

Region NOR County Lincoln Report Date 4/1995 Classification LAL
 Water Body: Wisconsin R., Trib to
 Discharger: C. of Tomahawk WWTP

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 channelization -- can it be reversed?
- 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 poor habitat
- 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 good
- Site Description/Map
- Other: photos

Historical Reports in file:

4/1995 - B Jaeger

Additional Comments/How to improve report:

- LAL bic determined to be effluent channel
- report states that unnamed trib could potentially support LFF comm
- T&E species (wood turtles) at site -- BER does not believe trib is imp. habitat for turtles.
- stream limited by channelization, low flow (natural) & poor habitat

April 95

RECOMMENDATION FOR STREAM CLASSIFICATION OF AN UNNAMED
TRIBUTARY TO THE WISCONSIN RIVER WHICH RECEIVES EFFLUENT FROM
THE CITY OF TOMAHAWK WASTEWATER TREATMENT PLANT

Setting and Effluent Description. The City of Tomahawk has for many years discharged it's wastewater effluent to an unnamed tributary of the Wisconsin River that has never been classified to determine the water uses and standards that can be supported. Currently the effluent limits for the Tomahawk wastewater discharge are set to protect the uses of the Wisconsin River but not the unnamed tributary. In the Tomahawk area the Wisconsin River is wasteload allocated and the river model has always been calibrated and run assuming direct discharge to the Wisconsin River. Since the distance from the outfall to the river is only about one-half mile there is probably only minimal assimilation of the wastewater in the tributary and the discrepancy probably is not causing any significant inaccuracy in the model.

The design wastewater flow for Tomahawk is 720,000 gallons per day. Effluent limits are the standard "secondary" limits of 30 milligrams per liter (parts per million) of biochemical oxygen demand and suspended solids. Ammonia and phosphorus removal are not required at this time. Tomahawk presently is in the planning process for a treatment plant upgrade. A significant increase in the design flow is expected. Two papermills also discharge to the Wisconsin River in the Tomahawk area.

Stream Characteristics. The Wisconsin River supports warmwater aquatic life including a sport fishery that attracts many anglers. The seven day average low flow with a 10 year recurrence interval (stream model design flow) is 750 cubic feet per second in the Tomahawk reach of the river.

The unnamed tributary was surveyed on August 11, 1993 and again on June 24, 1994. It is a channelized ditch for it's entire length of about 1/2 mile. The tributary averages about 8 feet wide and 1/3 foot deep. Maximum width is about 15 feet and maximum depth is only about one foot. Water sources for the tributary are the wastewater effluent, drainage from riparian wetland, and discharge from a drainage system in the earthen portion of the Tomahawk Dam on the Wisconsin River. Water filters through the earth of the dam and is collected in a subsurface drainage system that discharges to the unnamed tributary. The quality of the dam drain water does not appear to be very high. On June 24, 1994 it had an oxygen concentration of only 1.7 parts per million. It also appeared to contain some of the rust red turbidity of oxidized iron and filaments of iron bacteria. Apparently the water from the earthen dam contains a significant concentration of reduced iron. This is expected to be a constant and largely uncontrollable source of water quality degradation for the tributary.

The author of this report was not able to find definitive documentation of the reason the channel was originally excavated, when it took place, or if there was a stream present before the ditching was done. The origin of the ditching is important because NR 104, the stream classification code, specifies the Limited Aquatic Life classification "shall be applied to all surface waters classified as effluent channel". The land riparian to the ditch is mostly undeveloped woodland. Much of it is wooded wetland. During the site visits no evidence of an old natural stream channel was found. The watershed contributing to the tributary is quite small. It is very possible there was no natural stream channel and the surface water was diffuse over the wetland. Supporting this argument is that the last approximately 150 feet of the ditch before it meets the Wisconsin River has obviously been dug through an esker and there is no place for a natural stream to have connected to the river. There is no farmland immediately along the tributary so it cannot be an

agricultural ditch. The original facility plan for the current treatment plant site indicates at least part of the ditch predates the existing outfall. The pre-existing ditch was probably constructed to convey wastewater from the dam drainage system. It also appears at least part of the ditch was constructed to convey wastewater from the Tomahawk WWTP outfall. The ditch originates at the WWTP outfall and there is no other reason for the presence of the ditch at the outfall.

The background stream flow rate for this tributary has not been estimated but is expected to be much less than one cubic foot per second because of the small size of the watershed. The flow from the earthen dam drain was not measured because it's velocity was too slow to practically measure. Visually it was much smaller than the municipal wastewater flow rate and appeared to be only a small fraction of a cubic foot per second. Oxygen concentration in the tributary was measured during the June 24, 1994 visit. It ranged from 3 ppm near the Wisconsin River to 4.3 ppm near the wastewater outfall.

On the days of the stream surveys the biological quality of the tributary was not very good. No fish of any kind or size were noted in the tributary. A quick look at the aquatic macroinvertebrates revealed a predominance of blackfly larvae, sow bugs, midge larvae and sludge worms, all indicators of poor water quality. Occasionally seen were colonies of red sludge worms which indicates the stream is enriched with organic material. The bottom substrate of the stream is about 65% sand, 30% muck and a short stretch of gravel where the gradient increases near the Wisconsin River. It is not very high quality habitat for aquatic life. The small size and shallowness of the stream would restrict a permanent fishery to only small individuals a few inches in length. A Stream System Habitat Rating Form was completed for the unnamed tributary and resulted in a score of 222 which places the habitat in the "poor" category. The main factors for the unfavorable rating were the stream's shallowness, low quality bottom substrate, low natural stream flow and channelization. In a few areas aquatic plants were present but shading by the streambank overstory limits the macrophyte community. A large variety of dragonfly adults were flying above the stream during the late June visit but it is uncertain how important the tributary is to their life cycle considering all the wetland and river habitat available in the area.

It is interesting to note that on both visits to this stream wood turtles were found which is a Wisconsin threatened species. On the August 11, 1993 visit one individual was found in a meadow about 200 feet from the tributary. On June 24, 1994 three individuals were found in the tributary. All three were together in a small pool. All of the wood turtles found were adult sized. Bob Hay of the Bureau of Endangered Resources was contacted and he didn't think the tributary was particularly important habitat to the turtles.

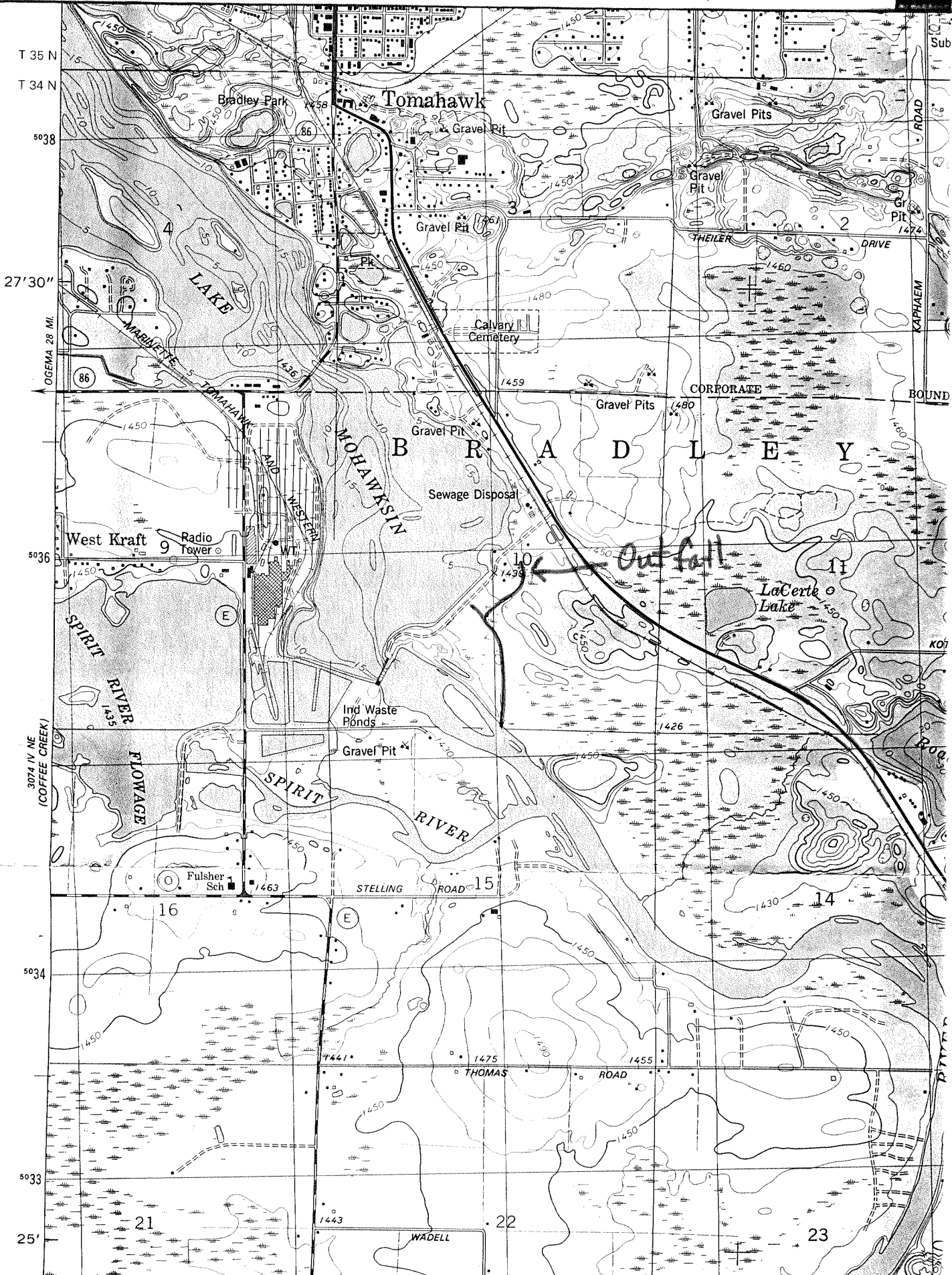
Beneficial Uses and Classification. The Unnamed Tributary is not capable of supporting a wide variety of uses. It is too small to support most water recreational use. It has only limited potential as aquatic habitat. Although it is situated in a pleasant natural setting it isn't a significant aesthetic asset because it is an artificial channel. It is unlikely to be used as a water supply for any domestic, industrial or agricultural purposes. At present the only apparent beneficial use is as a conduit to carry away wastewater.

Although the habitat is low quality the tributary could support a small population of forage fish if the water quality were improved. It could also support a better quality invertebrate population. The wastewater effluent is the source of most of the water flow in the tributary. The design consultant believes direct discharge to the Wisconsin River would be less costly than ammonia removal. It is difficult to predict what aquatic life could be supported if the wastewater effluent were removed from the tributary. The stream flow would be greatly reduced but the dam drainage system would maintain some constant flow. It is the judgement of the author that there would still be habitat to support some forage fish and aquatic invertebrates. This reasoning leads to the conclusion the unnamed tributary could potentially

support uses that fit the Limited Forage Fish classification (also known as "intermediate surface waters").

Recommendation. Although the origin of the ditch is not entirely clear it appears to have been constructed to convey wastewater. The hydrologic classification of the unnamed tributary to the Wisconsin River that receives the effluent from the Tomahawk wastewater treatment plant should be Wastewater Effluent Channel. It should be designated Limited Aquatic Life (marginal surface water) as required in NR104.02(3)(b). The effluent limits which are applied to this classification are listed in Table 2 of NR104 and include 20 mg/l monthly average BOD₅ and suspended solids limits and a minimum oxygen concentration of 4 mg/l.

Prepared by: William C. Jaeger 3/31/95
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Water Quality Biologist



T 35 N

T 34 N

5038

27'30"

OGEMA 28 MI

86

5036

3074 IV NE
(COFFEE CREEK)

5034

5033

25'

Bradley Park

Tomahawk

Gravel Pits

LAKE

Calvary Cemetery

THEILER DRIVE

KAPHAEM ROAD

CORPORATE BOUND

MOHAWESIN AND WESTERN

BRADLEY

West Kraft

Radio Tower

Sewage Disposal

Gravel Pits

LaCerte Lake

SPIRIT RIVER

Ind Waste Ponds

Gravel Pit

SPIRIT RIVER

STELLING ROAD

Fulsher Sch

THOMAS ROAD

WADELL

Sub

KOI

ROAD

PIPER

16

15

14

21

22

23

Outfall



Tomahawk WWTP Outfall.



Tomahawk Earth Dam Drain Outfall.



Unnamed Tributary About Midway Between
WWTP Outfall And The Wisconsin River



Unnamed Tributary Just Upstream Of
Confluence With The Wisconsin River

Stream Unnamed Tributary STP below Tom's house Reach Location entire, outfall to W. River Reach Score/Rating 222
 County Lincoln Date 8/11/93 Evaluator W.C. Jaeger Classification _____

Rating Item	Category			
	Excellent	Good	Fair	Poor
Watershed Erosion	No evidence of significant erosion. Stable forest or grass land. Little potential for future erosion. <u>(8)</u>	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. <u>8</u>	Some potential sources (roads, urban area, farm fields) <u>Dam drains (10)</u>	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. <u>(4)</u>	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. <u>(6)</u>	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. <u>(8)</u>	Adequate. Overbank flows rare. W/D ratio 8-15. 10	Barely contains present peaks. Occasional overbank flow. W/D ratio 15-25. 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. <u>(18)</u>
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. 8	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. <u>(20)</u>
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. 17	Less than 10% rubble gravel or other stable habitat. Lack of habitat is obvious. <u>(22)</u>
Avg. Depth Riffles and Runs	Cold >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	Cold >4' 0 Warm >5' 0	3' to 4' 6 4' to 5' 6	2' to 3' 18 3' to 4' 18	<2' 24 <3' 24
Flow, at Rep. Low Flow	Cold >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 without 24 <1 cfs STP 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. 16	>25. Essentially a straight stream. Generally all flat water or shallow riffle. Poor habitat. <u>(20)</u>
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. <u>(14)</u>	Stream does not enhance aesthetics. Condition of stream is offensive. 16
Column Totals:	<u>26</u>	<u>10</u>	<u>14</u>	<u>152</u>

Column Scores E 26 + G 10 + F 14 + P 152 = 222 = Score