

**CORRESPONDENCE/MEMORANDUM**

DATE: January 9, 2004

FILE REF:

TO: Laura Bub - WT/2  
Pat Oldenburg – Eau Claire  
Paul LaLiberte – Eau Claire  
Eric Donaldson – Wausau  
Tom Jerow – Wisconsin Rapids

FROM: Mark Hazuga - Wausau

SUBJECT: Stream Classification Surveys on Unnamed Creek 20-12a for Stratford WWTP for Phase II

The Village of Stratford owns and operates a 0.235 MGD activated sludge type wastewater treatment facility with ferric chloride for phosphorus removal. The discharge is in Marathon County to Unnamed Creek 20-12a in the Lower Big Eau Pleine Watershed (UW17).

Unnamed Creek 20-12a is a four mile long warm water tributary of the Big Eau Pleine River. According to the USGS 7.5 minute QUAD map, the stream is perennial for most of its length except near the headwaters. The map also shows four manmade impoundments on the stream upstream from Stratford. The Q710 flow of Unnamed Creek 20-12a near Stratford is near 0 cfs.

Unnamed Creek 20-12a is currently classified in NR104 as Limited Aquatic life (LAL) from the Stratford treatment plant downstream to the confluence with the Big Eau Pleine River (Figure 1). The Big Eau Pleine River receives the Full Fish and Aquatic Life (FFAL) designation.

**Unnamed Creek 20-12a 2003 Survey Results**

Fishery surveys were completed August 21, 2003 on Unnamed Creek 20-12a just upstream North Road and the WWTPs outfall and 120 meters downstream North Road using baseline monitoring protocols (Figure 2). Many area small streams in 2003 became intermittent with water only found in unconnected pools from severe summer drought conditions. Unnamed Creek 20-12a had minimal flow on the survey date upstream from the discharge.

**Site 1**

The electro-fishing survey began approximately 15 meters upstream North Road and the wastewater outfall and continued upstream for 100 meters. Streamflow was noticeably less upstream from the discharge and measured 0.03 cfs. Fishery survey results found a total of 291 individuals represented by 22 species. The percent of fish tolerant to low dissolved oxygen was 19% (Table 1). The dominant species included stoneroller, creek chub, common shiner, fathead minnow, white sucker and bluntnose minnow. The fish community also contained three darter species, three sunfish species and three gamefish species. Gamefish were represented by

young of year smallmouth bass (12), walleye (3) and bluegill (2) (Appendix 1). The presence of young of year smallmouth bass and walleye suggests fish likely migrated upstream from the Big Eau Pleine River. The sunfish species found are likely from the series of small impoundments upstream of the station.

Table 1. Unnamed Creeks 20-12a and 22-7 Fishery Survey Results

Sample Location	# of Fish per 100 m	# of fish species	% of fish tolerant to low D.O.	% fish tolerant disturbed habitat	# of low D.O. tolerant species	# of fish species tolerant to disturbed habitat
Creek 20-12A Upstream of Outfall	291	22	19	34	6	4
Creek 20-12A Downstream of Outfall	924	20	16	38	5	4
Creek 22 - 7	406	15	5	70	2	4

The stream channel was naturally meandering with a diverse habitat of riffles, runs and shallow pools. Substrate consisted of boulders, cobble, gravel and some sand. Stream gradient measured at the site was 50 feet per mile. The stream channel width ranged from 3 to 7 feet and depth ranged from 2 to 12 inches. Larger pools with boulders provided good cover for young of year gamefish and forage species. Landuse at the site consisted of light pasturing which has caused moderate streambank erosion. Filamentous algae was abundant suggesting excessive nutrients are available for growth. Instantaneous dissolved oxygen and temperature readings at 10:34 am were 11.96 mg/l and 23.6 degrees Celsius, respectively. Oxygen saturation was 140% indicating photosynthesis of filamentous algae was elevating oxygen concentrations in the stream.

## Site 2

The electro-fishing survey began 120 meters downstream of North Road and the outfall and continued upstream for 100 meters. Streamflow was noticeably greater below the discharge and measured 0.37 cfs. Fishery survey results found 924 individuals represented by 20 species. The percent of fish tolerant to low dissolved oxygen was 16% (Table 1). The dominant species included stoneroller, creek chub, bluntnose minnow, fathead minnow, common shiner and white sucker. The fish community also contained four darter species, two sunfish species and two gamefish species. Gamefish were represented by young of the year smallmouth bass (8) and walleye (1) (Appendix 2). The presence of young of year smallmouth bass and walleye suggests fish likely migrate upstream from the Big Eau Pleine River.

The stream channel was naturally meandering with a diverse habitat of riffles, runs and shallow pools. Substrate consisted of large cobble, gravel, some sand and silt. Stream gradient measured at the site was 50 feet per mile. The stream channel width ranged from 3 to 8 feet and depth ranged from 4 to 20 inches. Fish cover consisted of pools, overhanging vegetation, and woody debris. Water depth was greater at this site due to the volume of water discharged by the treatment plant. Boulders were scattered and were not as abundant compared to the upstream

site. Riparian landuse was woodland and shrub, which provided shading over portions of the stream. Filamentous algae were abundant at the site. Instantaneous dissolved oxygen and temperature readings at 10:42 am were 8.85 mg/l and 20.7 degrees Celsius, respectively. Oxygen saturation was approximately 100%.

The difference in oxygen saturation at Site 2 compared to Site 1 could be attributed to reduced photosynthesis of algae and/or the flow contribution from the upstream discharge. Filamentous algae growth was abundant at both sites but canopy shading at Site 2 (below discharge) could have reduced photosynthetic activity. Streamflow at Site 2 was dominated by the Stratford discharge, which accounted for 92% of the flow during the survey. Water quality in the stream below the outfall was likely influenced by effluent quality discharged from the treatment plant. The streams dissolved oxygen concentration at Site 2 was similar but higher to levels found in Stratford's effluent. The volume of water discharged by the treatment plant likely increased stream aeration below the outfall. Aeration in a stream tends to "push" the existing dissolved oxygen toward (up or down) the saturation point. Aeration above the outfall was likely much less than below due to minimal streamflow and the lack of surface turbulence. The additional water discharged by the treatment plant significantly increased streamflow and probably stream aeration.

### **Unnamed Creek 22-7**

Unnamed Creek 22-7 was selected to serve as a reference site for the Stratford stream classification survey. The stream is a three mile long warm water tributary to the Big Eau Pleine River in Marathon County. According to the USGS 7.5 minute QUAD map, the stream has perennial flow for most of its length except near the headwaters. The map also shows several small manmade impoundments scattered throughout the drainage. The Q710 flow of the stream is likely 0 cfs.

The survey was completed upstream of Fairview Road on August 21, 2003 approximately 0.2 miles upstream from the confluence with the Big Eau Pleine River. Riffles and runs were dry but water was present in unconnected pools. Minimal flow had been observed in riffles 8 days prior to the survey. A fishery survey was conducted by shocking the pools within a 100 meter station. Actual pool length surveyed was 75 meters. The fishery survey found 406 total fish represented by 15 species. The percent of fish tolerant to low dissolved oxygen was 5% (Table 1). The dominant fish species included white sucker, creek chub, blacknose dace and johnny darter. The fish community also contained 5 darter species and one young of the year smallmouth bass (Appendix 4). Smallmouth bass were also observed in the bridge pool and likely migrated upstream from the Big Eau Pleine River.

The stream was naturally meandering and substrate consisted mostly of gravel and cobble with some sand. The unconnected pools were 3 to 10 inches deep and 6 to 8 feet wide. Stream gradient measured at the site was 25 feet per mile. Moderate algae growth was observed in sunlit pools. Riparian landuse was mostly woodland with some open meadow areas. Fish cover consisted of some woody debris and pools.

A continuous dissolved oxygen meter was deployed for four days in a larger pool within the station. Readings were collected at 30 minute intervals. During deployment, the meter's membrane became slightly fouled due to water stagnation, which resulted in slightly lower than expected readings. Maximum and minimum dissolved oxygen concentrations were 5.7 and 2.4 mg/l, respectively. Dissolved oxygen levels spent 97% of the time below the State's water quality standard of 5 mg/l (Appendix 4). The severe drought conditions in 2003 caused intermittent flow trapping fish in the unconnected pools. Dissolved oxygen concentrations in pools were low and spent most of the time below 5 mg/l, however oxygen depletion was never observed during deployment. Substrate in the pools consisted mostly of coarse substrate with very little organic matter. Low oxygen levels in pools was likely a result of respiration by aquatic life since sediments did not contain significant amounts of organic matter that would use oxygen during decomposition. The unconnected pools provided a temporary refuge for aquatic life during short-term intermittent flow.

## **Discussion**

Currently, Unnamed Creek 20-12a is classified in NR 104 as Limited Aquatic Life from the outfall downstream to the confluence with the Big Eau Pleine River. Based on surveys completed on August 21, 2003, Unnamed Creek 20-12a from the Stratford outfall should be classified as Full Fish and Aquatic Life (FFAL) (Figure 3). According to the Use Designation document, a Full Fish and Aquatic Life stream is one that has the potential to contain a fishery represented by several species, fewer than 75% of the individuals tolerant of low dissolved oxygen or a least two gamefish within 100 meters. The percent of low dissolved oxygen tolerant fish in Unnamed Creek 20-12a ranged from 16 to 19%, which is well below the 95-75% threshold listed in guidance. The number of species collected was 20 or greater at both sites indicating a very diverse community, especially for a small stream. The number of gamefish collected at both sites also supports the FFAL designation. The stream channel was naturally meandering and substrate consisted of boulders, cobble, gravel and some sand. The stream also contained a diverse habitat of riffles, runs and pools. Pools, boulders, some woody debris and overhanging vegetation provided cover for both young of the year gamefish and forage fish. The diverse habitat conditions of Unnamed Creek 20-12a supports the diverse FFAL community.

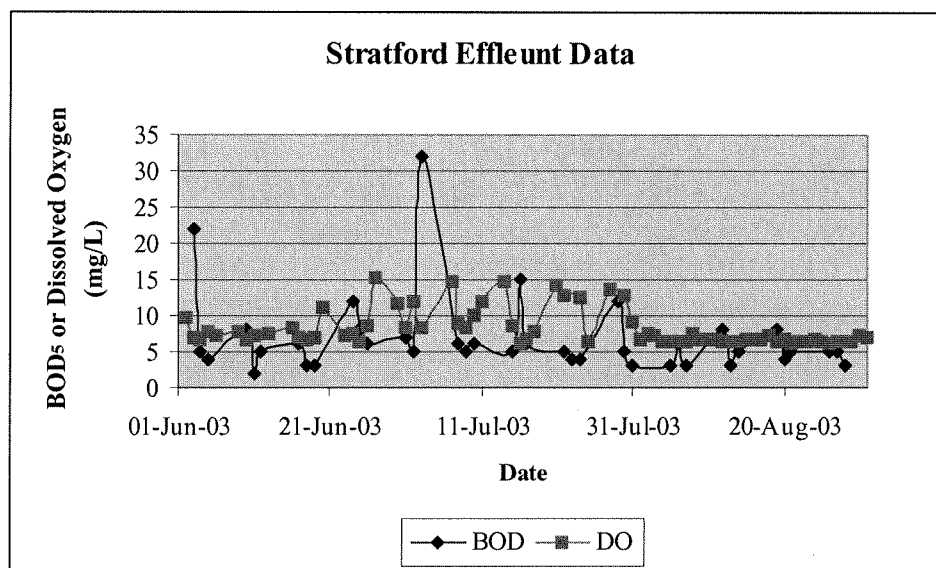
Unnamed Creek 22-7 also contained a diverse fishery that would be designated as Full Fish and Aquatic Life. The percent of low dissolved oxygen tolerant fish in Unnamed Creek 22-7 was 5% and the survey found 15 species. The stream became intermittent as a result of the 2003 drought trapping fish in unconnected pools. Dissolved oxygen monitoring indicated that concentrations in stagnant pools were below 4 mg/l most of the time but stayed above 2 mg/l. The only significant source of oxygen consumption observed was respiration of aquatic organisms in pools. These unconnected pools provide a temporary refuge during short-term intermittent flow. Organisms would be able to re-colonize other areas when perennial flow is established assuming drought conditions do not persist and stress organisms beyond recovery.

Unnamed Creek 22-7 was selected as a reference site for Unnamed Creek 20-12a because of similarities in habitat and drainage. Data collected at this site suggests that a FFAL community would have the potential to exist in Unnamed Creek 20-12a without the Stratford discharge.

Stratford's discharge does however augment streamflow increasing the amount of habitat available to support greater numbers of fish. The fish community in Unnamed Creek 20-12a downstream from the discharge contained similar species as the upstream community but also had three times the numbers of fish (Appendix 5).

Surveys in 2003 were completed during drought conditions and most of the streamflow in Unnamed Creek 20-12a was effluent discharged by the treatment plant. Current summer effluent quality from the treatment plant appears adequate to protect the FFAL community found in the stream (Figure 4).

Figure 4. Effluent Data from Stratford WWTP



\*Obtained from SWAMP

### Recommended Stream Classification

*Existing Classification in NR 104*

*Tributary from Stratford downstream to Big Eau Pleine River – Limited Aquatic Life.*

### Proposed Classification

Unnamed Creek 20-12a Full Fish and Aquatic Life from the Stratford Outfall in T27N R4E Sec 19 NE SE downstream to the confluence with the Big Eau Pleine River in T27N R4E Sec 20 SE SW. This would require removing the existing classification from NR 104 allowing the default classification to become effective.

---

## **Literature Review**

Lyons, John. 1992. Using the Index of Biotic Integrity (IBI) to Measure Environmental Quality in Warm Water Streams of Wisconsin. U.S. Forest Service General Technical Report NC-149.

Oldenburg, Pat. 2003. Draft Memo. Wisconsin Department of Natural Resources. Eau Claire, WI.

WDNR. 2003 Draft. Guidelines for Designating Fish and Aquatic Life Uses for Wisconsin Surface Waters.

# Appendix 1. Unnamed Creek 20-12a Fish Survey Results upstream North Road and Outfall

IBI Calculator for Central and Southern WI

(REV. 3/11/2003)

Sarr 37854

SIT Stratford WWTP Tributary - 15 meters upstream outfall and North Road

PER Hazuga, Kittel, Wiersma

MATRIX	VALUE	SCORE	Equipment Type =	Back Pack
total # of fish	291	n/a	Stream width (m) =	1.5
total # of native spp.	22	10	Ln stream width (m) :	0.41
total # of darter spp.	3	10	Distance shocked (m):	100
total # of sucker spp.	1	10	Is your sample site greater than 8 km from n	
total # of sunfish spp. < 8km f	3	10		
total # of sunfish spp. >8km fr	0	0		
total # of intolerant spp.	2	10		
total # of tolerant fish	146	2		
total # of omnivores	80	5		
total # of insectivores	109	5	% of tolerant spp.	50
total # of top carnivores	16	0	% of omnivorous spp.	27
total # of simple lithophils	102	5	% of insectivores	37
subtotal		67	% of carnivores	5
			% of simple lithophilous	35
Correction Factors		67	Correction Factors	
total # of DELT fish	0	67	# of nontolerant fish per 300m	435
Total after correction factors =		67	% DELT	0
IBI SCORE =		67	Emerald shiner ID uncertain could be Rosy face	
			Central Stoneroller ID uncertain could be Largescale	

Biotic Integrity Rating

EXCELLEN

## Notes

# of Fish species

\*\* STREAM WIDTH BELOW IBI MODEL CALIBRATION (<2.5m or 8.2 ft.)

## 44 Largescale Stoneroller

### 40 Creek Chub

### 36 Common Shiner

### 28 Fathead Minnow

### 27 White Sucker

### 25 Bluntnose Minnow

### 19 Logperch

### 14 Emerald Shiner

### 12 Smallmouth Bass

### 10 Green Sunfish

### 8 Central Mudminnow

### 6 Johnny Darter

### 6 Yellow Bullhead

### 3 Walleye

### 2 Black Bullhead

### 2 Blacknose Dace

### 2 Bluegill

### 2 Hornyhead Chub

### 2 Iowa Darter

### 1 Brook Stickleback

### 1 Burbot

### 1 Pumpkinseed

## Stream Class Guidance (7/2002) Tolerance Summary Data

Total # of game-fish species with more than 2 inc	3
Total # of DO tolerant fish	55
Total # of DO tolerant fish per 100 meter stream leng	55
% forage fish belonging to spp. that are tolerant to lo	20 %
Total # of fish tolerant to disturbed habitat	94
Total # of fish tolerant to disturbed habitat per 100m.	94
% of fish species that are tolerant to disturbed habita	34 %
% of DO fish AND tolerant to disturbed habitat fish sp	54 %
Total # of DO tolerant species =	6
Total # of Disturbed habitat species =	4
Total # of fish species collected =	22
Total # of fish collected =	291
Steam length shocked (m) =	100
Macroinvertebrates collected (mm/dd/yyyy)	
Overall sample HBI score and rating	
Toal # of macroinvcrtebrates with HBI tolerance values <=5.00 =	
Toal # of macroinvcrtebrates with HBI tolerance values >5.00 =	
% of macroinvertebrates with HBI Tol. Values >5.00 #DIV/0! %	

## Fish and Aquatic Life Minimum Expectations Evaluation

% forage fish belonging to spp. that are tolerant to lo	DFAL
% of macroinvertebrates with HBI Tol. Values >5.00	

## Coolwater Fish Species

Total # of coolwater fish species	2
Total # of coolwater fish	2

# Appendix 2. Unnamed Creek 20-12a Fish Survey Results downstream North Road and Outfall

IBI Calculator for Central and Southern WI

(REV. 3/11/2003)

<b>Sample Date</b>	08/21/2003
<b>SITE</b>	Stratford WWTP Trib - Start 120 meters downstream North Road and outfall - Station 100 meters
<b>PERSONNEL</b>	Hazuga, Kittel, Wiersma

<b>MATRIX</b>	<b>VALUE</b>	<b>SCORE</b>	<b>Equipment Type =</b>	Back Pack
total # of fish	924	n/a	<b>Stream width (m) =</b>	2
total # of native spp.	20	10	<b>Ln stream width (m) =</b>	0.69
total # of darter spp.	4	10	<b>Distance shocked (m)</b>	100
total # of sucker spp.	1	2	Is your sample site greater than 8 km from a ln	
total # of sunfish spp. < 8km from lake	2	5		
total # of sunfish spp. >8km from lake	0	0		
total # of intolerant spp.	2	10		
total # of tolerant fish	471	0		
total # of omnivores	261	5		
total # of insectivores	253	0	% of tolerant spp.	51
total # of top carnivores	9	0	% of omnivorous spp.	28
total # of simple lithophils	235	5	% of insectivores	27
subtotal	47		% of carnivores	1
			% of simple lithophilous	25
Correction Factors		47	Correction Factors	
<b>total # of DELT fish</b>	0	47	# of nontolerant fish per 300m	1359
Total after correction factors =		47	% DELT	0
<b>IBI SCORE =</b>		47	<b>Stoneroller ID uncertain could be Largescale</b>	
			<b>Emerald shiner ID uncertain could be Rosy face</b>	

## Biotic Integrity Rating

FAIR

### Notes

\*\* STREAM WIDTH BELOW IBI MODEL CALIBRATION (<2.5m or 8.2 ft.)

# of fish	Fish species
228	Central Stoneroller
170	Creek Chub
101	Bluntnose Minnow
89	Fathead Minnow
86	Common Shiner
71	White Sucker
35	Emerald Shiner
35	Logperch
29	Green Sunfish
28	Johnny Darter
17	Brook Stickleback
8	Iowa Darter
8	Smallmouth Bass
6	Central Mudminnow
5	Blackside Darter
3	Yellow Bullhead
2	Blacknose Dace
1	Northern Redbelly Dace
1	Pumpkinseed
1	Walleye

### Stream Class Guidance (7/2002) Tolerance Summary Data

Total # of game-fish species with more than 2 individ	1
Total # of DO tolerant fish	144
Total # of DO tolerant fish per 100 meter stream leng	144
% forage fish belonging to spp. that are tolerant to lo	16 %
Total # of fish tolerant to disturbed habitat	344
Total # of fish tolerant to disturbed habitat per 100m.	344
% of fish species that are tolerant to disturbed habita	38 %
% of DO fish AND tolerant to disturbed habitat fish sp	54 %
Total # of DO tolerant species =	5
Total # of Disturbed habitat species =	4
Total # of fish species collected =	20
Total # of fish collected =	924
Steam length shocked (m) =	100
Macroinvertebrates collected (mm/dd/yyyy)	
Overall sample HBI score and rating	
Total # of macroinvertebrates with HBI tolerance values <=5.00 =	
Total # of macroinvertebrates with HBI tolerance values >5.00 =	
% of macroinvertebrates with HBI Tol. Values >5.00 : #DIV/0!	%

### Fish and Aquatic Life Minimum Expectations Evaluation

% forage fish belonging to spp. that are tolerant to lo	DFAL
% of macroinvertebrates with HBI Tol. Values >5.00 :	

### Coolwater Fish Species

Total # of coolwater fish species	2
Total # of coolwater fish	18



# Appendix 3. Unnamed Creek 22-7 Fish Survey Results upstream Fairview Road

IBI Calculator for Central and Southern WI

(REV. 3/11/2003)

Sample Date 08/21/2003

SITE Unnamed Trib to Big Eau Pleine River upstream Fairview Road (T27N R4E Sec 15)

PERSONNEL Hazuga, Kittel, Wiersma

MATRIX	VALUE	SCORE	Equipment Type =	Back Pack
total # of fish	406	n/a	Stream width (m) =	2.13
total # of native spp.	15	10	Ln stream width (m) =	0.76
total # of darter spp.	5	10	Distance shocked (m)	100
total # of sucker spp.	1	2	Is your sample site greater than 8 km from a ln	
total # of sunfish spp. < 8km from l	0	0		
total # of sunfish spp. >8km from l	0	0		
total # of intolerant spp.	2	10		
total # of tolerant fish	285	0		
total # of omnivores	113	5		
total # of insectivores	117	0	% of tolerant spp.	70
total # of top carnivores	1	0	% of omnivorous spp.	28
total # of simple lithophils	207	10	% of insectivores	29
subtotal		47	% of carnivores	0
			% of simple lithophilous	51
Correction Factors		47	Correction Factors	
total # of DELT fish	0	47	# of nontolerant fish per 300m	363
Total after correction factors =		47	% DELT	0
IBI SCORE =		47		

Biotic Integrity Rating

FAIR

Stoneroller ID uncertain, could be Central

Emerald shiner ID uncertain, could be Rosy Face

## Notes

\*\* STREAM WIDTH BELOW IBI MODEL CALIBRATION (<2.5m or 8.2 ft.)

# of fish Fish species

111 White Sucker  
106 Creek Chub  
64 Blacknose Dace  
53 Johnny Darter  
20 Common Shiner  
19 Brook Stickleback  
9 Logperch  
8 Iowa Darter  
5 largescale Stoneroller  
3 Fantail Darter  
2 Blackside Darter  
2 Bluntnose Minnow  
2 Central Mudminnow  
1 Emerald Shiner  
1 Smallmouth Bass

## Stream Class Guidance (7/2002) Tolerance Summary Data

Total # of game-fish species with more than 2 individuals	0
Total # of DO tolerant fish	21
Total # of DO tolerant fish per 100 meter stream length	21
% forage fish belonging to spp. that are tolerant to low DO	5 %
Total # of fish tolerant to disturbed habitat	283
Total # of fish tolerant to disturbed habitat per 100m. stre	283
% of fish species that are tolerant to disturbed habitats	70 %
% of DO fish AND tolerant to disturbed habitat fish spp.	75 %
Total # of DO tolerant species =	2
Total # of Disturbed habitat species =	4
Total # of fish species collected =	15
Total # of fish collected =	406
Stream length shocked (m) =	100
Macroinvertebrates collected (mm/dd/yyyy)	
Overall sample HBI score and rating	
Total # of macroinvertebrates with HBI tolerance values <=5.00 =	
Total # of macroinvertebrates with HBI tolerance values >5.00 =	
% of macroinvertebrates with HBI Tol. Values >5.00 =	#DIV/0! %

## Fish and Aquatic Life Minimum Expectations Evaluation

% forage fish belonging to spp. that are tolerant to low DO DFAL  
% of macroinvertebrates with HBI Tol. Values >5.00 =

## Coolwater Fish Species

Total # of coolwater fish species	1
Total # of coolwater fish	19

#### Appendix 4. Continuous Dissolved Oxygen Monitoring on Unnamed Creek 22-7

##### Calibration Record and Summary

Put in 08/22/2003 Delayed Start 13:00

Take Dowl 08/27/2003 11:45

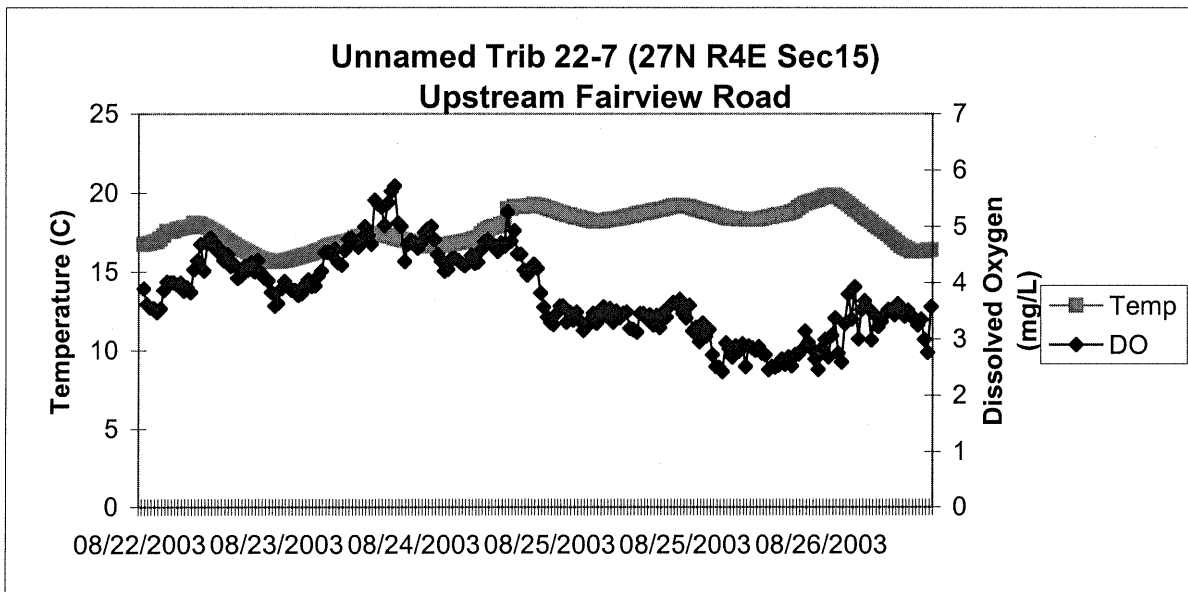
	Temp (C)	DO (mg/l)	D.O. Max (mg/l)	5.7
Before Clean Stream	16.46	3.88	min (mg/l)	2.4
After Clean Stream	16.52	4	ave. (mg/l)	3.8
Cal Cup before Cal	16.44	9.14	% below 5 mg/l	97
Cal Cup after Cal.	16.22	9.46	% below 4 mg/l	61
After Calibration stream	16.52	4.05	% below 3 mg/l	18

Field Read 11:45 16.3 4.06

According to Cal record, DO readings should be a little higher than recorded

Sitting in stagnant pool the membrane seemed slightly fouled,

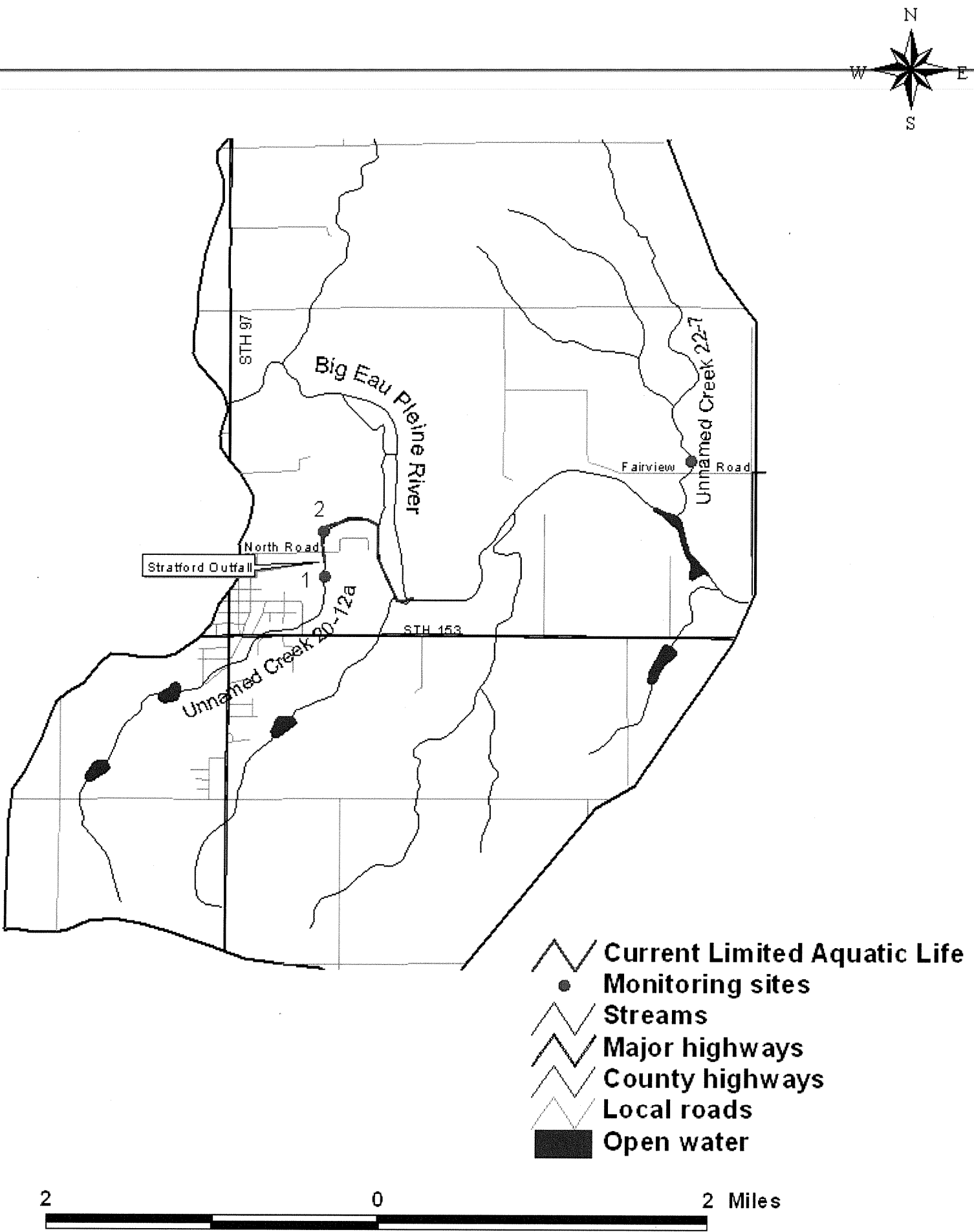
Cleaning the membrane slightly increased current readings.



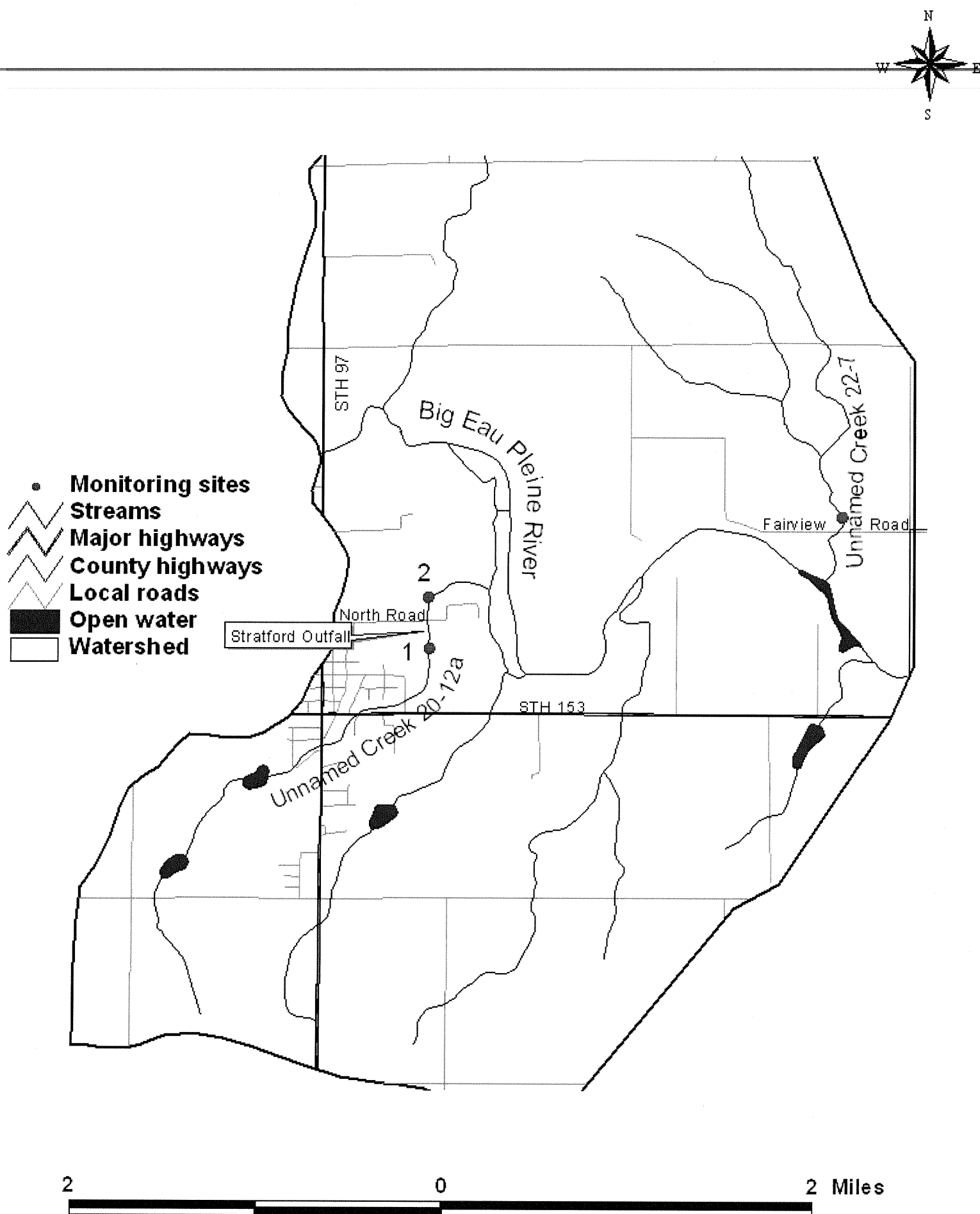
Appendix 5. Fish Species List by Site for Stratford Stream Classification Survey

	Un.Cr. 20-12a	Un.Cr. 20-12a	Un.Cr. 22-7
<b>Species</b>	<b>Site 1</b>	<b>Site 2</b>	<b>Ref. Site</b>
Stoneroller	44	228	5
Creek Chub	40	170	106
Common Shiner	36	86	20
Fathead Minnow	28	89	0
Bluntnose Minnow	25	101	2
White Sucker	27	71	111
Logperch	19	35	9
Emerald/Rosyface Shiner	14	35	1
Smallmouth Bass	12	8	1
Green Sunfish	10	29	0
Central Mudminnow	8	6	2
Johnny Darter	6	28	53
Yellow Bullhead	6	3	0
Walleye	3	1	0
Black Bullhead	2	0	0
Blacknose Dace	2	2	64
Bluegill	2	0	0
Hornyhead Chub	2	0	0
Iowa Darter	2	8	8
Brook Stickleback	1	17	19
Burbot	1	0	0
Pumpkinseed	1	1	0
Blackside Darter	0	5	2
Northern Redbellied Dace	0	1	0
Fantail Darter	0	0	3
<b>Total</b>	<b>291</b>	<b>924</b>	<b>406</b>

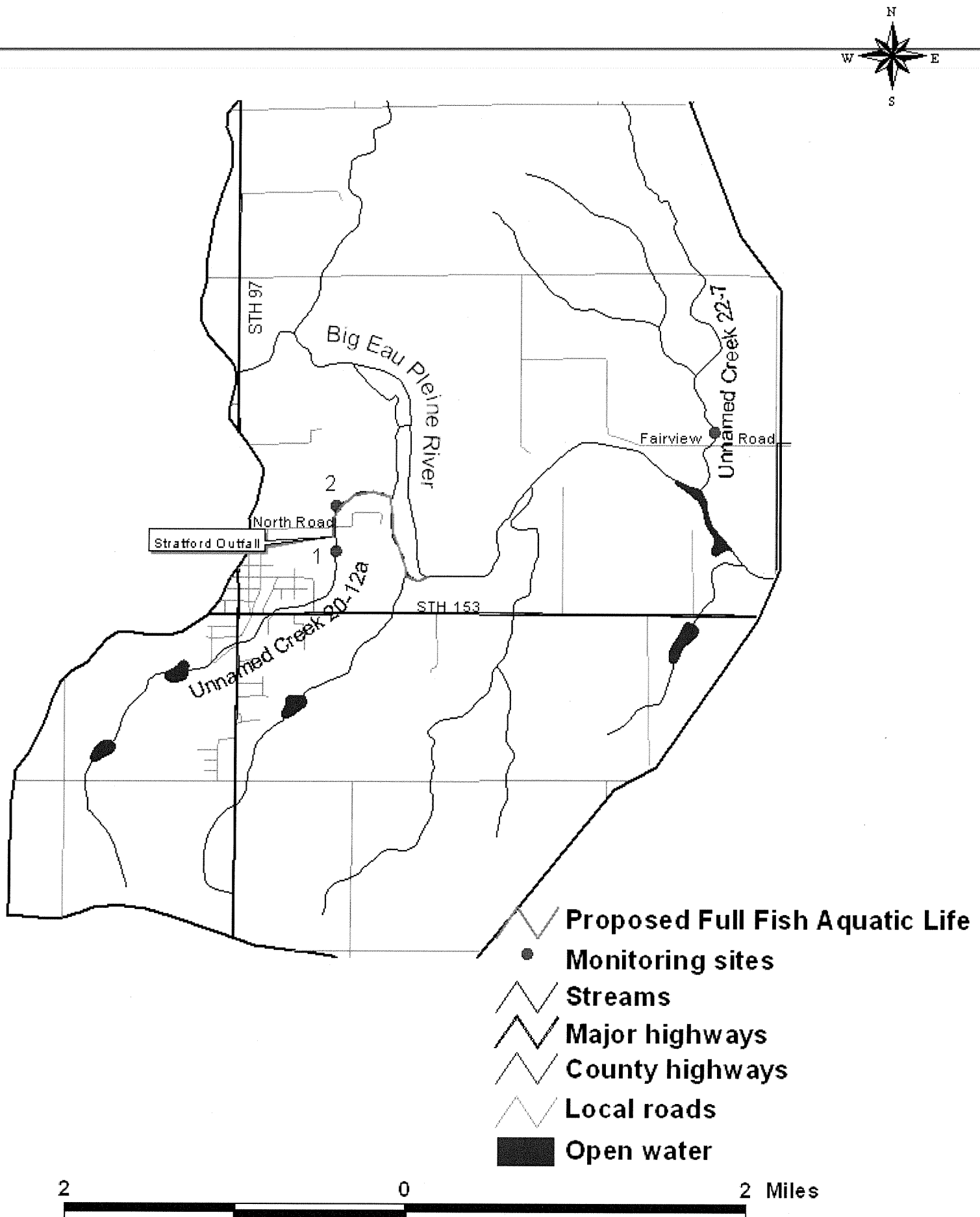
Figure 1. Unnamed Creek 20-12a Current NR 104 Classification



**Figure 2. Monitoring Sites for the Stratford Stream Classification Survey**



**Figure 3. Unnamed Creek 20-12a Proposed Classification**



## STRATFORD, MARATHON COUNTY

### Wastewater Receiving Stream Classification

The Stratford wastewater treatment plant discharges to a small creek which in turn joins with the discharge from Foremost Foods and travels approximately one mile before entering the Big Eau Pleine River. The Big Eau Pleine River has a 7Q10 of 0.2 cfs. Above Stratford, several ponds exist from which the flow in the tributary originates. This tributary, after picking up Foremost's discharge, flows through pasture and agricultural land until approximately 0.5 mile below the treatment plant where it enters the floodplain of the Big Eau Pleine and then meanders through wooded areas. During spring runoff, this area is flooded by the Big Eau Pleine. During dry periods, the flow is parallel to the river for 0.5 mile where it is joined by another tributary and forms a small pond. This pond, in turn, drains to the Big Eau Pleine River approximately 100 yards away.



Big Eau Pleine Tributary above Foremost Foods



Big Eau Pleine Tributary 100' below confluence with Foremost Foods



Big Eau Pleine Tributary below Foremost Foods and above Stratford





Big Eau Pleine Tributary 100 yards above confluence with Big Eau Pleine River.

A nonpoint source affects the tributary above Foremost Foods. On the Big Eau Pleine River above Stratford, the Stratford Rendering occasionally discharges to the river.

Forage fish have been observed in the tributary which receives the wastewater discharge. The Big Eau Pleine River supports northern pike, perch, carp, walleye, suckers, bluegills, bullheads, and several minnow species.

Recommendations: The small creek, which initially receives the wastewater from the sewage plant, shall be classed as a noncontinuous stream with an agricultural subclassification. The creek coming from Foremost, which is joined by the sewage treatment plant wastewater, shall be classed as a noncontinuous stream with an agricultural subclassification. The Big Eau Pleine River shall be classed as a continuous stream with a fish and aquatic life subcategorization.

District survey team: Bob Derksen, Environmental Engineer; Art Ensign, Staff Specialist (Fish); and Ron Yockim, Water Pollution Biologist.

