# RIFLE RIVER WATERSHED

## ARENAC AND OGEMAW COUNTIES
## MICHIGAN

## NONPOINT SOURCE WATERSHED MANAGEMENT PLAN

**Sponsored by:**

**Saginaw Bay RC&D Area, Inc.**
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**Co-Sponsored by:**

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## Chapter 1. Executive Summary

This Nonpoint Source Watershed Management Plan has been developed in response to an identified need for a well-coordinated, collaborative watershed restoration initiative which will have meaningful and enduring results. The members of the Rifle River Watershed Restoration Committee have recognized this need for at least fifteen years. The committee, through its actions, recognizes that this watershed restoration initiative must involve representatives from a cross-section of the stakeholders.

The Rifle River is located in northeast lower Michigan and is a tributary to Saginaw Bay (Lake Huron). Due to its high quality natural resource base, the Rifle River watershed supports a diversity of recreational uses including: fishing, hunting, canoeing, trapping and birding.

The overall high water quality found within the Rifle River watershed is an attribute deserving of protection. It supports and maintains the excellent and diverse recreational experiences that the public has come to expect of this watershed. The future of the tourist and recreation trade in this region is dependent upon the integrity of this high quality resource base. As well, these natural resources contribute to the quality of life which the region's residents have come to enjoy.

The Rifle River watershed is located centrally within Michigan's lower peninsula in what is widely regarded as the transition zone between the state's more densely populated southern half and its more rural northern half. In recent years these mid-Michigan counties have been experiencing increasing pressure from development. As more urban residents move out to rural Michigan counties, the potential for degradation of these natural resource bases is significant. In order to assure that growth within the Rifle River watershed does not adversely impact the region's natural resources, proper planning is of paramount importance.

In order to correct a number of priority surface water quality problems present in the watershed today, the Saginaw Bay Resource Conservation and Development (RC&D) Area, in partnership with the Huron Pines RC&D Area and the Rifle River Watershed Restoration Committee, has developed this twenty year Nonpoint Source (NPS) Watershed Management Plan. This plan is intended to be a work in progress which will need to be periodically updated.

A number of suspected water quality challenges have been identified within the watershed including: sedimentation from road/stream crossings, eroding streambank segments, impacts transmitted from various agricultural activities, stormwater runoff from developed lands, impacts related to public access needs, excessive localized beaver activity, the tapping of artesian flows, improperly functioning septic systems, industrial and municipal surface water discharges, urban sprawl, thermal pollution, recreational use conflicts and agricultural drainage.

In order to verify and assess the extent of these challenges, the following site-specific inventories were conducted prior to the development of this NPS Watershed Management Plan:

West Coastal Basin Road-Stream Crossing Assessment
Rifle River Road-Stream Crossing Inventory
Mainstem and West Branch Streambank Erosion Inventory
Hydrologic Evaluations in the areas including West Branch, Omer and Rose City

Aerial photographs, Natural Resource Conservation Service information and topographic maps were analyzed to provide updated and more detailed estimates of land use within the watershed. Analysis of land use data over the last forty years suggests a shift from agricultural to forested land use. To the extent possible, shifts to less intensive land uses, particularly in the case of riparian and other sensitive lands, should be encouraged. Agricultural land use was broken down into the following specific activities: row crops, specialty crops, small grains, forage crops and idle grassland.

The majority of the watershed is forested (55%) while 21% of the land mass is devoted to agriculture. The majority of this agricultural land is dedicated to forage crops (56%) while row crops constitute 27% of these lands. There are several areas within the watershed which support sizeable dairy farms.

In the process of analyzing agricultural land use within the watershed, specific opportunities were identified to improve water quality through the implementation of appropriate Best Management Practices (BMP's). These BMP's include: livestock exclusion fencing, livestock stream crossings, animal waste storage facilities, filter strips, nutrient management, integrated pest management, grassed waterways, green manure crops, mulch tillage and no-till. The estimated cost to implement these BMP's is $1,489,346 (1998 dollars).

A total of 157 eroding road stream crossings were inventoried. Of these, 147 are either serious or moderate in nature. A conservative estimate of the cost to repair these sites is $3,625,000 (1998 dollars). Collectively these crossings contribute a substantial portion of the total sediment volume delivered annually to surface waters.

There were a total of 379 eroding streambank segments identified in a 1994 streambank erosion inventory conducted on the West Branch and mainstem of the Rifle River. The projected total cost of restoration for these sites is $3,395,890 (1998 dollars). Since 1996, approximately 10% of these sites have been restored through the efforts of the Rifle River Watershed Restoration Committee. The Committee recognizes that, while restoring these eroding streambanks, there are significant opportunities to incorporate fisheries habitat improvement measures simultaneously.

A number of developing areas within the watershed are generating significant stormwater runoff. In some instances Combined Sewer Overflow events have occurred due to a lack of facility capacity. In order to achieve a sense of the magnitude of these stormwater concerns, hydrologic evaluations were conducted for the lands within and around West Branch, Rose City and Omer. These evaluations indicated that serious runoff challenges currently exist in the West Branch and I-75/Cook Road corridor. Development in these areas has generated extensive areas of impervious surface that have resulted in increasing peak flows within tributaries to the West Branch of the Rifle River and Eddy Creek.

While stormwater runoff in Rose City and Omer has not been a significant problem, the potential is significant given the development which these towns can anticipate. Wilkins Creek and Hougton Creek have experienced increasing runoff from recent development. In order to assure that runoff problems do not develop in these areas, proper stormwater planning will be required. Now is the time to initiate this process. A stormwater management study having an estimated cost of $100,000 is proposed.

The West Branch of the Rifle River has been heavily impacted by the failure of the Flowage Lake dam in 1985. This dam failure resulted in both catastrophic flood flows and excessive sedimentation (both bed and suspended loads). While the fine particulates (suspended load) have been flushed out of the system, the sand sediment released at the time of this failure remains in the stream and will take decades to be transported into the mainstream.

These sediments have significantly elevated the streambed, thereby covering over bottom substrates and fish habitat. This bedload is also causing the channel to widen, thus accelerating existing streambank erosion problems. In order to remediate this problem in the near-term, a well-planned $1.5 million sediment removal program is proposed. The hydrology of the West Branch should also be investigated further, as part of the larger stormwater management study which is proposed.

The public has identified increasing recreational use of the Rifle River as a challenge which needs immediate attention. Recreationists utilizing the river for canoeing, tubing and fishing approach or exceed the carrying capacity of the resource at times of peak use. Conflicts have arisen with riparian owners from time to time and the need for additional access and bathroom sites have been identified. In order to better define the problem and potential solutions, a River Use Task Force has been established. Short-term access development and improvement costs have been estimated at $200,000.

In order to inform and involve the public in the resolution of these challenges, an Information and Education program is proposed as a key component of this plan. This program includes the development of: a quarterly watershed newsletter, classroom curricula, volunteer stream water quality sampling program, Adopt-A-Stream program, printed educational materials for the general public and an annual public outreach initiative. The Rifle River Watershed Restoration Committee will collaborate with resource management agencies, local governmental leaders and citizens to establish a Watershed Stormwater Management Task Force and a Rifle River Agriculture-2020 Task Force.

The Restoration Committee will serve as the body that will set policy for this project. The project's day-to-day administrative responsibilities will lie with the Saginaw Bay Resource Conservation and Development Area. The Rifle River Watershed Restoration Committee was formally convened in 1996. The majority of the committee's members have, however, been actively involved in restoration efforts including fisheries habitat improvement and erosion control measures within the watershed since 1988.

In using this plan to guide the watershed restoration initiative over the next twenty years, the Restoration Committee will collaborate with resource management agencies, local school systems, local governmental units, the agricultural community, conservation organizations and local citizens to develop the funding and cooperation necessary for implementation. The committee recognizes that, in order to accomplish the goals set forth in this plan, it is of paramount importance to actively involve all of the watershed's stakeholders.

In conclusion, the partners involved in the development of this plan are committed to its successful implementation. The plan sets forth worthy goals and objectives which will need to be periodically reviewed and updated to reflect changing conditions. The members of the Restoration Committee encourage and welcome comments and input regarding the content of this Nonpoint Source Watershed Management Plan and the actions it proposes.

## Chapter 2. Watershed Description

### General Overview

The overall high water quality of the Rifle River watershed is an attribute deserving of protection. It supports and maintains the excellent and diverse recreational experiences which the public has come to expect of this watershed. The future of the tourist and recreation trade in this region is dependent upon the integrity of this high quality resource base.

The Rifle River originates in northern Ogemaw County and flows southeasterly to its confluence with Lake Huron (Saginaw Bay) in Arenac County. The watershed drains a land mass having a surface area of approximately 396 square miles. The Rifle River mainstem is approximately 60 miles long and has tributaries totaling 140 miles in length (USDA/SCS, 1994). The Rifle River is one of the swiftest moving streams in the lower peninsula, due to the fairly steep gradient found in many reaches (MDNR, 1980). A watershed map is provided in Figure 2.1.

In excess of fifty percent of the watershed is forested. A clay pan underlies much of the surficial soils within watershed, creating fairly rapid runoff and relatively flashy streamflows. All of the streams within the Rifle River watershed, upstream of Omer with the exception of Richter Creek (T19N,R4E,Sec. 25) and Wells Creek (T19N, R4E, Sec. 19), have been stipulated as “Designated Trout Streams”.

The Rifle River watershed can be divided into two segments. The upper watershed lies upstream of Greenwood Road and is predominantly a coldwater system that supports both resident brown trout and anadromous fisheries. The majority of the upper watershed is forested with a considerable portion of this forested acreage being in state ownership. The region is blessed with some 40 lakes, many of which are perched in depressions found in this topographically diverse area. Elevations vary from 1300 to 900 feet above mean sea level (USGS, 1971).

The upper watershed reaches elevations in excess of 1300 feet (USGS, 1971) and has an abundance of headwater streams, fed predominantly by groundwater. Thus, the major tributaries including the West Branch, Klacking, Houghton, Wilkins, Vaughn, Gamble, Prior and Ammond Creeks, together with the upper Rifle River mainstem, sustain resident brown trout fisheries.

The lower half of the watershed (below Greenwood Road) has a substantial gradient as it flows through broad plains that have been drained for agriculture. The reaches above Omer support significant spawning runs of anadromous salmon and steelhead. MDNR Fisheries Division staff are presently compiling historic and current data describing the fisheries of the watershed. This information will be included in amended versions of this plan.

Agricultural activities are interspersed on these plains, which flank the highlands. Dense cedar and spruce swamps border the streams of the upper watershed in its central and southern regions. The lower watershed, from Greenwood Road to the Rifle's confluence with the Saginaw Bay, is also dominated by forest. Agricultural activities are significant, however, and are maintained by artificial drainage networks.

The lower Rifle River watershed has areas of significant stream gradient and supports notable runs of anadromous brown trout and steelhead, salmon, walleye and suckers. As well, a resident brown trout fishery is sustained in portions of the lower watershed. The lower watershed lacks the significant topographic relief found within the upper watershed.

Much of the Rifle River watershed, upstream of Omer, was designated a State Natural River, under the Wild-Scenic classification, in 1980. A map delineating those reaches having the Natural Rivers designation is provided In Figure 2.2. This designation was made in 1980, pursuant to the Michigan Natural Rivers Act (P.A. 231, 1970). The intent of the designation was to recognize and maintain the free-flowing and natural characteristics of the watershed. As well, all of the streams within the Rifle River watershed, upstream of Omer with the exception of Richter Creek (T19N,R4E,Sec. 25) and Wells Creek (T19N, R4E, Sec. 19), have been stipulated as "Designated Trout Streams" by Director's Order No. DFI101, pursuant to Act 451, P.A. 94.

Water quality ranges from excellent in most tributaries to slightly impaired. Impairment to water quality throughout the watershed is typically due to non-point source problems such as erosion and runoff (ECMPDR, 1976). The only documented impacts from point sources to date are the municipal wastewater treatment plants at West Branch and Rose City. Improvements undertaken at these facilities should result in improved water quality.

Surface Water Quality Division of the Michigan Department of Environmental Quality has coordinated an ongoing water quality monitoring effort on the Rifle River as part of the development and implementation of the Saginaw Bay Remedial Action Plan (RAP). A number of nonpoint source challenges have been identified as a result of this work including: elevated total phosphorus and nitrate/nitrite concentrations, relatively high suspended solids loading and a high bedload (MDNR, 1994; Jude et al., 1993). Biological surveys undertaken in 1983, 1985 and 1994 (MDNR, 1995) at various locations in the watershed indicated "good" (slightly impaired) water quality.

## Soils

Gently rolling to hilly moraines typify the upper watershed. The lower watershed is relatively flat reflecting the old Lake Huron lake bed (MDNR, 1980). The watershed is bounded to the west by the West Branch moraine and to the east by the Gladwin moraine. The Rifle River mainstream flows primarily through outwash plain and lake plain. The watershed's surficial geology is shown in Figure 2.3.

Much of the watershed is underlain by clay pan which inhibits the infiltration of precipitation and directs additional runoff to streams. This increased runoff causes the Rifle River and certain tributaries to be some of the flashiest streams in the northern lower peninsula. Evidence of this clay can be seen frequently in clay ledges in streambanks and beds throughout the watershed. A soils map of the watershed is provided in Figure 2.4.

## Population

The Rifle River watershed is rural in nature and is situated within portions of Ogemaw and Arenac counties. This area includes the cities of West Branch and Rose City and Omer. Lupton, Forest Lake Lake Ogemaw and Skidway Lake are also significantly developed areas within the watershed which are unincorporated. Portions of twenty townships lie within the watershed as indicated in Figure 2.5.

The population of Ogemaw County in 1990 was 18,681 with an average density of 33.1 persons per square mile. Youth under the age of 18 comprise 26.9% of the population. Ogemaw County has 13 physicians and a crime rate of 4.8 percent.

Ogemaw County's median household income in 1989 was $17,665 (76$^{th}$ in the state) and median family income was $21,110. Per capita income in Ogemaw County was $8,479 (Michigan State University Extension, 1990).

Of those residents employed within Ogemaw County, 5.4% worked in agriculture. Agricultural sales in 1990 totaled $12,001,000. Retail sales in Ogemaw County totaled $100,141,000 while service businesses generated $22,875,000 and wholesale sales totaled $41,805,000.

The population of Arenac County in 1990 was 14,931 with an average density of 40.7 persons per square mile. The youth under 18 comprised 27.3% of the population. Arenac County has 6 physicians and a crime rate of 2.6 percent.

Agricultural sales in Arenac County in 1990 totaled $16,412,000. Of those Arenac County residents employed within the county, 7.1% worked in agriculture. Retail sales accounted for $79,549,000 while receipts from service businesses totaled $15,821,000. Wholesale sales in Arenac County in 1990 came to $51,654,000.

## Land Use

Saginaw Bay RC&D Area staff, with the assistance of NRCS staff and the project consultant, have utilized aerial photography, together with NRCS land use data, to update land use estimates within the watershed. Additionally in several instances, questionable areas were investigated on the ground to provide further definition. Figure 2.6 provides a graphic representation of the major land uses within the Rifle River watershed.

Figure 2.7 depicts land use breakdowns within the watershed as a whole, as well as within Ogemaw and Arenac counties. Table 2.1 summarizes land use, by township, within the watershed. Forested lands predominate, comprising 54.8% of the watershed. Agricultural land uses make up approximately 21.1% of the watershed's land use, followed by wetlands at 11.1% and urban areas at 3.2%. Open space, roads and idle land comprise the remaining 9.9% of the land mass.

Figures 2.8 and 2.9 portray land use by township (only those portions of each township which lie within the Rifle watershed) in cumulative bar graphs. In each case the watershed acreage found in each township is indicated parenthetically. These figures allow the reader to quickly determine localized land use patterns.

These updated data suggest that some agricultural acreage has been converted, over time, to forested land. Close inspection of several sources of land use data, over time, reveals the difficulty which resource mangers can have estimating land use. These estimates are only as good as the data base(s) utilized to generate them, and each has inherent biases.

## Water Bodies

### Lakes

The following table lists the watershed's major lakes and their corresponding surface area, by county.

**OGEMAW COUNTY**

| Lake | Size (ac.) |
|---|---|
| Bass Lake | 11.38 |
| Birch Lake | 19.53 |
| Black Lake | 9.07 |
| Boss Lake | 9.82 |
| Boughner Lake | 44.15 |
| Bovee Lake | 2.67 |
| Bush Lake | 33.58 |
| Cabin Lake | 59.98 |
| Cedar Lake | 7.76 |
| Chandlers Lake | 4.59 |
| Clear Lake | 23.94 |
| Cranberry Lake | 161.51 |
| Crapo Lake | 2.67 |
| Cummings Lake | 9.39 |
| Darlyn Lake | 3.70 |
| Deer Lake | 4.20 |
| Devoe Lake | 115.37 |
| Elbow Lake | 39.24 |
| Engle Pond | 15.30 |
| Feeding Ground Lake | 38.95 |
| Flowage Lake | 92 |
| George Lake | 184.85 |
| Grass Lake | 9.78 |
| Greebe Lake | 76.06 |
| Green Lake | 4.52 |
| Grousehaven Lake | 78.05 |
| Hardwood Lake | 174.57 |
| Haskell Lake | 2.10 |
| Heintz Lake | 8.22 |
| Henderson Lake | 164.18 |
| Hewey Lake | 47.50 |
| Houghton Lake | 30.45 |
| Indian Lake | 17.33 |

| Lake | Size(ac.) |
|---|---|
| Jewett Lake | 11.70 |
| Lake Ogemaw | 397.2 |
| Lang Pond | 1.92 |
| Little Feeding Ground Lake | 11.28 |
| Little Mud Lake | 8.29 |
| Lodge Lake | 17.01 |
| Long Lake | 18.75 |
| Lost Lake 1 | 5.51 |
| Lost Lake 2 | 5.62 |
| Mallard Lake | 3.70 |
| Middle Lake | 2.17 |
| Mills Lake | 31.70 |
| Mud Lake 1 | 2.74 |
| Mud Lake 2 | 7.90 |
| Mud Lake 3 | 9.93 |
| Norway Lake | 30.66 |
| O'Connor Lake | 8.89 |
| Ogemaw Lake | 26.29 |
| Peach Lake | 232.84 |
| Pintail Pond | 2.81 |
| Prior Lake | 28.82 |
| Rifle Lake 1 | 10.17 |
| Rifle Lake 2 | 170.01 |
| Rose Valley Pond | 4.38 |
| Sandleback Pond | 5.19 |
| Scaup Lake | 4.66 |
| Sidney Lake | 9.43 |
| Silver Lake | 17.54 |
| Skidway Lake | 33.65 |
| South Pond | 0.93 |
| Townline Lake | 19.82 |
| Withey Lake | 22.63 |

| **ARENAC COUNTY** | |
|---|---|
| Charlyle Lake | 17.18 |
| Forest Lake | 171.72 |

Information generated from USGS topographic quadrangle maps

Impoundments

There are a total of 87 dams in Arenac and Ogemaw counties, some of which lie outside of the Rifle River watershed. Of these, 11 (10 in Ogemaw County and 1 in Arenac County) lie within the watershed and are regulated by the state pursuant to either Part 307 or 315 of P.A. 454 of 1994. These are dams which: 1) have a legal lake level set by the courts or 2) have a six foot head or impound five acres or more. The State of Michigan owns and maintains one additional dam within the watershed for wildlife. Figure 2.10 indicates the location of regulated dams within the watershed (ECMPDR, 1976).

Streams

There are a total of 557 miles of stream within the Rifle River watershed. Of this total stream mileage, 193 miles are perennially flowing waters, 269 miles are intermittent streams and 95 miles are designated county drains. The following data summarize the extent of stream mileage, by type and reach, within the Rifle River watershed.

| **Reach** | **Stream Type** | **Extent** |
|---|---|---|
| Headwaters to M-55 | | |
| | Perennial | 103.6 mi. |
| | Intermittent | 126 mi. |
| | Drains | 7.6 mi. |
| M-55 to Arenac County Line | | |
| | Perennial | 51.8 mi. |
| | Intermittent | 52.5 mi. |
| | Drains | 9.97 mi. |
| Arenac County Line to Saginaw Bay | | |
| | Perennial | 37.6 mi. |
| | Intermittent | 90.5 mi. |
| | Drains | 77.1 mi. |

Wetlands

The following summary describing the wetlands within the Rifle River watershed was prepared from a review of the National Wetland Inventory (NWI) maps and discussions with several DEQ/Land and Water Management Division staff. This synopsis was developed by Ron Brown, a consulting wetland ecologist and Certified Wetland Scientist. In order to provide an overview describing the wetlands found throughout the watershed, this synopsis is necessarily general in nature. Future planning efforts will require ground-truthing due to the site-specific nature of wetlands.



Upper Watershed (Greenwood Road north to the headwaters)

The two most common wetland types found in the upper watershed are palustrine forested (PFO) and scrub-shrub (PSS), as is true in the lower watershed. The chief differences that distinguish wetlands in the upper watershed from those in the lower watershed are:

1) Wetlands are much more abundant in the upper watershed.

2) The wetland types are more widely interspersed, thus forming a mosaic pattern on the landscape;

3) Wetland habitat units are larger, on average, in the upper watershed.

Much of the landscape in the upper watershed is forested, undeveloped acreage. This lack of development has allowed a significant number of large wetland complexes to remain intact, as compared to the lower watershed. Some of these wetlands, such as the Dedrich Swamp, have remained virtually intact from a historical perspective. State ownership in the northern portion of the watershed is not only protecting many headwater streams, but also preserving the wetlands that flank them. Natural river zoning is also undoubtedly playing a role in limiting impact to wetlands along designated portions of streams. That zoning will become more important as time passes and additional development pressure is applied to the watershed.

Although the general observation can be made that wetlands increase in abundance and diversity from south to north, the West Branch area is an exception. It is the most developed portion of the upper watershed, and development has significantly impacted wetlands. The NWI maps reveal a noticeably lower concentration of wetland habitat in the West Branch vicinity than in other parts of the upper watershed.

Lack of development pressure, and presumably wetland regulation, make wetland restoration a lower priority in the upper watershed as compared to the lower watershed. However, the West Branch area is an exception. Streams in that general vicinity have been impacted by the removal, i.e. filling, of buffering wetlands in the riparian corridors to facilitate development or agriculture. Re-establishment of buffer strips adjacent to streambanks in agricultural areas would aid in restoring or improving water quality (J. Silagy, MDEQ, pers. comm.). Similarly, preserving wetland buffer zones along developing segments of streams would help preserve water quality. Within the City of West Branch, the restoration of riparian greenbelts (which could be allowed to revegetate naturally, i.e. not planted to grass) would, in most cases, result in successful wetland restoration and provide cost-effective and long-term water quality protection.

There are, of course, exceptions to these general observations. This characterization is meant only to provide a ready reference based on available data sources for future watershed planning efforts, particularly as they relate to wetland preservation and restoration within the Rifle River watershed.



Population trends in the northern portions of the Saginaw Bay Watershed have been on the rise since 1940. As more people move into the watershed, the natural

resource base, including wetlands, becomes increasingly stressed. Accordingly, natural resource managers, local government leaders and citizens have a heightened interest in planning for the future of the watershed.

As resource use becomes both more intense and diverse, it is imperative that we collectively arrive at a vision for the future of the watershed. This vision should be one which maintains and builds upon the high quality of life currently shared by stakeholders who live, work and recreate within the watershed, while allowing for well planned and sustainable development. The protection and restoration of wetlands is a key component in the planning process.

Lower Watershed (Greenwood Road to Saginaw Bay)

The two most prevalent wetland types in the lower watershed are palustrine forested (PFO) and scrub-shrub (PSS). By estimation, palustrine emergent (PEM) wetlands ranked third in abundance, usually appearing in concentrations of small pockets. Notably, the largest intact wetland habitat in the watershed is the PEM system at the mouth of the river (Wigwam Bay).

Wetlands in the lower watershed occur as relatively small units, presumably because agriculture has been the predominant land use activity. Historical wetlands have been drained and dissected to facilitate farming. Much of the riparian corridor of the Rifle River here contains intact wetland systems in the vicinity of Omer, upstream and downstream. Not surprisingly, the largest and most abundant concentrations of wetlands occur in the large block of State land northwest of Sterling. PEM was the predominant wetland type in that area, with PFO a close second. Coincidentally, development appears limited in this general vicinity. On the east side of the Rifle River mainstream, wetlands occurred in pockets along the riparian corridors of most tributary streams.

The Rifle River exhibits a flashy flow pattern in Arenac County (J. Silagy, MDEQ, pers. comm.), a predictable condition in this agricultural landscape where drainage, including stream channel dredging/straightening has occurred on a large scale. The heavy, clay or clay/loam soils in Arenac County would lend themselves to wetland restoration projects, especially where ditching, tiling, or other drainage work has occurred. Reversing these drainage activities would restore the wetland hydrology, thereby providing a suitable environment for hydrophytic vegetation to re-establish. Although water clarity may not be as high here as it is in watersheds having sandy soils, wetland functions such as flood retention and waterfowl habitat could be enhanced through wetland restoration. As well, at least initially, habitat diversity would be increased since the restored wetlands would be PEM, palustrine open water, or a combination of these types.

## Surface Water Quality

## River Valley Segments

In order to identify and classify relatively large physical areas within river systems which function as ecological units, both from a physical and biological persepective, Paul Seelback (MDNR/Institute for Fisheries Research) and Mike Wiley (University of Michigan), together with numerous colleagues, developed the River Valley Segement Classification System for use in Lower Michigan rivers (Seelbach, et al., 1997). This system recognizes that valley segment attributes most often change at stream junctions, slope breaks and local landform boundaries. In developing this valley segment classification system (MI-VSEC Version 1.0), these researchers utilized vast amounts of data which were then analyzed by a Geographic Information System (GIS) to create this model. The Rifle River watershed has five distinct valley segments. The fundamental physical and biological attributes of each of these segments are described below.

### Headwaters to Greenwood Road (MRI Segment 172)

This segment comprises the headwaters of the Rifle River mainstream. The Rifle River throughout this segment flows through a wide outwash channel in unconfined alluvial valleys. It has fair peak flows and moderate baseflows. Because of the significant groundwater accrual in this segment, water temperatures are cold with low diurnal variations. Gradient is low (4-10 ft./mi.). The fish community is typified by mottled sculpin and resident brown and brook trout.

### Greenwood Road to the Arenac County Line (MRI Segment 170)

As a percentage of total discharge, groundwater contribution begins to diminish within Segment Two. The channel is unconfined as it cuts through lacustrine plains of sand and gravel. There is a loss of gradient within this reach (< 4 ft./mi.) and increased channel meandering. Extensive mesotrophic wetlands dominate the floodplain in the majority of this valley segment. Fair base flow with moderate peak flows typify the hydrology within this segment. This results in cool water temperatures with moderate diurnal variations. A shift results here in the fish communities, with the loss of some coldwater species, such as brook trout, and the appearance of some warmer water species such as rock bass.

Arenac County Line to Melita Rd. (M-70) Bridge (MRI Segment 171)

The river in this segment flows through a glacial-fluvial valley and the channel is confined. Because of this more confined channel and the clay soils found in this fine textured end moraine, the hydrograph here is flashier than those in the two upstream segments. This valley segment has lower base flows and higher peak flows. The gradient has increased to the low classification (4-10 ft./mi.). Water temperatures continue to increase slightly here. This would still be considered a cool water environment with burbot and log perch being the indicator species predicted for this valley segment.

Melita Road to Mouth (MRI Segment 175)

The river here flows through an alluvial valley and is unconfined with a corresponding high degree of meandering. The temperature regime fluctuates from cool to warm, depending upon the season and precipitation. Diurnal temperature fluctuations are moderate. The hydrograph is relatively flashy with lower base flows and higher peak flows. The gradient here is very low (<4ft./mi.). Fish communities would include species such as rosyface shiner and log perch which are tolerant of warmer temperatures. Temperatures, however, are still probably somewhat cool for walleye.

West Branch of the Rifle River (MRI Segments 173 and 169)

The West Branch of the Rifle River originates in hilly terrain comprised of ice-contact soils that yield considerable volumes of groundwater. These waters are cold and this segment exhibits very stable flows which support resident populations of brown trout and mottled sculpin. Once Campbell and Peach creeks join the West Branch, the stream is in an unconfined floodplain where it meanders considerably with a very low (<4 ft./mi.) gradient. Peak flows are moderate with diminished groundwater inputs and water temperatures are cool with moderate fluctuations. The slightly higher water temperatures create a shift in the fish community to one represented by horneyhead chubs and brown trout.

## Geology, Hydrology and Water Temperature

Geology, hydrology and water temperature are significant physical attributes in any given watershed. To a large extent, these features and attributes dictate the nature of the biota inhabiting the streams within a watershed. For this reason, a more extensive discussion of these watershed attributes is warranted.

The Rifle River watershed's geology dictates the flashy nature of its streams. The upper watershed is a relatively unique hydrologic system. The significant portion of streamflow contributed by groundwater here assures adequate summer baseflows, thus sustaining resident trout populations.

In an average year streamflow is 140 cubic feet per second (cfs) at Selkirk. Of this, 103 cfs is derived from groundwater and 37 cfs is achieved from overland runoff (USGS, 1971). Sub-surface interbasin flow from the AuSable River watershed accounts for approximately 46 cfs of the groundwater flow. Thus, it is important to note that approximately 33% of the Rifle's groundwater input is derived from sources outside of the watershed. Activities within the AuSable River watershed, which might ultimately alter the groundwater flow to the Rifle, would be of concern to the stakeholders of both watersheds.

On average, the Rifle River watershed receives 29 inches of precipitation annually. The upper watershed's significant groundwater resources are due to extensive glacial deposits of sand, clay and gravel which range in depth up to 700 feet (USGS, 1971.

Two USGS gages were briefly analyzed in order to approximate the baseflow and flashiness characteristics of the Rifle River. The gage first used, #04139500, was located in the headwaters of the Rifle River mainstream near, Lupton, Michigan. Gage #04142000 is located near Sterling, Michigan and is not too far upstream of the mouth of the Rifle River. The Rifle River watershed has a total drainage area of 396 square miles.

Fifty percent and ninety five percent exceedence flows were calculated from data collected at each of these gages in order to determine the relative flashiness of the system. A 50% exceedence flow is that flow which is exceeded 50% of the time, while a 95% exceedence flow is that discharge which is exceeded 95% of the time during the noted month.

In evaluating the flashiness of the Rifle River, we analyzed both the wettest and driest conditions, the months of April and August respectively. From these data we compared the increase in flows from the 95% exceedence to the 50% exceedence values and developed a ratio.

Typically, if a stream has a ratio greater than 2:1, it could be considered a flashy stream. Since the ratio for the headwaters station is well below 2:1 (1.2:1), we expect flows in this stream to be relatively stable. The Rifle River near Sterling, however, has a much higher ratio (1.9:1) for the month of April, this indicates that flows could be considered moderately flashy during the rainy season. These spring floods are often due to large ice jams and subsequent back-ups which generate flooding from M-70 to the river mouth (R. Rockwell, Arenac County Drain Commissioner, pers. comm., 1999). In the drier months, the flows in the lower watershed appear to be more stable (D. Jeanette, MDEQ, pers. comm., 1998).

The middle and lower reaches of the Rifle River have flashier hydrographs due to the presence of clay soils and artificial drainage. Extensive land clearing and drainage following the turn of the century have also resulted in extremely low summer discharges.

Since the 1960's, the vast majority of the USGS gages on the Rifle River watershed have been either shut down or had their status minimized. This has been a common occurrence nationwide due to budget constraints. In order to fully evaluate the systemic hydrologic problems throughout the watershed, a complete hydrologic evaluation of the watershed should be conducted by a competent engineering firm. As well, additional funding should be developed in order to allow for an analysis of the watershed's stream channel morphology issues. The information developed through these studies should be incorporated into existing geographic information system databases so that modeling of the watershed can become more predictive in the future.

In northern lower Michigan streams, water temperature regimes have significant influence over the distribution of fish throughout the region (Wehrly, et al., 1998; Zorn, et al., 1998). Many of these streams are supplied with significant volumes of ground water, and thus are inhabited by cold water fish species. As the relative volume of surface runoff increases in these stream systems, an increasing proportion of the fish community is comprised of cool and warm water species.

Researchers have observed that by plotting July weekly variations in water temperature (degrees Centigrade) against the mean July water temperature (degrees Centigrade), they could predict the fish communities which were likely to inhabit these waters (Wehrly, et al., 1998). By estimating and plotting these July data for streams within the Rifle River watershed where empirical data were available, the following predictions were made:

| Brook Trout Streams | Brown Trout Streams | Coolwater Streams | Warmwater Streams |
|---|---|---|---|
| Sheppard's Creek | Houghton Creek | Oyster Creek | Rifle River at Melita |
| Hiltz Creek | Vaughn Creek | Prior Creek | Rifle River at Stover Rd. |
| | Gamble Creek | Rifle River at Selkirk | |
| | Klacking Creek | West Branch Rifle | |
| | | Eddy Creek | |

These predictions are consistent with field data collected by MDNR Fisheries Division staff over the last fifty years.

## Fisheries

While the upper Rifle River watershed has had a reputation for supporting a modest brown trout fishery, below Greenwood Road there is a noticeable warming of the waters and diminished flow stability. These trends continue as one progresses downstream.

The MDNR Fisheries Division has conducted electrofishing surveys througout the Rifle River watershed, dating back to the 1930's. These data, while fairly extensive, have not been, to date, systematically analyzed and compiled. Accordingly, it is difficult to ascertain trends in fish populations and communities over time. In order to accurately determine trends, fish stocking records would also need to be analyzed.

In comparing these electrofishing data to predictions drawn by the above-referenced models, we note that the fish communities present throughout the Rifle River watershed seem, in general, to be consistent with these models. There are no glaring deviations from what is predicted. In typical northern-lower Michigan trout streams, however, trout biomass approaches 80 pounds per acre. The Rifle River mainstem in Ogemaw County typically supports 20 pounds per acre (MDNR, unpublished data). Accordingly, we can assume that some factor(s) are limiting trout production. Field observations and a review of extant data would indicate that temperature regimes and flow instability (among other factors) are adversely affecting trout production. Houghton and Gamble creeks (both high-quality, groundwater driven systems) exhibit substantially higher (92 and 78 pounds per acre respectively) trout biomass. These streams are very stable, both from a temperature and discharge standpoint.

As future management initiatives are developed, it would be advantageous to more closely survey fish communities throughout the watershed. The majority of the electrofishing conducted to date has been undertaken in trout waters upstream of Greenwood Road. A rotenone survey conducted on August 3, 1993 in the lower Rifle River near the mouth in Arenac County, resulted in the identification of a wide variety of mostly warmwater species including: smallmouth, largemouth and rock bass, black crappie, bluegill, green sunfish, carp, yellow perch, among others. More intensive fish community analyses such as this would create a good baseline against which the effects of restoration work could be measured.

## County Drains

Some 30,000 acres of the Rifle River watershed are affected by artificial drainage. The Ogemaw and Arenac County Drain Commissioners administer these drainage districts. While much of this drainage was developed for purposes of farming, a great deal of the dredging in the lower river was performed initially for purposes of moving timber to market back in the late 1800's and early 1900's.

There are a total of 94.6 miles of county drains within the watershed. The vast majority of these drains lie within Arenac County.

**Special Resources**

The Rifle River watershed, upstream of Omer, was designated a State Natural River, under the Wild-Scenic classification, in 1980. This designation was made pursuant to the Michigan Natural Rivers Act (P.A. 231, 1970) by action of the Michigan Natural Resources Commission. The intent of the designation was to recognize and provide for the maintenance of the free-flowing and natural characteristics of the watershed. As well, the mainstream and all tributary streams within the Rifle River watershed upstream of Omer, with the exception of Richter Creek (T19N,R4E,Sec. 25) and Wells Creek (T19N, R4E, Sec. 19), have been stipulated as "Designated Trout Streams" by Director's Order No. DFI101, pursuant to Act 451, P.A., 1994.

A Natural River Management Plan was developed collaboratively by Michigan DNR staff, local citizens and representatives of local government. This plan continues to guide management of the river's riparian corridor. A 150-foot building setback is observed within the designated reaches of the Rifle mainstem, while a 100-foot setback is required on designated tributaries. Minimum lot widths and other land use regulations within this zone are also defined by the Act. Several local units of government have formally adopted the Natural Rivers provisions in their zoning ordinances and thus, these local units are able to administer zoning at the local level. The expansion of this Natural Rivers designation to other tributaries of the Rifle would serve to protect these riparian corridors and improve water quality over the long run by buffering man-induced impacts.

The Michigan Natural Features Inventory (MNFI), a joint venture between the Michigan DNR and The Nature Conservancy, maintains the only comprehensive database with regard to threatened, endangered or otherwise significant flora, fauna or natural features in Michigan. MNFI has provided the following list of Rare Species and Natural Plant Communities of the Rifle River Watershed. This list is by no means meant to be exhaustive.

| Scientific Name | Common Name | State Status | Federal Status |
|---|---|---|---|
| *Buteo lineatus* | Red-shouldered hawk | Threatened | |
| *Cirisium hillii* | Hill's thistle | Special | |
| *Dalibarda repens* | False violet | Threatened | |
| *Dentaria maxima* | Large toothwort | Threatened | |
| *Gavia immer* | Common loon | Threatened | |
| *Haliaeetus leucocepahlus* | Bald eagle | Threatened | Threatened |
| *Merolonche dolli* | Doll's merolonche | Special | |
| *Mesodon sayanus* | Spike-lip crater | Special | |
| *Opuntia fragilis* | Fragile prickly-pear | Endangered | |
| *Pandion haliaetus* | Osprey | Threatened | |
| *Percina copelandi* | Channel darter | Threatened | |
| | Great blue heron rookery | | |

The Rifle River watershed is located in northeast lower Michigan in close proximity to many urban centers including metropolitan Detroit, Flint, Saginaw and Bay City. Accordingly, the river supports significant and diverse recreational uses including, fishing, canoeing, hunting, birding and various watersports.

This NPS Watershed Management Plan addresses the Rifle River and its tributary streams. The Rifle River upstream of Omer is a designated trout stream, having the coolwater classification. It supports stocks of brook, brown and rainbow (both anadromous and resident), as well as suppressed stocks of chinook and coho salmon. A substantial sucker spawning run in the spring of each year has developed a significant sport fishery in the vicinity of Omer. The Rifle River mainstream and the major tributaries upstream of Omer also have the state Natural River designation.

Nutrient loading, sedimentation, pollutant loading, thermal pollution, stormwater runoff and riparian zone conversions are adversely affecting surface water quality within the streams of the Rifle River watershed.

Surface Water Quality Division of the Michigan Department of Environmental Quality has coordinated a significant water quality monitoring effort on the Rifle River as part of the development and implementation of the Saginaw Bay Remedial Action Plan (RAP). The RAP lists two minor industrial discharge permits and four minor municipal discharge permits within the watershed (MDNR, 1988).

As part of their ongoing point and non-point source program activities, the Surface Water Quality Division of the Michigan DEQ has undertaken biological surveys of the Rifle River in 1983, 1985 and 1994 (MDNR, 1995). In general these surveys (both macroinvertebrate and fish sampling) reflected a “good” (slightly impaired) water quality. It should be noted that rapid bioassessment protocols, while useful for purposes of characterizing overall stream health, do not necessarily accurately portray habitat conditions.

The Saginaw Bay Watershed Prioritization Process (MDNR, 1994) served to focus attention on natural resource quality throughout the Saginaw River Basin. The results of this process indicate that, overall, the Rifle River watershed is relatively intact and that its water quality challenges, in comparison to the other watersheds in the basin, are not as severe.

There are, however, a number of nonpoint source challenges, which should be addressed within the watershed. Total phosphorus and nitrate/nitrite concentrations, while low, were elevated. These slightly elevated values are due to nonpoint source pollution and, over time, could be improved through the implementation of appropriate Best Management Practices.



Suspended solids in the Rifle River exceeded the mean goal of 50 mg/l with cumulative mean readings of 67 mg/l. The study gives this suspended solids challenge a

medium priority rating. Since these pollutants are introduced by runoff from the landscape, remedial actions will need to be undertaken in a comprehensive and well-coordinated fashion in order to achieve the best outcome. It should be noted that these pollutant loading challenges are best attacked now, while the magnitude of the problems is relatively small.

Elevated nutrient and dissolved solid concentrations were noted in Peach and Campbell Creeks. A severely impaired habitat condition was found in both Campbell and Silver creeks. Livestock access challenges were noted in the case of Campbell Creek while stormwater runoff from the Skidway area seemed to be contributing to the problem on Silver Creek.

The Prioritization Process Draft Report did identify several areas of concern, however. 1994 chemical data generated from sediment samples downstream of the West Branch Waste Water Treatment Plant (WWTP) revealed detectable levels of the heavy metals arsenic, chromium, copper, mercury, nickel, lead, and zinc, as well as elevated levels of 2-propanone, 2-butanone and toluene. The macroinvertebrate sampling (utilizing GLEAS Procedure 51) at this site showed no discernable impairment due to the West Branch WWTP. 1994 sampling did reflect an improvement from the impaired condition that was noted in 1989. The report indicates that additional controlled sampling is warranted, in order to further define the source and extent of these contaminants.

Several surface water pollution challenges exist within the watershed. While contaminant levels in bedload samples were low overall, the Rifle River (of the 16 streams sampled within the Saginaw Bay from 1990-1992) had the third highest mean sediment bedload (37.84 mg/l) (Jude, et al., 1993). This bedload is comprised mainly of sands. 1990 samples of suspended solids in the Rifle detected elevated levels of copper and zinc. As well, concentrations of total nitrogen and total phosphorus were elevated in suspended sediment samples. Total phosphorus concentrations were elevated in sediments transported in the bedload. This high sand bedload serves to aggrade the stream channel, smothering gravels and covering over large woody debris which serve as habitat for fish. Phosphorus adsorbed to these sands makes its way downstream, eventually contributing to the phosphorus loading in Saginaw Bay.

## Initial Water Quality Statement

The Rifle River and its tributaries are affected by a variety of pollutants and impacts. These pollutants and their effects are ultimately transmitted downstream to Saginaw Bay, adversely impacting its water quality. The following pollutants are of major concern to this project:

-A major problem in the watershed is sedimentation in the river and Saginaw Bay. The sediment originates from agricultural lands, road crossing, roadside ditchbanks, streambanks, off-road vehicle trails and vehicular traffic on non-designated off-road vehicle trails and at road crossings; and stormwater runoff on roadside ditchbanks. The 1994 Rifle River Streambank Erosion Inventory lists 76 severe, 232 moderate and 46 minor erosion sites on the main and west branches of the Rifle River. An 1998 Upper West Coastal Basin Watershed Assessment and subsequent 1999 Rifle River Road/Stream Crossing Erosion inventory identified 154 actively eroding crossings.

-Nutrient Loading is also a major concern in the watershed. Many of these nutrients are carried into the water system adsorbed to soil particles which have eroded off of the landscape. Phosphorus has been named as a contaminant of concern in the Saginaw Bay.

-Toxins such as salts, gasoline, oil, antifreeze, together with additional unknown pollutants, are concerns within the watershed. The majority of these toxins enter the river through storm water runoff from paved areas where autos are stored or operated. As well, oil and gas wells and possibly unregulated sites where garbage such as old appliances, household products and the like have been illegally dumped can potentially contribute to this problem.

-Sewage from residential septic systems and livestock waste is a concern. The majority of sewage from septic systems comes from those systems which have failed due to improper installation, poor siting and/or lack of appropriate maintenance. The majority of livestock waste entering rivers and streams within the watershed originates from those sites where animal housing lots do not have adequate animal waste storage facilities or from fields where animal waste has been improperly spread. Animal waste is also introduced through livestock that have direct access to the river and/or its tributaries.

-Water temperatures have increased due to warm water runoff from privately owned ponds and beaver dams, as well as from shifts in land use over time. Within the Rifle River watershed over the last century there has been a shift from forested land cover, which served to shade and cool the streams, to more open areas which expose more of the water's surface to the heating effects of the sun. The corresponding rise in water temperatures has adversely affected the Rifle River's coldwater fisheries.



Final Water Quality Statement

The Rifle River watershed is affected by a variety of pollutants. While the majority of the watershed is forested, a variety of nonpoint source problems are affecting

surface water quality including: sedimentation from road/stream crossings, eroding streambanks and various riparian land uses; nutrient runoff from agricultural and residential activities; stormwater runoff; and thermal impacts caused by riparian zone conversions and impoundments. Thus, potential critical areas are identifiable and corresponding treatments can be readily developed and implemented. A summary of these pollution concerns is provided in Tables 3.1a and 3.1b. The following pollution challenges are of concern to this project, both now and over the long-term:

-Sedimentation is a pervasive problem within the watershed, as it is in the majority of Michigan watersheds. These sediments originate from roads, agricultural lands, eroding streambank segments, access sites, runoff from urban and developed areas, off-road vehicle trails and traffic.

Critical area inventories revealed that there were 379 eroding streambank segments, 40,000 acres of agricultural land (where at least one additional BMP could be implemented to derive water quality benefits), 154 eroding road-stream crossings, 36 livestock access sites, 6 developing or urban areas with stormwater runoff challenges, at least three public access site needs and several wetland restoration opportunities which, taken together, could significantly diminish the sediment loading problem within the Rifle River watershed.

-Nutrient loading is also a major concern within the watershed. These nutrients are entering surface waters from a variety of sources including urban and developed area stormwater runoff, agricultural lands and human and animal waste.

-Toxins such as salts, gasoline and other petroleum-based compounds, antifreeze, copper, chromium, lead, arsenic, lead, nickel, zinc, 2-propanone, 2-butanone, and toluene have been documented within specific reaches of stream within the watershed. The majority of these pollutants were identified at point sources; however, opportunities to abate or minimize the inputs of these pollutants which enter surface waters at non-point sources (e.g. stormwater runoff) are numerous.

-Sewage from residential systems and livestock waste are concerns within the watershed. The cities of West Branch and Rose City have sewage treatment plants. Critical area inventories have identified the potential to install in excess of eight miles of livestock exclusion fencing, 36 cattle crossings at streams, 13 new animal waste facilites and 7 upgrades to existing animal waste storage facilities. Delivery of sewage from residential septic systems has been documented in Omer (Central Michigan District Health Department, pers. comm., 1999). Government funding in the form of grants and/or low interest loans is available to remediate these problems.



Infrared aerial surveys, bacterial sampling or other methods to identify failing residential septic systems within riparian areas would assist in prioritization of these challenges in other locales. Failing septic systems and systems which are placed in soils that are unsuitable for onsite sewage treatment pose significant threats to surface

water quality. Accordingly, sanitary surveys need to be further enhanced and completed, particularly in riparian areas.

-Water temperatures within the watershed have warmed over time due to increased runoff from lakes, beaver ponds, developed areas and agricultural lands. As well, the clearing of riparian lands for various uses has eliminated the shading Previously provided by riparian vegetation. These elevated water temperatures have had an adverse impact upon the fisheries of the Rifle River. Past efforts by the MDNR and the Mershon Chapter of Trout Unlimited to lower water temperatures through the installation of a bottom-draw at Devoe Lake and through the diversion of water around Mallard Pond have produced demonstrable temperature reductions within the upper mainstream. In order to further improve the temperature regimes within the Rifle and its tributaries, additional best management practices such as the re-establishment of riparian vegetation, wetland restoration and reforestation should be appropriately implemented.

## Chapter 4. Inventory of Sources in the Critical Areas

The following land use categories and associated activities were identified as having the potential to cause pollution to surface waters within the Rifle River watershed.

Road-stream contact points
Agricultural lands-both cropping and livestock uses
Timber harvest in areas adjacent to streams
Tapping of artesian flows
Recreational waters with eroding streambanks and access sites
Highly erodible soils
County drains
Urbanized/developed areas (stormwater runoff, septic systems)

Each of these, when they are found within critical areas, provides a number of opportunities for the implementation of best management practices (BMP's) which will improve surface water quality. In order to determine the magnitude of these opportunities, inventories were conducted by Huron Pines and Saginaw Bay RC&D Council staff and the project consultant. Specific critical area inventories are discussed below.



### Road-Stream Crossings

In 1998 staff from the Saginaw Bay RC&D Area conducted an Assessment of Road-Stream Crossings in the Upper Western Coastal Basin. This assessment identified a total of 157 eroding crossings within the Rifle River watershed (SBRCDA, 1998). Detailed inventories of these eroding road-stream contact points were conducted in November and December, 1998 by the staff of both the Saginaw Bay and Huron Pines RC&D areas in Ogemaw and Arenac counties. A total of 117 sites were inventoried in Ogemaw County and 40 crossings have been assessed within Arenac County.

Table 4.1 summarizes the data generated by these stream crossing inventories, on a township by township basis. Severity ratings were generated for each site, in accordance with the protocol established by the Northwest Michigan Resource Conservation and Development Council (Conservation Resource Alliance). As well, restoration cost estimates were developed utilizing average treatment costs suggested by staff at the Huron Pines RC&D Area (B. Benjamin, Huron Pines RC&D, pers. comm., 1999). Total potential treatment costs for the 157 inventoried sites were estimated to be slightly less than $3.6 million. Treatments envisioned would include: culvert extensions, runoff (ditch) diversions, riprapping of ditches and streambanks, redesign and replacement of most the more severe crossings and improved grading practices.

**Streambank Erosion Inventory**

In order to determine the extent to which streambank erosion was impacting surface water quality, in 1988, the William B. Mershon Chapter of Trout Unlimited, through an RC&D measure proposal, initiated the Rifle River Restoration Project. In 1989, the Restoration Committee, together with the Michigan DNR, Huron Pines RC&D Area, USDA/Soil Conservation Service and Trout Unlimited, collaborated to develop a streambank erosion inventory. Final assistance for this project was granted through the DNR's Saginaw Bay National Watershed Initiative program in 1993. The inventory was published in 1994.



The following is a summary of the data generated by this inventory.

| Stream Reach | Minor | Moderate | Severe | Totals |
|---|---|---|---|---|
| Rifle River Mainstream Ogemaw County | 21 Sites (1,129') ($39,515) | 46 Sites (4,037') ($302,775) | 14 Sites (2,110') ($211,000) | 81 Sites (7,276') ($553,290) |
| Rifle River Mainstream Arenac County | 21 Sites (1,930') ($67,550) | 94 Sites (14,815') ($1,111,125) | 47 Sites (8,335') ($833,500) | 162 Sites (25,080') ($2,012,175) |
| West Branch Rifle River Ogemaw County | 3 Sites (355') ($12,425) | 84 Sites (9,440') ($708,000) | 49 Sites (1,100') ($110,000) | 136 Sites (10,895') ($830,425) |
| Totals | 45 Sites (3,414') ($119,490) | 224 Sites (28,292') ($2,121,900) | 110 Sites (11,545') ($1,154,500) | 379 Sites (43,251') ($3,395,890) |

(Restoration cost estimates, stated in 1998 dollars)

To date, a total of 35 sites, including 13 minor, 19 moderate and three severe sites have been treated by the Rifle River Watershed Restoration Committee. This work has stabilized approximately 10% of the eroding streambanks that have been inventoried to date. The committee plans to continue their streambank stabilization effort and, as well, is currently conducting streambank erosion inventories on the major tributaries in the upper Rifle River watershed.

The USEPA has designated sediment as the most pervasive pollutant affecting surface water quality in surveyed rivers and streams within the United States (USEPA, 1996). The Restoration Committee's effort to abate these nonpoint sources is significant and represents a worthwhile investment.

## Agricultural Lands

Review of detailed land use information reveals that a number of opportunities exist to utilize Best Management Practices on agricultural lands within the watershed. In order to better refine the land use data developed through this project, aerial photographs and NRCS data were utilized to break down agricultural land uses into the following categories: row crops, specialty crops, forage crops, small grains and idle grassland. These data are presented in Tables 4.2 and 4.3 and in the corresponding Figures 4.1 and 4.2. A map depicting the location of agricultural activities on lands which have the potential to be highly erodible is provided in Figure 4.3.



In general, significant opportunities were identified to implement agricultural Best Management Practices in the following categories: nutrient management, livestock exclusion, residue management, cover crops, filter strips and integrated pest

management. The potential exists for bacterial contamination of surface waters in many locations throughout the watershed. These situations can be easily remedied through the implementation of appropriate and proven BMP's.

As a result of these analyses, the following opportunities to implement agricultural Best Management Practices were identified within the watershed. The information provided below describes the potential universe of practices which could be utilized on agricultural lands within the watershed. Once prioritized, potential funding sources can be identified for each and cooperative plans can be developed with willing landowners on a cost share basis.

| **Best Management Practice** | **Potential to Utilize** | **Unit Cost** | **Extended** |
|---|---|---|---|
| Livestock exclusion (Fencing) | 46,200 lin. Ft. | $1/ft. | $46,200 |
| Livestock stream crossings | 36 | $1,500 ea. | $54,000 |
| Animal waste storage facilities | 12 new | $50,000 ea. | $600,000 |
| | 8 upgrades | $30,000 ea. | $240,000 |
| Filter strips | 400 ac./100 mi. | $70/ac. | $28,000 |
| Nutrient management | | | |
| Soil testing | 10,802 ac. | $5/ac. | $54,011 |
| Pre-side dressed N-testing | 10,802 ac. | $3/ac. | $32,406 |
| Wind breaks | 18 mi./72 ac. | $450/ac. | $32,400 |
| Integrated pest management | 12,963 ac. | $7/ac | $90,739 |
| Grassed waterways | 60,000 lin. ft. | $2.50/ft. | $150,000 |
| Green manure | 3,095 ac. | $5/ac. | $15,475 |
| Cover crop | 7,400 ac. | $5/ac. | $37,000 |
| Mulch and tillage | 7,202 ac. | $7/ac. | $50,411 |
| No-till | 4,321 ac. | $20/ac. | $86,424 |
| Total Estimated Cost—Agricultural Best Management Practices | | | $1,517,066 |

(Costs are estimated based on 1998 dollars)

## Urbanized/Developing Areas

A number of areas which are either currently undergoing development or have the potential for significant development in the near future were investigated by the project consultants in order to determine potential opportunities for improving surface water quality. These areas included: the City of West Branch, Cook Road/I-75 corridor, Rose City and Omer.

### West Branch and the I-75/Cook Road Corridor

Runoff from the Cook Road/I-75 corridor and the City of West Branch drains to the West Branch of the Rifle River. Past and current development within these areas have significantly increased the impervious (hard) surface within these sub-basins. Correspondingly, runoff rates have increased to the point that the West Branch of the Rifle and several of its tributaries are being adversely effected. No specific sampling was conducted during field investigations; however, it was evident that runoff was reaching surface water bodies directly during storm events. Thus, it is reasonable to assume that pollutants are being delivered at times of peak runoff. We were able to observe very little in the way of detention or retention facilities in this area. The only gage on the West Branch of the Rifle River was taken out of service in the early 1960's thus limiting our ability to accurately determine runoff and hydrologic trends.

The City of West Branch and its surrounding drainage area totals 13,723 acres. These lands drain to the West Branch of the Rifle River. Ogemaw, Martin (Smith) and Brewery creeks are the three tributaries which drain the city. A fourth un-named tributary drains the 272.65 acre Cook Road/I-75 corridor.

Historic and more recent development at and around the City of West Branch have altered flow regimes and water quality within the West Branch of the Rifle and the noted tributary streams. These impacts are primarily the result of increasing peak runoff rates and sediment and contaminant loading. Water quality sampling was not a component of this project, however, we recommend that a systematic stormwater sampling plan be developed and implemented as a second step, following the completion of a stormwater (engineering) study.

Figure 4.4 depicts the six sub-basins which were inspected in the West Branch and Cook Road/I-75 areas. The following information summarizes the extent of hard surface which has developed in each:



| Sub-basin | Sub-basin Area | Hard Surface Area | Percent Hard Surface |
|---|---|---|---|
| I-Ogemaw Ck. | 11,107.93 ac. | 130.49 ac. | 1.18% |

| | | | |
|---|---|---|---|
| II-Martin Ck. | 822.26 ac. | 39.68 ac. | 4.83% |
| III-Downtown | 210.95 ac. | 134.8 ac. | 63.9% |
| IV-Brewery Creek | 1,073.40 ac. | 65.59 ac. | 6.11% |
| V-S. West Branch | 507.99 ac. | 97.78 ac. | 19.25% |
| | | Cumulative Hard Surface = | 2.82% |
| VI-Cook Road | 272.65 ac. | 137.75 ac. | 50.52% |

There are myriad opportunities to improve runoff regimes in these areas. At the onset, however, a complete engineering study should be completed to assure that monies allocated to treatment result in meaningful and enduring solutions. As well, planning for future development needs to be undertaken as part of this initial engineering study. We estimate the cost of this engineering study to be $50,000-$75,000.

Currently, sub-basins III, V and VI have very low infiltration rates due to the great extent of hard surface within these areas. As well, there is very little stormwater detention or retention within these areas. Due to the extensive nature of the development which has taken place in these downtown areas, there is also very little opportunity to retrofit stormwater detention/retention into these areas. It is of the utmost importance that future development upgradient of the downtown area include adequate stormwater control measures. Significant opportunities exist to plan ahead to prevent stormwater problems in sub-basins I, II and IV. Successful planning in these sub-basins will also serve to minimize future impacts in sub-basins III and IV.

The drainage area supporting the Cook Road/I-75 corridor area (downgradient to the east side of I-75) has a very high percentage of hard surface already (50.52%). At present, this area also has very little in the way of stormwater retention or detention. This corridor will continue to develop and pass excess stormwater on to Eddy Creek. Very large wetland complexes are currently buffering the effects of peak discharge.

The Cook Road/I-75 corridor area does have significant opportunity for improvement in the handling of existing stormwater. The real opportunity here lies in the ability of the local units of government to come together in developing a regional stormwater management plan. This could be voluntary or they could incorporate their collective thoughts into local stormwater ordinances. Each individual site within this sub-basin should be encouraged to contain their own stormwater onsite.



Given the topography and lack of remaining space on some of the existing developed parcels, regional retention may be the only effective means of mitigating existing increased runoff. Existing MDOT lands adjacent to I-75 may be adequate for these purposes. If not, perhaps additional lands or easements could be puchased for these purposes. The engineering study should not only lay out the potential for stormwater

management on newly developed sites but should also identify ways in which existing impacts can be eliminated or softened. We recommend that a stormwater task force comprised of local business interests and local government officials be convened for the purpose of developing solutions to these challenges.

Rose City (Houghton and Wilkins Creeks)

The area surrounding Rose City which drains to Houghton Creek constitutes approximately 9,044 acres. There are 48.12 acres (0.53%) of impervious surface within the drainage. The limited development which has occurred in the Rose City area to date is, no doubt, having some effect upon water quality, however, it appears to be minimal at this time. Proper planning should be undertaken now in order to accommodate future stormwater needs. Figure 4.5 is a map of the area surrounding Rose City which drains to Houghton and Wilkins creeks.

Immediately south of the city limits, another sub-basin drains into Wilkins Creek. There had been substantial strip development within this area and, it would appear as though pollutants from the roadway, parking lots and other hard surfaces are being delivered to Wilkins Creek through road ditches. There is a good opportunity to develop a regional stormwater approach in the Rose City area. Stormwater detention facilities could easily be retrofitted to the majority of the sites in this area.

The West Branch of the Rifle River

The water quality of the West Branch of the Rifle River is impacted by a number of different factors. First, one positive note. The City of West Branch recently moved and upgraded their waste water treatment facility. As a result, nutrient loading to Flowage Lake was abated and the plant's increased capacity and efficiency have undoubtedly had a net positive effect upon the West Branch as a whole.

In 1985, the embankment at the Flowage Lake dam failed. As a result, all of the impoundment's water, and a significant volume of sediment, were transmitted downstream. The West Branch continues to recover from this event and, left untreated, the stream channel will not restore itself to pre-flood conditions for another century or so. In order to restore the pre-flood channel morphology and habitat, we are recommending that a feasibility plan be developed for removing this excess sediment bedload. The West Branch has the potential to be a significant spawning and nursery area for salmonids.



The Rifle River Streambank Erosion Inventory has identified a total of 136 banks needing treatment on the West Branch. Close inspection of the stream channel reveals that this stream is heavily impacted by excess sand bedload. As a result, the streambed is significantly elevated in many areas and this is causing lateral excursion of the channel.

This phenomenon is significantly accelerating the streambank erosion which pre-dated a dam failure at Flowage Lake. In order to remove this excess bedload and restore the pre-failure channel morphology and instream habitat a sediment removal program is proposed with an estimated cost of $1.5 million.

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While some of the documented streambank erosion is natural, most is the result of human activity. The effects resulting from the 1985 dam breach, however, are driving a great deal of the streambank erosion. Removal of significant volumes of excess sand bedload will restore the pre-flood channel condition and thus, minimize much of the existing erosion. Sediment removal, in combination with streambank stabilization and stormwater management, will restore the channel's integrity. In turn, instream habitat will be restored and fish populations will improve.

Failing Septic Systems

In many of the areas within the watershed which experienced significant development over the last thirty or more years, septic systems have either begun to malfunction or have been malfunctioning for some time. In some instances this is due to the fact that the systems were poorly designed or placed in soils where they can not function properly. In other cases, the systems are being overused and/or have received little maintenance. Having identified this challenge, MDEQ Surface Water Quality Division staff, in conjunction with the Michigan Department of Public Health and local municipalities, have begun to investigate and monitor surface water quality in areas where septic failures have been identified. Additional work is necessary to better define the scope of this problem in numerous areas within the watershed.

## Public Access/Recreational Use

Within Ogemaw and Arenac counties there are 1200 private campsites and over 1000 rental canoes at 15 liveries (MDNR, 1980). It is estimated that the Rifle River today supports upwards of 1700 canoes, with an additional 150 kayaks and an unknown number of inner tubes (Ladd White, pers. comm., 1999). Hunting and fishing opportunities abound throughout the year. Additional public campsites can be found within the AuSable State Forest and the Rifle River Recreation Area (159 campsites).

In the course of conducting four public meetings in December 1998 and January 1999, the need for additional public access facilities was identified. While there are 30 access sites along the Rifle River, only ten of those provide public access. Figure 4.6 and Table 4.4 indicate the location and type of access sites within the Rifle River corridor. Additional facilities would accommodate both high-density use during the summer months and, as well, serve to disperse recreational use of all types throughout the year. The reach between Moffatt's and M-70 and the undeveloped access site at Stoddard's Landing were identified as areas where improved facilities would be beneficial.

Currently, the lack of access and restroom facilities in the middle and lower stream reaches serves to concentrate use during peak times. A lack of adequate restroom facilities was identified as a problem by members of the public who attended these

meetings. This lack of access facilities has created conflicts with private riparian owners and, as well, may be creating public health risks in various locations.

Funding is needed for the development of access and/or restroom facilities. Estimated average costs for rest stop development are $25,000 (exclusive of land costs). Access site development (exclusive of land costs) could range from $35,000-$45,000, depending upon conditions at each site.

**County Drains**

The county drain network is very small in Ogemaw County. The county's annual drain budget (including the Drain Commissioner's salary) is less than $6,000 (M. DeMatia, Ogemaw County Drain Commissioner, pers. comm., 1998).

There are an estimated 77.06 miles of designated drains in Arenac County. Due to the heavy nature of the soils in much of the county, there are some opportunities to incorporate Best Management Practices into drain maintenance projects. Examples would include the development of regional stormwater retention in channels exhibiting flashy flows and the restoration of wetlands in those instances where farming has ceased upstream of the potential site. These opportunities would need to be developed collaboratively with the County Drain Commissioner.

**Forestry Practices**

It does not appear as though either commercial or private forestry operations within the Rifle River watershed are significantly affecting surface water quality. However, this assumption is based upon very little factual information. One forester has indicated that the Natural River designation has served to minimize disturbances near streams (M. Conley, MDNR-Retired, pers. comm., 1999). Accordingly, it would be advantageous to expand the Natural River designation to afford these water quality protections to other stream reaches.

In areas where riparian vegetation has been removed in the past (whether this was due to forestry or other land uses), it would be advantageous to develop a reforestation plan. Careful coordination with landowners would be required and it would be advantageous to develop a cost-share approach to this work. A number of USDA and MDNR cost share programs would be appropriate for this work.



## Chapter 5. Water Quality Goals

There is an abiding interest on the part of the citizens who work, live and recreate within the Rifle River watershed to affect an improvement in the area's water quality. To date, the integrity of the natural resource base has remained relatively intact as the area

has developed. Recreationists flock to the area both seasonally and on weekends and, to a significant extent, the local economy is fueled by this tourism.

Specific goals which can be realized through the implementation of this NPS Watershed Management Plan are detailed below. These goals assume that 100% of the nonpoint source challenges can not be treated within the term of this project.

Water Quality/Planning

1. Reduce sediment loading to the point that instream habitat is restored and the resident and anadromous fisheries rebound.
2. Reduce pollutant loading to a level which allows macroinvertebrate communities to be restored to more natural conditions.
3. Reduce nutrient loading sufficiently to meet or exceed MDEQ targets.
4. Reduce stormwater runoff so that peak flows within the West Branch of the Rifle and its tributaries are attenuated and downstream impacts are minimized.
5. Develop regional stormwater management plans for West Branch, Rose City, Omer and the I-75/Cook Road corridor to accommodate projected growth over the next 20 years and beyond.
6. Complete erosion inventory work on all tributary streams.
7. Addition of instream habitat for fish

Implementation

1. Treat 330 of the 379 eroding streambanks on the mainstream and West Branch of the Rifle over the next 20 years.
2. Complete implementation of the following agricultural Best Management Practices with new cooperators over the next 20 years:
    a. 36,960 lin. ft. of livestock exclusion fencing
    b. 30 livestock stream crossings
    c. 15 animal waste storage facilities
    d. 300 acres of filter strip planting
    e. Soil testing and pre-side dressed N-testing on 9,000 acres
    f. Plant 15 miles of wind breaks
    g. Accomplish integrated pest management on 10,000 acres
    h. Install 50,000 lineal feet of grassed waterways
    i. Plant green manure crops on 2,500 acres
    j. Plant 6,000 acres of cover crops
    k. Establish mulch and tillage practices on 6,000 acres
    l. Establish no-till practices on 3,500 acres



3. Efffectively treat erosion problems at 140 road stream crossings over the next 20 years.
4. Restore 1,000 acres of wetland in county drains and other locations throughout the watershed over the next twenty years.
5. Reforest a total of 5 miles (both sides) of riparian zones within the watershed over the next twenty years.

Information and Education

1. Establish a quarterly watershed newsletter for distribution to stakeholders representing a cross-section of the public.
2. Develop, adapt and distribute classroom curricula for use at all levels within the public school systems locally. This project will be a partnership between the Watershed Restoration Committee, MDNR, MDEQ and the local school system. A stream water quality monitoring program should be part of the middle and high school curricula.
3. Conduct, once annually, a public outreach program which will serve to draw additional partners into the Watershed Restoration Initiative. These outreach efforts will include an annual meeting and tour of treatment areas, publication of a project brochure (and an insert for other organizations' brochures) and the publication and distribution of placemats containing project promotional information.
4. Develop a Watershed Stormwater Management Task Force comprised of representatives from appropriate resource agencies, the Watershed Restoration Committee, local units of government, the local chambers of commerce and local residents. This task force should develop a strategy for effectively dealing with the stormwater challenges facing the watershed.
5. Develop a Rifle River Agriculture-2020 Task Force to develop the strategies and cooperation necessary to implement the agricultural BMP's noted above.
6. Create and distribute a video which documents the Watershed Restoration Initiative. This video should highlight both opportunities and accomplishments.
7. Continue the work of the River Use Task Force in order to further develop and implement strategies to balance competing uses of the river.

Economic

1. Work with the local business community to develop a promotional campaign (including a brochure) which extolls the recreational and other virtues of the Rifle River valley.

Water Quality Monitoring

1. Establish a stream water quality monitoring program as part of middle and high school curricula.



2. Collaborate with local municipalities to establish stormwater monitoring in those streams which are experiencing problems currently and where problems could be expected in the future.
3. Collaborate with MDEQ staff to establish a watershed-wide water quality monitoring program.

In the process of developing this NPS Watershed Management Plan, the stakeholders made it very clear that they saw constantly increasing recreational use

within the watershed. The most visible symptom they observed was user conflict. They felt that the overall quality of the recreational experience was being noticeably diminished by these conflicts. Use of the river at peak times by canoeists, for instance, has caused problems both with other canoeists and river users, as well as riparian owners. While there was a sense of need for additional access in the middle and lower reaches of the river, there was also an acknowledgment that something needed to be done to address the shear numbers of recreational users during times of peak use.

There was a consensus that fishing had declined over the last thirty years or so. The public has been very supportive of the streambank restoration efforts over the last several years. Overall there is a sense that stream habitat quality has also declined over the last thirty years. The public seems to embrace the notion of restoring the watershed.

The primary benefits resulting from this plans implementation will be: (1) restoration of the resident coldwater fisheries in the mainstream and West Branch of the Rifle and in many of the watershed's tributaries, (2) improved nursery and holding habitat for resident and anadromous fisheries throughout the watershed, and (3) reductions in suspended solids, bedload and other pollutants which will meet or exceed MDEQ surface water quality targets.

The secondary benefits of plan implementation will be: (1) improved water quality in the West Branch and mainstem of the Rifle River as well as Martin, Eddy, Ogemaw and Brewery Creeks, (2) restoration of instream habitat in those same stream reaches, (3) diminished nutrient, pollutant and sediment loading to the waters of the Rifle River watershed over the long-term, (3) a reduction in soil erosion on the uplands within the watershed, and (4) improved aesthetics and quality of life for residents, landowners and visitors.

## Chapter 6. Quantification and Prioritization Process

In determining the watershed's critical areas and identifying problems affecting surface waters, the Restoration Committee chose to focus on what it felt to be the most significant challenges. The Restoration Committee has developed a prioritization process which is reviewed annually. Criteria include the potential to deliver sediment, location within the watershed, feasibility of treatment, landowner participation and relative severity rating. The committee recognizes that by reviewing these prioritizations annually they will affect the most significant and cost-effective outcomes.



While developing the Initial Water Quality Statement, the Committee identified sediment as the most pervasive and cumbersome pollutant to treat. They had already inventoried streambank erosion sites and had begun treating these sites over the last several years. They acknowledged or assumed that sediment was being delivered by roads, agricultural practices, county drains, stormwater and streambanks. In developing their streambank and road crossing inventories, the committee assigned relative severity rankings to all sites.

In developing this NPS Watershed Management Plan, the following inventories were utilized to assist in assigning relative treatment priorities: streambank erosion inventory, watershed road-stream crossing assessment, road-stream crossing inventory, a land use inventory by township within the watershed, and an analysis of stormwater challenges. The following relative rankings were developed for purposes of this Draft NPS Watershed Management Plan:

I. Sediment
   A. Eroding Streambanks
   B. Eroding Road Stream Crossings
   C. Agricultural Sources
   D. Stormwater Runoff
   E. Sediment Removal

II. Nutrients
   A. Urban Areas-Stormwater & Sewage
   B. Agriculture
   C. Riparian lands

III. Toxic Pollutants
   A. Stormwater Runoff
   B. Road Runoff
   C. Point Sources
   D. Agriculture

IV. Thermal Pollution
   A. Converted Riparian Lands

## Chapter 7. Watershed Restoration-Purpose and History

The Rifle River Watershed Restoration Committee was formed in 1996 in order to bring together all of the public and private sector parties having an interest in the restoration of the watershed. The committee has been functioning (both formally and informally) for the past ten years. Through their efforts, and because of the steadfast work of the project partners, the committee has been successful at planning, funding and implementing a well-coordinated erosion control and instream habitat improvement program.



Prior to the formation of the Restoration Committee, the William B. Mershon Chapter of Trout Unlimited had spearheaded several habitat improvement projects in the upper Rifle River watershed including: (1) the installation of a bottom draw siphon on Devoe lake which now delivers much cooler water to the Rifle River mainstream, (2) the installation of fish cover structures in tributaries to the Rifle and (3) a diversion around Mallard Pond which also served to lower water temperatures in the mainstream. These activities, combined with the development of the erosion inventory served to motivate the key parties necessary for the establishment of the Watershed Restoration Committee.

Once the Restoration Committee was formed, the need for a long-range plan for the watershed restoration initiative was self-evident.

The MDEQ/Surface Water Quality Division staff out of the Saginaw Bay District office have been actively involved with the Restoration Committee. Tom Young and Charles Bauer have been very helpful in both providing the committee with pertinent watershed planning information. As well, the committee has collaborated with Tom and Charles in attempting to develop this long-term plan of action and the corresponding funding necessary for execution.

This NPS Watershed Management Plan has been drafted over the last 15 months in concert with the development of a Draft Watershed Assessment. The Watershed Restoration Committee has served as the coordinating entity during the plan's development and thus, this effort has truly been a public/private sector collaboration. A copy of the Watershed Restoration Committee Roster is provided in Appendix A. This committee's membership includes local citizens, landowners, local government, state government, resource agencies, the agriculture community and conservation organizations.

Key individuals who collaborated directly in the development of this plan include:

Jim Hergott, Saginaw Bay RC&D Area
Harold Kleinert, Chair, Rifle River Restoration Committee
Craig Ogg, Saginaw Bay RC&D Area
Christy Lewis, Mainstream Resources
Tim Bohnhoff, NRCS-Arenac County
Mieka Emerson, NRCS-Ogemaw County
Charles Bauer, MDEQ/SWQD
Tom Young, MDEQ/SWQD
Dan Sikarskie, Huron Pines RC&D Area
David Smith, Huron Pines RC&D Area
Kathrin Schrouder, MDNR-Fisheries Division
Steve Sendek, MDNR-Fisheries Division
John Lucas, MDNR-Parks Division
Ricky Rockwell, Arenac County Drain Commissioner
David Cozad, Mainstream Resources



Many other individuals and agency staff provided input, information and direction throughout the development of both the Draft Assessment and this plan. Citations denote those instances where their input was directly utilized. As noted in the education goals, the Restoration Committee will be expanding as the project evolves. The committee continues to strive to broaden its base of expertise in order to assure a competent and multi-disciplinary approach is maintained in the execution of these projects.

During the planning phase of this project four public meetings were held (two each in Ogemaw and Arenac counties). The first meetings were designed to introduce the project and to solicit initial input from the interested publics. During the second set of meetings, the plans draft conclusions were presented and public comment was received. These comments have been incoporated into this final draft plan.

## Chapter 8. Proposed Implementation Activities

Implementation of the following project components is proposed over the next 20 years:

I. Technical assistance to landowners, municipalities and the Restoration Committee

MDEQ Staff; Tom Young, Charles Bauer (100 hours annually)
MDNR Staff; Kathrin Schrouder, Jim Baker (100 hours annually)
NRCS Staff; Jim Hergott, Tim Bohnhoff, Mieka Emerson (300 hours annually)
Watershed Technician (200 hours annually)

II. Cost share on design and implementation of Best Management Practices, in accordance with USDA standards and practices, as follows:

NRCS Staff; Jim Hergott, Tim Bohnhoff, Mieka Emerson (300 hours annually)
Watershed Technician (1,300 hours annually)

Rifle River Watershed Restoration Committee (750 volunteer hours annually)

Development of 3 Regional Stormwater Management Plans (West Branch/Cook Road-I-75 corridor, Omer and Rose City)

Stabilize 330of 379 eroding streambanks, utilizing both vegetative and traditional measures

Stablize 140 of 154 road-stream crossings with measures including culvert extensions, runoff diversions, armoring of ditches and streambanks, and re-design and replacement of most severe sites



Restore 1000 acres of wetlands on county drains and in various other riparian locations throughout the watershed.

Reforest a total of 5 miles (both sides) of riparian zones within the watershed

Implement the following agricultural Best Management Practices:

-Install 36,960 lin. ft. of livestock exclusion fencing
-Construct 30 stream crossings for livestock
-Construct 10 new animal waste storage facilities
-Upgrade 5 existing animal waste storage facilities
-Plant 300 acres (100 miles) of filter strips
-Improve nutrient management practices through:
Soil testing on 9,000 ac.
Pre-side dressed N-testing on 9,000 ac.
Plant wind breaks on 15 miles

-Practice Integrated Pest Management on 10,000 acres
-Install 50,000 lin. ft. of grassed waterways
-Devote 2,500 acres to green manure crops
-Plant 6,000 acres to cover crops
-Practice mulch and tillage on 6,000 acres
-Practice no-till on 3,500 acres

III. Information and Education

The Information and Education goals are set forth in Chapter 5 of this plan and elaborated upon below in Chapter 9. The following staff will be utilized to accomplish these I&E goals:

| | |
|---|---|
| MDEQ Staff; Tom Young, Charles Bauer | (50 hours annually) |
| MDNR Staff; Kathrin Schrouder, Jim Baker | (50 hours annually) |
| NRCS Staff; Jim Hergott, Tim Bohnhoff, Mieka Emerson | (100 hours annually) |
| Watershed Technician | (420 hours annually) |

The following products will result from implementation of the Information and Education effort set forth in this plan:

Quarterly Watershed Newsletter (60 issues)
Classroom curricula for grade, middle and high schools
Annual public outreach programs
Watershed Stormwater Task Force
Rifle River Agriculture-2000 Task Force
Video documenting the Watershed Restoration Initiative



IV. Mechanisms to Institutionalize the Management Plan

A number of potential mechanisms could serve to institutionalize this management plan including: expansion of the state Natural Rivers plan, adoption of innovative local zoning ordinances for stormwater management and greenbelts and voluntary application for an MS4 Municipal Separate Stormwater System permit by local

units within the watershed. As well, the Restoration Committee will appoint an Evaluation subcommittee to undertake annual audits of nonpoint source control measures which have been completed within the previous year. The sub-committee will issue annual written reports. In order to document and evaluate annual accomplishments, the following staff time will be dedicated:

| | |
|---|---|
| MDEQ Staff; Tom Young, Charles Bauer | (20 hours annually) |
| MDNR Staff; Kathrin Schrouder, Jim Baker | (20 hours annually) |
| NRCS Staff; Jim Hergott, Tim Bohnhoff, Mieka Emerson | (60 hours annually) |
| Saginaw Bay RC&D staff; Sandy Essex | (120 hours annually) |
| Watershed Technician | (80 hours annually) |

## Chapter 9. Information/Education Program

Thus far the planning phase of this project has identified youth, the agricultural Community, landowners, local business and governmental leaders and conservation organizations as key targets for information and education campaigns. A high school river monitoring and Adopt-A-Stream program is being developed for local schools.

The following I&E initiatives will be undertaken over the next 20 years. A quarterly watershed newsletter will be published and distributed within the Rifle River valley. This newsletter will highlight project progress and inform the public about the projects goals and objectives.

In collaboration with local school districts and their teachers, classroom curricula will be developed for use in grade, middle and high schools. Recognizing that our youth have the largest stake in the success of this project, the Restoration Committee (including MDNR and MDEQ members) will guide the development of these curricula. Updates will be provided several times within the twenty-year project timeframe.

Currently the Restoration Committee has an annual summer meeting and field trip to spotlight project accomplishments. This practice will continue throughout the life of the project. In order to expand public involvement, the newsletter and other media outlets will be utilized in promoting this outing.



Stormwater management is a growing problem in those areas within the watershed which are undergoing significant growth. In order to heighten awareness and facilitate the resolution of these problems, we propose to convene a Watershed Stormwater Management Task Force. The Task Force would be comprised of individuals from local government and the business communities of West Branch, Rose City, Omer, Skidway Lake and Forest Lake. As well, the task force would have representatives from the Restoration Committee and appropriate resource agencies.

Agriculture is a significant economic factor in the Rifle River watershed. In order to facilitate the development of Water Quality and Resource Management Plans (WQRMP) on agricultural lands, we propose to convene a Rifle River Agriculture-2020 Task Force. This task force would develop appropriate strategies for implementing WQRMP's throughout the course of the project. This forum should provide for the sort of dialogue which will be necessary to ensure that agricultural needs are met as these Best Management Practices are implemented over time. As well, the task force will create the atmosphere necessary to encourage innovation.

In order to share the lessons learned from these endeavors, we propose to develop a video which will document the project's successes, as well as its stumbling blocks. The video will stress the advantages created by partnerships of this type and will endeavor to make the point that we all have a stake in making sure that water quality is maintained and improved. The video will have utility and value within and beyond the Rifle River watershed.

The Restoration Committee will develop a marketing/outreach plan which utilizes the news media, including local newspapers, radio and television, to promote the project and the recreational opportunities within the watershed. As well, the Soil Districts will continue to publish restoration project news in their quarterly newsletters. In addition to these traditional methods of communication, which have been very effective in the past, the committee will develop a video spotlighting the watershed, a brochure, and placemats to be distributed by local stores, restaurants, canoe liveries and realtors.

## Chapter 10. Agencies to be Involved in Implementation

The vast majority of the agencies which would be involved in the implementation of this project are currently active on the Watershed Restoration Committee, including:

Saginaw Bay RC&D Area-Jim Hergott
Huron Pines RC&D Area-Dan Sikarskie
NRCS, Arenac County-Tim Bohnhoff
NRCS, Ogemaw County –Mieka Emerson
Ogemaw County SCD
Arenac County SCD
Rifle River Watershed Restoration Committee-Harold Kleinert
MDNR-Fisheries Division-Kathrin Schrouder
MDEQ-Surface Water Quality Division-Tom Young, Charles Bauer
Arenac County Drain Commissioner-Ricky Rockwell



The project would be coordinated by the Saginaw Bay Resource Conservation and Development Area, Inc. Jim Hergott would serve as project manager and would be assisted by a Watershed Technician who would manage the day-to-day activities in the field. The Rifle River Watershed Restoration Committee would serve as the executive body which would have policy making responsibilities for the project. The participating agencies will have technical input to the appropriate project segments, consistent with their expertise. At a minimum, the Restoration Committee will meet quarterly to conduct business as they do currently.

The Restoration Committee which is currently in place would remain throughout the course of the project; however, it is likely that membership will be augmented as the project develops and other stakeholder express interest. A current Restoration Committee Membership Roster is provided in Appendix A.

## Chapter 11. Implementation Schedule/Evaluation

The following proposed project schedule is provided with the recognition that as the project evolves, the project milestones will need to be broken down into more detailed objectives. Given this 20 year implementation cycle and the nature of many of the activities we propose to undertake, project scheduling will necessarily involve balancing and coordinating the planning and construction phases of many of these projects simultaneously.

Project evaluation and monitoring will take place constantly throughout the life of the project. Quarterly progress reports will be filed with the Restoration Committee and all project cooperators and funders. These reports will track progress on-the-ground and performance against the budget and project timeline.

A number of criteria will be utilized to determine the relative success we have had at achieving the project goals. These will include: number of units (e.g. acres, lineal ft., etc.) treated with BMP's, number of cooperating landowners, number of acres of wetland restored or riparian zone reforested, number of youth utilizing the classroom curricula, extent of newsletter distribution, number of Adopt-A-Stream reaches added each year and number of stream reaches having standardized water quality monitoring stations. These results will be documented in annual project reports.

It is expected that, over time, water quality improvements will be reflected in the data collected both through monitoring data generated over the course of the project by the Restoration Committee, MDEQ staff, and numerous school programs. As a result of the water quality improvements brought about through the implementation of this plan, we expect to see a documentable improvement in the fish and macroinvertbrate communities within the Rifle. As well, we would expect to see diminished phosphorus and sediment loading rates. These improvements will extend beyond the Rifle basin to the Saginaw Bay.



In order to document these results, physical, chemical and biological monitoring will be necessary. For instance, measurements including: channel cross-sections at streambank restoration sites, bacterial sampling upstream and downstream of livestock exclusion sites, and aquatic macroinvertebrate sampling in areas where sediment removal

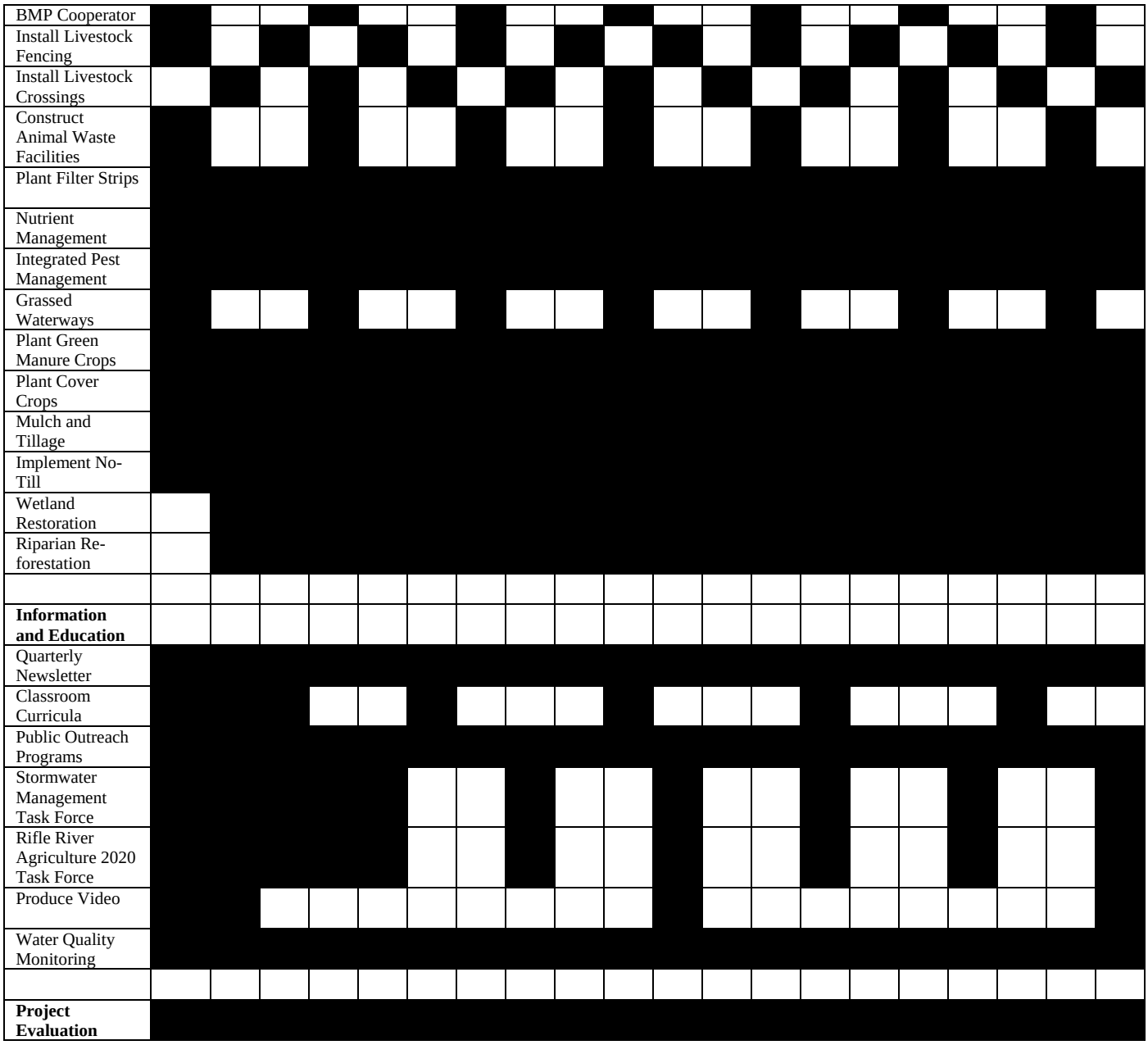
will be performed will need to be taken both before and after treatments in order to appropriately assess the impact of these treatments.

As indicated earlier in this plan, additional systematic data collection is needed throughout the watershed in order to create a long-term database which is capable of depicting trends in water and instream habitat quality. MDNR Fisheries Division staff, in collaboration with Trout Unlimited and the Rifle River Watershed Restoration Committee, have been collecting some water temperature data over the last fifteen years. This effort should be continued and expanded. As well, stream hydrology and channel morphology information should be collected from throughout the watershed. MDEQ/Surface Water Quality Division has conducted several biological assessments, utilizing GLEAS Procedure 51. It would be advantageous to expand this assessment program. In many instances, volunteer assistance could significantly facilitate the data collection process. The Watershed Restoration Committee serves as a good forum for discussing the development of additional monitoring programs. This monitoring is essential in order to determine the impact of restoration treatments and to identify and prioritize new problems as they arise.



**PROPOSED PROJECT TIMELINE**

| Activity | 2000 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Implement BMP's** | | | | | | | | | | | | | | | | | | | | |
| Streambank Stabilization | | | | | | | | | | | | | | | | | | | | |
| Stabilize Road Stream Crossings | | | | | | | | | | | | | | | | | | | | |
| Develop Ag | | | | | | | | | | | | | | | | | | | | |






## Chapter 12. Cost of Implementation

The following budget summarizes the expected implementation costs over the next twenty years:

## Projected Implementation Budget

**Installation of Best Management Practices**

| | |
|---|---|
| Stabilization of Road-Stream Crossings | $3,585,000. |
| Stabilization of Eroding Streambanks | 3,396,000. |
| Sand Bedload Removal-West Branch of the Rifle | 1,500,000. |
| Agricultural Best Management Practices | 1,517,066. |
| Stormwater Management Planning | 100,000. |
| Stormwater Best Management Practices | 5,000,000. |
| Wetland Restoration | 200,000. |
| Riparian Reforestation | 150,000. |
| Water Quality Monitoring | 750,000. |
| Access Site Development/Improvement | 200,000. |

**Information and Education**

| | |
|---|---|
| Newsletter Publication and Distribution | $ 200,000. |
| Classroom Curricula | 175,000. |
| Public Outreach | 45,000. |
| Stormwater Management Task Force | 35,000. |
| Rifle River Agriculture-2020 Task Force | 35,000. |
| Rifle River Watershed Restoration Committee | 30,000. |
| Video Production and Distribution | 15,000. |

| | |
|---|---|
| **Project Admininstration** | 1,750,000. |
| Total Projected Project Cost | $18,683,066. |

(Cost estimates expressed in 1998 dollars)



This project will be undertaken by leveraging grant funding with cost-share dollars which are currently available through a number of government and non-profit sources. These sources include the following:

Wetland Reserve Program-USDA
Forestry Incentives Program-USDA
Environmental Quality Incentives Program-USDA
Forest Stewardship Program-USDA
Stewardship Incentives Program-USDA

Conservation Reserve Program-USDA
Wildlife Habitat Incentives Program-USDA
Partners for Wildlife-USFWS
Inland Fisheries Grant Program-MDNR
Clean Michigan Initiative-MDEQ
Recreation Bond Fund-MDNR
Groundwater Stewardship Program-MDA w/Soil Districts

At the end of 20 years, the Rifle River Watershed Restoration Committee will still be in place and functioning. Thus, the Committee, in concert with the appropriate resource agencies, will be able to continue to monitor both emerging watershed needs and the state of programs and practices which have been undertaken through this project. The Committee will also be in a position to develop and sustain funding for ongoing maintenance needs.