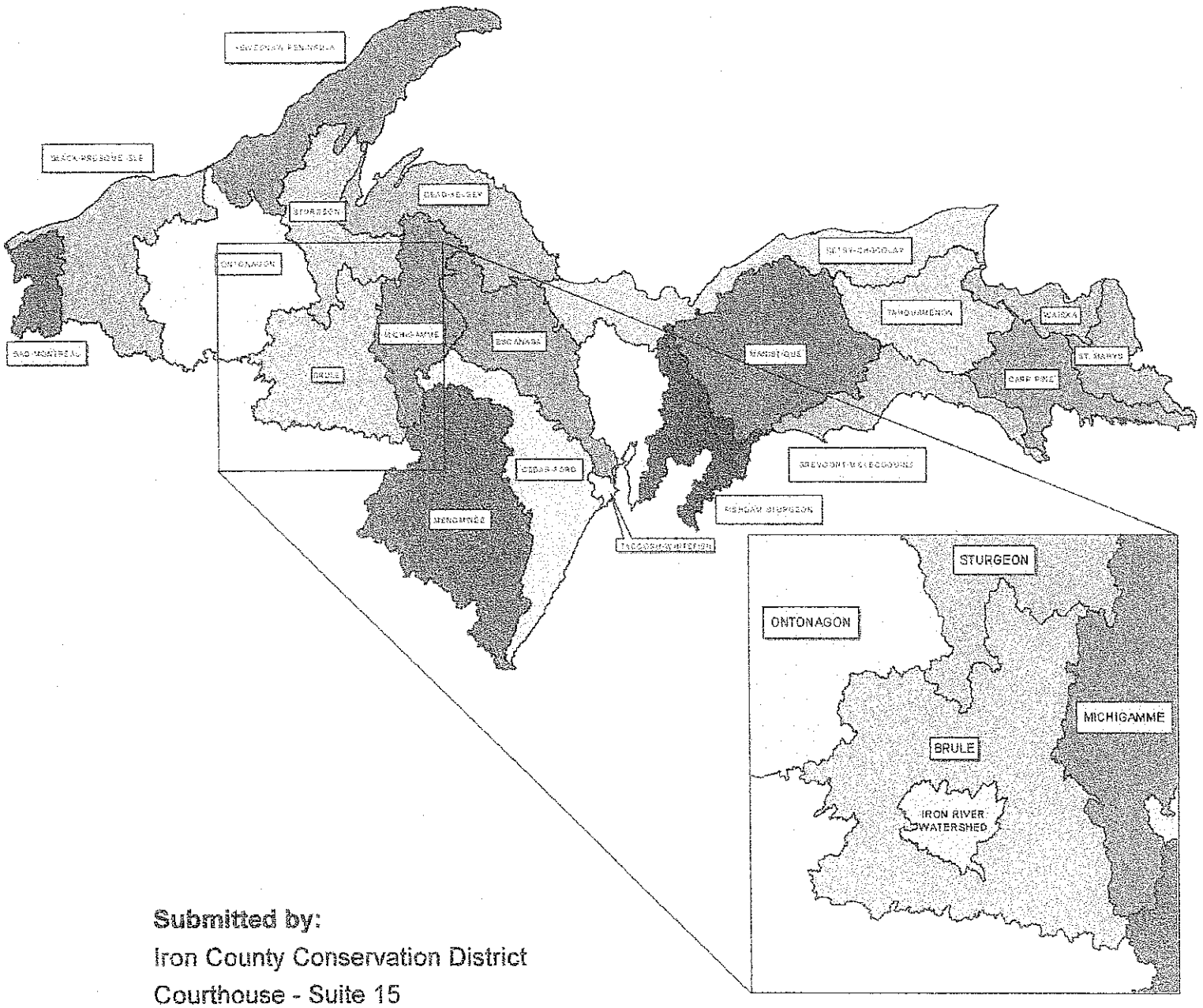
IRON RIVER WATERSHED
COMPREHENSIVE MANAGEMENT PLAN
2001



Iron River Watershed in Relation to
Other Upper Peninsula Watersheds

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TABLE OF CONTENTS

APPENDICES

Acknowledgments

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Introduction

The Iron River Watershed Management Plan was made possible by a planning grant through Section 319 of the federal Clean Water Act which was later revised to qualify under Section 604b of the federal Clean Water Act. In June of 1999, the Iron Conservation District, on behalf of the Iron River Watershed Council, was awarded this grant to begin the initial stages of the Iron River Watershed Project, a project devised to protect, improve, and promote the Iron River and its tributaries.

Over the past two years the project manager has spent time collecting data and information regarding the condition of the watershed, as well as taken steps to increase public awareness about the Iron River watershed and related issues. The time researching both in the field and in the office has brought to light a number of issues throughout the watershed which are in need of attention. This document will present information gathered over the past two years as well as possible strategies to improve the watershed.

This management plan is to be used as a resource for directing efforts concerning the betterment and well being of the Iron River Watershed, however, should not be considered as an ultimate recipe for all topics related to the watershed. Watershed management is a dynamic process that evolves with increased awareness and understanding. The ultimate goal of watershed management is to foster more than just an awareness of how it fits into our landscape, but rather a respect of how we fit within that composition. With that respect, hopefully, we will naturally develop a conscious effort to maintain a healthy balanced relationship between our lifestyles and the land.

The Iron River certainly deserves respect and has for far too long been neglected. One of the most productive native Brook trout streams in Michigan, the Iron River has weathered through the impacts caused by Iron mining and development along its banks. Urban runoff, acid mine drainage, and waste water effluent are some of the major obstacles that the Iron River has and continues to face. Despite these obstacles the Iron River remains a truly special resource for Iron County and Michigan.

Iron County is rich in a diversity of natural ecosystems important to the local economy and quality of life. Hunting, fishing, and other forms of outdoor recreation are integral parts of many people's lives and form a solid basis for the tourism industry in the area. Historically, however, the local economy has been more closely tied to extractive uses of its natural resources through mining and logging.

These consumptive resources have bestowed a legacy of environmental problems on the landscape inhabited by today's citizens. Perhaps no more dramatic display of ecological potential and problems can be found than along the length of the Iron River which passes through the heart

of the Iron River and conterminous municipalities. From its headwaters in springs and a lake to its confluence with the larger Brule River, this small river is a veritable wellspring of both environmental potential and problems. From its origins, it is transformed from a source population for hatchery stock brook trout to an urban aquatic ecosystem with severe problems of acid mine drainage, erosion, and stream channelization. Finally, more insidious, but no less real, are the limited citizens' perspectives that result from growing up in a community historically so closely tied to extractive resources abuse and use.

The Iron River Watershed consists of approximately 61,440 acres located in southwestern Iron County. The Iron River contributes to the Brule River Watershed. Subsequently, the Brule River is a tributary to the Menominee River, which is a designated Area of Concern (AOC) recognized in the Lake Michigan Lakewide Management Plan (LaMP). The Iron River watershed contains the Iron River along with eight significant tributaries and five major lakes. Of the 40 miles of streams which constitute the Iron River Watershed, 12 ½ are classified as blue-ribbon trout waters. More than 46% of the population of Iron County resides in the watershed. Land use within the watershed is distributed as 57% forested, 12% agricultural, 7% wetland, 16% urban, and 8% of other varied classifications.

While it is true that approximately 1/3 of the Iron River has been classified as blue ribbon trout water most of this classification describes the river upstream of the towns. In fact, for management purposes, the watershed could easily be divided into two sub-watersheds, one from the headwaters to the city of Iron River, and the second from the city of Iron River downstream to its mouth at the Brule River. Generally, most of the Iron River upstream from the cities has seen less impact from human activities and therefore has remained higher quality. Downstream however, the influence of urbanization and industrialization has degraded the stream to much lower habitat quality and ecological diversity.

Sediment is the primary pollutant of concern for the Iron River Watershed. Potentially, the most significant contributor of this pollutant is runoff from the streets and sidewalks of the cities. However, gravel mining operations have also released large amounts of sand and sediment that have practically buried entire stretches within the river. Other sources of sediment throughout the watershed include livestock access, road/stream crossings, and impounded sediment behind dams.

Although gravel mining has had some detrimental impacts on the watershed the effects of the gravel mining pales in comparison to the damage created from the iron mines decades earlier. Pyritic iron ore, in contact with the air and water oxidizes to create sulfuric acid which reacts with the ore to result in an acidic iron solution. After further oxidation and the neutralization of the solutions from water, the iron falls out of solution into a orange-yellow flocculent precipitate known as "yellow boy".

Oxidation of the sulfides in the presence of air and water produces sulfuric acid and soluble ferrous sulfate:

$$2FeS_2 + 7O_2 + 2H_2O > 2H_2SO_4 + 2FeSO_4$$

Pyrite + Oxygen + Water yields Sulfuric Acid + Ferrous Sulfate

Additional exposure to air and water causes ferrous sulfate to oxidize to ferric sulfate:

$$4FeSO_4 + O_2 + 2H_2SO_4 > 2Fe(SO_4)_3 + 2H_2O$$

Ferrous Sulfate + Oxygen + Sulfuric Acid yields Ferric Sulfate + Water

Ferric sulfate becomes hydrolyzed to relatively insoluble ferric/hydroxide upon neutralization which takes place rapidly when acid mine drainage mixes with stream waters:

$$Fe(SO_4)_3 + 6H_2O > 2Fe(OH)_3 + 3H_2\ SO_4$$

Ferric Sulfate + Water yields Ferric Hydroxide ("Yellow Boy") + Sulfuric Acid

For years yellow boy saturated the river downstream of the mines and an orange plume indicated where the Iron entered the Brule. This contaminant covered the bottom substrate, clouded the water, coated aquatic insects and infiltrated the fish gills. In recent years, remediation and the departure of the mines has greatly improved the habitat and water quality of the water.

While sediment and acid mine drainage constitute the majority of pollutants affecting the watershed there are other, very real, threats to the stability of the Iron River Watershed as well. Nutrients, toxics, and thermal pollution associated with urban runoff contaminate the watershed. Development and gravel excavation continue to reduce recharge areas and increase impervious surfaces. Certain road stream crossings also damage stream habitat and impede fish migration.

The fact that brook trout production has persisted despite both past and present obstacles is a testament to the durability of the Iron River. However, this perseverance should neither be taken for

granted, nor overestimated. Unless certain changes are made both to rectify problems created in the past, and in how people view the watershed in the future, the Iron River Watershed may not remain the high quality brook trout fishery we know today.

Background/History of Watershed Council

In 1997, various residents of the Iron County community came together to form the Iron River Watershed Council. Although from different backgrounds and professions, they all shared a common ground. Each member of the council recognized the Iron River Watershed as a valuable asset to Iron County. They saw that despite the hardships that the river has faced, the Iron River continues to be a productive brook trout stream which has great both promise and serious threats for the future. Their belief was that by protecting, promoting, and improving the Iron River they could both rectify some of the damages done in the past, and ensure that the Iron River watershed remained a viable resource for both the natural ecosystem and the local community.

One of the most damaging influences to the Iron River Watershed came from the acid mine drainage from the Dober and Buck mines. In 1995, the Michigan Department of Environmental Quality filed a lawsuit against the Hannah mining company which sought retribution for the environmental degradation that occurred as a result of their mining practices. The parties agreed on a settlement in which the Hannah Mining Co. was made to apply remediation tactics to limit acid runoff as well as fined for $318,000.00 dollars in damages. This money was to be administered by the state, but managed by the newly formed Watershed Council. The award was earmarked specifically for activities to repair, enhance, or protect the Iron River, as well as provide for increased public use. The settlement spawned the idea for the watershed project, and the monies will serve as the financial foundation for the activities that the council will undertake over the next several years.

One activity that the watershed council has since become recognized for is the annual Adopt-A-River clean-up day. Each year a clean up effort is organized and run by the Iron River Watershed Council which has the participation of many high school students, local clubs and organizations, and interested individuals. These members of the community wade through the river picking up litter in the water and along the banks. Every year tons of garbage are removed. Everything from couches to toilet seats and truck tires to bicycles have been withdrawn during this event.

In 1999, through the efforts of the Iron River Watershed Council, the Iron County Conservation District was awarded a 319 planning grant to begin development for a management plan for the Iron River Watershed. That summer the watershed project officially began with the hiring of a full time project manager. (The 319 planning grant was later revised to a 604b planning grant, a modification which allowed for additional technical equipment to be purchased for use in the project.) With the Watershed Council acting as steering committee, an inventory of the watershed was conducted, an information and awareness campaign begun, and strategies to address sources of nonpoint pollution were developed. This management plan is the direct result of those efforts and the product of that grant.

Description of Watershed

Location

The Iron River Watershed is located in southwestern Iron County in Michigan's Upper Peninsula. The watershed is approximately 61,440 acres and stretches over the townships of Iron River, Stambaugh and Bates. It contains the cities of Iron River, Caspian, and Gaastra, as well as the community of Beechwood. The Iron River drains into the Brule River which flows into the larger Menominee River, which then eventually empties into Lake Michigan. The Menominee River is a designated Area of Concern (AOC) listed in the Lake Michigan Lakewide Area Management Plan (LaMP).

Climate & Precipitation

The yearly average temperature for the area is 39.8 degrees F with extremes ranging from 98 to -44 degrees F. The average daily maximum is 51.8 and the average daily minimum is 27.7. On average the watershed will see 31.68 inches of rainfall each year and 76.9 inches in snowfall. (Climate and precipitation statistics were taken from the Iron County Soil Survey. Information was taken from data recorded in the period 1956-85 at Stambaugh, MI. Stambaugh was incorporated into the city of Iron River in July of 2000.)

Population & Land Use

According to the 2000 census, Iron County has a population of 13,138 people. Of this, approximately 6000 people reside within the Iron River Watershed or about 46% of the county. Most of these people are concentrated within the cities of Iron River, Caspian, Gaastra, through which the Iron River passes. Additionally there are a number of residents who own homes or camps along many of the larger waterbodies in the watershed. Land use for the Iron River Watershed is distributed as 57% forested, 12% agricultural, 7% wetland, 16% urban, and 8% of other varied classifications.

Waterbodies

There are approximately 40 miles of streams that constitute the major flowing water systems in the Iron River Watershed. Major streams and their lengths include:

South Branch Iron River: 3 miles
North Branch Iron River: 4 miles
Nash Creek: 2 miles
Stanley Creek: 1.5 mile
Autio Creek: 2.5 miles
Iron Lake Creek: 1 mile
Sunset Creek: 5 miles
Holmes Creek: 3 miles
Baker Creek: 2.5 miles
Iron River: 15.5 miles

Along with the streams, the watershed contains five major lakes: Iron Lake, Ice Lake, Lake Ottawa, Stanley Lake, and Sunset Lake. The watershed also contains smaller perennial and intermittent streams, lakes, vernal springs and wetlands, many of which are unnamed. The Iron River is a rather low gradient river, dropping only about 150 feet in elevation between the headwaters to its confluence with the Brule River.

Soil & Geology

Iron County is part of a high plateau region. Elevation ranges from about 1,285 to 1,875 feet above sea level. The physiography of the county is the result of continental glaciation, modified in some areas by bedrock. Glacial landforms include rolling ground moraines, end moraines, steep ice-contact features, and outwash plains.

The major bedrock types in the county are Middle Precambrian. They are dominantly the Michigamme slate and associated formations including graywacke, greenstone, and quartzite deposits. Extensive iron formations are near the area around Iron River and Crystal Falls. Lower Precambrian rocks, chiefly Algoman and Laurentian granite and granite gneiss, occur in the eastern part of Iron County.

Outcrops of bedrock are throughout the county, but most areas are covered with glacial drift as much as 200 feet thick. The surficial glacial deposits in Iron County are all of late Wisconsin Age. They were deposited primarily by the Langdale, Ontonagon, Keweenaw Bay, Green Bay, and Michigamme lobes of the Woodfordian and Valders advances. Subsequent ablation of the glacier, glacial meltwater, and post glacial activity greatly modified these deposits.

The lineated topography characterized by drumlins and intervening grooves in southwestern Iron County is a ground moraine deposited by the Langdale lobe. The drumlins are oriented

northeast-southwest and are typically .5 to 1.0 mile long, .3 to .5 mile wide, and 50 to 150 feet high. The grooves at the lower altitudes tend to contain deposits of outwash and ice-contact stratified sand and gravelly sand. Swamps and lakes are in linear depressions adjacent to the drumlins. (Iron County Soil Survey, 1990 - pgs. 2-3)

Special Resources

The following are documented in the Michigan Natural Resources Inventory as occurring in Iron County.

Vertebrate Animals	State Status
Red-Shouldered Hawk	Threatened
Common Loon	Threatened
Bald Eagle	Threatened
Osprey	Threatened
Moose	Special Concern

Invertebrate Animals	State Status
Freija fritillary	Special Concern
Frigga fritillary	Special Concern
Red-disked Alpine	Special Concern
Rapids Clubtail	Special Concern

Plants	State Status
Assiniboia Sedge	Threatened
Carey's Smartweed	Threatened
Purple Clematis	Special Concern
Satiny Willow	Special Concern
Torrey's Bulrush	Special Concern

Designated Uses

The state of Michigan has determined eight uses by which all surface waters are designated and shall be protected for. The designated uses are as follows: Agriculture, Industrial Water Supply, Public water supply at the point of intake, navigation, warmwater fishery/coldwater fishery, Other indigenous aquatic life and wildlife, Partial Body contact recreation, total body contact recreation between May 1 and October 31.

Currently, the Iron River Watershed is meeting or is capable of meeting all of the eight designated uses. However, impacts from both current and historical development of the area have threatened a number of the designated uses.

Public Water Supply at the Point of Intake

Abandoned iron mine pits and shafts have been known to contain acidic or low pH water. This acidic water has also been known to carry metals in solution. Due to the many mines which once operated in the Iron River Watershed there is a potential that acidic or metal laden water may find its way into public water supplies. I have found no information to conclude that the drinking water for the area has ever been contaminated in this way in the past however it does remain a possibility, especially if the municipalities were ever to alter their sources for water. Currently, a wellhead protection program is being developed for the cities of Iron River and Caspian to help ensure that their sources of water remain secure.

Coldwater Fishery

A major source of pride for Iron County and the residents of the Iron River Watershed is that the Iron River is a native brook trout stream. The brook trout that inhabit the Iron River Watershed have endured through many negative impacts however they are not immune to misuse of the resource. Urban runoff, gravel mining operations, "yellow boy", and improperly designed storm drain outlets and road crossings contribute sediment and other pollutants to the stream. These pollutants threaten brook trout by diminishing habitat and changing the condition of the water quality to characteristics which may be unsuitable for trout survival.

Other Indigenous Aquatic Life and Wildlife

Likewise, the aquatic life, especially the aquatic invertebrates, are also sensitive to alterations in water chemistry and habitat. Many of the same factors which influence brook trout sustainability also influence the indigenous aquatic life and wildlife. For these reasons aquatic life and wildlife in the Iron River Watershed are also threatened.

Partial Body Contact

Normally, the water in the Iron River Watershed is suitable for partial body contact. However, under certain specific conditions this designated use can be threatened. The waste water treatment plant for the area municipalities is located in Caspian next to the Iron River. During times of extreme rainfall or in the event of a failure at the plant there is the possibility for sewage to contaminate the river. Large rainfall events may produce more water than the plant can handle and thereby result in backups and overflows of untreated waste water entering the stream. Although the city of Iron River has recently undergone a waste water/storm water separation project, faults in some of the waste water lines at times contribute additional ground water to the system, and thereby result in failures.

Total Body Contact Recreation Between May 1 and October 31

Total body contact recreation also may be threatened for the same reasons as listed above.

Desired Uses

Extension of Apple Blossom Trail

The continued development of the Apple Blossom Trail is an important topic with the Iron River Watershed Council and the community. The current Apple Blossom Trail which was established about 5 years ago travels along the Iron River in Caspian from the Museum northward to 19th street in Iron River. This trail sees much use from the community; students access the river from the trail to use as part of their class studies, walkers, rollerbladers and bikers recreate on the trail, and three fishing piers allow angling access to the river. The extension calls for another 1.8 mile of trail to be added which will continue its path along the river ending at Nanaimo Park in Iron River. By extending this trail into Iron River it promises to bring more people closer to the river and increase awareness and appreciation. Furthermore, the linkage of the two towns helps to build a sense of community for the area and likewise showcases the river as a feature which the communities share. The Apple Blossom Trail will also be a key component to our information and education campaign. Informational kiosks are planned to be located at the main entrance points to the trail. These signs will help to increase awareness and update the public on progress of the watershed project.

Protect River Corridor/Unique Habitat

As we enter into the 21st century, growth and development for Iron County and the Iron River community are bound to occur. It is therefore essential that as we begin to grow as a community we keep in mind how our actions might affect the quality of the river we strive to protect. Maintaining a riparian corridor is vitally important to sustaining the habitat of the brook trout and other aquatic life that reside in the watershed. The riparian corridor helps regulate water temperature, provides woody debris which is a crucial habitat component for fish and insects, contributes detritus for insects to feed upon, serves as a buffer to filter contaminants, reduces runoff velocities, helps stabilize banks, and acts as a living highway for many animals and migratory birds. Conversely, a community with an established green corridor along a river can help bolster the economy by attracting new businesses, raising property values, and increasing local tourism. The watershed council has plans to work with the municipalities that surround the Iron River to ensure that this vital habitat is preserved to benefit both community growth and sustain the natural resource.

Urban Planning for Watershed Protection

As an extension to protecting the river corridor and unique habitat, in order to ensure that the watershed remains healthy in the future the watershed council would like to see new regulations in place for the local municipalities. Zoning ordinances which help control development and industrialization near the river ultimately protect the watershed. Likewise, continuing to consider the sources for urban runoff, the relative effectiveness of storm sewer systems, and limiting the expansion of impervious surfaces benefit watershed protection. Development does not necessarily have to equal a negative impact on a resource. A conscious awareness of the watershed while planning development will help to limit the impact on the river and the need for remediation later on. By adopting new ordinances and regulations which consider the Iron River Watershed the communities help foster that awareness.

Canoe Navigability/Increased Accessibility

Hopefully as people are more able to utilize the river, respect for the river will increase. The watershed council would like to promote activity on the river by supporting additional fishing access locations, removing non-natural canoe obstructions, and providing canoe portages where appropriate.

Watershed Pollutants

Known

Sediment:

Sediment has been identified as the primary pollutant of concern for the Iron River watershed. The following details known sources of sediment in the Iron River Watershed: gravel excavating operations, urban runoff/impervious surfaces, unrestricted livestock access, substandard road crossings, impoundments, and poorly designed storm drain outlets. Likewise, sediment in the system from previous events (logging, pipeline developments, etc) remains trapped behind dams and other obstructions.

Nutrients:

Unnatural amounts of nutrients such as Nitrogen or Phosphorous occasionally occur. Known causes are from the following: privately applied fertilizer, unrestricted livestock access, waste water treatment plant overflows.

Toxics:

Oil, grease, and metal collect on roads and parking lots every year. Urban runoff carries these pollutants directly into the river via storm drains. The proximity of storm drain inlets to locations where these types of pollutants accumulate (heavy equipment sale and repair, service stations, etc) and the visual confirmation of oil sheens and other indicators confirm this as a known pollutant in the Iron River.

Acid Mine Drainage:

Many of the abandoned iron mines and waste rock piles throughout the municipalities have impacted the Iron River. The "yellow boy" precipitate is a result of acid mine drainage and is present in many areas, specifically in Baker Creek and the Iron River below the Dober mine location.

Debris & Litter:

Literally tons of litter and debris are removed annually from the Iron River during stream cleanup.

Suspected

Nutrients:

Suspected sources of nutrients include faulty septic systems at waterfront properties, livestock waste, and residential fertilizer on waterfront lawns.

Thermal:

Urban runoff during the summer can carry rain water warmed from hot rooftops, sidewalks and roads into the river, raising the temperature. Likewise, slow water behind a dam or obstruction may heat faster, especially when aided by a dark, silt covered bottom. While some studies have been done to gauge the temperature on the Iron River there remains more work to be done to conclude definitively that this is a pollutant to the Iron River Watershed. The Wild River Road culvert-dam is highly suspected site for raising water temperature.

Sources & Causes for Each Pollutant

Sediment

Urban Runoff/Storm Drain Outlets:

(There are many storm drain outlets throughout the municipalities however the following locations have been recognized as being significant contributors of sediment)

1. Outlet on north side of US 2 across from Family Dollar store.
2. Outlet on north side of Marlowe Gas, north of US 2 and adjacent to Homer Road.
3. Outlet on east side of Minkler Street where it crosses the Iron River (in the city of Iron River)
4. Outlet on northeast side of 7th Avenue bridge in the city of Iron River.
5. Outlet at 6th Avenue and Sturgeon St., within "Pappy" Park in the city of Iron River.
6. Outlet within Nanaimo Park at 4th Avenue and Franklin Street, in the city of Iron River.
7. Outlet on the east side of the ORV trail at the corner of River and Cayuga Streets, in the city of Iron River.
8. Outlet on the east side of the entrance to the Iron River RV Park, located at River and Genesee Streets, in the city of Iron River.
9. Outlet in the middle of the Iron River RV Park, located at River and Genesee Streets, in the city of Iron River.
10. Outlet at Diamond and Madison in Iron River.
11. Outlet on the west side of the Apple Blossom Trail just above the Dober Dam, located south of the Museum Drive Bridge, in the city of Caspian.
12. Outlet located on the north side of the river at the Apple Blossom Trail Parking lot on Brady Avenue, in the city of Caspian.

Erosion/Gully from Storm Drain Outlets:

1. Outlet on north side of US 2 across from Family Dollar store.
2. Outlet on north side of Marlowe Gas, north of US 2 and adjacent to Homer Road.
3. Outlet within Nanaimo Park at 4th Avenue and Franklin Street, in the city of Iron River.
4. Outlet on the east side of the ORV trail at the corner of River and Cayuga Streets, in the city of Iron River.
5. Outlet on the east side of the entrance to the Iron River RV Park, located at River and Genesee Streets, in the city of Iron River.
6. Outlet in the middle of the Iron River RV Park, located at River and Genesee Streets, in the city of Iron River.
7. Outlet at Diamond and Madison in Iron River.

Gravel Pits:

1 Hebert Gravel Pit on M-73 across from Stanley Creek.

2. Mottes Gravel Pit behind Family Dollar Store on US 2.
3. Beauchamp Gravel Pit adjacent to the Mottes gravel pit along US 2.
4. Spicer gravel pit adjacent to Beauchamp gravel pit along US 2.

Road Crossings:

1. Wild River Road.
2. Mottes Bridge.
3. Homer Road
4. Old McNutt Road

State and County ORV /Snowmobile Trail System

Erosion resulting from Livestock Access

1. Shepich Farm in Stambaugh Township.
2. Olsen Farm in Stambaugh Township.

Nutrients

Agriculture:

1. Livestock access to the river at Shepich Farm.
2. Livestock access to river at Olsen Farm.
3. Field runoff at Olsen Farm.

Urban Runoff:

Stormdrains throughout the municipalities transport nutrients carried in the runoff. Residentially applied fertilizer, lawn and garden clippings, and improperly disposed of waste or chemicals are among some of the sources.

Waterfront Landowners:

1. Many waterfront landowners within the watershed have large lawns which extend to the water's edge. In doing so they remove the buffer that would otherwise protect against excess nutrient input from their property. Lakes and streams which are highly populated in the watershed include: Stanley Lake, Sunset Lake, Sunset Creek, Iron River.
2. Golf Courses also use often use ample amount of fertilizer in maintaining their greens and fairways. The Iron River Country Club, located along M-189, west of Caspian, may also be a source of nutrients. Holmes Creek passes through the golf course before it enters the Iron River.

Waste Water Treatment Plant:

Faults in the sewer lines contribute additional water into the system during heavy rain events. The profusion of water leads to plant overflows which result in the discharge of waste water directly into the Iron River.

Yellow Boy/Acid Mine Drainage

Runoff:

Exposed waste rock piles and waste rock fields near the Iron River still produce acidic runoff. Prominent areas of these waste rock piles include:

1. Along the Iron River, from approximately Garnet Street in Iron River to Museum Drive in Caspian.
2. Along Baker Creek south of Bengal Road to the City of Caspian.
3. Along Sunset Creek west of Homer Road (near the old village of Mineral Hills.)

Treatment Ponds/Wetlands:

Treatment designs are heavily saturated with yellow boy, and release contaminated water into the stream. The systems have as of yet had no maintenance and may have become filled to capacity. There are two systems currently active: the Buck Mine Treatment System, and the Dober Mine Treatment System, located at T.42-R.35W.-S.1.

Oil, Grease, Metal

Urban Runoff/Storm Drain Outlets:

Toxics are can be found throughout urban areas on parking lots, roads, etc. however the following locations have been recognized as having a high likelihood of contributing significant quantities of oil, grease, and metals:

1. Riverside Plaza in Iron River.
2. The Saigh property in Caspian next to Caspian Pond.
3. Rex Angeli Motors in Iron River.
4. Combination of Woodland Equipment, MuffEx and Lindwall Motors in Iron River.
5. Citgo fleet yard in Iron River.
6. Hebert Construction Yard in Iron River.
7. Lakeside Equipment factory

Critical Areas

A critical area is defined as the geographic portion of the watershed that is contributing a majority of the pollutants and is having a significant impact on the waterbody. The critical area for the Iron River watershed therefore can be established from Sunset creek downstream to the Iron river's confluence with the Brule river.

This portion of the watershed has been pressured by industry and development for many years. With the discovery of iron ore in this region in the beginning of the 20th century, the land around the Iron River soon became cultivated by iron mines and urban developments. While the mine operations themselves have since passed, the cities of Iron River, Caspian, and Gaastra remain and continue to grow. The Iron River passes directly through the heart of these developed lands and as a result, has been degraded. Yellow boy from the mines, sedimentation from eroding banks, improperly designed storm drain outlets, urban runoff, agricultural related impacts, and litter have all contributed to lowering the quality of the Iron River. Historically, most of the mines in the watershed were located in a corridor along the river beginning in the Mineral Hills community (near Sunset Creek) and continuing southward through the towns of Iron River, Stambaugh, Caspian, and Gaastra. Downstream of these urban developments, the river was also utilized for the benefits it could provide for agriculture and farming.

Today, these same areas continue to impact the watershed. Although the mines are no longer in operation, the yellow boy and waste rock piles left behind still affect the river. Other forms of industrialization and development have succeeded iron mining. Gravel mining and gradual urban growth create more impervious surface and lead to more runoff and associated pollutants entering the Iron River. Additionally, the increase in impervious surface may affect the temperature of the runoff and warm the river, which is a critical factor that could limit trout production. Furthermore, the accretion in development of waterfront property also poses a threat to the watershed if done so without concern to the well being of the lake or stream. Due to the many threats that the area from Sunset Creek downstream to the Brule present and potentially can cause it is reasonable that this should be defined as the critical area.

Many of the problems directly facing the Iron River fall within this area, however there is another location which is also significant toward improving the Iron River. There is a road crossing over the Iron River just below the union of the north and south branches. This crossing is known as the Wild River Road crossing. The river flows under the road through an extremely large culvert. The culvert contains a man-made dam at the inlet which has held back considerable amounts of water and caused the river upstream to widen and shallow. This segment of stream has also amassed vast amounts of sediment and acts as a solar collector. Due to the habitat degradation that this site has caused, and coupled with the fact that this occurs in what is otherwise a high quality stretch of river this site should be recognized as an area of high concern as well.

Summary of Methods Used to Conduct Inventory

The Iron River Watershed was evaluated using a variety of methods. First and foremost the watershed underwent a visual inventory. All of the Iron River itself has been reviewed but some of the areas of the creeks flowing into the river have not been completely inventoried due to inaccessibility and time. Visual inventories were conducted via wading, automobile, canoe and airplane. By conducting a visual inventory we were able to quickly identify many of the areas of concern in the Iron River watershed.

Along with the visual inventory, habitat, aquatic invertebrate communities, and selected water quality characteristics were inventoried at sampling stations along the river. For much of this data collection, the EPA's Rapid Bioassessment Protocol was selected as the procedure. Also, TempMentor temperature data recording devices were deployed at three locations in the Iron River; one upstream from the city of Iron River, one in the city of Iron River, and one downstream. These devices were used to measure water temperature at hourly intervals over the course of several months.

Rapid Bioassessment Protocol

The EPA's Rapid Bioassessment Protocol is a method used to rate selected sections of stream based on a comparison to a high quality reference site from the same stream. Physical characterization was used and ranked according to the Rapid Bioassessment protocol system. The following parameters were scored: bottom substrate and available cover, embeddedness, flow/velocity, channel alteration, bottom scouring and deposition, pool/riffle, run/bend ratio, bank stability, bank vegetation, and streamside cover.

A total score is obtained for each biological station and compared to a site specific control. The ratio between the score for the station of interest and the score for the control provides a percent comparability measure for each station. The station is then classified on the basis of its similarity to expected conditions (control), and its apparent potential to support an acceptable level of biological health.

Water Quality Characteristics

Water samples were taken from the selected sites and tested for various parameters. Nutrients (Phosphorous and Nitrogen), DO, temperature, pH, conductivity, and suspended solids were among

the parameters tested. This information provided some baseline data to which we can compare water quality data in the future and determine if any significant changes have been made.

Aquatic Invertebrate Sampling

Designated sampling stations were surveyed for aquatic invertebrate community comparisons. Approximately 100 individual organisms were sampled at each site. Relative abundance of species, species diversity, and the comparison between pollution tolerant species to pollution intolerant species were documented. In general, sites containing higher diversity of species and a dominance of pollution intolerant organisms such as ephemeroptera, tricoptera, and plecoptera (mayflies, caddisflies, and stoneflies) are classified as higher quality areas. Sites were scored and ranked in reference to a high quality area of the Iron River. This information will provide the baseline data to which we compare aquatic invertebrate communities in the future and note whether any changes have occurred.

TempMentor

Temperature recording devices were deployed at three sites in the Iron River. One upstream, above the Wild River Road, one midstream, between the US 2 bridge and Genesee Street, and one downstream above the waste water treatment plant. It was presumed before deployment that the upstream location would record the lowest temperatures due to its proximity to the cold head waters. However, the data shows that apart from the warmest summer months, this location actually had the highest peaks in temperature. This may be largely due to the impoundment created by the Wild River Road crossing. The area of river between the junction of the North and South Branches of the Iron River to the Wild River Road is almost three times the normal width of the river. It is also heavily silted and very little, if any, natural stream bottom is evident. Based on preliminary conclusions made from the data, and from the site characteristics, it can be implied that this area is acting as a large solar collector, warming the water.

Prioritized List of Designated Uses

The following designated uses have been prioritized based on the known impacts affecting the use, the potential for continued impact if improvements are not made, and the significance of that use for the watershed.

Regarding the Iron River Watershed, the designated uses can be prioritized in the following manner:

1. Coldwater Fishery
2. Other indigenous aquatic life and wildlife
3. Partial Body Contact Recreation
4. Total Body Contact Recreation
5. Public Water Supply at Point of Intake
6. Agriculture
7. Navigation
8. Industrial Water Supply

The importance the Iron River holds as a native brook trout stream and as an integral component to the western Iron County communities justifies coldwater fishery as the primary designated use. The Iron River is one of the most productive native brook trout streams in the state. This productivity, coupled with its designation as a blue ribbon trout stream make it a very unique and important ecological resource. Also, being that the Iron River passes directly through one of the major population centers in the county, it plays a potentially vital role in the well being and success of those municipalities as well.

Consequently, preserving other indigenous aquatic life and wildlife naturally follows as the next priority. The ecological community is a major factor in the productivity of the Iron River. In order to maintain its status as a high quality cold water fishery, actions must be made to ensure that all facets of that ecosystem are preserved. Other aquatic life, most significantly aquatic invertebrates, are crucial to the health and vitality of the brook trout. If we fail to recognize the importance that other aquatic life and wildlife play in the role of sustaining the Iron River Watershed as a coldwater fishery, the likelihood for success in safeguarding the primary use will be greatly reduced.

Due to the large amount of use that Iron County water bodies see from both tourists and residents throughout the year it is very important that the waters of the Iron River Watershed remain

safe for public use. Fishing, swimming and boating are common activities that bring thousands of people to water both in Iron County and the State of Michigan. The Iron River Watershed alone hosts high quality lakes that contain Musky, Northern Pike, Largemouth and Smallmouth Bass, Walleye, Rainbow Trout, Lake Trout, Perch and Bluegill. Those fishing opportunities, along with the Iron River, a blue ribbon trout stream, guarantee high public use. Furthermore, some of the lakes have public swimming areas as well as many private homes or camps that allow individuals access to the water.

Residents of the Iron River Watershed utilize groundwater for their water supply. Currently, the main sources for the municipalities are clean and safe for human consumption. The watershed presently meets the designated use for a public water supply at the point of intake but it should be noted that if the cities expand and develop they may eventually need to seek additional public water supplies. Due to the heavy mining that was done in the area and the polluted water that has resulted in the abandoned shafts and tunnels caution should be displayed when seeking new sources.

The remaining designated uses: Agriculture, Navigation and Industrial Water Supply are lower priorities for the Iron River Watershed because they represent a relatively small percentage of usage of the Iron River Watershed, and are unlikely to change in the near future.

Prioritized List of Pollutants

Pollutants have been ranked according to their relative abundance, number of sources, and present and potential impact on the Iron River Watershed.

1. Sediment
2. Acid Mine Drainage
3. Thermal
4. Nutrients
5. Toxics (oil, grease, metals)

Sediment

Sediment is designated as the primary pollutant for the Iron River Watershed. This designation comes as a combination of the impact sediment has on trout populations, the number of contributing sources of sediment within the watershed, and the potential increase in sediment from development and urbanization.

Trout populations are dependant on cold clean water and gravel stream bottoms for their spawning beds. Brook trout, more than other species of trout, necessitate this kind of gravel substrate in conjunction with a source of groundwater recharge. The gravel acts as protection for the eggs while at the same time allowing water to flow over the eggs, thereby supplying them with oxygen. As sedimentation occurs, the stream bottom becomes predominated with particles which are to small to facilitate the eggs and eventually depletes them of oxygen. Similarly, the insects which the Brook trout feed upon need gravel substrate for protection, while also allowing for oxygen consumption. Heavy sedimentation thereby changes the necessary habitat for these aquatic organisms and in turn decrease the amount of food available to trout. Additionally, sedimentation increases turbidity which affect fishes ability to find prey, transports pollutants attached to suspended particles, and increases water temperature by allowing for greater heat absorption.

In the Iron River Watershed, sources of sediment are abundant and constitute the majority of immediate concerns. Numerous storm drain outlets have poor outlets either emptying directly into the river, or drain at the top of a slope which result in gullies. Gravel pit operations near the river have also contributed tons of sediment from runoff. Further downstream from the towns, cattle farms add sediment from erosion created from the destabilization of banks by livestock. There are two major road crossings that also add sediment. The road crossing at the Schinella-Mottes office

and supply yard is improperly designed with undersized culverts which are eroding the banks and stream bottom, resulting in the formation of a delta downstream. ORV/snowmobile trails extend adjacent to much of the river. The Wild River Road has a small dam in front of its crossing which impounds a large amount of water and results in heavy sedimentation behind it.

Acid Mine Drainage/Yellow Boy

AMD is second on the priority list due to the legacy of problems yellow boy has created in the past, the ever present threat that yellow boy currently poses, and the difficult and complex nature of locating and eliminating sources.

Yellow boy is the common name for the yellowish orange precipitate that results from acid mine drainage. Much like sediment, yellow boy covers stream bottom and diminishes fish and aquatic insect habitat. However, unlike sediment, yellow boy clings to objects it comes into contact with as well, including submerged logs, rocks, fish gills, or even aquatic insects. Due to this, yellow boy is often much more detrimental and displays its effects in a considerably shorter amount of time. Also, the acidic conditions that lead to yellow boy may change water chemistry to less than suitable conditions for the organisms that inhabit the stream.

Iron County was built out of the mining of Iron ore and the Iron River watershed has seen the majority of those iron ore operations over the course of the 20th century. Although all of the mines have since closed or moved away the evidence of their presence is still noticeable today. Unlike old mine buildings or equipment that may provide historical value for the community, the waste rock piles and flooded mine shafts only cripple one of the most important natural resources in the U.P. Waste rock piles can be found throughout the watershed, with some of the most apparent and potentially harmful occurring along the river in a corridor which extends from Garnett St. in Iron River to Brady Ave in Caspian.

Eventually, the surfaces of the waste rock piles lose their ability to produce acid mine runoff. The biggest problem in dealing with eliminating the waste rock piles is the fact that in disturbing the waste rock, new rock with the capacity to produce more acid and yellow boy is exposed, aggravating the situation once again. The nature of the rock along with the vast extent of its presence in the watershed makes the cost of removal and disposal serious logistical problems as well.

In the past, work has been done on two locations which were known to have a serious detrimental effect on the river. Both the Dober and Buck mine locations were addressed by implementing a series of treatment ponds and wetlands which would allow for the participation and settling of yellow boy before entering the river. These systems have worked well, yet to date, there

has been no maintenance of the facilities or any study to see if they have reached their carrying capacity. It is unknown how long these treatment systems will remain effective, and this, in conjunction with the amount of untreated areas, lend to the high priority of AMD/Yellow Boy.

Reclamation of land and the removal of acid producing waste rock within the watershed is a dauntingly large task the size of which elicits the Iron River Watershed Project only to mention it as a serious concern. In order to properly address the situation, an extensive and detailed study will need to be conducted and complete cooperation between local governments, private landowners, and various agencies will need to be established. Although the effects of yellow boy and acid mine drainage are substantially less than they were at the height of the mine operations, it is still a present danger to the stream which requires consideration. The uncovering of new waste rock or the failures of current treatment systems could considerably set back any progress made on the Iron River in the future. Currently the Iron River Watershed is being considered for the USDA PL-566 program which could provide the assistance necessary to adequately address this problem. Until additional steps are taken to appropriately address this issue on a long term scale, AMD and yellow boy will remain a high priority pollutant for the Iron River Watershed.

Thermal

Thermal pollution is ranked third as a pollutant priority. It is ranked third because of the sensitivity of trout to water temperature, the amount of impervious surface in the watershed, the number of storm drain outlets that drain directly into the river, and the potential for this threat to increase as the municipalities develop and expand.

The optimal temperature range for growth and survival of Brook trout is 55 to 65 degrees Fahrenheit (Brook Trout pg.58). Many trout streams are dependant upon their tributaries to supply the cold water that define a healthy coldwater fishery. However, high beaver populations along the feeder streams in the Iron River watershed have dammed many of these creeks and warmed the water to less than desirable conditions. Despite the warmer water input from the feeder creek, a key ingredient to what makes the Iron River watershed so unique is the strong, cold groundwater recharge that flows directly through the stream bottom. The groundwater recharge that the Iron River receives balance the effects of the creeks and maintains suitable habitat for brook trout.

The ability for groundwater to effectively cool the river is lessened in the urbanized areas. During the summer months, impervious surface such as roof shingles, sidewalks, and streets absorb heat as the temperatures increase. Then when rain events occur, this heat is transferred to the runoff as the water flows over those surfaces. In the Iron River Watershed, many of the storm drains outlet immediately into the river providing a direct route for the warmed runoff to enter the system.

Currently, the watershed is able to cope with the relatively limited number of occasions when this happens. However, as development in the watershed increases the impervious surfaces that result will do two things. First it will increase the area that readily absorbs heat (and consequently increase the amount of warm water that will enter the stream during storm events) and secondly, it decreases the amount of area able to absorb precipitation thereby decreasing the amount of ground water available to maintain the cool water recharge.

In the Iron River watershed some of the creeks such as Nash, Sunset, and Stanley are historically known to have contained viable brook trout populations. Warmed water, largely due to beaver impoundments, have left these creeks unsuitable for a sustainable brook trout fishery. Disregarding the effects that impervious surfaces and numerous impoundments have on the Iron River may lead to a similar result for the Iron River.

Nutrients

Excess nutrients in any biological system may stimulate plant growth and productivity. It is for this very reason that farmers apply fertilizer to their crops, and homeowners use fertilizer and other chemicals on their lawns and gardens. In an aquatic ecosystem, nutrients act in much the same way, stimulating algal growth along with other aquatic vegetation. However, too much plant growth in an aquatic system can be detrimental for a number of reasons. Excess nutrients, particularly in lakes, can result in algal blooms and overgrowth of plants. Apart from being a nuisance to lakefront property owners and recreationists, it can also have a very real impact on the water quality of the lake or stream.

As the plant matter grows it can alter the conditions and habitat for the organisms within the system. Then, as the plants and algae die, the dying matter uses up oxygen during the decomposition process, depleting oxygen from other organisms in the water. If enough plant life is produced, the resulting decaying matter could subsequently consume enough oxygen to literally suffocate fish and other organisms within that lake or stream.

Nutrients can be introduced by fertilizer, human or animal waste, or decomposing plant material such as leaves or lawn clippings, to name a few sources. In the Iron River Watershed, contributing sources of nutrients include the waste water treatment plant, livestock access from local farms, runoff transported via the storm drain systems within the municipalities, as well as runoff from waterfront properties, specifically on Sunset and Stanley Lakes.

Toxics

Toxic chemicals and other hazardous materials such as oil, grease, and metals can be severely damaging to aquatic plants and animals. In the Iron River Watershed, these substances typically enter the streams and river via storm drain outlets and road crossings. Over time these pollutants collect on streets, parking lots, and driveways. Similar to other pollutants, these substances are then washed away and become concentrated in the runoff. Typically, the Iron River watershed does not contribute enough toxics to significantly impact the stream on a large scale, however, there are areas in the watershed that may affect localized biological communities.

There is a corridor along the Iron River which spans roughly from M-73 to the US 2 bridge in Iron River. Throughout this corridor many prime locations where toxic accumulation would be expected are present. Heavy machinery equipment dealers and manufacturers like Lakeshore Equipment, Woodland Equipment, and Nortrax equipment, auto dealerships and maintenance facilities such as Rex Angeli Motors, Lindwall Motors, MuffEx, and shopping area parking lots from Family Dollar, Riverside Plaza, and the downtown district of Iron River.

Additionally, there are some sites outside of this corridor that may also contribute toxics. In Caspian, runoff from John's Auto Salvage, the Saigh property near Caspian pond, and Hebert Equipment yard are some key potential sites where toxics could enter the river.

Although as of yet the toxic levels in the Iron River Watershed have not been detrimental, the sources listed above should be recognized and measures should be taken to ensure that harmful chemicals are kept on site and do not enter the river. Furthermore, any future expansion of industry or commercial development should also ensure maintenance and containment of these types of pollutants.

Prioritized List of Sources & Causes Within the Iron River Watershed

Sediment

1. Urban: Storm Drain - (a) Direct outlet into river, (b) Sand accumulation after spring melt
2. Mining - Runoff from gravel pits
3. Stream bank/Shoreline: Eroding Gullies - Improperly placed or designed storm drain outlets
4. Transportation: Road Crossing - (a) Inadequate size or improperly placed culverts, (b) Runoff, (c) Impoundments
5. Agriculture: Livestock - Unlimited Access
6. Transportation: ORV/Snowmobile trails

Acid Mine Drainage

1. Mining: Waste Rock Piles - Runoff from waste rock
2. Mining: Baker Creek - Runoff from waste rock
3. Mining: Dober Mine - Outflow from treatment at Dober Mine
4. Mining: Buck Mine - Outflow from treatment at Buck Mine

Thermal

1. Urban: Storm Drain - (a) Direct outlet into river, (b) Impervious surfaces
2. Forestry: Small Feeder Creeks - Beaver impoundments
3. Transportation: Wild River Road - Impoundment

Nutrients

1. Residential: Waterfront Property - (a) Lack of buffer, (b) Residential Fertilizer Use, (c) Failing Septic Systems
2. Agriculture: Livestock - (a) Unlimited Access, (b) Agricultural Runoff

Toxics

1. Urban: Storm Drain - Direct Outlet into River
2. Urban: Impervious Surfaces (streets, parking lots, etc.) - (a) Runoff, (b) Lack of storm water control systems

List of Water Quality or Protection Goals for the Iron River Watershed

Cold Water Fishery/Other Aquatic Life Wildlife

Sediment Reduction Goals:

1. Install BMPs to limit sediment input from storm drains.
2. Stabilize eroding gullies at storm drain outlets
3. Repair substandard road stream crossings.
4. Restrict cattle access
5. Limit gravel excavating and other forms of mining near the river and install BMPs to control runoff from those sites.
6. Install in-stream structures to restore natural stream bottom.
7. Remove unnatural, useless, or excessive flow obstructions.
8. Limit erosion from ORV/Snowmobile trails and devise strategies to confine users to designated trails.

Nutrient Reduction Goals:

1. Install BMPs to limit nutrient input from storm drains.
2. Restrict livestock access to the river.
3. Limit residentially applied fertilizer.
4. Identify and correct failing septic systems.
5. Repair municipal waste/storm water lines to avoid waste water treatment plant overflows.

Oil, Grease, & Metal Reduction Goals (toxics):

1. Install BMPs to limit toxic input from storm drain outlets.
2. Educate the public on how to properly dispose of toxics.
3. Control runoff from service stations, heavy equipment repair businesses, and other locations where the toxics are often accumulated.

Yellow boy and Acid Mine Drainage Reduction:

1. Improve and maintain existing treatment systems.
2. Cap and revegetate bare waste rock fields and piles.
3. Identify and treat additional sources of acid mine drainage.

Litter and Debris Reduction:

1. Continue annual river clean-up.
2. Educate the public on the proper disposal of waste.

Thermal Pollution Reduction:

1. Install BMPs to increase storm water infiltration.
2. Limit the amount of impervious surface allowed in future development.
3. Remove unnatural or excessive flow obstructions.

E. coli Bacteria Prevention:

1. Repair municipal waste/storm water lines to prevent waste water treatment plant overflows.
2. Identify and correct failing septic systems.
3. Restrict livestock access to the river.

Maintain Current Hydrologic Flow:

1. Install BMPs to increase storm water infiltration.
2. Limit gravel excavating and other forms of mining near the river and install BMPs to control runoff from those sites.
3. Limit the amount of impervious surface allowed in future development.

Systems of BMPs

Best Management Practices, or BMPs, are structural, vegetative, and managerial practices implemented to control nonpoint source pollution. Series of BMPs are often applied in conjunction with one another to form a resource management system. A resource management system tries to provide the optimum combination of BMPs to address the identified concerns for a particular resource. There are many different BMPs that can be applied to control pollution and often different strategies may be utilized at a given location. The following will list BMPs which are most appropriate for the concerns afflicting the Iron River Watershed.

Urban: Storm Drain Outlets

Storm sewer systems are vital to the safety and well being of any urban area. The storm sewer systems help to manage water from rainfall and snowmelt that might otherwise damage buildings, create accidents, or generate other flood related problems. However, these same systems can be a detriment to nearby water bodies if they carry pollutants via runoff directly into a lake or stream. Similarly, if the storm drain outlets are not sized or placed properly they can accelerate erosion and add sediment to the stream. The following best management practices may be considered to reduce the pollutants from storm drain outlets in the Iron River Watershed: *critical area treatment, detention basin, grassed waterway, infiltration/retention basin, wetland restoration/creation, stabilized outlet, stream bank stabilization.*

Transportation: Road Crossing

Road crossings can inflict negative impacts on a stream if designed improperly. Mis-sized culverts may lead to erosion of the banks around the crossing, the creation of impoundments above the crossing, the formation of plunge pools below the crossing, and the acceleration of water through the culvert limiting fish migration. The following Best Management Practices may be considered to alleviate negative impacts from road crossings: *critical area treatment, stream bank stabilization, watercourse crossing.*

Transportation: Road Side Runoff

Water not handled by storm sewer systems may travel along roads until it reaches a low point, often delivering the water to a stream at a road crossing. Water running along a bare road or shoulder may create erosion and carry displaced soil particles into the stream, along with nutrients

or toxic pollutants associated with runoff. The following Best Management Practices may be considered to alleviate roadside runoff and limit the amount of pollutants entering the stream at road crossings: *check dams, critical area treatment, diversions, grassed waterway, sediment basin, slope/shoreline stabilization.*

Agriculture: Livestock Access

When livestock utilize a stream for their water supply, they can have negative impacts on water quality. Destabilization of the banks under foot of livestock can occur and result in erosion. Natural waste associated with livestock can also accumulate along the stream bank and contaminate the water. The following Best Management Practices may be used to restrict livestock access and allow for alternative methods to provide the livestock with water: *alternate watering source (hydroram pumps, sling pumps, solar pumps, etc.), critical area treatment, fencing, livestock crossing, stream bank stabilization.*

Agriculture: Runoff

Overland runoff from farm fields and pastures can lead to negative impacts for a watershed. Agricultural runoff can collect significant amounts of nutrients from fertilizer or animal waste, harmful chemicals from pesticide, or sediment from bare fields and erosion. The following Best Management Practices may be used to limit agricultural runoff and its associated pollutants: *animal waste facility, check dams, cover crops, critical area treatment, diversion, filter strip, forest riparian buffer strips, grade stabilization structure, grassed waterway, infiltration/retention basin, no-till, reduce till, slope/shoreline stabilization, stormwater conveyance channel, windbreak.*

Mining: Runoff

Gravel excavating has replaced iron ore as the predominant mining industry in Iron County. Many of the gravel pits in Iron County can be found in close proximity to streams or lakes in the watershed. The size of the pits and highly erosive nature of the exposed sand and gravel often lead to vast amounts of sediment laden runoff after rain events. The following Best Management Practices may be used to limit runoff from leaving the gravel pit locations and reduce the amount of sediment entering the stream: *check dams, critical area treatment, detention basins, diversion, grade stabilization structure, infiltration/retention basin, infiltration trench, sediment basin, slope stabilization, stormwater conveyance channel.*

Mining: Waste Rock Piles

Waste rock piles left from the mining days in Iron County still produce acid runoff and yellow boy. As previously unexposed wasterock comes into contact with water and air the acid runoff is produced, which can seriously impact water quality. The following Best Management Practices may be used to contain acid runoff from the waste rock piles and reduce further contamination: *critical area treatment, detention basins, fencing, filter strip, grade stabilization structure, infiltration/retention basin, sediment basin, slope stabilization, wetland restoration/creation.*

Streambank/Shoreline: Eroding Gullies

Gullies are the result of a concentration of water moving down a slope with a great amount of force. In the Iron River Watershed, gullies have been found in association with streambanks or shoreline erosion. After investigation of the erosion and associated gullies, often the cause was the result of storm drain outlets emptying at the top of slopes near the river. The soil removed in the formation of the gully is transported into the river, increasing sedimentation. The following Best Management Practices may be used to stabilize the eroding gullies and decrease sedimentation in the Iron River Watershed: *check dams, critical area treatment, erosion control structure, grade stabilization structure, grassed waterway, infiltration trench, sediment basin, slope stabilization, stabilized outlet, stormwater conveyance channel.*

Channel Restoration: Sedimentation

Sediment deposition over time can decrease the amount of suitable habitat for macroinvertebrate organisms and spawning trout. A large increase in sediment over a short amount of time can have serious impacts on the ecological integrity of a watershed. The following Best Management Practices may be used to remove and/or trap sediment, and restore the stream bottom to more natural conditions: *boulder placement, brush bundles, channel constrictor, cross log and revetment, cover logs and rootwads, double-wing deflector, K dam, single-wing deflector, wedge dam.*

Channel Restoration: Impoundment removal

Impoundments in a watershed may serve several useful purposes. They may have been created to produce electricity, transport harvestable resources, or provide habitat for wildlife. However, impoundments can also create disturbances in a stream system by obstructing fish migration,

changing water temperature and quality, and collecting sediment. In the Iron River Watershed, the detriments appear to outweigh the benefits at the Wild River Road crossing. The following Best Management Practices may be considered to remove that impoundment and restore the stream to more natural conditions: *brush bundles, critical area treatment, shoreline stabilization, wetland restoration/creation.*

Residential: Waterfront Property

Much like agricultural runoff, runoff from waterfront land owners can carry nutrients, toxics, and sediment if not properly managed. While the concentrations are much less than would be from a farm, the accumulation of those pollutants from many landowners can add up to a significant impact on the lake or stream. The following Best Management Practices may be used to limit pollutant input from residences and other waterfront property: *abandoned well capping, check dams, critical area treatment, diversion, filter strip, forest riparian buffer strip, grade stabilization structure, slope/shoreline stabilization, yard waste management.*

Tasks Needed To Implement BMPs

Water Quality Resource Management Plan

A water quality resource management plan (WQRMP) will be developed for each site determined for an implementation project. A WQRMP details the whole system of BMPs designed to solve a particular water quality concern at a given site. A WQRMP will include detailed site descriptions, costs and contributing partners, construction designs submitted by a certified engineer, and a maintenance plan, if necessary.

Engineering & Plan Review

Each project implemented will need to have engineered site plans designed according to the standards and specifications determined for the state of Michigan. Engineered plans are necessary to accurately size and situate structures and best management practices. These plans will then be submitted to DEQ staff for review and approval.

Permits

Proper permits will need to be acquired for projects taking place in or near waters of the state. Most permits for projects implemented under the Iron River Watershed Project will need to be applied for through the Department of Environmental Quality - Land & Water Division, and the Iron County Conservation District.

Accessibility

Projects cannot be undertaken without the permission of landowners on or adjacent to the implementation sites. All landowners within the project area will need to be notified and their approval for construction and/or ingress or egress to the implementation site granted. If projects require maintenance beyond initial construction, agreements will also need to be made to allow for future accessability, possibly in the establishment of permanent easements.

Maintenance

After designs have been approved and construction completed, there may be some implementation projects which will require periodic maintenance. Maintenance agreements are crucial to the long term success of such projects and details to maintenance scheduling and responsibility should be finalized during the development of the WQRMP to ensure the effectiveness of the project in the future.

Implementation Projects

The following projects are scheduled for implementation over the next three years. These sites have been selected based on the pollutants the projects address, the potential for greatest positive impact, and the willingness of landowners and partners to undertake projects. While the projects are currently being scheduled, conditions in the watershed may change over the next few years to warrant alterations in project priorities. The goal of this watershed project is to implement projects which will provide the most benefit for the Iron River Watershed. As the project evolves through time it is expected that ideas and perspectives will evolve as well. Therefore it is important to note that the following projects may be revised or new projects developed in their place. This management plan is to be used as a tool to help direct activities in the Iron River Watershed. It is up to the local decision makers and the Iron River Watershed community to effectively utilize the information within the plan. Changes in implementation projects are acceptable so long as the changes provide the best option for preserving the Iron River as a high quality brook trout fishery.

Nanaimo Park - Storm Drain Outlet

The storm drain outlet in Nanaiino Park, in the city of Iron River, empties directly into the river. In addition to the sediment and various pollutants associated with urban runoff that this drain discharges, the flow from the pipe has created an erosion problem around the outlet as well. The erosion has resulted in additional sediment entering the stream and has damaged the pipe such that portions of the drain have actually broken off and fallen into the river.

Objective: Redesign outlet to limit the amount of pollutants entering the stream

Task: Stabilize eroding outlet and create a basin to allow for storm water to settle out pollutants before entering the river.

Responsible Party: City of Iron River

Systems of BMPs: stabilized outlet, infiltration/retention basin, critical area treatment, grassed waterway

Timeline: Year 2

Estimated Cost: $28,000

RV Park - Middle Outlet

The storm drain located in the middle of the Iron River RV Park drains at the western side of the park. The water exiting the pipe flows through a channel which is divided into three small basins. The problem associated with this site is that the channel is not designed to receive the amount of sediment that is delivered from this outlet. While the middle section of the channel does collect some sediment, there is still a significant amount that passes through the channel and into the river. The outlet of the storm drain has also created problems with erosion and subsequently increased the amount of sediment entering the system.

Objective: Redesign storm drain outlet and channel to limit the amount of pollutants entering the stream

Task: Stabilize outlet and resize and design channel to allow for storm water to settle out pollutants before entering the stream

Responsible Party: City of Iron River

Systems of BMPs: critical area treatment, sediment basin, infiltration/retention basin, stabilized outlet, basin retrofit, stormwater conveyance channel

Timeline: Year 3

Cost: $28,000

RV Park - North Outlet

The area located at the north end of the Iron River RV Park contributes sediments and pollutants from two outlets. The combination of the storm water from these drains has also caused erosion along the southern slope of Genesee Street.

Objective: Design storm drain outlet to limit the amount of pollutants entering the stream

Task: Stabilize bank and create wetland to act as infiltration/retention basin

Responsible Party: City of Iron River

Systems of BMPs: critical area treatment, grassed waterway, created wetland, infiltration/retention basin

Timeline: Year 2

Cost: $28,000

Schinella-Mottes Road Crossing

The road crossing at the Schinella-Mottes main office and supply yard is inadequately sized. The double culvert road crossing is not large enough to handle the flow of the river at this location. Culverts have greatly increased the velocity of the water under the crossing and have resulted in scouring/erosion of the streambed and banks and the formation of a delta downstream from the crossing. Velocities at certain times of year are also prohibitive to fish passage.

Objective: Restore natural stream flow through the crossing

Task: Replace double culvert road crossing with bridge and stabilize any eroding banks.

Responsible Party: Schinella-Mottes

Systems of BMPs: bridge, critical area treatment, diversion

Timeline: Year 3

Estimated Cost: $150,000

Olsen Farm

Cattle Access to the Iron River has resulted in a large section of stream bank left bare and eroding. There currently exists a 50-60 foot wide path extending approximately 125 feet long from the top of the hill down into the river. The slope is relatively steep dropping about 35 feet from the top of the slope down to the river.

Objective: Eliminate erosion and sediment input by restricting cattle access to river

Tasks: Fence cattle from river, provide alternative system for cattle watering, and stabilize bank and slope

Responsible Party: Phyllis Olsen

Systems of BMPs: critical area treatment, fencing, alternative water supply system

Timeline: Year 2

Estimated Cost: $24,000

Shepich Farm

Cattle access along the river has resulted in the destabilization of the stream bank at a number of locations on the Shepich farm property. The Shepich farm has approximately ½ mile of frontage along the river from which the cattle have access.

Objective: Eliminate erosion and sediment input by restricting cattle access to river

Task: Fence cattle from river, provide alternative system for watering cattle, and stabilize eroding banks

Responsible Party: James Shepich

System of BMPs: critical area treatment, fencing, alternative watering supply

Timeline: Year 1

Estimated Cost: $24,000

ORV/ACE Trail Washout

At the corner of Cayuga and River streets in Iron River there is a washout which begins at the top of the ORV trail and extends down and across the ACE trail ending in the Iron River. The washout resulted in a gully approximately 8 feet wide, 40 feet long, and 3 feet deep. The gully was caused when a failure of the storm drain pipe at the top of the slope combined with runoff from the ORV trail to create the washout.

Objective: Prevent further erosion of gully and limit sediment from entering the stream

Tasks: Stabilize the slope, divert waterway away from location, and design a stormwater conveyance channel to handle runoff

Responsible Party: City of Iron River

Systems of BMPs: stabilized outlet, critical area treatment, diversion, stormwater conveyance channel

Timeline: Year 1

Estimated Cost: $20,000

Gravel Pit Washout

Sand and sediment from gravel pit washouts across US-2 have left a gully beginning at the outlet for the drainage pipe on the north side of US-2 and ending in the Iron River. The gully is approximately 6 feet wide, 100 feet long, and between 1½ and 3 feet deep. The accumulated material has left a large delta and the sand deposited from the washout has buried much of the stream bottom for about ½ to ¾ of a mile downstream. The owners of the gravel pits that are the source of this runoff are working with the DEQ-SWQD. The cooperation between the DEQ and the gravel pit operators has precipitated the construction of stormwater control measures at the gravel pit locations, the seeding of the slopes at the gravel pits, and an instream sediment trap down river of the washout.

Objective: Reduce sediment input from eroding gully

Task: Stabilize outlet and eroding gully to prevent further sediment input.

Responsible Party: City of Iron River

Systems of BMPs: stabilized outlet, storm water conveyance channel, critical area treatment

Timeline: Year 2

Estimated Cost: $20,000

Apple Blossom Trail Run

The stretch of river extending from approximately Spruce street in Iron River to Museum Drive in Caspian is heavily silted and has been channelized. The city of Iron River contributes significant amounts of sediment and other pollutants from its urban runoff. Due to the upstream sources of pollution and the channelization of the stream in this section of river this stretch has lost considerable amounts of suitable habitat for trout and aquatic invertebrate communities.

Objective: Restore natural habitat and limit sedimentation in this stretch

Task: Install instream structures such as brush bundles to restore habitat, alter channel flow, and trap sediment

Responsible Party: DNR Fisheries, Iron River Watershed Council, Iron Conservation District

Systems of BMPs: Brush bundles, deflector logs, root wads, boulder placement

Timeline: Year 2

Estimated Cost: $18,000

Gravel Pit Run

Runoff from the gravel pits along the Iron River between M-73 and Homer Road have contributed tons of sediment into the river. The sediment has covered gravel stream bottom and decreased suitable habitat for trout and other aquatic organisms. The gravel pit operators have taken measures to limit the amount of future sediment and runoff from these sites and have installed an instream sediment trap below the Homer Road bridge to collect sediment that flows downstream. However they have made no plans to remove the sediment currently present in the system. Structures placed in the stream may move sediment to the sediment trap which can then be maintained.

Objective: Restore natural stream bottom

Tasks: Install instream structures to encourage sediment removal and improve habitat

Responsible Party: DNR Fisheries, Iron River Watershed Council, Iron Conservation District

Systems of BMPs: deflector logs, single-wing deflectors, root wads

Timeline: Year 1

Estimated Cost: $18,000

Information & Education Strategies

A watershed project cannot be successful by only fixing problems, it must prevent them as well. Incorporating an information and education campaign is vital to addressing the future of the watershed. Educating watershed residents about the issues the Iron River faces, as well as the many actions we each can take to help protect it, will foster an awareness for the river and lead to its protection.

The Iron River Watershed Project has a number of projects designed to develop a better understanding and appreciation for the watershed. The following details the activities scheduled for promoting interest in the Iron River watershed.

Blue Ribbon Bragging Boards

Informational kiosks which will be located at the Apple Blossom Trail, and the Iron River RV Park. The kiosks will present some permanent information such as maps, general description of the watershed, and the issues surrounding it. Additionally, there will be areas which can be changed to give updates as to project progress, information about different problems and sources of pollution, insect identification charts and hatch schedules, as well as the basis for the title of the board, an area where people can display photos of fish they have caught in the watershed.

Storm Drain Markers

Almost all of the storm drains throughout Iron River and Caspian drain directly into the Iron River. The storm sewer inlets will be clearly marked with signage that tells people not to dump their waste down the sewers. These markers will serve as constant reminders of how the residents can impact the river. The involvement of school kids in the placement of the markers will also help foster a watershed ethic with the youth of the area.

Web Site

A website with information about the project, general watershed concerns, and links to similar watershed protection efforts will be developed. The site will give many people an opportunity to explore and understand the watershed in a format that is constantly accessible.

Publication Development

Production of a high quality publication to be distributed to watershed residents and interested persons will be assembled. It will include detailed information about the watershed size and components, information about the watershed council and project, elements that contribute to the degradation of a watershed, and what we all can do to contribute to watershed protection.

Entering Iron River Watershed Signs

Signs will be developed and located along main roadways to inform people when they are entering the Iron River Watershed. The signs will familiarize the community with the size of the watershed and give them a better understanding of their place within that landscape.

Newsletters & Articles

Newsletters and articles will continue to be written informing the public on project activities, as well as watershed topics in general. The quarterly newsletter, the Iron River Informer, is distributed as part of the Dickinson-Iron Conservation District newsletter. Coverage of the Iron River Watershed Project, and the Iron River Watershed Council is given periodically in the local newspaper, the Iron County Reporter.

Public Service Talks

The project manager will average at least one public speaking engagement a month over the next few years. Talks will be given to various groups, from school classrooms, to community organizations, to local government boards. The presentations will give local citizens information about the Iron River Watershed, actions they can take to improve it, and updates regarding the project activities.

Adopt-A-River Clean Up

The annual Adopt-A-River clean up is a day in which local high school students and the Iron River Watershed Council work together to remove garbage and unnatural debris from the Iron River. Typically the result of that day is the removal of tons of garbage. These activities are vital to the I/E

strategy as it gives the school kids a connection with the river and reminds the community of one improvement that can be made which they can directly impact.

Iron River Educational Box

The "Iron River Boxes" will serve as tool kits to aid teachers in teaching watershed issues to their students. The boxes will contain equipment and materials for use in both the classroom and the field. They will contain supplies to educate students on watershed issues, basic stream ecology, and water chemistry. Boxes will include but are not limited to: lesson worksheets, ID guides, maps, kick nets, sorting trays, hand lenses, forceps, thermometer, litmus paper, Hach kits, tape measure, etc.

Publicity Materials

Repetition of an image is an effective way to establish a message to an audience. Once people relate a particular idea with a specific image, the more often that image is presented, the more likely they will become familiar with that message. The Iron River Watershed Project will incorporate various publicity materials such as stickers, sport bottles, shirts, hats, magnets, etc that will be distributed at speaking engagements and public events. These items will act as a constant reminder of the Iron River Watershed and the efforts being made to preserve it.

Summary of Local Projects, Programs

The Iron River Watershed Project is not the sole project actively working to improve water quality and increase awareness and appreciation for the Iron River Watershed. Currently, the following projects or programs exist for the benefit of the Iron River.

Buck Mine

As mentioned previously, the treatment systems put in place to contain acid mine drainage and limit yellow boy are thought to either be operating at less than peak effectiveness or have begun to outlive their lifespan. The treatment system associated with the Buck Mine is currently under investigation by the State of Michigan Department of Environmental Quality - Surface Water Quality Division.

Dober

Like the Buck Mine treatment system, the remediation project developed for the Dober Mine effluent is under close scrutiny to ensure that the system is operating according to design. Presently, the Dober Mine settling ponds are enrolled in the National Pollutant Discharge Elimination System (NPDES) which is administered by the Michigan Department of Environmental Quality - Surface Water Quality Division.

ACE High School

The Alternative Center for Education is a service learning institute designed to provide students an education who do not necessarily respond to the traditional secondary education format. Students enrolled at ACE are given a less structured education and learn through a combination of classroom lessons and community service projects. As part of their science curriculum they frequently utilize the Iron River. The ACE students maintain a walking trail along the river where they have installed interpretive signs, removed evasive species, and restored sections of riparian corridor by planting trees. The ACE students and staff are active members of the Iron River Watershed Council and are important players in the Adopt-A-River clean-up efforts.

Trout Unlimited

The Menominee Range Chapter of Trout Unlimited, based out of Iron River, is committed to the protection of Iron County's coldwater trout streams. The chapter actively pursues activities geared toward this goal and the Iron River is just one of the county's high quality trout streams that Trout Unlimited has had an active role in preserving. Dave Tiller, chapter president, along with other members of the organization are active members of the watershed council.

Iron River Watershed Council

The Iron River Watershed Council acts as a steering committee for the Iron River Watershed Project. However, their participation in watershed protection goes beyond an advisory role. As the catalyst for the 319 planning grant which began the watershed project, the council has since commenced a series of ventures to improve the Iron River. Along with the watershed project, the Iron River Watershed Council is involved in securing a grant which will extend the Apple Blossom Trail from Caspian into Iron River, connecting it with the trail maintained by ACE High School. The council, and specifically member George Polich, also takes a large role in organizing the annual Adopt-A-River clean up. The council was formed, in part, to administer monies awarded from a legal settlement between the State of Michigan and the Hannah Mining Company. It was determined that the council would be responsible to direct these funds into projects which will garner the most benefit to the watershed. As the council builds upon its past successes it is assured that the council will remain the active force behind the protection, preservation, and improvement of the Iron River Watershed.

Evaluation

The Iron River Watershed Project is more than an effort to install practices to improve water quality, it is also a project to instill a new way of thinking to ensure that improvements are maintained. Over the next few years, the Iron River Watershed Project will begin to apply the strategies to improve water quality in the Iron River. While the next phase covers a three year time period, the work done to preserve, protect, and improve the Iron River will continue on for many years to come.

Throughout the course of the project, open review and discussion has been a critical element to the formation of the plan. Watershed council meetings, district board meetings, and reports to the MDEQ-SWQD have been ways to constructively evaluate progress. These forums also have assisted in keeping the project activities on schedule. This reporting will continue throughout implementation of the plan.

Biological surveys and water quality monitoring are important methods used to evaluate project effectiveness. Information gathered prior to implementation will be compared to data collected after projects are completed to determine changes in watershed conditions. Results from biological or water quality studies may illustrate positive effects or may help focus energy to more deserving areas of the watershed.

The effectiveness of watershed management cannot be fully realized without the support of the people who use and live in the watershed. Information and education activities are therefore crucial components to any watershed project. Monitoring the number of people reached through newsletters, articles and public speaking engagements, gathering feedback from those activities, and comparing previous survey responses to responses from future surveys are all ways which will be applied to evaluate the effectiveness of the Iron River Watershed Project.

Equally important to the I/E campaign is the annual Adopt-A-River stream cleanup. Each year this event joins high school students with watershed council members in an effort to remove trash from the Iron River. This cleanup day generally generates a good deal of publicity and illustrates to the community how much garbage is still being dumped into the river each year. Over time we can compare pounds of trash removed annually to see if behavioral changes are being made by the watershed residents.

The implementation of best management practices will also be a tool for evaluating project effectiveness. The number of practices installed and priority of the pollutants addressed by those practices will help define the success of the next phase of the project. Pollutant reduction calculations will show the impact each practice has on the watershed which eventually will be used in part to demonstrate the overall effectiveness of the project.

Conclusion

The Iron River Watershed Management Plan has been developed to help recognize the importance of the Iron River, offer possible strategies to improve current problems, and supply information to aid in the protection of the watershed for the future. Perhaps most importantly, it serves as the impetus for discussion about the watershed and the issues that it faces. It is documented that the Iron River is truly a unique and special resource that deserves protection. Nevertheless, the only way the watershed will receive the attention it deserves is if the community as a whole recognizes the importance of the watershed and takes action to preserve it.

The primary pollutant of concern in the watershed is sediment. Sediment accumulation can have serious consequences on a cold water fishery. An overload of sediment can bury spawning beds, decrease suitable habitat for the aquatic organisms which the trout feed upon, limit the ability of trout to find prey, and alter the quality of the water by changing the chemistry and temperature of the stream. The Iron River Watershed has been susceptible to degradation from sediment and because of its status as a high quality cold water brook trout fishery, measures should be taken to assure that further degradation does not occur.

Apart from the implementation projects that are scheduled to improve the watershed, actions must be taken to prevent problems in the future. These actions are the responsibility of the cities, townships, and citizens who reside within the watershed. Local governments will need to examine and further develop laws and regulations regarding growth and activity within their boundaries. Cities will also need to examine the practices of controlling urban runoff and modifications to their current systems may be necessary to reduce sediment and other pollutant input to the water. As the cities expand and continue to develop, a conscious awareness of the watershed, and how are actions impact the quality of the system must be realized. Simple steps taken in the beginning of the planning process can eliminate potential problems and the necessity for remediation later on. Developments designed with the watershed in mind will not only strengthen the quality of the Iron River Watershed, but the quality of the community as well.

As part of the preventative process, ordinances play a crucial role in maintaining sound practices within the watershed. Development near a lake or stream can be very disruptive to the ecological integrity of an area. Ordinances are often the only measure that can be implemented to preserve that integrity. As is the case in the Iron River Watershed, rivers and streams often cross political boundaries. Many times neighboring politics have incongruous perspectives on how to treat the land. In order to adequately protect the Iron River it is therefore important that uniform ordinances and regulations be established among the bordering political jurisdictions in the watershed.

Gravel mining is prevalent in Iron County and an important economic resource for the area. However it is strongly suggested that one of the first topics examined for regulation be the location of future gravel excavating operations. Too often the gravel pits are located in close proximity to the streams in the watershed. The runoff from these sites discharge tons of sediment into the streams and result in an immediate impact. More discrete, but just as influential to the stability of the aquatic environment is the role the glacial moraines which are being excavated, play in the overall status of the watershed. As mentioned earlier, part of what has lent to the impressive perseverance of the Iron River has been its groundwater recharge. This recharge produces the cold water necessary to brook trout through springs within and near the river. The source of the groundwater is provided by the glacial moraines that are able to absorb and store significant amounts of water from snow melt and rain events. If the removal of these geologic features from near the river continue, it may result in the elimination of the primary source of groundwater for the watershed, and result in an impact which is far more detrimental and lasting than excess sediment.

The goals of any project cannot be reached without the support and enthusiasm of those involved. With a watershed project, everyone who lives in or utilizes the watershed is included in the process. Because of this it is crucial that as the project continues to evolve, so to does the awareness and appreciation for the Iron River. The Iron River Watershed Project has, and to an even greater extent will continue to share information and educate the public about the issues that face the river. Ultimately though, it is up to the people who use and live within the watershed to utilize the information to benefit the Iron River.

The benefits of watershed protection go well beyond the preservation of a natural resource. A healthy blue-ribbon brook trout stream flowing through town can have a lasting impact on the social and economic aspects of the area as well. Many locales capitalize on their rivers and lakes to strengthen their community. A clean, healthy brook trout stream can provide greater use and appreciation from the citizens and consequently enhance the quality of life for an area. It can also bolster a commercial or downtown district by generating an increase in tourism and business. Property values also are often increased when homes or businesses occur in a community with a high quality resource such as the Iron River.

It is clearly evident that the Iron River Watershed is an extremely important ecological component to Iron County and the State of Michigan. In addition, the Iron River Watershed plays a crucial role in the livelihood for many of the citizens of Iron County. The preservation of the Iron River Watershed is not only a admirable goal, but a very achievable one as well. With the implementation of physical improvements, and the prevention of many future problems through information and education, the Iron River Watershed will remain a high quality Brook trout fishery. Hopefully, this management plan will begin that process toward sustaining this truly unique and exceptional natural resource.

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