

ARROWHEAD RIVER/DAGGETS CREEK  
PRIORITY WATERSHED WATER RESOURCE  
APPRAISAL MONITORING PLAN

Prepared by  
Mary K. Gansberg  
March 1991

TABLE OF CONTENTS

	<u>Page</u>
I. Introduction.....	2
II. Description of the Watershed.....	2
III. Summary of Existing Data.....	2
IV. Monitoring Activities.....	3
V. Monitoring Methods.....	3
VI. Workload Analysis .....	5
VII. References.....	6

## I. INTRODUCTION

The Arrowhead River/Daggets Creek watershed was selected as a priority watershed project in 1990 under the Wisconsin Nonpoint Source Pollution Abatement Program. Before implementation of nonpoint source pollution abatement measures, a water resources appraisal must be conducted to evaluate the condition of the water resources. Preliminary water resource objectives will be developed from this appraisal. This report provides a brief description of the Arrowhead River/Daggets Creek watershed, summary of past monitoring that has been done, description of what appraisal monitoring activities will be done, a schedule, methods used, and a description of workload analysis.

## II. DESCRIPTION OF THE WATERSHED

The Arrowhead River/Daggets Creek watershed is located in the southeast most part of the Wolf River drainage basin (WR01-112). This basin drains to the Winnebago Pool of Lakes. The Arrowhead River/Daggets Creek watershed has a drainage area of a 135 square miles and is comprised of the Arrowhead River, Daggets Creek, Rat River, and several unnamed streams and ditches (see Figure 1). The Arrowhead River is tributary to the east shore of Lake Winneconne, the Rat River is tributary to the mainstem of the Wolf River which drains to Lake Poygan, and the lower half mile of Daggets Creek is a dredged channel that enters Lake Butte des Morts. These upriver lakes drain to Lake Winnebago which eventually drains to Green Bay via the Fox River. The Winnebago Pool of Lakes is a highly productive warm water system that is described in the Winnebago Comprehensive Management Plan as highly eutrophic primarily due to nonpoint source loading of nutrient and sediment from poor agriculture practices in the watershed (WDNR, 1989).

## III. SUMMARY OF EXISTING DATA

A summary of past stream monitoring that has been collected is provided in Table 1. Some data dates back to 1975 when a Wolf River Drainage Mini-Basin survey was conducted. Macroinvertebrate analysis was done on the Rat River at South Road (monitoring site # 9) and the results included in the Wolf River Drainage Basin Survey Biologicals report (Weisensel, 1976). Bacteriological and water chemistry data was also collected monthly in 1975.

In 1978, four sites along the Rat River were surveyed for bacteria, water chemistries, and flows to determine background water chemistry data during a period of low flow. Results are summarized in the, "Water Quality Sampling on the Rat River" report (Bahti, 1978).

Macroinvertebrate sampling was done in Spring and Fall 1980 and in Fall 1990. Habitat evaluations, flows, bacteriological and water chemistry data was also collected Fall 1990.

There is no existing fisheries data for this watershed.

#### IV. MONITORING ACTIVITIES

Table 2 lists the appraisal monitoring activities that will be conducted in the Arrowhead River/Daggets Creek watershed. Existing data collection sites and appraisal monitoring sites are indicated in Figure 2. Stream appraisal sites were selected based on accessibility and location of previous monitoring sites for the goal of appraising each major sub-watershed. The sites for all monitoring activities will be the same.

Fish surveys, along with habitat evaluations, will be done in Spring 1991, by Fish Management. Water Resources will do macroinvertebrate monitoring in the Spring 1991. Spot monitoring for dissolved oxygen, temperature, pH, flow and bacteria will be done in the spring and during low flow periods in the summer. Continuous dissolved oxygen and temperature meters will be placed at one site on each of the three main streams for a three to four week period in summer in hopes of monitoring one or more nonpoint source runoff events. The Winnebago and Outagamie County Land Conservation Department will collect bacteria samples once every week during July and August in hopes of monitoring runoff events.

#### V. MONITORING METHODS

Following is a brief description of methods that will be used to collect information for the water resources appraisal. Monitoring procedures followed are outlined in the "Field Procedures Manual" (FPM, DNR 1988).

##### Macroinvertebrate

Aquatic macroinvertebrates will be collected at each site (FPM, Benthic Invertebrate Sampling-1001) and sent to UW-Stevens Point for sorting and identification. Sample results will be evaluated using Hilsenhoff Biotic Index which provides a relative measure of organic loading to streams.

## Habitat Evaluations

Stream habitat conditions will be evaluated at each site concurrently with fish surveys and also in mid-summer conditions. A matrix is used to numerically rank habitat characteristics from excellent to poor to assess physical factors that may limit the quantity and quality of aquatic life (Ball, 1982).

## Flows

Flows will be calculated at each stream site (FPM, Open Channel Flow Measurement-2301). Fast moving streams with riffles assimilate pollutants better than sluggish streams. The riffle provides reaeration sites to improve dissolved oxygen. Grade and width of the stream affect the flow and quality of aquatic life. A combination of riffles, runs and pools within a stream offers the best habitat conditions to maintain a self sustaining aquatic community.

## Dissolved Oxygen/Temperature/pH

Dissolved oxygen, temperature and pH will be monitored at each site (FPM, Dissolved Oxygen Meter-2101, Temperature-2502, and pH Meters-2000). In addition, continuous dissolved oxygen and temperature meters will be placed at one site on each of the three main streams during critical low flow, high temperature conditions. Wisconsin Administrative Code, NR 102 establishes water quality standards for fish and aquatic life classified streams. Dissolved oxygen should not be less than 5 mg/l and pH should be within the range of 6 to 9 to maintain favorable aquatic life.

## Bacteria

Bacteriological samples will be collected twice in Spring and once every week in summer at each site. The samples will be sent to the State Lab of Hygiene for fecal coliform and fecal streptococcus analysis. (FPM, Sample Handling and Preservation).

## Fisheries Resource Assessment

To provide an adequate picture of fish communities in the basin, stream segments 35 to 40 times the mean channel width will be electrofished. Fish will be captured with either a stream shocker or a backpack shocker depending on stream size. All fish collected will be counted and identified to species.

Physical stream habitat conditions will be measured or estimated while conducting fish surveys. Stream conditions include streamflow, width, depth, substrate composition and streambank characteristics (Ball, 1982).

### VI. WORKLOAD ANALYSIS

The following is a summary of hours needed by DNR staff to conduct proposed appraisal monitoring for the Arrowhead River/Daggets Creek Watershed project:

<u>Activity</u>	<u>Date</u>	<u>Hours</u>
Fisheries Resource Assessment:	Spring	120 hours
Macroinvertebrates:	Spring	40 hours
DO, temp, pH, flows, Bacti:	Spring	20 hours
	Summer	50 hours
Habitat Evaluations:	Summer	10 hours
	<u>Total:</u>	240 hours

Table 1

Watershed: Arrowhead/Daggets

SUMMARY OF EXISTING DATA

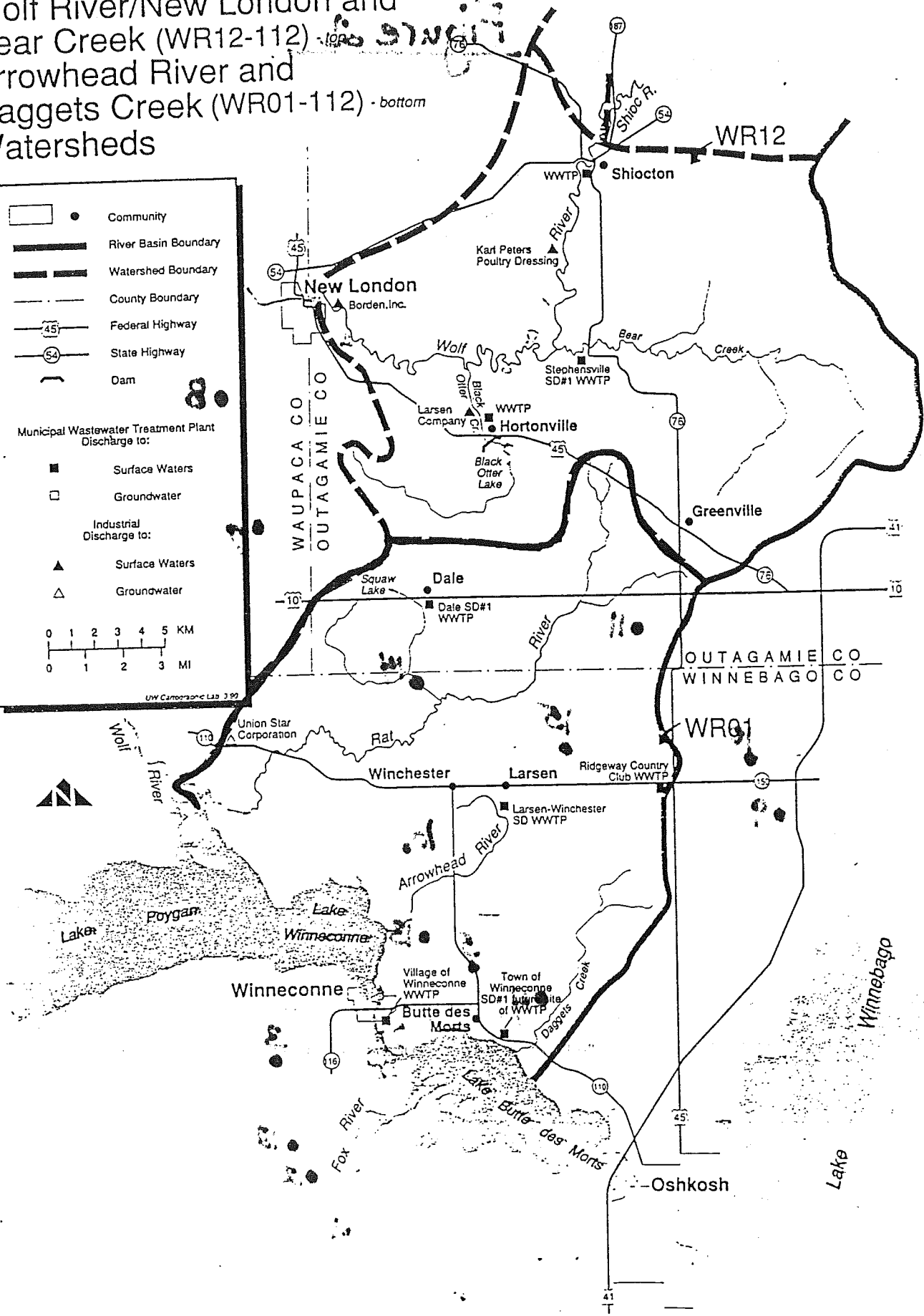
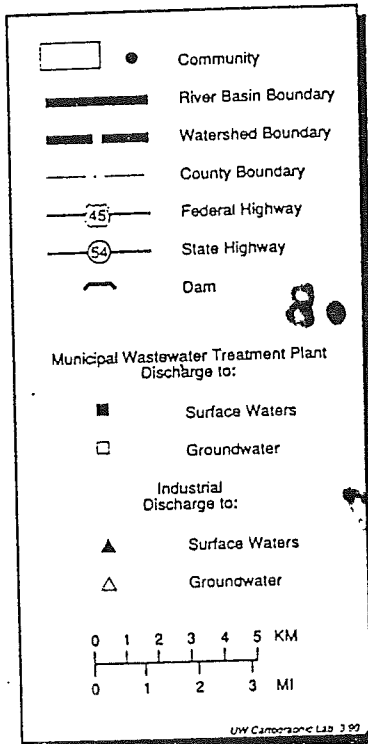
<u>Location</u>	<u>Survey type</u>	<u>Date</u>
<b>Daggets Creek</b>		
1 Brooks Road & 2 HWY "GG"	HBI Habitat Bacti/Nutrients Flows	5/80, 11/80, Fall 1990 Fall 1990 Fall 1990 Fall 1990
3 Allenville Road	HBI Habitat Bacti/Nutrients Flows	Fall 1990 " " "
<b>Arrowhead River</b>		
4 Breezewood Road, & 6 Grandview Road	HBI Habitat Bacti/Nutrients Flows	Fall 1990 " " "
5 HWY "110"	HBI Habitat Bacti/Nutrients	" " "
<b>Rat River</b>		
7 Island Road	HBI Habitat Bacti/Nutrients Flows	" " 1978, Fall 1990 Fall 1990
8 Spring Road	HBI Habitat Bacti/Nutrients Flows	" " " "
9 South Road	HBI Habitat Bacti/Nutrients Flows	" " 1975, 1978, Fall 1990 1975
10 HWY "110"	HBI Habitat Bacti/Nutrients	Fall 1990 " "
11 Cedar Road	HBI Bacti/Nutrients	" "
14 HWY "M"	Bacti/Nutrients	1978
15 HWY "W"	Bacti/Nutrients	1978





Figure 1

Wolf River/New London and  
 Bear Creek (WR12-112) - top  
 Arrowhead River and  
 Daggets Creek (WR01-112) - bottom  
 Watersheds



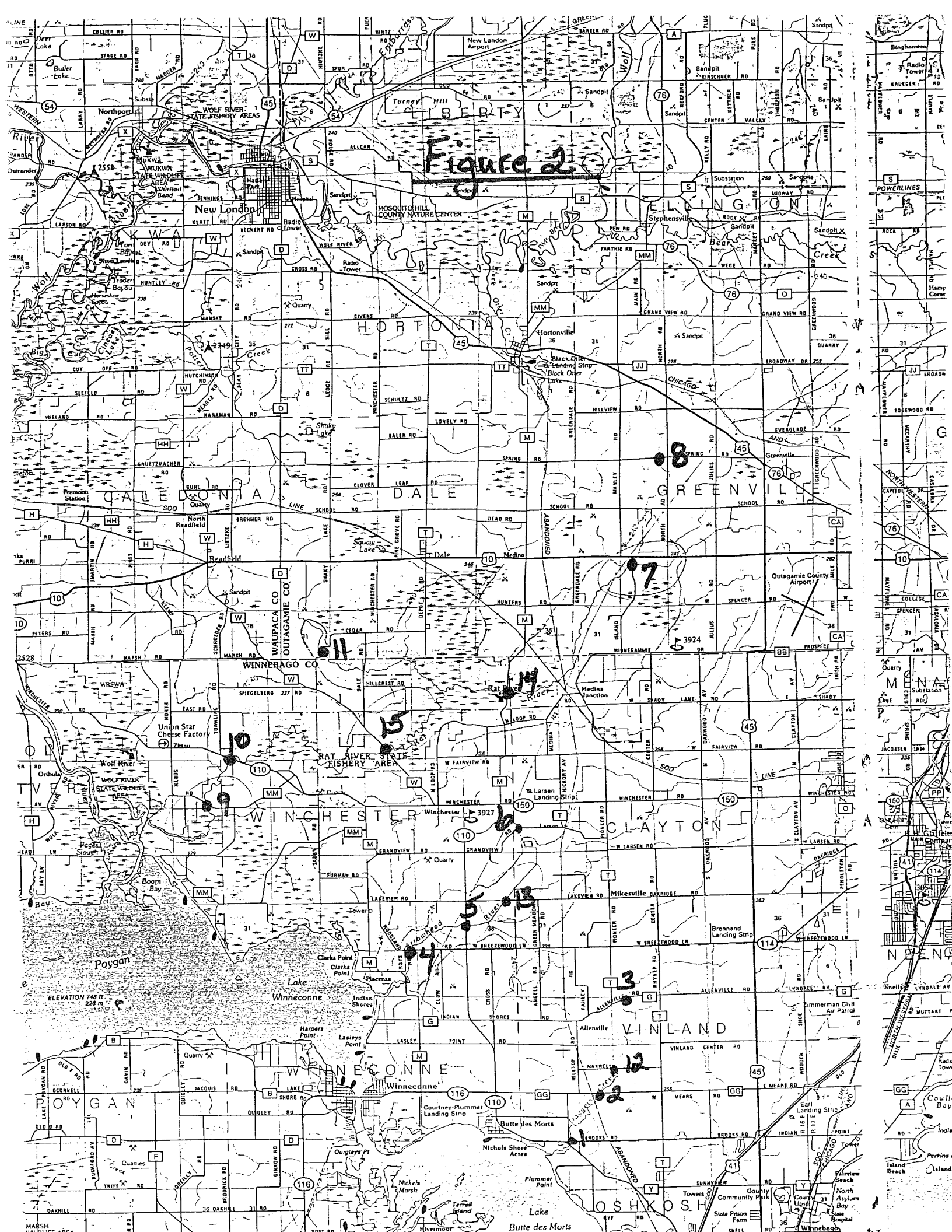


Figure 2

8

7

15

10

9

4

5

13

6

14

3

12

2

11

1

2

3

4

5

6

7

8

9

10

11

12

Table 2

Watershed: Arrowhead/Daggets

Watershed Appraisal Monitoring Activities/Schedule

<u>SITE #</u>	<u>LOCATION</u>	<u>SPRING</u> '91	<u>SUMMER</u> '91
<u>Daggets Creek</u>			
1	Brooks Rd	Fish survey, Habitat Eval, DO, Temp, pH, Flows, Bacti, Biotic index	Continuous DO/Temp, Grab DO, Temp, pH, Flows, Bacti, & Habitat Eval.
2	Hwy "GG"	X	X
12	Maxwell Rd	X	X
<u>Arrowhead River</u>			
4	Breezewood Rd	X	X
5	Hwy 110	X	X
13	Lakeview Road	X	X
<u>Rat River</u>			
7	Island Road	X	X
9	South Road	X	X
15	Hwy "W"	X	X

*out of range + LORM too*  
*only at 1st station*

## VII. References

Weisensel, Dennis C., 1976. Wolf River Drainage Basin Survey Biologicals: Wisconsin Department of Natural Resources.

Bahti, Tom, 1978. Water Quality Sampling on the Rat River: Wisconsin Department of Natural Resources.

Ball, Joe, 1982. Stream Classification Guidelines for Wisconsin: Wisconsin Department of Natural Resources.

Wisconsin Department of Natural Resources, 1988. Field Procedures Manual. Draft 2nd Edition.

Wisconsin Department of Natural Resources, 1989. Winnebago Comprehensive Management Plan.