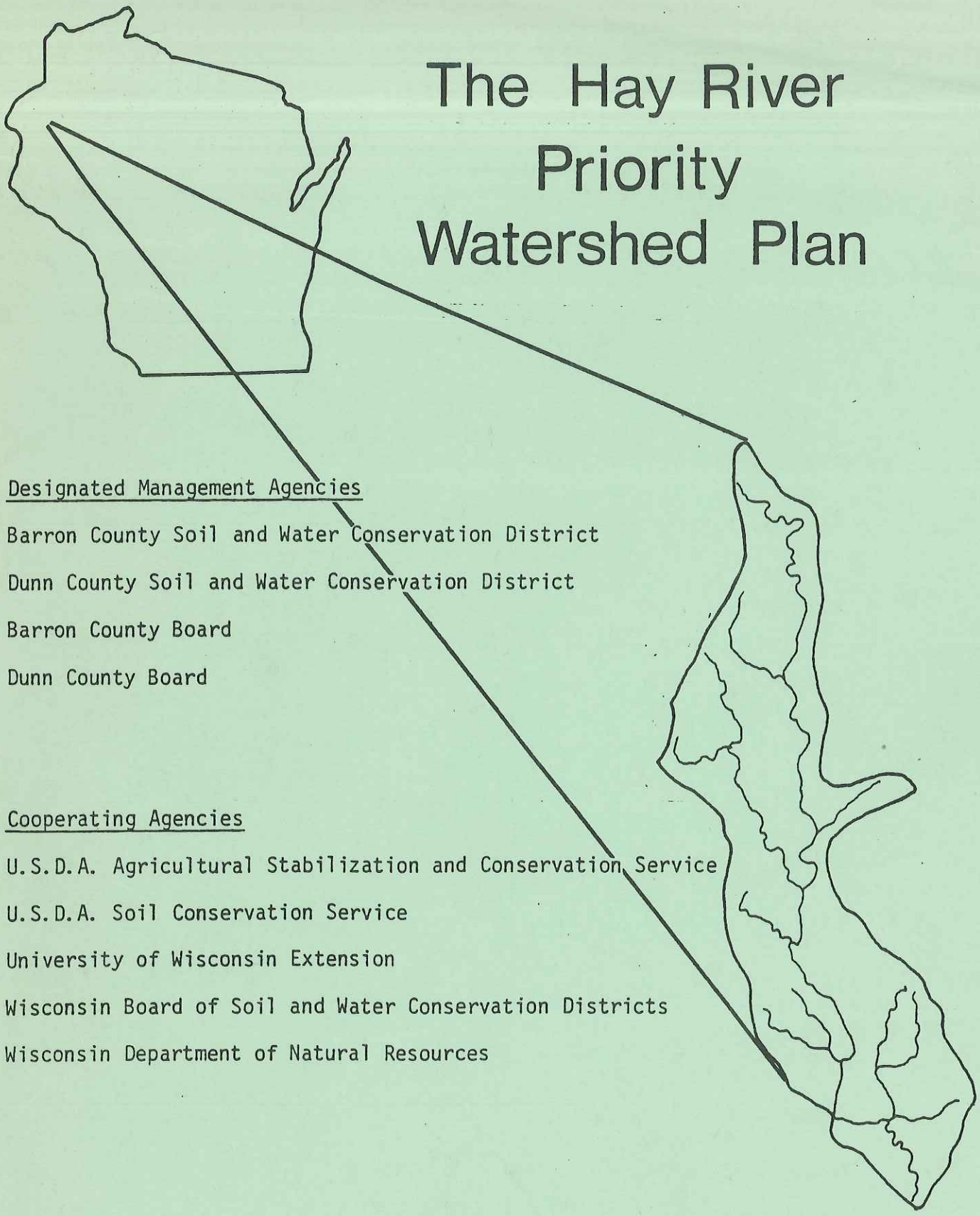
The Hay River Priority Watershed Plan



Designated Management Agencies

Barron County Soil and Water Conservation District

Dunn County Soil and Water Conservation District

Barron County Board

Dunn County Board

Cooperating Agencies

U.S.D.A. Agricultural Stabilization and Conservation Service

U.S.D.A. Soil Conservation Service

University of Wisconsin Extension

Wisconsin Board of Soil and Water Conservation Districts

Wisconsin Department of Natural Resources

This plan was prepared with the assistance of the Wisconsin Department of Natural Resources and the Wisconsin Board of Soil and Water Conservation Districts under the provisions of the Wisconsin Nonpoint Source Water Pollution Abatement Program.

BARRON COUNTY
Soil & Water Conservation District

Barron County Courthouse Annex
Barron, Wisconsin 54812

October 12, 1979

Mr. Anthony S. Earl
Department of Natural Resources
P. O. Box 7921
Madison, WI 53707

Dear Mr. Earl:

The Barron County Soil and Water Conservation District, as the Lead Designated Management Agency for the Hay River Watershed, authorizes approval of the Hay River Watershed Water Quality Management Plan provided that additional modifications of the plan meet Soil and Water Conservation District specifications. The recommendation by the Barron County Soil and Water Conservation District Supervisors was unanimously approved on October 9, 1979. We do not expect, however, that changes would significantly alter the document.

We will proceed with implementation of the plan immediately upon final Department of Natural Resources approval.

Sincerely,

V. Gordon Greener

V. Gordon Greener
Chairman

VGG:kmc

cc: Jerry Griswold

HAY RIVER WATERSHED WATER QUALITY MANAGEMENT PLAN

Introduction

In 1978, the Wisconsin Legislature established the Wisconsin Nonpoint Source Water Pollution Abatement Program in order to accelerate efforts to achieve and maintain fishing and swimming water quality standards in lakes and streams of Wisconsin. This program developed from the federally mandated area wide water quality management planning activities (also referred to a "208" or basin planning), and has been developed to address water quality problems and to implement technical and institutional solutions delineated in the area wide plan. Through the nonpoint source element of the Wisconsin Fund, cost-sharing monies are available to municipalities, landowners, and land operators for installation of Best Management Practices. Most of the funds are focused into priority watersheds where nonpoint source control needs are critical.

HAY RIVER WATERSHED WATER QUALITY MANAGEMENT PLAN

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Hay River Watershed Selection

The Hay River Watershed was selected as one of the first five priority watersheds under the Wisconsin Nonpoint Source Water Pollution Abatement Program. The selection process involved three steps:

1. The Hay River Watershed was identified by the Wisconsin Department of Natural Resources (W. D. N. R.) in the top 25 percent of eligible watersheds in the state based on a numerical system designed to select the best candidate watersheds for the program.
2. Northwest Regional Policy Advisory Committee, a group established to provide local input to area-wide water quality management planning and convened by the Wisconsin Department of Natural Resources, reviewed Northwest Region watersheds that were included in the top 25 percent. The committee recommended three watersheds to next level of selection. The Hay River Watershed was ranked first among the watersheds based on support given for the project by Barron and Dunn County representatives.
3. Finally, the Wisconsin Department of Natural Resources upon recommendation of State Nonpoint Source Coordinating Committee, comprising of representatives of local interests and federal agencies, selected the Hay River Watershed.

Summary of Findings and Recommendations

Chemical, bacteriological, benthic and fisheries data were used to evaluate the water quality of streams and lakes in the Hay River Watershed located in Dunn and Barron Counties. Water quality in the watershed was judged to be generally good based on the biological index. Bacteriological samples exceed safe standards for surface waters in most cases based on public health standards. Samples, were, however, indeterminant with respect to whether the source was human or livestock.

From the fishery information, water bodies were classified into three groups based on stream surveys and field experience of fish managers: high water quality with a high game fishery potential, degraded water quality with good game fishery potential, and high water quality with a restricted fishery potential.

In order to assess the existing and potential water quality problems and address the prospect of abatement through implementation of Best Management Practices, Barron and Dunn County Soil and Water Conservation District personnel, in cooperation with the respective county field offices of the Soil Conservation Service, surveyed the Hay River Watershed. Practices needed to control cropland erosion, animal waste runoff, streambank erosion and eroded pastures were estimated for each tributary (subwatershed). Manpower needs to plan and implement Best Management Practices were calculated for each watershed to meet water quality goals. Significant findings were revealed by the survey:

1. In terms of cost-share dollars, the largest portion is needed for animal waste management systems and secondly for upland treatment.
2. In terms of personnel, the greatest need is for plan development followed by technical survey and design personnel.

It is assumed water quality will be effected by land management and maintenance or improvement will be proportional to the implementation level of Best Management Practices. Management practices required in the Hay River Watershed are listed by subwatershed with respective cost-share monies and hours of manpower required to implement the practices. (See Appendix I)

To emphasize the direction of implementation, subwatersheds were grouped into three categories dependent on existing water quality and potential improvement: streams are characterized by high water quality and a high potential, degraded water quality with a high potential, and high water quality with a limited potential restricted by natural conditions. Protection of water bodies with existing high quality and a potential high quality are considered priority one (1) streams. Rationale is based on the fact that it is more cost effective to protect high quality/high potential water body than to rehabilitate a degraded water body. Also, the land management needs may be relatively low for a subwatershed in which both the present water quality and future potential are high. Second priority is the rehabilitation of those water bodies where nonpoint sources have degraded the resource, or those which require protection to insure a high water quality with restricted potential.

Implementing Agencies and Units of Government

The area wide water quality basin management plan for the Lower Chippewa River Basin identified the Soil and Water Conservation Districts and County Boards of Barron and Dunn Counties as the Designated Management Agencies (D. M. S.'s). Barron and Dunn County Soil and Water Conservation Districts and County Boards jointly worked to develop the watershed plan and to identify responsibilities for various agencies and groups in the implementation of the plan. The watershed plan identifies:

1. Water quality problems, objectives, and target levels of pollutant control necessary to meet the water quality objectives.
2. Most significant nonpoint sources of pollution, a map of critical areas where control measures will be undertaken, Best Management Practices (B. M. P.'s) eligible for cost-sharing, and the costs associated with implementing B. M. P.'s.

Description of Project Area

A. Physical

The Hay River Watershed in the Lower Chippewa River Basin is located in western Barron and Dunn Counties. Hay River originates in the headwaters of Beaver Dam Lake and extends southerly for approximately 58 miles to Tainter Lake and the confluence with Red Cedar River. The watershed encompasses 187,000 acres and is characterized by a well-developed, dendritic patterned drainage basin with 14 named tributaries.

Tributaries classified as trout water include Big Beaver, Deutch, Dority, Jones, Little Otter, Turtle, Silver, Vance and Washburn Farm Creeks. Warmwater streams are the Hay River, Lightning, Little Beaver, Moon and Quarter Creeks. Map I shows the Hay River with subwatersheds delineated.

The Hay River Watershed has nine named lakes and two impoundments. Surface water bodies exceeding 25 acres are Beaver Dam, Big Moon, Kidney, Kirby, Little Moon, Lower Turtle, Mosquito, Prairie Farm Flowage, Spring, Tainter, and Upper Turtle Lakes.

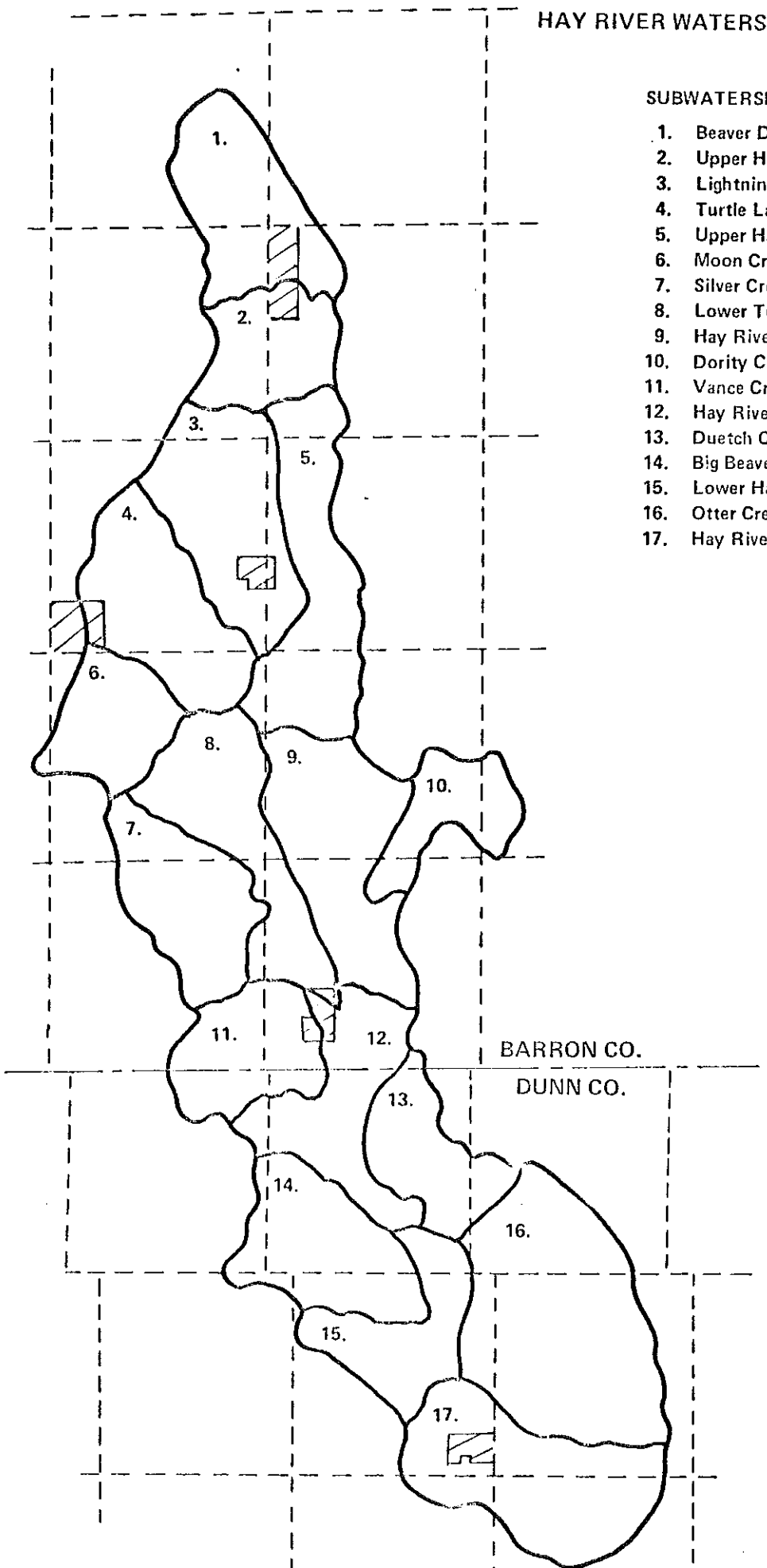
Bedrock geology in the watershed consists of Cambrian sedimentary formations which overlie ancient igneous bedrock. Three formations of sedimentary rock have been identified and consist of sandstones, siltstones, and shales. In the Lower Hay River exposed sedimentary rock out cropping are common.

Physical characteristics of the watershed are gently rolling to rolling slopes in the north. The floodplain narrows in the southern portion of Barron County, then after entering Dunn County, it widens continually as the river flows toward Tainter Lake. Steep slopes with high, narrow ridges characterize the portion of the watershed in Dunn County.

Glaciation has strongly influenced soils and to a lesser extent general topography of the watershed. Northwestern portion is characterized by deep, well drained, loamy soils over sandy glacial till represented by the Amery-Cloquet association. Topography ranges from nearly level to steep slopes on glacial moraines.

Onamia-Antigo-Chetek association constitutes a small area in the northeastern section of the watershed. These are shallow sands on nearly level outwash plains, with farming as the main land use.

HAY RIVER WATERSHED AND SUBWATERSHEDS



SUBWATERSHEDS

1. Beaver Dam Lake
2. Upper Hay River/Johnson Creek
3. Lightning Creek
4. Turtle Lakes
5. Upper Hay River
6. Moon Creek
7. Silver Creek/Jones Creek
8. Lower Turtle Creek
9. Hay River/Tainter Creek
10. Dority Creek
11. Vance Creek
12. Hay River/Quarter Creek
13. Duetch Creek/Washburn Farm Creek
14. Big Beaver Creek
15. Lower Hay Creek
16. Otter Creek
17. Hay River/Tainter Lake

Spencer-Almena-Santiago association occupies a substantial area in the northcentral part of the watershed. These are loam soils derived from loess underlain by glacial till and tend to be poorly drained and can experience severe erosion. The association is nearly level to sloping on ground moraines of Wisconson Age.

Arland-Hixton-Gale association occupies the greatest land area of the watershed. Soils are moderately deep and well drained underlain b y sandstone. Topography varies from nearly level on sandstone uplands to steep on hillsides. Cropland is the major land use, but most steeper slopes are wooded or pastured.

Plainfield-Plainbo association is found adjacent to the Hay River and tributaries in Dunn County. These soils are nearly level to sloping, excessively drained underlain by sand. Woodlots and cropland constitute the major land use.

Otterholt-Almena association predominates on upland ridges along the western border of the watershed in Dunn County. Soils are silt loams underlain by glacial till and are slowly permeable. Erosion is a significant hazard with intertilled crops.

Moderately steep to very steep Urne-Elkmound association occupies a significant area in the south-central portion of the waterhsed. These soils range from loams to very fine sandy loams covering sandstone. Most of the association is used for pasture or woodlots. Erosion hazard is moderate to severe because of steep slopes.

B. Social, Economic, and Environmental

Land use within the watershed is predominately agricultural with dairying being the major enterprise. Current estimates show approximately 42 percent of the watershed in cropland (21 percent corn, 20 percent

small grains, and 59 percent hayland), 24 percent is in grassland pasture, and 27 percent is wooded. The remaining seven percent includes urban areas, roads and surface water.

There is an estimated 1,500 rural landowners within the watershed boundaries of which approximately 1,100 are active dairy farmers. A reduction in the number of dairy operations has occurred during the past decade with the remaining farming operations increasing in size. Because dairying is the chief agricultural operation, crops are generally rotated. Most commonly employed rotational scheme is one year of corn followed by a year of oats and three or more years of hay. Exceptions may include another year of corn. Cash cropping and turkey production are also significant farming operations in the basin. Over 1,100 acres are planted to vegetables and nearly 400,000 turkeys are produced annually.

Urban and Scattered Development

Urban development is quite limited in the Hay River Watershed. Cumberland (population of 1,959) is the only city located near the headwaters of the Hay River along Beaver Dam Lake. Cumberland's storm sewer discharges directly into Beaver Dam Lake. Street sweeping occurs on a limited basis, and treated wastewater is discharged into the lake. There are four incorporated villages including Almena, Prairie Farm, and Turtle Lake having a combined population of approximately 1,800 residents. Almena has a storm sewer discharge into a tributary of Lightning Creek and Prairie Farm storm sewer discharges into the Hay River. Turtle Lake does not have a storm sewer outlet into a permanent stream or lake. Almena and Prairie Farm discharge treated wastewater to the Hay River. Turtle Lake and A.M.P.I. discharge treated wastewater to a tributary of Moon Creek.

Wetlands

Wetland areas constitute only a small fraction of the watershed. Only two appreciable wetland areas not associated with lakes or streams are recognized: an area near Turtle Lake and near Cumberland. Wetland areas on the Hay River and some tributaries are minimal. More extensive wetland areas are found on Big Beaver Creek (Big Beaver Creek Wildlife Area) and Otter Creek (otter Creek Wildlife Area).

Water bank contracts are possible in the future, but have not yet been approved. Total wetland acreage constitute about 3,800 acres or 2.0 percent of the watershed.

Water Quality Goals and Objectives

In general there are two water quality goals for a watershed:

a. nondegradation of water bodies currently in high or moderate water quality classifications.

b. rehabilitation of water bodies degraded by nonpoint source pollution.

For the Hay River Watershed, the water quality objective is a combination of both. An improved or protected stream will be defined in terms of the following parameters:

a. fecal bacteria

b. biotic index values

c. fish and macroinvertebrate diversity and population

d. dissolved oxygen

e. asthetic nature of the stream

f. sediment transport

To achieve the goal of rehabilitation and protection in the Hay River Watershed, the objectives of the project will focus on the following:

a. decreasing or maintaining biotic values to the good or excellent categories.

b. reduce fecal bacteria average count

c. esthetic nature of the stream

Evaluation of the project in achieving objectives will be done by:

a. monitoring water quality over time using the following techniques:

1. biotic index monitoring
2. bacteria count monitoring
3. fish surveys
4. chemical event monitoring
5. chemical water quality characterization

b. conduct public opinion surveys

Following is a description of each water quality monitoring technique including an explanation of how the technique can effectively evaluate whether the objectives of the project are being met.

A. Biotic Index is a measure of overall water quality based on the type and number of aquatic insects in a benthic sample. The index assumes that certain species of insects and/or larva can only survive in waters of certain quality. This biological technique monitors the general integrity of water and is capable of responding rapidly to changes in water quality. However, the Biotic Index is not an indication of any specific parameter of water quality.

To calculate the biotic index, each species is assigned a numeric value ranging from zero to five. Species intolerant of pollution recieve a low number while pollution-tolerant species are assigned a higher value. Approximately one hundred organisms are collected at each site; organisms are identified and values assigned; the total is divided by the number collected for the index number. The ranges of values have been classified according to various levels of water quality.

CLASSES OF WATER QUALITY ACCORDING TO THE BIOTIC INDEX

Biotic Index	Class of Water Quality	State of Stream
0.00 - 1.75	Excellent	Clean undisturbed.
0.75 - 2.25	Good	Some enrichment or disturbance.
2.25 - 3.00	Fair	Moderate enrichment or disturbance.
3.00 - 3.75	Poor	Significant enrichment or disturbance.
3.75		

* Biotic index values are based on single samples collected in spring and autumn. For spring and autumn samples, 0.13 is added to calculate values.

B. Bacteria Counts measure the abundance and ratio of fecal coliform and fecal streptococcus in water samples. Bacteria counts are useful for distinguising sources of animal waste pollution from human sources although the numbers are highly dependent on runoff, adjacent land use and other variables.

C. Fish Surveys are the measure of abundance or diversity of fish species. This method assumes that certain fish can only survive in waters of certain quality. For instance, smallmouth bass cannot survive in waters with limited amounts of dissolved oxygen. These fish surveys can be used to establish base line conditions of fish populations, type, and diversity. Fish surveys can also indicate areas of degraded habitat and, over time,

changes in fish population provide evidence of habitat and water quality improvements. These surveys may also be useful for determining the maximum fishery potential.

D. Chemical Monitoring is the measure of chemical compounds such as sediment, phosphorus, and nitrogen contained in a water sample. Monitoring can be on a rainfall-event basis or by low-flow sampling. The advantages are that loadings of specific water quality parameters (the chemical compounds) can be measured and that these parameters are responsive, for the most part, to changes in land use and weather.

Biotic index and bacteriological sampling are the basic monitoring techniques for the Hay River Watershed Project. Other types of assessments will be made where desirable. Biotic index sampling should be continued on a spring and fall basis each year. Bacteriological sampling should be conducted before and after implementation. After initial assessment, some sampling sites will probably be deleted in each watershed; conversely, sites may be added in areas where problems are very severe and implementation intensive.

Determining Priority Management Areas

Determination of priority management areas (PMA) involves identification of potential for pollutants reaching streams and lakes. Studies indicate damage from nonpoint sources occur to streams and lakes within the Hay River Watershed. Damage is a result of both biological and sedimentary degradation.

Determining priority management areas involves identifying:

A. Where potential for pollutants reaching streams is greatest.

B. Where water quality should be protected or rehabilitated based on studies.

C. Where good land management practices are not widespread and where land management practices can impact water quality.

These criteria are consistent with the legislative and intent provisions of the Wisconsin Nonpoint Source Abatement Program (ss. 144.25, NR 12(d)). Limited funding and technical assistance can be concentrated where it can do the most good.

In applying criteria (a) above, experience has shown potential for pollutants reaching streams is greatest within 1/8 mile of any intermittent or permanent stream. For criteria (b) above, Biotic Index samples were collected at 15 sites. Bacteria samples at 15 sites were also collected. These studies indicate water quality conditions throughout the watershed. In considering criteria (c), the animal unit survey, streambank survey

and upland erosion inventory were used. When criteria (a) (b) and (c) are combined, a priority management area is delineated as follows:

A. All lands within 1/8 mile of perennial and intermittent streams, wetlands and ditches.

B. Subwatersheds are grouped as indicated.

1. Big Beaver, Dority, Jones, Silver and Vance.
2. Deutch, Lightning, Little Beaver, Little Otter, Moon, Otter, Quarter, Tainter, Turtle and Washburn Farm.
3. Hay River subwatershed.

C. Best management practice priorities within each watershed is as follows:

1. Shoreline protection practices and barnyard runoff management.
2. Upland practices
3. Other eligible best management practices that influences water quality.

Source or Potential Source of Pollution by Subwatershed

A field survey was conducted in May and June of 1979 in order to identify and locate potential nonpoint pollution sources. Reconnaissance of the Hay River and tributaries located significant areas within direct access of stream channels.

Priority one (1) subwatersheds include: Big Beaver, Dority, Jones, Silver and Vance Creeks.

A. Livestock and Pollution Potential

Animal waste runoff is a problem in priority one subwatersheds. Dority, Jones, Silver and Vance Creeks have high concentrations of livestock. Spring runoff from manure disposed during the winter is a significant pollution hazard in the subwatersheds. Barnyard runoff is a hazard, especially from farms located near stream channels. From field surveys, 27 critical barnyards were located within 660 feet of the streams. Of the 27 critical barnyards, only two have animal waste management systems planned and a limited number have systems implemented.

B. Cropland Pollution Potential

Cropland erosion is considered a significant potential source of nonpoint pollution, discharging sediment and phosphorus into surface water. Upslope cultivation on steeper slopes, the lack of contour strips and tillage, and the absence of waterways and diversions in many areas produce soil erosion. Information from the Conservation Needs Inventory showed that in 1977 about 60 percent of the cropland exceeded the tolerable soil loss. Other land uses were generally below the allowable erosion limit. Potential cropland erosion exists on 4,670 acres in the priority one (1) subwatersheds, which is approximately 35 per cent of the total cropland area of the subwatersheds.

C. Other Critical Areas

Cattle pasturing along permanent streams poses an additional nonpoint hazard by producing streambank erosion and depositing manure.

Roadside and upland pastures were noted, in the field surveys, as a potential erosion hazard. Significance of this source, however, was believed to be considerably less than other sources due to a lesser contributing area.

Priority two (2) subwatersheds include Deutch, Lightning, Little Beaver, Little Otter, Moon, Otter, Quarter, Tainter, Turtle and Washburn Farm.

A. Livestock Pollution Potential

Animal waste runoff is a significant source of pollution. Livestock concentrations are somewhat less than priority one (1) subwatersheds, but there are 72 critical barnyards within the 660 foot distance of a stream. Proposed animal waste management systems number less than five.

B. Cropland Pollution Potential

Cropland erosion potential consists of approximately 13,430 acres in priority two (2) subwatersheds. This constitutes approximately 31.5 percent of the cropland in the subwatersheds, and about 13.5 percent of the total land area. Erosion is considered a major nonpoint source in these subwatersheds.

C. Other Critical Areas

Streambank and roadsides are other critical areas requiring attention. Approximately 40 acres of streambank are eroded contributing sediment to priority two (2) watersheds. Roadsides and other critical areas constitute minor sources.

Hay River Subwatershed **(Critical Areas Included With Priority** One)

A. Livestock Pollution Potential

Animal waste is a significant pollution potential of the Hay River. Within the priority management area there are 50 critical barnyards. Manure runoff during the spring snowmelt season is considered a severe hazard due to a high reliance on winter disposal. Animal waste management systems are lacking in areas along the Hay River.

B. Cropland Pollution Potential

Cropland erosion potential consists of nearly 7,000 acres located along the Hay River. This is approximately 25 percent of the cropland in the area and represents a substantial pollution potential.

C. Other Critical Areas

Streambank erosion potential is a substantial nonpoint pollution hazard for the Hay River. Approximately 110 acres are considered critical erosion areas along the Hay River.

Actions Needed by Subwatershed and In Total

A. Priority Management Area

The extent to which nonpoint source pollution affects the quality of surface water is dependent on the distance of the source to water and type of conveyance. The immediate adjacent areas to the channel are believed to contribute the majority of the pollutants. The conveyance factor in the area is generally highest and potential sediment and nutrient loading is significant. By concentrating management techniques within a restricted area near the stream, nonpoint source pollution abatement efforts can be extremely effective and more economical than total watershed implementation. The Priority Management Area for the Hay River Watershed Management Plan begins at the streambank of permanent stream channels and extends upslope for a total of 660 feet on both sides of the channel. There are, however, areas beyond the corridor that contributes significant pollutants. For instance, a high livestock density area outside of the corridor with a direct conveyance to a stream may be included in the priority management area. Significant sources located within the Priority Management Area are also identified on the watershed map.

B. Best Management Practices

Best Management Practices are defined as practices, techniques or measures identified in the water quality management for the Lower Chippewa River Basin which are determined

to be most effective, practical means of preventing or reducing pollutants generated from nonpoint sources.

Best Management Practices applicable for the Hay River Watershed are listed:

1. Conservation Cropping System - growing crops in combination with needed cultural and management measures to protect the soil during periods when erosion usually occurs.
2. Contour Cropping - farming sloping cultivated land on the contour to reduce erosion and control water.
3. Critical Area Stabilization - planting vegetation on critical areas to stabilize the soil and reduce damage from sediment and runoff to downstream areas.
4. Diversions - a channel with a supporting ridge on the downslope side constructed across the slope to divert water from areas where it is in excess to sites where it can be used or safely disposed.
5. Grade Stabilization Structure - a structure to stabilize the grade and control erosion in natural or artificial channels, prevent the formation or advance of gullies, and reduce pollution hazards.
6. Minimum Tillage - Tillage practices which disturb and roughen the soil surface but not to the extent of mold board tillage systems. Some vegetative residue must remain on the surface.

7. Waterway - a natural or constructed waterway or outlet shaped or graded and established in suitable vegetation as needed to provide for the disposal of excess surface water without damage from erosion.

8. Shoreline Protection - stabilizing and protecting the streambank against scour and erosion by vegetative or structural means (riprap) to prevent the loss of land, maintain channel capacity, control meanders, and to reduce sediment loads resulting in downstream damage and pollution.

9. Strip Cropping, Contour - growing crops in a systematic arrangement of strips or bands on the contour to reduce erosion and control water runoff.

10. Terraces - an earthen embankment, channel or a combination ridge and channel constructed across the slope to reduce erosion and reduce the sediment content in runoff water.

11. Barnyard Runoff Management/Manure Storage Facilities - a planned system to manage liquid and solid waste including runoff from concentrated waste areas in a manner which prevents or minimized degradation of air, soil and water resources and protects public health and safety.

12. Livestock Exclusion From Woodlots - Protection of woodlots from livestock grazing by fencing or other means.

13. Settling Basin - an impoundment created to retain sediment and other pollutants carried by runoff water.

Tables II and III of Appendix II estimate number or amount of Best Management Practices required and cost estimates. Cost-sharing rates were set at a level comparable to other existing programs, i.e., A.C.P.

Estimated Costs

Estimated watershed Best Management Practice implementation costs are listed in Tables II and III of Appendix I. The tables are based on current costs of conservation practices installed in the general area during the past year. If 100 percent implementation was achieved in the priority one subwatersheds, total cost would be $198,951, $288,327 with manpower, administrative, information and travel expenses. Priority two subwatersheds would require an additional $682,694 for 100 percent implementation. Implementation levels of 50 and 75 percent would require correspondingly less money. Manpower requirements were based on planning and technical needs with salaries based on current federal salary guidelines. Travel expenses

are based on 10,000 miles per man year at .19 cents per mile. Administrative information and education costs are estimated.

VII. Institutional Arrangements

The Wisconsin Nonpoint Source Water Pollution Abatement Program administrative responsibilities for the Hay River Watershed Plan are assigned to the Barron and Dunn County Soil and Water Conservation Districts and respective Barron and Dunn County Board of Supervisors. Specific duties relating to the administration of the Wisconsin Fund include:

A. Determine the priority for assistance for cost-sharing within the watershed.

B. Coordinate the use of other funds available for cost-sharing from other sources.

C. Solicit and process applications for cost-sharing agreements.

D. Prepare cost-sharing agreements and screen applications for variances to prescribed cost-sharing rate maximums.

E. Prepare and maintain all program records.

F. Certify practice installation and authorize cost-share payment.

G. Coordinate a program of information and education.

H. Supply technical assistance.

It has been recognized that other agencies will be consulted and involved in the execution of many tasks without being assigned major responsibilities. Listed briefly are assisting agencies and their roles:

1. B. S. W. C. D. - Coordinate Soil and Water Conservation District programs, assist with information and education, provide funds to cover the costs of technical assistance in the implementation of the Watershed Management Plan.
2. D. N. R. - Overall administrative role in charge of Wisconsin Nonpoint Source Pollution Abatement Program.
3. S. C. S. - Provide technical assistance with the planning and implementation phase of the "Best Management Practices" as identified by the Management Plan.
4. U. W. - EXT. - Assist with a program of information and education. A detailed account of the program is located in the Public Information Education Plan.
5. A. S. C. S. - Assist with a program of information and education.

IMPLEMENTATION PLAN OF THE HAY RIVER WATERSHED

WATER QUALITY MANAGEMENT PLAN

The procedure for implementation of the Hay River Watershed Water Quality Plan is detailed in this section. This phase of the plan describes the process of installing Best Management Practices in an attempt to improve the water quality of the Hay River.

BEST MANAGEMENT PRACTICES, IMPLEMENTATION PRIORITIES AND COST-SHARE RATES

Implementation of Best Management Practices will follow a rank-order priority system. Best Management Practices that have the greatest impact on reducing nonpoint pollution will be implemented during the year. Best Management Practices with lesser impact on water quality will be installed later in the project. Each contract will list the Best Management Practices in order of priority by year. The list of priority Best Management Practices is listed below. The list, however, may not be applicable in all cases. Depending on the severity of the pollution hazard and what practices may have previously been installed, the order of Best Management Practices implemented may be amended by technical assistance personnel. Generally, the technical personnel in developing the Conservation Plan of Operations will use the following Best Management Practices Priority Ranking.

Best Management Practices	Cost-Share Rate (%)	Priority of Implementation
Shoreline Protection	70	1
Barnyard Runoff Management	70	1
Wateways, Terraces, Diversions	70	2
Manure Storage Facilities	70	2
Critical Area Stabilization	70	2
Grade Stabilization Structures	70	2
Contour Strip Cropping	($8.00/Acre)	3
Livestock Exclusion	($4.75/Acre)	3

The Wisconsin Fund can be used to supplement other cost sharing programs (e. g. ACP). The cost-share rate (percent) of another program can be subtracted from the established Hay River Plan Best Management Practice percentage to provide additional funds for the landowner/operator. For example, if a 50 percent ACP cost-share rate is set for a

Best Management Practice and the landowner/operator is also eligible for Wisconsin Fund monies at a 70 percent rate, the individual would qualify for an additional 20 percent (70 percent minus 50 percent equals 20 percent). In the case of an animal waste storage facility with an ACP rate of 50 percent not to exceed $3,500 and the system costs $10,000, the Wisconsin Fund will cost-share an additional 20 percent or $2,000. The Hay River Plan limits the cost of an animal waste storage facility at $6,000. For the Wisconsin Fund to plan the full $6,000 to compliment another cost-share program, the system would have to cost approximately $33,000.

If the Hay River Management Plan is to be used to supplement other cost-sharing programs, the Best Management Practice must be listed in the management plan and meet the requirements of implementation (lie within the Priority Management Area).

MECHANISM FOR IMPLEMENTATION OF BEST MANAGEMENT PRACTICES

The mechanism for implementation of the Hay River Water Quality Management Plan will closely parallel the ASCS Long Term Agreements derived from the Conservation Plan - Conservation Plan of Operations (CPO) as identified in the Resource Conservation Planning Manual of the Soil Conservation Service. The process will be the responsibility of the DMA with support from the SCS. A detail account of the steps necessary from initial contact to contract completion is outlined below:

1. The SWCD and the SCS will contact landowners/farmers in the watershed to determine if the landowner is receptive to implementation of conservation practices under the

Wisconsin Fund, or landowners contact the SWCD or SCS office. Additional contacts will be made through the ASCS office with landowners inquiring as to availability to ACP or other funds.

2. Determination of eligibility will be the final responsibility of the DMA, but initial screening will also be conducted by the SWCD and SCS personnel. To meet the requirements of cost-sharing, the Best Management Practices of priority tributaries or the extended Priority Management Area are as outlined in the Management Plan. Initial contracts will be developed in Priority I and Priority II subwatersheds without discrimination as to subwatershed ranking. If a landonwer is not located in a priority watershed or within the Priority Management Area, the landowner will be referred to the ASCS office as to possible eligibility under ACP funding.
3. If the requirements for Wisconsin Fund cost-sharing are met, the landowner will complete a Department of Natural Resources cost-share agreement. The DMA will use this form for final approval for cost-sharing under the Wisconsin Fund.
4. After completion and approval of the Department of Natural Resources cost-share agreement, the DMA will refer the landowner to the SCS or SWCD for development

of a Conservation Plan of Operations (Form SCS-CONS-11). The plan will include all conservation practices relating to nonpoint pollution abatement. Both cost-shared and noncost-shared Best Management Practices will be included on the Conservation Plan of Operations Form. The DMA will approve or reject the plan depending on compatibility with project goals.

5. After completion of Form SCS-CONS-11, the Department of Natural Resources cost-share agreement will be signed. The SWCD will enter into the ledger money encumbered in the contract. The plan will then be referred to the SCS for technical assistance.

6. Form RE-247 (Referral for Technical Determination) will be used and sent to the DMA. A minimum of one Best Management Practice will be initiated during the first year of the contract. A minimum of one Best Management Practice will be implemented each year after the first year for the duration of the contract.

7. The SWCD will accept cost-share performance reports and compute the cost shares earned and recommend that amount to the DMA for approval and payment.

   7a. The mechanism for payment will begin after approval by the DMA. After construction compliance and proof of payment by the landowner, one County voucher will be sent to the County Treasurer's Office. A check from the Hay River Watershed account will be drafted. The original voucher will remain at the

Treasurer's Office with a copy sent to the DMA along with the payment draft. The DMA will forward the payment to the landowner.

8. The Dunn County DMA will follow the above steps in implementation of the above practices. However, additional forms, as listed will be sent to the Barron County DMA for inclusion of their files.

Forms SCS-CONS-11 and the Department of Natural Resources cost-share agreement will act as the contractual record establishing the conditions and considerations under which the participant agrees to cooperate with the DMA. The document will describe the pollutant source, its location, the Best Management Practices to be applied and the schedule for applying the practice.

Form RE-247 will provide a method of certification that the practices cost-shared have been properly installed and qualify for payment. The contract or agreement with the lead DMA and the cooperator will delineate the responsibility for the operation and maintenance of Best Management Practices for the duration of the practice. The agreement will also stipulate a provision for periodic inspection of the practice and review of the contract.

SCHEDULE OF IMPLEMENTATION FOR YEAR ONE

The number of contracts executed during the first year is dependent upon employment of a full time conservationist and technician devoted solely to the Hay River Watershed. Provided that adequate

personnel is available, it is estimated that 35 to 40 contracts could be developed the first year for the entire watershed. This assumption is based on the following factors: landowner cooperation with the Soil Conservation Service has traditionally been excellent in both counties, interest in conservation planning and erosion control in the watershed is high, and cost-share rate is favorable.

Of first year contracts, a minimum of two best management practices would be developed and implemented for each landowner to insure continued support and to maintain momentum of the project. Implementation of individual farm conservation practices will require a three to five year period depending on the amount or number of Best Management Practices.

The project will deal with the farms which have significant sources within the Priority Management Area. Farms with adequately treated land will be investigated to determine any additional needs or maintenance required.

After contact with landowners, a needs determination will be made. A conservation plan will be developed and cost-sharable Best Management Practices implemented.

Contracts initiated during year one (1) would account for an estimated 2,500 acres of upland erosion treatment, 2,800 rods of fencing for streambank protection, and 20 animal waste management systems. Contracts may not be completed during the first year (contingent on weather, contractor availability, and other factors), but work would be initiated. Plans and implementation will be concentrated within priority one (1) watersheds with subsequent work in priority two (2) subwatersheds.

Table 1

COMPREHENSIVE LISTING OF BEST MANAGEMENT PRACTICES

		Effectiveness	Capitol Cost	Private On-Site Benefit	Relationship to Customary Operating Practices	Maximum State Cost-Sharing
C1	Contour Cropping	High	Low	Moderate	Moderate	50%***
C2	Strip Cropping	High	Low	Moderate	Moderate	50%***
C3	Diversions	High	Moderate	Moderate	Low	70%
C4	Terraces	High	Moderate	Moderate	Low	70%
C5	Waterways	High	Moderate	Moderate	Moderate	70%
C6	Minimum Tillage	High	Low	Moderate	High	50%***
C7	No-Till	High	Low	Moderate	High	50%***
M1	Critical Area Stabilization	High	High	Low	Low	70%*
M2	Grade Stabilization Structure	High	High	Low	Low	70%*
M3	Shoreline Protection	High	High	Low	Low	70%*
L1	Barnyard Run-off Management	High	Moderate	Moderate	Low	70%
L2	Manure Storage Facilities	High	High	Moderate	Moderate	70%**
L3	Livestock Exclusion From Woodlots	High	Low	Low	Moderate	50%

C: Generally used in cropland but may be applicable in urban areas as well
M: Applicable in both rural and urban areas
L: Livestock

* May be increased to 80 percent according to the conditions on Page 45.
** A dollar ceiling of $6,000 is set for priority watershed projects and $4,000 is set for local priority projects.
*** A flat rate per acre equal to the cost-share rate applied to an average installation may be used.

COST-SHARING FOR BEST MANAGEMENT PRACTICES

Overall goal of the Wisconsin Nonpoint Source Water Pollution Abatement Program is to make the state's lakes and streams swimmable and fishable. In order to help meet this goal the program offers financial assistance to landowners, operators and municipalities for installing or applying best management practices. Best management practices are defined as:

> practices, techniques or measures which are determined to be most effective, practicable means of preventing or reducing pollutants generated from nonpoint sources to a level compatiable with water quality goals. They are identified in the areawide water quality management plans and priority watershed plans.

The purposes of this plan are to identify:

1. rural and urban best management practices and the components of those practices eligible for cost-sharing
2. state maximum cost-share rates for each eligible practice
3. cost-sharing conditions desginated management agencies must certify are being met by land users
4. minimum cost-sharing conditions the land user must meet to comply with the cost-sharing agreement

Some Best Management Practices do not require cost-sharing because they are low-cost or no-cost or provide a high degree of benefit to the land user. Practices which will not be cost-shared are listed in Section VI

of the booket. Efforts have been made to make the cost-sharing under this program as compatible as possible with the Agricultural Conservation Program (ACP), administered by the Agricultural Stabilization and Conservation Service.

Wisconsin Department of Natural Resources in consultation with the Board of Soil and Water Conservation Districts is required to identify a maximum cost-sharing rate for each Best Management Practice. The maximum cost-sharing rate identified in this booklet represents a ceiling. Local Designated Management Agencies may use any rate at or below the ceiling.

Section 144.25 of the Wisconsin Statutes states cost-share payments shall not exceed 50 percent of the cost of implementing the Best Management Practice except as follows:

1. The maximum rate may be increased to as much as 70 percent where:
   a. the practice produces benefits for the applicant but the main benefits to be derived are related to improving offsite water quality and
   b. limiting the cost-sharing to 50 percent would place an unreasonable cost burden on applicants.
2. The maximum rate may be increased above 70 percent for certain practice where:
   a. the practice produces negligible benefit to the applicant with the benefits to be derived related to improving offsite water quality.

b. limiting the cost-sharing payment to 70 percent would place an unreasonable cost burden on applicants.

In order for a specific practice to receive cost-sharing above 70 percent, county cost-sharing must be provided. The county cost-sharing may be matched by supplemental state cost-sharing up to ten percent. For example, a streambank protection practice could have 80 percent state cost-sharing if the county provides ten percent cost-sharing.

State funds may be the sole source of cost-sharing or may be used together with federal cost-sharing, such as ACP, up to 70 percent. The remaining costs must be met by county cost-sharing or borne by the landowner. For example, a manure storage facility could receive 70 percent cost-sharing in state funds or 35 percent federal funds and 35 percent state funds. In either case, the cost to the land user is the remaining 30 percent.

Additional guidance for determining cost-share rates is provided in NR 120 of the Wisconsin Administrative Code. They are:

1. Practices which are very effective for pollution control and which have high capital costs should have higher rates.
2. Practices normally used for crop or livestock production should have lower rates.

General Policies

1. Only best management practices installed at specific locations necessary to improve or protect water quality are eligible.
2. Rural and urban areas are eligible.
3. Cost-sharing is limited to areas of the state with approved areawide water quality management plans.
4. Cost-sharing is limited to priority management areas in priority watersheds or areas likely to be within a priority management area in other watersheds.
5. Cost-sharing is not available for the following:
   a. mining activities
   b. construction activities* on privately-owned lands (e. g. erosion control practices for construction or subdivisions)
   c. silviculture activities (excluding farm woodlots)
   d. septic systems (small scale onsite human domestic waste disposal systems)
   e. dredging activities
   f. practices installed primarily for flood control purposes
6. When two or more practices are of equal pollution control effectiveness and compatible with the use and management of the land, the maximum cost-share will be based on the least-cost practice. For example, a manure storage tank

($50,000) and a solid stacking pad ($8,000) may provide equal pollution control of manure. While the farmer may desire to install the more expensive manure storage facility in order to enhance his operation, cost-sharing will be based on the least cost alternative.

7. Cost-sharing is not available for practices which:
   a. are normally and routinely used in growing crops
   b. are normally and customarily used in cleaning of streets and roads
   c. have drainage of land as the primary objective
   d. installation costs can reasonably be passed on to potential consumers
   * This does not include construction of Best Management Practices.

Best Management Practices Eligible for Cost-Sharing

Table I identifies the Best Management Practices. Designated Management Agencies are encouraged to coordinate local adjustments to cost-share rates and conditions with the County Agricultural Stabilization and Conservation Committees.

LANDOWNER PARTICIPATION AND BEST MANAGEMENT PRACTICE EFFECTIVENESS

Based on water quality measurements reported by the Wisconsin Department of Natural Resources, the steering committee consisting of District Chairman, District employee and District Conservationist, will evaluate effectiveness of the implementation program in terms of both landowner

participation and Best Management Practice effectiveness in addressing identified water quality goals. If landowner participation is low in a particular subwatershed in which either initial or updated water quality measurements indicate a need for Best Management Practice implementation, then information/education efforts will be intensified. If landowner participation is widespread in a subwatershed in which water quality measurements indicate a need for additional Best Management Practice implementation, efforts should be redesigned to provide increased imphasis on installing Best Management Practices that address a particular water quality problem (e. g. adjust cost-share rates to encourage the implementation of a needed Best Management Practice, or to require implementation of needed Best Management Practice prior to other practices). To permit assessments, Barron and Dunn County Soil and Water Conservation Districts will record landowner participation and Best Management Practices implementation by subwatershed. Continued assessment and fine tuning of the program by all agencies involved in implementation of the program is mandatory to assure water quality improvement.

MAINTENANCE AND ENFORCEMENT OF BEST MANAGEMENT PRACTICES

The guidelines for the Nonpoint Source Water Pollution Abatement Program identifies the operation and maintenance phase of the agreement. The practice included in the agreement shall be maintained in an effective and improved condition for their expected useful life span as specified in the technical guide. Failure to meet this obligation will be in violation of NR Chapter 120.11 of the Wisconsin Administrative Code.

A precise method for repayment of state funds for cost-share recipients is not clearly indicated and must be defined in the Watershed Plan. The following actions will be taken:

1. Identification of violation will be obtained through an annual status review of Best Management Practices.
2. The Designated Management Agency will contact the landowner/operator in control of the Best Management Practice in violation. The contact will follow up with a formal letter explaining in detail the violation and possible alternatives that may be followed to bring the violation to compliance.
3. The final action will be to submit a violation to the Designated Management Agency for further action and proceedings.

The Designated Management Agency is responsible for maintenance of all Best Management Practices within the Watershed Project because the Department of Natural Resources entered into agreement with the Designated Management Agency and not the individual landowner.

PROGRAM EVALUATION

The Hay River Water Quality Project will be evaluated and assessed on an annual basis. The evaluation program will address the degree of participation in the project, the amount or number of Best Manage ment Practices installed and operational and the affect of the program on water quality.

An annual report prepared by the Barron and Dunn County Soil and Water Conservation Districts will be prepared and will include the following items:

1. The degree of landowner participation which will be obtained from comparison of Soil and Water Conservation District and Soil Conservation Service field and office contacts with the number of Conservation Plan of Operations (contracts) signed and operational.
2. The number of contracts will also be compared to the number of landowners within the Priority Management Area of each subwatershed.
3. The level of individual landowner participation will be obtained by comparison of the Long Term Agreement (LTA) to the number of Best Management Practices completed and operational per year. Forms RE-247 and SCS-CONS-11 (CPO) or comparable forms, will be used to audit project progress.
4. The annual net changes in the Best Management Practice application within priority subwatersheds.

Landowner cooperation and the program's assessment will be discussed bimonthly with representatives of the Barron and Dunn County Designated Management Agency. The ASCS and DNR will be requested to attend the meetings.

The U.W. - Extension will assist in the evaluation and assessment phase of the program.

Water quality monitoring will be the responsibility of the Wisconsin Department of Natural Resources and will compare water quality improvement or degradation with Best Management Practices installation.

PROCESS OF DEPARTMENT OF NATURAL RESOURCES REIMBURSEMENT TO THE DESIGNATED MANAGEMENT AGENCY

The Wisconsin Department of Natural Resources will transfer an initial sum of money to the Barron County Soil and Water Conservation District. This advance payment will be equal to 10% of the maximum grant amount as detailed in the grant award. The money is to be deposited in the County Treasury in a separate Hay River Account.

Both the Dunn and Barron County Designated Management Agencies will draft payments from this account. The Mechanism for Implementation of Best Management Practices describes the process of payment for Barron County. The Dunn County Designated Management Agency will institute a somewhat different process. After a construction compliance check by SCS technical personnel, one (three part) county voucher will be sent to Barron County for processing. The County Treasurer will issue the check with the original voucher remaining at the Treasurer's office. One copy will be sent to the Barron County Designated Management Agency, and the remaining two copies will be forwarded to the Dunn County SWCD. The Dunn County ASCS office will have the responsibility to check the payment draft for accuracy and send the payment to the participant. On a monthly basis, the Designated Management Agency will total all vouchers paid and bill the Wisconsin Department of Natural Resources for reimbursement. If the total money outgoing exceeds 50 percent of the balance, the Designated Management Agency will bill the Wisconsin Department of Natural Resources for reimbursement on a biweekly basis.

AUDITING AND REPORTING REQUIREMENTS

The following agencies will be involved with the cost-sharing program:

Barron County Soil and Water Conservation District
Dunn County Soil and Water Conservation District
Barron County Soil Conservation Service
Dunn County Soil Conservation Service

The following agency personnel will be involved with the program:

Barron and Dunn County Soil and Water Conservation Districts
- Clerk and Conservationist

Barron and Dunn County Soil Conservation Service
- District Conservationist

The Designated Management Agency will follow the guidelines set forth in the 'Nonpoint Source Water Pollution Abatement Program: A Part of the Wisconsin Fund.'

The Soil and Water Conservation District office will prepare an annual report showing the flow of funds to technical assistance, program administration and grant assistance. The report will include the number of Best Management Practices installed, the cost of Best Management Practices, funds encumbered for additional practices outlined in the Conservation Plan of Operations, and the balance of nonencumbered funds.

The County will perform an annual audit of the Wisconsin Fund Program in the Hay River Watershed to maintain the fiscal integrity of the program.

PUBLIC INFORMATION - EDUCATION PLAN

An intensive educational program will be necessary if the goals for establishment of Best Management Practices on the land are to be met.

It is, therefore, necessary to make landowners aware of the program, to convince them that implementation of Best Management Practices are in their own best interests, and in some cases, make an appeal to their concern for the public interest.

Some practices, especially the high-priority streambank protection practices, return little or nc tangable financial benefit to the landowner. Others, such as the animal waste management practices, may be in considerable demand. A strong educational program is needed to keep the total program objectives in balance as well as to achieve water quality goals.

The University Extension will take primary responsibility in information and education efforts that will include mass media, direct mail, public meetings, tours and deomonstrations, and individual contacts. The expertise of other agency personnel will be solicited in developing many of the projects, and SCS and SWCD and the DNR Forester will be heavily involved in the individual contact phase of the program.

Mass Media Publicity - Daily and weekly newspaper, specialized farm newspaper and radio releases and personal columns will be used to publicize meetings and other special events. They will also be used to keep landowners aware of program progress and program changes. Educational releases on various aspects of water quality and feature stories of accomplishments will also be written as needed.

Direct Mail - A Hay River Watershed Newsletter will be mailed to all landowners in the watershed area, as well as to agency personnel and others involved in the program. Its purpose will be to keep landowners aware of the program and inform them of current

activities, events and deadlines. Direct mail will also be used to invite landowners to meetings and to correspond with individuals and smaller groups on specific projects or problems.

Public Meetings, Tours and Demonstrations - A public information meeting will be held in the watershed before the watershed plan implementation begins. Public educational meetings on conservation and water quality topics will be open to the general public but special efforts will be made to encourage attendance by watershed landowners and farm operators. Tours and demonstrations showing Best Management Practices in use on farms in or near the watershed will be scheduled. At least two such public educational events are planned for the winter of 1979-80. One is a meeting on soils and forages to be held when Extension specialists in these fields are available, hopefully in February or March. The other is a tour of manure handling facilities on area farms to be held in April or May of 1980.

Individual Contacts - A great deal of individual contact work will be carried on during the implementation phase of the program, largely by SCS, SWCD and DNR personnel. Landowners who have not signed a request for technical assistance will also be contacted to encourage their participation. This step will likely be necessary because of goals which call for a very high level of participation compared to previous conservation cost-sharing programs.

MANPOWER POLICY AND REQUIREMENTS

The Hay River Water Quality Management Plan is designed in such a way that installation of Best Management Practices in Priority One Tributaries will take a minimum of two years and may be overlapped

by implementation of Priority Two Tributaries only after 75 percent of the practices have been completed in the Priority One basins. Available and required man years are compared below:

Priority One and Two Tributaries

Fiscal Year	1980	1981	1982	1983	Total
Estimated Time Required in Man Years	2.0	2.5	2.5	2.0	9.0
Estimated Time Available					
SWCD Personnel	.9	.9	.9	.9	3.6
SCS Personnel	.9	.9	.9	.9	3.6
Additional Needs	.2	.7	.7	.2	1.8

The table is based on estimated manpower needs identified in the Management Plan with an allowance made for unforeseen circumstances. Estimated time required was based on .3 man years for each SWCD and SCS personnel in Barron and Dunn Counties (conservationist and technician).

The table includes time required for planning, surveying and design of Best Management Practices but does not include miscellaneous administrative duties (e. g. records of cost-shares earned).

The additional man years estimated to complete the project may be gained through a contract with the SWCD and the SCS. A trained conservationist will be employed in both counties for a period of two years or until monies funded through the State Board of Soil and Water Conservation Districts are exhausted.

INFORMATION - EDUCATION PLAN BUDGET

A program of information and education cannot be developed without adequate funds. Hay River Watershed Budget is outlined below:

1. Public Meetings - A public information meeting for each subwatershed (five) will be held during year one of the plan. Cost - $750
2. Mass Media Publicity - News releases monthly (year one). Cost - $150
3. Newsletters - Every two months during year one, quarterly thereafter. Cost - $750
4. Individual Contacts - Two hundred contacts (year one). Cost - $500

The total information - education program cost for year one is estimated at $2,150.

SOIL AND WATER CONSERVATION DISTRICT ANNUAL PLAN OF OPERATION

The Barron County Soil and Water Conservation District, the Lead Designated Management Agency, has included in the 1979 Annual Plan of Operation an Objective describing the preservation of streams (e. g. water quality).

"Objective No. II" - Reduce nonpoint pollution to an acceptable level as established in the Hay River Watershed Priority Management Plan.

Action Planned - Conduct educational programs relative to water quality and implementation of the Wisconsin Fund goals.

Develop resource plans with landowners to meet water quality guidelines of the Watershed Management Plan.

Promote the use of and administer cost-sharing funds under the Wisconsin Fund, Rural Clean Waters Program, and other funds available to the Soil and Water Conservation District.

MEMORANDUM OF UNDERSTANDING

BETWEEN THE

BARRON COUNTY SOIL AND WATER CONSERVATION DISTRICT

AND THE DUNN COUNTY SOIL AND WATER CONSERVATION DISTRICT

Relative To: Cost-sharing distribution in the Wisconsin Nonpoint Source Water Pollution Abatement Program in the Hay River Watershed.

THIS AGREEMENT is made and entered into this _____ day of _____, 19 ___, by and between the Barron County and Dunn County Soil and Water Conservation Districts.

Purpose: The purpose of this memorandum of understanding is to delineate cost-sharing responsibilities of the Barron and Dunn County Soil and Water Conservation Districts for implementation of Best Management Practices in the Hay River Watershed Management Plan authorized under the Wisconsin Nonpoint Source Water Pollution Abatement Program.

Both Soil and Water Conservation Districts have a common objective of helping to bring about conservation development and the wise use of land, water, and related resources in the Hay River Watershed. Therefore, both Soil and Water Conservation Districts deem it mutually the parties hereto advantageous to cooperate in this undertaking and to agree as follows:

I. The Barron County Soil and Water Conservation District Agrees:

A. To administrate and implement the Hay River Watershed Water Quality Plan as written and approved, or as amended and approved.

B. To accept Wisconsin Fund Revenues from the Wisconsin Department of Natural Resources and to process in a speedy and efficient manner all cost-shared vouchers from the Dunn County DMA relating to the Hay River Watershed.

II. The Dunn County Soil and Water Conservation District Agrees:

A. To provide manpower for technical assistance in planning, design and layout of Best Management Practices within the Hay River Watershed in Dunn County according to the guidelines outlined in the Water Quality Plan.

B. To forward all original cost-share vouchers to the Barron County DMA for processing and payment drafting.

C. To send payment drafts to participants in the watershed along with a letter describing the project.

D. That any Memorandum of Understanding between the Dunn County DMA and any other agency in the administration of the Wisconsin Fund be known to the Barron County DMA so that the document can be included in the amended plan.

III. It is Mutually Understood and Agreed:

A. That both Soil and Water Conservation Districts may attend and assist in the other's annual planning meetings of both Districts.

B. Bimonthly meetings will be scheduled and attended by both DMA's to assess and evaluate the Hay River Watershed Plan.

This Memorandum of Understanding Shall:

A. Be modified at any time by mutual consent of all parties to it.

B. Remain in effect for a period of one year and be automatically renewable except that it may be terminated at any time by mutual consent of all parties or by any party upon not more than 60 days, nor less than 30 days, written notice to the others prior to the anniversary date of the agreement.

Barron County Soil and Water Conservation District	Dunn County Soil and Water Conservation District
_____ Signature	_____ Signature
_____ Title	_____ Title
_____ Date	_____ Date

COOPERATIVE AGREEMENT BETWEEN THE
BARRON COUNTY SOIL AND WATER CONSERVATION DISTRICT
AND THE
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

RELATIVE TO: Acceleration of resource planning and the application of Best Management Practices for improving water quality in the Hay River Watershed in Dunn and Barron Counties which are being implemented through the State of Wisconsin Nonpoint Source Pollution Abatement Program - "Wisconsin Fund".

AUTHORITY: PL-46 - 74th Congress, 16 U. S. C. (590 a-f)

THIS AGREEMENT, made and entered into this _____ day of _____, 1979, by and between the Barron County Soil and Water Conservation District (hereinafter called the District) and the United States of America, acting by and through the Soil Conservation Service of the United States Department of Agriculture (hereinafter called the Service).

THE SERVICE, in carrying out its assigned responsibilities under applicable legislation, has need for resource planning for water quality improvement which will be obtained as a result of this cooperation, has certain resources available, but does not have sufficient resources available to obtain the desired resource planning within the period specified in this agreement.

THE DISTRICT, for planning purposes, has a need for technical services that are presently unavailable, and within the limits of its resources from the "Wisconsin Fund" is willing to reimburse the Service for the costs of obtaining such accelerated resource planning.

THEREFORE, both the District and the Service deem it mutually advantageous to cooperate in this undertaking, and hereby agree as follows:

I. The District agrees:

A. To reimburse the Service quarterly for salaries and related expenses which include retirement, health and life insurance benefits, annual leave, holiday and sick leave for a portion of the cost of the services of one soil conservationist. The reimbursement to the Service for the agreed to work is not to exceed $ _____ annually.

B. That the signature of the authorized representative of the District on this agreement is official notice for the Service to commence work.

C. To comply with the Clean Air and Water Pollution Control Provisions which are attached hereto and made a part of this agreement.

II. The Service agrees as described in the Hay River Watershed Plan.

A. To provide the necessary supervision, technical services, onsite assistance, equipment, and materials normally needed to accelerate resource planning.

B. To provide transportation to sites throughout the area.

C. To provide a district conservationist and additional soil conservationists and technicians as Service appropriations permit for acceleration of the resource planning.

D. To absorb from its appropriations that portion of the estimated costs of this undertaking not covered by the amounts to be reimbursed.

III. It is mutually understood and agreed:

A. Area Covered - Barron and Dunn Counties with special emphasis on the Hay River Watershed.

B. Method of Payment - The Service will bill the District quarterly for the District's share of the costs not to exceed the amounts shown below:

October 1, 1979 to December 31, 1979	$ _____
January 1, 1980 to March 31, 1980	$ _____
April 1, 1980 to June 30, 1980	$ _____
July 1, 1980 to September 30, 1980	$ _____

For any of the above listed payments not entirely earned by the Service during the three-month period, the amount not earned may be added to each succeeding period until the total cumulative amount has been earned and billed.

C. Intent to Cooperate - It is the intent of the Service to fulfill its obligations under this agreement. However, committments cannot be made beyond the period for which funds have been appropriated by Congress. In event funds from which the Service may fullfill its obligations are not appropriated, the agreement will automatically terminate. Reimbursement will then be for work completed that is otherwise eligible for reimbursement prior to the effective date of termination.

D. Renewals - This agreement will remain in force until September 30, 1980. It may be affirmatively renewed each fiscal year by the parties through an exchange of correspondence until the purposes of the agreement are complete, but not later than the end of the fiscal year in which the work is completed.

E. Modification - This agreement may be modified by amendment duly executed by authorized officials of the District and the Service, provided such modification does not extend the agreement beyond the close of the fiscal year in which the work is completed.

F. Officials Not to Benefit - No member of or delegate to Congress or Resident Commissioner shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

IN WITNESS THEREOF, the District and the Service have executed this agreement as of the date first above written.

BARRON COUNTY SOIL AND WATER CONSERVATION DISTRICT

By: _____

Title: _____

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

By: _____

Title: State Conservationist

This action authorized at an official meeting of Barron County Soil and Water Conservation District on the ____ day of _____, 1979, at Madison, State of Wisconsin.

_____
(Signature)

_____
(Title)

A P P E N D I X I

HAY RIVER WATERSHED WATER QUALITY MANAGEMENT PLAN

Table 1

SURVEY RESULTS FOR THE HAY RIVER TRIBUTARIES

Rank	Tributary	Livestock Hazard Index (Animal Units per mile)	Critical Barnyards Within 660 Feet	Acres of Potential and Actual Cropland Erosion	Acres of Streambank Erosion	Acres of Oth Critical Are Erosion
1	Big Beaver	NA	6	1,361	<5	NA
1	Dority	75.7	5	794	<5	1.7
1	Jones	65.5	3	595	<5	1.0
1	Silver	79.3	5	935	<5	31.0
1	Vance	50.5 (In Barron Co.)	8	992	<5	.6
2	Deutch	NA	6	822	<5	NA
2	Lightning *	45.0	18	2,014	5 - 10	2.0
2	Little Beaver	NA	5	650	<5	NA
2	Little Otter	NA	1	879	<5	NA
2	Moon	33.9	8	1,078	<5	NA
2	Otter	NA	8	2,486	<5	NA
2	Quarter	NA	4	340	<5	NA
2	Tainter	52.9	3	454	<5	1.5
2	Turtle *	27.5	15	4,197	5 - 10	1.0
2	Washburn Farm	NA	4	510	<5	NA

* - Indicates Point Source Discharge

NA - Information Not Available

Table II - BEST MANAGEMENT PRACTICE NEEDS WITHIN PRIORITY MANAGEMENT AREA

Tributary and Priority Ranking

B. M. P. Cost/Unit	Big Beaver - 1		Dority - 1		Jones - 1		Silver - 1		Vance - 1		Total Cost Rank - 1		Cost Share	
AWSF * 6,000/Unit	6	32,000	5	30,000	3	18,000	5	30,000	8	48,000	27	162,000	70%	113,400
Waterways 700/Acre	5.6	3,930	12.6	8,855	6.2	4,690	10.0	7,000	12.0	8,400	46.4	32,480	70%	22,736
Diversions 1.00/Foot	1053	1,053	760	760	400	400	600	600	975	975	3788	3,788	70%	2,652
Contour Strips 5.00/Acre	74	370	295	1,475	156	780	233	1,165	241	1,205	999	4,995	70%	3,497
Grade Stabilization Structure 2,500/Acre	0	-	1	2,500	0	-	0	-	2	5,000	3	7,500	70%	5,250
Critical Area Shaping 300/Acre	2	600	2.8	840	.7	210	1	300	2	600	8.5	2,550	70%	1,785
Stream Fencing 8.25/Rod	861	7,103	776	6,402	340	2,805	752	6,204	1019	8,406	3748	30,920	70%	21,644
Stream Riprap 20.00/Foot	0	-	245	4,900	208	4,160	328	6,560	315	6,300	1096	21,920	70%	15,344
Stream Crossing 800/Unit	3	2,400	4	3,200	2	1,600	5	4,000	4	3,200	18	14,400	70%	10,080
Terraces 2.00/Foot	2000	4,000	0	-	0	-	0	-	0	-	2000	4,000	70%	2,800
Total BMP Cost Per Tributary	51,456		58,932		32,645		55,829		82,686		284,553		199,188	

* Animal Waste Storage Facility includes storage pond, diversions, critical area planting, fencing and vegetated filter strips not to exceed $6,000.

Table II - BEST MANAGEMENT PRACTICE NEEDS WITHIN PRIORITY MANAGEMENT AREA

Tributary and Priority Ranking

B. M. P. Cost/Unit	Otter - 2		Quarder - 2		Tainter - 2		Turtle - 2		Washburn F. - 2		Total Cost		Cost-Share	
AWSF * 6,000/Unit	8	48,000	4	24,000	3	18,000	15	90,000	4	24,000	34	204,000	70%	142,800
Waterways 700/Acre	10.2	7,140	2	1,400	7.4	5,180	62.0	43,400	2.5	1,750	84.1	58,870	60%	35,322
Diversions 1.00/Foot	1741	1,741	337	337	440	440	3720	3,720	460	460	6698	6,698	60%	4,019
Contour Strips 5.00/Acre	134	670	40	200	173	865	1448	7,240	38	190	1833	9,165	50%	4,583
Grade Stabilization Struc 2,500/Acre	0	-	0	-	1	2,500	2	5,000	0	-	3	7,500	60%	4,500
Critical Area Shaping 300/Acre	2.0	600	1	300	1.5	450	120	3,600	1.5	450	18	5,400	80%	4,320
Stream Fencing 8.25/Rod	1436	11,847	48.5	400	1110	9,158	2927	24,148	560	4,620	6081	50,172	80%	40,138
Stream Riprap 20.00/Foot	240	4,800	0	-	154	3,080	1474	29,480	0	-	1868	37,360	80%	29,888
Stream Crossing 800/Unit	6	4,800	1	800	5	4,000	10	8,000	3	2,400	25	20,000	70%	14,000
Terraces 2.00/Foot	0	-	1000	2,000	1000	2,000	8000	16,00	0	-	10000	20,000	60%	12,000
Subtotal Rank II Tributaries Cost	79,598		29,477		45,673		230,588		33,870		419,165		291,570	
GRAND TOTAL - Rank II Tributaries -											805,255		560,492	

* Animal Waste Storage Facility includes storage pond, diversions, critical area planting, fencing and vegetated filter strips not to exceed $6,000.

Table II - BEST MANAGEMENT PRACTICE NEEDS WITHIN PRIORITY MANAGEMENT AREA

Tributary and Priority Ranking

B. M. P. Cost/Unit	Duetch - 2		Lightning - 2		L. Beaver - 2		Little Otter-2		Moon - 2		Total Cost		Cost Share	
AWSF * 6,000/Unit	6	36,000	18	108,000	5	30,000	1	6,000	8	48,000	38	228,000	70%	159,600
Waterways 700/Acre	3.5	2,450	25	17,500	3	2,100	3.6	2,520	18.4	12,880	53.5	37,450	60%	22,470
Diversions 1.00/Foot	603	603	1500	1,500	570	570	680	680	1100	1,100	4453	4,453	60%	2,672
Contour Strips 5.00/Acre	44	220	578	2,312	60	300	50	250	430	2,150	1162	5,232	50%	2,616
Grade Stabilization Struc. 2,500/Acre	0	-	1	2,500	0	-	0	-	1	2,500	2	5,000	60%	3,000
Critical Area Shaping 300/Acre	2.0	600	2.0	600	1.0	300	2.0	600	0	-	7.0	2,100	80%	1,680
Stream Fencing 8.25/Rod	1430	11,798	1600	13,200	800	6,600	436	3,597	737	6,080	5003	41,275	80%	33,020
Stream Riprap 20.00/Foot	0	-	704	14,080	0	-	100	2,000	375	7,500	1179	23,580	80%	18,864
Stream Crossing 800/Unit	2	1,600	8	6,400	3	2,400	3	2,400	4	3,200	20	16,000	70%	11,200
Terraces 2.00/Foot	0	-	7000	14,000	0	-	0	-	4500	9,000	11,580	23,000	60%	13,800
Subtotal Rank II Tributaries	53,271		180,092		42,270		18,047		92,410		386,090		268,922	

* Animal Waste Storage Facility includes storage pond, diversions, critical area planting, fencing and vegetated filter strips not to exceed $6,000.

Table III - ESTIMATED COSTS FOR IMPLEMENTATION OF BEST MANAGEMENT PRACTICES WITHIN PRIORITY MANAGMENT AREAS OF PRIORITY I, II AND THE HAY RIVER PRIORITY MANAGEMENT AREA

	50%			75%			100%		
SUBWATERSHEDS	FEDERAL	STATE	LOCAL	FEDERAL	STATE	LOCAL	FEDERAL	STATE	LOCAL
PRIORITY ONE									
BMP Cost Estimates		99,475			149,213			198,951	
Personnel GS-7 Conserv.		13,014			19.521			26,028	
GS-6 Technician		23,424			35,136			46,848	
Administration		1,000			1,500			2,000	
Information and Education		1,500			2,000			2,500	
Travel		6,000			7,000			12,000	
Subtotal		144,413			179,234			288,327	
PRIORITY TWO									
BMP Cost Estimates		280,246			420,369			560,492	
Personnel GS-7 Conserv.		26,028			32,535			39,042	
GS-6 Technician		35,136			46,848			58,560	
Administration		2,800			4,200			5,600	
Information and Education		2,500			2,500			3,000	
Travel		10,000			12,000			16,000	
Subtotal		356,710			518,139			682,694	
Hay River PMA									
BMP Cost Estimates		221,876			332,813			443,751	
Personnel GS-7 Conserv.		26,028			26,028			32,535	
GS-6 Technician		35,136			46,848			46,848	
Administration		2,200			3,330			4,440	
Information and Education		2,000			2,800			2,800	
Travel		10,000			12,000			12,000	
Subtotal		297,260			423,819			542,374	
TOTAL		798,383			1,121,192			1,513,095	

*State grant amount includes Priority One, Priority Two and critical areas that have direct influence on water quality within the Hay River Priority Management Area.

Table IV - BEST MANAGEMENT PRACTICE NEEDS WITHIN PRIORITY MANAGEMENT AREA

MAN HOUR REQUIREMENTS

Tributary and Priority Rankings

B. M. P. Hours/Unit	Big Beaver - 1		Dority - 1		Jones - 1		Silver - 1		Vance - 1		Total Hours 100% Implementation		Man Years
AWSF 50/Unit	6	300	5	250	3	150	5	250	8	400	27	1,350	.65
Waterways 20/Acre	5.6	112	12.6	252	6.2	124	10.0	200	12.0	240	46.4	928	.45
Diversions 50 feet/Hr.	1053	21	760	38	400	8	600	12	975	19.5	3788	75.5	.04
Contour Strips 5 Ac./Hr.	74	14.8	295	59	156	31.2	233	46.6	241	48.2	999	200	.10
Grade Stabilization 40/Unit	0	0	1	40	0	0	0	0	2	80	3	120	.06
Critical Area Shaping 1 Ac./Hr.	2	2	2.8	3.0	.7	1.0	1	1	2	2	8.5	11.0	.004
Stream Fencing 40 ft./Hr.	861	22	776	20	340	9	752	19	1019	25	3748	95	.05
Stream Riprap 20 ft./Hr.	0	0	245	12	208	11	328	16	315	16	1096	54	.03
Terraces 500 ft./Hr.	2,000	4	0	0	0	0	0	0	0	0	2000	4	-
Stream Crossings 32/Unit	3	96	4	128	2	64	5	160	4	128	18	576	.28
Planning 32 hr./plan	6	192	12	384	9	288	11	352	12	384	50	1,600	.77
Total Hours	767		1,186		682		1,057		1,343		5,014		2.4

Table IV - BEST MANAGEMENT PRACTICE NEEDS WITHIN PRIORITY MANAGEMENT AREA

MAN HOUR REQUIREMENTS

Tributary and Priority Rankings

B. M. P. Hours/Unit	Deutch - 2		Lightning - 2		L. Beaver - 2		Little Otter -2		Moon - 2		Total Hours 100% Implementation		Man Years
AWSF 50/Unit	6	300	18	900	5	250	1	50	8	400	38	1,900	.91
Waterways 20/Acre	3.5	245	25	500	3	60	3.6	72	18.4	368	53.5	1,245	.60
Diversions 50 feet/Hr.	603	12	1500	30	570	11	680	14	1100	22	4453	77	.04
Contour Strips 5 Ac./Hr.	44	9	578	116	60	12	50	10	430	86	1162	232	.11
Grade Stabilization 40/Unit	0	0	1	40	0	0	0	0	1	40	2	80	.04
Critical Area Shaping 1 Ac./Hr.	2.0	2	2.0	2	1.0	1	2.0	2	0	0	7.0	7	-
Stream Fencing 40 ft./Hr.	1430	36	1600	40	800	20	436	11	737	18	5003	125	.06
Stream Riprap 20 ft./Hr.	0	0	704	35	0	0	100	5	375	75	1179	115	.06
Terraces 500 Ft./Hr.	0	0	7000	14	0	0	0	0	4500	9	11500	23	-
Stream Crossings 32/Unit	2	64	8	256	3	96	3	96	4	128	20	640	.31
Planning 32 hr./plan	8	256	27	864	5	160	6	192	8	256	54	1,728	.83
Subtotal Hours Rank II	924		2,797		610		452		1,402		6,172		2.96

Table IV - BEST MANAGEMENT PRACTICE NEEDS WITHIN PRIORITY MANAGEMENT AREA

MAN HOUR REQUIREMENTS

Tributary and Priority Rankings

B. M. P. Hours/Unit	Otter - 2		Quarder - 2		Tainter - 2		Turtle - 2		Washburn F.-2		Total Hours 100% Implementation		Man Hours	
AWSF 50/Unit	8	400	4	200	3	150	15	750	4	200	34	1,700		.82
Waterways 20/Acre	10.2	204	2	40	7.4	148	62	1,240	2.5	50	84.1	1,682		.81
Diversions 50 feet/Hr.	1741	348	337	67	440	9	3720	74	460	9	6698	508		.24
Contour Strips 5 Ac./Hr.	134	27	40	8	173	35	1448	290	38	8	1833	367		.18
Grade Stabilization 40/Unit	0	0	0	0	1	40	2	80	0	0	3	120		.06
Critical Area Shaping 1 Ac./Hr.	2.0	2	1.0	1	1.5	1.5	12.0	12.0	1.5	1.5	18	18		-
Stream Fencing 40 ft./Hr.	1436	359	48.5	1.0	1110	28	2927	73	560	14	6081	475		.23
Stream Riprap 20 ft./Hr.	240	12	0	0	154	8	1474	74	0	0	1868	93		.04
Terraces 500 ft./Hr.	0	0	1000	2	1000	2	8000	16	0	0	10000	20		-
Stream Crossings 32/Unit	6	192	1	32	5	160	10	320	3	96	25	800		.38
Planning 32 hr./plan	8	256	4	128	10	320	23	736	6	192	51	1,632		.78
Subtotal Hours Rank II	1,800		479		901.5		3,649		570.5		7,415		3.5	
Total Hours Rank II Tributaries	2,724		3,276		1,511.5		4,101		1,972.5		13,587		6.5	

Table IV - BEST MANAGEMENT PRACTICE NEEDS WITHIN PRIORITY MANAGEMENT AREA

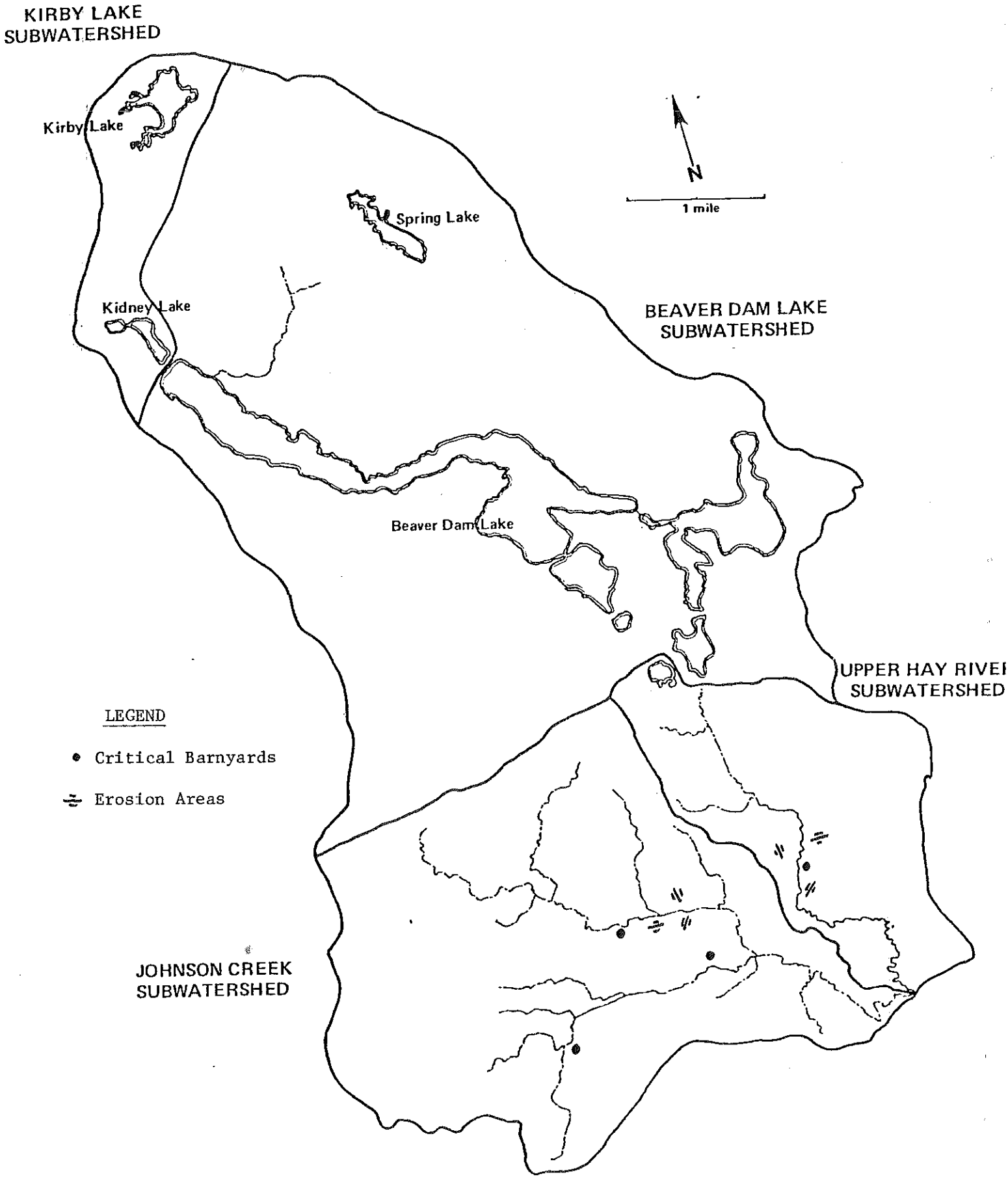
MAN HOUR REQUIREMENTS

Tributary and Priority Rankings

B. M. P. Hours/Unit	Hay River PMA		Man Years	
AWSF 50/Unit	50	2,500	1.20	
Waterways 20/Acre	170	3,400	1.64	
Diversions 50 feet/Hr.	6080	122	.06	
Contour Strips 5 Ac./Hr.	2907	581	.28	
Grade Stabilization 40/Unit	2	80	.04	
Critical Area Shaping 1 Ac./Hr.	203	203	.10	
Stream Fencing 40 ft./Hr.	6078	152	.07	
Stream Riprap 20 ft./Hr.	1600	80	.04	
Terraces 500 ft./Hr.	19,000	38	.02	
Stream Crossings 32/Unit	20	640	.31	
Planning 32 hr./plan	48	1,536	.74	
Total Hours		9,332	4.5	

A P P E N D I X I I

TRIBUTARY MAPS


KIRBY LAKE
SUBWATERSHED
Kirby Lake
Spring Lake
Kidney Lake
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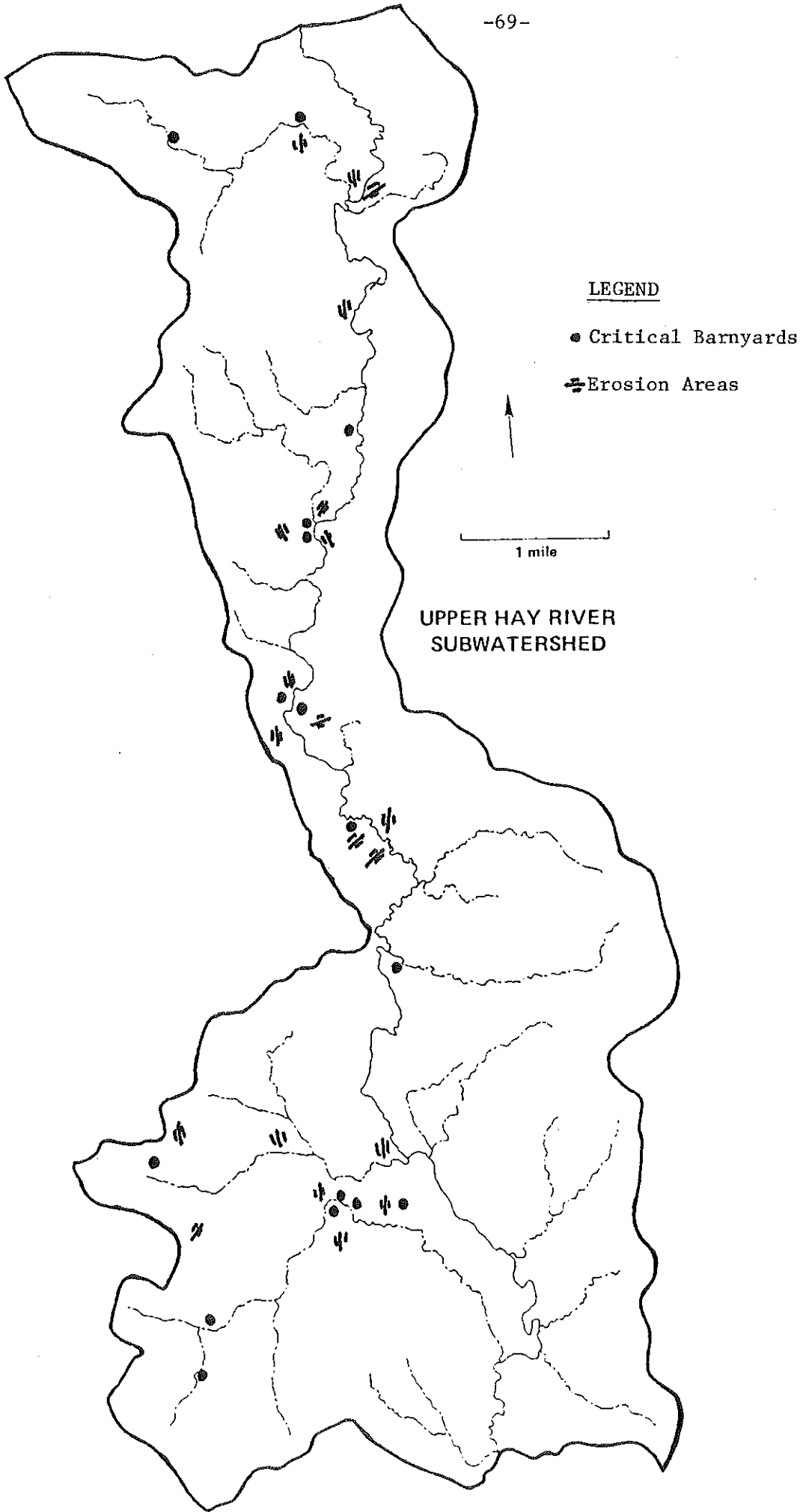
1 mile
BEAVER DAM LAKE
SUBWATERSHED
Beaver Dam Lake
UPPER HAY RIVEI
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas
JOHNSON CREEK
SUBWATERSHED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Critical Barnyards
Erosion Areas
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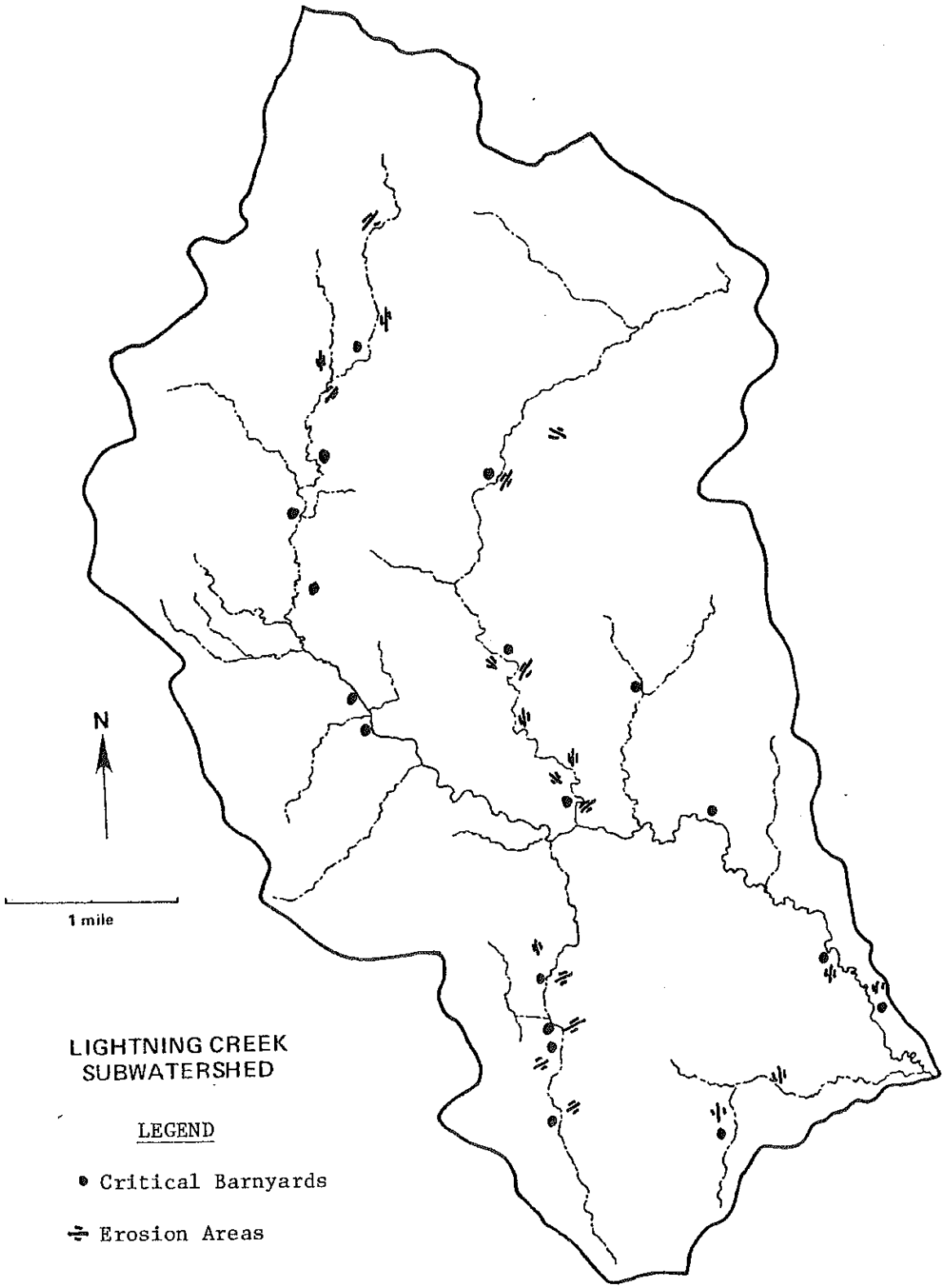
UPPER HAY RIVER
SUBWATERSHED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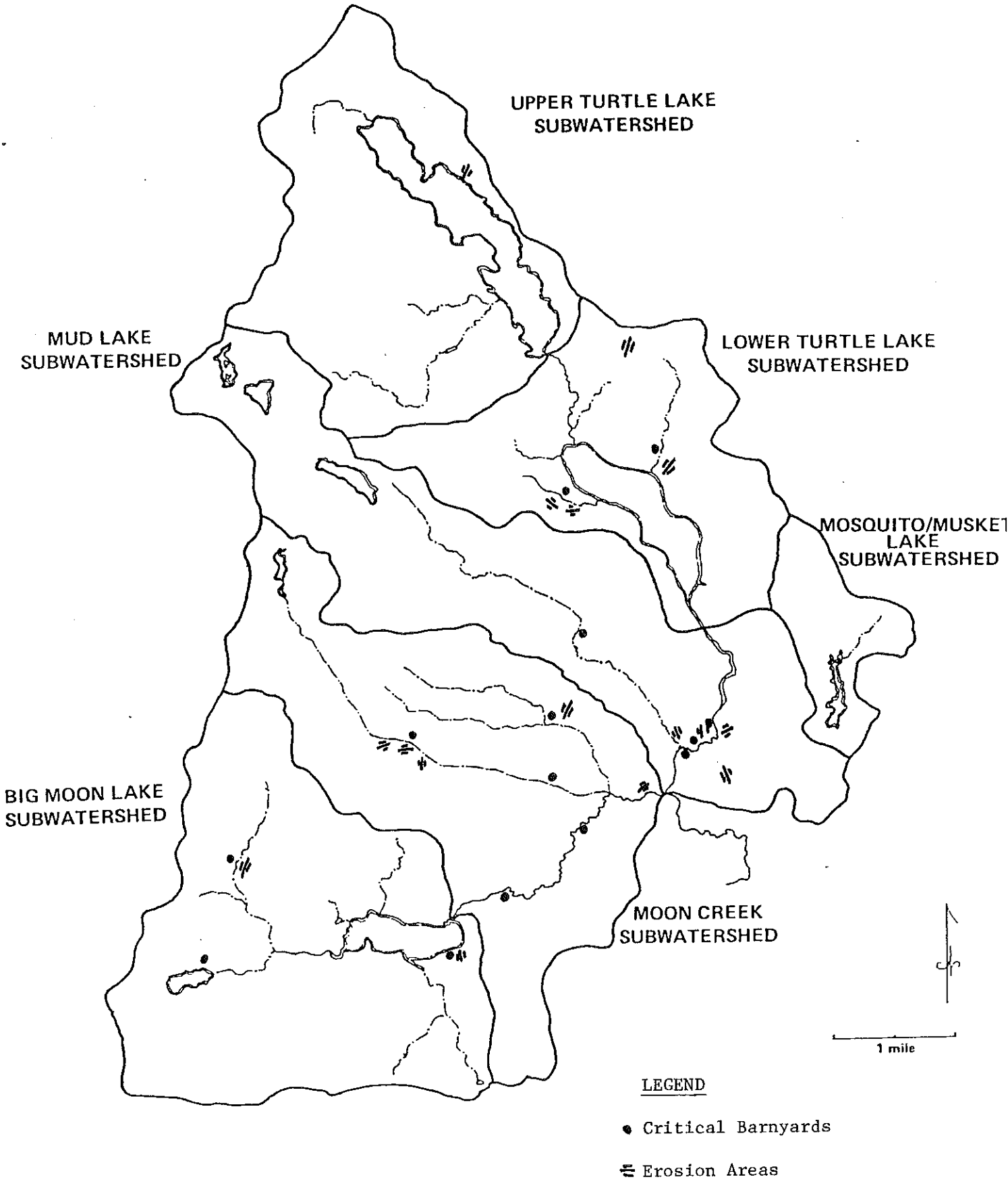
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas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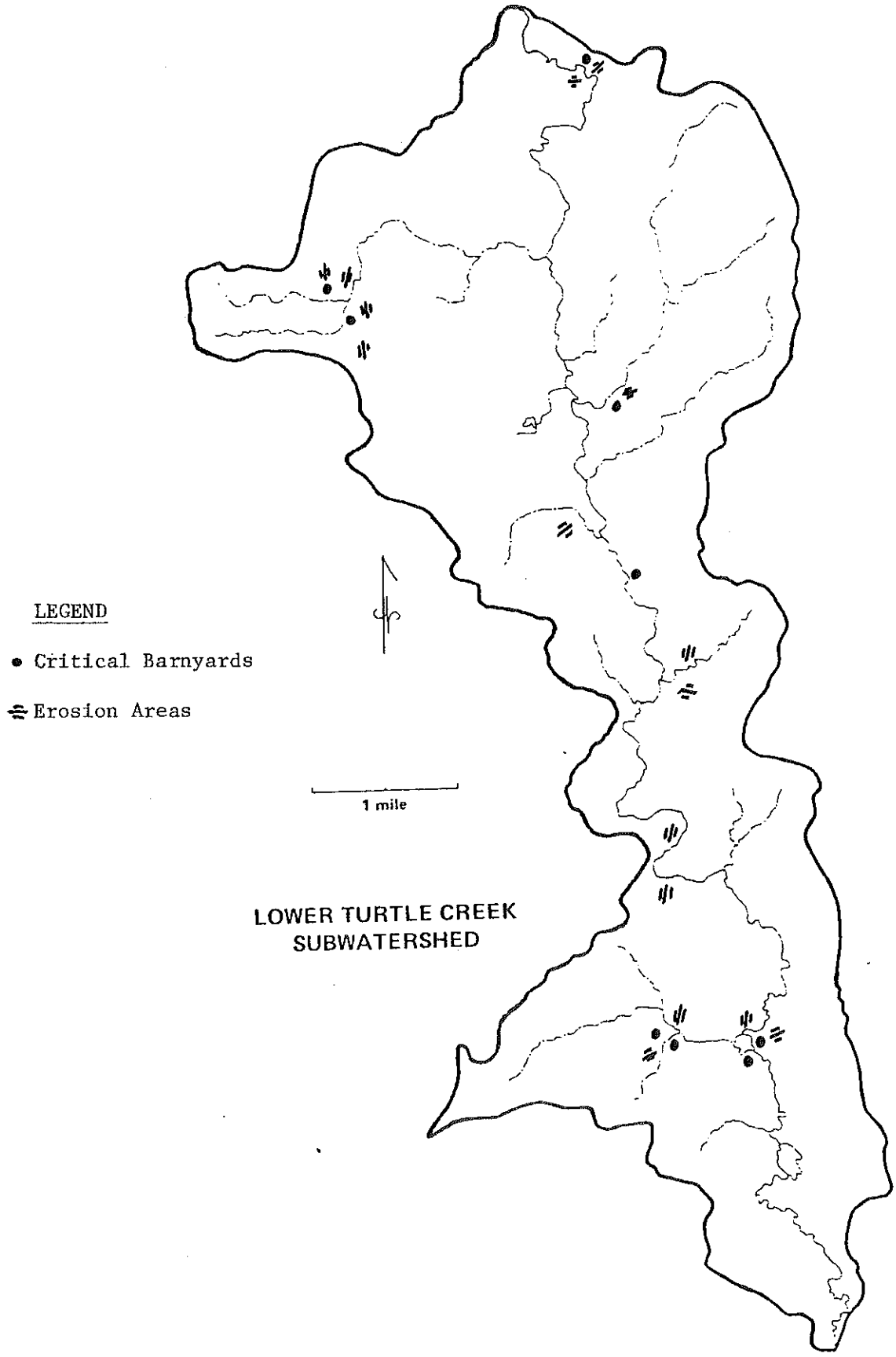
SUBWATERSHED
MUD LAKE
SUBWATERSHED
LOWER TURTLE LAKE
SUBWATERSHED
MOSQUITO/MUSKET
LAKE
SUBWATERSHED
BIG MOON LAKE
SUBWATERSHED
MOON CREEK
SUBWATERSHED
1 mile
LEGEND
Critical Barnyards
Erosion Areas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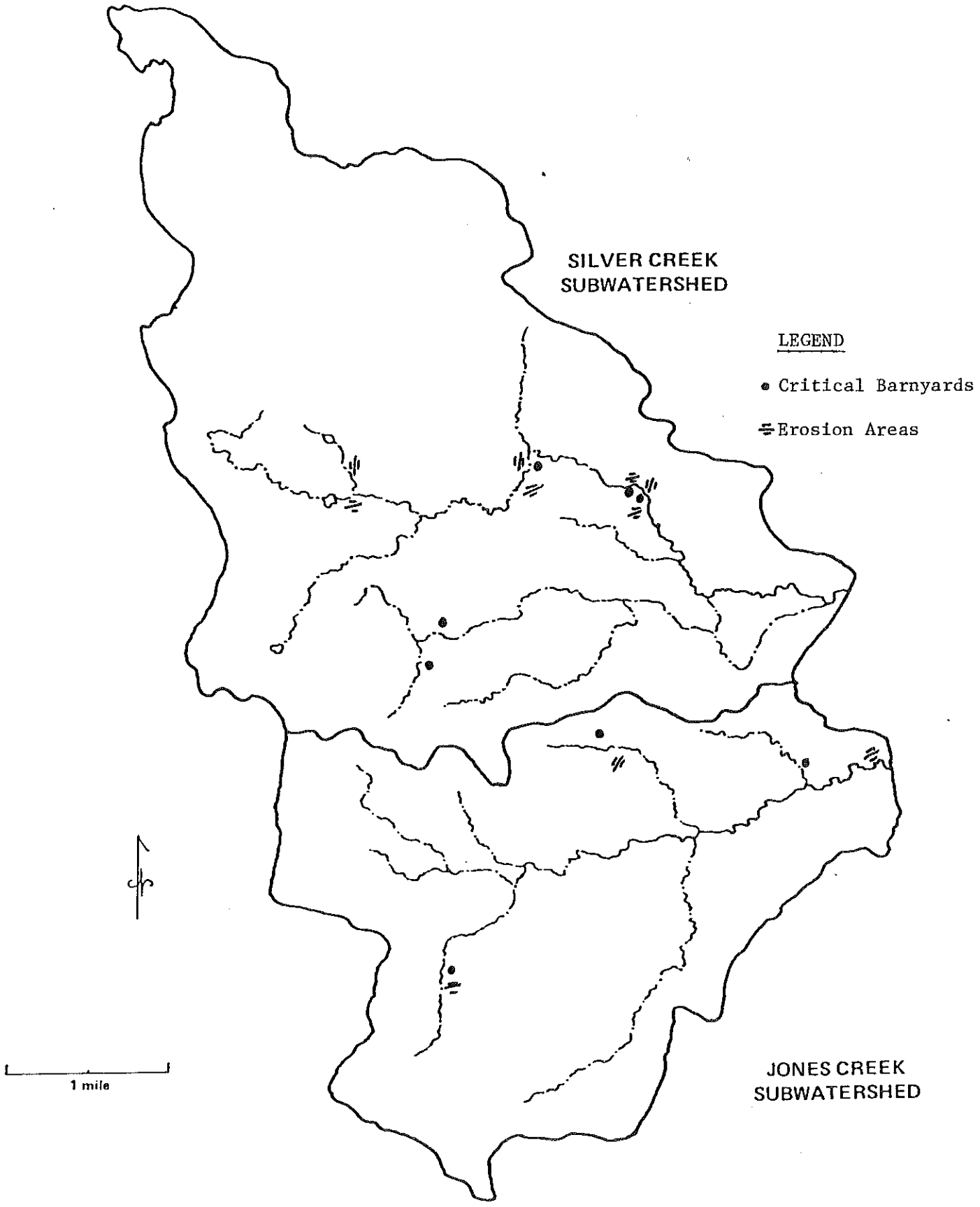
Critical Barnyards
Erosion Areas
1 mile
LOWER TURTLE CREEK
SUBWATERSHED


SILVER CREEK
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas
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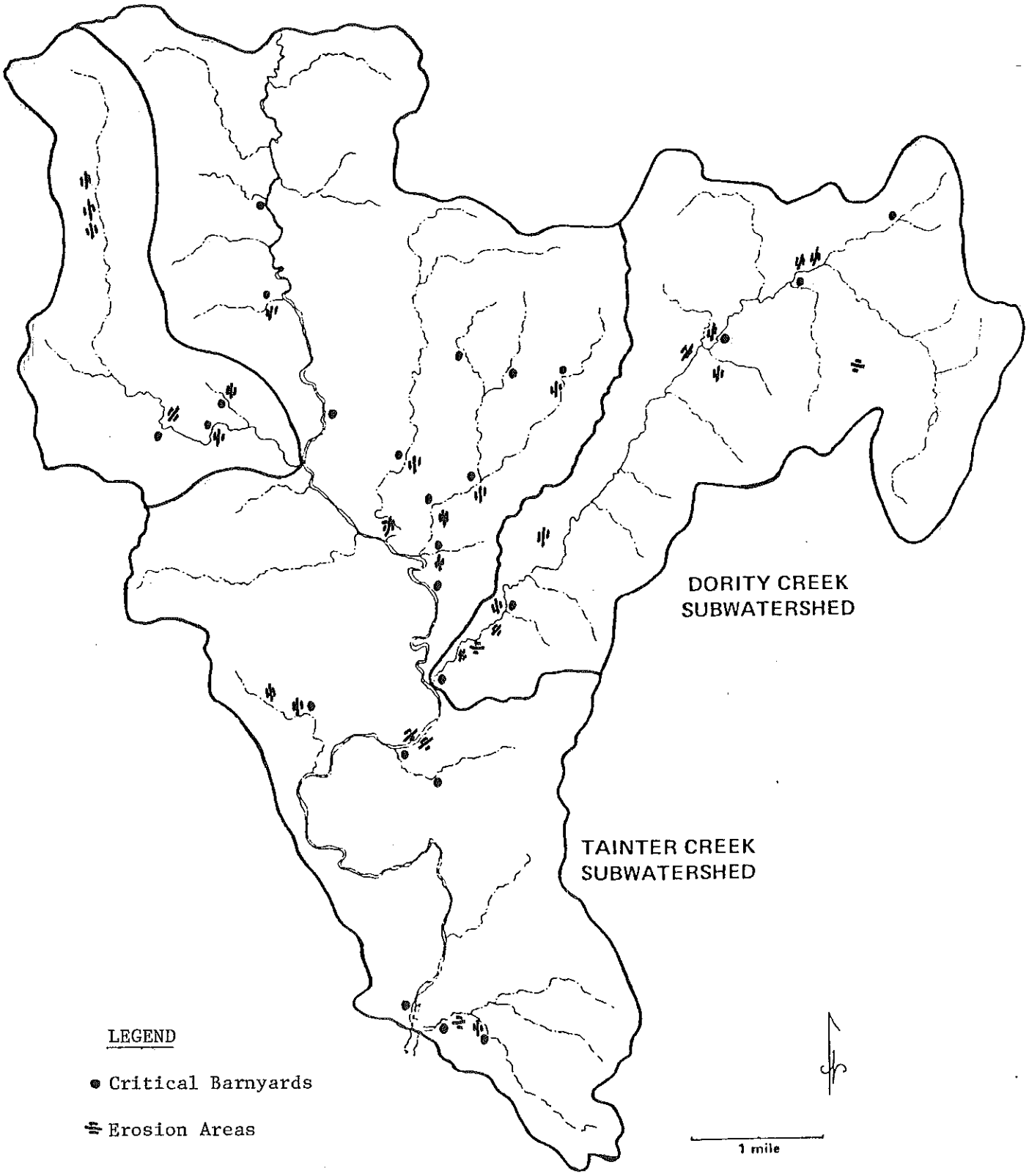
JONES CREEK
SUBWATERSHED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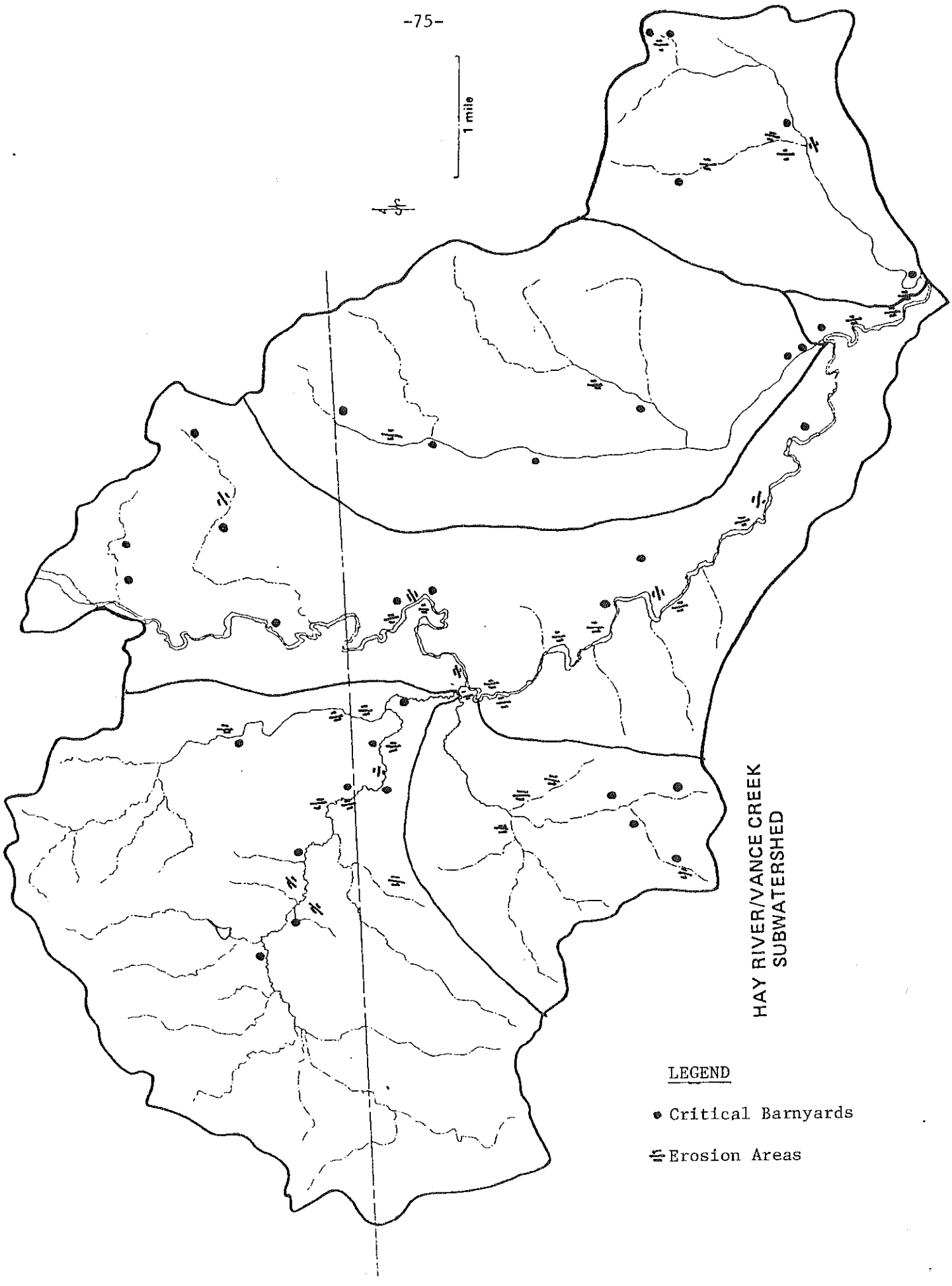
SUBWATERSHED
TAINTER CREEK
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas
1 mile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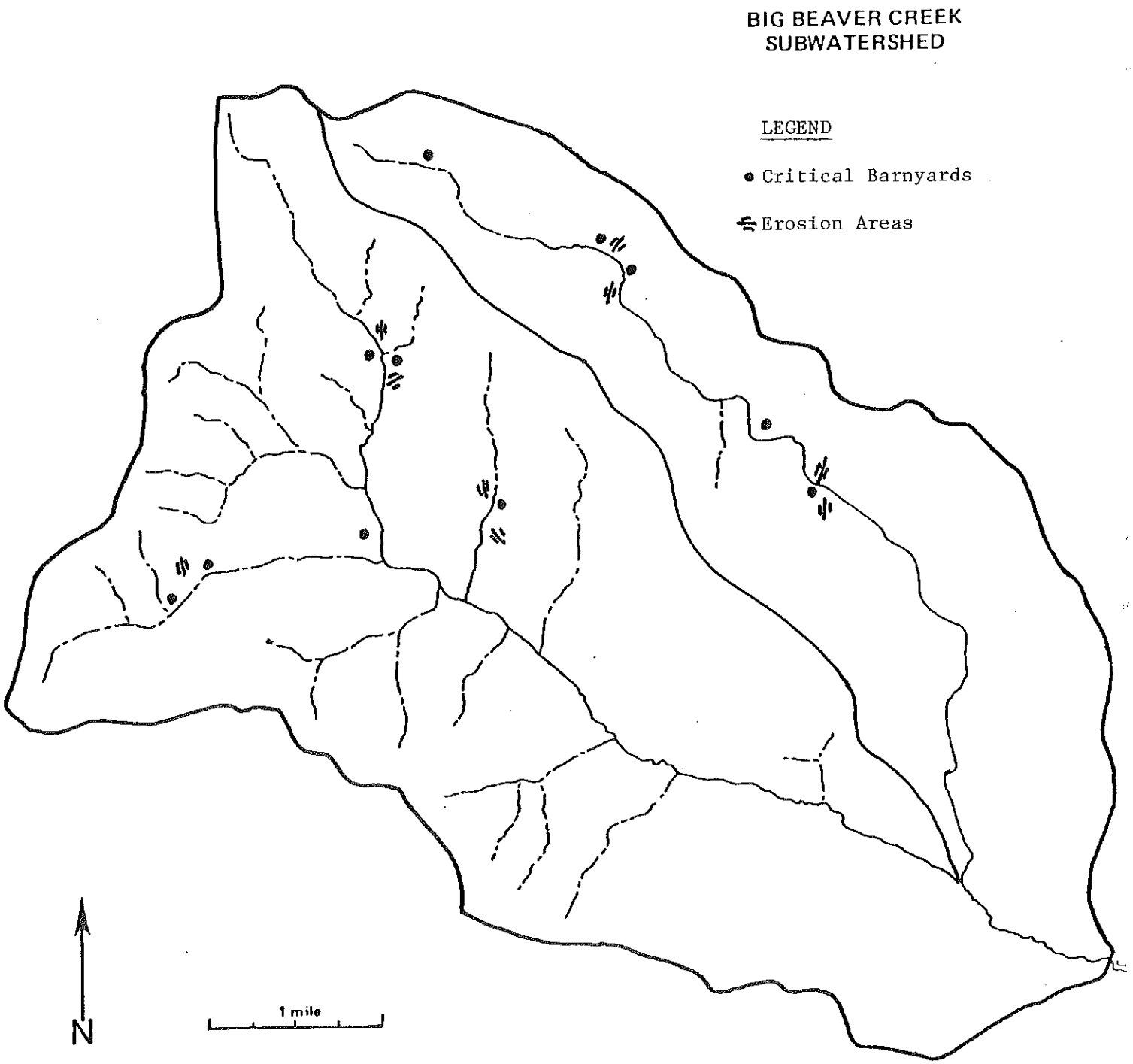
HAY RIVER/VANCE CREEK
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas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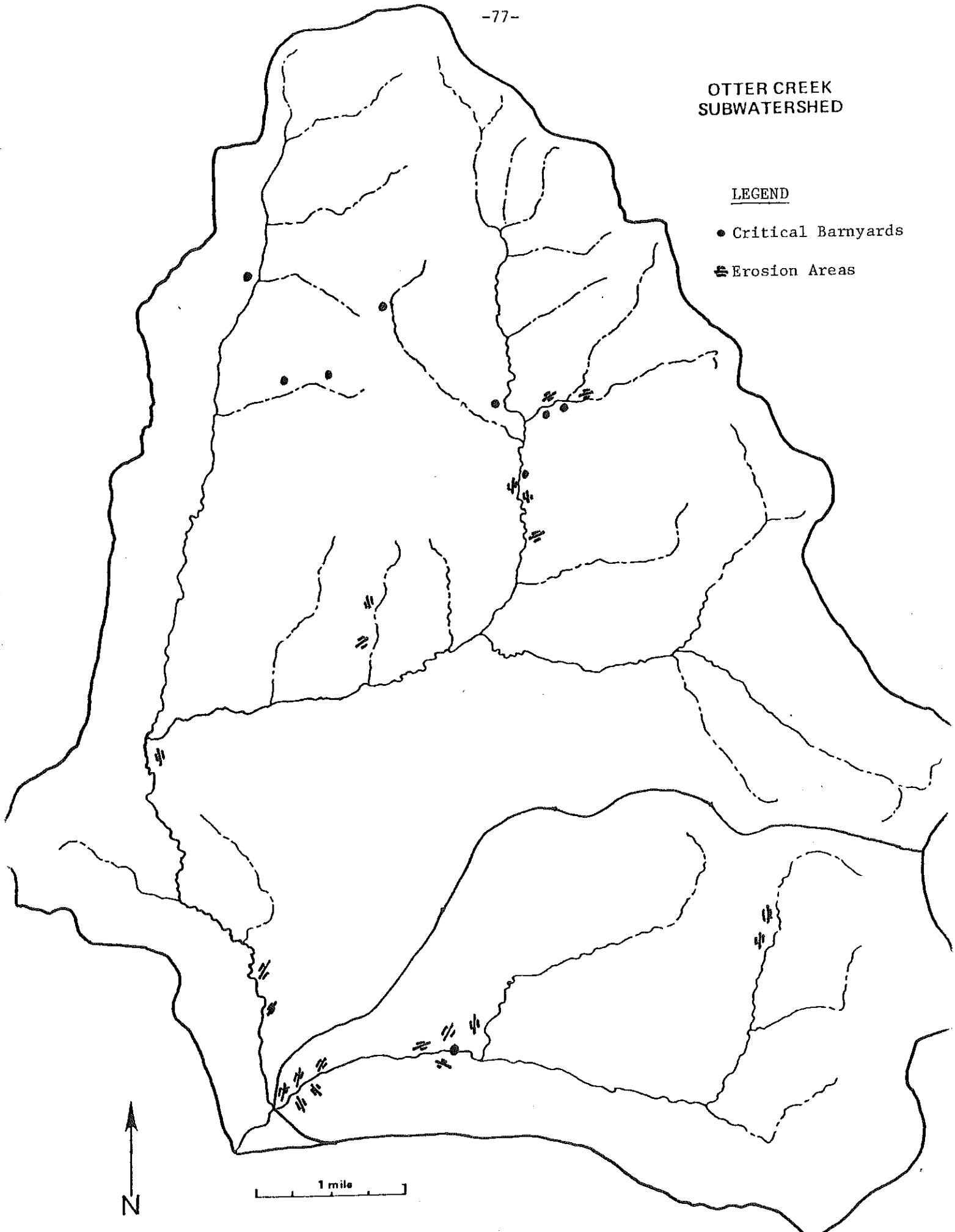
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas
N
1 mile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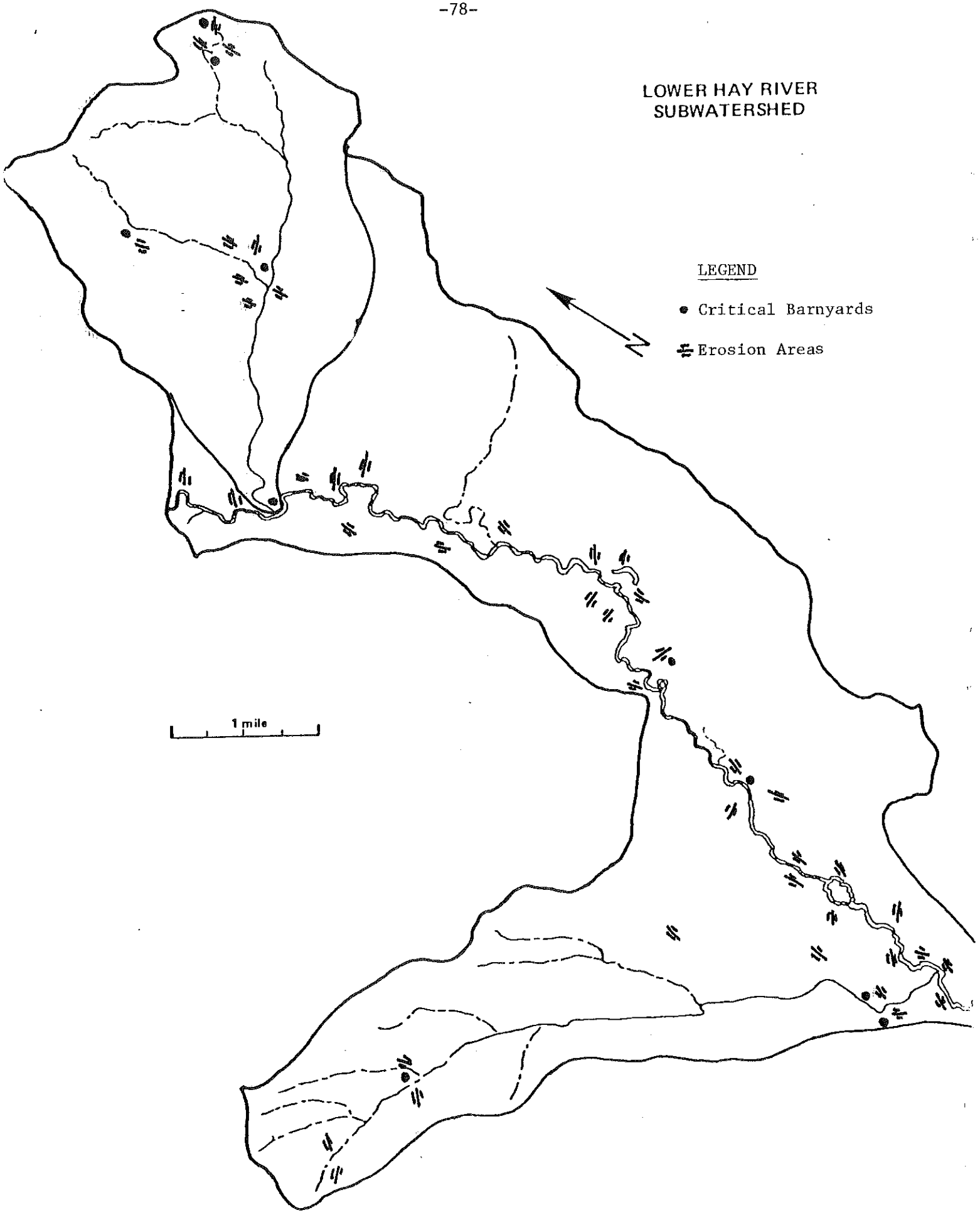
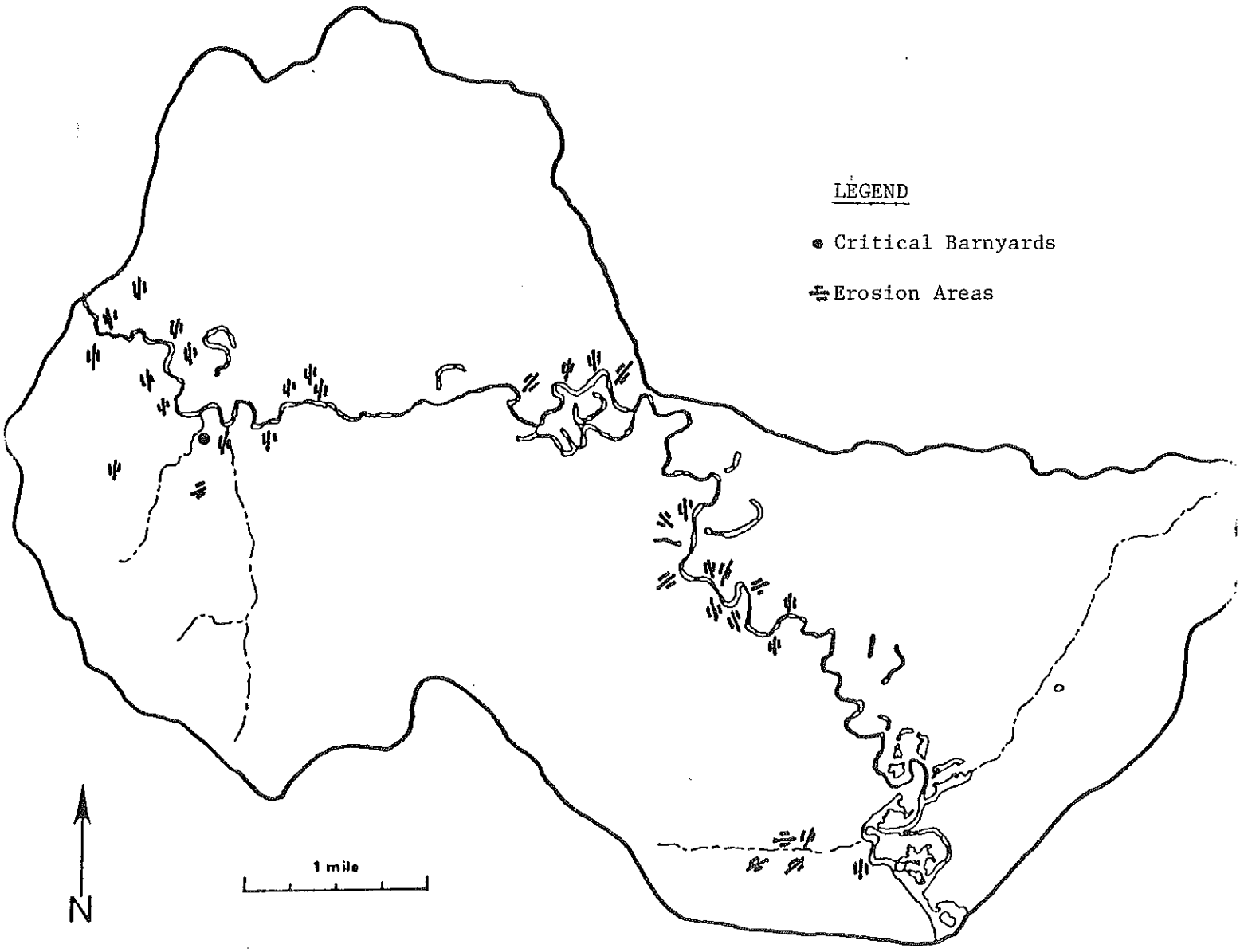
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas
N
1 mile


LOWER HAY RIVER
SUBWATERSHED
LEGEND
Critical Barnyards
Erosion Areas
N
1 mile

HAY RIVER/TAINTER LAKE
SUBWATERSHED



A P P E N D I X I I I

SUMMARY OF WATER QUALITY INFORMATION

Water Quality Information Summary

1. Beaver Dam Lake Subwatershed

The major water resource of this region is Beaver Dam Lake. It covers 1,112 acres and has been given a Lake Classification Index of six (6), corresponds to the mesotrophic class of lakes. Chemical data from the Lower Chippewa River Basin Report shows the upper portion of Beaver Dam Lake to be more oligotrophic while the lower portion near the Hay River outlet is very very eutrophic (data included in summary of the Lower Chippewa River Basin Report). The City of Cumberland's sewage treatment plant and Universal Foods both discharge to lower Beaver Dam Lake and are the large source of the high nutrient levels found there with the sewage treatment plant being the large contributor to the lake at this point. The fisheries of the lake contain cold water fish as well as warm and include walleye, largemouth bass, northern pike, perch, panfish, cisco, bullhead, carp and suckers.

Two other lakes in this subwatershed are Kirby Lake (92 acres) and Kidney Lake (35 acres) which are both soft water seepage lakes with fish populations consisting of northern pike, largemouth bass, bluegills and bullheads.

Beaver Dam Lake

	LCI	(Ft.) Secchi	(umho) S. Cond.	mg/l Alk.	mg/l T.P.	pH	mg/l T.N.
Upper Basin -	6	4.8-19.2	145	56-84	<.01-.05	7.6	.48
Lower Basin -		1.5	190	62-63	.91-.97	9.6	2.45-2.72

	mg/l O.N.	mg/l NH_3-N	mg/l NO_3-N	mg/l NO_2-n
Upper Basin -	.31	.05	.13	.003
Lower Basin -	1.88-2.38	.23-.25	.09-.30	.014-.015

2. Upper Hay River/Johnson Creek Subwatershed

Johnson Creek is an intermittent stream flowing into the Hay River. Much of the Hay River in this subwatershed is also intermittent. Physical and chemical data was determined for one sample collected on the Hay River just north of the mouth of Johnson Creek. The biotic index gave this site a fair rating (2.85 on a scale of 0-5.0) and might be reflective of nearly intermittent conditions. The physical data included the following:

Date	Site	Temp.	mg/l D.O.	pH	MFFCC
May 22, 1979	H31A	13.2	5.9	7.0	270

Water quality standards were violated only by the fecal coliforms which were 270/100 ml. Since this sample was taken in May, problems with low DO or higher MFFCC would not show as it would later in the summer or early fall.

3. Lightning Creek Subwatershed

Lightning Creek (7.3 miles) is a warm water stream with a fish population primarily composed of forage fish. There is extensive wetlands along its course (422 acres). The Biotic Index sampling on Lightning Creek was taken in Section 29 of Almena Township, T.34N. - R.14W. of Barron County. The sample indicated poor conditions for benthos. This might be a result of the Almena sewage treatment plant discharge into Lightning Creek. In the Lower Chippewa River Basin Report, a sampling site above the Almena sewage treatment plant outfall showed pollution tolerant species of benthos. Two high fecal coliform counts (1,400 and 1,900/100ml) may be indicative of livestock waste discharge.

Site	Temp.	D. O.	pH	MFFCC
H37	9.9	10.0	7.3	4600

The fecal coliform levels exceeded standards and is likely indicative of sampling below the Almena sewage treatment plant outfall.

4. Turtle Lake Subwatershed

The two major water bodies in the watershed are Upper Turtle Lake (423 acres) and Lower Turtle Lake (278 acres). Upper Turtle Lake has a lake classification index value of seven and Lower Turtle Lake was given a five indicating both are mesotrophic. Both contain a fishery of walleye, northern pike, largemouth bass, panfish, carp and bullheads.

Two other lakes in the area are Mosquito Lake (24.5 acres) and Mud Lake (19.2 acres) which are subject to winterkill conditions due to shallow depths. The fishery consists of mudminnows, fathead minnows and bullheads.

A biotic index sampling was conducted at two locations. Below Upper Turtle Lake the sampling site was given a 3.77 rating which is very poor. The second site was below both lakes about one-half mile upstream from the mouth of Moon Creek. Physical data showed on May 22, 1979 the following:

Site	Temp.	D.O.	pH	MFFCC
H39	12.5	8.8	8.0	10
H40A	10.9	8.3	7.4	1,400

The sample was collected too early in the year to indicate any D. O. problem. The bacteria count exceeded standards at the second site.

Sampling Data

	LCI	UMHO S. Cond.	mg/l Alk.
Lower Turtle Lake	5	189	88
Upper Turtle Lake	7	202	100

5. Upper Hay River Subwatershed

The Hay River in the reach becomes a permanent stream. Its fishery primarily consists of walleye, northern pike, smallmouth bass, suckers and carp.

There is one biotic index and physical chemical sampling site. The biotic index received a 2.39 or fair rating in this reach of the river. The physical data showed:

Site	Temp.	D.O.	pH	MFFCC
H32	12.0	8.3	7.3	660

The sample was taken on May 22, 1979.

The bacteria counts were higher than established standards but all other parameters were in compliance. The early sampling data (with high flow) may result in higher than normal D. O.

6. Moon Creek Subwatershed

Moon Creek is a warm water stream with a fish population consisting of forage minnows. It is a low gradient, often silt bottomed, mashy edged stream. The Village of Turtle Lake has a wetland sewage treatment plant discharge to an impounded wetland in the headwater of tributary to Moon Creek.

Data from the Lower Chippewa River Basin Report had three sampling sites. Chemical site 189 was located at the Turtle Lake sewage treatment plant outfall. Of two samples, one fecal coliform count was excessive (140,000/100 ml). Site 190 located at the outlet of an impounded wetland that eventually flows to Moon Creek. Of three samples, one fecal coliform was high (650/100 ml) and two pH values (9.1 and 9.2) exceeded water quality standards. Chemical site 191 was .4 miles below the wetland discharge and all three samples contained D. O. levels below intermediate aquatic life standards (0.5 - 1.4 mg/l). (Data is included on attached sheet)

The two lakes in this region include Big Moon Lake (178.4 acres) and Little Moon Lake (27 acres). Big Moon Lake is a warm-cold water lake with walleye, muskellunge, cisco and fathead minnows comprising the fishery. It is given an LCI of three which indicates oligotrophic conditions. Little Moon Lake is a hardwater seepage lake that has a fishery of largemouth bass and northern pike. The biotic index sampling was done on two sites. H-43, below Little Moon Lake, had a biotic index value of 3.81 which is very poor. This may be because the stream is intermittent at this site.

H-44A was below Big Moon Lake and received a 3.77, a very poor rating. The physical data at these sites showed the following on May 22, 1979:

Site	Temp.	D. O.	pH	MFFCC
H-43	13.8	7.5	7.2	50
H-44A	11.2	8.6	8.1	< 10

All water quality standards were met.

	LCI	S. Cond.	Alk.
Big Moon Lake	3	238	91

7. Silver Creek/Jones Creek Subwatershed

Only limited data exists for this watershed. Jones Creek and Silver Creek are classified as Class I or II trout streams. Jones Creek has good water quality and instream cover. The biotic index sampling (46) received a 1.36 or excellent rating. The physical sampling showed on May 22, 1979:

Site	Temp.	D. O.	pH	MFFCC
H46	7.8	10.5	7.6	80

All water quality standards were met on May 22, 1979.

8. Lower Turtle Creek Subwatershed

It should be noted that the Village of Turtle Lake's sewage treatment plant outfall empties into a marsh whose outlet empties to Moon Creek 0.75 mile upstream to the confluence with Turtle Creek. Turtle Creek has a fish population of northern pike, rock bass, bullheads, white suckers, and in isolated reaches contains trout and is classified as a Class II trout stream. Two biotic index samplings were done,

one on the border of Sections 14 and 23 of Turtle Lake Township, T.33N. - R.14W (41) which received a 1.82 or good rating and off of the town road in Section one of Turtle Lake Township (42A) received a 6.88 or excellent rating. The physical sampling showed on May 22, 1979 the following:

Site	Temp.	D.O.	pH	MFFCC
41	12.7	8.2	7.4	250
42A	11.2	9.4	7.6	90

Only site 41 had slightly elevated bacterial counts but was in compliance with water quality standards in all other cases.

9. Hay River/Tainter Creek Subwatersheds

One impoundment of the Hay River, Prairie Farm Flowage (28.9 acres), is in this region. A fishery of northern pike, walleye, smallmouth bass, bluegills and rock bass exist in this flowage. Tainter Creek is a warm water stream that is intermittent for much of its reach. Two biotic index sampling sites were sampled. No. 33 is on the Hay River upstream from the mouth of Tainter Creek. The index gave it a 1.40 or excellent rating. The second site, 34, on the Hay River at the mouth of Dority Creek received a 1.63 or excellent rating. The physical sampling showed:

Site	Temp.	D.O.	pH	MFFCC
H-33	11.5	8.1	7.3	170
H-34	11.1	8.6	7.4	280

Only one bacteria count exceeded recommended levels. The Lower Chippewa River Basin Report also had data for several sites in this region. Upstream from the Village of Prairie Farm's sewage treatment plant outfall showed excessive fecal coliform counts

(1,400 and 1,900/100) on two of three occasions. The biological sampling at the same site, B72A, showed pollutant intolerant benthic fauna present (or an unpolluted environment).

Site 182 at the sewage treatment plant had excessive fecal coliform but again showed intolerant benthic fauna. At the border of subwatersheds nine and 12, the D. O. dropped below fish and aquatic standards on one occasion.

10. Dority Creek Subwatershed

Portions are managed as trout water but is mainly a warm water stream. The upper portion is heavily pastured and the lower portion is in open fields. One biotic index sampling site was located on Dority Creek. This sample (38) showed a 1.38 or excellent rating. The chemical sampling showed:

Site	Temp.	D. O.	pH	MFFCC
38	8.0	9.5	7.5	60

All water quality standards were met.

11. Vance Creek Subwatershed

Vance Creek is a cold water stream managed for brook and brown trout. Barron County Forest Land borders much of the shoreline but there is also extensive agricultural areas. Little Vance Creek is a small spring feeder to Vance Creek. It originates from a sedge meadow and forage minnows are its main fishery.

One biotic index sampling site (15) is in this region. A 1.38 or excellent rating was recorded. Bacterial sampling showed the following:

Date	Site	Coli	Strep	Ratio	Interp.
May 10, 1979	15	8-900	700	1.29	B
June 7, 1979	15	500	500	1.00	B

The bacterial levels are above recommended levels and are indeterminant of human or animal waste origin.

12. Hay River/Quarter Creek Subwatershed

Quarter Creek is a forage fish stream that is intermittant through much of its reach. Biotic index sample 14 on Quarter Creek close to its confluence with the Hay River indicated a 1.64 or excellent rating. Its bacterial sampling showed the following:

Date	Site	Coli	Strep	Ratio	Interp.
May 10, 1979	14	1,200	700	1.7	B
June 7, 1979	14	1,000	800	1.2	B

The bacterial levels are above recommended levels, but are indeterminant of human or animal waste origin.

Two biotic index sites are on the Hay River. Site 35, is near the northern end of this subwatershed and site 13 is located downstream from the mouth of Vance and Quarter Creeks. The indexes showed site 35 as 0.77 or excellent and site 13 has a 1.62 or excellent rating. The bacteriological data showed:

Site	Coli	Strep	Ratio	Interp.
13	1,200	200	6.0	A
	300	100	3	B

Site	Temp.	D. O.	pH	MFFCC
35	12.1	9.3	8.0	80

Bacteriological levels were slightly elevated and some evidence indicates it may be of human waste origin.

Date	Site	Coli	Strep	Ratio	Interp.
May 10, 1979	3	100	100	1.0	B
June 7, 1979	3	100	200	0.5	C
June 14, 1979	3	170	700	.2	C
May 10, 1979	4	<100	<100	-	-
June 7, 1979	4	400	200	2.0	B
May 10, 1979	5	<100	<100	-	-
June 7, 1979	5	200	400	.5	C

Several bacterial samples were elevated, especially on site two. Site three and five showed a possible indication of livestock waste.

17. Hay River/Tainter Lake Subwatershed

The lower Hay River supports a fishery consisting of walleye, smallmouth bass, northern pike, suckers and carp. The Lower Chippewa River Basin Report showed one sampling site (184) in this subwatershed. High nutrient levels were indicated.

pH	A SS	A Org-N	A NH_3-N	A NO_2-N	A NO_3-N	A Tot. P	A Sol.P	A Cl
7.9	1-	.12-	0.01-	.007-	1.40-	.06-	0.026-	4-
8.4	19	.58	0.08	.014	0.38	.14	0.072	5

A = Chemcial parameters reported in mg/1.

Biotic index sampling was completed in two locations and showed:

1 - Hay River	1.33 - Excellent
6 - S. Fork of Hay R.	1.61 - Excellent

Bacteriological sampling showed:

Date	Site	Coli	Strep	Ratio	Interp.
May 10, 1979	1	2,400	1,800	1.3	B
June 7, 1979	1	200	100	.2	B
June 14, 1979	1	1,800	1,000	1.8	B

Date	Site	Coli	Strep	Ratio	Interp.
May 10, 1979	6	6,000	10,000	0.6	C
June 7, 1979	6	500	300	1.6	B
June 14, 1979	6	190	90	2.1	B

Elevated levels were found in all samples. On one occasion an indication of livestock waste was evident aon the South Fork of the Hay River which is not included within the Hay River Watershed.