

A Comprehensive Land Use History of the Huron Creek Watershed



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This introduction to the land use history of the Huron Creek Watershed was written with an intention of providing the background historical research necessary for developing a watershed management plan in the future. This research was written for the sole benefit of those with a vested interest in the Huron Creek Watershed, with research support being provided by the National Science Foundation and Michigan Technological University.

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--Gerald Greer

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Chapter 1

Introduction

Providing a wide array of benefits in watershed management planning, a multi-disciplinary approach provides a more holistic understanding of watersheds, while at the same time increasing the odds of community implementation. Following this philosophy, our group consisted of scholars with various academic backgrounds. Our objective was to conduct the background policy, chemistry, and historical research of the environmentally threatened Huron Creek Watershed. It is our desire that our research will lead to the eventual development and implementation of a watershed management plan for the Huron Creek.

Karen Gonzalez, with civil engineering background, attempted to understand the current physical and chemical makeup of the creek. Her focus was on finding what problems the creek is facing in terms of hydrology and chemistry, and determining the current sources of these problems. Sean Hurley, with a background in environmental economics, set out to identify stakeholders and ways of engaging stakeholder participation within the Huron Creek Watershed. Tremaine Phillips, also with a background in environmental economics, gauged the effects of a Wal-Mart expansion project in the watershed and the local community. My objective was to try and trace human land use activity and determine its corresponding effects on the watershed.

By working closely together in conducting our individual research, we were able to educate ourselves in a variety of fields that were once foreign to us, as well as developing a broader understanding of the Huron Creek. We were able to learn that our research was not isolated, but was impacted and expanded on by research that was conducted in a multitude of fields. This multi-disciplinary approach not only expanded our insight, it allowed the group the added benefit of finding better ways of engaging the community and in developing ideas for improving the overall quality of the creek.

Sometimes overshadowed by chemical analysis, historic land use surveys play a vital role in successful watershed management planning. A land use survey can be defined as the study of changes in landscape initiated by human interaction. Combining archival research, ethnography, and GIS mapping, I was able to define these changes in the Huron Creek Watershed. A closer look at these changes helped in defining ways that the watershed's natural environment has been altered by human contact, and in evaluating the enduring impacts these changes may have had. Historic land use survey benefits are not only limited to the past, they can also be utilized in helping to define a community's sense of place and incorporating these characteristics in future reclamation plans, thus encouraging greater community involvement.

My research showed that the watershed has undergone three phases of human interaction over the last one hundred and fifty years, a mining phase, a residential/municipal phase, and a commercial phase. Each phase had dramatic impacts on the Huron Creek Watershed, and while these phases may have not been simultaneous many of the problems still persists in the watershed. The good news at many of these problems are not terminal and the community has an excellent opportunity to restore the creek to its natural beauty and reap the recreational, ecological and visual benefits of a community watershed

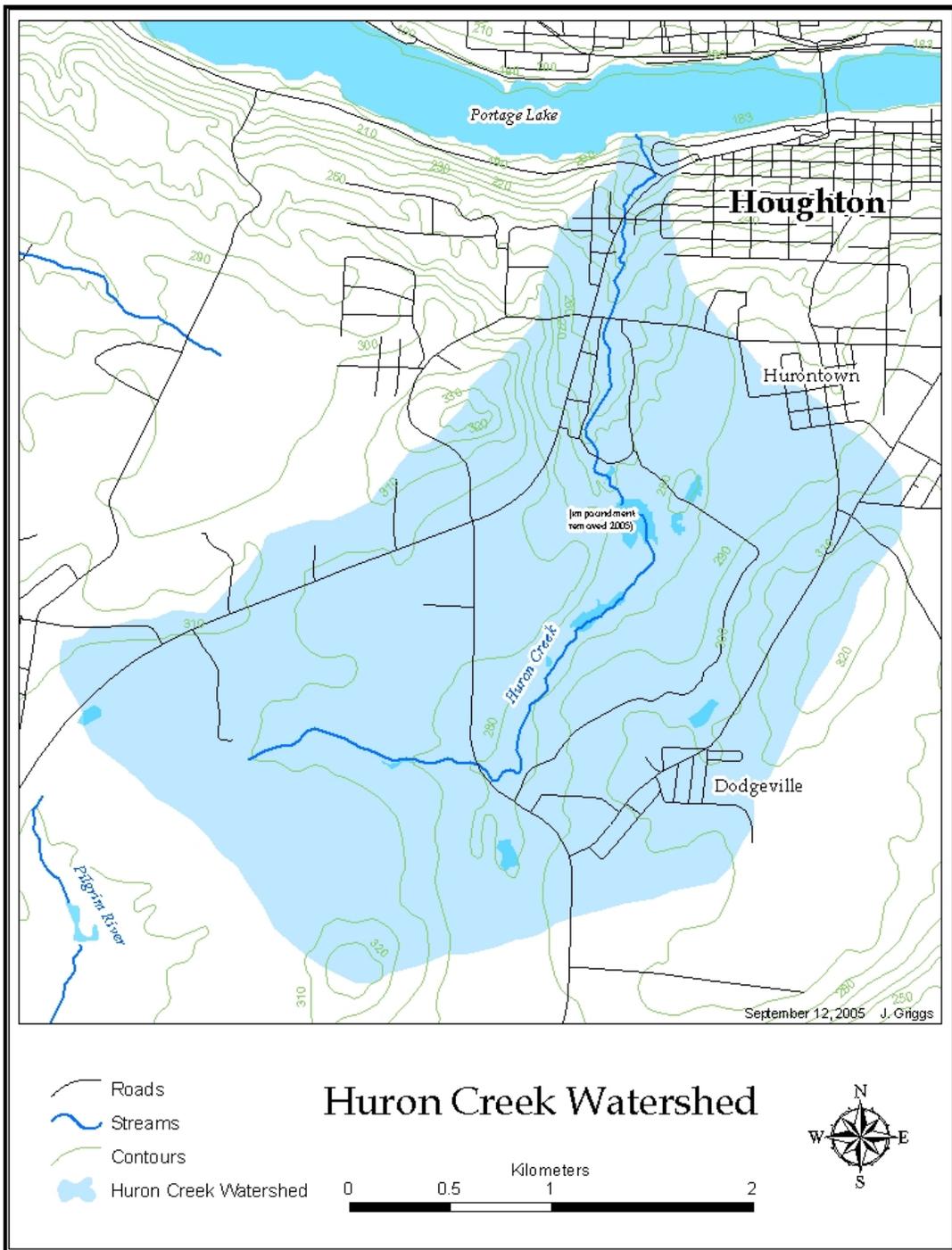


Figure 1.1

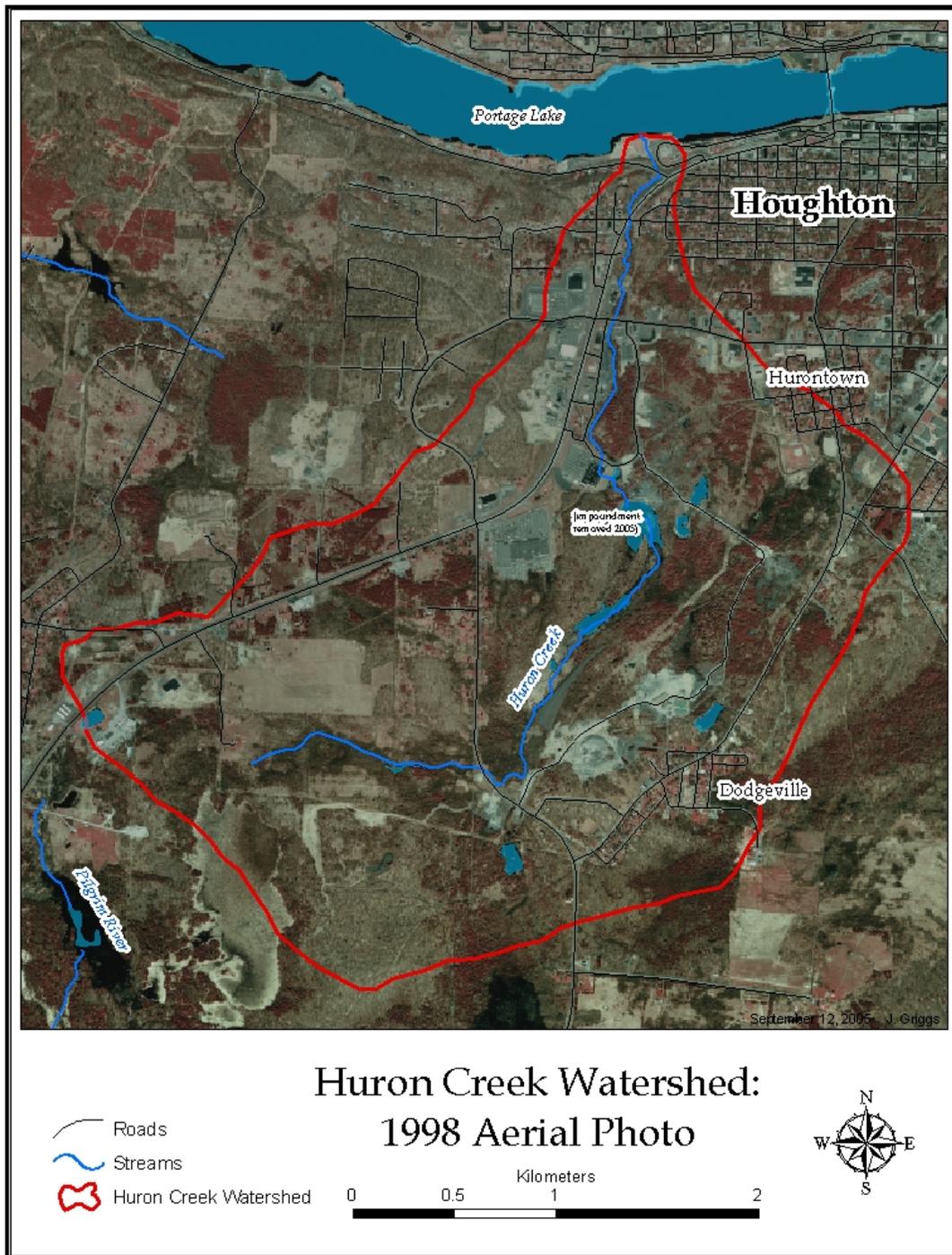


Figure 1.2

Chapter 2

Copper Mining

Long before any commercial development impacted Huron Creek, there was another far more significant activity, one which upset the natural chemistry and hydrology of the Huron Creek forever. That activity was copper mining. Two companies depended on the watershed for nearly one hundred years (1850-1945); these were the Huron and Isle Royale Mining Companies. The stream provided these companies the power necessary to create steam, the mechanism necessary to separate copper out, and finally an ideal location for disposal of waste material. While the mining companies depended on the watershed for every aspect of operation, it left a lasting mark on the environment. While areas that were once clear cut to provide mine companies with power now are beginning to show life again, many of the stamp sand waste piles still remain, leaving large pockets of nominal growth, where stamping activities once occurred and also posing possible threats to the chemistry of Huron Creek.

History of Mining in the Huron Creek Watershed

Houghton, Michigan, located on the Upper Michigan's Keweenaw Peninsula, is positioned along one of the richest deposits of native copper in world; and unlike most copper bearing lodes, the copper along Keweenaw Peninsula is unusually pure, which made it an ideal location for copper extraction. Geologist Douglas Houghton, the city's namesake, explored the peninsula in the early 1840's, and reported to the Michigan State Legislature on the abundance of native copper in this region, but also warned of the hardships that extraction would bring.¹ Houghton cautioned that for a copper industry to thrive and be profitable along the Keweenaw Peninsula the frontier would have to be tamed, and extreme environmental conditions would have to be overcome. Despite his warnings, Houghton's report spurred a rush of speculators to the area. Financed mainly by mining companies and investment firms from the eastern seaboard, a number of substantial mining sites were opened between 1842 and 1850.

Prior to 1850, mining activity was concentrated in the northern portion of the Keweenaw Peninsula, in cities such as Calumet, Copper Harbor, and Eagle Harbor, and then also to the east of Houghton near the city of Ontonagon. It wasn't until Ransom Shelden's discovery of the Isle Royale vein, south of Portage Lake in 1850, that mining operations really began to take root in the Houghton area.² Mining activity inside the Huron Watershed was primarily limited to two entities, the Huron Mining Company, operating from 1853 – 1893; and the Isle Royale Mining Company (1852-1870 and 1897-

¹ Lankton, Larry. Cradle to Grave Life, Work, and Death at the Lake Superior Copper Mines. New York: Oxford University Press, 1991.

² Lankton, Larry. Cradle to Grave Life, Work, and Death at the Lake Superior Copper Mines. New York: Oxford University Press, 1991.

1855), which bought out the Huron Mining Company and the Portage Mining Company in 1897, and operated on and off, up until the end of World War II.³

Isle Royale Mining Company

After operations in Copper Harbor and on Isle Royale produced little success, the Isle Royale Company moved near Portage Lake, purchasing the northwest quarter of Section 1 (T 54N – R 34W) in 1852. With only nineteen workers, and four shafts, mining operations commenced in 1852. Despite the small size of the Isle Royale Mine, it produced 18,738 pounds of copper in 1853, and was able to expand to twenty-six miners, forty-five surface men, five boarding houses, a barn, two change houses, a blacksmith shop, and several homes.⁴ A stamping mill and office were then added in 1854, located $\frac{3}{4}$ of a mile from the mine, copper that needed further processing was sent to the mill on Portage Lake via tram. By the late 1860's, however production was slowing down at the Isle Royale Mine and it was leased to John and Austin Maab's in 1869, and producing little copper it was placed on tribute in the 1870.⁵

Huron Mining Company

One year after the Isle Royale Mine opened, the Huron Mining Company opened one shaft on a half portion of section 2 (T 54N R 34W). The mine quickly expanded to four shafts by 1854 and required stamping operations to extract rock surrounding the copper. A primitive stamping mill, relying on a small labor force and traditional stamping techniques was constructed in 1854. Rock was crushed by sixteen Cornish heads and washed or sorted using buddles. Because the technology in the first stamping mill was so primitive and could not adequately support the amount of rock coming out of the mines, plans were made to construct a new state of the art stamping mill.⁶

While copper along the Isle Royale vein was unusually pure, in most cases it still had to be removed from sedimentary rock that encased it before it was to become of any value to the miners. Miners referred to this process of breaking the rock surrounding copper as stamping, milling, pulverizing, or crushing. Copper that required further rectification, to break up rock surrounding the copper was sent by tram to the Huron Stamping Mill. The pieces of copper taken from the mines that were free of rock, and required no further processing, were sorted and shipped directly to be smelted, the same final destination as the ore that needed to be stamped.

The new Huron Stamp Mill, completed in 1865, damned up Huron Creek to utilize water power, essentially creating Huron Lake.⁷ The lake provided the mill with the power and filtration mechanism needed to process the copper. While the first mill was quite primitive and relied on gravity to handle most of the crushing, the second mill was a

³ Clarke, Don H. Copper Mines of the Keweenaw No. 18 Isle Royale Mine. 1990.

⁴ Isle Royale Annual Report 1855 MTU Archives Houghton Michigan

⁵ Clarke, Don H. Copper Mines of the Keweenaw No. 18 Isle Royale Mine. 1990.

⁶ Wilson, Joseph A. The History and Archaeology of the Huron Copper Milling Complex Including a Brief Social History of Hurontown. Houghton, MI: Michigan Technological University, 2004.

⁷ Portage Lake Mining Journal 17 Dec. 1864 [MTU Archives].

technological specimen towering sixty feet in height, crushing rock using a 2600 lb steam powered hammer, multiple Blake stamps, and corrugated rollers to do most of the crushing. Copper was washed (sorted) using a Collom Jig. Designed by former mill superintendent John Collom, the jig would sort the copper from loose rock, called slime. The jig relied on specific gravity and water to sort the copper and then the ground sand and rock would be disposed of and the copper taken to the smelter.⁸

To provide the power necessary to operate the steam hammers and the water necessary to wash the copper at the new mill, a twenty acre reservoir was constructed and completed by 1863.⁹ The man made reservoir was developed by damming the Huron Creek with a thirteen foot earthen dam. The new mill was once again built at the base of the hill so that ore and rock could be easily transported using the slope of the hill as a power source, and also so that the rock would enter at the top of the mill, enabling the mill to utilize gravity in moving rock through the multiple stages of the stamping process.

Despite the mining technology employed at the mill, Huron Mine's only truly successful decade came in the 1880's. The mine had several reorganizations, changing its name to the Agawami Mining Company in 1868, later to the Houghton Mining Company in 1871, and back to Huron mining company in 1880. As production diminished in the late 1880's and early 1890's, the Huron Mine finally ceased operation in the 1893.¹⁰

Isle Royale Consolidated Mining Company

Four years after the Huron Mine shut down, in 1897, the Isle Royale Consolidated Mining Company (IRCMC) merged the Portage, Huron, and Isle Royale Mines into one mining operation.¹¹ IN 1899, IRCMC merged again, this time with the Miners Mining Company, forming the Isle Royale Copper Company. From 1897 until 1900, the IRCMC and the Isle Royale Copper Company continued to use the Huron Stamping mill for finishing operations. This meant that up until 1900 Huron Creek was being affected by stamp sand waste, as well as being utilized as a power source. It wasn't until 1900, when the Isle Royale Copper Company built a new stamping mill on Portage Lake at the mouth of the Pilgrim River, that Huron Creek was finally free of new stamp sand waste.¹² The creek, however would continue to feel the affects of stamp sand waste up until the present time. The new mill site remained in operation from 1900 until 1914 when a fire burnt most of the mill on Christmas Eve; a new mill was built on the same location and remained in operation until the Mines final closure in 1954.¹³

⁸ Benedict, Harry. Lake Superior Milling Practice A Technical History of a Century of Copper Milling. Houghton, MI: Michigan Technological University, 1955.

⁹ Wilson, Joseph A. The History and Archaeology of the Huron Copper Milling Complex Including a Brief Social History of Hurontown. Houghton, MI: Michigan Technological University, 2004.

¹⁰ Clarke, Don H. Copper Mines of the Keweenaw No. 18 Isle Royale Mine. 1990.

¹¹ Isle Royale Annual Report 1898 MTU Archives Houghton Michigan

¹² The Engineering and Mining Journal (1900) [MTU Archives] : 330

¹³ Isle Royale Annual Report 1900, 1914 MTU Archives Houghton Michigan

Copper Mining and its Lasting Impact on Huron Watershed

Historic copper mining was an activity that placed a heavy burden on the natural environment, both in supplying the fuel to drive the mining processes, and the abundance of space required for processing copper. To open up the space required for processing rock taken from the mine, mining companies would clear-cut a large majority of forest cover within close proximity of their mine. Clear cutting occurred not only to open up space, but also to provide timber for mine stability, fuel to produce steam power, material for building miners homes, and tracks for trams and railroads. While the benefits of logging were abundant to the mining companies, the consequences on the Huron Creek Watershed were also substantial. Clear cutting exposed the creek to sedimentation buildup and natural erosion. The natural vegetation that was in place prior to mining activity protected the creek from erosion by providing stability, and also shielding the creek from winds that would kick up sediment and drop it in the creek. Once the miners cleared the natural vegetation, there was nothing protecting the creek from sedimentation buildup and erosion. Today, as we deal with sedimentation problems, it is important to note that some of these problems may be the result of mining activity that occurred over one hundred years ago.

Huron Creek was more directly impacted by the water needs of the miners more than the removal of vegetation. The mines relied on the water for many of the mining processes, with water being most critical in the stamping process. The natural course of the river was diverted by the needs of miners; Huron Creek was damned to provide power, but in doing so Huron Mining Company and later Isle Royale Mining Company changed the natural flow of the creek forever.

The miners would use water as a power source to drive stamping processes, and then also as a means of separating copper and waste rock during stamping, waste otherwise known as stamp sand. The mill would produce massive amounts of these stamp sand wastes, which would require space for disposal. Stamp sand waste was disposed of both in and along the creek. With copper and other various metals still prevalent in the waste, allowing these metals to enter the creek would be a threat to the integrity of the stream.¹⁴ There is also an abundance of large stamp sand piles still remaining in the watershed from the mining era, these stamp sand waste piles may pose a prominent threat to the creek, and must be considered in any watershed management proposal.

¹⁴ Personal Interview #7 with Biologist / MDEQ Official July 8, 2005

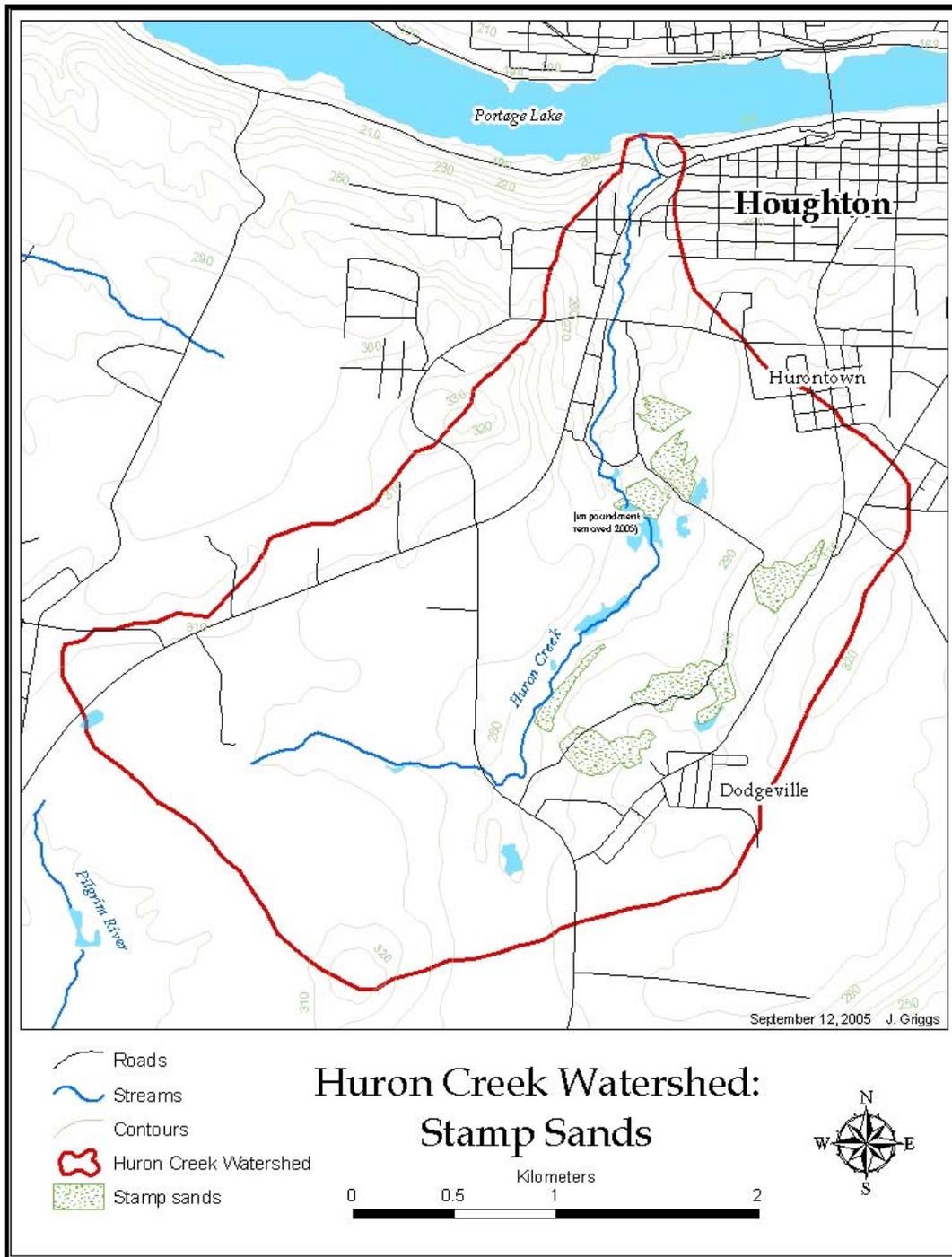


Figure 2.1

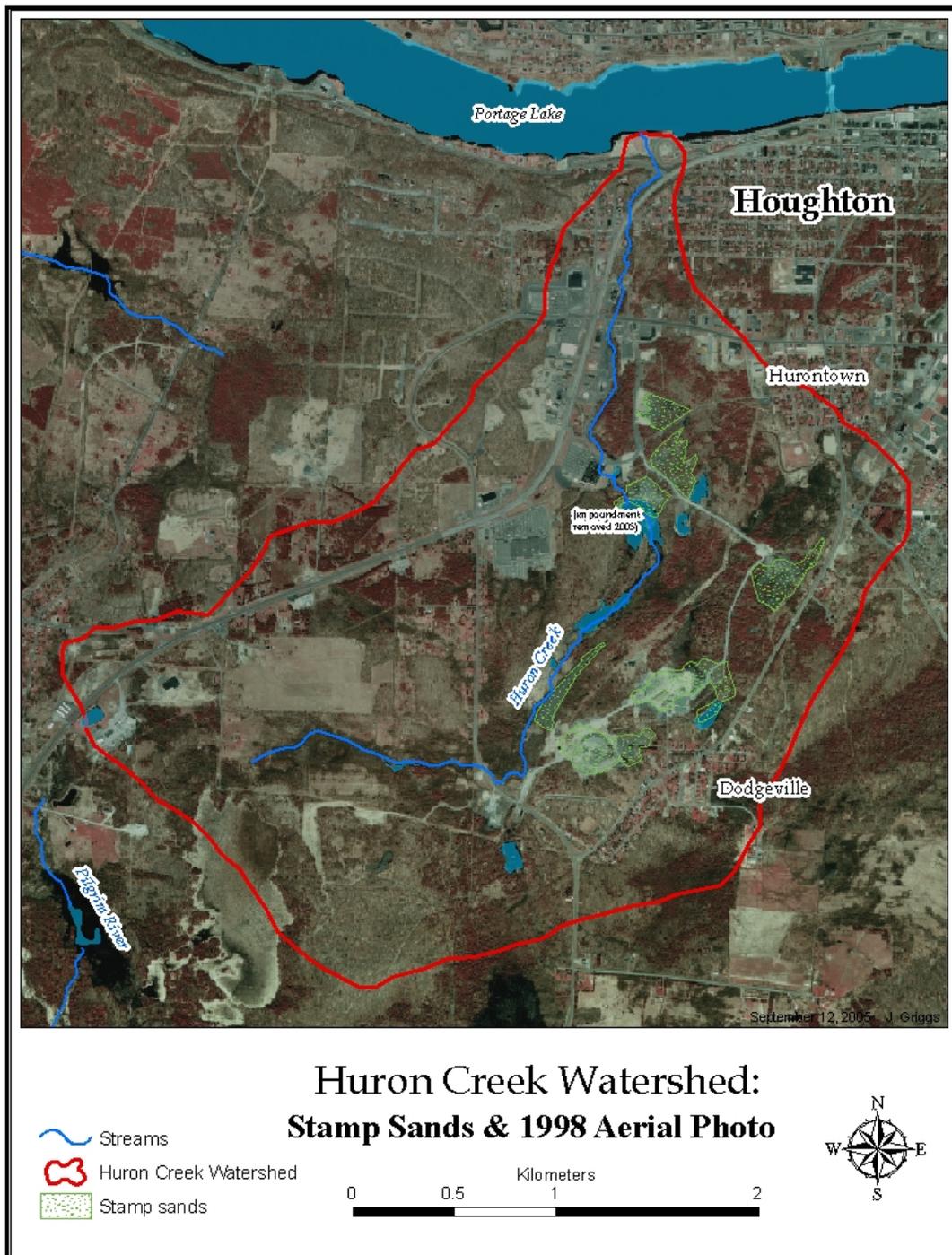


Figure 2.2

Chapter 3

Residential/Municipal Development and Waste Removal

Over the last one hundred and fifty years, the Huron Creek Watershed has seen a dramatic change in land use, the most substantial environmental impacts coming from mining operations over a one hundred year period beginning in the 1840's, and the most dramatic changes coming from commercial development beginning in the late 1970's. Often forgotten in the scope of watershed management planning residential and municipal change are critical in understanding land use patterns over time. As I found in the case of Huron Creek Watershed, residential and municipal development has triggered significant amount of change, both socially and environmentally, consequently having serious environmental impacts on the creek itself.

The environmental impact of residential development in the Huron Creek watershed is immense. It is important to understand that construction of homes, stores, and roads, is accompanied by increased traffic in the watershed, traffic that would not have been there otherwise. Residential development in the Huron Creek Watershed has increased erosion through the loss of natural vegetation, the creek has been exposed to unhealthy waste due to untreated septic waste, and increased runoff due to roads that have been built, and finally more people means more litter and junk that finds its way to the creek.

Within the watershed, there are two major governmental entities that share oversight, those being the City of Houghton, and Portage Township. The relationship between the two has at times been quite tenuous, especially over the last thirty years. Houghton, the county seat and largest populated city in the area, has served residents with its downtown business district for many years. However, with recent commercial development, Houghton has expanded outwards, both commercially and residentially. This expansion has often been at the expense of Portage Township, whose growth at times has been stymied by the growth of the city.

Portage Township, unlike Houghton is a conglomeration of many different communities, some areas sharing a single border with the city, while other parts, like Dakota Heights seem completely engulfed by Houghton. While Houghton has enjoyed the luxuries of an increased tax base, Portage Township has remained off many city services.¹⁵

Significant Historical Residential Development within the Huron Creek Watershed

When conducting a historic land use survey for use in a watershed management plan, it is important to first note critical areas, or areas that have the greatest impact on the watershed itself. While in some smaller watershed areas a holistic history may be achievable, in larger areas, a land use survey may be constrained by time and resources. Fortunately, the Huron Creek Watershed is relatively small and I had the benefit of nine weeks of substantial research, thus allowing me to construct a more complete history of

¹⁵ Personal Interview #1 with Portage Township city official July 1, 2005

land use in the area. Even with significant time and resources, I still had to limit my areas to those residential developments that impacted the creek most dramatically. My strategy was to choose the areas in the watershed that were most substantial, or saturated with residences. Secondly, I wanted to consider areas that were on still on septic since this poses the greatest risk to the creek, environmentally. This process led to me considering the history of five major residential developments within the area; Dodgeville, Hurontown, Dakota Heights, and development on Green Acres Road, all parts of Portage Township, and then an area of development west of M-26, commonly referred to as Shopko Heights, which is part of the city of Houghton.

Hurontown

Hurontown was originally built as a mining town to support workers at the Huron Mine, its name sake. Platted in 1862 by E.J. Hulbert, it occupies the northeast quarter of section 2, and northwest quarter of section 1 of township 54, range 34.¹⁶ Hurontown was actually considered part of Houghton for a brief period from 1867-1872, but for most of its history it has been considered part of Portage Township.¹⁷

In the early 1900's, during the copper boom days, Hurontown was bustling with activity and was quite self-sufficient, despite its close proximity to Houghton. It had at least one dairy, meat market, grocery, saloon, school, and fire department. Hurontown residents even had their own baseball diamond and competitive baseball team, the Copper Socks.¹⁸ These signs all point to the fact that Hurontown, nestled above the picturesque Huron Creek, was a substantial community.

Unfortunately, as mining operations gradually fell off beginning with the great depression, Hurontown began a downward spiral. In 1929, local residents drained the Huron Creek reservoir for safety purposes, a sign of decline. "With the draining of the reservoir for safety reasons in 1929, came the end of the golden era of prosperity in Hurontown."¹⁹ Gradually, businesses that were once located in Hurontown shut their doors and residents became more dependent on trips to Houghton for their needs.

While many businesses began closing in the 1930's, Hurontown remained a vibrant residential district, even up until today. Omitting the businesses, Hurontown looks very similar to when it was first platted in 1862. Roads have been improved, but they take on the same path as when they were first laid down almost one hundred and fifty years ago. Most prominent of the remains of this company mining town are the homes that are still standing, providing shelter for residents of new century, just as they had for miners who had built them a century before.

¹⁶ Historic Districts and Buildings of the Upper Peninsula MS-046 Box 4 Folder 14 Mishkar, Larry MTU Archives

¹⁷ Historic Districts and Buildings of the Upper Peninsula MS-046 Box 6 Folder 1 Wilson, A. P. Joseph MTU Archives

¹⁸ Polk Directory for Houghton County 1900-1901 MTU Archives

¹⁹ "When Hurontown was a Flower" Daily Mining Gazette May 7, 1966

Dakota Heights

Dakota Heights is the second critical residential area within the Huron Creek Watershed. Dakota Heights is a geographic anomaly; it is surrounded by the City of Houghton on all four sides, yet it is considered part of the Portage Township.

Platted in 1906, the area known as Dakota Heights received its name from Dacotah Mining Company, which briefly operated prospective mining operations in its general vicinity. Just north of Dakota Heights, at the base of a steep embankment sat the Copper Range Railroad, which housed most of its facilities on Portage Lake. Requiring workers for its multiple machine shops, iron works, coal docks, a depot, round house, and various other facilities, Dakota Heights provided an ideal location for worker housing.²⁰

Acting in a paternalistic fashion common during the mining era, Copper Range owned most of the housing, allowing its workers to rent a home at a reasonable rate, and to be close to the job site. Dakota Heights originally sat at the end of Sheldon Avenue and bordered west Houghton. It was designed in traditional rectangular fashion, with four roads running vertically (Park Avenue, Lincoln Avenue, Ravine Street, and Washington Avenue) and two main roads running horizontally (Calverly, and Douglass Street). Similar to Hurontown, many of the original streets and homes remain in place today.

Park Street, at the very west end of Dakota Heights had always acted as a road for traffic traveling from Houghton to Atlantic Mine, but when M-26 was rerouted in the 1979, it greatly disrupted the community of Dakota Heights. Once one solid unit, the reroute of M-26 essentially bisected Dakota Heights, leaving part of Dakota Heights to the west of M-26 and the other part to the east. While Park Street (also referred to as Old M-26), may have had moderate traffic flow, the new M-26 brought a heavy traffic flow right down the center of the Dakota Heights community. Throughout most of its history, Dakota Heights has remained mainly residential; several commercial establishments have been built in recent years, including a restaurant, motel, and a physician's office.²¹

Dodgeville

Platted in 1908, Dodgeville is another critical residential area within the Huron Creek Watershed. Originally developed by the Isle Royale Consolidated Copper Company, under the direction of James Healy and Frank Hildebrandt, Dodgeville was built to provide housing for employees at the Isle Royale Mine. The original plat had ten streets: a main street, six streets running east and west and 3 streets running north and south.

Like Hurontown, Dodgeville was originally more of a community than a residential neighborhood. From 1908 to 1930, during peak mining operations, Dodgeville was a vibrant community. It had its own post office, grocery, bakeries, small shops, and saloons scattered along Main Street.²² Unfortunately, as the price of copper slowly dropped and the Great Depression set in Dodgeville's commercial district slowly

²⁰ Historic Districts and Buildings of the Upper Peninsula MS-046 Box 3 Folder 11 Vago, David MTU Archives

²¹ MTU Archives Vertical File "Dakota Heights"

²² Historic Districts and Buildings of the Upper Peninsula MS-046 Box 3 Folder 12 Rivett, Suika MTU Archives

disappeared, leaving behind a small residential district dependent on Houghton for its commercial needs. To this day, many of the roads and homes originally built in Dodgeville still remain.

Development along Green Acres Road

Green Acres Road, located in close proximity to the head waters of the Huron Creek, is home to Portage Township offices and an area that has seen great expansion over the last thirty years. Originally built as a dirt road, to give Baltic access into Houghton and Atlantic Mine, Green Acres Road, formerly #6 Road, underwent heavy residential development in early 1970's and later commercial development. Prior to 1970, there were only two homes and no businesses located on Green Acres Road, and the two homes that were there were located right at the corner of Dodgeville. Beginning in the early 1970's, when Matt Manderfield began to sell off his land in parcels, residential development along Green Acres Road began to boom. To accommodate residential development, Green Acres Road was paved - a prelude to the commercial development that was to follow.²³

Development West of Dakota Heights

The final critical residential area of development within the Huron Creek Watershed is a pocket of development that has occurred west of Dakota Heights, but still within city limits. Local community members sometimes refer to this area as "Shopko Heights," because of its location behind Shopko, a local retail store. Surprisingly, development in this area actually began long before Shopko was even here. The first development in this area was actually a low income housing project called Waterworks, built in the 1970's by the City of Houghton. This remained the only critical development until 1994, when residential development in this area began to take off. Coinciding with commercial development along the M-26 corridor, the city was growing and needed areas to expand. When Sharon Avenue was expanded west of M-26 in 1994, and connected to Green Acres Road, it created an ideal location for residential development. Four major neighborhoods have been built thus far, and at least three more are in the works over the next few years.²⁴ This area of residential development is turning out to be one of the fastest growing residential areas in the watershed, and remains one of the critical areas to watch, in regards to the Huron Creek.

In the last thirty years, Huron Creek has gone from sparse residential development to becoming one of the densest populated areas in the city, thus having dramatic impacts on the hydrology of the stream. Residential development can lead to increased exposure to runoff and soil erosion through the removal of vegetation, while increased population increases debris and harmful pollutants that enter the stream. Residential growth is not all bad. In fact it is good for the city in many respects and it can actually be an opportunity for developers and city authorities to utilize the stream, but in order for the stream to be utilized for its natural beauty and recreational purposes, these problems must be addressed.

²³ Personal Interview #1 with Portage Township Official July 1, 2005

²⁴ Personal Interview #2 with Houghton City Official July 6, 2005

Residential Wastes and their Impact on the Huron Creek Watershed

Historically, human biomass and solid waste disposal into and around the creek have been problems that have affected the natural hydrology and chemistry of the Huron Creek. Up until the late 1960's, when a waste water treatment system was first installed in the area, the Huron Creek acted as a natural pathway for the removal of human biomass. Not to say that the creek isn't any longer impacted by harmful bacteria, because it is. Today, many homes within the watershed have septic systems with inadequate drain fields, which allow human biomass to enter the creek. Solid waste products, otherwise known as garbage or rubbish, also have posed a serious threat to the integrity of the creek, and continue to do so today. Before commercialization began within the watershed, two landfills occupied this territory, exposing the creek to many harmful toxins. Although these landfills have long since been filled in, harmful toxins continue to leach into the creek via groundwater runoff. Historical waste disposal remains a critical area of concern within the creek, and in order for one to understand how waste has had an adverse impact on the creek; one must first understand the history of waste disposal in the area.

Sewage and Septic in the Huron Watershed

In today's modern era, when most think of waste disposal, they think of waste being taken away and treated, but that wasn't, and still isn't always the case. Beginning in the late 1960's there was growing concern over the direct discharge of pollutants into water sources, both industrially and residentially. Public awareness and the passage of the Clean Water Act in 1972, led to better technologies, in turn introducing waste water treatment facilities and better sanitation control on a national scale. Prior to this awareness, water was viewed as a natural treatment source, however with the pressure of added wastes, some water sources were not able to handle the waste that were being discharged into them. Slowly but surely, changes began to be made. Houghton built its first waste water treatment facility in 1966. At the time this had a positive effect on human health, but there were still many environmental concerns that needed to be addressed.

Prior to 1966, all waste in the city of Houghton was pumped directly into the Portage Canal. Waste in Dodgeville and Hurontown were either on private septic systems or waste went directly into areas surrounding Huron Creek. Thereafter, waste water treatment facilities were built in the area, which changed the dynamic of biomass removal. In 1968 the first treatment facility was built next to the Portage Lift Bridge in Hancock Michigan. With an initial capacity of 1.8 million gallons of waste per day, this facility was built to handle the needs of Hancock, Houghton, and parts of Franklin Township. Even with the new facility, when capacity was reached, excess waste still went directly into the canal. Over the years, the system was improved, increasing capacity to 2.5 million gallons. However during extreme waste periods such as spring runoff, excess waste was still discharged directly into the Portage Canal.²⁵

²⁵ Personal Interview #3 Portage Sewer Authority Engineer July 6, 2005

As Houghton and Hancock began to expand in the early 1990's, a new wastewater treatment facility on the Isle Royale Stamp sands was built to accommodate expansion. While Hancock pumped their waste across the bridge, Houghton used the pump station originally used to pump waste across to the old Hancock Treatment facility. The pump was used to move waste from west Houghton to the top of the ridge where gravity would naturally move the waste to the treatment facility on the Isle Royale Stamp Sands. The new facility went online on August 23, 1993, and could handle 9.1 million gallons of waste per day. Unfortunately, while the treatment facility is on average only running at 30-35% capacity, the pump is nearly reaching its capacity. At the rate of expansion, this is causing great problems for a city experiencing heavy commercial expansion, and a township that wants to get residents off of septic and onto the sewer.²⁶

In 1975, Portage Township agreed to a contract for the original wastewater treatment to handle 100,000 gallons of waste per day. They originally agreed to this contract so that Hurontown and Dodgeville could be on sewer, however there were no provisions in this agreement for the other communities in Portage Township. This meant that the rest of Portage Township could not be put on sewer due to the limit on waste specified in the contract. At the time they signed this contract, they were close to their limit for per day waste. But as the Township expanded both commercially and residentially, they began reaching capacity, and are currently exceeding capacity, averaging 125,000 gallons of waste per day. When Portage Township exceeds their daily allotment of waste (100,000), they pay a penalty. In 1993 when the new waste water treatment facility was built on the Isle Royale Stamp sands Portage Township was given another opportunity to be get the entire township on sewer. Due to financial restraints and local politics, they declined the invitation to join the sewer authority, which left them in their current predicament. In addition, they have not been able to put any new businesses or residences on sewer.

The City of Houghton is reluctant to put new businesses and homes in Portage Township on sewer, because any waste that comes from Portage Township puts strains on the pump station capacity, and thus limits Houghton's own growth potential. Furthermore Portage Township declined to be put on the sewer system when the new facility was built. More recently Portage Township and the City of Houghton have worked out agreements putting new businesses on sewer, thus allowing construction in Portage Township to happen. Under current arrangements, Houghton essentially annexes the land, giving them their 11 mills of tax revenue to support infrastructure, but they pay Portage Township three mills in tax revenue, and the new businesses are able to be put on sewer. This essentially assures that Houghton can support the new hookups and Portage Township still get their revenue. Portage Township and Houghton will also occasionally swap properties so that businesses coming into the area can be put on sewer.²⁷ While this does help to get new businesses and residential areas on sewer, it does nothing to solve the problem of existing areas that remain on septic, and it also limits the growth potential of Portage Township.²⁸

Septic systems are a more primitive form of waste treatment. In septic treatment, waste is pumped to a storage tank where solids are broken down. Once solids are broken

²⁶ Personal Interview #2 Houghton City Official July 6, 2005

²⁷ Personal Interview #2 Houghton City Official July 6, 2005

²⁸ Personal Interview #1 Portage Township Official July 1, 2005

down, the liquid waste is released to into a drain field where it is treated organically. Septic systems work well if you have a good drain field. But in most of the areas within the watershed the systems are old, inadequate or too many residents are using the same drain field. This usually means that the natural abilities of the drain field have been exhausted, which means waste is not broken down completely.

Through runoff, and especially increased runoff through commercialization, these wastes can find their way to the Huron Creek, posing a threat to the stream and those using the stream, especially during spring runoff. Septic waste can increase the levels of phosphates and nitrates which lead to increased algae blooms, thus hindering the creek's natural ecosystem. Humans are at risk when playing or swimming in the stream, because of increased levels of bacteria and potentially contracting diseases from the waste itself.²⁹

Despite the risks of inadequate septic systems there are several key areas within the watershed that still aren't on sewer. As a result, Festival Foods, the Mini Mall next to Festival Foods, residents on Green Acres road, residents and businesses north of Green Acres Road, and Dakota Heights, are all considered critical areas, due to their potential for sewage runoff into the creek.³⁰

In light of these environmental and financial concerns, Portage Township is examining possible solutions to the problem of getting new areas on sewer. They recently hired UP Engineering to do a survey of possible ways of getting these areas off of septic systems. Portage Township supervisor is currently considering four options. First, they could pump their waste to Adams Township, which would still require pumping waste, and also they would have to build a lagoon. Second, they could also pay to have the pump expanded, but of all options this seems the most unlikely, since it would cost nearly a million dollars. Third, they could build their own lagoon to treat their waste (sort of their own natural mass treatment facility). Finally, they could pump their waste east to Agate Street, where they could pump it down to the current waste water treatment facility using gravity, thus eliminating the need of a pump.³¹ It is clear no matter what they choose to do they will have make changes in the near future.

Human biomass through inadequate disposal of septic waste is currently threatening the sanctity of the Huron Creek. According to municipal officials, there are homes that are on septic which often have an awful stench near their drain fields. There are also areas with multiple homes on the same septic system. There is no doubt that some of this waste is finding its way to the creek.

Solid Waste Disposal within the Huron Creek Watershed

By upsetting the natural chemistry of the Huron Creek, solid waste has and will continue to impact the watershed. Increased consumerism has lead to an increased litter problem within the creek. It is not uncommon to see shopping bags, fast food wrappers, or even junk disposed of in the creek. As critical as that is, it is small potatoes compared to the problem posed by leach aid entering the creek via historic landfills.

The Huron Creek watershed has had two landfills in its brief human history. The first landfill operated for about fifteen years beginning in the mid 1950's. The first

²⁹ Personal Interview #4 Western Upper Peninsula Health Department July 6, 2005

³⁰ Personal Interview #1 Portage Township Official July 1, 2005

³¹ Personal Interview #1 Portage Township Official July 1, 2005

landfill extended down from what is now Domino's Pizza all the way down to the Huron Creek. There was a small dirt access road similar to the direction that Sharon runs now. Some say that this was just for residents of Hurontown and Houghton, while others say that many communities may have dumped here

The first landfill operated as a burning dump, which meant everything that could be burned was burned, which is why construction crews building a new strip mall north of Sharon Avenue on top of the hill are finding large metal items, such as car parts. ^{32 33}

In the early 1970's, as an environmental ethic was growing, the Clean Air Act was passed, which restricted the use of burning dump sites. The State of Michigan wanted all burning dumps shut down within a couple of years of the act being passed, one of those sites being first dump sites in Houghton. Houghton closed the burning dump site in the early 1970's, tried to open a small children's ski and sled area, but insurance costs scratched that idea, and it was just left filled in. A state registered compact and fill dump site replaced the old burn site. Located within a stones throw from the old dump site, the new dump site was built where Pizza Hut is currently located. After only a couple years of operation, this site was closed due to the potential threat to the creek, or potential development depending on who you believe. ³⁴

Leach aid, or liquid remains from the items left at these historic land fill sites pose a critical threat to the Huron Creek Watershed. Leach aid, with its distinctive orange color similar to what you might see underneath an old car, can be seen entering the creek in multiple spots along the creek. This leach aid then increases the concentrations of trace metals above safe levels, and this seriously threatens the Huron Creek ecosystem. ³⁵

³² Personal Interview #3 Portage Sewer Authority Engineer July 6, 2005

³³ Personal Interview #1 Portage Township Official July 1, 2005

³⁴ Personal Interview #1 Portage Township Official July 1, 2005

³⁵ Personal Interview #5 MDEQ Official July 8, 2005

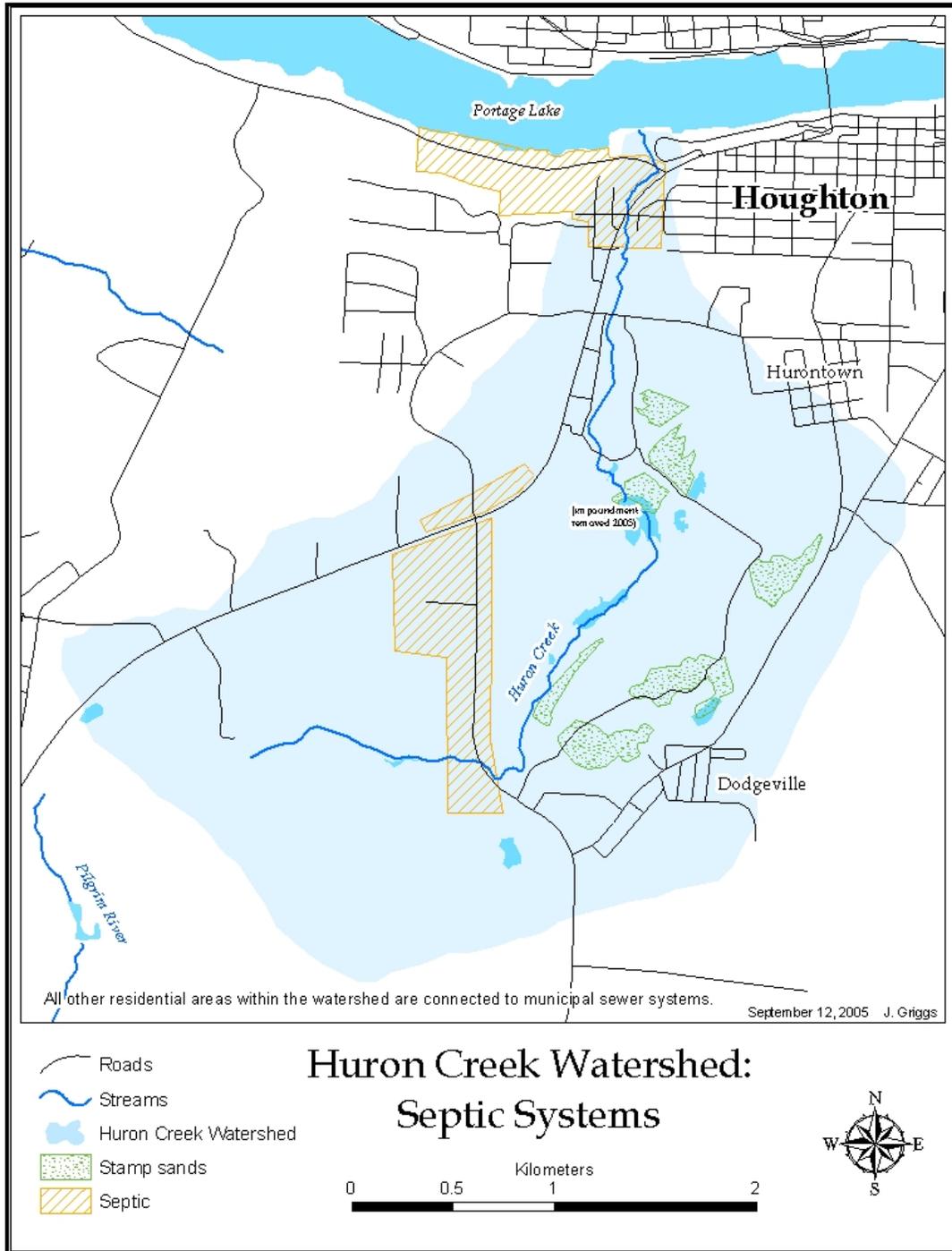


Figure 3.1

Chapter 4

Commercial Development

Introduction

In the last thirty years Huron Creek has seen yet another wave of development, one that has been most dramatic, upsetting natural river flows, chemistry, hydrology, and biology. While strip malls and box stores had dominated the American landscape since the early 1960's, it took them considerably longer to arrive on the Keweenaw Peninsula, but when they had, of all three phases of land use, commercial development had the fastest and most impressive impacts on the stream.

After mining operations ceased in the 1940's, most of the Huron Creek watershed became reclaimed forest, remaining on the outskirts of the city of Houghton, both geographically and economically. During this time period, the watershed was used primarily as a source of recreation, for fishing and swimming, and then of course, it was also used as a convenient location for dumping solid wastes. As traditionally had been the case, the center of commercialization for Houghton remained east of the watershed, but as mass commercialism was penetrating smaller rural communities with a greater fury, the Huron Creek wouldn't remain on the outskirts much longer.

Commercial developers like two things when considering where to build, land and lots of it, and close proximity to other commercial establishments. Developing in close proximity to other establishments meant that their potential commercial base would be increased by consumers frequenting other businesses in the area.³⁶ One area that could provide such abundance of land, and later, close proximity to other commercial establishments, was the Huron Creek Watershed.

As the watershed was being transformed from an area with absolutely no commercial development into a commercial center, the natural balance of the Huron Creek was greatly upset. While commercial development may seem like a positive economic opportunity for the local community, it had profound negative effects on Huron Creek. Increased parking areas, posed and continue to pose a serious threat to the chemical integrity of this small stream. Parking lots, via storm water runoff, provide a pathway for harmful automobile chemicals, such as anti-freeze or brake fluid to find their way into the creek. Commercial development also brought the construction of multiple culverts and channels in the Huron Creek Watershed. These construction techniques may have benefited the needs of the developers, but by changing the natural hydrology of the stream, they increased sedimentation buildup and erosion. Physical construction was not the only area of impact with the watershed, there was an also a social impact. Increased foot traffic saw more and more debris entering the stream.³⁷ Commercial development

³⁶ Personal Interview #1 Portage Township Official 1 July 2005.

³⁷ Personal Interview #6 Public Citizen 7 June 2005.

also brought about the construction of many new highways and service drives to support the influx of foot traffic.

In 1972, the city of Houghton hired Vilican-Lema to conduct a future land use survey, studying parking, accessibility, traffic congestion, and retail variety.³⁸ The future land survey outlined a plan for the creation of a commercial district along the M-26 corridor. It is important to note that up until this point this area had only one small access road, a dump, and a small recreational area, with plenty of space to accommodate such a commercial endeavor. Once the plan was in place and city zoning hurdles were cleared, commercial development along the corridor grew exponentially. To accommodate this commercial demand, many city and state infrastructure changes had to be made over the years. M-26 was widened to four lanes, Sharon Avenue was extended two times, multiple service drives and access roads were constructed, and one of the first traffic lights in the city was installed. Like their parking lot counter parts, these municipal road projects required the Huron Creek to be rerouted and culverts to be constructed, resulting in the same negative effects on the stream.

Environmental Impact of Commercial Development on Huron Creek:

If you have seen the M-26 corridor, it may be impossible to imagine, but commercial development didn't always dot the landscape of the Huron Creek Watershed. Beginning in the 1970's, development began fast and furious, eating up much of the landscape, and that trend continues to the present day. Like the mining industry before it, commercialization has initiated another human transformation of the creek, both directly, through construction techniques, and indirectly, through the influx of consumers and pollution. In constructing culverts and channeling Huron Creek, developers have long viewed it as an obstacle, trying to minimize and reroute the creek to fit their business models, rather than trying to optimize its natural beauty and recreational potential.

Commercial development didn't occur all at once; instead the development can be characterized by three phases, first being the construction of a foundation (1976-1985), the second framing the inner workings of a commercial complex (1986-1995), and finally a phase of expansion, with the addition of many new commercial establishments (1996-2005). Alone each phase didn't significantly impact the creek, but when considered together as a collective unit, the impact on Huron Creek has been extreme.

Houghton, similar to most towns on the Keweenaw Peninsula, was a one-industry town, and remained that way for over one hundred years. That industry was of course copper mining. You did have other businesses in the area, but their income relied on the income generated at the mines. Unfortunately, as the mines went deeper and the price of copper got cheaper, copper mining in Keweenaw was becoming too expensive a proposition, leading to complete extinction by 1968. The decline of copper mining left a large number of workers struggling to find other occupations, but unfortunately there were none. Some miners left the area, but a large majority of miners and second and third generation mine families stayed in the area.

The city of Houghton and Hancock for that matter, trying to find ways spur economic development, began looking at ways to attract outside investment in the local

³⁸ [Daily Mining Gazette](#) 18 May 2005. and Vilican-Lema Future Land Use Survey 1972 MTU Archives

community.³⁹ In 1972, the two cities contracted with Vilican-Lema to conduct a future land use survey. The survey studied parking, accessibility, traffic congestion, retail variety, and economic impact on the local community.⁴⁰ The survey concluded that to meet the needs of large scale commercial development a commercial district would have to be created on the outskirts of the city. This report led to the birth of the M-26 corridor, an area located southwest of downtown Houghton.

In constructing any new building or home, the most critical component is a solid foundation; the same holds true in creating a centralized commercial district. You need a few businesses to commence operation in order to attract other businesses into the area. In 1976, Food Saver Warehouse (later Festival Foods), a full service grocery and gas station, became the first business to open along the M-26 corridor. Located at the corner of M-26 and Green Acres road in Portage Township, Food Saver Warehouse became the first full service grocery/ gas station catering to residents of the western end of the city. Pamida, the area's first discount retailer, and a small Sears store built adjacent to Pamida, quickly followed Food Saver, moving into the M-26 Corridor in 1978.

With the opening of the Copper Country Mall in 1981, the area saw the development of its first primary catalyst spurring on commercial development in the watershed. The Copper Country Mall, located in Portage Township was the area's first large shopping venue. The mall initially provided 200,000 square feet of retail space and was anchored by JC Penney and K-Mart, with multiple boutiques, music, and clothing stores in between.⁴¹ The early success of the mall also led to the opening of the Portage Plaza strip mall across from the mall. This was the communities first alternative to

downtown shopping.



³⁹ Personal Interview #2 Houghton City Official 6 July 2005.

⁴⁰ Daily Mining Gazette 18 May 2005.

⁴¹ Daily Mining Gazette 19 May 2005.

Filling in vacant areas along M-26 and creating a commercial framework, the second wave of commercial development began in the mid 1980's and lasted up until approximately 1995. During this period, shopping venues outside downtown Houghton were becoming more available resulting in more consumers doing their shopping outside of the downtown



district. These attributes provided developers with an opportunity to build new commercial establishments. This was the period that many of the national chains began entering the Houghton market. Pizza Hut, built on top of the second landfill in 1986, was the first chain restaurant to open outside of the downtown area. Ridge Road, built to service customers of Pizza Hut also provided additional lots for other businesses.⁴²

Keweenaw Gem and Gift, the Muffler Shop, Domino's, Jiffy Lube, and Kentucky Fried Chicken followed suit, opening in the same area shortly after Pizza Hut. Just west of M-26, several small car dealerships, including Sayen's and Keweenaw Automotive, as well as an auto parts store, all appeared on the scene during this period.⁴³ Small local businesses began to fill in some of the space around the larger national chains. Businesses that you would have once seen downtown were now choosing to move to the outskirts of town, where they could find more customers.

⁴² Personal Interview #2 Houghton City Official 6 July 2005.

⁴³ Daily Mining Gazette 19 May 2005

The second wave of development was capped by an accelerated amount of



commercial construction, construction that is probably the single most important factor in transforming the Huron Creek landscape forever. Situated at what was the western end of Sharon Avenue, Econo Foods,

Holiday Inn Express, Shopko, and Perkins all opened their doors in 1993.⁴⁴ Providing a large variety of food stuffs, Econo Foods would become the watershed's largest grocery store. Shopko, a Midwestern discount retailer similar to Wal-Mart opened in 1993 as well. Perkins, Houghton's only twenty-four hour restaurant, opened its doors in 1993.

The single largest company to date came to town in 1994, when Wal-Mart built



its original 98,000 square foot retail store.⁴⁵ After a battle between Portage Township and Houghton for Wal-Mart's tax revenue, Wal-Mart settled on building within the city limits. The store was built on the eastern side of M-26 parallel to Huron Creek, in an area that had once been primarily wetlands. In order to meet the needs of Wal-Mart, Razorback Drive was built by the City of Houghton. Huron Creek was channeled and rerouted, and in other areas culverts were built. The stream

⁴⁴ [Daily Mining Gazette](#) 19 May 2005

⁴⁵ [Daily Mining Gazette](#) 17 May 2005

was viewed as little more than an obstacle or nuisance. With a new road, it opened new space; one notable addition was Godfather's Pizza (currently Mancino's).⁴⁶ Office Max also moved in adjacent to the mall, trying to take advantage of this commercial base. While these smaller businesses did have an indirect effect on the stream, none had as much of an impact as Wal-Mart.

In a little over twenty years, Houghton went from having a few small grocery stores to two major grocery operations. The city went from having no discount retailers to having three, from no chain restaurants to many, and all in the same vicinity, in the Huron Watershed. The landscape of the watershed was changing, but would it continue to grow at the exponential rate that it had, and how would this growth impact the watershed?

Thus far the answer has been yes, commercial development within the watershed has continued to grow by leaps and bounds and yes it has affected the watershed. This growth represents the third wave. At this point in our land history, good commercial land is becoming scarcer and developers are fighting to find ways to situate their establishments in close proximity to the foot traffic, which is at other establishments. This phase is characterized by the addition of the strip mall to the Houghton landscape. In 1995, the area's first strip mall, Sharon Center went up at the corner of Sharon Avenue and Razorback. Strip malls weren't the only form of development in this wave. Houghton saw the construction of Blockbuster Video, Taco Bell, Rex, Goodwill, and Ming Garden. Coinciding with the development of these establishments, another strip mall, The Huron Center was erected adjacent to the Sharon Center, opening in 1996.⁴⁷ In 2000, the area's first up-scale assisted-living facility was opened.⁴⁸ Located at the very western boundary of the watershed, the Bluffs were another Moyle venture. Seeing their market dwindling downtown, McDonalds finally moved to the M-26 corridor in 2002, after many years downtown.⁴⁹ This was a sign of the times: the commercial center had become the commercial edge.

Further impacting the downtown district, Wal-Mart commenced a 100,000 square feet expansion of their existing structure. This was after much debate over moving to a new location and leaving the current site empty, however Wal-Mart officials settled on expanding their current site. In the current project, Wal-Mart is converting the Houghton store into a super Wal-Mart, which adds the addition of a grocery store and gas station. The gas station is not actually owned by Wal-Mart, but by Murphy Oil, who owns and operates a majority of the gas stations on Wal-Mart property. As well as expanding the store, Wal-Mart plans on doubling the surface area of their parking lot.⁵⁰ Instead of ignoring parking lot runoff as has been the case in the past, Wal-Mart plans on preventing harmful runoff from entering the wetlands by installing a parking lot runoff collection system that filters harmful automobile waste.⁵¹

Wal-Mart is not the only large scale construction project currently impacting the watershed. Two new strip malls, one south and one north of M-26, a new 100 plus room

⁴⁶ Daily Mining Gazette 19 May 2005

⁴⁷ <http://www.moyleusa.com/about-timeline.html>

⁴⁸ <http://www.moyleusa.com/about-timeline.html>

⁴⁹ Daily Mining Gazette 17 May 2005

⁵⁰ Daily Mining Gazette 19 May 2005

⁵¹ Personal Interview #2 City of Houghton Official 6 July 2005

Country Inn Hotel, and numerous road projects to support expansion are currently underway. Increased commercialization through increased congestion, pollution, and runoff are continuing to threaten the Creek today. It is important to note that as new construction is entering the area, we are entering a new phase of development, one that sees the Copper Country Mall suffering the same fate as local downtown businesses. Just as the mall had displaced shoppers from downtown, discount retailers and strip malls are replacing consumers from the mall.

Related to commercial development in the area, construction mining has contributed to increased soil erosion and sediment buildup in the Huron Creek Watershed. It is important to understand that commercial construction of this magnitude requires massive amounts of sand, gravel, and rock, for many of the projects. Rather than paying for it from an outside source, some construction firms have instead purchased their own land and mined the material from their own properties. Within the watershed there are two such sites, one operated by Moyle east of Huron Creek, and the other operated by Siler Construction is located just west of M-26 behind the new McDonalds Restaurant. Companies choosing these sites in the early eighties because of their remoteness are now being squeezed out as commercial development has moved into the area, and are beginning to choose other sites. These sites may possibly pose of a threat to the structural integrity of several hillsides, as well as have sedimentation effects.

Of all developers in the area, one dominated recent commercial development in the watershed, that developer was Thomas Moyle of the Moyle Construction and Development Company. Started in 1976 as a small construction firm, it has become one of the largest construction companies in the Upper Peninsula, mostly due to the commercial work done in the Huron Creek Watershed.⁵²

Moyle Construction Company constructed or will be constructing Wal-Mart, the Wal-Mart expansion, Holiday Inn, Ming Gardens, Miner's Bank and Country Inn.⁵³ They constructed and operate the Huron, Sharon and Razorback Center strip malls, as well as the Wilderness Carwash. From these observations, it becomes quite evident that Moyle is one of the major stake holders within the watershed, and that in order for any restoration project to be successful it will require this company's cooperation.

Road Development in the Huron Creek Watershed:

Increased road development, correlated with increased commercial development, has greatly impacted the Huron Creek Watershed both directly and indirectly. Some of the roads that have been built in the watershed have required culverting or major rerouting of the creek, as previously mentioned, this greatly impacts the natural flow of the stream. As pavement surface area has been increased, so has runoff and harmful automobile runoff entering the creek. Increased parking area means a higher concentration of automobiles in the creek, which means there is a greater likelihood of harmful chemicals such as antifreeze and oil entering the creek via runoff. The indirect impact is not quite as obvious, and that is the increased traffic into the area. While the obvious effect is increased pollution, decreased road safety was one unintended consequence.

⁵² [Daily Mining Gazette](#) 17 May 2005

⁵³ [Daily Mining Gazette](#) 18 May 2005

Green Acres Road, paved and rerouted in the mid 1970's in response to commercial development, has remained relatively untouched for over twenty years, while many old roads were modernized and new roads erected.⁵⁴ Sharon Avenue and Green Acres remain the two roads that directly cross the creek, which means both required the construction of a culvert. Of all roads in the watershed, Green Acres has been the only road that has seen little connection to commercial development at least initially.

M-26 originally a very steep and treacherous state byway between and Houghton and Atlantic Mine, was the first major road project in the watershed. Improvement plans were being discussed as early as the 1970's, just as Houghton was considering creating the M-26 corridor.⁵⁵ The plan called for expanding the highway, repairing 10 miles of old road, and straightening the old Van Orden S Curve. The new road was officially completed on Nov. 10, 1979, and actually decreased the descent into Houghton from 12% grade all the way down to a 6% grade.⁵⁶ As part of this project, Baaco Construction Company filled the Huron gully with massive amounts of mine rock, thus exposing the creek to a variety of heavy metals. The project was later extended to include a stretch of M-26 up to Green Acres Road, which expanded M-26 to four lanes up to the mall. This portion of the M-26 project was completed in 1982. Also coinciding with the first stage of commercial development, the city of Houghton extended Sharon Avenue from Madeline Street down to M-26 in 1978.⁵⁷ These two projects were most critical in opening up the M-26 corridor to commercial development. They were and still remain today the main arteries of this commercial complex.

Once these main thoroughfares were completed, commercial development blossomed, and it led to many other road projects in the watershed. As Sharon Avenue was becoming more congested, the City wanted to make the M-26 Corridor safer, so they planned to limit direct access to M-26 through the use of access roads that service multiple businesses.⁵⁸ The first secondary road to be built was Ridge Road. Built in 1978, its purpose was to service Pizza Hut and the other new businesses that decided to open along the western edge of Huron Creek. Following almost instantly, was construction of Frog Pool Lane. The next major project was the extension of Sharon Avenue west of M-26. No big surprise, this project occurred in conjunction with the construction of Shopko, Econo Foods, and Perkins. The city also found this the perfect opportunity to open up some residential parcels by extending Sharon Avenue in a loop and connecting it with Green Acres Road.

In 1993, Razorback Drive was built to provide secondary access to Wal-Mart, and at the same time open up additional commercial space.⁵⁹ Razorback and Ridge Road are currently undergoing further upgrades currently, to accommodate Wal-Mart expansion. In both cases, the city has had to channel and construct culverts to allow consumers' access to Wal-Mart, resulting in upsetting the natural hydrology of the stream. Of all the road projects that occurred in the watershed, these were the ones that have proved to be most detrimental to the creek.

⁵⁴ Personal Interview # 1 Portage Township Official 1 July 2005

⁵⁵ Daily Mining Gazette 9 May 1972

⁵⁶ Daily Mining Gazette 9 May 1972

⁵⁷ Personal Interview #2 Houghton City Official 6 July 2005

⁵⁸ Personal Interview #2 Houghton City Official 6 July 2005

⁵⁹ Personal Interview #2 Houghton City Official 6 July 2005

Conclusions:

New establishments required huge parking lots to meet consumer demands, and in order to provide it, Huron Creek was rerouted to a more easterly location,⁶⁰ upsetting its natural hydrology. In order to fit more and more businesses in smaller areas, culverts over the stream had to be constructed in multiple areas, changing the natural flow of the creek. New large scale parking lots and road construction projects presented another problem as well, that being automobile runoff. Collected on the pavement, leaking automobile chemicals have the potential to find there way to the nearby Huron Creek, thus upsetting its natural chemistry. Increased consumerism also perpetuates other risks to the Huron Creek Watershed. As more and more people are coming and going in and out of the watershed, litter and debris may be a much more serious problem.⁶¹

⁶⁰ Personal Interview #1 Portage Township Official 1 July 2005

⁶¹ Personal Interview #6 Public Citizen 7 June 2005.

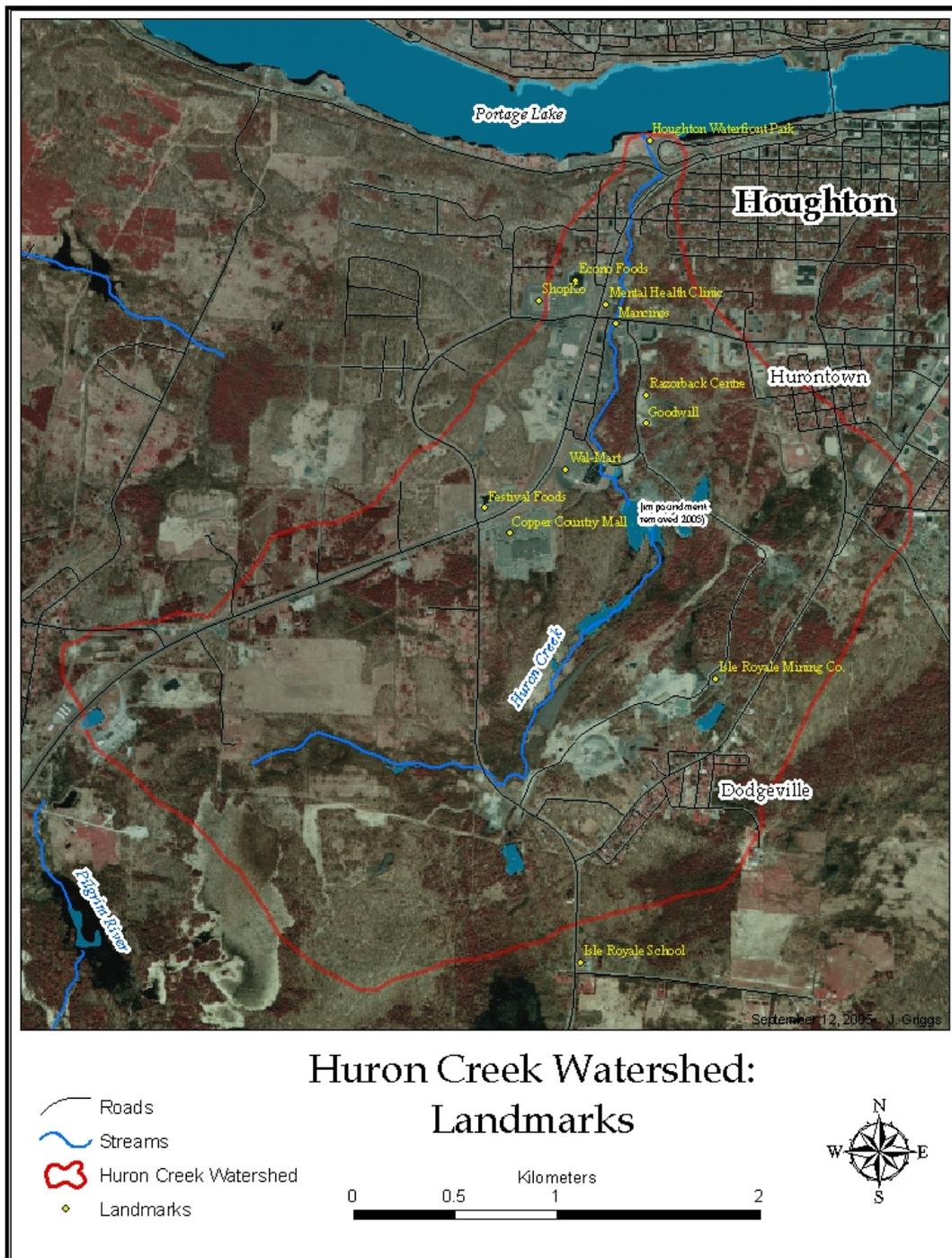


Figure 4.1

Time Lapse Photographs of the Huron Creek Watershed Showing Changes over the Last 30 Years.



Figure 5.1 Map of Huron Creek Watershed facing South 1975 (Courtesy of Dave Wisti)



Figure 5.2 Map of Huron Creek Watershed facing south, showing both the New and Old M-26 (Photo from MTU GEM Center)



Figure 5.3 Map of Huron Creek Watershed facing south, showing recent commercial development. (Photo from MTU GEM Center)

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