped Watershed

A large proportion of the watershed area is in a wild or undeveloped state and provides exceptional scenic or aesthetic values. Regional considerations may be applied in this evaluation. Thus, watersheds in northwest Wisconsin should contain a higher proportion of wild or undeveloped areas than watersheds in southeast Wisconsin. List approximate (guesstimate) % of wild or undeveloped watershed area and regional average, if known.

Largely Undeveloped Shoreline and "Viewshed"

Similar evaluation and regional consideration as for the watershed (see above). List approximate (guesstimate) % of undeveloped shoreline and viewshed, and regional average, if known.

WATER QUALITY

Excellent Water Quality

Data and/or professional judgement indicate excellent levels of water quality. Indicate basis for determination.

No Known Standards Violations

Data indicates that water quality is better than applicable water quality standards. Indicate parameters for which there are data.

No Existing or Potential Water Quality Problems

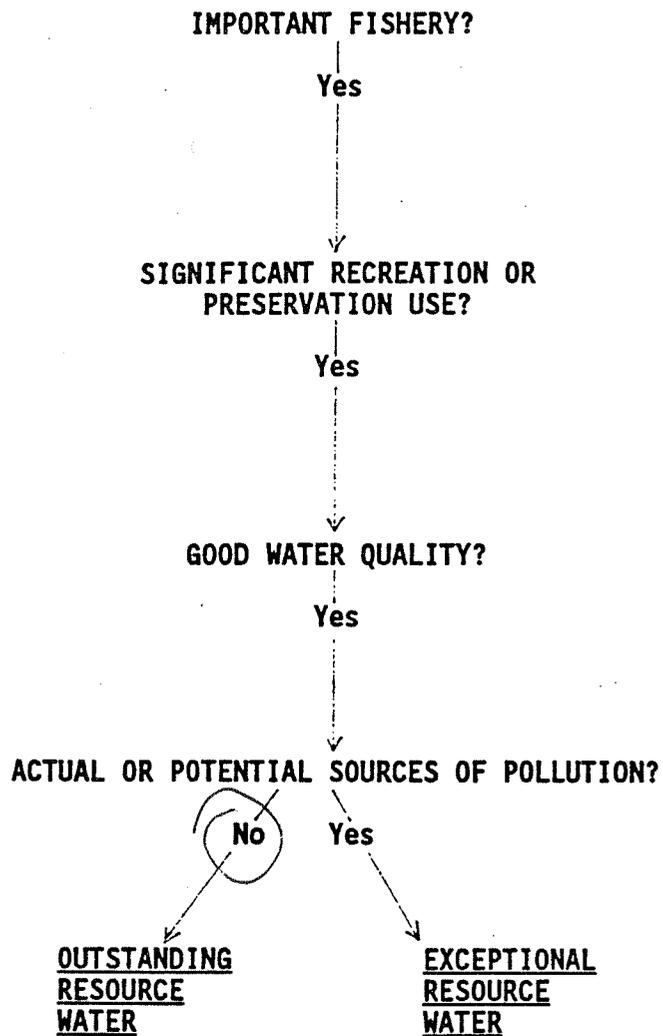
The stream reach does not experience water quality problems or does not have significant potential for problems relating to dam operation, channel modification, low stream flows, background conditions, etc. Provide supporting information, if appropriate.

SOURCES OF POLLUTION

No Significant Actual or Potential Impacts From Point Sources or Culturally Induced Nonpoint Sources

There are no detectable water quality impacts from point or nonpoint sources of pollution to the stream reach or upstream of the reach. Any wastewater discharge should be considered a significant pollution impact. Likewise, any unsewered community located near the stream should be considered a potential impact. Nonpoint sources should be considered only if they are land use related, as opposed to naturally occurring. Nonpoint source impacts should be considered significant if they are significantly impacting any of the resource value criteria in the other categories.

FLOW CHART FOR DECISION PROCESS
ON SELECTING OUTSTANDING AND EXCEPTIONAL
RESOURCE WATERS - STREAMS



OUTSTANDING AND EXCEPTIONAL RESOURCE WATER EVALUATION - STREAMS

Stream Name: CAVES CREEK

Reach Designation: ENTIRE REACH (12.1) MILES

CRITERIA

RELATED INFORMATION

IMPORTANT FISHERY

- Excellent Population Levels/Standing Stocks
- Outstanding Size Structure of Stocks
- Trophy Fishery
- Outstanding Ecological Diversity
- Endangered, Threatened, or Watch List Species or Unique Strains

SEE CLASSIFICATIONS
REPORT

SIGNIFICANT RECREATION OR PRESERVATION USE

- Provides Outstanding Fishing Experience
- Provides Other Outstanding Recreational Experiences or Special Uses
- Public Fishing Grounds
- State or Federal Wildlife Refuge
- State Scientific or Natural Area
- Largely Wild and Undeveloped Watershed
- Largely Undeveloped Shoreline and "Viewshed"

WATER QUALITY

- Excellent Water Quality
- No Known Standards Violations (N/A)
- No Existing or Potential Water Quality Problems

NO DISCHARGER (WPDEL)

OUTSTANDING AND EXCEPTIONAL RESOURCE WATER EVALUATION - STREAMS(continued)

Stream Name: CAVES CREEK

Reach Designation: ENTIRE

CRITERIA

RELATED INFORMATION

SOURCES OF POLLUTION

No significant impacts from actual or potential point sources or culturally induced nonpoint sources

If this waterbody did not receive a check in each of the 4 categories, but based on your professional judgement and overriding environmental concerns, you still believe that this should be an Outstanding or Exceptional Resource Water, explain why.

Scott M. Probst

Evaluator

12/19/02

Date

David B. [Signature]

Evaluator

07 Jan 03

Date