

Pere Marquette River Watershed Assessment

EXECUTIVE SUMMARY

This watershed assessment is an effort to assimilate the wealth of knowledge and information concerning the Pere Marquette River and its watershed into one comprehensive working document. Its primary purpose is to identify attributes, problems and opportunities. But it is also intended to distribute information on the watershed and give natural resource managers an organized reference from which to obtain information for developing future management plans for the Pere Marquette River. While this assessment assumes its innate value to management purposes, it is not intended to be a management plan. It is, however, a management tool. The hope of the Pere Marquette Watershed Council is that this assessment will lead to a unified understanding of the watershed in its present state and unified management objectives, goals, and plans

The assessment document has a basic organization founded on distinct watershed characteristics: Geography, History, Natural Features, Land Use, Socioeconomics, and Natural Resource and Land Management. A variety of topics such as fisheries, geology, sub-drainages, hydrology, vegetative land cover, wildlife, economics, demographics, and others are covered in detail. The document ends with a summary of notable attributes, management problems, and opportunities for resource enhancement or additional information gathering. As such, this assessment incorporates the important aspects of watershed management from human population characteristics in remote watershed areas to brown trout populations in the "flys-only" reach.

The Pere Marquette River watershed is located in west-central Michigan and empties into Lake Michigan near Ludington. The watershed encompasses portions of Lake, Mason, Newaygo, and Oceana Counties and drains 755 square miles. Four major tributaries flow into the Pere Marquette River: Little South Branch, Middle Branch, Baldwin River, and Big South Branch. The Middle and Little South Branches Join at the "Forks" to form the Pere Marquette River mainstem (Mainstem). The Baldwin River joins the Mainstem a few miles west of M-37 and the Big South Branch joins it near Custer. The Pere Marquette River flows nearly 96 miles from the Middle Branch headwaters to Pere Marquette Lake, falling 585 feet in elevation. The Pere Marquette River watershed is drained by nearly 380 lineal miles of stream channel

Like most watersheds of northern Michigan, the Pere Marquette watershed has a rich history earmarked by the logging era during the late 1800's and early 1900's. Early native Americans dating to the last ice age approximately 10,000 years ago inhabited portions of Michigan and hunted wildlife. In more recent times, native Americans built camps along the Pere Marquette River valley and along the Lake Michigan Shoreline near the river mouth. These later native American peoples competed and battled for rights to the Pere Marquette River's resources and left their mark on the landscape. Most notably, native Americans attracted European missionaries to the region including Pere Jacques Marquette for whom the river is named. Europeans gradually displaced native Americans in the mid-1800's starting with the early fur traders. Stillwater, European lumber barons moved into the region and removed vast forests of the Pere Marquette River watershed by the early 1900's. Where the native American peoples had left their subtle marks on the landscape, the lumbering era also left its mark, but in a much more profound way. Logging decimated the Pere Marquette River's ability to support its once abundant aquatic life

The geology of the Pere Marquette River watershed is characterized by Silurian sedimentary bedrock formations overlain by a thick mantle of glacial drift. This glacial drift consists of unsorted, unstratified till and well sorted and stratified glacial outwash deposits. The drift, which was deposited at the end of the Pleistocene epoch some 13,000 years ago, is the parent material for the modern soils of the watershed. Having predominantly sandy textures, the glacial drift is responsible for the abundant, stable, cold groundwater that feeds the rivers and provides habitat for coldwater fish species. While the Pere Marquette watershed is blessed with this glacial overburden, the thickness does not rival other watersheds in northern Michigan such as the Au Sable, Manistee, and Jordan Rivers. The distribution of high moraines in the

watershed is low; a large portion of the watershed is glacial outwash plain.

Hydrological characteristics of the Pere Marquette River system are stable, suggesting that landscape changes in the watershed have not substantially affected hydrology. However, there may be a trend toward increasing mean discharge after about 1960. This assessment obtained flow data from the United States Geological Service Scottville gauging station for the period of record (October 1939 to May 1998). Analyses of flow duration curves showed that the Pere Marquette River maintained a base flow (95% exceedence flow) 60% of its median flow (640 cfs) and high flows (5% exceedence flow) roughly two-times (200%) the median flow. The most stable streams in Michigan display similar flow characteristics with flow duration curves that remain between 80% and 200% of their median flows. The highest recorded discharge (6020 cfs) occurred in September 1986 during the largest flood of record. The mean discharge of record is 717 cfs.

Thirty-two (32) licensed dams were identified in the watershed. Recreational dam construction in the watershed was very popular before enactment of the Inland Lakes and Streams Act in 1972. This activity was also highly controversial at that time due to an awareness of the negative impacts dams can have on coldwater fisheries. The Pere Marquette Watershed Council was originally formed in 1970 to combat dam construction in the watershed. The thirty-two dams in existence today support recreational opportunities for the land owners, but may affect water temperature regimes in important headwater streams and, for the vast majority, prevent fish passage.

Artificial drainage in the watershed is minor with exceptions concentrated in the lower watershed. Mason County maintains drains that feed the Mainstem Newaygo and Oceana Counties maintain several miles of drains in the upper Big South Branch watershed. In particular, Beaver Creek is highly impacted by agricultural and rural drains. These impacts affect flow characteristics and physical habitat conditions of the Big South Branch. Future drain management practices are crucial to management of the watershed.

Water quality parameters reported for the Pere Marquette River system suggest water quality is unimpaired. Most parameters reported by the United States Forest Service (USFS) were typical for a northern Michigan hardwater stream (dissolved oxygen, nutrients, alkalinity, hardness, turbidity, etc.). Parameters were also consistent from location to location throughout the area sampled between 1971 and 1981. Mean dissolved oxygen (DO) levels for all sites were around 10.0 mg/L. The lowest recorded DO was 7.3 mg/L measured at Scottville. No elevated parameters or constituents were reported.

Water temperature throughout the system remains conducive to supporting cold-water fisheries. Eleven stations sampled in 1996 showed only slight variations in mean, maximum, and minimum water temperatures. Water temperatures were remarkably consistent among sites and extremely stable at each site, never varying much more than 5 F during any given day. A site on the Middle Branch was the coldest with a summer mean of 57 F and maximum of about 65 F. The six stations from approximately the Forks to South Branch Road had a mean summer water temperature of 62 F, mean winter temperature of 34 F, and summer maximum/minimum temperature of 70 /55 F. The Big South Branch sites and Mainstem sites near Reek and Custer Roads displayed higher summer water temperatures with maximums reaching 75 F and minimums near 60 F (summer mean of 65F). Exceptions include localized effects from small impoundments on headwater tributaries where studies suggest that elevated temperatures may be limiting trout production. However, these headwater streams seem to recover a relatively short distance downstream.

The history of the Pere Marquette River fisheries is as diverse and rich as the cultural history of the entire watershed. It is, in fact, a reflection of cultural history in the watershed. Most notably, the Pere Marquette River has the prestige of being the location of the first brown trout plants in United States rivers. Brown trout were planted in the Baldwin River (then known as the North Branch) in 1884 by the Michigan Fish Commission. However, brook trout were the first introduced trout species to be planted in the Pere Marquette River system in 1879. Although the brown trout fishery is still very popular among select groups, the Pere Marquette River is not widely known for its tremendous brown trout fishery as it once was. Today, anadromous salmon and steelhead runs attract thousands of anglers to the watershed each year.

The Michigan Department of Natural Resources first planted rainbow trout, which were thought to be non-anadromous, in 1885. These early introductions have developed into a self-sustaining steelhead population that now dominates the fisheries by sheer numbers. Coho and Chinook salmon were not introduced until 1966. The only salmon plants in the Pere Marquette system occurred in Ruby Creek in 1967. However, a naturally reproducing salmon population has established in the river. While the MDNR continues to plant brown trout, the river system is primarily managed for its anadromous fisheries.

Today, fisheries concerns focus on increasing pressure by recreational anglers and commercial guide services, interspecies competition, a declining brown trout population due primarily to poor recruitment, and carrying capacity of the river. Current debate involves competition between anadromous salmon/steelhead and brown trout. Overall, fisheries management has shifted toward reduced stocking, habitat improvement and self-sustaining populations, and quality fishing opportunities. A portion of the Mainstem from M-37 to Gleason's landing is designated as a quality fishing area with special regulations including "fly-only" and more restrictive creel limits.

Sea lamprey control in the Pere Marquette River system has also been a hot topic of debate. Traditionally, the rivers have been treated with 3-trifluoromethyl-4-nitrophenol (TFM) every four years since 1964. Typically the location of treatment sites has varied from treatment to treatment depending on lamprey ammocoete distribution in the system. Unfortunately, TFM has some negative drawbacks including toxicity to non-target organisms and cost. TFM has been shown to temporarily reduce aquatic insect populations within the treatment zone. However, Indiana University and the United States Fish and Wildlife Service (USFWS) studies seem to suggest that TFM treatments have no long term effects on community composition or abundance of aquatic insects in the Pere Marquette River. The estimated treatment cost for 1999 is \$615,000.

In addition to TFM treatments, the USFWS has attempted to control lamprey reproduction in the Pere Marquette River system and reduce its dependency on expensive, controversial TFM treatments using a blocking weir which prevents upstream migration of adult sea lamprey. The first weir was installed near Custer prior to 1980. This weir was replaced in 1989 by a second weir which blocked non-target anadromous steelhead and salmon. It was deactivated in 1990 until further refinements could be made and impacts to non-target organisms could be resolved. Since 1990, the USFWS and MDNR have worked together to develop new weir technology for the Custer site. The new electronic grid weir and incorporated fish passage are under construction and is expected to be operational in 1999. Construction costs are estimated to be less than one TFM treatment. The success of the new weir will be evaluated by Michigan State University. Baseline data has been collected over the past two years to evaluate effects on anadromous fish migration.

Macro-invertebrate surveys conducted on the Mainstem and Big South Branch have been primarily qualitative. Very little is known about aquatic insect production. In general, aquatic insect communities in the Pere Marquette River system are healthy, indicating very little disturbance or water quality impacts. The Indiana University studies showed that the orders Ephemeroptera (mayflies) and Diptera (true flies) were the dominant taxa every year since 1987. However, the data does seem to suggest that the river system has habitat limitations. That is, the abundance of suitable attachment sites for aquatic insects is low. The relative abundance of Plecoptera (stoneflies) and certain families of the order Trichoptera (caddis flies) was low due to their preference for rocky substrates. The Indiana University studies showed that 36% to 43% of insects collected were found on woody debris and only 11% to 15% were found on gravel/rock substrates. This is more an indication of the relative abundance of habitat types than a specific preference for habitat types by the aquatic insect taxa present. This distribution of habitat types is common for sand dominated streams in Michigan and highlights the importance of woody debris to ecology of the river. Findings were similar on the Big South Branch.

Michigan Information Resource System (MIRIS) data indicate that 74% of the modern watershed is still forested compared to 93% presettlement. However, forest composition has changed from conifer dominated to deciduous dominated. Vegetative communities of all types, excluding agriculture, represent 82% of the total modern watershed area. According to MIRIS data, wetland comprises 10% of the modern

watershed area. Sixteen percent (16%) of the modern watershed is subject to agricultural practices of which 12% is row cropping. Combined, urban land uses constitute only 3% of the total modern watershed area.

Recreation on and along the Pere Marquette River has increased drastically since the 1970's. Most of the local municipal and county economies are dominated by the tourist and service industries. This rapid rise in recreation has created the need for multiple use management in the watershed. Dealing with the growing demand on the resources is critical to protecting the stream resources. A recreational use survey conducted in 1997 indicated that 95% of the users fished, 53% canoe or tube, 42% observe nature, and 16% hunt. The focus of this study was on riparian lands within the Pere Marquette River valley. Use statistics for recreational areas in other parts of the watershed are not available. Water craft use on the river is managed by the United States Forest Service (USFS) and MDNR by permit system. A certain number of permits are issued to canoe liveries and private water craft owners. Permits are partitioned by week day and river segment to distribute river users. However, this permit system only applies to water craft which are launched at USFS or MDNR owned sites along the river. Permits are not required for launching water craft from private property or other public access areas.

Waste management and environmental contamination sites were obtained from MIRIS and mapped using GIS software. Thirty-seven (37) active NPDES permits have been issued in the watershed. These are point-source or storm-water discharges to the river, tributaries, or wetlands contiguous to those water courses. Today, only one solid waste disposal site is permitted. However, there is a growing demand in the watershed for landfills and all four counties are currently preparing for this demand. Only one licensed hazardous waste facility exists in the watershed the DOW Chemical plant in Ludington. Twenty-eight closed Leaking Underground Storage Tanks and sixty-seven open Leaking Underground Storage Tanks are reported to exist in the watershed by the Michigan Department of Environmental Quality (MDEQ). Thirty-three sites of environmental contamination are recorded by the MDEQ. The most notable of these is the Wash King Laundry Superfund Site south of the Mainstem along M-37. Population data for the watershed show steady, moderate growth. Between 1990 and 1997, the populations of Lake, Mason, Newaygo, and Oceana counties grew by 18.3%,9.1%,17.9%, and 95% respectively. Most of the growth in Newaygo County has occurred in the three major cities in the southern half of the county. In contrast, most of the Lake County growth has occurred in the watershed. A large portion of the watershed's population is transient, either seasonal home owners or tourists. During the peak of the summer tourist season, the Pere Marquette River watershed may experience a temporary twofold increase in its population. The US. Census Bureau is projecting only modest growth for these four counties over the next twenty years. The economy of the four counties is largely influenced by tourism and service trades, especially in Lake County. Economic growth has been modest in all four counties. Lake County has been designated by the federal government as a Rural Enterprise Community. This designation makes the county eligible for substantial monetary grants which it applied for and has been awarded. The purpose of the designation and grants is to promote economic growth and opportunity within the designated counties.

The most significant land management practices instituted in the watershed are the state Natural River and federal Scenic River designations which were applied in 1978. Under the Natural River designation, townships are given the authority to adopt and enforce zoning guidelines according to the Natural River Plan. Special zoning is applied within a Natural River District (400 feet wide on each side of the stream). Approximately 664 miles of the Mainstem and 140 miles of tributaries are designated as Natural River.

The National Scenic River corridor encompasses the same 66.4 miles of Mainstem from the Forks to the old US 31 bridge as the Natural River designation. The scenic corridor is approximately one-half mile wide, but varies as dictated by the river valley and scenic viewscape. The United States Forest Service has jurisdiction over the National Scenic corridor, controlling user access to the river on federal forest lands and instituting stringent zoning requirements. This national designation has been important to managing multiple user conflicts and reducing private-public conflicts.

The assessment highlights other aspects of state and federal land management in the watershed and the role of local governmental units in land management. As one may conclude, the multiple management agencies in the watershed result in many conflicts between management styles and priorities. The Pere Marquette

River Watershed Council, Michigan Department of Natural Resources, and United States Forest Service are working together to develop a unified approach with common rules and guidelines for managing the Mainstem corridor and its users.

The Pere Marquette Watershed Council In cooperation and partnership with other agencies and groups has been responsible for several conservation projects in the watershed. The most notable of these IS the Pere Marquette Restoration Project. The project was initiated in 1987 with the signing of a partnership agreement. Major funding came from the Michigan Department of Natural Resources and United States Forest Service. More than 190 sites, representing 30,800 lineal feet of streambank, were stabilized with an estimated 23, 700 cubic yards of stone In conjunction with bioengineering techniques. Other projects include the Fisheries Workshop in 1992, Forum on River Management in 1997, the ongoing "Big South". project. streambank erosion surveys. large woody debris inventory , fish structure rehabilitation, sediment basin construction and maintenance, various independent studies. and miscellaneous other streambank stabilization sites

Several attributes were highlighted modern land cover, stable hydrology, diverse fisheries, general biological diversity. cultural and historical resources. special designations and regulations. free flowing characteristic, diverse recreational opportunities, low density development and populations, and active conservation ethics, activities, and organizations. In combination, these characteristics of the watershed make it unique and define the Pere Marquette River watershed as it exists today.

Unfortunately, the watershed is not without its problems. This assessment has attempted to identify some of them including' declining brown trout populations, recreation impacts. non-unified management. non-watershed based management. and poor or lacking land use planning at the watershed scale.

Still many opportunities exist including continued road-stream crossing improvements, further development of the unified management concepts for the Mainstem corridor, further research, long-term monitoring, river protection endowment fund, classification and landscape-based study of the river system. fish assemblage and distribution research, and further intensification of information sharing and dissemination through information technologies, forums, symposiums, and literature.