

Region WCR County St. Croix Report Date 9/1989 Classification LAR  
 Water Body: Tiffany Creek, wetland trib  
 Discharger: Glenwood City POTW

**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)
- Chemical Data (temp, D.O., etc.)
- Physical Data (flow, depth, etc.)
- Habitat Description
- Site Description/Map
- Other:

**Historical Reports in file:**

9/20/89 - Paul LaLiberte  
3/6/81 - Sam Spanel / Terry Motes

**Additional Comments/How to improve report:**

- all collected data is not included  
- LAR = wetland default

WATER QUALITY STANDARDS REVIEW  
WETLAND TRIBUTARY TO TIFFANY CREEK  
GLENWOOD CITY POTW

September 20, 1989

Paul LaLiberte

The Glenwood City POTW consists of series of series of aerated ponds followed by an artificial wetland. The wastewater discharge then flows through braided channels in a natural wetland to a railroad trestle where it crosses the tracks and enters an agricultural drainage ditch (see map). After traveling about 1/2 mile, it enters Tiffany Creek. Since the wetland was last classified in 1981, chemistry sampling and macroinvertebrate sampling were conducted. In 1985, beavers had dammed the drainage ditch, considerably slowing the flow.

METHODS

Dissolved oxygen, pH, and temperature grab sample measurements were taken in the field in accordance with the DNR field procedures manual. Other chemistry parameters were grab samples collected in accordance with the State Lab of Hygiene (SLOH) Handling and Preservation Handbook and analyzed by SLOH. Macroinvertebrate samples were collected and processed utilizing the procedures for sampling and sorting adopted by the Department in 1983. The biometrics applied were those of Hilsenhoff (1987) and Narf et al (1984). Table 1 lists Hilsenhoff's biotic index classification categories.

TABLE 1. HILSENHOFF WATER QUALITY CATEGORIES

BIOTIC INDEX	WATER QUALITY	DEGREE OF ORGANIC POLLUTION
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

Since no flow measurements were taken during the surveys, flows were estimated utilizing data from the USGS gauge on the Red Cedar River at Menomonie. Tiffany Creek is in the watershed of this gauge. For both surveys, representative data from the USGS record were averaged and a ratio of actual flow versus  $Q_{7,10}$  flow was established. This ratio was then applied to the  $Q_{7,10}$  of Tiffany Creek at Glenwood City (2 cfs) to estimate creek flow.

## RESULTS

The physical-chemical sample data appear in Table 2. A decline in BOD to background conditions occurred between the outfall the railroad tracks (sites 1-2). However, DO dropped considerably in the agricultural ditch from the railroad tracks (site 2) to the mouth (site 4). This could be caused by loss of aeration due to beaver activity and intrusion of low DO groundwater, as evidenced by the 22 percent drop in chloride. Another tributary entering Tiffany Creek further downstream was not influenced by the POTW or beavers (site 9) and showed a less pronounced reduction in DO. Only a slight drop, .3 mg/l, in Tiffany Creek DO occurred as a result of impact from the agricultural ditch and POTW. Tiffany Creek flow on 6-3-85 was estimated at 7 cfs. It was concluded that the POTW was having little or no effect on Tiffany Creek on the survey date.

As a result of the artificial wetland, very little ammonia is present in the effluent under summer conditions. To evaluate the potential for ammonia problems under winter conditions, when the POTW probably discharges high ammonia, the effluent concentration needed to exceed the water quality standard for trout streams was calculated. The conditions used were  $Q_{7,10}$  river flow, design plant flow, effluent, pH of 8.0 s.u., stream temperature of 5° C, and stream pH of 7.5 s.u. Based on experience at similar sites in WD, it was assumed that no loss of effluent ammonia occurred prior to reaching Tiffany Creek. The resultant concentration of 26 mg/l is close to that of POTW influent and, as such, does not suggest a potential problem for Tiffany Creek in the winter.

Three replicate macroinvertebrate samples were collected in a bedrock-boulder riffle adjacent to the POTW (site 8). A single macroinvertebrate sample was collected 75 feet above the Highway 170 bridge, below the POTW discharge. Since this entire reach of stream had primarily a shifting sand bottom, the sample was collected from debris and vegetation. The downstream biotic index value of 4.18 was statistically different than the average upstream value of 3.72 using the T-test procedure of Narf, et al. (1984). However, the difference was not sufficient to change the narrative description of water quality from "very good" (see Table 1).

During the unusually low flow summer of 1988, the 7-day minimum flow for Tiffany Creek was estimated as 2.54 cfs. From POTW discharge monitoring data, the highest daily load estimates that occurred during periods of low creek flow in 1988 were 25-50 lbs/da. The 50 lbs/da figure is very close to the estimated assimilative capacity for Tiffany Creek at the flows which were likely during the summer of 1988. Some loss of BOD no doubt occurs prior to the effluent reaching Tiffany Creek.

Using current POTW design flow and effluent limits, a maximum weekly average loading rate of 65 lbs/da was obtained. Using the 26 lb rule and water quality standards for trout streams, a maximum loading rate of 30 lbs/da was obtained for direct discharge to Tiffany Creek. This means that, under design conditions, the wetland tributary would have to remove 54 percent of effluent BOD. The data from 6-3-85 suggests this may be occurring. However, effluent BOD was very low on that date. The biotic index data, collected after higher loading rates were discharged under near  $Q_{7,10}$  conditions, detected a small impact on water quality.

#### RECOMMENDATIONS:

1. The current effluent limits be expressed as lbs/da in addition to concentration in the WPDES permit to insure excessive loads do not overwhelm the existing receiving water system. This should be done at the next permit issuance.
2. A waste load assimilation study should be undertaken to determine if lower loading limits are needed to protect Tiffany Creek water quality.
3. The 1981 stream classification should remain unchanged.

#### REFERENCES

Hilsenhoff, W. L. 1987. An Improved Biotic Index of Organic Stream Pollution. Great Lakes Entomologist. Vol. 20, #1, page 31.

Narf, R. P., Lange, E. L., and Wildman, R. C. 1984. Statistical Procedures for Applying Hilsenhoff's Biotic Index. Journal of Fresh Water Ecology. Vol. 2, #5, page 441.

enc

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TABLE 2. PHYSICAL - CHEMICAL DATA FROM 6-3-85

SITE	LOCATION	TIME	TEMP.	DO	PH	BOD6	SUSP. SOLIDS	NH3-N	CL	COMMENTS
1	POTW OUTFALL	08:10	13	12.2	9.65	7.1	5	0.1	51	
2	RR CROSSING	07:55	10	5.9	7.35	2.2	13	0.16	49	
3	ABOVE BEAVER DAM	07:00	8	2.8	7	2.2	14	0.07	38	TURBID WATER, SOME PLANKTONIC ALGAE
4	MOUTH OF DRAINAGE DITCH	07:05	8	3.9						
5	TIFFANY CR. ABOVE DRAINAGE DITCH	07:10	8	10.3	7.45	2.2	18	0.09	11	
6	TIFFANY CR. BELOW DITCH 100YDS	07:20	8	10.1						
7	TIFFANY CR. BELOW DITCH 200YDS	07:25	8	10.1	7.65	1.5	29	0.09	12	
8	TIFFANY CR. ABOVE SECOND TRIB.	07:45	8	10						
9	SECOND TRIB. BELOW THE POTW	07:40	7	4.7						SIGNIFICANT FLOW OF CLEAR WATER, NO BEAVERS



GLENWOOD CITY, ST. CROIX COUNTY

Wastewater Receiving Stream Classification

Receiving Stream: Drainage Area Tributary to Tiffany Creek

Location: T30N, R15W, Sections 25, 26, 35, and 36

The Glenwood City wastewater treatment system is comprised of a 23-acre primary stabilization pond with two overflow wiers to about a 7-acre secondary pond. An emergency overflow structure to Tiffany Creek also exists on the south side of the primary pond.

The system was originally sized to include a dairy plant which ceased operation. One-quarter mile of a tributary was re-routed and one mile of Tiffany Creek was straightened to allow for construction of the ponds. The excavation area for the system included the old stream channels. The primary pond was not sealed and allegedly, bedrock was encountered during excavation. As a result of the above factors, the primary pond held little water as can be seen from the attached 1976 aerial photograph photocopy. The primary pond did fill up during the summer of 1980 and experienced a short-term overflow into the secondary pond. The pond was about one foot below the wier control level at the time of the stream classification.

Tiffany Creek is a class II trout stream and young-of-the-year brook trout were observed on March 6, 1981, at the section 26/35 east/west town road crossing of the south branch about one mile west of the treatment facility. The stream flows from west to east. Land adjacent to the stream is intensively pastured with severe streambank erosion where it flows along the east half of the section 26/35 line. From the town road crossing near the 25, 26, 35, 36 section corner, 3/4 mile east between the stabilization pond (north side) and E/W town road (south side) to a railroad crossing, the stream has been channelized. Adjacent land use is wetland, roadside, pond dike, and cropland. Vegetation varies from grass to shrubs to larger trees. The streambank is stable. Stream bottom substrate in this section includes sand and silt, bedrock, rock and gravel with sand and bedrock being dominant. One beaver dam is present and located south of the mid-point of the primary pond south dike. Except for the intensive pasturing and in spite of being channelized, the stream is in very good condition down to the railroad crossing.

Land surrounding the west, north, and east sides of the treatment facility is characterized by abandoned stream channels, high groundwater, open standing water, organic soil and wetland vegetation. The area of this land type is about 30 acres. A facility access road from the west bisects that area into northeast/southwest halves. Seasonal high water floods small portions of the wetland due to runoff flow through the area (north and northwest of facility) and due to reutilization of old flow channels (west and east of facility). Common wetland vegetation noted were cattails, reed canary grass, tag alders, grey dogwood, red osier dogwood and willow. Wetland classifications according to Fish and Wildlife Circular 39 would be type 2 - inland fresh meadow, type 3 - inland shallow fresh marsh and type 6 - shrub swamp.

Recommendation

The drainage area surrounding the Glenwood City wastewater stabilization ponds which is tributary to Tiffany Creek shall be classified as a wetland. Tiffany Creek shall be classified as fish and aquatic life suitable for cold water sport fish, i.e. as a class II trout stream.

Evaluation Date: March 6, 1981

Personnel: Sam Spanel - Environmental Engineer - Eau Claire Area  
Terry Moe - Water Quality Management Leader - West Central  
District

LENWOOD CITY WASTEWATER STABILIZATION PONDS - AUG. 6, 1976



