

FISH AND AQUATIC LIFE DESIGNATED USE FORM
(Attach supporting data sheets)

WATERBODY NAME West Branch Sugar River WBIC# 886100

REGION South Central BASIN Sugar-Pecatonica COUNTY Dane

Segment Shown on Mount Vernon Quad. Map

Reference Site(s) _____, Attach class.
form for reference site/condition.

SEGMENT DESCRIPTION for Segment 1 of 1 (headwater = segment 1)

From: Headwaters downstream <u>13</u> mi.	lat/long 42° 59' 24.38" 89° 44' 36.66"	tn, rng, ¼, ¼, section SE ¼ SE ¼ T6N R6E S14
To: State Highway 92	lat/long 42° 54' 47.81" 89° 37' 19.69"	tn, rng, ¼, ¼, section NE ¼ NE ¼ T5N R7E S14

Attach site map and photos showing stream segment and discharge point
See Attached Narrative

DESIGNATED USE INFORMATION:

New Classification X (Mile 8-19), Standards Review X (Mile 19-21), Ref. Site _____, Date field work conducted/completed 2001-2003

Current FAL Designated use Mile 19- 21 LFF; Mile 8-19 WWFF; Mile 2.5 - 8 COLD

Existing FAL Use Based on current data Coldwater A - Class II, Date April 2004

Recommended Attainable Designated use Coldwater - A - Class II

Seasonal Designated use(s)/Dates Year round

Other Applicable Uses: ORW _____, ERW _____, GL _____, GLS _____, Drinking Water Supply _____,
Recreation _____, Wild Life _____

Submitted By: <i>James F. [Signature]</i>	Date: <u>12/21/04</u>
Reviewed By: <i>[Signature] Greg Searle</i>	Date: <u>1/5/05</u>
Approved Basin Leader: <i>[Signature]</i>	Date: <u>12/21/04</u>
WQS Sect. Chief, or Designee:	Date:

538 112

Water Body Name West Branch Sugar River, WBIC# 886100, Date April, 2004

DISCHARGER INFORMATION:

Municipality/Company Village of Mount Horeb, Permit # 0020281

Outfall Location West Branch Sugar River downstream from the Village of Mount Horeb

2247 Sand Rock Road, Mt. Horeb WI

Contact Person Mike Goeltz, Contact Date(s) _____

Did A Representative Observe Field Work? No x, Yes _____

Representative Name n/a, Date(s) _____

Comments about facility, representative's observations, etc.:

BASIS FOR DESIGNATED USE DECISION (List and briefly discuss key elements for the decision)

Temperature data and biota (presence of trout and other indicator species) support the cold water classification. See narrative.

Send final report to:

Facility _____ Date: _____

Basin Wastewater Eng. Larry Benson Date: 12/21/04

Limits Calculator: Nasim Mohapane Date: 12/22/04

Watershed Expert Greg Searle Date: 12/22/04

Fish and Habitat Expert Scott Stewart Date: 12/22/04

Bureau of Endangered Resources when these species are present n/a Date: _____

Other interested parties (list) n/a Date: _____

Water Body Name West Branch Sugar River, WIBC# 886100, Date April, 2004

LITERATURE REVIEW

1. Cite here and attach previous classification reports and designated uses.
2. Cite here and attach all previous studies and data associated with the water body that are applicable to use classification.

Rehabilitation of the West Branch Sugar River – A Documentation for Removal from the State of Wisconsin’s List of Impaired Waters. Wisconsin Department of Natural Resources. South Central Region. April, 2004.

3. If applicable, cite here and attach a copy of the page from *Wisconsin Trout Streams*, and any other publication listing the stream as trout water.

Wisconsin Trout Streams, February, 15, 2002. Page 15

4. Cite here and attach any other literature applicable to the fish and aquatic life designated use.

Lyons, John, Lizhu Wang, and Timothy Simonsen. 1996. Development and Validation of an Index of Biotic Integrity for Coldwater Streams in Wisconsin. North American Journal of Fisheries Management. 16:241-256.

WDNR, 2003. Waterbody Use Classification Guidance. October, 2003 Draft.

Simonsen, Timothy, John Lyons, and Paul Kanehl. Guidelines for Evaluating Fish Habitat in Wisconsin Streams. U.S. Department of Agriculture’s Forest Service General Technical Report NC-164. 36 pages.

Summarize and interpret the literature available and how it relates to and supports the classification and the recommended designated use:

The above cited literature provides scientific support of current data which properly defining coldwater streams.

Water Body Name West Branch Sugar River, WIBC# 886100, Date April, 2004

FIELD ASSESSMENT DATA AND OBSERVATIONS

Assessment dates: 8/27/2002 upstream CTH JG to _____

PHYSICAL/CHEMICAL DATA

SEGMENT LENGTH 143m, DEPTH, AVG. _____ MAX. _____ AVG. WIDTH 3.9m

SEGMENT GRADIENT _____, VELOCITY _____

SUBSTRATE MATERIAL %silt 30 %sand 30 %gravel 25
 %rubble 2 %organic 3 %other 10

NATURAL FLOW 2.64 cfs, (MEASURED X, ESTIMATED _____).

Flow was high _____, normal _____, low _____, very low _____

Q7,2 flow _____, Q7,10 flow _____, estimated _____ or measured _____

EFFLUENT FLOW: 24 hr. average _____, measured _____, estimated _____
 Design flow _____

TEMPERATURE 21.0*, Instantaneous _____ or 24 hr. max. average x, Date(s) 6/1/02-9/30/02
 * at STH 92

DISSOLVED OXYGEN:

Instantaneous _____ mg/L, Time of day _____, Date _____

Continuous: Minimum _____ mg/L, Range _____ mg/L to _____ mg/L

Dates / time measured: _____ to _____, total = _____ hrs.

CHEMICAL DATA COLLECTED:

BREIF INTERPRETATION/COMMENTS:

Water Body Name West Branch Sugar River, WIBC# 886100, Date April, 2004

BIOLOGICAL DATA

FISH: Sampling date Various, Attach species list and IBI forms if applicable

Survey Location(s) Various. See Narrative

Distance sampled _____ Sampling Gear _____

No. of species _____, Total fish _____,

No. of species not listed as tol. to low DO _____, Total fish _____, % not listed _____

Endangered or other special category species _____

Warm B species _____, Total no. _____

MACROINVERTEBRATES: Sampling date Sept. 11, 2002, HBI **3.154 (Excellent)**

Survey location(s) 15 m Downstream County Highway JG

Sampling Procedure Kick net

< 100 organisms found, list dominant genera, numbers and HBI values:

> 100 organisms found, attach taxonomy bench sheet or other analyses:
See attached.

% individuals with HBI value 5 or less 100

OTHER BIOLOGICAL DATA/OBSERVATIONS:

Evidence of reproduction in brown trout as well as survival of multiple year classes. Mottled sculpin also present in high numbers.

INTERPRETATIONS BASED ON EXISTING FISH AND AQUATIC LIFE COMMUNITY:

Stream meets definition of a Coldwater – A – Class II stream.

Water Body Name West Branch Sugar River, WIBC# 886100, Date April, 2004

HABITAT

Procedure _____

Habitat rating various, attach habitat rating forms

Significant problems affecting use attainment:

low flow _____ sedimentation bank erosion ditching fish cover depth _____

Other _____

Observations About Habitat Quality:

The above stated problems have been addressed through a stream rehabilitation program which has been in progress over the past 4 years. Habitat scores have gone from poor - good prior to rehabilitation to good - excellent after project completion. See narrative for further details.

WATERSHED DATA AND OBSERVATIONS

AREA

Approximate size 42,420 acres

Land use: % crop land 58, % pasture 1, % forest 16,

% grass land 14, % urban <1, % wetland _____,

No. feedlots/barn yards near stream _____

Other NPS _____

Is this watershed currently or proposed to receive NPS management under a State, Federal or local organization?
Yes , no _____. List dates and explain:

Qualified for grants under the state's Targeted Runoff Management (TRM) program in 2000, 2001, 2002 and 2003. Rehabilitated over 12 miles of stream.

Discuss NPS impacts and controllability, and NPS relationship to fish and aquatic life existing and attainable uses. Include factors such as bank erosion, land cover/use near stream, gully erosion, barn yards, etc. (attach additional sheets if required):

Changes in land use practices and rehabilitation of the riparian stream corridor have attempted to address the nonpoint source elements. Farming practices that promote infiltration have increased baseflows over the past decade. Bank stabilization and habitat improvement projects over the last 4 years have addressed the sedimentation impacts and lack of habitat. See narrative for further details.

Water Body Name _____, WIBC# _____, Date _____

THIS PAGE MUST BE COMPLETED WHEN THE RECOMMENDED DESIGNATED USE IS TOLERANT FISH AND AQUATIC LIFE OR VERY TOLERANT AQUATIC LIFE.

RECOMMENDED DESIGNATED USE: _____

Tolerant and Very Tolerant Designated uses

Tolerant Fish and Aquatic Life and Very Tolerant Aquatic Life designated uses are not defined as full fish and aquatic life uses. In most cases an TFAL or VTAL use is the best that can be attained by these resources due to natural habitat or water quality limitations. A designated use recommendation into one of these sub-categories must be based on one or more of the following factors (s. 283.15(4), Stats.). Check all that apply to this designated use and provide a brief description of the situation:

- a. Naturally occurring pollutant concentrations prevent the attainment of a full fish and aquatic life community.
- b. Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of a full fish and aquatic life community, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating water conservation requirements.
- c. Human caused conditions or sources of pollution prevent the attainment of a full fish and aquatic life community and cannot be remedied or would cause more environmental damage to correct than to leave in place.
- d. Dams, diversions or other types of hydrologic modifications preclude the attainment of a full fish and aquatic life community, and it is not feasible to restore the water body to its original condition or to operate such modification in a way that would result in the attainment of a full fish and aquatic life community.
- e. Physical conditions related to the natural features of the water body, such as the lack of proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of a full fish and aquatic life community.

DESCRIPTION:

Stream Reclassification

West Branch Sugar River

Sugar-Pecatonica Basin

West Branch Sugar River and Mount Vernon Creek Watersheds (SP16)

WBIC# 886100

Submitted by James F. Amrhein

Wisconsin Department of Natural Resources

South Central Region Headquarters

April, 2004

Introduction

Stream Classification

The West Branch of the Sugar River rises near the southwest limits of the Village of Mount Horeb and proceeds southeast for 21 miles where it flows into the Sugar River just upstream from Lake Bellevue (Figure 1). It drains 66.6 miles of southwest Dane County and has a gradient of 7.5 feet per mile (WDNR, 1985). The Mount Horeb wastewater treatment plant is the only permitted facility discharging effluent to headwaters of the West Branch Sugar River. While the upper watershed is receiving development pressure, most of the stream flows through agricultural lands.

The stream is currently classified as a limited forage fishery (tolerant fish and aquatic life) from its headwaters downstream 2 miles (Table 1). The next 11 miles, from Barton Road to State Highway 92, is classified as a warm water forage fishery (Diverse fish and aquatic life – non gamefish). The next 5.5 miles from Mount Vernon Creek to County Highway PB is classified as a cold water Class II trout fishery. The final 2.5 miles from Highway PB to the mouth is considered a default warm water sport fishery (Diverse Fish and Aquatic Life – gamefish). With the exception of the lower 2.5 miles, the rest of the stream has the potential to be a cold water trout fishery (WDNR, 2004a). In 1998, the river was put on the state's list of impaired waters due to severe nonpoint source pollution causing a failure to meet its potential biological use. The stream was impacted by streambank erosion, overgrazed pastures, unrestricted cattle access, barnyard runoff, gully erosion, and sediment deposition from uplands, all of which resulted in the destruction of in-stream habitat.

Table 1: West Branch Sugar River Designations

Stream Mile (from mouth)	Existing Use	Potential Use	Supporting Use?	Codified Use	Proposed Codified Use	Use Impairment - Source	Use Impairment - Impact
19-21	COLD II	COLD II	Part	LFF	COLD II	NPS	Habitat
8-19	COLD II	COLD II	Part	WWFF	COLD II	NPS	Habitat
2.5-8	COLD II	Same	Part	COLD	Same	NPS, HM	BAC, Habitat
0-2.5	WWSF	Same	Part	DEF	Same	NPS	Habitat

Impairment Key: NPS = Nonpoint Source; HM = Hydrologic modification; BAC = Bacteriological contamination

Improvements in the Watershed and Stream Corridor Rehabilitation

The Dane County Land Conservation Department started working with landowners in the 1970s to change cropping practices to reduce erosion and prevent animal waste from entering streams. Farmers' adoption of whole farm planning, conservation tillage practices and leaving a buffer strip next to the river helped reduce erosion and sediment entering the river (Connors, 2004). In 1979, a portion of the West Branch Sugar River Watershed was selected as a high priority area for focusing best management practices (BMPs) in an effort to improve water quality. The implementation of BMPs lasted from 1981 through 1990. During this period, focus was on reducing nonpoint source pollution from sheet and rill erosion, streambank pasturing, cattle access to streams, and proper management of animal waste from barnyards and feedlots. This project was successful at putting a number of conservation practices on the landscape (Sorge, 1997). In 1985, the National Farm Bill went into effect and introduced the Conservation Reserve Program (CRP). The federally funded program targeted highly erodible soils by providing financial incentives to farmers to retire land from agricultural use (for a minimum duration of 10 years). This program currently encompasses nearly 6000 acres in the watershed. Such practices promote infiltration of rainfall and meltwater, increasing base flows and reducing the "flashiness" of high rainfall events.

In 1999, the DNR, Dane County Land Conservation Department (LCD), landowners and several volunteer organizations began work to improve the riparian corridor and habitat of the stretch of the West Branch Sugar River above State Highway 92. The LCD received the first of four Targeted Runoff Management (TRM) grants for riprap, fencing, shaping, seeding, and stabilizing the banks of the river. Cost share money received from trout stamp funds, the USDA Natural Resources Conservation Service (NRCS), the Wildlife Habitat Improvement Program (WHIP), non-profit organizations and volunteer labor allowed the construction of fish habitat structures for placement at strategic locations along the river. The LCD subsequently received 3 additional TRM grants for rehabilitating a total of 12 miles of river.

The water quality objective of the project was to reduce streambank erosion by 60%, resulting in an overall reduction in sediment load of over 13,000 tons/year over the whole area of the project. In all, over 20,000 feet of riprap was strategically placed to stabilize the toe of the stream bank, 58,000 feet of stream bank was shaped, 17 acres seeded and over 1000 fish habitat structures placed in the stream. Nonprofit organizations will hold 20 year, 66 foot-wide easements on the project area for public access.

Post-rehabilitation Monitoring

Habitat

The DNR conducted post-rehabilitation monitoring on the sections of river to gage the effectiveness of the project. In 2001, Sorge (2001) monitored the habitat at 3 sites on the West Branch Sugar River using a protocol developed by Simonson et. al. (1994). Habitat scores prior to the project ranged from poor to good. Post-rehabilitation scores ranged from good to excellent (Table 2).

Table 2: Pre and Post Rehabilitation Habitat Evaluation – West Branch Sugar River

Site	Pre-rehabilitation	Post-Rehabilitation
State Highway 92	58 (Good)	78 (Excellent)
Upstream State Highway 92 (upstream of cattle crossing)	38 (Fair)	60 (Good)
Downstream from County Highway U	20 (Poor)	65 (Good)
Upstream from County Highway JG	N/A (No rehabilitation in this section)	60 (Good)

Qualitative Ratings: Excellent ≥ 75 ; Good 50-74; Fair 25-49; Poor < 25

Fisheries

The DNR conducted post-rehabilitation monitoring on 15 sites along the West Branch Sugar River in 2002 and 2003. Monitoring on some sections took place while work on other sections had already occurred. Table 3 shows the Coldwater IBI for the applicable surveys. In some surveys, only gamefish were captured, for others a full IBI run was conducted. A full listing of species collected can be found in Appendix Y.

Table 3: Coldwater IBI Fisheries Evaluation – West Branch Sugar River

Site #	Location	2002	2003
1	State Highway 92	30 (Fair)	20 (Poor)
5	Downstream CTH U	40 (Fair)	40 (Fair)
6	Upstream CTH U	50 (Fair)	40 (Fair)
7	Upstream Primrose Center Road	10 (Poor)	20 (Poor)
8	Upstream CTH G	20 (Poor)	10 (Poor)
9	Rhiner Property to Tributary	N/A	20 (Poor)
10	Upstream L. Haag Property	N/A	20 (Poor)
11	Downstream L. Haag Property	30 (Fair)	10 (Poor)
12	Haag Tributary	N/A	20 (Poor)
13	Upstream Lewis Road	30 (Fair)	20 (Poor)
14	Upstream CTH JG	50 (Fair)	60 (Good)
15	Upstream Barton Road	40 (Fair)	60 (Good)

Qualitative Ratings: 0 = Poor; 10-20 = Poor; 30-50 = Fair; 60-80 = Good; 90-100 = Excellent

Shaded areas indicate pre-rehabilitation monitoring

Temperature Data

Hourly temperature readings were taken at 3 sites on the West Branch Sugar River: Barton Road, Lewis Road and State Highway 92 (Figure 2). None of the instantaneous maximum temperatures reached 25°C nor did the mean daily summer maximum exceed 22°C at any site (Table 4).

Table 4: Summer Temperatures on the West Branch Sugar River (2002)

Site	Maximum Instantaneous	Maximum Daily Mean
Barton Road	23.5	17.8
Lewis Road	21.5	19.5
State Highway 92	24.5	21.0

Discussion

Post rehabilitation monitoring was limited to habitat and fisheries evaluations as historic macroinvertebrate sampling had already indicated good water quality and land use had generally improved in the watershed over the past 15 years (WDNR, 2004b). Habitat scores showed dramatic improvement from historic and pre-rehabilitation scores. Water temperature data indicated that temperatures were within the guidelines established for defining cold water quality characteristics (WDNR, 2003).

Some re-occurrence of brown trout had already occurred due to changes on the landscape that allowed for better baseflow and cooler water (Sorge, 1997). Species diversity in established cold water systems is typically very low, generally consisting of only 1 or 2 trout species and a few intolerant cool and coldwater forage species (Lyons et. al., 1996). Lower scores in the West Branch Sugar River are reflective of the number of tolerant species, primarily white suckers that still inhabit the stream. The post-rehabilitation IBI scores are typical of what one would tend to see the first couple of years following the implementation of a large scale habitat improvement project as the fish community is typically slower to respond than other biological indicators (Sorge, 2004). Certain tolerant species will always find conditions in the West Branch favorable as water temperatures are not cold enough to completely preclude their existence. Cool and coldwater species now inhabit the sections of river above the project area. Brown trout and mottled sculpin are now showing up in more numbers as far up as County Highway JG and Barton Road (WDNR, 2002 and 2003). The Coldwater IBIs for these upper sections are among the highest for the entire river.

The Cold Water IBI is just one metric that is used to evaluate the effectiveness of the project. Another means of evaluation is the Catch Per Unit Effort (CPUE). This metric looks at the number of trout collected within a certain length of stream or period of time. When comparing the 1997 CPUE for brown trout to the 2002 data, the response was positive with the exception of one site (Table 5). The slight decrease at State Highway 92 can be attributed to angler harvest because of easy access to the site (Sorge, 2004).

Table 5: Catch Per Unit Effort for Brown Trout in the West Branch Sugar River

Location	1997	2002	Percent Change
State Highway 92	206	180	-12
County Highway U	147	179	+22
Primrose Center	56	68	+21
County Highway G	77	202	+162

Another positive indicator of project success is the evidence of multiple year classes of trout, including 3-4 inch young-of-the-year (YOY) that are evidence of natural reproduction, in the project area. Evaluation of length frequency data is conducted to determine recruitment, carryover, and year class strength. Surveys conducted in 1997 showed no YOY present at any of the sampling sites (Sorge, 1997). Surveys conducted in 2002 and 2003 show the presence of YOY at ten of the thirteen post-evaluation stations (Figure 3). A stocked fish in the West Branch Sugar River receives an adipose clip prior to stocking. The presence of non-clipped YOY at all of these locations indicates that natural reproduction is taking place in the West Branch Sugar River. This was one of the major limiting factors impacting year class strength and overall population densities. Prior to the habitat restoration, brown trout did not have suitable spawning

habitat. Now brown trout have access to spawning habitat and desirable substrate that is necessary to complete their life cycle (Sorge, 2004).

Also important is the carryover of one year class to the next. The length-frequency analysis shows the presence of multiple year classes of trout at all 13 locations with most having at least 4 consecutive year classes present. Two sites contained 6 year classes. Densities of brown trout are recovering and populations starting to build toward management goals. The overall growth rates and condition factors of brown trout seem to be similar to neighboring waterbodies in western Dane County (Sorge 2004).

Conclusion

The West Branch Sugar River has responded to the implementation of best management practices which have helped increase baseflow and reduce erosion. Coldwater A – Class II system is defined as:

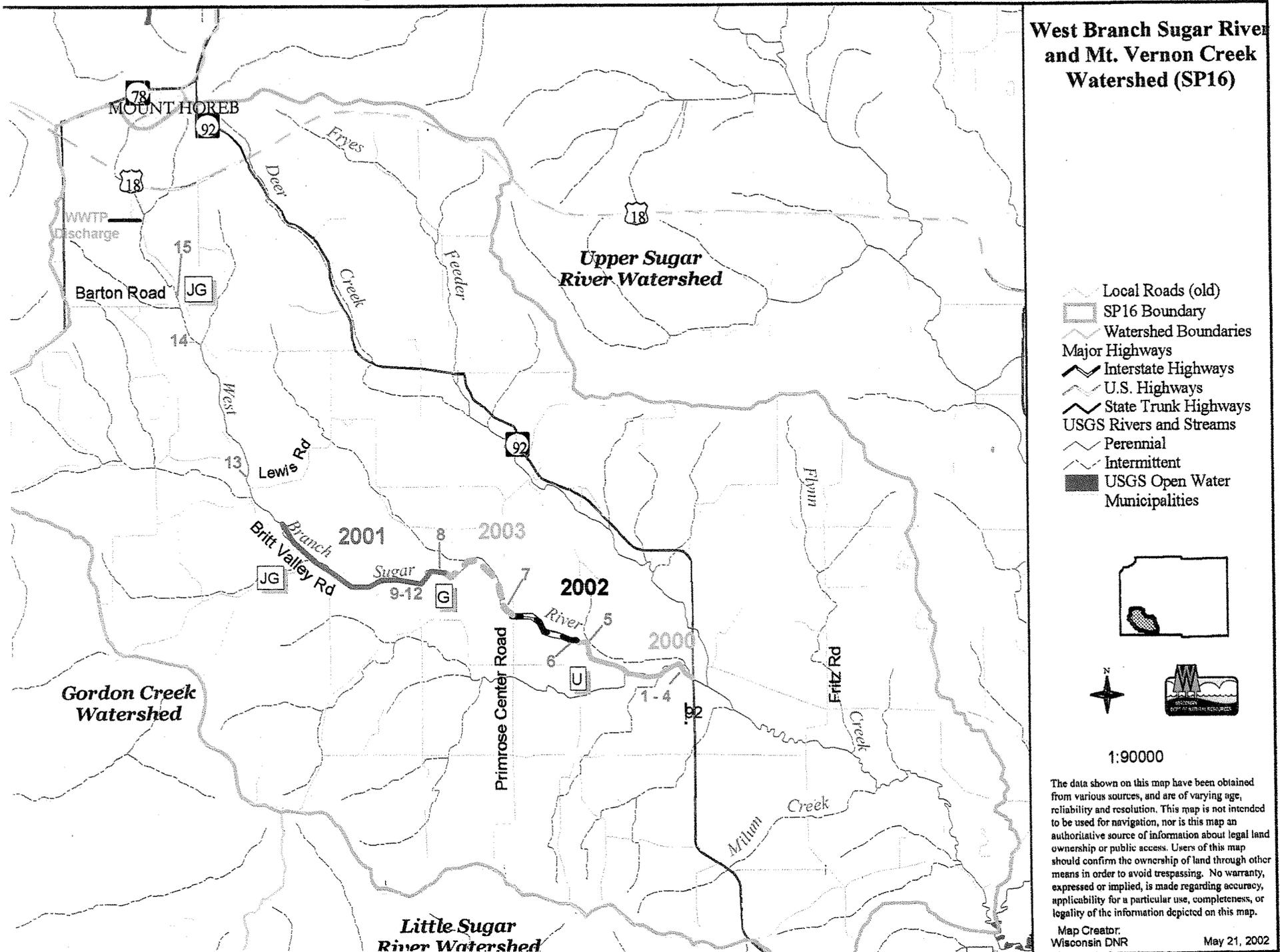
Capable of attaining a salmonid community with one or more age groups above the age of 1 year, in sufficient numbers to indicate substantial survival from one year to the next. These streams also contain habitat and water quality adequate for natural reproduction, but some stocking is necessary to fully utilize all available habitat or to sustain a fishery.

The stream is meeting its potential as a Class II trout fishery. For these reasons, the department is removing the West Branch Sugar River from the state's list of impaired waters and recommends the **West Branch Sugar River from its headwaters downstream to State Highway 92 be reclassified as a Coldwater A – Class II stream.**

References.

- Connors, Kevin. 2004. Dane County Land Conservation Department. Personal communication.
- Lyons, John, L.Wang, and T. Simonson. 1996. Development and Validation of an Index of Biotic Integrity for Coldwater Streams in Wisconsin. *North American Journal of Fisheries Management* 16:241-256.
- Simonsen, Timothy, John Lyons, and Paul Kanehl. 1994. Guidelines for Evaluating Fish Habitat in Wisconsin Streams. Forest Service - U.S. Department of Agriculture General Technical Report NC-164. 36 pages.
- Sorge, Michael. 1997. West Branch and Upper Sugar Watershed Surface Water Resource Appraisal Monitoring Report. Wisconsin Department of Natural Resources.
- _____. 2001. Habitat Surveys of West Branch Sugar River. Wisconsin Department of Natural Resources. Unpublished data.
- _____. 2004. Wisconsin Department of Natural Resources. South Central Region. Personal Communication.
- WDNR. 1985. Surface Water Resources of Dane County. Elizabeth Day, Gayle Grzebieniak, Kurt Osterby, Clifford Brynildson. Wisconsin Department of Natural Resources Lake and Stream Classification Project. Madison, WI.
- _____. 2002 and 2003. Wisconsin Department of Natural Resources. South Central Region Fisheries Program. Unpublished data.
- _____. 2003. Guidelines for Designating Fish and Aquatic Life Uses for Wisconsin Surface Waters. October, 2003 DRAFT. Wisconsin Department of Natural Resources.
- _____. 2004a. Draft of the State of the Basin Report: Sugar and Pecatonica Rivers Basin. March, 2004 Draft. James Amrhein. Wisconsin Department of Natural Resources. South Central Region Headquarters.
- _____. 2004b. Rehabilitation of the West Branch Sugar River – A Documentation for Removal from the State of Wisconsin's List of Impaired Waters. Wisconsin Department of Natural Resources. South Central Region. April, 2004.

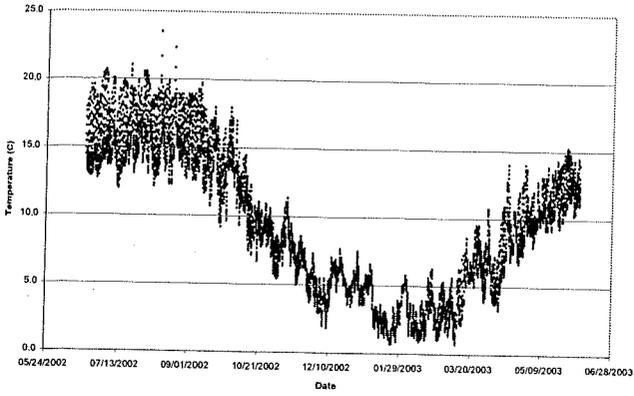
Figure 1: West Branch Sugar River Rehabilitation Segments and Fish Sampling Stations



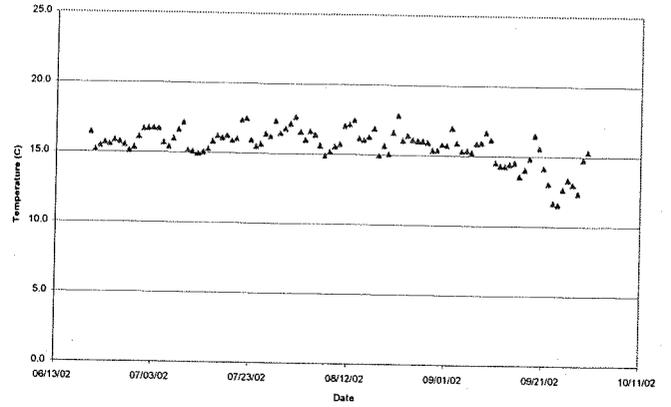
The data shown on this map have been obtained from various sources, and are of varying age, reliability and resolution. This map is not intended to be used for navigation, nor is this map an authoritative source of information about legal land ownership or public access. Users of this map should confirm the ownership of land through other means in order to avoid trespassing. No warranty, expressed or implied, is made regarding accuracy, applicability for a particular use, completeness, or locality of the information depicted on this map.

Figure 2: West Branch Sugar River Water Temperature Data

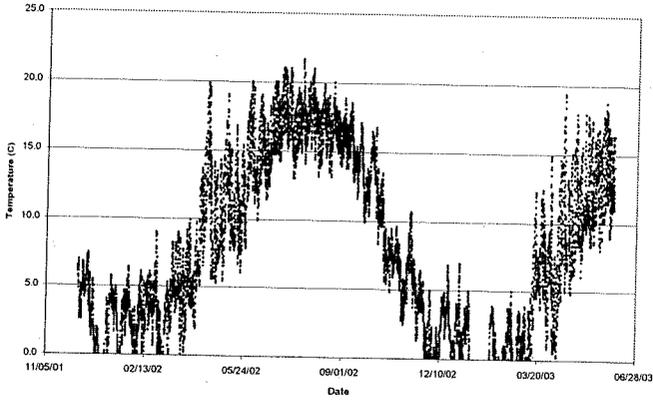
West Branch Sugar River at Barton Road - Water Temperature Data



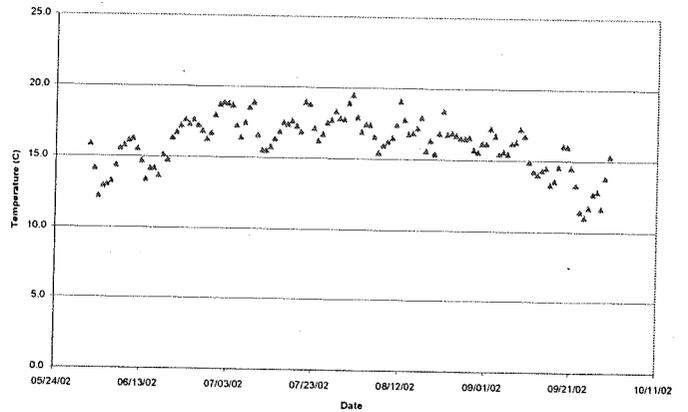
West Branch Sugar River at Barton Road - Summer Daily Mean Temperatures



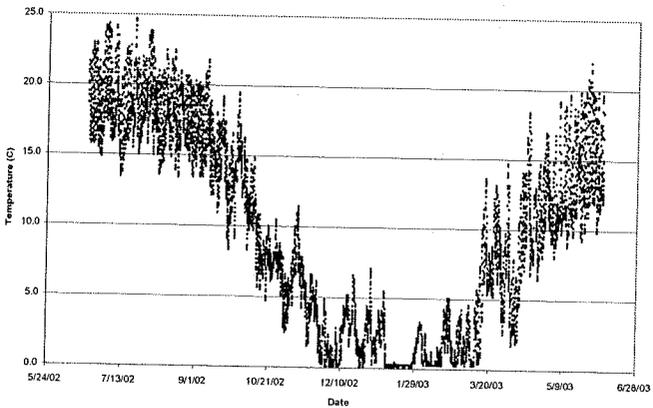
West Branch Sugar River at Lewis Road - Water Temperature Data



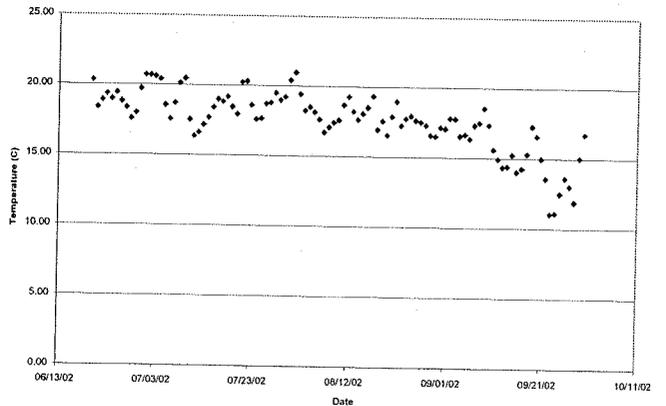
West Branch Sugar River at Lewis Road - Summer Daily Mean Temperature



West Branch Sugar River at State Highway 92 - Water Temperature Data



West Branch Sugar River at State Highway 92 - Summer Daily Mean Temperatures



Region <u>SCR</u>	County <u>Dane</u>	Report Date <u>1/2005</u>	Classification <u>CWA</u> <small>(Fr. LFF WWS C.W.)</small>
Water Body: <u>Sugar R., West Branch</u>			
Discharger: <u>Mt Horrib, V of</u>			

If stream is classified as Limited Forage Fish (LFF) or Limited Aquatic Life (LAL), check any of the following Use Attainability Analysis factors that are identified in the classification report:

- Naturally occurring pollutant concentrations prevent the attainment of use
- Natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met
- Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place
- Dams, diversions or other types of hydrologic modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or operate such modification in a way that would result in the attainment of the use
- Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses
- Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact

Supporting Evidence in the report (include comments on how complete/thorough data is)

- Biological Data (fish/invert) brown trout pop'n
- Chemical Data (temp, D.O., etc.) temperature 0.25°C
- Physical Data (flow, depth, etc.)
- Habitat Description
- Site Description/Map
- Other: _____

Historical Reports in file:

1/2005 - J Amrhein

Additional Comments/How to improve report:

designated use based on temp & biological data
1998 303(d) not due to severe NPS pollution

AR 104

REPORT ON THE RECLASSIFICATION OF WEST BRANCH
SUGAR RIVER HEADWATERS AND PERFORMANCE OF THE
MT. HOREB WASTEWATER TREATMENT FACILITY

July, 1988

by

Dave Marshall

WI DNR

The West Branch Sugar River arises in Section 14, T6N, R6E and flows southeast for 18 miles to the confluence with the Sugar River. In the headwaters reach, the stream flows through a combination of woodlands and meadow. Consequently, agricultural impacts to the stream are minor. Meanders are common and there is a good pool-riffle ratio. Most of the stream substrate is a combination of rubble, gravel, sand and hard clay. Fine sediment occurs in pools near Barton Road.

The West Branch Headwaters has low natural base flow with an estimated Q7,10 of .13 cfs above the wastewater treatment plant. Flow is continuous year-round and the estimated upstream discharge was approximately .2 cfs late June, 1988 following a severe draught lasting three months. At the point of discharge, the wastewater treatment facility often doubles the stream flow. Below the treatment plant, additional flow is augmented by groundwater discharge.

For the most part, aquatic life in the stream is limited. Aquatic plants are not abundant because most of the stream is shaded by woodlands and overhanging grasses in the meadow. Fish populations are scarce even though the stream provides good habitat for forage species. A backpack shocking survey performed in September, 1987, revealed only one white sucker. Aquatic invertebrates indicate very good water quality upstream of the wastewater treatment facility but display some degree of degradation downstream.

Recommendation

The current classification of the West Branch Headwaters is continuous Intermediate Fish and Aquatic Life (INT-D) downstream to CTH JG. The determination was made in 1975 before criteria was established for protecting non-game fish such a intolerant forage fish. Based on the stream characteristics including good habitat, very good water quality above the treatment plant and sustainable flows, the stream has the potential to support intolerant forage fish and the classification should be changed to Full Fish and Aquatic Life (FAL-C).

Several tributaries in the drainage basin contain species of intolerant forage fish including the Redside Dace. Reason(s) for the lack of intolerant forage fish in the West Branch Headwaters are unclear, but may reflect impacts of the Mt. Horeb wastewater treatment facility and/or occasional spills, originating in the Village of Mt Horeb. During wet weather, a gully drains the southwest side of Mt. Horeb which has light industry. A spill of high strength BOD material reached the stream in 1982.

West Br.

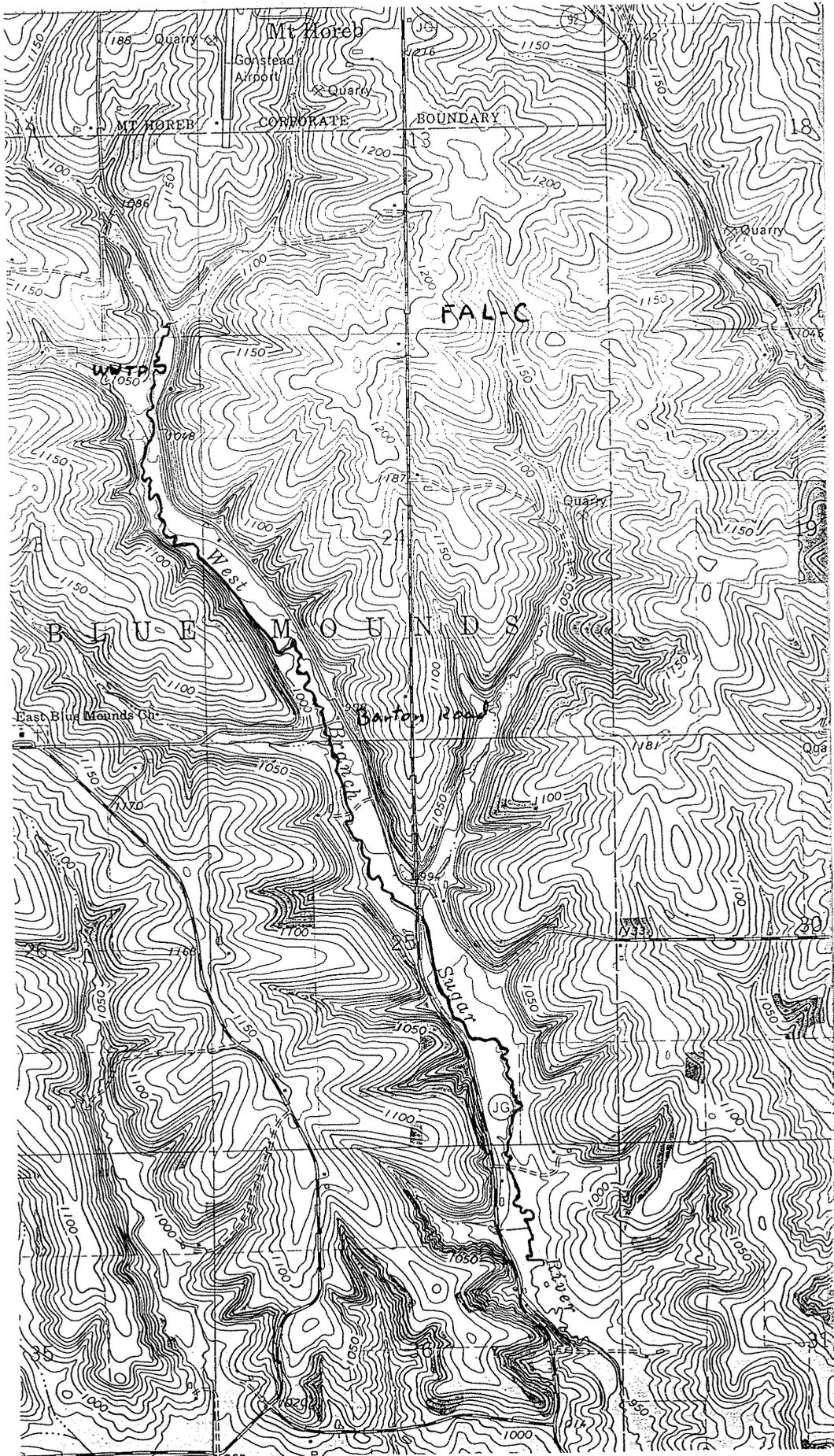
Stream Sugar R. Reach Location Headwaters to CTH JG Reach Score/Rating 164 / Fair
 County Dane Date Sept. 30, 1987 Evaluator Marshall Classification FAL-C

Rating Item	Category			
	Excellent	Good	Fair	Poor
Watershed Erosion	No evidence of significant erosion. Stable forest or grass land. Little potential for future erosion. 8	Some erosion evident. No significant "raw" areas. Good land mgmt. practices in area. Low potential for significant erosion. (10)	Moderate erosion evident. Erosion from heavy storm events obvious. Some "raw" areas. Potential for significant erosion. 14	Heavy erosion evident. Probable erosion from any run off. 16
Watershed Nonpoint Source	No evidence of significant source. Little potential for future problem. 8	Some potential sources (roads, urban area, farm fields). (10)	Moderate sources (small wetlands, tile fields, urban area, intense agriculture). 14	Obvious sources (major wetland drainage, high use urban or industrial area, feed lots, impoundment). 16
Bank Erosion, Failure	No evidence of significant erosion or bank failure. Little potential for future problem. 4	Infrequent, small areas, mostly healed over. Some potential in extreme floods. (8)	Moderate frequency and size. Some "raw" spots. Erosion potential during high flow. 16	Many eroded areas. "Raw" areas frequent along straight sections and bends. 20
Bank Vegetative Protection	90% plant density. Diverse trees, shrubs, grass. Plants healthy with apparently good root system. 6	70-90% density. Fewer plant species. A few barren or thin areas. Vegetation appears generally healthy. (9)	50-70% density. Dominated by grass, sparse trees and shrubs. Plant types and conditions suggest poorer soil binding. 15	<50% density. Many raw areas. Thin grass, few if any trees and shrubs. 18
Lower Bank Channel Capacity	Ample for present peak flow plus some increase. Peak flow contained. W/D ratio <7. 8	Adequate. Overbank flows rare. W/D ratio 8-15. 10	Barely contains present peaks. Occasional overbank flow. W/D ratio 15-25. (12) 14	Inadequate, overbank flow common. W/D ratio >25. 16
Lower Bank Deposition	Little or no enlargement of channel or point bars. 6	Some new increase in bar formation, mostly from coarse gravel. (9)	Moderate deposition of new gravel and coarse sand on old and some new bars. 15	Heavy deposits of fine material, increased bar development. 18
Bottom Scouring and Deposition	Less than 5% of the bottom affected by scouring and deposition. 4	5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools. (10)	30-50% affected. Deposits and scour at obstructions, constrictions and bends. Some filling of pools. 16	More than 50% of the bottom changing nearly year long. Pools almost absent due to deposition. 20
Bottom Substrate/ Available Cover	Greater than 50% rubble, gravel or other stable habitat. 2	30-50% rubble, gravel or other stable habitat. Adequate habitat. 7	10-30% rubble, gravel or other stable habitat. Habitat availability less than desirable. (12) 17	Less than 10% rubble gravel or other stable habitat. Lack of habitat is obvious. 22
Avg. Depth Riffles and Runs	Forage >1' 0 Warm >1.5' 0	6" to 1' 6 10" to 1.5' 6	3" to 6" (18) 6" to 10" 18	<3" 24 <6" 24
Avg. Depth of Pools	Forage >4' 0 Warm >5' 0	3' to 4' 6 4' to 5' 6	2' to 3' 18 3' to 4' 18	<2' (22) <3' 24
Flow, at Rep. Low Flow	Forage >2 cfs 0 Warm >5 cfs 0	1-2 cfs 6 2-5 cfs 6	.5-1 cfs 18 1-2 cfs 18	<.5 cfs (22) <1 cfs 24
Pool/Riffle, Run/Bend Ratio (distance between riffles ÷ stream width)	5-7. Variety of habitat. Deep riffles and pools. 4	7-15. Adequate depth in pools and riffles. Bends provide habitat. 8	15-25. Occasional riffle or bend. Bottom contours provide some habitat. (10) 16	>25. Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. 20
Aesthetics	Wilderness characteristics, outstanding natural beauty. Usually wooded or un-pastured corridor. 8	High natural beauty. Trees, historic site. Some development may be visible. 10	Common setting, not offensive. Developed but uncluttered area. (12) 14	Stream does not enhance aesthetics. Condition of stream is offensive. 16

Column Totals:

Column Scores E _____ +G _____ +F _____ +P _____ = 164 = Score

<70 = Excellent, 71-129 = Good, 130-200 = Fair, >200 = Poor



SUMMARY OF WASTEWATER TREATMENT PLANT PERFORMANCE

Prior to the treatment plant upgrade in 1978, waste assimilation studies demonstrated significant impact of the former treatment facility on the water quality in the West Branch. Based on waste assimilation surveys performed in 1973 and 1974, the former treatment plant increased ammonia and suspended solids in the stream to unnaturally high concentrations. During one survey, dissolved oxygen levels dropped below 3.0 mg/l. The concentrations of ammonia frequently exceeded Intermediate Aquatic Life criteria.

The new treatment plant uses rotating biological contact disks, sand filters and post aeration. Based on self-monitoring report data (Table 4), a post operational survey (Table 1) and two waste load allocation surveys (Appendix), effluent quality at the new facility is significantly improved. BOD, ammonia and dissolved oxygen concentrations were all within the FAL-C criteria. Although chemical effluent and stream data generally indicate effective wastewater treatment, mechanical problems have occurred over the last six years which had some impact on the stream. In 1982, for example, problems included over-chlorination and technical difficulties associated with backwashing the sand filters. These problems have since been corrected. In 1987, a biological contact disc collapsed from the weight of the treatment organisms. The problem occurred during a wasteload allocation survey but effluent samples displayed no degradation of effluent quality. On the other hand, benthic organisms in the mixing zone indicated substantial enrichment. The substrate was covered with stalked protozoans, a type of "slime growth" which indicates organic pollution. In spite of the problems associated the bio-contact discs, wasteload allocation modelling indicated effective waste assimilation in the stream and that Full Fish and Aquatic life standards are maintained for conventional pollutants.

Unlike the chemical monitoring data, biological sampling indicated some degree of water quality degradation. Aquatic invertebrates reflected organic pollution within the first quarter mile below the treatment plant but indicated recovery farther downstream. Invertebrates indicated very good water quality above the wastewater treatment plant and a mile downstream. Scarcity of forage fish populations indicate unbalanced aquatic ecology in the stream even though flow and good habitat should support abundant forage populations.

Table 1: Mt. Horeb Post Operational Study
July 29, 1982

<u>Location</u>	<u>Distance From Outfall (miles)</u>	<u>Time (24 hr.)</u>	<u>Temp (°C)</u>	<u>D.O. (mg/l)</u>	<u>pH (su)</u>	<u>Tot.-P (mg/l)</u>	<u>Tot. Kjehl. N (mg/l)</u>	<u>NH₃-N (mg/l)</u>	<u>NO₂-N + NO₃-N (mg/l)</u>	<u>Sus. Solids (mg/l)</u>	<u>BOD₅ (mg/l)</u>	<u>Flow (cfs)</u>	<u>MFFCC #/100 ml</u>	<u>Fecal Strep #/100 ml</u>
above WWIP	- .01	10:00	14.5	9.5	7.9	.2	.4	.02	5.8	16	0.8	.54	530	650
		*05:40	15.8	7.0										
WWIP	0	10:05	24.0	6.4	7.8	12	4.0	1.1	3.0	16	10		90	
Norman Driveway	.2	10:30	19.5	7.4	7.8	4.3	1.6	.35	4.6	20	4.9		< 10	< 10
		*05:45	16.3	7.6										
Warton Road	1.0	10:45	16.0	8.9	7.9	2.1	0.6	.07	4.3	10	1.6		120	320
		*05:53	15.0	7.9										
TH JG	1.6	10:50	15.2	10.1	7.9	1.51	0.6	.05	4.2	14	2.0		520	580
		06:00	15.0	8.3										

August 22, 1988 Diel D.O. Survey

Table 2: Hilsenhoff Biotic Index (1987 Revision)

<u>Location</u>	<u>October, 1975</u>	<u>July, 1982</u>	<u>October, 1982</u>	<u>September, 1987</u>
Docken Dr. (Above)		3.99	3.98	4.09
Forman Dr. (Below)	6.04	7.99	6.04	5.79
Barton Road		6.04	4.27	4.27
CTH JG	4.17	5.26	3.91	4.18

Table 3: Evaluation of Water Quality Using Biotic Index Values of Samples Collected in March, April, May, September and early October

<u>Biotic Index</u>	<u>Water Quality</u>	<u>Degree of Organic Pollution</u>
0.00-3.50	Excellent	No apparent organic pollution
3.51-4.50	Very Good	Possible slight organic pollution
4.51-5.50	Good	Some organic pollution
5.51-6.50	Fair	Fairly significant organic pollution
6.51-7.50	Fairly Poor	Significant organic pollution
7.51-8.50	Poor	Very significant organic pollution
8.51-10.00	Very Poor	Severe organic pollution

Table 4: Self Monitoring Report Data (monthly averages)

<u>Date</u>	<u>Flow MGD</u>	<u>BOD₅ mg/l</u>	<u>Suspended Solids mg/l</u>
09/86	.43	9	5
10/86	.41	9	7
11/86	.38	9	7
12/86	.38	9	4
01/87	.39	8	5
02/87	.40	8	6
03/87	.36	12	5
04/87	.38	9	5
05/87	.39	12	5
06/87	.38	12	9
07/87	.37	11	7
08/87	.39	11	6

References

- Bainbridge, Tom. 1975. Stream use Classification for the West Branch Sugar River. WI DNR.
- Ball, Joe. 1981. Stream Classification Guidelines for Wisconsin. WI DNR.
- Day, Elizabeth A., G.P. Grzebieniak, K.M. Osterby, and C.B. Brynildson. 1985. Surface Water Resources of Dane County. WI DNR.
- Eagan, Lloyd. 1987. Sugar-Pecatonica River Basin Water Quality Management Basin Plan. WI DNR.
- Fago, Don. 1981. Wisconsin Fish Distribution Survey Data. WI DNR Bureau of Research.
- Hilsenhoff, William. 1987. An Improved Biotic Index of Organic Stream Pollution. The Great Lakes Entomologist.
- Marshall, Dave, Marc Phillips and Steve Skavroneck. 1979. Wisconsin Small Stream Studies. The Sugar-Pecatonica Basin. WI DNR.
- Pearson, Lynn. 1978. Rejustification of Intermediate Stream Classification for the West Branch of the Sugar River downstream from Mt. Horeb. WI DNR.
- Wulk, Rick. 1988. Mt. Horeb Wasteload Allocation for the West Branch Sugar River. WI DNR.

DATE: May 3, 1988 FILE REF: 8250

TO: Duane Schuettpelz - WR/2

FROM: Rick Wulk - WR/2 *RW*

SUBJECT: Mt. Horeb Wasteload Allocation for the West Branch
Sugar River

Wasteload allocation field surveys were conducted on August 5-6, 1987. Thereafter, a water quality-based modeling effort to determine stream assimilative capacity was completed in April of 1988. Effluent limits for the Mt. Horeb POTW are as follows:

Table 1 - Mt. Horeb Effluent Limits

	<u>May-October</u>	<u>October-April</u>
BOD ₅ (mg/l)*	15	22
SS (mg/l)*	15	22
NH ₃ -N (mg/l)*	2	4
D.O. (mg/l)*	6	6
pH	6-7.8	6-7.8

*Weekly Average

Field data collected (pages 1-2) were used for both documentation of existing conditions and calibration of the model output. Prediction models for summer and winter conditions were developed to determine effluent limits that would not exceed the protective assimilative capacity for the West-Branch Sugar River.

Model output plots for the calibration survey display a dissolved oxygen sag/recovery occurrence (pages 3-6). From the survey conditions encountered the various model parameters (decay rates, CBOD, NBOD, K₂, P, R) are determined and are justifiably characteristic of the stream. Using these parameters, prediction models were developed to determine effluent limits that would not exceed the protective assimilative capacity of the stream. The West-Branch of the Sugar River was reclassified from intermediate to full fish and

aquatic. Thus, the instream target assimilative capacity is based on a minimum dissolved oxygen concentration of 5 mg/l and a chronic unionized ammonia concentration of .04 mg/l. The actual end of pipe ammonia limits (Table 1) are determined from the stream's pH, temperature, and flow.

For the prediction model runs, the Mt. Horeb POTW flow was fixed at its design of 0.91 cfs and the stream flow at 0.13 cfs Q_{7-10} . POTW effluent (BOD, $\text{NH}_3\text{-N}$) concentrations were varied with season to determine the stream's response. Effluent from the POTW is entering the model run at segment number two. Prediction plots on pages 7-14 demonstrate that with the Table 1 limits in place, the West-Branch of the Sugar River can maintain the minimum D.O. standard of 5.0 mg/l.

RW:bm/P1702-17

cc: Tom Bainbridge - SD
Dave Marshall - SD
Chuck Burney - WW/2

LOCATION: MT HOREB WEST BR. SURGAR RIVER SURVEY 1
 DATE: 080587

STATION DATA

B7-10 = 0.13 CFS
 DESIGN FLOW = 0.59 MGD 0.91 CFS

MILEAGE:	-0.01	0.00	0.30	0.50	1.00
T.O.T. HOURS/MI.:		10.30	11.25	12.15	
SAMPLE TIME:	10.20	10.25	11.35	12.30	
CBOD/BOD5 RATIO:		3.10			
BOD LT MG/L:	2.00	32.00	19.00	13.30	
CBOD MG/L:	1.50	25.00	15.00	10.30	
NBOD MG/L:	0.46	7.30	4.00	3.00	
BOD5 MG/L:	1.00	8.00	3.70	3.40	
TOT-P MG/L:	0.16	5.50	3.00	2.30	
DISS-P MG/L:	0.14	5.20	2.70	2.04	
ORG-N MG/L:	0.03	3.50	4.40	1.00	
NO2-NO3 MG/L:	5.30	0.05	2.30	2.70	
NH3-N MG/L:	0.10	1.60	0.66	0.23	
PH FIELD:				7.70	
PH LAB:	7.80	7.40	7.40	7.50	
CHLORIDE MG/L:	24.00	310.00	170.00	140.00	
CHLOROPHYLL A US/L:	4.00				
SUS. SOLIDS:					
DISS. O2:	8.80	6.00			
TEMPERATURE C:	15.00	19.00			
FLOW CFS:	0.28	0.54	1.06		2.20

SEGMENT DATA:

SEGMENT LENGTH FT:		0.00	1584.00	2640.00
AVE. WIDTH FT:	5.00		3.00	8.00
AVE. DEPTH FT:	0.27		0.55	0.48
GRADIENT FT/MILE:				
AVE. VELOCITY FT/S:	0.24		0.50	0.65

K2: THE K2 COEFFICIENT IS 31.2/DAY, USGS RADIOACTIVE TRACER
 CBOD REMOVAL RATE: FOR THE ENTIRE REACH 3.0
 CBOD DECAY RATE: FOR THE ENTIRE REACH 3.0
 NBOD REMOVAL RATE: FOR THE ENTIRE REACH 3.5
 NBOD DECAY RATE: FOR THE ENTIRE REACH 3.5
 SOD DECAY RATE: ACCOUNTED FOR IN RESPIRATION TERM
 RESPIRATION: 10.00
 PHOTOSYNTHESIS: 10.00
 PHOTO. FACTOR: 0.14

LIGHT DATA HOURLY FOR TWO DAYS STARTING AT MIDNIGHT

DATE: 8-5-87 0 0 0 0 0 0 12 18 40 65 165 170 175 175 170 170 165 165 130 70 15 0 0 0
 DATE: 8-5-87 0 0 0 0 0 0 12 18 40 65 165 170 175 175 170 170 165 165 130 70 15 0 0 0

AVERAGE STATION TEMP FOR STRART TIMES

1200	16.00
1800	15.00
2400	14.00
0600	15.00

DIURNAL TEMPERATURE/DO

LOCATION: MT HOREB WEST BR. SURGAR RIVER SURVEY I

START DATE: 080587

STATION MILEAGE: -0.01 0.00 0.30 0.50

TIME	-0.01	0.00	0.30	0.50
9.00	1508.7	1906.0		n
10.00	1508.8	1906.0		e
11.00	1508.8	1906.0		t
12.00	1608.9	1906.0		e
13.00	1608.6	2006.1		r
14.00	1708.7	2006.0		
15.00	1708.6	2005.9		d
16.00	1608.2	2005.8		i
17.00	1608.0	5.8		d
18.00	1508.0	5.8		n
19.00	1507.8	5.7		t
20.00	1507.8	5.5		
21.00	1507.8	5.5		w
22.00	1507.8	5.5		o
23.00	1507.8	5.5		r
24.00	1407.8	5.6		k
1.00	1407.8	6.0		
2.00	1407.8	6.4		
3.00	1407.8	6.4		
4.00	1407.8	6.2		
5.00	1407.8	6.2		
6.00	1407.8	6.2		
7.00	1407.8	6.0		
8.00	1407.8	6.0		
9.00	1507.8	6.0		

APPENDIX B

B. VILLAGE OF MOUNT HOREB SEWAGE TREATMENT PLANT

General Information

Permit No.: WI-0020281

Expires: 3/31/88

Facility Plan Approved: 8/75

Year Built or Major Improvements: 1978

Treatment Types: Rotating Biological Contact Disks
Sand Filters
Disinfection (Chlorine)
Post Aeration

Design Data:

Flow (mgd): Avg. 0.600

BOD Load (#/day): Avg. 1,654

SS Load (#/day): Avg.

Population:

Design: 5,000 (9,924 with industrial allowance)

1985: 3,880

Projected 2010: 4,534

Receiving Water Information:

Name: West Branch Sugar River

Classification: Continuous Intermediate (D)
Continuous Fish and Aquatic Life (C)

$Q_{7.10}$: 0.13 cfs

Dilution Ratio: 0.14

Treatment Action Required: Intermediate

Industrial Contributors and Toxic Screening

Industries which discharge to the Mount Horeb WWTP are listed in Table C-30. Water samples indicate the presence of barium, copper, manganese, sodium, and magnesium in the water supply. The suspected source of these metals in the water supply is the plumbing throughout the village. Data from Mount Horeb WWTP sludge samples indicates the presence of mercury, lead, copper, zinc, chromium, nickel, arsenic, and cadmium. Inputs of zinc and phenols to the WWTP are also documented in NR 101 reports. Toxic screening identified 13 industries as potential contributors of toxics to the WWTP. Further monitoring is warranted to define the nature and extent of the problem.

Compliance Maintenance

The Mount Horeb treatment plant was upgraded in 1978. It uses rotating biological contact disks, sand filters, and post aeration. The plant is in substantial compliance with its WPDES permit, however it is approaching or exceeding its organic design limits. The plant treats wastewater from two sizeable dairies. The community could benefit from evaluating its industrial control program. The next WPDES permit reissuance should include facilities planning to address the organic loading capacity question.

Recommendations

1. The community should submit a facilities plan by 1989 (Type B).
2. The community should evaluate its industrial control or pretreatment program to assess sources and adequacy of treatment (Type B).
3. The DNR should review water quality standards and related effluent limits by 1988 (Type C).
4. Mount Horeb should work with DNR during its WPDES permit reissuance process to address potential problems with the following substances identified during toxic screening: Pb, Cu, Zn, Cd, Cr, Ni, As, Hg, Phenols, Ag, CN-, 2-chlorophenol, pentachlorophenol, 2,4,6-trichlorophenol, fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, pyrene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(ghi)perylene, phenanthrene/anthracene, benzo(a)anthracene, dibenzo(a,h)anthracene, naphthalene, acenaphthene, fluorine, chrysene (Type A).

C. MOUNT HOREB COLD STORAGE

Permittee Name: Same

Mount Horeb Cold Storage is covered under General Permit No. WI-0044938-1. See Table C-2.

D. RYSER BROTHERS OF WISCONSIN, INC.

Permittee Name: Same

Ryser Brothers of Wisconsin, Inc. is covered under General Permit No. WI-0044938-1. Ryser Brothers contracts with a hauler to haul whey to cattle feeding sites. The Department has received several complaints about whey dumping from this facility and is working with the permittee to improve their whey handling methods.

APPENDIX C

MT. HOREB - DANE COUNTY

July 9, 1975

The site of the new Mt. Horeb treatment facility will be approximately 1/2 stream mile below the first town road bridge on the west branch of the Sugar River. The west branch of the Sugar River will receive the discharge from this new facility. The stream basically flows through agricultural land with some areas being semi-wooded with bordering meadows. There is pasturing next to the stream in several areas with cattle occasionally wading in the stream.

The 7 Q 10 at the first town road bridge above the new plant site is .13 cfs. At this point the stream runs through a wooded area occasionally breaking into meadows. The stream bottom is basically hard with some gravel and rubble and filamentous algal growth. At the plant site, roughly 1/2 stream mile below the first town road bridge, the stream begins to meander and assumes a pool riffle nature. The new plant site is located in a meadow with seemingly good bank protection. The banks are well defined in this region and the stream appears to exhibit a perpetually wet environment. The stream bottom was varied but basically consisted of clay hard pan and gravel rubble.

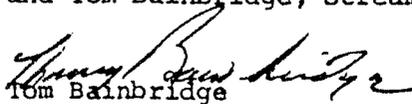
At the second town road bridge, roughly 1.6 stream miles below the new plant site, the stream seems to have picked up noticeable flow and velocity. The bottom in this reach was basically all sand and the pool riffle ratio had increased. The stream side vegetation seemed to present a good buffer to the stream. However, the entire stream length to this point seems to be susceptible to rain water runoff as a rather high ridge borders the stream on its near west bank. Several forage fish were observed in this area.

County Trunk "JG" crosses the stream approximately .6 of a mile below the second town road bridge and 2.2 miles below the plant site. At this point there was a more noticeable increase in flow. Average stream widths and depths had nearly doubled, and pool riffle areas had increased. Bottom structure was varied and remained firm and the stream vegetation seemed to be more diverse at this point. Good bank protection was in evidence at this point and the stream meadow had increased in width.

RECOMMENDATIONS

At the point of discharge at the new plant site, the stream should be classified as continuous intermediate aquatic life. This classification should hold for the entire approximate 2.2 stream mile length to County Trunk "JG". At County Trunk "JG" and for the entire remaining downstream length of the west branch of the Sugar River, the classification should be continuous fish and aquatic life.

The above recommendations represent a concurrence of opinion of the stream classification team who are as follows: Bob Bate, District Engineer; Steve Jaeger and Ron Martin, Bureau of Water Quality; Cliff Brynildson, Area Fish Manager; and Tom Bainbridge, Stream Classification Coordinator.


Tom Bainbridge

Stream Classification Coordinator

EB:lg

APPENDIX D

Rejustification of Intermediate Stream Classification for the West Branch of the Sugar River downstream from Mt. Horeb

The West Branch of the Sugar River rises near the Village of Mt. Horeb and receives a discharge from the Village's sewage treatment plant (Appendix E). From the headwaters downstream to CTH "JG" the stream's substrate consists of a hard clay bottom with some gravel rubble on top (Appendices C&D). A good benthic community cannot be established in this situation. Biological samples collected in this reach of the stream were limited in diversity (Appendices C&D). Due to warm summer temperatures (Appendix B) and low flows (Appendix B), this part of the river generally supports only forage fish species (Appendix F).

As stated in the original classification (Appendix A) the morphology of the stream improves downstream of CTH "JG". The pool-riffle ratio improves, the bottom material is firm and varied, stream vegetation is more diverse and bank cover improved. Just below CTH "JG", an unnamed tributary (See attached map) flows into the stream. Below the confluence, flows increase and stream depths and widths double. These changes create an environment more conducive to a balanced biological population.

APPENDIX E

SURFACE WATER RESOURCES OF DANE COUNTY



DEPARTMENT OF NATURAL RESOURCES
MADISON, WISCONSIN

1985

Sugar River West Branch - T5N, R8E, Sec. 28
Surface acres = 30, Length = 18 miles, Stream order = III, Gradient = 7.5 ft/mile,
Base discharge = 8.1 cfs

The Sugar River West Branch originates south of Mount Horeb, and flows southeast to meet the Sugar River just upstream of Belleville. It drains 66.5 square miles which is mostly pasture land with the remainder in upland hardwoods, marsh, and cropland. Above Mount Vernon Creek, the West Branch has a moderate gradient and low base flow. Below this point, the creek has mostly a very low gradient and meanders through a wide flood plain (Dane Cty. Reg. Plann. Comm. 1979a). Flow is augmented by the input from several spring-fed tributaries that support trout fisheries.

- 40 -

Channel alterations have been made in the lower portions of the West Branch for the purpose of draining agricultural lands. Stream bank erosion, in-stream watering, and overgrazing by livestock are very significant problems for this stream (Dane Cty. Reg. Plann. Comm. 1979a). Many portions of the stream are heavily silted and fertility is high. Mount Horeb discharges treated sewage effluent to the headwaters of the West Branch of the Sugar River. Effluent standards for this plant have recently been upgraded and any pollution from this source is less important than nonpoint sources (Dane Cty. Reg. Plann. Comm. 1979a).

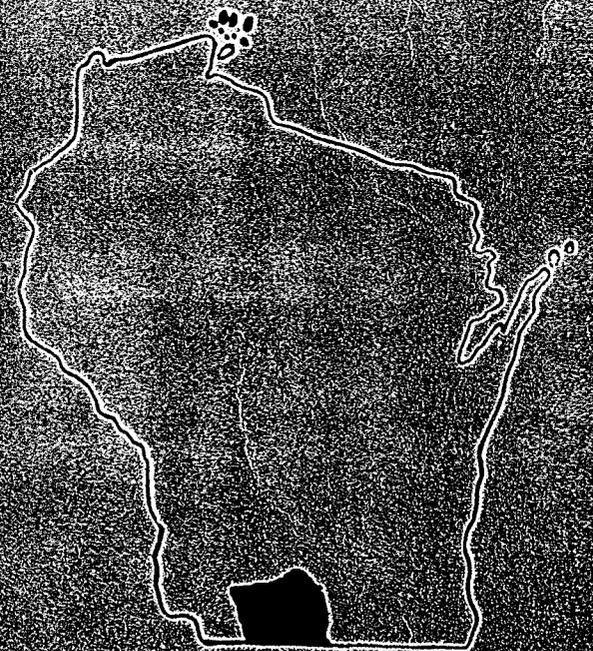
The stream from the mouth of the Primrose Branch (Sec. 14, T5N, R7E) to Hwy. PB is classified as a Class II trout stream. Stream habitat development has been conducted by the Dane County Conservation League and Madison School Program in cooperation with the DNR. There is limited spawning of brown trout in the stream, and both brown and rainbow trout have been stocked. The remaining portions of the West Branch of the Sugar River support a diverse warm water fishery. There is no public ownership of lands along the stream but the Dane County Conservation League has leases with several landowners to better protect and manage the stream. Access is available at 7 road crossings.

Fish species: brook lamprey, rainbow, brown, and brook trout, central mudminnow, northern pike, minnow (unsp.), stoneroller (unsp.), central stoneroller, reddsides dace, common carp, brassy minnow, golden, common, and sand shiner, bluntnose and fathead minnow, creek chub, buffalo (unsp.), river carpsucker, white sucker, golden redhorse, black and yellow bullhead, brook stickleback, green sunfish, pumpkinseed, largemouth bass, black crappie, Johnny and blackside darter, walleye, sculpin (unsp.), and mottled sculpin.

APPENDIX F

WISCONSIN SMALL STREAM STUDIES

THE
SUGAR-
PECATONICA
RIVER
BASINS



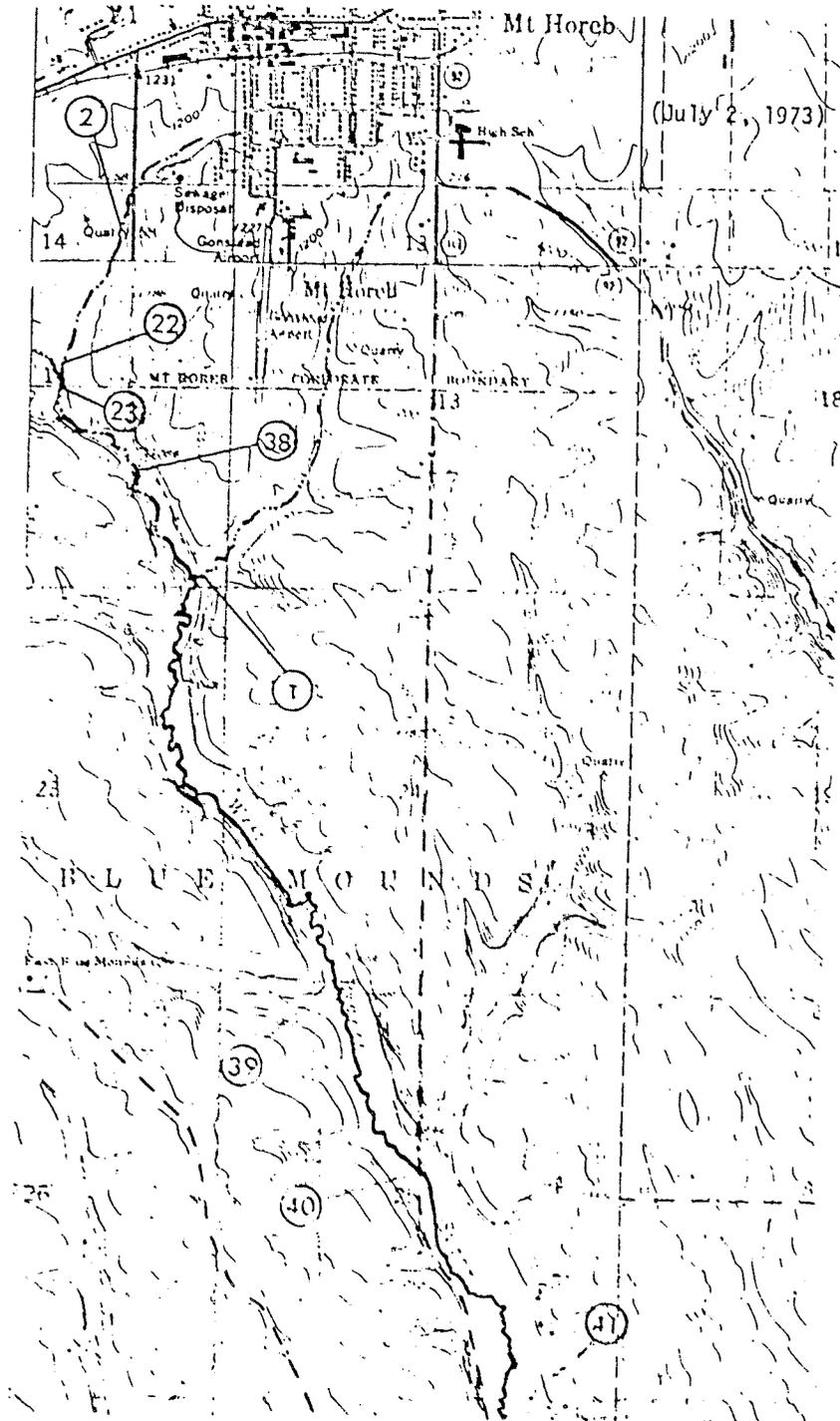
WEST BRANCH SUGAR RIVER AT MOUNT HOREB

The former Mount Horeb sewage treatment plant discharged to the West Branch Sugar River approximately 1 mile above the 1st town road bridge. At this location there is virtually no flow during dry weather. The existing plant is located approximately 1/2 mile below the first town road bridge.

At the first town road bridge, the Sugar River has an estimated $Q_{7,10}$ of .13 CFS. The stream flows through agricultural land with some areas being semi-wooded. Pasturing appears to be a non-point source problem in many areas of the stream.

At the point of discharge at the new plant site, the West Branch Sugar River is classified a continuous intermediate aquatic life stream. At the CTH JG bridge, the classification changes to continuous fish and aquatic life.

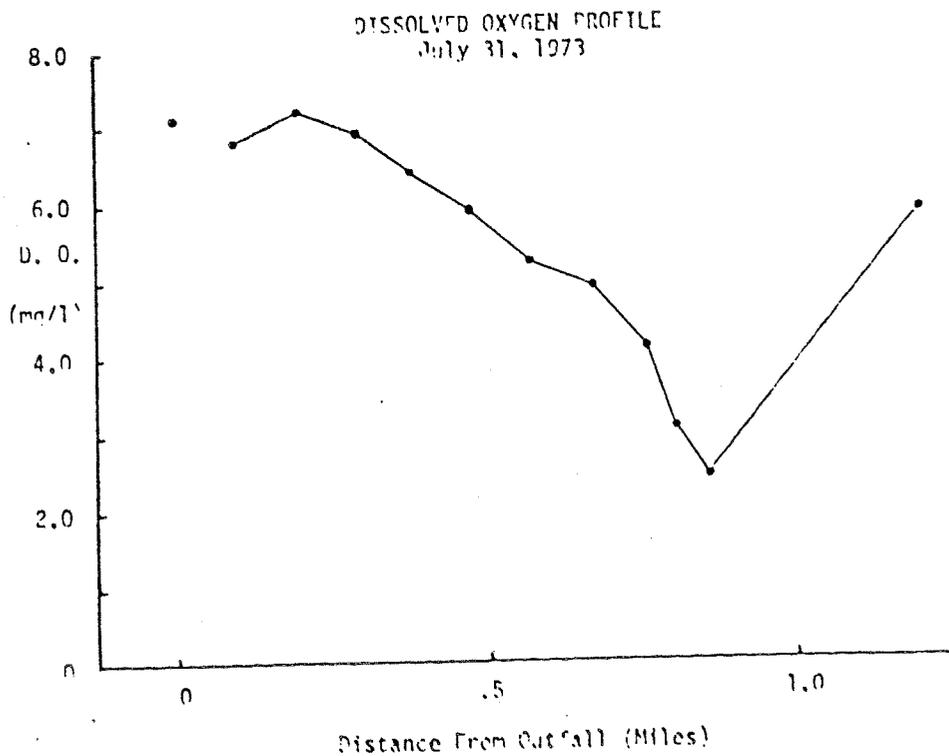
In 1973 and 1974 the West Branch Sugar River was studied four times while the old plant was in operation. The survey were performed by the Water Quality Evaluation Section.



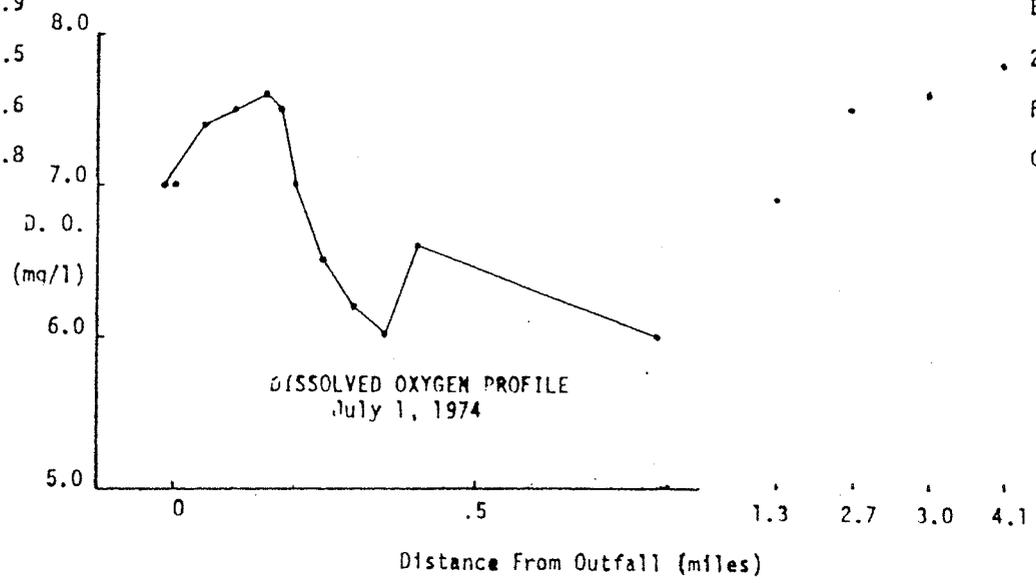
July 31, 1973

WEST BRANCH SUGAR RIVER AT MOUNT HOREB

Station Number	Distance From Outfall (miles)	Time	Temp. (°C)	D.O. (mg/l)	BOD ₅ (mg/l)	Total Org-N (mg/l)	NH ₃ -N (mg/l)	NO ₂ -N (mg/l)	NO ₃ -N (mg/l)	Flow (CFS)	Sampling Location
2	0	09:57	22.5	7.1	31	7.0	10.2	.03	.03	.68	
3	.09	10:09	18.5	6.8							
4	.19	10:23	18.5	7.2							
5	.28	10:35	18.5	6.9							
6	.37	10:46	18.5	6.4							
7	.47	10:58	18.0	5.9	43						
8	.56	11:10	17.5	5.2							
9	.66	11:25	17.5	4.9							
10	.76	11:41	17.5	4.1							
11	.81	11:53	17.5	3.0	18	2.7	7.5	.59	.90	.79	1st Town Road Bridge
12	.86	12:07	17.5	2.4							
13	1.18	13:12	15.5	5.8	17	1.8	3.1	.66	1.5		



Station Number	Distance From Outfall (miles)	Temp. (°C)	D.O. (mg/l)	BOD ₅ (mg/l)	Fl. BOD ₅ INH (mg/l)	Total Org-N (mg/l)	NH ₃ -N (mg/l)	NO ₂ -N (mg/l)	NO ₃ -N (mg/l)	Susp. Solids (mg/l)	Width (ft.)	Ave Depth (ft.)	Flow (CFS)	Sampling Location
1	-.01	22.0	7.0											
2	0		7.0	14	14	3.9	6.0	2.88	2.7	60			1.14	STP
3	.05	21.0	7.4											
4	.10	21.0	7.5								4	.44		
5	.15	21.0	7.6								4	.44		
6	.17	21.5	7.5		10	4.32	4.8	2.25	3.3	95			1.52	Farm Bridge
7	.20	22.0	7.0								4	.33		
8	.25	23.0	6.5								3.5	.36		
9	.30	23.0	6.2								5	.36		
10	.35	22.0	6.0								4	.38		
Trib	.40	18.0	5.6								1.5	.17		
11	.41	21.0	6.6											
12	.81	23.5	6.0		9.7	3.0	2.58	2.1	3.7	75			1.24	1st Town Road Bridge
Trib.	1.1	17.0	8.4											
13	1.3	19.5	6.9											Below Tributary
14	2.7	21.0	7.5											2nd Town Road Bridge
15	3.0	20.0	7.6											Farm Bridge
16	4.1	20.0	7.8											Co. JG Bridge



November 5, 1974

WEST BRANCH SUGAR RIVER AT MOUNT HOREB

Station Number	Distance From Outfall (miles)	Time	Temp. (°C)	D.O. (mg/l)	Suspended Solids (mg/l)	Total Org-N (mg/l)	NH ₃ -N (mg/l)	NO ₂ -N (mg/l)	NO ₃ -N (mg/l)	Sampling Location
2	0	11:00	14.5	8.0						
3	.05	12:25	13.0	8.8	70	4.5	.80	1.35	10.5	
4	.17	13:13	12.0	10.0	60	3.9	.90	1.43	10.3	Farm Culvert
5	.81	11:00 15:03	10.5 10.5	9.6 8.2	65	2.9	.50	.88	9.0	1st Town Road Bridge
6	1.0	17:03	10.0	8.6	12	1.4	.30	.58	7.7	Above trib below 1st Town Bridge
7	1.2	11:00	9.0	11.2						Below trib
8	2.7	11:00	8.8	10.6						2nd Town Road Bridge
9	4.1	11:00	8.0	10.1						CTH JG Bridge

Incident Report

MAY 27 1982

On May 7, 1982, at about 1:00 p.m., I was contacted, by telephone, by the Mount Horeb Police Department. The officer advised me that he had a whey spill in Mt. Horeb and could not contact the Dane County warden. He asked if I could help him. I advised him I was enroute to Madison with some samples and would stop in Mt. Horeb and assist him.

I arrived in Mt. Horeb at about 1:45 p.m. and went to Ryser Cheese Factory on Front Street and 2nd. I found a Chevrolet truck bearing Wisconsin license #HA 4642 parked under the pipe at Ryser Cheese. A wet, white stain ran from the truck down the street for about a block and into a parking lot. There was a storm sewer grate in the parking lot and the stain ended there. The spill had gone into the storm sewer. There was very little left on the street. I talked to the Mt. Horeb officer and the truck driver. I was told the driver left the truck to get a sandwich while the truck was being filled and when he got back it was overflowing. The driver said he was hauling wash water to Adams Road in Fitchburg. He said he hauled two to five loads per day. I advised him I was going to find out where the storm sewer went to and that I would mail him a citation for polluting if his spill reached ground or surface waters. I left a sample bottle with the Mt. Horeb officer and took my samples to the lab in Madison after checking with the public works people to see where the storm sewer went. The advised me it went to a park on the southwest side of town off Blue Mounds road. The water coming out of the outfall was clear at 2:15 p.m. when I checked it prior to going to the lab. I returned to Mt. Horeb at about 4:30 p.m. and went to the creek and checked the outfall. There was a large pool of white liquid near the outfall and several smaller pools downstream for about 100 yards. I took samples and contacted the Mt. Horeb Police Department for information on the driver. The driver was: David Swenson, 6029 Co. Trunk A, Brooklyn, WI 53521. DOB 06/29/56.

LOCATION	DATE	TIME	DEPTH	LAB-NUMBER	END-DATE	END-TIME
13-MBC	022587	1700		06510		

TEST-ID	STORY-ID	TEST-NAME-AND-UNITS	TEST-VALUE
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EXTRA INFORMATION ABOUT SAMPLE: CLOUTIER
EXTRA INFORMATION ABOUT SAMPLE: F1A2

025	00310	BOD	5 LAY	MG/L	>11000
097	00403	LAB	PH	SU	6.1
130	00500	RESIDUE	TOTAL	MG/L	14900
105	00530	RESIDUE	TOT MELT	MG/L	220

***** COMMENT: 5FT DOWN OF STORM SEWER OUTFALL MT HOREB (ENFORCEMENT)

LOCATION	DATE	TIME	DEPTH	LAB-NUMBER	END-DATE	END-TIME
13-MBC	022587	1701		06510		

TEST-ID	STORY-ID	TEST-NAME-AND-UNITS	TEST-VALUE
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EXTRA INFORMATION ABOUT SAMPLE: CLOUTIER
EXTRA INFORMATION ABOUT SAMPLE: F1A2

025	00310	BOD	5 LAY	MG/L	>11000
097	00403	LAB	PH	SU	7.0
130	00500	RESIDUE	TOTAL	MG/L	4790
105	00530	RESIDUE	TOT MELT	MG/L	92

***** COMMENT: 5FTS DOWN OF STORM SEWER AT MT HOREB (ENFORCEMENT)

Rejustification of Intermediate Stream Classification for the West Branch of the Sugar River downstream from Mt. Horeb

The West Branch of the Sugar River rises near the Village of Mt. Horeb and receives a discharge from the Village's sewage treatment plant (Appendix E). From the headwaters downstream to CTH "JG" the stream's substrate consists of a hard clay bottom with some gravel rubble on top (Appendices C&D). A good benthic community cannot be established in this situation. Biological samples collected in this reach of the stream were limited in diversity (Appendices C&D). Due to warm summer temperatures (Appendix B) and low flows (Appendix B), this part of the river generally supports only forage fish species (Appendix F).

As stated in the original classification (Appendix A) the morphology of the stream improves downstream of CTH "JG". The pool-riffle ratio improves, the bottom material is firm and varied, stream vegetation is more diverse and bank cover improved. Just below CTH "JG", an unnamed tributary (See attached map) flows into the stream. Below the confluence, flows increase and stream depths and widths double. These changes create an environment more conducive to a balanced biological population.

APPENDIX A
Original Stream Classification

MT. HOREB - DANE COUNTY

July 9, 1975

The site of the new Mt. Horeb treatment facility will be approximately 1/2 stream mile below the first town road bridge on the west branch of the Sugar River. The west branch of the Sugar River will receive the discharge from this new facility. The stream basically flows through agricultural land with some areas being semi-wooded with bordering meadows. There is pasturing next to the stream in several areas with cattle occasionally wading in the stream.

The 7 Q 10 at the first town road bridge above the new plant site is .13 cfs. At this point the stream runs through a wooded area occasionally breaking into meadows. The stream bottom is basically hard with some gravel and rubble and filamentous algal growth. At the plant site, roughly 1/2 stream mile below the first town road bridge, the stream begins to meander and assumes a pool riffle nature. The new plant site is located in a meadow with seemingly good bank protection. The banks are well defined in this region and the stream appears to exhibit a perpetually wet environment. The stream bottom was varied but basically consisted of clay hard pan and gravel rubble.

At the second town road bridge, roughly 1.6 stream miles below the new plant site, the stream seems to have picked up noticeable flow and velocity. The bottom in this reach was basically all sand and the pool riffle ratio had increased. The stream side vegetation seemed to present a good buffer to the stream. However, the entire stream length to this point seems to be susceptible to rain water runoff as a rather high ridge borders the stream on its near west bank. Several forage fish were observed in this area.

County Trunk "JG" crosses the stream approximately .6 of a mile below the second town road bridge and 2.2 miles below the plant site. At this point there was a more noticeable increase in flow. Average stream widths and depths had nearly doubled, and pool riffle areas had increased. Bottom structure was varied and remained firm and the stream vegetation seemed to be more diverse at this point. Good bank protection was in evidence at this point and the stream meadow had increased in width.

RECOMMENDATIONS

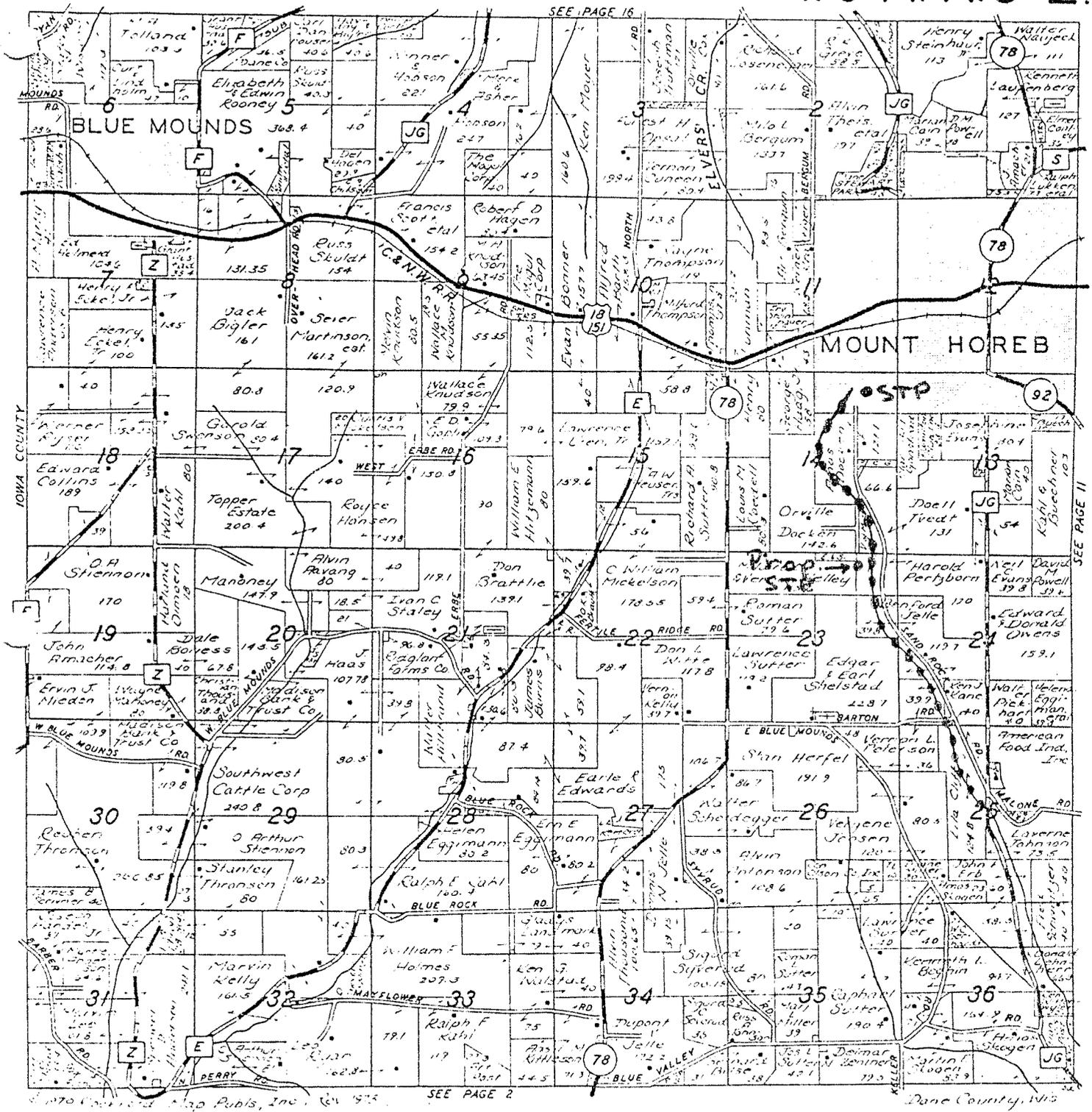
At the point of discharge at the new plant site, the stream should be classified as continuous intermediate aquatic life. This classification should hold for the entire approximate 2.2 stream mile length to County Trunk "JG". At County Trunk "JG" and for the entire remaining downstream length of the west branch of the Sugar River, the classification should be continuous fish and aquatic life.

The above recommendations represent a concurrence of opinion of the stream classification team who are as follows: Bob Bate, District Engineer; Steve Jaeger and Ron Martin, Bureau of Water Quality; Cliff Brynildson, Area Fish Manager; and Tom Bainbridge, Stream Classification Coordinator.


Tom Bainbridge

Stream Classification Coordinator

West Branch SUGAR RIVER BLUE MOUNDS MT. HOREB T. 6 N-R. 6 E.



BLUE MOUNDS TOWNSHIP OFFICERS

CHAIRMAN	ARTHUR BERGUM	MOUNT HOREB - RFD
SUPERVISORS	EDWARD COLLINS	BLUE MOUNDS - RFD
	LEO RYAN	BLUE MOUNDS - RFD
CLERK	HENRY ECKEL, JR.	BLUE MOUNDS - RFD
TREASURER	C. WILLIAM MICKELSON	MOUNT HOREB - RFD 2
ASSESSOR	ELMER CONLEY	MOUNT HOREB - RFD 1

APPENDIX B
Small Stream Survey
1973 and 1974

WEST BRANCH SUGAR RIVER AT MOUNT HOREB

The former Mount Horeb sewage treatment plant discharged to the West Branch Sugar River approximately 1 mile above the 1st town road bridge. At this location there is virtually no flow during dry weather. The existing plant is located approximately 1/2 mile below the first town road bridge.

At the first town road bridge, the Sugar River has an estimated $Q_{7,10}$ of .13 CFS. The stream flows through agricultural land with some areas being semi-wooded. Pasturing appears to be a non-point source problem in many areas of the stream.

At the point of discharge at the new plant site, the West Branch Sugar River is classified a continuous intermediate aquatic life stream. At the CTH JG bridge, the classification changes to continuous fish and aquatic life.

In 1973 and 1974 the West Branch Sugar River was studied four times while the old plant was in operation. The survey were performed by the Water Quality Evaluation Section.

