State of Wisconsin
Department of Natural Resources
dnr.wi.gov

Fish and Aquatic Life Use Designation Summary

Form 3200-121 (12/04)

(Attach supporting data sheets)

Use Designation Information – Required

Water Body Name	WBIC #	Date
Unnamed Creek 26-12	1397200	02/23/2005

Region: ☐ NER ☐ NOR ☐ SCR ☐ SER ☑ WCR

Basin: Central Wisconsin

County: Wood

Quad Map Where Segment is Shown

Wisconsin Rapids North

Reference Site(s) (Attach use designation form for reference site/cond.)

Mosquito Creek (Supporting data can be found in attached report)

Segment Description for Segment 3 of 3 (headwater = segment 1)

From:

The mouth in T23N R6E Sec 34 NW NW upstream 4.7 miles

upstream 5 ☑ mi., ☐ km., ☐ ft., ☐ M.

Latitude:	DEG	MIN	SEC	
	44	26	04.0000	N

Longitude:	DEG	MIN	SEC		Datum Used
	089	47	03.0000	W	

Township		Range	☑ E ☐ W	Section	¼-Section	¼, ¼-Section
23	N	06		34	NW	SE

To:

The tributary in T23N R6E Sec 16 SE NW

Latitude:	DEG	MIN	SEC	
	44	28	31.0000	N

Longitude:	DEG	MIN	SEC		Datum Used
	089	47	51.0000	W	

Township		Range	☑ E ☐ W	Section	¼-Section	¼, ¼-Section
23	N	06		16	NW	SE

Attach site map and photos (prefer digital) showing stream segment and discharge point.

Date Fieldwork Conducted/Completed: 07/17/2004

Use Designation Status:
- ☐ New Use Designation (First Field Assessment)
- ☑ Standards Review (Updating Previous Field Assessment)
- ☐ Reference Site

Current Codified Fish and Aquatic Life Use Designation:
- ☐ Coldwater Community
- ☐ Warmwater Sport Fish Community
- ☐ Warmwater Forage Fish Community
- ☐ Tolerant Fish and Aquatic Life Community (LFF)
- ☑ Very Tolerant Aquatic Life Community (LAL)

- ☐ Default
- ☐ Field Assessment – Date (mm/dd/yyyy): _____

Existing FAL Use Based on Current Data:
- ☐ Coldwater Community
- ☐ Warmwater Sport Fish Community
- ☑ Warmwater Forage Fish Community
- ☐ Tolerant Fish and Aquatic Life Community (LFF)
- ☐ Very Tolerant Aquatic Life Community (LAL)

Recommended Attainable Use Designation:
- ☐ Coldwater A (Coldwater)
- ☐ Coldwater B (Coldwater)
- ☑ Diverse Fish and Aquatic Life
- ☐ Tolerant Fish and Aquatic Life (LFF)
- ☐ Very Tolerant Aquatic Life (LAL)

Recommended Seasonal Use Designation(s): Effective Date: (mm/dd/yyyy)
- ☐ Coldwater A (Coldwater) _____ to _____
- ☐ Coldwater B (Coldwater) _____ to _____
- ☐ Diverse Fish and Aquatic Life _____ to _____
- ☐ Tolerant Fish and Aquatic Life (LFF) _____ to _____
- ☐ Very Tolerant Aquatic Life (LAL) _____ to _____

Other Applicable Uses (as recognized by existing administrative rule):
- ☐ Outstanding Resource Water
- ☐ Exceptional Resource Water
- ☐ Great Lakes System
- ☐ Public Drinking Water Supply
- ☐ Recreational Use
- ☐ Wildlife

Community Types:
- ☐ Class I Trout
- ☐ Class II Trout
- ☐ Class III Trout
- ☐ Coldwater A
- ☐ Coldwater B
- ☑ Game Fish
- ☑ Non-Game Fish
- ☐ Macroinvertebrates
- ☐ Endangered/Threatened Species
- ☐ Intolerant Species
- ☐ Coolwater
- ☐ Tolerant Fish
- ☐ Tolerant Macroinvertebrates

Water Body Name	WBIC #	Date
Unnamed Creek 26-12	1397200	02/23/2005

Use Designation Information (continued)

Basis for Use Designation Decision (List and briefly discuss key elements for the decision) – Use Attachment A, if necessary

See Attached Report

Discharger Information – Required

Municipality/Company	WPDES Permit Number	Date Permit Issue	Permit Renewal
Village of Rudolph WWTP and Wisconsin State Dairy Cheese INC	0021288		

Outfall Location

T23N R6E Sec 9 SW NW

Contact Person	Contact Date(s)

Did a Representative Observe Field Assessment? ☐ Yes ☑ No

Representative	Telephone Number (include area code)

Comments about facility representative's observations, etc.

Literature Review – Use Attachment B, if necessary

1. Previous classification reports and use designations – cite here and attach

The original stream classification survey was completed on July 27, 1976. The current NR 104 classifications are based on recommendations in the report.

2. All previous studies and data associated with the water body that are applicable to use designation – cite here and attach

Stream observations were made on 10/8/76. Standards review completed in 1995 including a flow measurement and a few water chemistry samples. Stream observations completed at three sites in October 1996. Stream observations at one site in 2003.

3. Is stream listed as trout water in Wisconsin Trout Streams? ☐ Yes ☑ No If yes, cite here and attach a copy

4. Any other literature applicable to the fish and aquatic life use designation – cite here and attach

5. Summarize and interpret the literature available and how it relates to and supports the recommended use designation

Stream observations completed support a higher classification than Limited Aquatic Life or Very Tolerant Aquatic Life. Most observations indicate that minnows were observed in the stream suggesting a higher classification than VTAL.

Water Body Name	WBIC #	Date
Unnamed Creek 26-12	1397200	02/23/2005

Field Assessment Data and Observations – Use Attachment C, if necessary

Assessment Date (mm/dd/yyyy)	Additional Assessment Date(s):		
06/29/2004	07/19/2004	07/26/2004	

Stream Segment Physical/Chemical Data:

Length	255	☐ feet	☑ meters ☐ miles
Avg. Width		☐ feet	☐ meters
Max. Width		☐ feet	☐ meters
Avg. Depth		☐ feet	☐ meters
Max. Depth		☐ feet	☐ meters

Gradient _____ Velocity _____

Substrate Material:

Silt _____% Organic _____%
Rubble _____% Gravel _____%
Sand _____% Other _____%

Stream Flow _____ cfs ☐ Measured ☐ Estimated
At time of assessment, flow was: ☐ High ☐ Low ☐ Very Low
7Q2 Flow _____ cfs
7Q10 Flow _____ cfs

Stream Temperature _____ °C ☐ Instantaneous ☐ 24-Hr. Maximum ☐ 24-hr. Avg.
Dissolved Oxygen (Instantaneous) _____ mg/L Time of Day ____:____ ☐ am ☐ pm
Minimum Dissolved Oxygen Recorded _____ mg/L Time of Day ____:____ ☐ am ☐ pm
Maximum Dissolved Oxygen Recorded _____ mg/L Time of Day ____:____ ☐ am ☐ pm
Method of Analysis: ☐ Meter ☐ Modified Winkler Method

Effluent Flow:

Daily Average .19 cfs ☑ Measured ☐ Estimated
Design Flow .26 cfs (Convert MGD to cfs by multiplying by 1.55)

Chemical Data Collected: (STORET # _____)

☐ Ammonia ☐ Pesticides ☐ Other: _____
☐ Atrazine ☐ Phosphorus ☐ Other: _____
☐ Bacteria ☐ Metals ☐ Other: _____

Brief Interpretation/Comments:

This segment was evaluated at two stations. Physical data, streamflow, gradient and continuous dissolved oxygen measurements are different for each station. See Attached Report for details.

Habitat – Use Attachment D, if necessary

Procedure:
☑ Guidelines For Evaluating Fish Habitat in Wisconsin Streams (Simonson, Lyons and Kanehl, 1994)
☐ Development and Evaluation of a Habitat Rating System For Low Gradient Wisconsin Streams
☐ Other – Describe: _____

Habitat Rating – Attach Habitat Rating Forms: ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Significant Problems Affecting Use Attainment:
☐ Low-flow ☐ Sedimentation ☐ Bank Erosion ☐ Ditching ☐ Fish Cover ☐ Depth
☐ Other – Describe: _____

Observations About Habitat Quality:

A Lyons habitat survey was completed at two stations within this segment. See attached report for details.

Water Body Name	WBIC #	Date
Unnamed Creek 26-12	1397200	02/23/2005

Biological Data – Fish data is required

Fish:

Sampling Date (mm/dd/yyyy) 07/01/2004

Species List and IBI Forms: ☑ Attached to Report ☐ Not Applicable

Survey Location(s) Two Stations including downstream of 3rd Ave. and upstream from Oak Road; data below combined

Distance Sampled 255 ☐ feet ☑ meters ☐ miles

Sampling Gear: ☑ Backpack Shocker ☐ Other – Describe: _____

Number of Species Collected 14 Total Number of Fish Collected 1107

Number of Intolerant Species 1 % Intolerant Species _____

Endangered or Other Special Category Species Collected:

Species _____ No. of Individuals Collected _____

Species _____ No. of Individuals Collected _____

Species _____ No. of Individuals Collected _____

IBI Score _____ Rating _____

Macroinvertebrates:

Sampling Date (mm/dd/yyyy) _____ ☐ HBI ☐ FBI

Survey Location(s) _____

Sampling Procedure _____

☐ Less than 100 organisms were found – List Dominant Genera, etc.:

Genus _____ Number Found _____ HBI Score _____

Genus _____ Number Found _____ HBI Score _____

Genus _____ Number Found _____ HBI Score _____

☐ More than 100 organisms found – Attach taxonomy bench sheet or other analyses

Other Biological Data/Observations – Use Attachment E, if necessary

The IBI could not be calculated for one of the two sites due to small nature of the stream. See Attached Report for details.

Interpretations Based on Existing Fish and Aquatic Life Community – Use Attachment F, if necessary

See Attached Report

WATERSHED DATA AND OBSERVATIONS – Optional (Please answer to the best of your ability. Estimates are acceptable.)

Approximate Area _____ ☐ Acres ☐ Square Miles

Land Use: Crop Land _____% Pasture _____ % Forest _____%

Grass Land _____% Urban _____ % Wetland _____%

Number of Feedlots/Barn Yards Near Stream _____

Other Nonpoint Sources _____

Water Body Name	WBIC #	Date
Unnamed Creek 26-12	1397200	02/23/2005

WATERSHED DATA AND OBSERVATIONS (continued) – Use Attachment G, if necessary

Is this watershed currently or proposed to receive nonpoint source management under a State, Federal or local organization?

☑ No ☐ Yes List Date(s) (mm/dd/yyyy) _____ _____ _____

Explain _____

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

See Attached Report

VTAL/TFAL Justification – Required – Use Attachment H, if necessary

Note: This section must be completed when the use designation is tolerant fish and aquatic life (formerly LFF) or very tolerant aquatic life (formerly LAL)

Recommended Attainable Use Designation: ☐ **TFAL** ☐ **VTAL**

Tolerant Fish and Aquatic Life and Very Tolerant Aquatic Life use designations (LFF & LAL) are not defined as full fish and aquatic life uses. However, these uses are in most cases the best use that can be attained by these resources due to 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 (sec. 283.15, Stats.). Check all that apply to this use designation 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:

Prepared By

Preparer Signature	Printed Name	Date Prepared

Water Body Name	WBIC #	Date
Unnamed Creek 26-12	1397200	02/23/2005

Author and Peer Review

The author should submit a peer-reviewed report to Watershed Program Coordinator for review and approval.

Submitted By	Date
Mark Hazuga	04/21/2005
Peer Reviewed By	Date
Paul La Liberte	04/05/2005

Approval Signatures

Review, approval, and signature by the Watershed Program Coordinator (Expert), Regional Water Leader (or designee) as well as the Water Quality Standards Section Chief (or designee) is required.

Printed Name of Watershed Program Coordinator (Expert)	Watershed Program Coordinator (Expert) Signature	Date
Paul Laliberte		
Printed Name of Regional Water Leader (or designee)	Regional Water Leader (or designee) Signature	Date
Dan Baumann		
Printed Name of Water Quality Standards Section Chief (or designee	Water Quality Standards Section Chief (or designee) Signature	Date

Final Report Distribution List

Once the Use Designation Report has been approved by the Water Quality Standards Section Chief (or designee), the report can be distributed to the appropriate individuals, as listed below. Please indicate below individuals who should be copied on final report distribution. It should be noted that the classification recommendation in the report does not become official until it is approved by the Natural Resources Board and adopted into Wisconsin Administrative Code.

Facility Contact _____

Basin Engineer Pete Pfefferkorn

Basin Planner _____

Effluent Limits Calculator Pat Oldenburg

Endangered Resources _____
(when T&E Species Present)

Other Interested Parties:

_____

_____

_____

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: December 7, 2004 FILE REF: [Click **here** and type file ref.]

TO: Pat Oldenburg – Eau Claire
Paul Laliberte – Eau Claire
Pete Pfefferkorn – Wisconsin Rapids
Laura Bub – Madison
Rudolph File
Wisconsin State Dairy Cheese File

FROM: Mark Hazuga - Wausau

SUBJECT: Rudolph and Wisconsin State Dairy Cheese Stream Classification

The Village of Rudolph Waste Water Treatment Plant (WWTP) consists of two aerated lagoons with a submerged plate diffuser system. The lagoons are separated by a fabric fence to provide a quiescent zone. The average annual design flow of the plant is 0.125 MGD or 0.2 cfs. Final effluent is discharged to an unnamed tributary of the Wisconsin River in the Wisconsin Rapids Watershed (UW08).

Wisconsin State Dairy Cheese Company Inc. operates a natural cheese production facility and a whey processing plant. Process wastewater and permeate from the reverse osmosis system are treated and discharged to the same unnamed creek that receives the Village's discharge. The average annual design flow of the treatment plant is 0.0419 MGD or 0.06 cfs.

Stream Background

The unnamed creek or Rudolph tributary is a six-mile warm water tributary to the Wisconsin River. According to the USGS 7.5 minute QUAD map, the stream is intermittent for its entire length. The original stream course near the mouth has been altered based on the 1840 Government stream history survey. The stream originally emptied into the Wisconsin River in T23N R6E Sec 26. The stream now enters an unconnected backwater of Biron Flowage near the original location of the mouth. An artificial channel was created to divert the backwater around the flowage into the river below the Biron Dam (Figure 1).

Currently the unnamed creek receives two classifications in NR104. The stream is classified as a Limited Aquatic Life effluent ditch from the Village of Rudolph's outfall downstream to Plum Road. The Limited Aquatic Life classification continues from this point downstream to the confluence with a tributary in T23N R6E Sec 26. From this tributary downstream to the confluence with the Wisconsin River the stream receives the Limited Forage Fish classification (Figure 2).

Stream Classification Surveys in 2004

Baseline monitoring activities were completed on streams in the Wisconsin Rapids Watershed during the summer of 2004 including the Rudolph tributary. Fish and habitat surveys were completed at three sites on the Rudolph tributary including Oak Road (site one), Third Avenue (site two) and Plum Road (site three). Continuous dissolved oxygen (DO) monitoring was also completed at the three sites during a seven-day deployment in mid-July. On the day habitat evaluations and streamflow measurements were collected the combined effluent flow from the point sources was 0.19 cfs which constituted the entire flow in the upper stream reaches. Monitoring results are found in Table 1.

Baseline surveys and continuous DO monitoring completed on other streams in the Wisconsin Rapids Watershed provided several reference sites for the Rudolph stream classification survey. The reference sites provide an opportunity to evaluate the fishery potential of the Rudolph tributary without the presence of effluent.

Rudolph Tributary and Selected Reference Sites

Site One – Oak Road

The Rudolph tributary at Oak Road is located approximately 3.4 miles downstream from the Rudolph WWTP outfall and 2.3 miles upstream from the mouth. A fishery and habitat survey was completed in a 120 meter station upstream from the bridge. Fishery survey results found 652 fish per 100 meters represented by 14 species. The percent of fish tolerant to low dissolved oxygen was 21%. The dominant fish species collected include creek chub, white sucker and brook stickleback. One young of year northern pike was also collected during the survey.

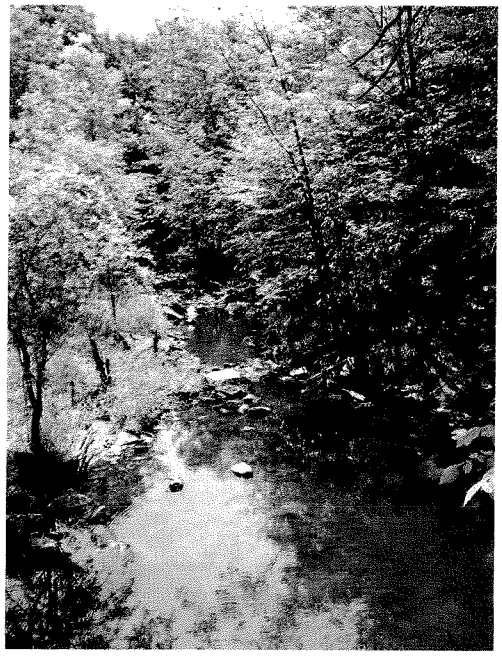
In-stream habitat was evaluated and received a qualitative rating of good. The stream channel averaged 5.5 meters wide and had an average depth of 0.41 meters in runs and pools. Substrate consisted mostly of boulder, cobble and gravel with some sand. Riffles, runs and pools were present within the station, however pool habitat was an overly dominant feature. A high percentage of pool area creates a monotypic habitat that reduces habitat and biological diversity. Stream gradient calculated for the site was 25 feet per mile. Adult and forage fish cover was abundant and consisted mostly of boulders in the pools. An instantaneous streamflow measurement was 0.41 cfs indicating streamflow increased from the headwaters as a result of groundwater input. Filamentous algae growth was abundant in the large pools suggesting excessive nutrients are available for growth.

DO saturation values fluctuated from 50% to 140% during the deployment period indicating respiration and photosynthesis of algae influenced oxygen concentrations in the stream. Dissolved oxygen concentrations spent 4% of the time below the water quality standard of 5 mg/L (Figure 3).

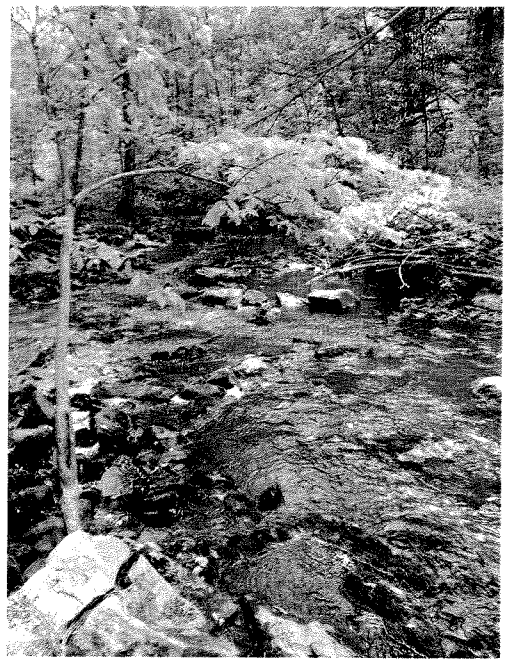
Reference Site for Oak Road

Surveys completed on Mosquito Creek at Stone Road provide a potential reference site for the Rudolph tributary at Oak Road. This site was similar to the Rudolph tributary at Oak Road in size and substrate composition but the Mosquito Creek site had a larger drainage area and a more balanced pool to riffle ratio. The instream habitat rating was excellent. Fish survey results found 697 fish per 100 meters represented by 15 species. The percent of fish tolerant to low dissolved oxygen was 9%. The dominant fish species collected include blacknose dace, creek chub and johnny darter.

DO saturation values fluctuated from 60% to 125% during the deployment period indicating photosynthesis had some influence on increasing the dissolved oxygen concentrations. Filamentous algae and aquatic plants were not observed within the station, however photosynthetic activity may have been occurring upstream where there was less canopy cover. Dissolved oxygen concentrations never fell below the water quality standard of 5 mg/L.



Rudolph Tributary at Oak Road
(Baseflow Conditions)



Mosquito Creek at Stone Road
(>Baseflow Conditions)

Site Two – Third Avenue

The Rudolph tributary at Third Avenue is located approximately 2.3 miles downstream from the treatment plant outfall. A fishery and habitat survey was completed in a 120 meter station starting downstream from the bridge. Fishery survey results found 271 total individuals per 100

meters represented by 8 species. The percent of fish tolerant to low dissolved oxygen was 55%. The dominant fish species collected include central mudminnow, creek chub, brook stickleback and white sucker. Electro-shocking efficiency was not optimal due to the highly conductive water.

In-stream habitat was evaluated and received a qualitative rating of fair. The stream channel averaged 2.3 meters wide and had an average depth of 0.24 meters in runs and pools. Substrate consisted mostly of fine sediment (sand, silt and clay) that embedded gravel. Habitat features consisted of pools, shallow runs, bends and a few riffles. Stream gradient calculated for the site was 12.5 feet per mile. Adult fish cover was scarce but forage fish cover consisted of pools and woody debris. Filamentous algae growth was present within the survey station but was more abundant upstream from Third Avenue where no canopy shading was present. Aquatic plants were observed growing in the Third Avenue bridge pool. An instantaneous streamflow measurement was 0.28 cfs indicating streamflow was dominated by effluent. The increase in streamflow from the headwater reaches is likely a result of some ground water input.

DO saturation values fluctuated from 14% to 160% during the deployment period indicating respiration and photosynthesis of algae and aquatic plants had a significant influence on oxygen concentrations in the stream. Dissolved oxygen concentrations spent 40% of the time below the water quality standard of 5 mg/L.

Reference Site for Third Avenue

Surveys completed on Mosquito Creek at Zubella Road provide a reasonable reference site for the Rudolph tributary at Third Avenue. This site is similar in size and drainage area as the Rudolph tributary but had more riffles, bends and coarse substrate. The instream habitat rating was good, however the survey was completed during above normal streamflow. Fishery survey results found 207 total individuals per 100 meters represented by 10 species. The percent of fish tolerant to low dissolved oxygen was 75%. The dominant fish species collected include brook stickleback, creek chub and central mudminnow. Minimal streamflow was observed by the middle of summer.

DO saturation values fluctuated from 60% to 98% during the deployment period indicating photosynthetic activity was not a significant problem in the stream. This site was completely shaded and no significant growth of aquatic plants or algae was observed during the surveys.

Rudolph Tributary at Third Ave. (Baseflow Conditions)

Mosquito Creek at Zubella Road (Baseflow Conditions)

Site Three – Plum Road

Plum Road is located approximately 0.9 miles downstream from the treatment plant outfall. A fishery and habitat survey was completed in a 100 meter station starting upstream from the bridge pool. Fishery survey results found 80 individuals represented by two species, which included brook stickleback and central mudminnow. The percent of fish tolerant to low dissolved oxygen was 100%. Electro-shocking efficiency was not optimal due to the highly conductive water.

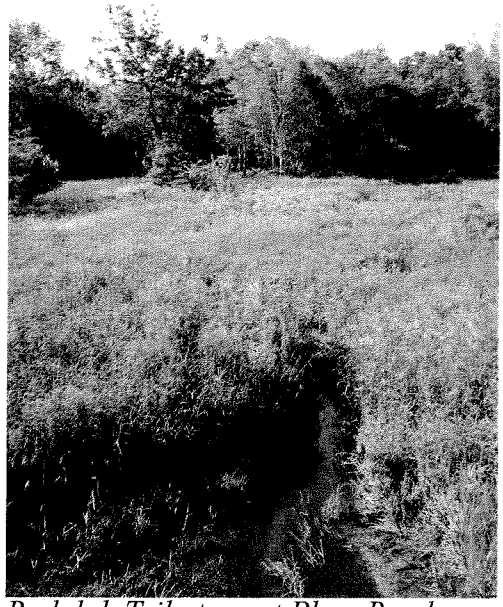
In-stream habitat was evaluated but the stream was too small to assign a qualitative rating. The stream channel averaged 1.18 meters wide and had an average depth of 0.21 meters in runs and pools. The stream flows through a wetland area and was ditched in the past. Habitat features consisted of shallow pools, runs and small shallow riffle areas. Substrate composition was dominated by fine sediment that significantly embedded gravel and cobble. Stream gradient calculated for the site was 12.5 feet per mile. Forage fish cover consisted of woody debris and overhanging reed canary grass that was growing over much of the channel. Measured streamflow at the site was 0.22 cfs indicating streamflow consisted of effluent discharged from the upstream treatment plants. Filamentous algae growth was abundant within the station suggesting excessive nutrients are available for growth.

DO saturation values fluctuated from 35% to 120% during the deployment period indicating respiration and photosynthesis of algae was controlling oxygen concentrations in the stream. Dissolved oxygen concentrations spent 25% of the time below the water quality standard of 5 mg/L.

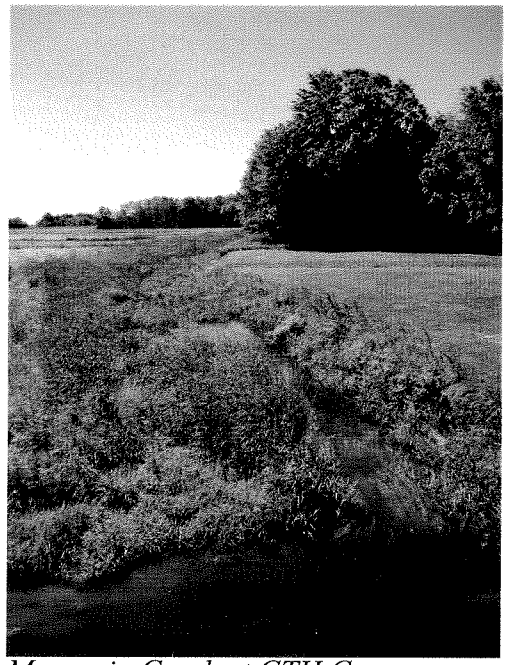
Reference Sites for Plum Road

Two small unnamed streams were originally selected to serve as reference sites based on their proximity and similarity to the Rudolph tributary at Plum Road. However, both sites were dry by early July when fishery surveys were completed on the Rudolph tributary. These observations suggest that the Rudolph tributary in this reach would have also been dry in the absence of effluent.

Moccasin Creek at CTH C is similar to the Rudolph tributary at Plum Road in size, channel morphology and drainage area and was selected to serve as a reference site. As with the Rudolph tributary, this reach of Moccasin Creek had been ditched in the past and represents an intermittent headwater area. A fishery survey was completed in early July when streamflow was present. Streamflow at this time was likely augmented from a non-permitted de-watering activity from an upstream gravel operation. Fishery survey results found 27 total individuals per 100 meters represented by 5 species. The percent of fish tolerant to low dissolved oxygen conditions was 85%. Moccasin Creek had no flow from the headwaters downstream eight miles by middle to late summer. According to local residents, it is not unusual to see this reach intermittent during the summer months. Below STH 13, the stream steadily increased streamflow from groundwater inputs, which supported a brook trout fishery below George Road.



Rudolph Tributary at Plum Road (Baseflow Conditions)



Moccasin Creek at CTH C (>Baseflow Conditions)

Continuous dissolved oxygen monitoring was not completed on Moccasin Creek at CTH C; however data was collected approximately three miles downstream at Townhall Road. This reach had minimal streamflow and shallow water depth in runs and riffles, therefore a pool was selected for a deployment site. This pool was dry by early September. DO saturation values

fluctuated from 20% to 140% indicating photosynthetic activity was controlling oxygen concentrations. Dissolved oxygen concentrations spent 47% of time below the water quality standard of 5 mg/L. Filamentous algae and aquatic plant growth was common to abundant, especially in sunlit pools.

Discussion

Stream Classifications

The Rudolph tributary should be reclassified based on data collected in 2004. The surveys completed at Oak Road and Third Avenue, representing the lower 3.5 miles of the stream, indicate the stream is currently supporting a Full Fish and Aquatic Life Fishery or a Diverse Fish and Aquatic Life community. This reach is currently listed in NR104 as Limited Aquatic Life and Limited Forage Fish. According to the Use Designation document, a Diverse Fish and Aquatic Life community is one that has the potential to contain a fishery represented by several species, fewer than 75% of the individuals are tolerant of low dissolved oxygen or at least two gamefish per 100 meters. The percent of low dissolved oxygen tolerant fish in this reach of the Rudolph tributary ranged from 21 to 55%, which is well below the 75% listed in guidance. The number of species collected ranged from 8 to 14 indicating a relatively diverse community, especially for a small stream. One young of the year northern pike was captured at Oak Road indicating that pike will migrate to this reach for spawning.

The survey completed at Plum Road found an existing fishery use of Limited Forage Fish. According to the Use Designation document, a Limited Forage Fishery is a community that does not have the potential to contain gamefish and is dominated by species tolerant of low dissolved oxygen (>75%). The percent of low dissolved oxygen tolerant fish found at Plum Road was 100%, which is much higher than 75% listed in guidance. Two low dissolved oxygen fish species were collected indicating low species abundance.

Currently, the Rudolph tributary upstream from Plum Road is classified in NR 104 as a Limited Aquatic Life effluent ditch. The effluent ditch classification is not appropriate for this entire reach based on the Use Designation Guidance. According to guidance, an effluent channel is an open channel constructed to transport effluent from a permitted facility to a surface water or natural drainage way. Continually flowing or intermittent natural watercourses that are modified or unmodified to receive effluents shall not be defined as effluent channels except where it is environmentally beneficial. Based on the original stream history survey map and USGS QUAD map, a natural watercourse (Rudolph tributary) existed in the middle of T23N R6E section 9. The USGS QUAD map now shows a modified stream in this location. The treatment plants do not discharge directly to the Rudolph tributary but discharge to an unnamed ditch that joins the Rudolph tributary in T23N R6E Sec 9 NE SW. Documentation of stream history for this ditch or information indicating when it was created or modified could not be found. Therefore, the effluent ditch classification of the Rudolph tributary from Plum Road in T23N R6E section 16 upstream to the confluence with the ditch in T23N R6E section 9 NE SW should be removed from NR 104. The recommended classification for this reach will be discussed later in the document.

The effluent channel classification for the ditch that initially receives both discharges can remain in NR 104. If new information regarding the history of this ditch is found the classification should be reviewed.

The Limited Forage Fish community found at the Plum Road crossing likely represents the potential use of this stream segment. Limiting factors preventing this reach from achieving a higher classification include low flow, past channelization and physical habitat conditions. Two of the three reference sites near the Rudolph tributary could not be surveyed due to the lack of water. These two sites were tributary streams to the Rudolph tributary and were similar in size and drainage area. The Rudolph tributary would have also been dry without effluent discharged by the treatment plants. This reach flows through a wetland area and would be characterized as low gradient. Minimal streamflow and poor instream habitat conditions resulting from past channelization, does not provide adequate water depth, proper substrate and habitat diversity to support a Diverse Fish and Aquatic Life community. Without the augmentation of streamflow from the discharges this reach of the Rudolph tributary would have been dry with an existing use of Limited Aquatic Life. The continuous discharge from the treatment plants provides a small year round flow that raises the potential of the stream to a Limited Forage Fishery. Moccasin Creek at CTH C was similar to the Rudolph tributary and was surveyed earlier in the summer when streamflow was present. The survey on this stream segment also found a Limited Forage Fish community when water was present. The lack of permanent streamflow and poor habitat conditions from past channelization in this segment of Moccasin Creek are significant limiting factors to the fishery.

Fish and habitat surveys were not completed on the stream reach from Plum Road downstream to Third Avenue (distance of 1.4 miles). The transition from a Limited Forage Fish community found at Plum Road to a Full Fish and Aquatic Life community at Third Avenue is likely a function of changes in habitat and increased groundwater inputs. Habitat conditions at Third Avenue were more diverse than Plum Road with a higher number of bends, pools and runs. The past ditching that occurred near Plum Road reduced the natural habitat variability of the stream. Based on streamflow measurements there appeared to be a slight increase in groundwater inputs between these two road crossings. Further increase in groundwater inputs was found downstream at Oak Road. Based on aerial photos and observations, the stream channel becomes more meandering below the confluence with the tributary in T23N R6E Sec 16. There are some areas that appear channelized within this reach but the majority of the channel appears to be in a natural state. The physical habitat in this reach appears to be similar to conditions found at Third Avenue and likely supports a similar fishery. These surveys were also completed following a two-year drought period. Groundwater inputs would likely be greater during a normal to wet precipitation year. Therefore, the potential use classification of this reach should be Full Fish and Aquatic Life in recognition of improved habitat conditions and some increase in groundwater inputs (Figure 4).

Continuous Dissolved Oxygen Monitoring

Continuous dissolved oxygen monitoring on the Rudolph tributary and baseline reference sites indicates that dissolved oxygen concentrations fell below the water quality standard in several

stream reaches monitored in the watershed. Low oxygen concentrations were a result of low streamflow conditions and/or photosynthetic activity of filamentous algae and aquatic plants. Low streamflow conditions or minimal groundwater input seems to be a natural phenomenon that was likely exacerbated by drought conditions from the pervious two years. Several small streams and headwater reaches of larger streams had minimal streamflow during deployments and some were completely dry by late summer. The lack of surface turbulence reduces stream aeration and prevents adequate oxygen exchange with the atmosphere. Also, the respiration of aquatic organisms likely contributed to the low oxygen concentrations.

Dissolved oxygen concentrations fluctuated significantly in streams with abundant filamentous algae growth. The photosynthetic activity of algae created super saturated oxygen conditions during day but by early morning hours oxygen was consumed during respiration. Oxygen concentrations fell well below saturation due to the lack of adequate stream aeration and respiration of aquatic life.

The abundant growth of filamentous algae in many streams indicates that excessive nutrients are available for growth. Nutrient loading to streams is from both nonpoint and point sources in the watershed. Agricultural is one of the dominant land uses within the Wisconsin Rapids Watershed. Nutrients and sediment delivered to the streams from cropland runoff, barnyards and pastures are available for uptake by algae and aquatic plants. Effluent discharged from point sources also increase nutrient loading to streams. The Rudolph tributary receives effluent from the Village of Rudolph and Wisconsin Dairy State Cheese Inc. Phosphorus discharged by treatment plants is mostly in dissolved form and can be quickly assimilated by algae. The abundant growth of filamentous algae in the Rudolph tributary indicates the treatment plants are contributing nutrients to the stream. The Village of Rudolph is not required to have an effluent limit for phosphorus since they have not exceeded the 150 pound threshold established in NR217. Wisconsin Dairy State Cheese Inc. has a phosphorus limit based on the use of biological removal. The stream also receives nonpoint source runoff from agriculture land use and some storm water from the village.

Recommended Classifications for the Rudolph Tributary:

The Rudolph tributary Diverse Fish and Aquatic Life from the mouth upstream to the tributary in T23N R6E Sec 16 SW NE.

The Rudolph tributary Tolerant Fish and Aquatic Life from the tributary in T23N R6E Sec 16 SW NE upstream to the confluence with the ditch in T23N R6E section 9 NE SW.

Recommended Classification for Unnamed Ditch that receives initial effluent

Unnamed Ditch classified as an effluent ditch from the confluence with the Rudolph tributary in T23N R6E section 9 NE SW upstream to Wisconsin Dairy State Cheese Inc. outfall. (If new information is found as to the creation of this ditch, the classification should be reviewed.)

Bibliography

La Liberte, P. 2005. Personal Communications

WDNR. 2004. Guidelines for Designating Fish and Aquatic Life Uses for Wisconsin Surface Water. Publ-WT-807-04.

WDNR. 2005. SWAMP Database

Table 1. Monitoring Results for the Rudolph Tributary and Reference Sites

Stream	Location	# Fish per 100 m	# Fish Species	% fish tolerant low D.O.	# of low D.O. tolerant Species	Max. D.O. mg/L	Min. D.O. mg/L	Ave. D.O. mg/L	Min. Ave. Daily D.O. mg/L	% Time below 5 mg/L	% fish tolerant disturbed Habitat	# of fish species tolerant to disturbed Habitat	Station Gradient feet/mile	Drainage Area Sq./Miles
Rudolph Trib	Plum Rd.	80	2	100	2	10.39	3.33	6.23	4.8	25	0	0	12	1.9
Rudolph Trib	Third Ave.	271	8	55	3	12.89	1.21	6.49	5.39	40	43	3	12	3.9
Rudolph Trib	Oak Rd.	652	14	21	3	11.91	4.57	7.90	6.44	3.5	75	4	25	5.2
Moccasin Creek	CTH C	27	5	85	3						15	2	20	1.8
Moccasin Creek	Townhall Rd.	90	4	44	2	11.75	2.20	5.77	4.68	47	56	2	18	6.7
Mosquito Creek	Zubella Rd.	207	10	75	3	8.61	5.47	6.76	6.13	0	16	3	25	3
Mosquito Creek	Stone Rd.	679	15	9	4	10.75	5.53	7.88	7.39	0	65	4	50	6.9
Un. Cr. Moccasin	Lumburg Rd.	60	1	100	1						0	0	20	0.6
Un. Cr. Wis.R.	CTH II	239	6	65	2						21	2	33	2.9

Figure 3. Rudolph Trib Continuous Dissolved Oxygen Monitoring
July 19 - 26, 2004

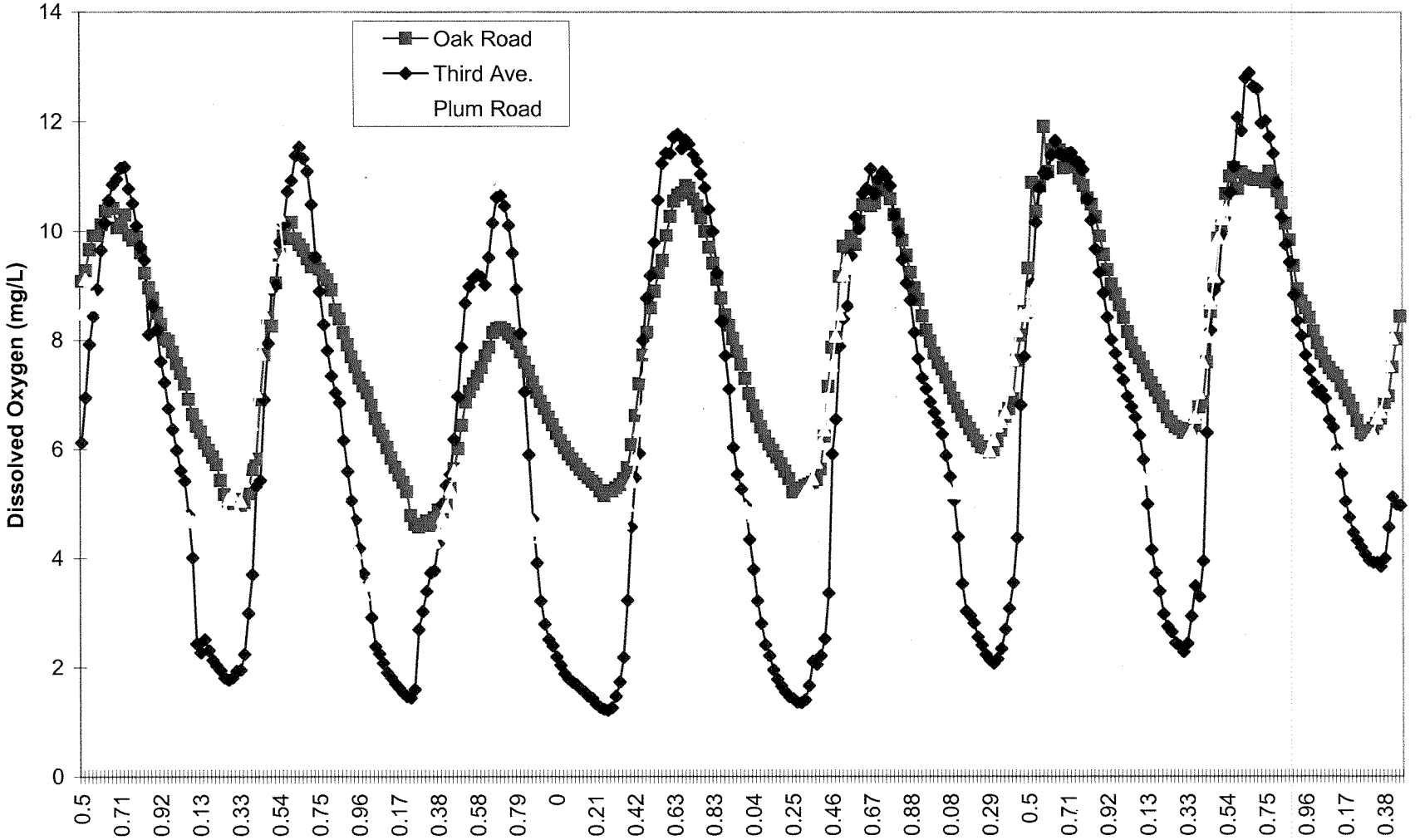


Figure 2. Rudolph Tributary Current NR 104 Classifications

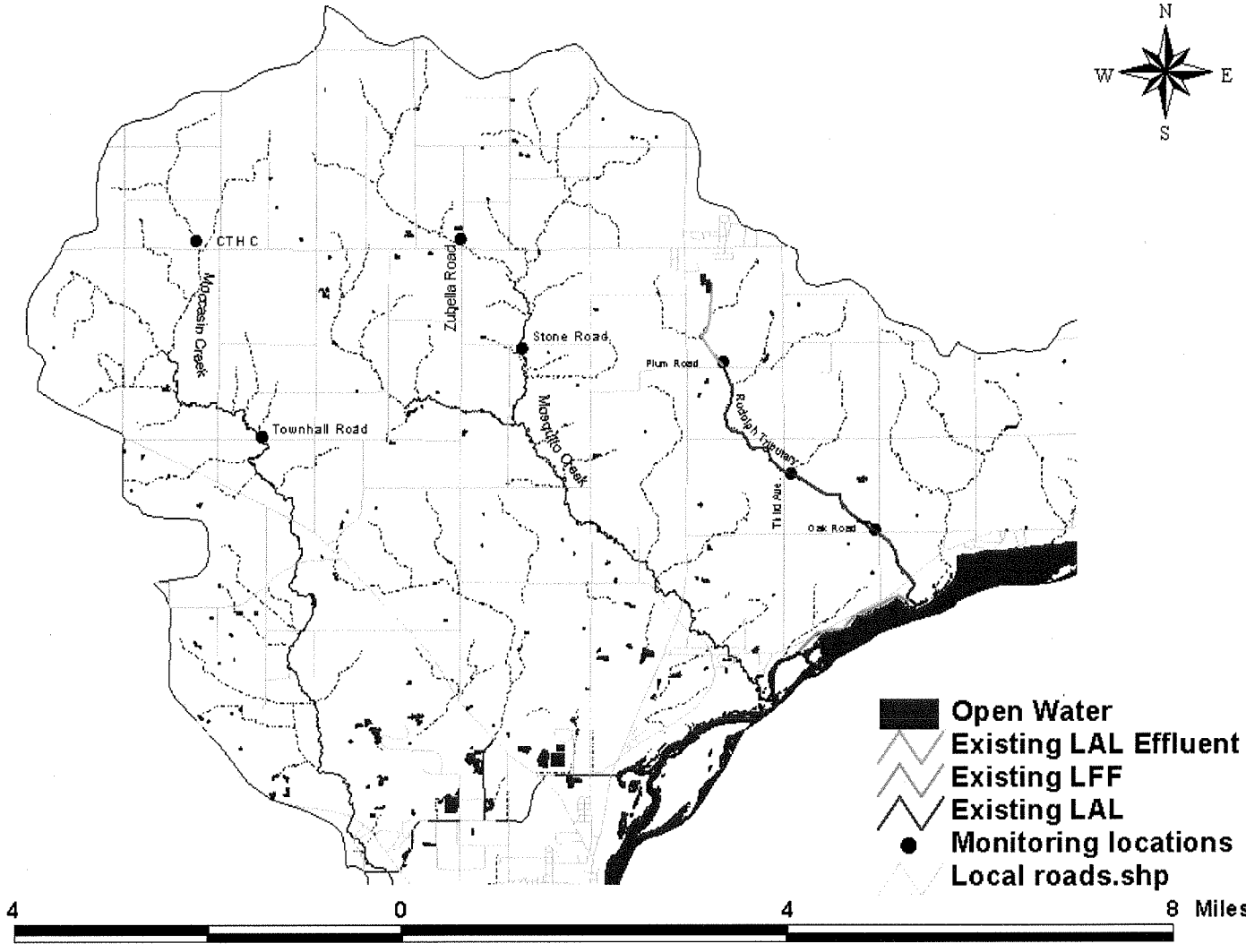
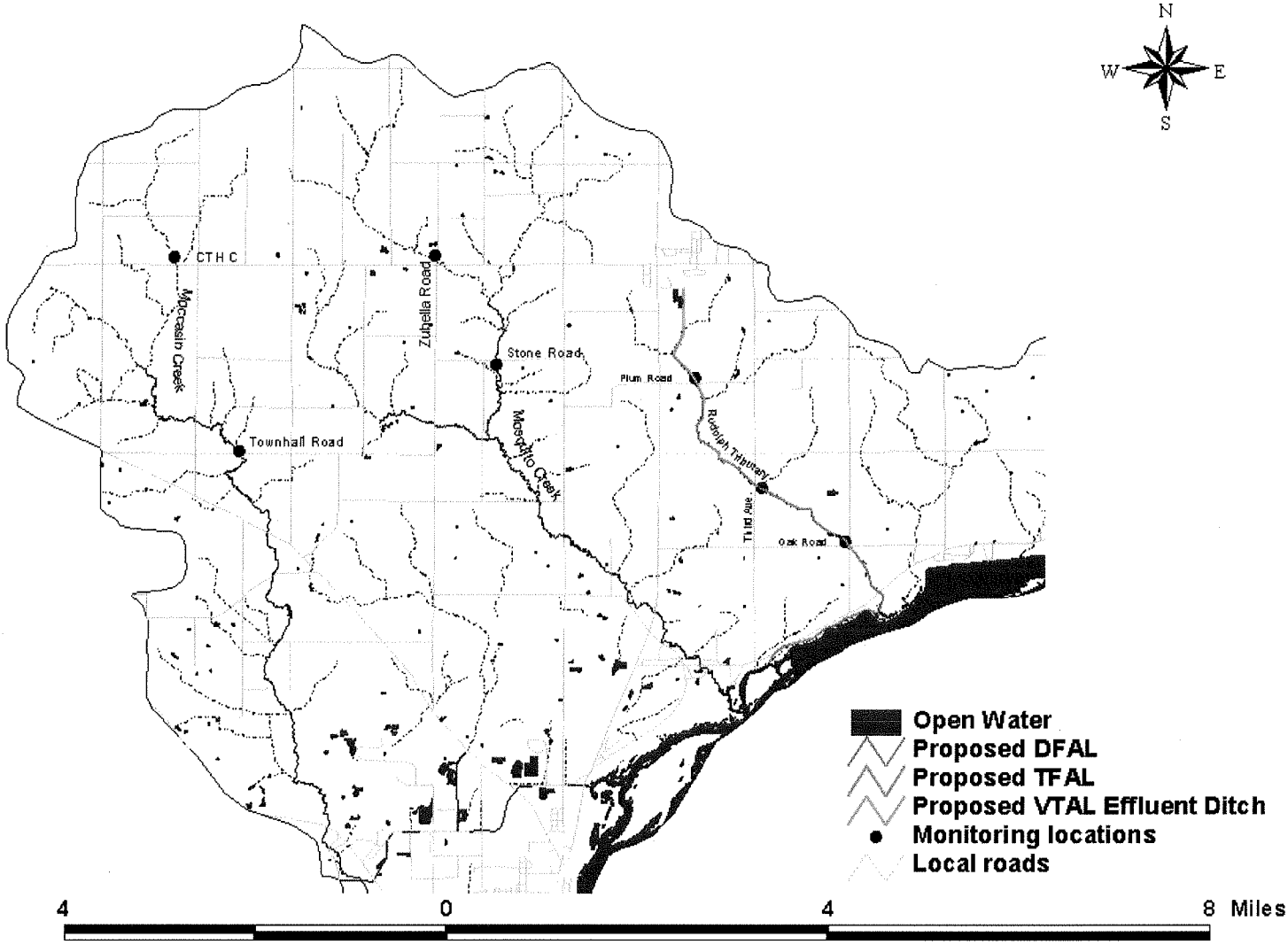


Figure 4. Rudolph Tributary Proposed NR 104 Classifications



Reviewed by LBub Date 2/2004

Region WCR **County** Wood **Report Date** 10/1976 **Classification** LAL/LFF

Water Body: Wisconsin River, unnamed trib

Discharger: Rudolph STP

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: photos

Historical Reports in file:

10/1976 - Ken Schreiber

11/1976 -

Additional Comments/How to improve report:

LAL = effluent ditch default classn.

- classification in database does not seem to match recc. classn in report.

- check w/ region on this classn.

Department of Natural Resources

INTRA-DEPARTMENT

MEMORANDUM

Wisconsin Rapids
Station

Date October 8, 1976

IN REPLY REFER TO: 3410

TO: File

FROM: Kenneth W. Schreiber

SUBJECT: Unnamed Tributary of Wisconsin R. with Drainage Basin Originating in Vicinity of Rudolph

On September 21, 1976 the writer conducted a survey of the subject area.

The survey included five bridge sites located between the tributary source to approximately 1/2 mile before entering the Wisconsin River.

The streambed was completely dry at all sites, except for a few small pools of standing water directly below the bridges.

Kenneth W. Schreiber

KWS:dls

NOTED:

_____ _____

Date

Rudolph, Wood County

Wastewater Receiving Stream Classification

The Rudolph sewage treatment lagoons discharge into an unnamed tributary to the Wisconsin River. The receiving stream begins at the lagoons and flows 4.6 miles before it meets another tributary and then flows another 1.2 miles where it joins the river. The first mile of stream has been ditched and flows through farmland its entire length. The 7 day Q_{10} at Rudolph is 0 cfs and there is normally no flow except for the lagoon discharge. At the point where the stream joins a tributary 1.2 miles upstream of the river, it flows within a few feet of the Biron Flowage. At that point it follows a ditch around the flowage to join the river below the Biron Dam. As it follows along the flowage, it picks up some flow which is probably seepage through the dikes that contain the flowage. For the first 400 yards of the stream below the outfall, it is very small and is covered by grass. After that it flows through a pasture where it widens and there are occasional pools. As the stream flows farther, it widens and pools become more frequent. No flow was found throughout most of its length on the day of the survey.

The fishery of the stream is largely unknown but is likely to be of poor quality because of intermittent flow and small stream size. Two boys were catching chubs from an unusually large pool at the bridge two miles south of the discharge.

Recommendations: The unnamed tributary to the Wisconsin River that receives the discharge from Rudolph should have the effluent ditch hydrologic classification from the outfall to the crossing of the first town road. From that point down to Section 26, T23N, R6E, at the point where it meets the ditch that parallels the Biron Flowage, it should be classified noncontinuous. This entire segment should have the "marginal" water quality classification. The remainder of the stream down to the Wisconsin River should be classified continuous and "not supporting a balanced aquatic community."

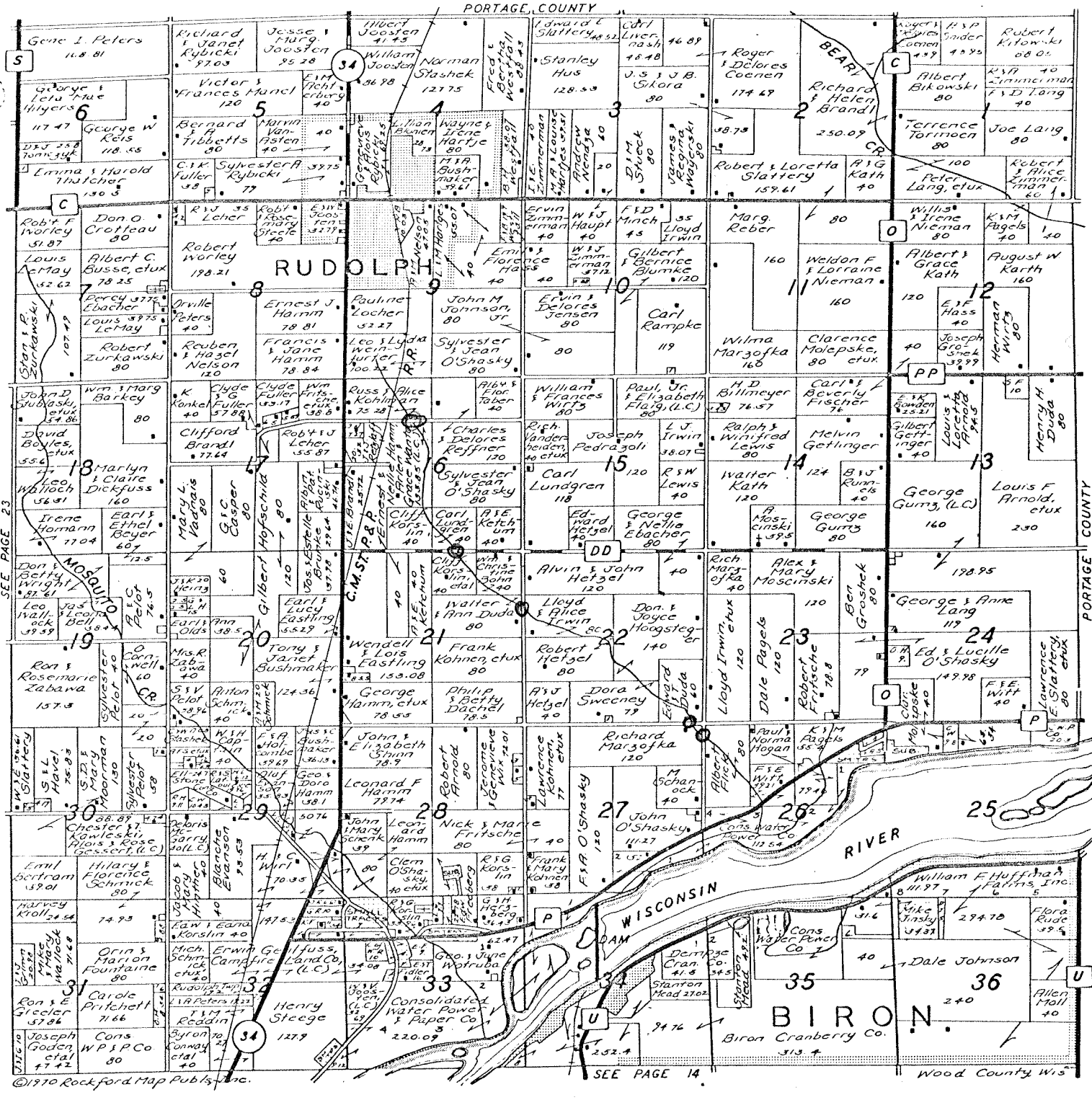
Effluent ditch receiving Rudolph discharge.

Rudolph Tributary at first Town road below discharge.

Rudolph Tributary at CTH "P".

Rudolph Tributary at Biron Dam.

RUDOLPH NORTH PART GRAND RAPIDS T. 23 N.-R. 6 E.



WISCONSIN
COMMISSION
RAL HISTORY SURVEY

WISCONSIN RAPIDS QUADRANGLE
WISCONSIN—WOOD CO.
15 MINUTE SERIES (TOPOGRAPHIC)