

# **The Economic Impacts of Renewed Copper Mining in the Western Upper Peninsula of Michigan**

A report prepared for

**Friends of the Land of Keweenaw  
FOLK**

by

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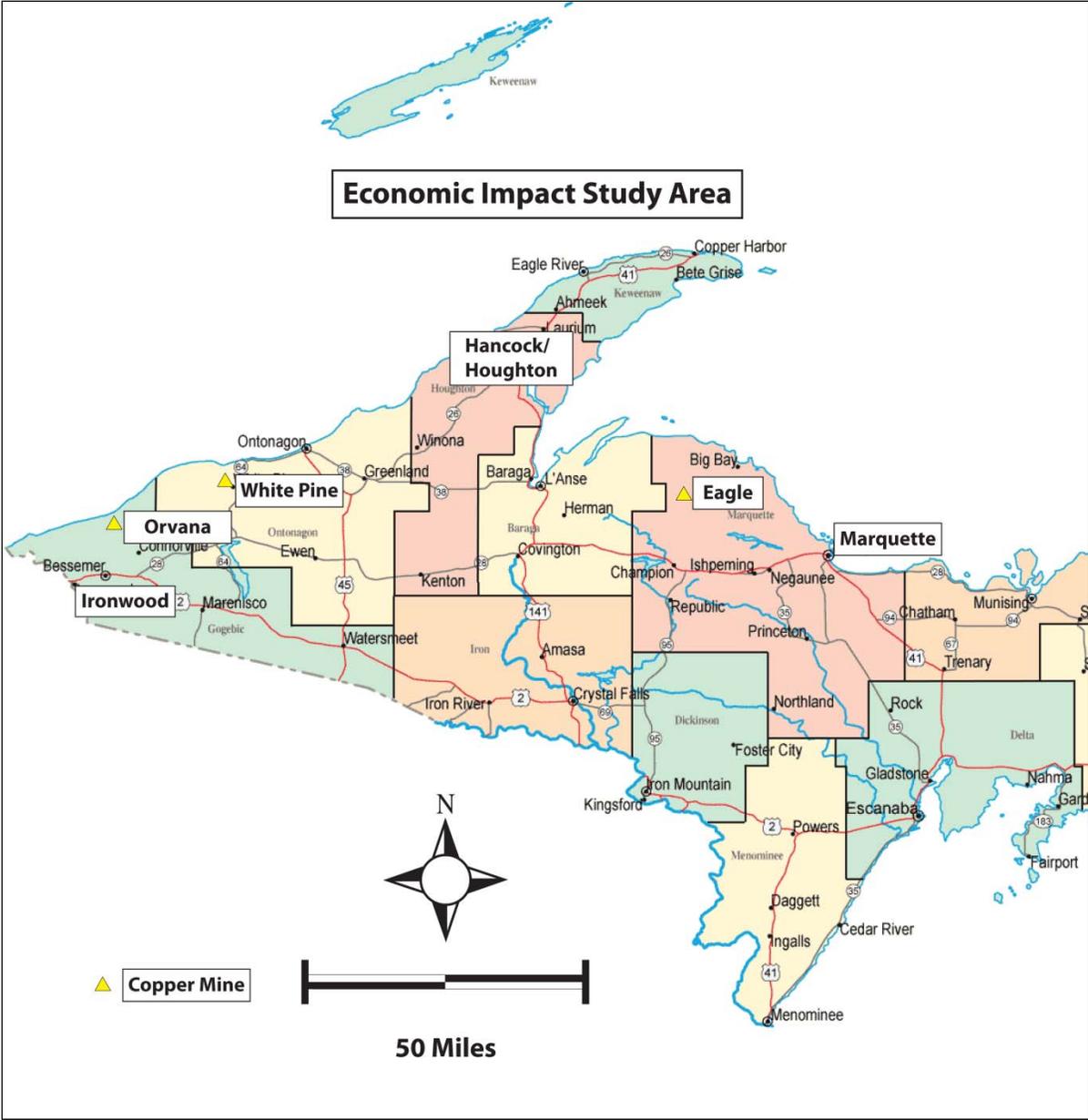
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# Executive Summary

## 1. Introduction

In recent years mining companies have returned to the Western Upper Peninsula of Michigan (Western UP) to explore for metal ore deposits and propose a variety of metal ore mining and processing projects. The Friends of the Land of Keweenaw (FOLK<sup>1</sup>), an active all-volunteer organization located in the Western UP, is concerned about the lack of involvement of the resident population in the decision-making about these metal mining proposals. It wants a public assessment of renewed metal mining that engages citizens to discuss and decide if the resumption of metal mining is in the region's best interest.

To that end, FOLK has launched a grassroots "Mining Education and Citizen Empowerment Campaign." The objective of this public campaign is to provide citizens, community leaders, and private and public institutions with the capacity to make informed and responsible decisions regarding new mining projects in the Western Upper Peninsula. This requires that information be made available on the likely impacts of a return to a metal mining economy on the region's natural and social environments and economy.

FOLK commissioned this study of the Western Upper Peninsula economy and the likely impact of metal mining on that economy as part of FOLK's education and empowerment campaign. We define the Western Upper Peninsula as the five-county area including Keweenaw, Houghton, Baraga, Ontonagon, and Gogebic Counties.

## 2. Avoiding a Rear-View Mirror Approach to the Local Economy: The New Economy That Has Emerged in the Western Upper Peninsula

When discussing proposals for economic development in small urban centers and the surrounding rural areas, the focus often falls on the land-based activities of the past that allowed European-Americans to inhabit those areas. As a result, the focus tends to be on the *export base*. In the Western UP that typically involves focusing on mining and processing metal ores, forest products and other land-based manufacturing, and agriculture.

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<sup>1</sup> For more information about FOLK, visit one of its websites: [www.folkup.org](http://www.folkup.org) or [www.folkminingeducation.info](http://www.folkminingeducation.info).

Although these land-based activities may remain important, focusing on the economic activities that dominated the regional economy decades or a century or more in the past is a dysfunctional and dangerous way to approach economic development. Market economies are constantly evolving over time and the sustainable economic activities of the present and the future may be quite different from those of the past. “More of the same” or trying to relive the past is not a viable economic development strategy.

This report begins with a discussion of the broader view we have to take of the local economy if we are going to understand it enough to design public policies to support local economic vitality and improve local economic well-being. We need to supplement the focus on traditional land-based export-oriented activities by incorporating several other vital dimensions of the local economy:

- i. We need to include in our view of the local economic base *all* economic activities that draw income into the community from outside, regardless of whether traditional exports or any physical exports are involved. In the Western UP that includes:
  - a. The visitor economy including tourism and recreation;
  - b. Urban trade center activities serving the surrounding area including professional and technical services such as medical facilities;
  - c. Universities, colleges, and other residential schools;
  - d. State and federal government institutions and facilities.

Almost all of the job growth in the Western UP over the last four decades took place in the service, retail trade, and state and local government sectors. In 2010 these were also the largest sources of employment in the region. Land-based activities such as mining and agriculture, in contrast, laid off workers by the thousands.

- ii. We need to recognize that “locally-oriented” businesses are not “secondary” in economic importance. It is they that capture and circulate the income that flows into the community, creating the multiplier impacts. A rich and diverse commercial infrastructure focused on serving local needs is important to local economic vitality as well as quality of life just as are export-oriented firms.
- iii. Much income flowing into the Western UP is *not* tied to current employment in the labor force. This “non-employment” income includes investment income (dividends, rent, and interest) as well as retirement-related pension programs including Social Security, Medicare, other government pensions, as well as private pension programs. Government programs for household income support also contribute to income flows into the region, especially during economic downturns. These non-employment income flows were responsible for a billion dollars flowing into the Western UP in 2010. Those income flows were almost as

large as all labor earnings associated with jobs in the region. Those non-employment income flows are a very important source of economic well-being in the region.

- iv. Over half of this non-employment income is associated with retirees. This makes the residential decisions of retired persons potentially important to local economic vitality.

It is important to note that most of these sources of new jobs and local economic vitality are tied to preferences that people have for where they would prefer to live, start a business, retire, go to school, or visit. That is, the attractiveness of an area to current and potential residents, visitors, and businesses is an important source of economic vitality and local economic well-being. That is why one local commentator on the Houghton-Keweenaw County area economy correctly labeled it a “quality of life economy.”<sup>2</sup>

### **3. The Promise and Reality of Mining**

The economic attraction of metal mining is that mining and ore processing pay wages that are substantially higher than the average. Between 1990 and 2000 the average annual pay associated with metal mining in Michigan was 81 percent larger than the average annual pay across all Michigan wage and salary jobs. After 2000, metal mining as an industry had shrunk so much that statistics on it were no longer presented at the state and county level. The National Mining Association reported average annual pay in American metal mining in 2010 as being 74 percent above all private sector jobs: \$81,300 compared to \$46,751.<sup>3</sup> Metal mining provides some of the highest paid jobs available to blue-collar workers.

Despite the high wages paid in metal mining, the communities that rely on mining have not, in general, shown signs of widespread prosperity and economic vitality. Employment, population, and total community income have grown much slower in mining communities than in communities not dependent on mining. Often unemployment and average income per person have also been lower. This feature of mining communities across the United States and around the world has led economists to study the apparent “curse of natural resource abundance.”

- i The Western UP has had a long experience with mining and it is difficult to detect signs of unusual prosperity that has flowed from that experience. Instead, there has been a series of booms and busts that have left communities in economic difficulty.

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<sup>2</sup> “Reinventing the Keweenaw and the Western U.P.: New Strategies, Changing Perceptions, and the Emergence of a Quality-of-Life Economy,” David Harmon, 2012, <http://www.folkminingeducation.info/reinventing-the-keweenaw-and-the-western-u-p/>

<sup>3</sup> Economic Contribution of U.S. Mining in 2010,” September 2012, p. 16. [www.nma.org/pdf/economic\\_contributions.pdf](http://www.nma.org/pdf/economic_contributions.pdf) .

We identify five reasons for this “anomaly of mining”: The failure of the high pay in mining to bring prosperity to mining communities.

- ii The instability of mine production, employment, and payroll tied to fluctuations in the demand for and price of minerals on national and international markets.
- iii The impact of ongoing labor-displacing technological change that constantly reduces the workforce required for any given level of mine production.
- iv Mine employees are very mobile, commuting long distance to work while maintaining their residences outside of the area immediately impacted by the mining and milling. This leads much of the mining payroll to “leak” out of the region around the mine.
- v Mines, ultimately, always deplete their economically viable ore deposits and shut down. The average life of a metal mine has declined significantly in recent decades. For instance, the copper mining activities in Butte, Montana, have lasted 125 years, albeit, employing a drastically reduced workforce. The White Pine mine operated for almost 45 years. But the proposed Copperwood project in Gogebic County is estimated to last 13 years.
- vi Mining is land intensive and as a result can have nearly permanent impacts on the natural environment. Environmental degradation can significantly reduce the attractiveness of a mining area as a place to live, work, raise a family or start a business.

Metal mining is often described as a pure benefit: Valuable “treasure” is removed from the earth by paying workers much higher wages than could be earned anywhere else. But, as outlined above, there are clearly costs that are incurred alongside the benefits. Rational decision making requires the costs and benefits to be carefully weighed and there is no reason to believe that the benefits of mining always exceed the costs. Mining companies know this. They do lots of exploration to find mineral deposits and then do lots of drilling and economic-engineering analysis to determine if the value of the mineral once extracted and processed justifies the costs that would have to be incurred. Mining companies regularly decide **not** to actively mine a known ore deposit because the costs are expected to exceed the value produced. Mining companies regularly leave mineral deposits in place because that is the economically rational thing to do.

The public should be as rational and hardnosed as mining companies: The public should carefully study both the costs and benefits of new metal mining, but from a public interest point of view rather than from a commercial business point of view. If the costs appear to exceed the benefits, the public should reject the proposed mine just as a mining company would if the private costs exceeded the private value produced.

#### 4. Sustainable Development of the Western Upper Peninsula Economy

The most common type of “economic development” strategy urged on communities is to go searching for large companies and try to lure them into locating in your community, thus putting residents to work at, hopefully, relatively high wages. In that approach, community economic development depends on an external agent *bringing* economic development to an area. The local community itself is conceived of as a passive recipient of a gift except for the reciprocal gifts the community may have to give to the new company to encourage it to locate in the community. This assumed community passivity can result in very little actual local economic development taking place because the new industrial operation puts down few roots in the community and a passive dependency is encouraged, something that is the opposite of an entrepreneurial culture. At its extreme, this results in a “company town” mentality in which very little community-based economic development takes place. Instead the community waits for one “outside savior” after another to deliver a fully formed industrial facility to the local area.

There is an alternative to these strategies of passive dependence, an alternative that does not wait for large industrial facilities to magically appear in a timely fashion to maintain local economic vitality and avoid stagnation. Instead the local economy is seen as having its own entrepreneurial energy that with encouragement and modest support can blossom into a variety of small enterprises that have the capacity to grow and interact with other local businesses and the local workforce to provide employment and income opportunities. In this vision of diversified organic economic development, the local area is not a passive participant. The site-specific characteristics of the community are crucial to encouraging and maintaining local economic vitality: environmental amenities, both social and natural, the quality of the local workforce, schools, public and private infrastructure, cultural richness and openness, independent entrepreneurial spirit, etc.

Protecting and enhancing the qualities that make a location an attractive place to live, raise a family, and do business becomes central not only to local quality of life but also to maintaining and enhancing local economic vitality. What is good for local quality of life also, often, is good for a vital local economy. Rather than there being some tragic tradeoff we have to make, purposely accepting damage to our quality of life in order to encourage someone to “create jobs” for us, we can simultaneously improve both quality of life and economic vitality.

This is not a prescription for a community to passively sit back and wait for something to happen. Rather it involves an active nurturing of existing businesses and support for new start-ups. The Keweenaw Economic Development Alliance’s apt phrase for this is an “Economic Gardening” strategy.<sup>4</sup> A productive garden requires active management that

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<sup>4</sup> “An Economic Overview of the Development of the Keweenaw Peninsula Economy & of an Entrepreneurial Support System,” Phil Musser, <http://kedabiz.com/about.html#historical> .

understands, respects, and supports the natural system in which it is embedded. The same is true of a vital local economy.

Empirical analysis of the Houghton-Keweenaw region indicates that local “economic gardening” has a significant potential. Quantitative comparison of the Houghton-Keweenaw Area with growing non-metropolitan counties nationwide indicates that at least three of the requisite characteristics are already present: the natural outdoor amenities, the concentrations of professional and technical workers, and the presence of significant urban areas (Houghton-Hancock and Ironwood).

Keweenaw, Houghton, and Ontonagon Counties make up one set of contiguous counties that were in the top quarter of all U.S. non-metropolitan counties in terms of the quality of outdoor amenities.<sup>5</sup> Gogebic and Baraga Counties were in the top half of U.S. non-metro counties according to that index. Iron and Vilas Counties just across the state line from Gogebic County were also in the top quarter.

In terms of concentrations of professional-technical “knowledge” or “creative” workers, Houghton County is in the top 5 percent of all U.S. non-metropolitan counties in terms of the density of these “creative” workers. Adjacent Keweenaw County is in the top quarter. Gogebic County was also in the top quarter of non-metropolitan counties as were the adjacent Wisconsin counties across the state line: Iron, Vilas, and Oneida.

The Keweenaw Economic Development Alliance (KEDA) has also recognized the economic potential represented by this combination of a concentration of professional/technical workers, a vibrant urban center that is also home to two institutions of higher education, and the high quality of life associated with the Upper Peninsula-Lake Superior location. KEDA has adopted an “economic gardening” approach focusing on creating a business support system for technology firms, including high tech incubators and customized business assistance. KEDA has experienced technology commercialization professionals on staff to provide assistance at its three technology incubator facilities. KEDA reports initial success in this effort.<sup>6</sup>

This is not just relevant information for the Houghton-Hancock and Ironwood areas. Almost all of the five-county Western UP study area is within commuting distance of the three regional trade centers serving that area: Houghton-Hancock, Ironwood, and Marquette. There is an interdependency between these urban trade centers and the surrounding smaller towns and rural areas that can lead to a sharing of the benefits of economic development in both urban and rural areas if appropriate local economic development strategies are adopted.

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<sup>5</sup> David A. McGranahan. See “The rural growth trifecta: outdoor amenities, creative class and entrepreneurial context,” *Journal of Economic Geography*, 11(3):529-557, 2011, David A. McGranahan, Timothy R. Wojan and Dayton M. Lambert.

<sup>6</sup> Phil Musser, “An Economic Overview of the Development of the Keweenaw Peninsula Economy & of an Entrepreneurial Support System,” Keweenaw Economic Development Alliance, p. 3. Undated.

Quality of life matters *economically*: protecting natural landscapes, air and water quality, wildlife, and recreational opportunities protects an important part of a locale's economic base. Similarly with urban and community amenities: good schools, attractive public spaces, diverse and interesting culture and cultural opportunities. An independent and active business and non-profit community is also important in supporting entrepreneurial activity.

Mining and mill towns have the potential to undermine most of these important local qualities both because they are land and natural resource intensive, seriously or even permanently degrading them. The uncertainty and volatility associated with metal mining and processing also creates economic insecurity that can undermine a community, leading to long commutes and significant leakage of payroll out of the community. That uncertainty can also discourage investment in the community and a certain level of passiveness or fatalism which does not support entrepreneurial activity. Instead, a "company town" mentality of passive dependence can emerge.

Our analysis in this report has documented all of the following:

- i. There are significant costs associated with mining activities that tend to offset the positive impacts of the high pay associated with mining jobs.
- ii. The economies of the Western Upper Peninsula have been successfully transitioning away from past reliance on unstable land-based, export-oriented economic activities.
- iii. The attractiveness of a place in terms of its social and natural amenities is an important part of that place's economic base and future economic vitality.
- iv. For that reason, economic activities that damage those attractive local characteristics are incompatible with the current sources of economic vitality and, if allowed to develop, will displace other important economic activities in the region.
- v. The Upper Peninsula has begun to develop a cluster of entrepreneurial manufacturing firms and other supporting firms build around social and cultural assets, high tech knowledge workers, attractive small urban areas, and high quality recreational amenities.

For all of these reasons, it is our professional judgment that a return to metal ore mining and processing in the Western Upper Peninsula would damage, not improve, regional economic well-being and vitality. Instead, the economic development focus should continue to be on local "economic gardening" and further developing the positive economic trends already under way.

## I. Introduction and Study Objective

Metal mining has been part of the history of the human habitation of the Western Upper Peninsula (UP) for a very long time. For centuries before Europeans migrated into the UP, Native Americans had mined the native copper of the Keweenaw Peninsula, Isle Royale, and Ontonagon County, converted it into tools and art objects, and traded them widely with other groups across North America. One of the things that initially drew Europeans to the Keweenaw area was the copper deposits which they proceeded to develop and export to distant markets. This part of the Western UP came to be called the Copper Country because of that. However, copper was not the only mineral mined in the Western UP: Iron ore was produced to the south in Gogebic County on the Wisconsin-Michigan border where the county seat was named Ironwood and a county on each side of the Wisconsin and Michigan line was named Iron County.

Like mining everywhere, the production, employment, and income from mining in the Western UP were erratic, swinging between booms and busts. The opening of the White Pine copper mine in Ontonagon County in 1953 set off the last boom in copper production in the UP with employment in copper ore mining and processing at White Pine reaching about 3,000 in 1974. By 1984 it had fallen to near zero before partially bouncing back to employing about 1,000 workers in the late 1980s and early 1990s. But by 1995 most of the White Pine operation was in the process of permanently shutting down. Iron mining in the Western UP began its terminal decline beginning in the 1950s as the quality of the ore declined and it was no longer profitable to ship without considerable and costly processing. The last shipment of iron ore from Gogebic County was in 1967.

Recently, however, a variety of metal mining projects have been proposed for the Western UP area. The most detailed proposals include the Copperwood Mine on the shores of Lake Superior in Gogebic County and the proposed Gogebic Taconite Mine in the part of the Gogebic Iron Range just southwest of the Michigan-Wisconsin border. Other copper, nickel, uranium, iron, gold, silver, and platinum group projects in the Upper Peninsula have reached at least the exploration stage. It is possible that history may repeat itself in the form of another metal mining “rush” to the Western UP.

Given the promise of additional high-paid jobs for the Western UP as well as the history of social and economic disruption and environmental damage associated with previous metal mining booms and busts, the Friends of the Land of Keweenaw (FOLK) have been seeking to encourage a broad-based discussion of the benefits, costs, and risks associated with the Western UP again committing itself to metal ore mining and processing.

FOLK has called for a public assessment of new metal mining: a regional discussion in which citizens could have a voice on whether they believe that a resumption of metal mining is in the region’s best interest. To that end, FOLK has launched a grassroots “Mining Education and Citizen Empowerment Campaign.” The objective of this public campaign is to provide citizens,

community leaders, and private and public institutions with the capacity to make informed and responsible decisions regarding new mining projects in the Western Upper Peninsula. This requires that information be made available on the likely impacts of a return to a metal mining economy on the region's natural and social environments and economy.

FOLK commissioned this study of the Western Upper Peninsula economy and the likely impact of metal mining on that economy as part of FOLK's Mining Education and Citizen Empowerment Campaign. The objectives of the study were to:

- i. Carefully analyze the current economy in a five county Western UP study area (Keweenaw, Houghton, Baraga, Ontonagon, and Gogebic Counties) and describe how that economy has been evolving since metal mining ceased in the region.
- ii. Carefully analyze the impact of mining on the Western Upper Peninsula in the past as well as the impact of mining in various regions across the nation. The objective is to understand both the economic *promise* of mining as well as the actual economic *performance* of mining communities. This information was then to be used to discuss the likely impact on the regional economy of the various mining proposals that have recently been made.
- iii. Carefully compare the trajectory on which a return to mining would put the region compared to the trends in the economy that has been developing in the region over the last decade or more.
- iv. On the basis of the above economic analysis, make recommendations about the most productive economic development path for the region.

## **II. Shifting Our Gaze from the Economic Rear-View Mirror: The Dangers of a Focus on Land-Based Exports**

### **1. How We Look at and Think about the Local Economy and Local Economic Well-Being**

The *export base* or *economic base* view of the local economy is one of the most widely shared pieces of popular economic understanding. Most of us learned this way of understanding our local economies from our parents, grandparents, elementary school teachers, and neighbors. We were informally taught "tales of livelihoods" that explained to us how our families several generations back came to inhabit areas and made livings for themselves. That *popular* or *folk economics* tends to stick with us just as other cultural values and traditions do. It simply becomes part of the way we look at the world.

The traditional economic base of an area is usually associated with folk tales of how European-Americans came to inhabit any particular area and built a successful and enduring economy. This view is called an *export base* view because it focuses on the economic activities in which the local population specializes, producing more than it needs for its own consumption, and *exports* the surplus to the rest of the national or world. Those exports are seen as bringing money into the local economy from outside. That money then can circulate within the local economy putting people to work in locally-oriented economic activities and allowing the importing of vital goods and services that could not be easily or economically produced locally. Unless the local residents want to live a self-sufficient, non-monetary, subsistence way of life, those exports and the resulting income flows into the economy from outside sources are necessary for a modern, vital economy. In that sense those export-oriented activities are seen as the region's *economic base*: the economic energy driving the local economy.

Most regions have an export-oriented folk story: In the Upper Peninsula of Michigan and the Western Upper Peninsula area it is linked heavily to metal mining and the timber industry. In Arizona it is "cattle, cotton, and copper." It is automobiles in Detroit, dairy farms in Wisconsin, corn in Iowa, wheat and cattle on the Great Plains, timber and hydroelectric power in the Pacific Northwest, coal in Appalachia, etc.

No widely held popular understanding of this sort could have become established and persisted for so long unless it had an important element of truth to it. In the context of the European-American settlement of a continent largely depopulated of its indigenous population by disease, warfare, and removal to reservations, the export base view was largely accurate in depicting how settlers were able to move from subsistence homesteads on a wilderness frontier to a prosperous commercial economy. Whatever its historical accuracy, however, it is important to ask whether that original 19<sup>th</sup> and early 20<sup>th</sup> century economic insight is a sufficient guide for understanding a modern 21<sup>st</sup> century economy. As we will explain below that export base view of the local economy is now seriously incomplete and needs to be supplemented in several important ways that allow us to accurately look at the *total* economy and all the sources of local economic well-being when making public economic policy decisions.

## **2. Completing Our Analytical View of the Local Economy: The Total Economy**

As we will develop in more detail below, there are three other important economic insights that have to be integrated with the export base view to complete our view of the local economy:

- A. The export base view focuses only on what creates a local demand for workers. In that sense it ignores the other half of the twin supply-demand blades of the "economic scissors," the important role of the local supply of labor in encouraging the expansion of local economic activity.

- B. The export base view focuses only on commercial goods and services sold in markets in exchange for money. It ignores non-commercial, non-market sources of scarce and valuable goods and services that support and facilitate commercial activities and contribute to local economic well-being. These include clean air and water, scenic landscapes, wildlife, crime-free neighborhoods, comfortable climatic conditions, good schools and other public infrastructure, etc.
- C. The export base view, as the name makes clear, focuses on exports as the sole determinant of local economic vitality. Its message is that “only exports matter.” We need to understand that locally-oriented economic activity is not a passive, unimportant or “secondary” aspect of the local economy. By capturing, holding, and re-circulating income that comes into the local economy, the web of locally-oriented economic activities creates the “multiplier” impacts associated with export and other income injected into the local economy.

### **A. Incorporating Labor Supply into Our View of the Local Economy**

The export base view focuses on the commercial forces that draw workers and their families to a particular area. What are the export-oriented activities the local area can support and thus create a local demand for workers? In a frontier economy these are likely to be land-based economic activities, hence the focus on mineral extraction, forest products, ranching, and farming.

That narrative has a compelling historical ring to it. But most economic activities in the 21<sup>st</sup> century are not land-based. The total of all jobs in agriculture, mineral extraction, and forest products represents only about 3 percent of total jobs in the American economy in 2011.<sup>7</sup> Clearly we cannot explain the location of economic activity across the American landscape on the basis of this tiny part of the total economy. We have to be able to explain why non-land-based economic activity locates where it does independent of this tiny land-based sliver of the overall economy.

Even if we stick with a focus on export-oriented economic activities as the engine driving a local economy, we are still left with the question of why a particular export-oriented firm chose to locate where it did. If we cannot explain that, we have not really explained what the economic forces are supporting the local economy. For instance, much of light manufacturing (computer assembly, chip manufacturing, appliance assembly, etc.) as well as export-oriented services (publishers, information businesses, financial services, technical support, professional services, etc.) are relatively “foot-loose” in terms of where they locate. The fertility of the land, minerals in the ground, commercially valuable natural vegetation including livestock forage and timber are unlikely to provide an explanation for why most of the firms found in the Houghton,

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<sup>7</sup> Agriculture, agricultural services, fishing, forestry, mining (including oil and gas), wood products, paper, and primary metals. U.S. Department of Commerce, BEA, REIS data base.

<http://www.bea.gov/regional/spi/default.cfm?selTable=SA25N&selSeries=NAICS>

Ironwood, or Marquette areas chose to locate there. For that reason, the export base view of the economy provides only limited insight into the local sources of economic vitality.

Businesses locate in particular areas for a wide variety of reasons, but two considerations are almost always important:

- i. the availability of a sufficiently skilled workforce at an affordable cost, and
- ii. access at an affordable cost to the markets for the firm's products.

The geographic distribution of the population and people's preferences for where they would like to live influence both of these important economic considerations. Businesses cannot afford to ignore either of these: markets and the cost of reaching them and an adequate labor supply at a reasonable cost are central to any business location decision.

The export base view of the world implicitly assumes that *people do not care where they live*. People are assumed to passively go to where the jobs are because they have no choice if they want to be employed and their families to prosper. But in the 21<sup>st</sup> century continent-wide American economy, individuals and families do have a choice as to where they live. They face a broad range of economic opportunities mixed with an equally broad range of regions and communities that have diverse sets of attractive and unattractive characteristics that are unrelated to job availability and pay. Individuals and families can make tradeoffs and choices that mix labor market opportunities and the level of pay with other local characteristics such as quality of schools, crime rates, levels of congestion and commuting time, intensity of social conflict, pace of life, neighborliness, cultural variety, recreation and cultural opportunities, etc.

This is not to suggest that all citizens are "rootless" or "footloose," quite the opposite. Many people are committed to place or become committed and make significant sacrifices in terms of labor market opportunities and access to social and natural amenities located elsewhere to reside in that place. Farm families committed to farms that have been in their family for generations, members of families that have continued to live in particular areas for many decades, or Native American committed not only to their reservations but also to the landscapes that their ancestors inhabited for centuries are just a few examples of people committed to place. Those commitments are expressions of the site specific values that hold people in places. Those commitments also have important economic implications.

Areas that have mixes of qualities that make it easy for those areas to attract and hold residents will have a relatively large, diverse, and skilled workforce available at a somewhat lower price. Alternatively, such areas can get workers to move to the area without wages being bid up significantly. That makes such areas attractive to businesses. The fact that businesses are run by people who also have preferences about where they and their families live only adds to the economic importance of a community's attractive qualities. To the extent the dynamic between the attractiveness of a community to new residents and businesses has triggered ongoing economic development, local markets for goods and services will also be expanding, increasing the economic attractiveness of the area to firms.

In brief, labor supply and its cost and the location of population concentrations matter to businesses. Areas that attract high quality workers at a relatively low price will, in turn, be attractive to business firms. Ignoring labor supply and focusing only on labor demand, as the export base view does, is inappropriate economic analysis. As in most components of a market economy, both supply and demand matter.

It is important to keep in mind that conceptually, we do not have to choose between the export base view of the economy and the residential location choice view. These two views encompass between the two of them the two primary market forces of supply and demand. We should be careful to consider both. The relative importance of labor supply and labor demand can be expected to shift over time and vary across geographic areas. At any particular location at a given time, the relative importance of these two sets of forces is an empirical matter. Local economic development policy, however, may choose to focus strategically on some elements of one or both of these sets of economic forces.

### **B. Looking at All Sources of Economic Value Including Non-Market Economic Values**

The economic dynamic described above has been called *amenity-supported local economic development*. This economic potential in some ways is the opposite of the economic force that the export base view of the economy emphasizes. Within the export base view, people move to where the jobs are. Within the amenity-supported economic development model, economic activity follows the residential preferences of the population. Economic activity shifts in this way because the existence of local amenities provides businesses with access to a lower cost skilled labor force and to markets for their goods and services. In essence, because workers and families value local amenities, they are willing to sacrifice a certain amount of income to gain access to those site-specific qualities. They accept lower wages than they could earn in less attractive locations as an effective “price of admission” to what potential residents judge to be a more valuable set of local qualities. The *total real income* being received by residents comes in two parts: The value of the conventional paycheck and the value of the site specific amenities to which living in that location provides access. The value of those local amenities provides residents with a “second paycheck.”<sup>8</sup>

This is not a new way of looking at the local economy. Since the mid-1950s economists have emphasized the importance of residential location decisions as a powerful economic force. They focused on the role of local environmental “amenities” such as climate and natural

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<sup>8</sup> Ed Whitelaw at the University of Oregon and with ECONorthwest coined that phrase. Local economies can be a bit more complicated than this. As the local economy expands, limited supplies of land for commercial and residential development can lead to land values rising, increasing both the cost of living and the cost of doing business. This can ultimately work to stabilize community size, limiting that location to those for whom it is the most productive site for a business and to those residents who most highly value the qualities of that location. The higher cost of living will reduce the purchasing power of local wages and residents will pay an effective access fee in the form of lower real (cost of living adjusted) wages. To the extent that the available land base is not a serious constrain on ongoing development, the effective price residents pay to gain access to the qualities associated with that location are likely to be reflected in the lower pay they accept compared to what they could earn in less attractive locations.

landscapes in the settlement of the desert Southwest (including Arizona, New Mexico, and Southern California), Florida, and the Pacific Northwest.<sup>9</sup> Tiebout underlined the fact that people “shop around” for the social amenities produced by different levels of local government taxation and different public spending patterns such as on schools, parks, and roads.<sup>10</sup> Borts and Stein argued that in a mobile, open economy, it would be an area’s ability to attract and hold a labor force without bidding up labor costs that would determine the geographic distribution of economic activity.<sup>11</sup>

These economic forces tied to local amenities have, in fact, transformed many parts of the nation’s economic geography and help to explain the above average economic performance across most of the Mountain West, as well as in the Southeast and the Pacific Northwest over the last two decades before the Great Recession struck.<sup>12</sup> Ten years ago the Economic Research Service of the U.S. Department of Agriculture published a special edition of *Rural Development Perspectives* on the rapid growth in population in the rural counties of the Mountain West. That growth attracted attention of analysts because it could not be explained by the Mountain West’s traditional land-based activities of mineral extraction, forest products, farming, and ranching, all of which were in relative or absolute decline. These USDA studies were focused on the non-metropolitan West, where one would expect these traditional land-based economic activities would dominate. The titles of the studies indicated the common theme: “Amenities Increasingly Draw People to the Rural West.” “Quality of Life, Nontraditional Income and Economic Growth: New Development Opportunities for the Rural West,” “Wildlife Conservation and Economic Development in the West,” and “Jobs Follow People in the Rocky Mountain West.”<sup>13</sup>

This half-century of economic research simply underlines the important role that non-commercial, non-market goods and services can play both in contributing to the economic well-being of individuals and households as well as the economic vitality of communities. Some of these non-market economic values are human-created, others are gifts of nature, flowing as they do from well-functioning natural systems. All of them are often encompassed in the larger concept of “quality of life” or “local amenities.”

### C. Capturing, Holding, and Circulating Income in the Local Economy

Our thinking about the local economy has to move beyond an “only exports matter” point of view. The export base view of the economy implicitly takes that point of view, effectively dismissing the bulk of local economic activity as “secondary” or “passive.” This is an important error. As we will show below, a traditional export base view of the economy cannot explain the

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<sup>9</sup> Ullman, Edward, 1954, “Amenities As a Factor in Regional Growth, *Geographic Review*, 44(1):119-132.

<sup>10</sup> Tiebout, Charles, 1956, “A Pure Theory of Local Expenditures, *Journal of Political Economy*, 64(2):160-164.

<sup>11</sup> Borts, G.H., and J.L. Stein, 1964, *Economic Growth in a Free Market*, New York: Columbia University Press

<sup>12</sup> Thomas M. Power and Richard Barrett, *Post-Cowboy Economics: Pay and Prosperity in the New American West*, Island Press, Spring 2000.

<sup>13</sup> See the special issue of *Rural Development Perspectives* on the rural West, 14(2), August 1999, USDA, Economic Research Service.

actual economic vitality of the Western UP counties. Here we focus on the important economic role of locally-oriented economic activity in boosting the local economy.

Exports by themselves do not create a local economy. On the North Slope of Alaska billions of dollars' worth of oil has been produced but there is almost no "local economy" on the North Slope. The value of that oil and the wages earned producing it all flow to other areas a great distance from the North Slope, the places where people actually live and where there is the commercial infrastructure in which that income can be spent. This is an extreme example, but the mining, timber, cattle, and farm towns that grew up around a primary export often had similar limiting characteristics: The income generated by the exports primarily went to fund imports. That is, the income from the exports almost immediately "leaked out" of the region. That is why many of the mining and mill towns became the equivalent of ghost towns as demand for the exports declined or technological change reduced the size of the workforce needed to produce the exports. Empirical economic analysis of the impact of natural resource activities in rural areas confirms that the multiplier impacts associated with natural resource extraction activities in contemporary rural areas can also be nearly zero.<sup>14</sup>

The actual size of the impact of an export activity on the local economy is determined by the interaction of two sets of local economic characteristics: The size of the flow of income into the local economy from the outside and the web of local economic interconnections among residents that captures and circulates that income among businesses and households. The "multiplier" impacts associated with export income is determined by that ability to capture and circulate income locally. It is the local web of specialized and interdependent businesses and households that actually make up the local economy. Without those locally-oriented businesses there can be enormous export flows but only a very primitive, under-developed local economy.

Both export-oriented and locally-oriented businesses contribute to the vitality of the local economy. It can be a serious economic error to ignore either of these two sides of the local economy.

#### **D. Conclusions on the Limits of the Export Base View of the Local Economy**

The importance of amenity supported local economic vitality in transforming the economic geography of much of the United States including many non-metropolitan and rural areas cannot be safely ignored when evaluating the likely economic impacts of a revival of copper and other metal mining in the Western UP. Local economic vitality and local economic well-being are not primarily determined by the same land-based economic activities that facilitated the original European American settlement of the UP in the nineteenth century. Although those traditional economic activities may remain significant to some local economies, in general they have not been the source of new jobs and income for the region. The economic impacts of the copper and other metal ore mining and milling operations need to be put into a long-run

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<sup>14</sup> "A Test of the Economic Base Hypothesis in the Small Forest Communities of Southeast Alaska," Guy C. Robertson, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, General Technical Report, PNW-GTR-592, December 2003. [http://www.fs.fed.us/pnw/pubs/pnw\\_gtr592.pdf](http://www.fs.fed.us/pnw/pubs/pnw_gtr592.pdf)

economic development context: What are these copper and other metal mining activities likely to contribute to the sustained economic development of the region?

In answering that question, the importance of the attractiveness of a region to new residents and businesses has to be considered alongside any particular proposal to boost the region's exports. To the extent that a re-industrializing of the region around copper and other metal mining damages the region's attractiveness as a place to live, work, raise a family, and do business, it may undermine future economic vitality rather than stimulate it. To the extent that those mineral extraction activities are also unstable, generating booms and busts that weaken communities and economies rather than strengthen them, there is even more reason to be concerned about what that revival of copper and other metal mining in the region can actually contribute to local economic vitality and well-being.

### 3. Summary

Most regions have an export-oriented folk story that explains what the primary engine is that drives the regional economy: In the Western Upper Peninsula of Michigan that "livelihood" story is linked heavily to metal mining and the timber industry. It is automobiles in Detroit, dairy farms in Wisconsin, corn in Iowa, wheat and cattle on the Great Plains, timber and hydroelectric power in the Pacific Northwest, coal in Appalachia, etc. These industries are seen as the *export base* that drives economic development.

As we will explain below, that export base view of the local economy is now seriously incomplete and needs to be supplemented in several ways that allow us to accurately look at the *total* economy and all the sources of local economic well-being when making public economic policy decisions.

As we developed in more detail above, there are three important other economic insights that have to be integrated with the export base view to provide a complete view of the local economy:

- i The export base view focuses only on what creates a local demand for workers. In that sense it ignores the other half of the twin supply-demand blades of the "economic scissors," the important role of the local supply of labor in encouraging the expansion of local economic activity.
- ii The export base view focuses only on commercial goods and services sold in markets in exchange for money. It ignores non-commercial, non-market sources of scarce and valuable goods and services that support and facilitate commercial activities and contribute to local economic well-being such as clean air and water, scenic landscapes, wildlife, crime-free neighborhoods, comfortable climatic conditions, etc.

- iii The export base view, as the name makes clear, focuses on exports as the sole determinant of local economic vitality. Its message is that “only exports matter.” We need to understand that locally-oriented economic activity is not a passive, unimportant or “secondary” aspect of the local economy. By capturing, holding, and re-circulating income that comes into the local economy, the web of locally-oriented economic activities creates the “multiplier” impacts associated with exports and other income injected into the local economy.

### III. The Local Economy That Has Actually Developed in the Western UP over the Last Several Decades

#### 1. Data Sources Used in this Report

In this report we will often refer to economic statistics that describe the past and present performance of the Western UP regional economy. Appendix B at the end of this report discusses the approach we took to this study and the data sources. All of the data came from a federal data base maintained by the Bureau of Economic Analysis in the U.S. Department of Commerce. That data collection is called the Regional Economic Information System.<sup>15</sup>

**Whenever we present economic data in a figure or table, we will be using that data base unless we note otherwise.** When we are presenting historical income information we will have adjusted it to dollars of constant purchasing power using 2010 dollars as the reference point. Such adjustments of historical data, expressed in dollar terms to remove the effects of inflation, is said to produce *real* values. They are called “real” values because dollars of constant purchasing power are used so that the measurements are not made in units that vary in size over time.

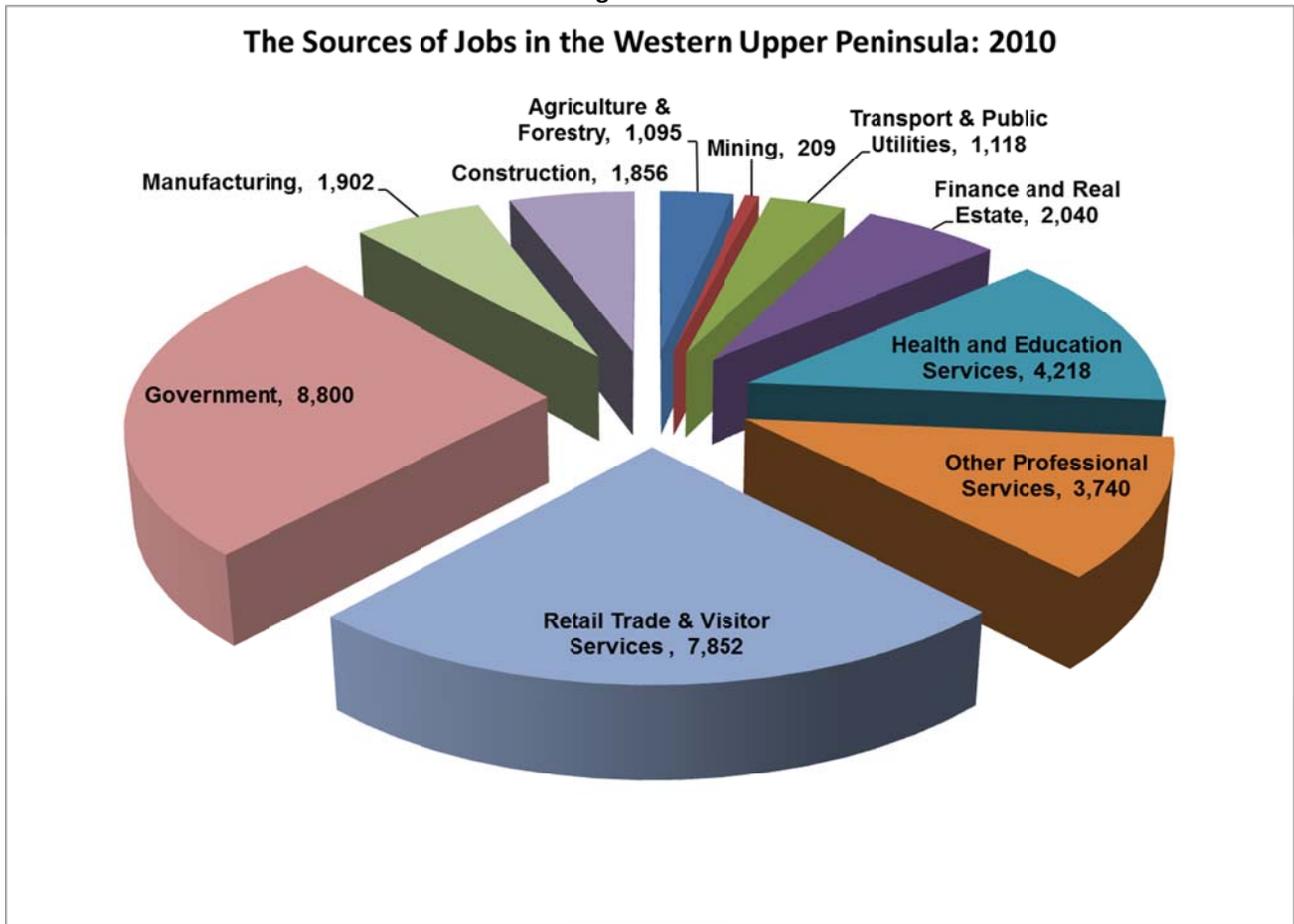
#### 2. Trends in the Development of the Economy of the Western Upper Peninsula

The primary sources of jobs in the Western UP in 2010 were in services, retail trade and visitor services, and government. Figure A below shows the distribution of total employment among the various industries in the five county study area. The reader will note the diverse sources of employment, with at least nine major sources of jobs. It will also be noted how small the contribution of mining is to current employment. This economic diversity is interesting by itself. It is even more interesting and informative to study the evolution of this Western UP economy over the last several decades. That is the purpose of this section.

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<sup>15</sup> <http://www.bea.gov/regional/>.

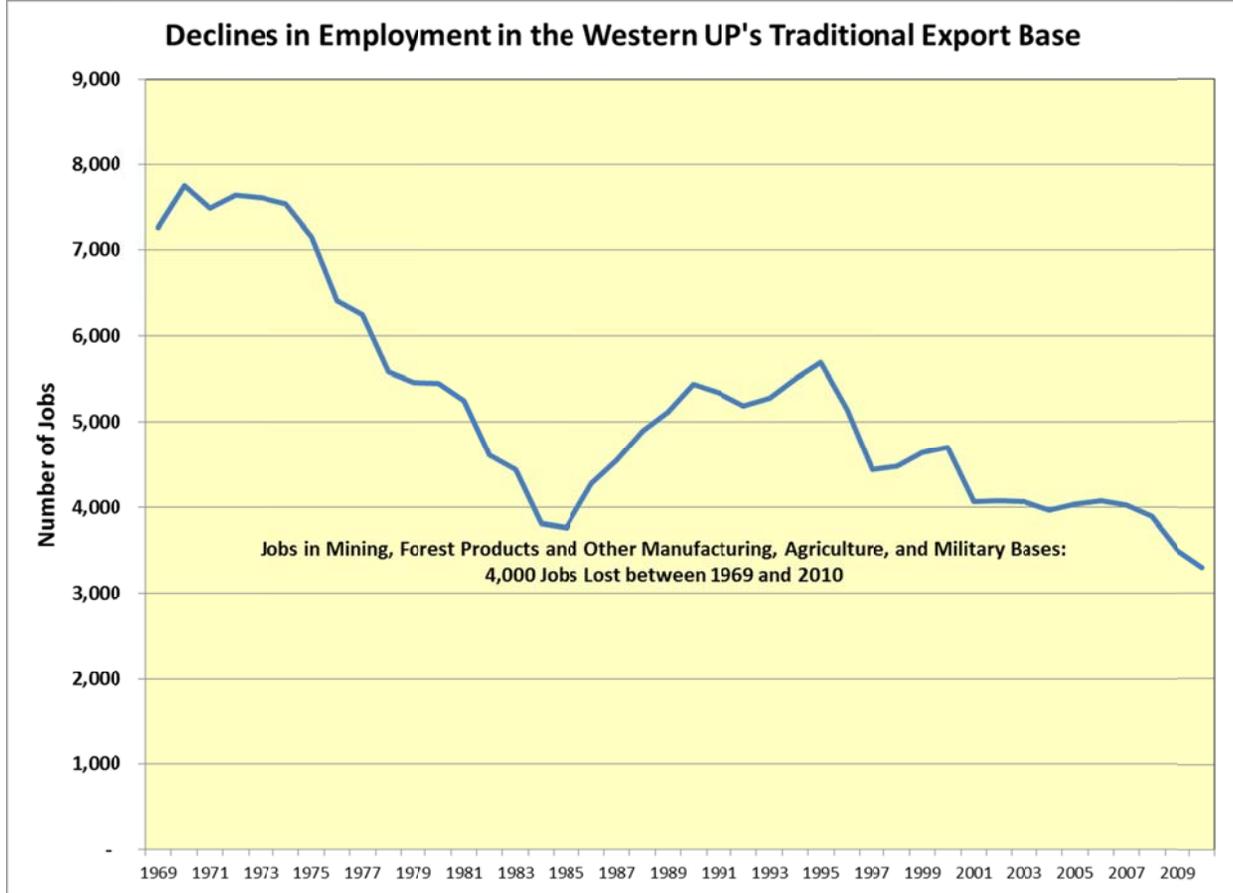
Figure A.



The most serious problem with the conventional view that land-based economic activities such as mineral extraction and processing, forest products, and agriculture are the engines that drive rural economies is that that view fails to explain the actual performance of the Western Upper Peninsula regional economy. While the traditional export activities have offered little or no stimulus to the regional economy over the last 40 years, the rest of the economy has expanded nonetheless.

In our five-county study region, the number of jobs in mining, forest products and other manufacturing, and agriculture has declined by 4,000 jobs or 55 percent between 1969 and 2010. Most of that job loss was associated with the decline in copper ore mining and processing at White Pine. See Figure B below.

Figure B.



Despite this major loss of land-based export jobs, mostly mining jobs, the rest of the regional economy did not follow the export base downward. Instead, jobs in other sectors of the economy actually expanded significantly, adding 12,100 jobs, a 70 percent gain. See Figure C below.

Clearly there were other economic forces supporting job growth that lay outside the traditional export base. Those positive economic forces need to be identified and focused on when considering ways of protecting and enhancing local economic vitality.

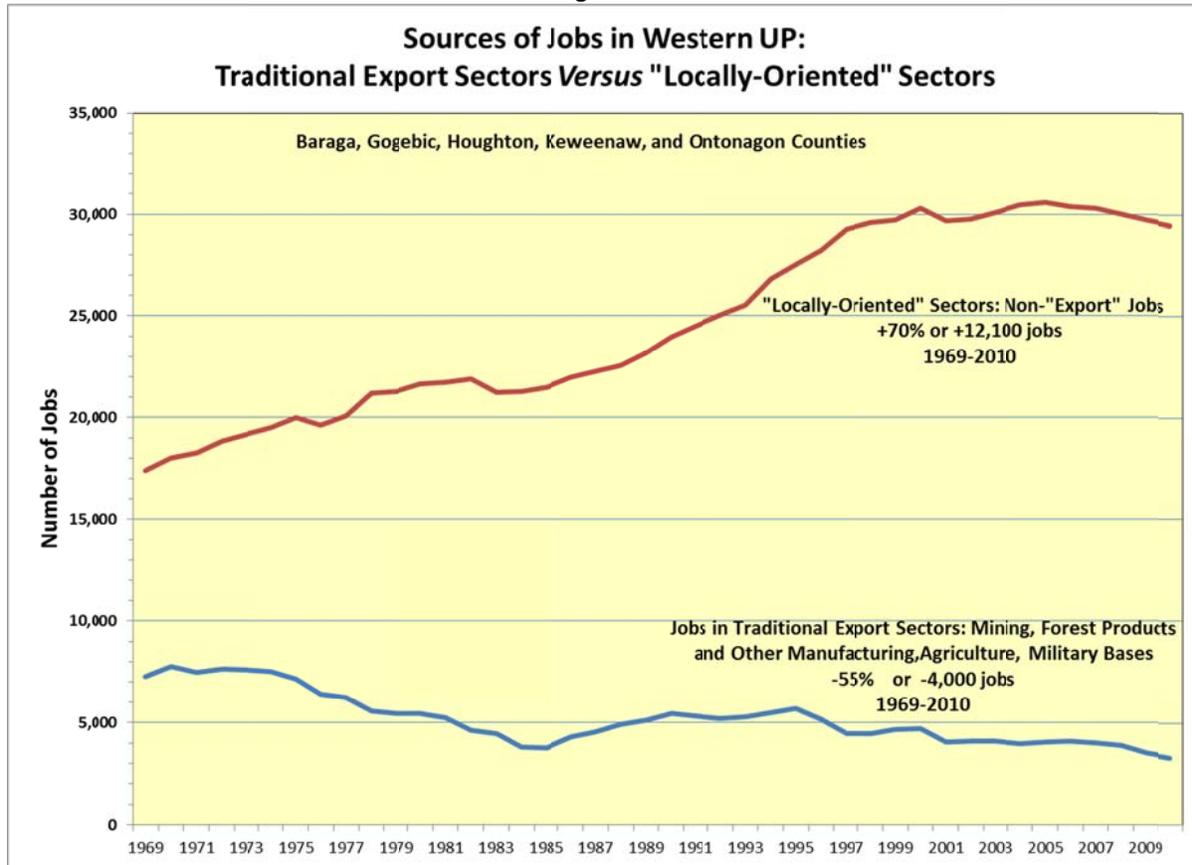
The economic sectors that gained the most jobs in the Western UP between 1969 and 2000<sup>16</sup> were professional services such as health care and visitor services such as eating and drinking

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<sup>16</sup> Table A focuses on job growth between 1969 and 2000, not including the 2001-2010 period. This is because in the year 2001 the federal regional economic statistics shifted to a more detailed set of industries. In rural areas such as the Western UP, however, the employment and income information for those more detailed industries could not be released without violating confidentiality rules aimed at protecting the financial details of individual firms. As a result, very little data for the rural parts of our study area are available for the first decade of the 21<sup>st</sup> century.

establishments and accommodations. Services added 4,300 jobs while Retail and Wholesale Trade added 2,600 jobs. Although federal government employment declined slightly, State and Local Government added 3,900 jobs. Other sectors that had significant job growth included Construction, Finance and Real Estate, and Manufacturing. See Table A below.

Figure C.



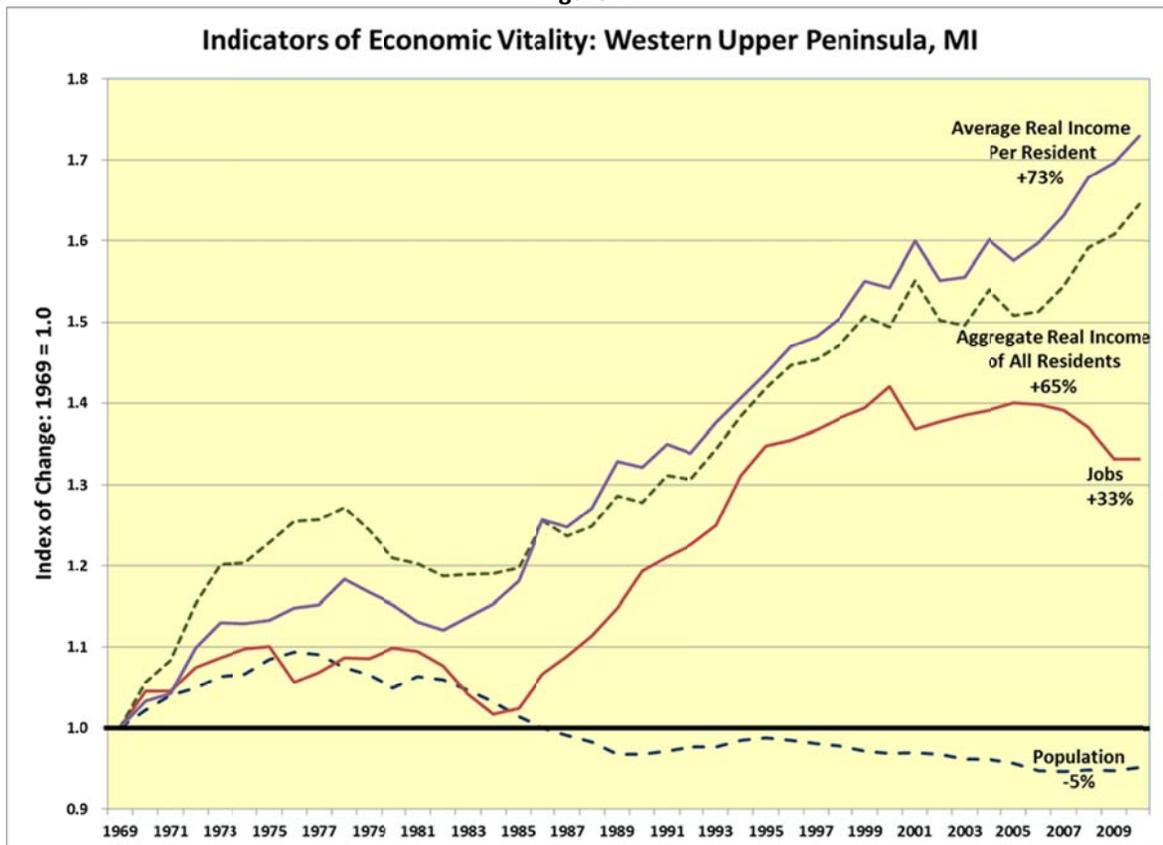
The gain in jobs in the manufacturing sector was notable since it is the only part of the traditional export base that actually added significant numbers of jobs. Those jobs gains in manufacturing continued into the 2000s. Between 2000 and 2006 another 150 manufacturing jobs had been added in our five-county study area. The Houghton and Baraga Counties actually added 214 manufacturing jobs during the first half of the 2000s, before the Great Recession struck. We will return to this bright spot in the Western UP economy below.

Despite the massive job losses in mining, by most measures the regional economy displayed considerable economic vitality. After removing inflation, average income per resident increased 73 percent between 1969 and 2010. The total of all of the income received by residents increased 65 percent in inflation adjusted terms. Total jobs grew by almost 40 percent between 1984 and 2007 when the Great Recession led to layoffs. Total jobs still increased by a third between 1969 and 2010. Population, however, declined beginning in 1977. From its peak that year, population declined 15 percent so that in 2010 it was 5 percent below its 1969 level. See Figure D below.

Table A.

Western Upper Peninsula Region	
Industrial Sectors Gaining and Losing Jobs: 1969-2000	
Industrial Sectors	Change in Jobs 1969-2000
<b>Sectors Gaining Jobs</b>	<u>13,274</u>
Services	4,267
State and Local Government	3,880
Retail & Wholesale Trade	2,573
Construction	890
Finance and Real Estate	808
Manufacturing	534
Transportation and Public Utilities	226
Agriculture	96
<b>Sectors Losing Jobs</b>	<u>-3,187</u>
Mining	-2,891
Federal Government	-296

Figure D.



Because inflation systematically reduces the purchasing power of the dollar, when we measure income at different points in time, we have to adjust the dollar values to reflect dollars of constant purchasing power so that we are measuring income in units of the same size no matter what year we are studying. Such income measures adjusted to remove the effects of inflation are called *real* income since the dollars in any year represent the same purchasing power.

The growth in real income per person in the Western UP study area was impressive given the significant jobs losses in mining. Between 1969 and 2010 the *increase* in real per capita income in the Western UP was almost the same as in the nation as a whole, 73 percent in the Western UP and 75 percent in the U.S. The growth in real income per person in the Western UP was much faster than the growth in state of Michigan as a whole which was only 41 percent. See Figure E below.

It is important to note that the above discussion of per capita income focused on the *growth rate* rather than the level of per capita income. The *level* of per capita income in the Western UP remains well below national and state levels. Per capita income in the Western UP in 2010 was almost 30 percent below the national level and 20 percent below the state level.

Average income per person tends to be higher in more densely settled urban areas. As a result the Michigan state average annual income level is largely tied to the most densely settled urban areas in the state where over 80 percent of the state's population lives. In 2011, the correlation coefficient between population and average annual income among the state's metropolitan areas was 0.53. For the state's counties the correlation coefficient between population and average annual income was 0.47.<sup>17</sup> The larger the population, the higher was the average annual income. At the extreme in Michigan, the average annual income in the greater Detroit area was \$40,000 for the 4.3 million people living in that metro area in 2011. The average income across all of the state's metropolitan counties was about \$37,400 per year. For the state as a whole, the average annual income was \$36,300 in 2011 quite close to the average in the metropolitan urban centers. For the non-metro counties, however, it was only \$31,400. Clearly average annual income for Michigan as a whole was closer to the metropolitan average than to the non-metropolitan average. For our Western UP study area, which is entirely non-metro, the average income was \$28,100, about 90 percent of the Michigan non-metro average.

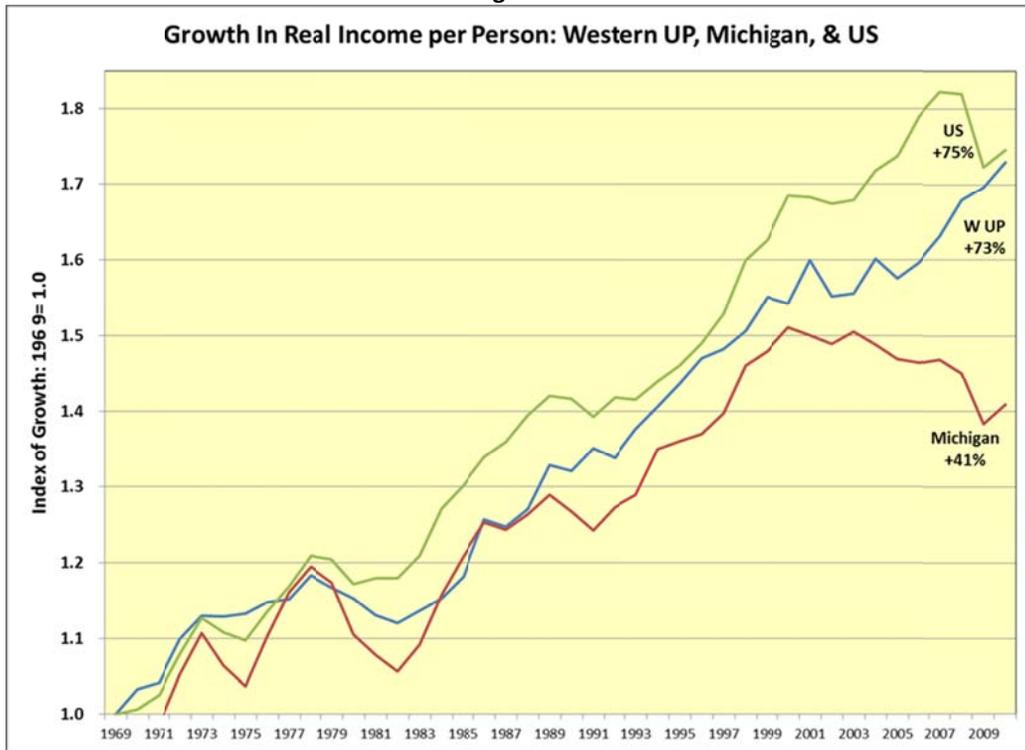
This is not just a pattern in Michigan. The same is true across the nation.<sup>18</sup> More densely settled areas tend to have higher labor productivity, higher cost of living, and a broader array of urban dis-amenities, all of which tend to push average pay and income upward. Whether economic well-being and the average income adjusted for the cost of living are higher in the more densely settled areas is a more difficult question to answer.

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<sup>17</sup> The log of population was used. The correlation was significant at the 95 percent level.

<sup>18</sup> See *Post-Cowboy Economics: Pay and Prosperity in the New American West*, Thomas Michael Power and Richard N. Barrett, Island Press: Washington DC, 2001, pp. 108-115.

Figure E.



Clearly the Western UP is neither a “stagnant” nor a “collapsing” economy. While it has been hit hard in the past by the chaotic fluctuations in the mining industry, the region has been “growing” a new economy that is quite different from the land-based export economy of the past. It is more diversified. A more complete set of commercial economic activities have developed in the region. Income flows associated with investments and retirement have been circulating in the local economy in addition to the income received by regional workers. Instead of being a one-industry region, a more complete or total economy has been developing.

### 3. Including Other Economic Activities That Draw Income into the Regional Economy

One weakness of the focus on the “traditional export base” is that it focuses on the production and export of “things,” raw materials, agricultural products, manufactured goods, etc. As the often discussed “shift to services” should remind us, the production of material goods has played a decreasing role in our economy. More and more of our economic activity is focused on providing services to customers. One of the most dramatically growing service sectors has been health services. Our urban areas have become medical services centers with hospitals, clinics, and groups of specialized doctors and other medical technicians. These services may not be “exported” in the usual sense, but they do draw people and their money into those urban areas with the same impact as an industry that is exporting a product.

Medical services are not the only service sector that plays this role. Institutions of higher education do the same thing. They do not export products, but they draw students from throughout the region, state, or nation and the funds that support those students throughout their college or graduate training. Michigan Technological University and Finlandia University in the Houghton-Hancock urban area clearly are an important part of Houghton County's economic base. Student and faculty spending as well as a broad range of research and development grants and business spinoffs contribute significantly to local economic vitality. Similarly Gogebic Community College in Ironwood, the other urban trade center in our five-county study area also has significant economic impacts in the southwestern part of the study area.<sup>19</sup> Finally, there is the Keweenaw Bay Ojibwa Community College outside the town of Baraga that is part of the Keweenaw Bay Indian Community.

The visitor economy, including tourism, is another important part of the economic base that "imports" people rather than exporting goods. Federal researchers have identified non-metropolitan counties that specialize in providing recreational experiences to visitors. One concentration of those recreational counties is located in the Upper Peninsula and northern Wisconsin. These counties have a high share of their jobs and payroll in recreation-related industries, a large share of housing units in seasonal use, and relatively high spending per capita on lodging.

In the Western UP, Gogebic, Ontonagon, Keweenaw, and Iron Counties are classified as non-metropolitan recreation counties as are the adjacent Wisconsin counties just across the state line. See Figure F below.

Almost a quarter of the housing units in our five-county study area are vacation homes. In Keweenaw County almost half of the homes fall into that category and in Ontonagon County almost a third of homes do. See Table B below.

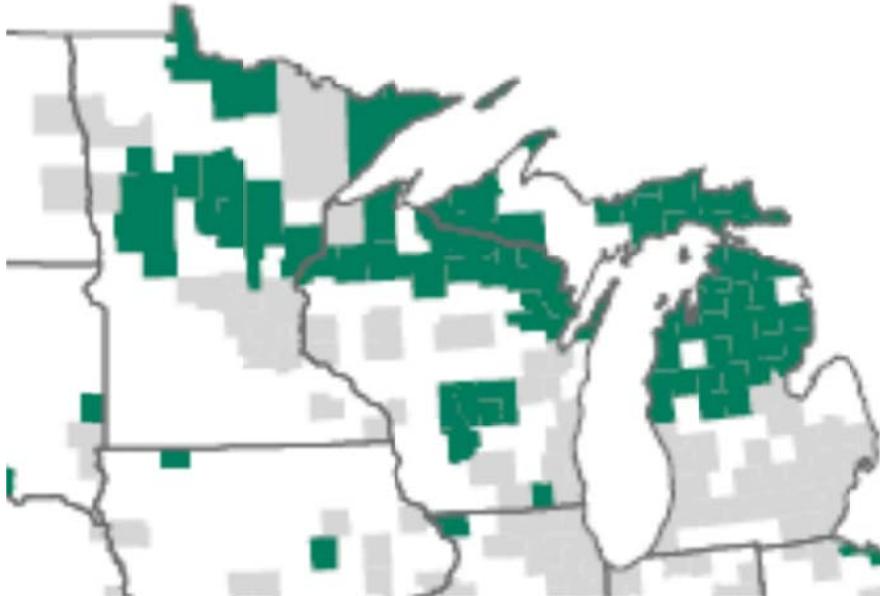
In the above discussion, we have provided only a few examples of how "service" sectors can be an important source of income drawn into the local economy. Other professional services also tend to cluster in urban areas including legal, financial, computer, and information services, as well as the arts and cultural activities.

Clearly focusing on the "traditional export base" is a misleading way of thinking about a contemporary economy, even in a relatively rural area. It may provide an interesting historical view through the rear-view mirror, but it is not an accurate view of the actual sources of local economic vitality.

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<sup>19</sup> [http://www.gogebic.edu/news/2010/Gogebic Economic Impact Survey 2010 Volume 1 Final.pdf](http://www.gogebic.edu/news/2010/Gogebic%20Economic%20Impact%20Survey%202010%20Volume%201%20Final.pdf)

**Figure F.  
Rural Counties Specializing in Commercial Recreation in the Northern Midwest**



**Table B.**

<b>Vacation (Seasonal) Homes in the 5-County Western UP Study Area, 2010</b>			
<b>County</b>	<b>Total Housing Units</b>	<b>Seasonal Housing Units</b>	<b>% of Housing Units Seasonal</b>
Baraga	5,270	1,383	26%
Gogebic	10,795	2,490	23%
Houghton	18,636	2,761	15%
Keweenaw	2,767	1,278	46%
Ontonagon	5,672	1,932	34%
<b>5-Counties</b>	<b>43,140</b>	<b>9,844</b>	<b>23%</b>
Source: 2010 Census of Housing and Population; Western Upper Peninsula Economic Development Strategy 2011, p. 25, Table 3-VII.			

#### **4. The Growth in Manufacturing Employment in the Western UP**

As mentioned above, one part of the traditional export base that has shown signs of vitality in the Western UP is manufacturing, at least up until the Great Recession began in 2007. Back in

the early 1980s, manufacturing jobs plummeted in the Western UP as mining employment declined and the White Pine Mine was shut down for the first time in 1984. Manufacturing jobs in Houghton and Baraga counties began growing again after 1985, adding 1,100 jobs by 2006. The other three counties in our study area added another 160 manufacturing jobs during that period. Clearly the manufacturing job growth was centered in Houghton and Baraga counties with Houghton County the source of 655 and Baraga 470 of those new manufacturing jobs between 1985 and 2006.

Although we have talked about manufacturing activities as part of the “traditional” export base, most of the new manufacturing jobs created in the Western UP were not manufacturing associated with mining, forest products, or food processing. Rather much of it was associated with the development of a dynamic technology sector in the area around Houghton-Hancock. Beginning in 2001, the Keweenaw Economic Development Alliance (KEDA), in partnership with Michigan Technological University and the Cities of Houghton and Hancock, have been focused on establishing a business support system for technology firms. Since start up, KEDA reports that a technology sector of 35 to 40 companies has been created. We will discuss this initiative to develop new manufacturing, new products, and new firms later in the report.

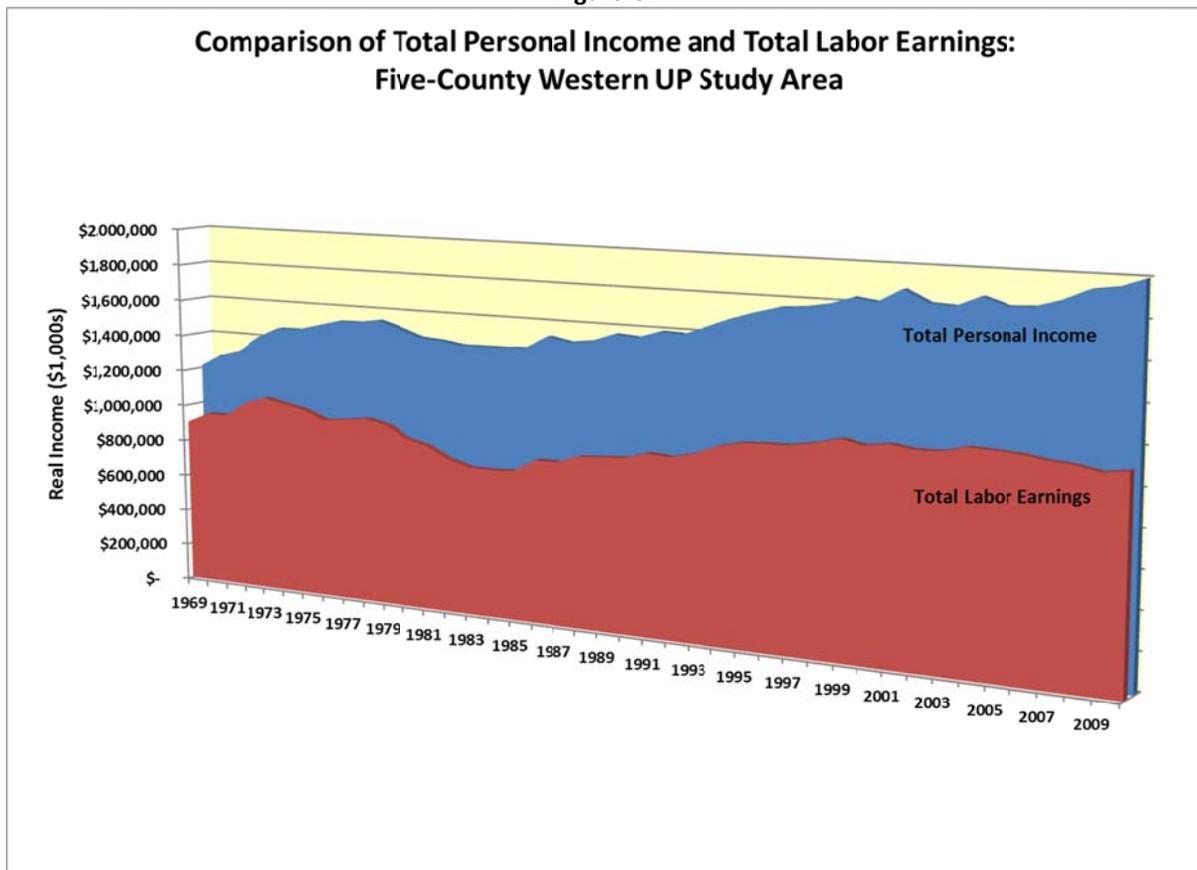
## **5. Putting “Jobs” and Associated “Payroll” in the Perspective of the Total Economy**

Most discussions of local economic vitality and economic well-being focus on the employment opportunities available and the pay associated with those jobs. In many ways this emphasis on “jobs” is appropriate. Adults tend to define themselves and their role in their communities at least partially in terms of their work. Employment is important not just for economic reasons but also for cultural and psychological reasons. However, when we are trying to understand **all** of the economic forces operating on a particular local or regional economy, we need to be careful to study all of the income flows in and out of our communities and not just *some* of them.

For instance, if we focus primarily on the income earned on the job in our five-county Western UP study area, we would find that about one billion dollars in pay flowed to individuals and households from those jobs. But if we look at the *total* income received by residents of that study region, we would find almost twice as much income being received, almost two billion dollars. See Figure G below. (All income data is in “real” terms, meaning the impact of inflation has been removed.)

If we focus *only* on the jobs in our study area and the accompanying payroll, we will ignore almost half of all income being received by residents.

Figure G.

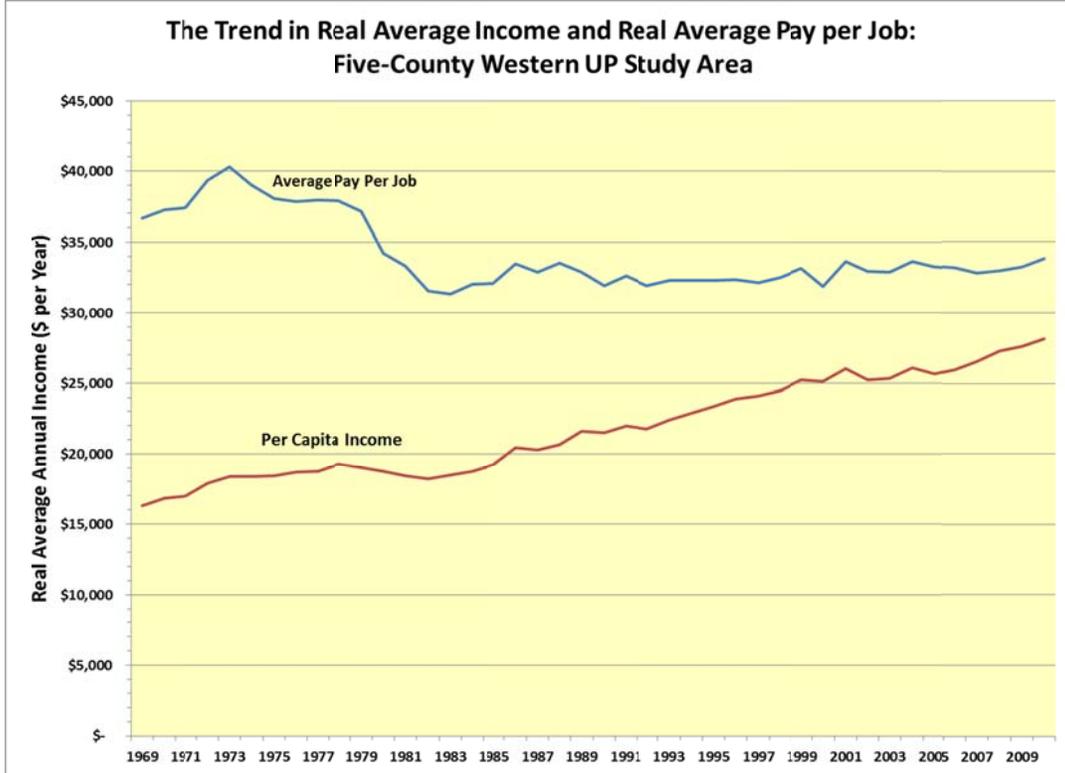


Similarly, if we measure local economic well-being looking at the average pay associated with all of the jobs in the study region, we are likely to conclude that economic well-being declined in the 1970s and has been stagnant since then. If, on the other hand, we look at average annual income per person (per capita income), we see a steady improvement in well-over the last two decades despite a few shallow dips. See Figure H below.

If, instead of focusing on the five counties combined, we focus on Ontonagon County, the county in our study area that held on to substantial mining until the mid-1990s, average pay per job and, assumedly, local economic well-being have been declining for almost forty years for a total decline of about 40 percent. But if, after adjusting for inflation, we look at average income (per capita income), it has almost doubled, increasing by 82 percent, over the last forty years in Ontonagon County. See Figure I below.

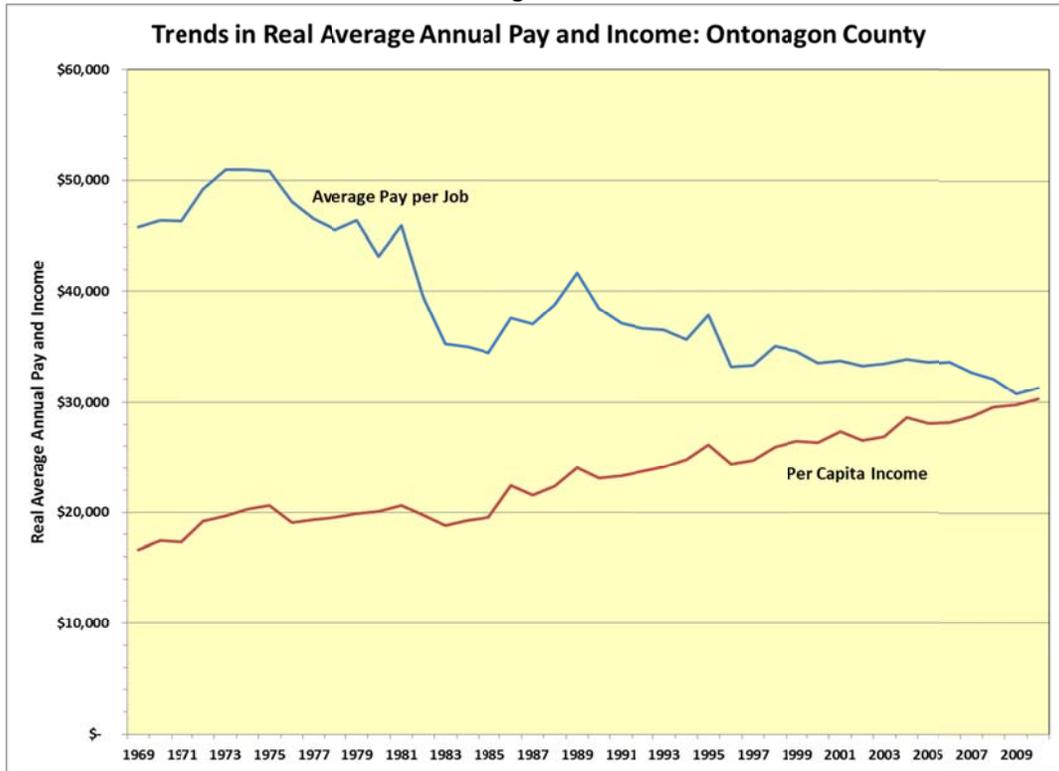
Clearly we have to look at more than just jobs and payroll to understand how the Western UP has been developing over the last several decades. When we do, these divergent trends of stagnant or declining real pay per job but rising per capita income shown in Figures H and I are relatively easily explained.

Figure H.



First, over the last several decades more family members have been working outside of the home. Labor force participation rates have been rising. This has helped boost the money income flowing into our households even when pay levels have been depressed partially by the expanding workforce taking entry level positions. In addition and related, more people have been working part-time so that they can combine multiple objectives such as going to school with also earning a living or taking care of children and other family members while also earning some income. The reduced hours per job tends to reduce the pay per job. Workers holding multiple jobs partially offset that. Since per capita income is total income divided by the total number of people, as the fraction of the population working rises, per capita income is likely to move up, too, even if the *annual* pay associated with some of those jobs is low or falling.

Figure I.



Second, people do not only receive income from their current paycheck. Those who have saved and invested are also likely to be receiving income from their investments: dividends, rent, and interest. In addition, those who have retired are likely to be receiving pension payments and other retirement benefits such as medical insurance. Finally the state and federal governments run income support programs that attempt to provide a safety net under those temporarily unemployed (unemployment compensation) or those living below or close to poverty (food stamps, Medicaid). See Figures J and K below.

Figure J.

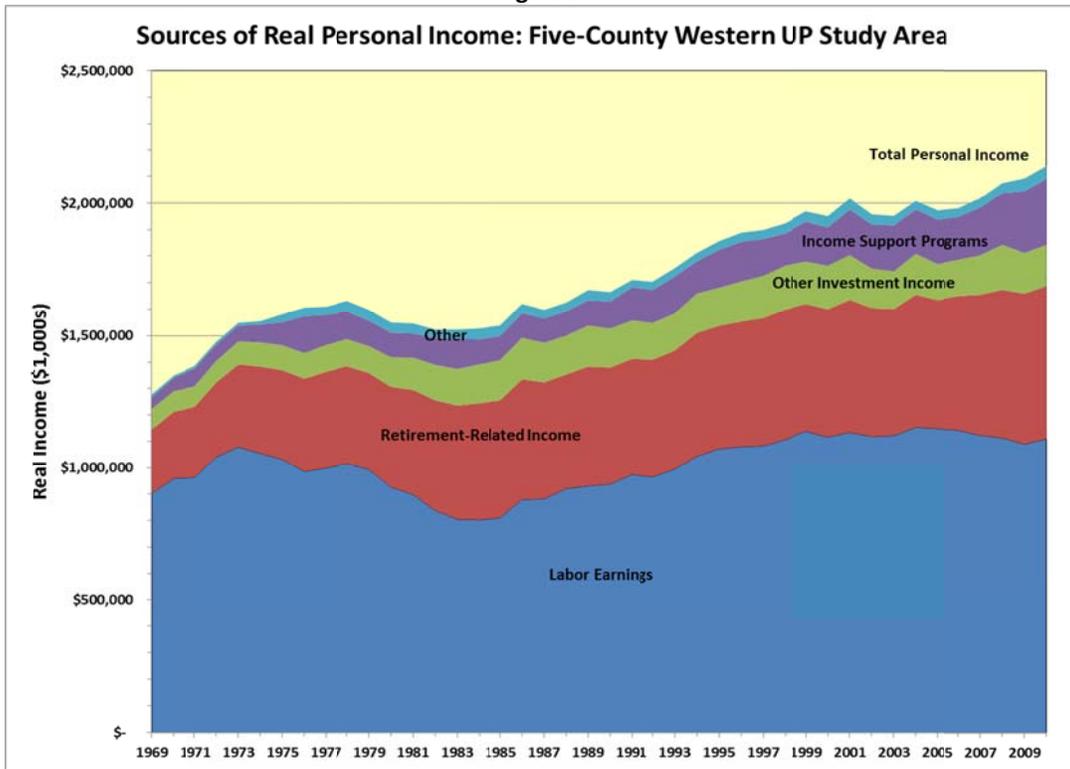
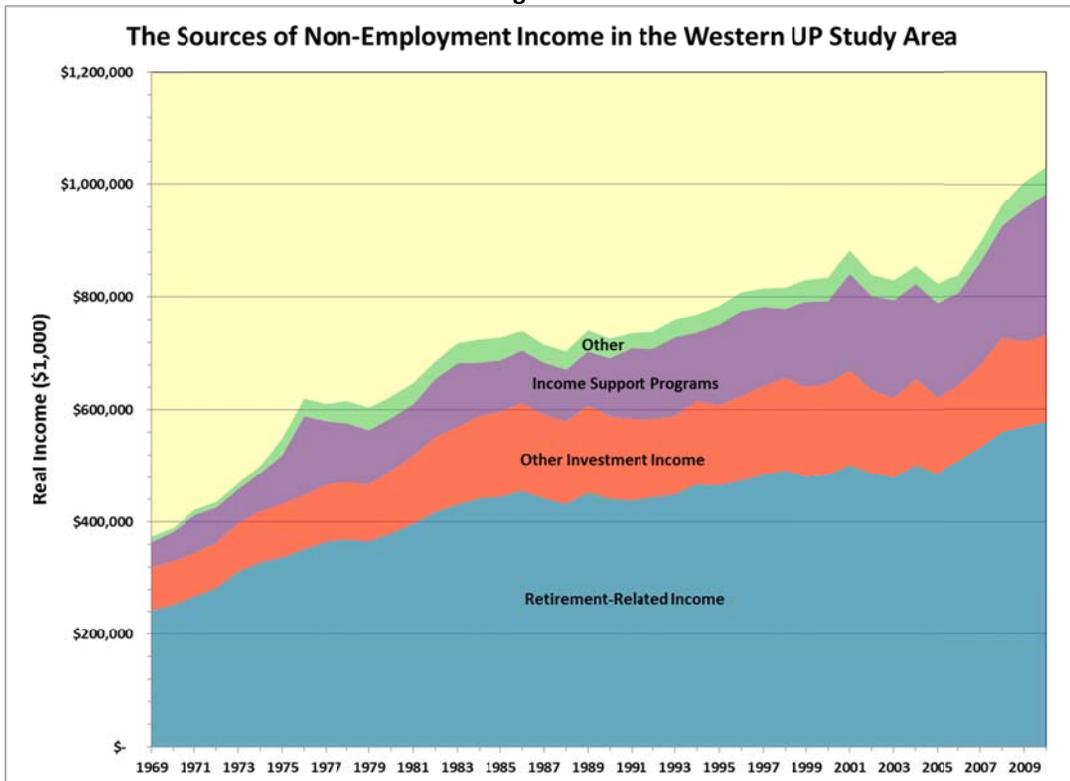


Figure K.



When all of these flows of income that are not tied to current paychecks are added up, they represent a substantial income flow to households that, along with wages and salaries, are reflected in the rising per capita income.

Third, payroll is reported on the basis of where the jobs are located, not where the workers reside. To the extent that many of the workers at a mine or mill resided in another county, much of the loss of income from the shutdown of the mine or mill would be felt in other counties, not exclusively where the mine or mill was located.

Finally, per capita income is total income divided by population. If, with the loss of employment opportunities, residents of an area move away to where jobs are more plentiful, that loss of population tends to keep the average income of remaining residents higher. If population falls faster than income being received, average income can actually rise. That is a warning that we should be careful about using in per capita income as a measure of local economic well-being.

As a result of all of these factors, despite declining or stagnant pay per job in the Western UP, per capita income has been able to continue to rise. In fact, after the closure of the White Pine Mine in the mid-1990s per capita income rose at the same rate as per capita income rose across the nation and significantly faster than per capita income rose across the state of Michigan. We will discuss some of the other income flows that supported this growth in average income in more detail below.

## **6. Including Retirement, Investment, and Support Payment Income**

One of the reasons for the apparent conflicting trends in paychecks and average income found in the economic data for the region is that individuals and households receive significant income from sources other than paychecks. That is, income flows into the economy for reasons other than just paid employment. Such *non-employment income* flows are primarily tied to:

- i. Investment income (dividends, interest, and rent),
- ii. Retirement income, including both private and government pension programs.
- iii. Income support programs such as unemployment compensation, Medicaid providing health care to low income families, Food Stamps, and what has come to be called “welfare.”

These categories of *non-employment income* are somewhat related and the latter category, income support, is tied to the employment situation somewhat.

Investment income can be received by working individuals who are not even close to retirement. On the other hand, individuals often provide for their retirement by building up savings and investments to support them when they partially or fully retire from the workforce. Even private company and state and local government pension programs are funded in whole or in part by investment income from the portfolio of assets that the pension fund has

accumulated over time. On the other hand, programs such as Social Security and Medicare are largely funded by current special taxes as well as direct federal government spending, rather than from investment income.

Statistical analysis of the variations in investment income and Social Security payments across all the counties in Michigan indicates that about 55 percent of investment income is associated with retirees. When this is combined with payments under federal retirement programs (Social Security and Medicare), these retirement-related income flows totaled \$577 million in 2010 in our Western UP study area, over half the size of all labor income generated there.

Government income support programs are designed to assist people during economic hard times. When the payrolls turn down and unemployment increases, unemployment compensation payments increase as do food stamp and Medicaid expenditures. Those income support expenditures are “counter-cyclical,” rising as overall payrolls fall and falling as overall payrolls rise.

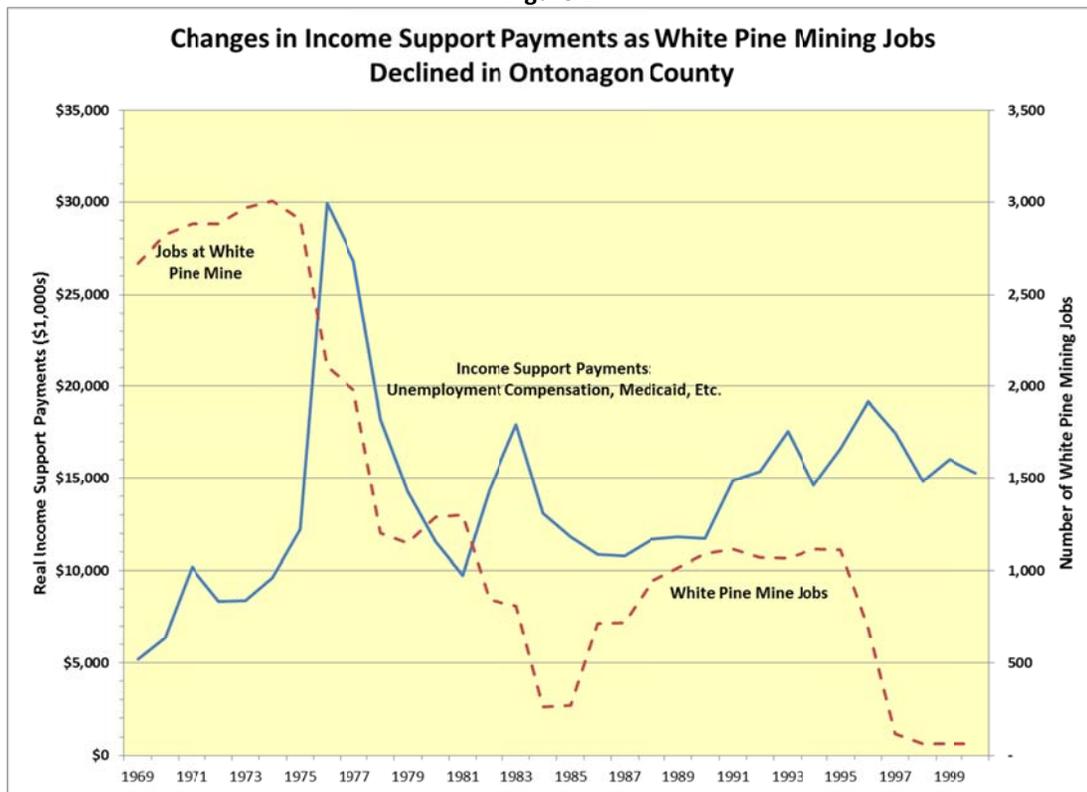
The sum of all of these various income flows that are not associated with current employment is not small. In 2010 in our five-county study area, the sum of non-employment income flows was almost as large as the total labor earnings of the population: Workers collected \$1.11 billion in pay while the combination of investment income, retirement income, and income support totaled \$1.02 billion. See Figure K above.

Note also that while there has been little growth in labor earnings since 1973, there has been substantial growth in these sources of non-employment income. This growth in non-employment income can be seen in Figure K above that shows the growth in retirement-related income, other investment income, and income support programs.

Note that retirement-related income flows dominate this non-employment income. Income support programs (unemployment compensation, food stamps, Medicaid, and other “welfare” programs), however, have been increasing in importance. Such support payments rise when the economy turns down and employment and labor earnings decline. It is not surprising, therefore, that these payments going to stabilize the income of households rose during the “Great Recession” and its aftermath.

The increased importance of income support programs when the local economy turns down can be seen clearly in Figure L below which focuses only on Ontonagon County where the White Pine Mine and copper processing facilities were located. During the layoffs at and ultimate shutdown of the White Pine Mine facilities, income support programs temporarily rose dramatically. That figure not only demonstrates the instability in employment in mining but also the stress that volatile employment puts on the social safety net as miners get laid off and, as a result, the entire economy contracts.

Figure L.



## 7. The Local Economy of the Western Upper Peninsula: A Summary

The economy of the Western UP is typically discussed in terms of its “traditional export base”: mining, forest products, and agriculture. Although these industries may be important, a focus on them cannot explain the dominant economic trends in the region. While those traditional regional exports have been a declining source of jobs in the region, employment opportunities elsewhere in the economy have proliferated. While employment in the traditional export sectors *declined* by 4,000 jobs between 1969 and 2010, jobs in other sectors *increased* by over 12,000 jobs, three times the loss. It is unlikely that we can understand the overall regional economy if we focus only on the declining sources of jobs and ignore the increasing sources of jobs. That traditional, backward-looking, view of the economy has to be supplemented in several important ways:

- i. We need to include in our view of the local economic base *all* economic activities that draw income into the community from outside, regardless of whether traditional exports or any physical exports are involved. In the Western UP that includes:
  - a. Visitors including tourism and recreation:

- b. Urban trade center activities serving the surrounding area including professional and technical services such as medical facilities;
- c. Universities, colleges, and other residential schools;
- d. State and federal government institutions and facilities.

The primary sources of jobs in the Western UP in 2010 were in services, retail trade and visitor services, and government.

In addition, as we will discuss below, almost all of the job growth in the Western UP took place in the service, retail trade, and state and local government sectors, too. Land-based activities such as mining and agriculture, in contrast, laid off workers by the thousands.

- ii. The Western UP economy has not stagnated or fallen into collapse. By most measures of local economic vitality our five-county study area has demonstrated considerable economic vitality. Over the last forty years, average income per resident (expressed in dollars of constant purchasing power) has risen 71 percent, almost as fast as the national growth rate and much faster than the growth rate across Michigan. In addition the total income received by all residents together grew 65 percent in inflation adjusted terms. Jobs expanded by a third. Population, however, has declined by 5 percent compared to where it was four decades ago.
- iii. Much income flowing into the Western UP is *not* tied to current employment in the labor force. This “non-employment” income includes investment income (dividends, rent, and interest) as well as retirement-related pension programs including Social Security, Medicare, other government pensions, as well as private pension programs. Government programs to support household income have also contributed to income flows into the region, especially during economic downturns. These non-employment income flows were responsible for a billion dollars flowing into the Western UP in 2010. That income flow was almost as large as all labor earnings associated with jobs in the region. It is a very important source of well-being in the region.
- iv. Over half of this non-employment income, about \$600 million in 2010, was associated with retirees. This makes the residential decisions of retired persons potentially important to local economic vitality.

It is important to note that many of these additional sources of local economic vitality involve decisions by people about where to live, where to shop, where to visit, or where to go to school. That is, much of this economic activity is tied to the preferences of potential visitors or residents. For that reason the attractiveness of a local area, its social, cultural, and natural amenities are an important part of the area’s economic base and an important determinant of local economic vitality. That can be seen most clearly in tourism and recreation, choice of trade centers to visit, choice of schools, or retirement locations. But there is a broader force

operating too where both residents and potential residents are held or drawn to especially attractive locations triggering a set of economic changes that stimulate the local economy.<sup>20</sup>

The public policy implications for local communities seeking to protect or enhance their local economic vitality are clear. Protecting local amenities that contribute to the local quality of life is important in both retaining current residents but also in attracting new residents and businesses. Maintaining and enhancing the natural, social, and cultural environments has to play an important role in any local economic development strategy. Put somewhat negatively, communities have to be careful what tradeoffs they embrace as they try to expand their economies. Steps that undermine local quality of life can be economically counterproductive. It is possible that the potential public costs associated with certain types of industrial development can damage rather than improve local economic vitality.

## **IV. The Promises and Reality of Copper Mining**

### **1. The Promises of Copper Mining**

Mining projects are often presented by the mineral developer and perceived by residents of surrounding communities as “an offer that is too good to refuse” because it offers access to needed minerals, the production of new wealth, and high wages for local workers. We begin with a discussion of those positive economic aspects of mining and then turn to some of the often ignored negative economic characteristics of mining.

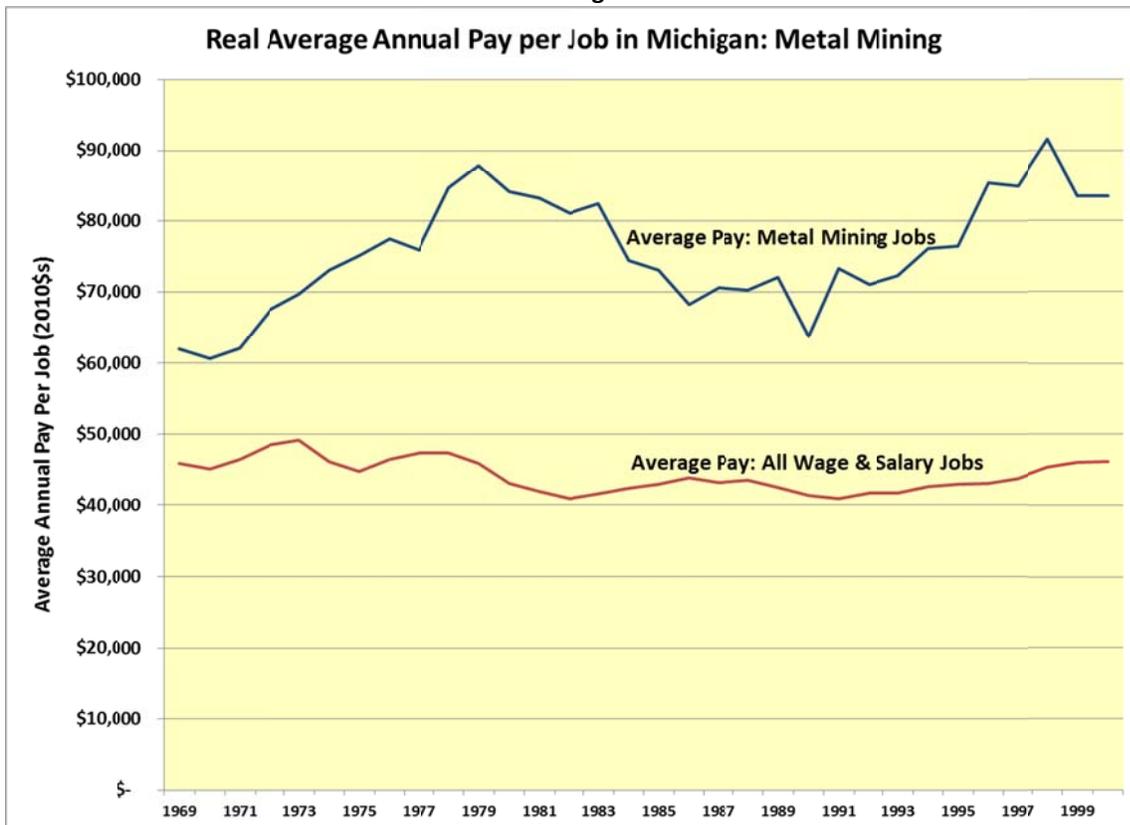
Michigan’s Upper Peninsula contains a broad range of metal ores. Iron ore and copper have been mined over an extended period in the UP and iron ore is currently being mined in Marquette County at the Empire and Tilden Mines operated by Cliffs Natural Resources. Kennecott Eagle Minerals has been developing a new copper-nickel mining operation west of Marquette that is scheduled to begin production in 2014. In the Western UP a copper mining project (Copperwood) has been proposed and just across the Gogebic County border in Wisconsin a new iron mine has been proposed. Meanwhile exploration for copper, nickel, uranium, iron, gold and silver, and platinum group metals continues. We will primarily focus on copper mining in this report because those projects appear to be proceeding toward actual production more quickly than others. Many of the comments about the economic challenges of copper mining also apply to other types of metal mining.

Because mineral extraction involves removing valuable minerals from the earth, a capturing of a “gift of nature,” it is commonly perceived to involve the “production” of substantial wealth. In both our history and folklore, mineral exploration, when successful, has been seen as discovering substantial “treasures.” The mining of metals, gold, silver, copper, and iron provide

some of the most colorful examples from our history as one “rush” of migrating miners moved long distances from one newly discovered “mother lode” to another, at least temporarily densely populating the areas around the mines. This certainly has been true in the Western UP where copper was found in “native” form, meaning as pure copper metal, not as ore that had to be processed to extract the copper. This copper metal was collected by Native Americans and hammered into tools and decorations for many millennia before Europeans arrived. The copper products produced by Native American residents of the Keweenaw area were traded widely across North America. Because this copper could be collected on or near the surface and could be transformed into useful objects without chemical treatment, the Native American extraction and use of copper did not have a significant impact on the natural environment. Early European-American settlement of the Houghton-Keweenaw region was tied to the development of those same copper resources.

Copper mining and processing *can* generate considerable wealth. The copper mines in the city of Butte, Montana, were referred to as “the richest hill on Earth” in the early 20<sup>th</sup> century. The State of Montana adopted the title of the “Treasure State” because of its early history in mining. This “strike it rich” folk history of the European settlement of the North America has colored our view of the nation’s economic history and has led to a common association of almost any mining project with the production of considerable wealth (“treasure”) that is expected to benefit mining companies, workers, and local residents.

Figure M.



In fact, mineral extraction activities do pay among the highest wages available to blue collar workers. According to the U.S. Department of Labor, in 2010, wages in gold, silver, iron and copper ore mining were in the top ten percent of the 1,200 separate industries for which weekly and annual wages are calculated. The average annual wage in these metal mining jobs was in the \$76,000 (copper) to \$88,000 (gold) range. Within Michigan, the only metal mining industry listed in the Department of Labor average industrial wage statistics, iron ore mining, was in the top 3 percent of Michigan industries in terms of annual wage, paying \$97,000 per year in 2010.<sup>21</sup> Metal mining employment and earnings were regularly reported by state and county until 2000 when that industrial category was dropped because so little of the workforce was employed in metal mining across the nation. Between 1969 and 2000 metal mining in Michigan (largely copper and iron mining in the UP) often had average annual pay about twice the average pay across wage and salary jobs in Michigan. For the 1990-2000 period annual pay in Michigan metal mining was 81 percent above the average pay across all wage and salary jobs. See Figure M above.<sup>22</sup> The National Mining Association reported average annual pay in American metal mining in 2010 as being 74 percent above all private sector jobs: \$81,300 compared to \$46,751.<sup>23</sup>

## 2. The Anomaly of Mining: High Pay but Little Prosperity

Given the high wages associated with mining, one would expect communities that rely on mining to be unusually prosperous. That, in general, is not the case. Across the United States mining communities, instead, are noted for high levels of unemployment, slow rates of growth of income and employment, high poverty rates, and stagnant or declining populations. In fact, our historic mining regions have become synonymous with persistent poverty, not prosperity: Appalachia (coal), the Ozarks (lead), the Four Corners (coal), and the Upper Peninsula of Michigan (copper and iron) are the most prominent of these.<sup>24</sup> Federal efforts have focused considerable resources on overcoming the poverty and unemployment found in these historic mining districts. In addition, the copper towns of Arizona, New Mexico, Montana, and Michigan

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<sup>21</sup> Bureau of Labor Statistics, Quarterly Census of Employment and Wages,

[http://www.careerinfonet.org/industry/ind\\_highest\\_paying.aspx?id=&nodeid=49&stfips=00&from=highest](http://www.careerinfonet.org/industry/ind_highest_paying.aspx?id=&nodeid=49&stfips=00&from=highest)

<sup>22</sup> Most of our economic data for the counties in the Western UP come from the Regional Economic Information System (REIS) maintained by the Bureau of Economic Analysis which is located in the U.S. Department of Commerce. <http://www.bea.gov/regional/index.htm> If a specific citation to some other source is not provided, the county-level data comes from the BEA-REIS.

<sup>23</sup> Economic Contribution of U.S. Mining in 2010," September 2012, p. 16.

[www.nma.org/pdf/economic\\_contributions.pdf](http://www.nma.org/pdf/economic_contributions.pdf) .

<sup>24</sup> Outside of the rural US Deep South where a long history of racial inequality has led to persistent poverty, mining and other natural resource counties are prominent among the persistently poor non-metropolitan counties. "Mining the Data: Analyzing the Economic Implications of Mining for Non-metropolitan Regions," William R. Freudenburg and Lisa J. Wilson, *Sociological Inquiry*, 72(4), Fall 2002. Also the Revised ERS County Typology: An Overview, 1994, Peggy J. Cook and Karen L. Mizer, Economic Research Service, Rural Development Research Report Number 89, U.S. Department of Agriculture. Compare the mining counties with the persistent poverty counties, pp. 8 and 24.

and the Iron Range in Minnesota, the Silver Valley of Idaho, the gold mining towns of Lead and Deadwood, South Dakota, the “Uranium Capital” of the nation in the Grants area of New Mexico and the Uravan Belt in western Colorado, etc. are also not prosperous, vital communities. Over the last several decades some of these areas have begun to recover either as a result of hundreds of millions of dollars of Super Fund expenditure and/or as a result of the in-migration of new, relatively foot-loose residents and economic activities, but that recovery is usually *not* tied to ongoing mining.

The dramatic contrast between the wealth created and the high wages paid in mining and the poor economic performance of mining communities needs to be understood before expanded mineral extraction activities can be safely promoted as a local economic development strategy. Below we take a brief look at the actual performance of mineral communities over the last thirty years and then turn to an explanation for that relatively poor economic performance.

In order to explore the local impact of reliance on mining in the United States over the last three decades, we look at the economic performance of all US counties where mining (excluding oil and gas extraction) was the source of 20 percent or more of labor earnings at some time in the 1980s. There are about 100 such counties that could be identified out of the 3,100 counties in the US.<sup>25</sup> Data disclosure problems prevented the identification of some mine-dependent counties.<sup>26</sup> Appendix C lists those counties.

The US mining-dependent counties are spread out over half of the American states but are geographically clustered in the Appalachian (Pennsylvania, West Virginia, Tennessee, Kentucky, and Virginia) and Mountain West states. The century-old copper mines of Arizona, New Mexico, Montana, Utah, and Upper Michigan are included as are the new gold mines in Nevada. The older coal mines in the southern regions of the Great Lakes states (Illinois, Indiana, and Ohio) are included as are the new open pit coal mines of Wyoming, Montana, Utah, Colorado, and New Mexico. The lead mines of the Ozarks in Missouri, the precious metal mines in the Black

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<sup>25</sup> The Regional Economic Information System 1969-2000 CD-ROM (Bureau of Economic Analysis, US Department of Commerce) was the source of the data. A county was included as “mining-dependent” if the data indicated that for at least one year in the 1980-1989 period “mining” less “oil and gas” earnings were 20 percent or more of total earnings by place of work.

<sup>26</sup> If a few firms dominated local mining, federal regulations prevent the release of the mining data for that county. This is often a problem in any given year, but it is less of a problem when looking at 20 years of data since mining data often will be available for at least one of those years and thus qualify it as “mining-dependent.” The number of counties that would have been labeled mining-dependent if it were not for these data disclosure restrictions is unknown. However, our analysis identified about the same number of mining-dependent counties as other studies, about 100 counties dependent on solid minerals and another hundred dependent on oil and gas extraction. Kenneth Deavers and David Brown in a 1985 study identified a total of 199 counties in these two categories (Natural Resource Dependence, Rural Development, and Rural Poverty, Economic Research Service, US Department of Agriculture. Rural Development Research Report No. 48). A 1994 study identified only 146 mining-dependent counties (including oil and gas counties) (Peggy Cook and Karen Mizer, The Revised ERS County Typology, Economic Research Service, Rural Development Research Report Number 89, US Department of Agriculture).

Hills of South Dakota and the Silver Valley of Idaho, and the iron fields of Minnesota and Upper Michigan are also included.

The question we seek to answer is whether this high degree of reliance on mining allowed these counties to out-perform counties that did not specialize in mining. Economic performance was measured in terms of the *growth* in the total income received by residents, the aggregate labor earnings of residents of the county, per capita income, and population. In addition, the level of per capita income at the beginning and end of the periods was analyzed. We judge the relative economic performance of specialized mining communities by comparing them to counties that did not specialize in mining. We simply form a ratio of the growth in the mining counties and the growth in the non-mining counties. If this ratio, say, is 0.50, it means that the growth in the mining counties was only half that of the growth in non-mining counties.

The decade of the 1980s was not good for mining-dependent counties. Aggregate labor earnings in those counties grew much more slowly than in other counties, almost 60 percent slower. During the 1990s earnings were still growing more slowly in mining-dependent counties, 25 to 30 percent slower. In the 2001-2008 period<sup>27</sup>, however, rising metal and coal prices led to a recovery of some mining counties after 20 years of depressed economic vitality. During that period, although mining counties saw much slower population growth, the earnings and per capita income of the residents of mining counties grew faster than in other counties for the first time in 20 years. Per capita income and residents' labor earnings grew 13 percent faster in mining-dependent counties while total income grew 9 percent faster. For the whole period 1980-2008, despite the resurgence of mining activity in the most recent period, however, aggregate earnings and per capita income still grew significantly more slowly. Mining-dependent county earnings grew over a third slower, personal income almost a quarter slower, and population and per capita income about an eighth slower.

Given this poor economic performance in US mining-dependent counties despite the high wages paid by mining, it is not surprising to find that population growth in these counties was negative during the 1980s and significantly slower than in the rest of the nation in the 1990s. Population growth continues to be significantly slower during the 2001-2008 period too. See Table C below.

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<sup>27</sup> In 2001 the U.S. Department of Commerce shifted its industrial categories from the Standard Industrial Classification to the North American Industrial Classification. Instead of reporting on total mining and the sub-categories of metal mining, coal mining, oil and gas, and other mining, it reported only on the sub-categories of "oil and gas extraction" and "mining except oil and gas." The 2000 and 2001 data cannot be directly compared, hence our use of the 2001-2008 period. For the 1980 to 2000 period we approximated the "mining except oil and gas" by subtracting "oil and gas" from total mining.

Table C.

Ratios of Growth in Economic Vitality Indicators				
Growth in Mining Dependent/Growth in Non-Mining Dependent				
	1980-1990	1990-2000	2001-2008	1980-2008
Personal Income	0.59	0.82	1.09	0.76
Population	-0.85	0.50	0.65	0.87
Per Capita Income	0.72	0.95	1.13	0.88
Earnings	0.41	0.69	1.13	0.64

Source: US Dept. Comm., BEA, REIS Local Area Income

This loss of population from mining areas when mines shut down or as long-lived mines adopt labor-displacing technologies is not surprising. After all, the cultural artifacts of past mining areas, the “ghost town,” have been an important part of our history.

Despite the high wages paid in mining, the level (as opposed to the growth rate) of per capita income was also lower in the mining-dependent counties and, given the slower growth, the gap increased relative to the rest of the nation between 1980 and 2000. The gap grew to \$11,800 per person by 2000 in inflation adjusted terms. In 2008 per capita incomes were still significantly lower in mining counties, but the gap had narrowed slightly to \$10,200.<sup>28</sup> See Table D below.

Table D.

Level of Real Per Capita Income: Mining Dependent and Non-Mining Dependent Counties				
	1980	1990	2000	2008
Mining-Dependent	\$21,922	\$22,658	\$25,129	\$30,097
Non-Mining Dependent	\$26,660	\$32,334	\$36,954	\$40,272
Difference	-\$4,738	-\$9,676	-\$11,825	-\$10,176

Source: US Dept. Comm., BEA, REIS Local Area Income, and author's calculations. 2008 \$s.

A recent study of all U.S. non-metropolitan counties in the years 2000-2007 confirmed our results from the earlier periods. It found that increased dependence on mining was associated with slower population growth in the 2000 to 2007 period.<sup>29</sup> It also found that increased

<sup>28</sup> Most mining operations are located in non-metropolitan areas where average incomes, in general, are lower. If the mining-dependent counties are compared only to other non-metropolitan areas as opposed to *all* counties, both metropolitan and non-metropolitan, it is still true that the mining-dependent counties have lower per capita incomes and that they lost ground relative to other non-metropolitan counties during the 1980-2000 period. This is also true for most mining regions even if the mining-dependent counties are compared only with the other non-metropolitan counties within the same state. Of the 24 states with mining-dependent counties, only five (MT, MN, MI, GA, and SD) had per capita incomes above the state's non-metropolitan average in 1990 and per capita incomes in the mining communities within those five states were only 4 to 9 percent higher. In 2000 the per capita incomes of mining-dependent counties exceeded that of the state's non-metro areas in only three states. In 2008, despite the expansion of mining, 17 of the mining states still had non-metro per capita income above that in the mining-dependent counties. The average per capita income in the mining-dependent counties remained below the per capita income in the non-metropolitan areas for 1970, 1990, 2000, and 2008. In 1980 the per capita income in mining-dependent counties was 5 percent above the national non-metropolitan per capita income.

<sup>29</sup> Mining except oil and gas development was the industrial classification. That includes metal, coal, sand and gravel, and other non-metallic mineral mining.

reliance on mining had no positive impact on employment growth. On the other hand, the more reliant a rural county was on mining in the 2000-2007 period, the *higher* was the growth rate in per capita income in that period.<sup>30</sup>

It is clear that over the last several decades, dependence on mining did not provide a reliable path to prosperity that allowed mining communities to perform better than other American communities. In fact, mining-dependent communities lagged significantly behind the average for the rest of the nation.

These are not new results. US Department of Agriculture analyses of mining-dependent counties have also pointed out the slower economic growth and lower per capita incomes in mining-dependent counties.<sup>31</sup> In addition recent reports by the US Census Bureau providing *Profiles of Poor Counties* showed, when counties are classified by the type of industry that dominates the local area, mining counties had the highest poverty rates of any industrial group and that poverty rate increased systematically between 1989 and 1996.<sup>32</sup>

Unemployment is also higher in mining-dependent counties in the US. For instance, unemployment rates in coal mining counties<sup>33</sup> are significantly above the average unemployment rate in the state where the county is located. Averaged over the 1990-2000 period and across all coal-mining counties, the unemployment rate in those counties was 55 percent above the state average rates. For some states such as Arizona and Virginia, the coal county unemployment rates are two to three times higher than the state unemployment rates. See Table E below. Given the ongoing job losses in most coal mining counties due largely to labor-displacing technological change, these high unemployment rates might be expected. During the 1980s, for instance, the layoff rate in the mining industry was the highest of all the major industrial groups in the US and the rate of job displacement in coal mining was much higher than in mining as a whole.<sup>34</sup>

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<sup>30</sup> Deller, Steven C. and Andrew Schreiber. 2012. "Mining and Community Economic Growth," *The Review of Regional Studies*, 42(2):121-141. Mining included all mineral extraction except for oil and gas exploration and development. Thus it included not only metal mining but also coal mining, sand, gravel, and rock production, and other mineral production such as phosphate, limestone, etc.

<sup>31</sup> See the studies cited in footnote 22 above.

<sup>32</sup> Profiles of Poor Counties: Some Empirical Evidence, Patrick Cardiff, US Census Bureau, Small Area Income and Poverty Estimates, FB3-1065, Washington, DC 20233, 1999.

<http://www.census.gov/hhes/www/saipe/asapaper/Cardiff99.pdf>

<sup>33</sup> A US county was categorized as being a "coal mining county" if it had 200 or more coal miners in its work force. There were 99 such counties out of America's 3,100 counties. The Regional Economic Information System (US Bureau of Economic Analysis) was the source of the employment data; US Department of Labor the source of the unemployment data for the years 1990-2000.

<sup>34</sup> "The Industrial structure of job displacement, 1979-88," *Monthly Labor Review*, September 1992, pp. 17-25.

Table E.

Ratio of the Unemployment Rates in US Coal Counties to the Statewide Average Unemployment Rate, 1990-2000								
AL	AZ	CO	IL	IN	KY	MT	NM	ND
1.05	2.64	1.31	1.50	1.38	1.64	1.76	1.38	1.82
OH	PA	TX	UT	VA	WV	WY	All US Coal Counties	
1.75	1.44	1.23	1.73	2.95	1.27	1.02	1.55	

Source: US Department of Labor; author's calculations

The important point to be drawn from all of these statistical results is that these mining activities, in general, have not triggered sustained growth and development in the local regions where the mining took place. Closure of mines in the late 19<sup>th</sup> and the first half of the 20<sup>th</sup> centuries often led to “ghost towns” and abandonment of a mining region. Where mining persisted over longer periods, it did not trigger a diversification of the economy. Instead, as labor saving technologies reduced employment opportunities, the region around the mines became distressed with high unemployment and poverty rates.<sup>35</sup> As mining again began to expand in the 2001-2008 period, counties that depended on mining made up some of the losses over the previous twenty years, but still lagged behind other counties that were not mining-dependent and remained vulnerable to downturns in the mineral economy such as happened in 2009 and almost certainly will take place again

### 3. Explanations for the Poor Economic Performance of Mining Communities

There are five important explanations for the poor economic performance of mining communities despite the high wages paid in those industries:

- The instability of mine production, employment, and payroll.
- The impact of ongoing labor-displacing technological change that constantly reduces the workforce requires for any given level of mine production.
- Mine employees are very mobile, commuting long distance to work while maintaining their residences outside of the area immediately impacted by the mining and milling. This leads much of the mining payroll to “leak” out of the region immediately around the mine.
- Mines, ultimately, always deplete their economically viable ore deposits and shut down. The average life of a metal mine has declined significantly in recent

<sup>35</sup> A 2002 review of the literature dealing with the economic characteristics of mining-dependent rural communities in the US confirms these results. Of the 301 quantitative economic findings in scholarly studies about how mining-dependent communities fared relative to other communities, there were almost two (1.9) negative impacts reported for every positive finding. See “Mining the Data: Analyzing the Economic Implications of Mining for Non-metropolitan Regions,” William R. Freudenburg and Lisa J. Wilson, *Sociological Inquiry* 72(4):549-75. “Rural” is used loosely here to refer to non-metropolitan areas that can have urban areas with populations of up to 50,000.

decades. For instance, the copper mining activities in Butte, Montana, have lasted 125 years, albeit, employing a drastically reduced workforce. The White Pine mine operated for almost 45 years. But the proposed Copperwood project is estimated to last 13 years.

- Mining is land intensive and as a result can have nearly permanent impacts on the natural environment. Environmental degradation can significantly reduce the attractiveness of a mining area as a place to live, work, and raise a family.

We discuss each of these in turn below.

### **A. Riding the Natural Resource Economic Roller Coaster: Copper Mining in the Western UP**

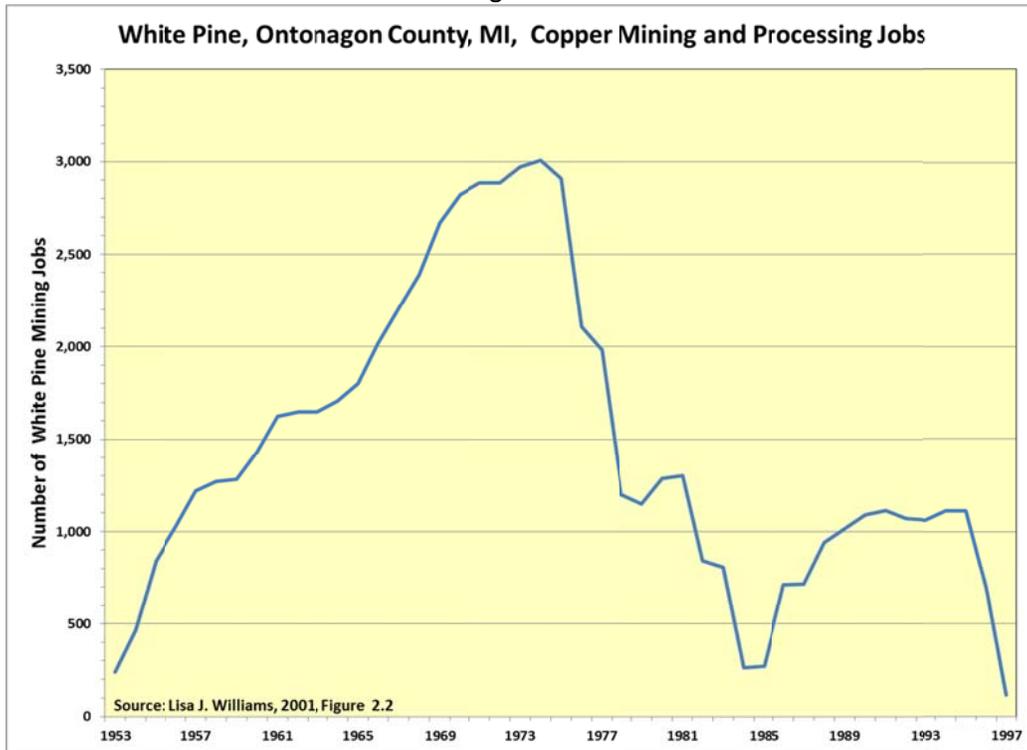
One important explanation for this poor economic performance of local economies specializing in mining despite the very high wage characteristics of that industry is the instability of employment and income associated with mineral development activity. The experience of the Michigan UP in general and its western region in particular with copper and iron mining dramatizes this.

The Western UP has had over a century and a half of economic history with copper mining, concentrating, smelting, and refining. A little more than a century after copper was first mined by European-Americans in 1848 on the Keweenaw Peninsula, the “modern” White Pine Mine complex in Ontonagon County was opened in the early 1950s to support the U.S. war effort in Korea. Ultimately the White Pine copper facilities included not only the mine but processing plants to concentrate the ore, smelt it, and refine it. The Town of White Pine was also built to provide housing and services the needed workforce.

By the time the modern White Pine copper complex began to be developed in 1953 to process the local sulfide copper ores, most of the previous copper mining activities in the Western UP had shut down. That earlier copper mining activity focused on the “native” copper, copper in metallic form, rather than mining chemical compounds such as copper sulfide and copper oxide from which the copper had to be extracted by various industrial processes.

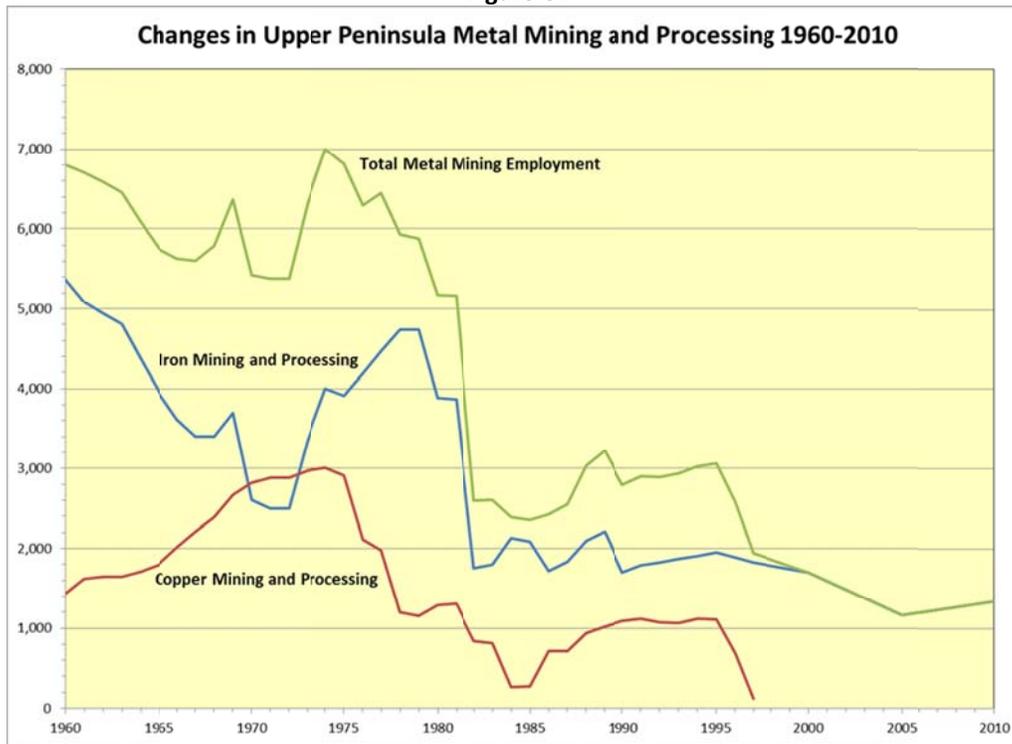
Over a 20-year period the White Pine Mine complex expanded its production, processing, and employment. Employment reached a peak of about 3,000 in 1974 and then plunged by almost 2,000 jobs over the following five years. By 1984 most of the White Pine copper complex had been shut down and only 270 employees worked there. A brief recovery brought employment up to 1,100 between 1989 and 1995 but then employment plunged to only about 100. See the Figure N below.

Figure N.



Initially as the White Pine Mine complex was expanding, iron mining activities in the UP were contracting. When White Pine began to lay off workers, iron mining in the UP was expanding again, temporarily, and this offset some of the losses of copper jobs. The happenstance of these offsetting movements in copper and iron mining employment opportunities helped stabilize metal mining employment in the UP between 1960 and 1980. By 1979 both iron and copper jobs were in steep decline and total metal mining employment dropped steeply. By 1985 4,650 metal mining jobs had been lost. By 2005, there were only about 1,000 metal mining and processing jobs left in the UP. See Figure O below.

Figure O.



In general metal ore mining and processing follows international metal prices up and down. The White Pine Mine was built to serve a wartime demand for copper. Not only was the price of copper high in the early 1950s but the federal government entered into contractual arrangement to assure a market for the new copper mine and processing complex. As copper prices reached record highs in the early 1970s so did employment at the White Pine Mine complex. As those prices tumbled unstably downward between 1975 and 1985, the White Pine Mine complex laid off almost its entire workforce. The brief recovery of mining activities at the White Pine Mine complex in the late 1980s was also tied to a temporary recovery of copper prices. See Figure P below.

These fluctuations in metal mining jobs in the UP during the last half-century were not unusual from a national perspective. As national and world demand for metal commodities, like copper, fluctuate, metal prices and the profitability of metal mines and mills fluctuate too. That leads to mine and mill layoffs or shutdowns. This has been true for copper mining throughout the twentieth century and into the current century despite a long term trend of producing more and more copper. Figure Q shows the fluctuations in American copper production from 1900 through 2010. Total production regularly tumbles by a quarter or a third, leading to proportional layoffs and periodically falls by 50 to 75 percent as mines and mills completely shut down.

Figure P.

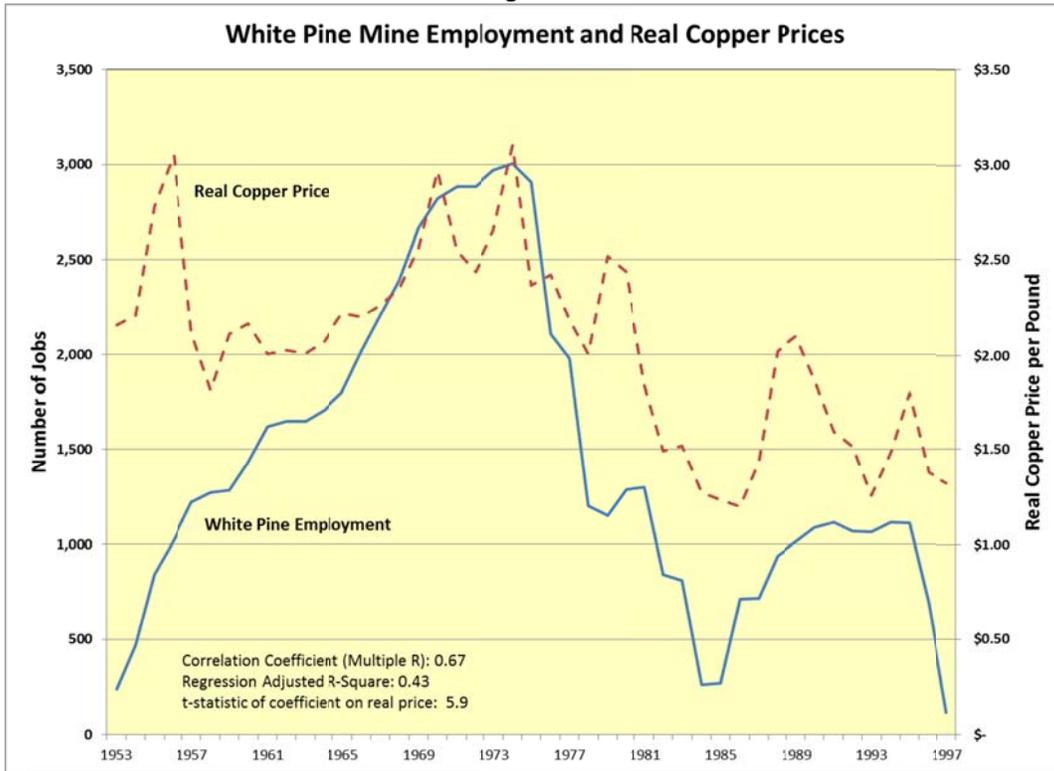
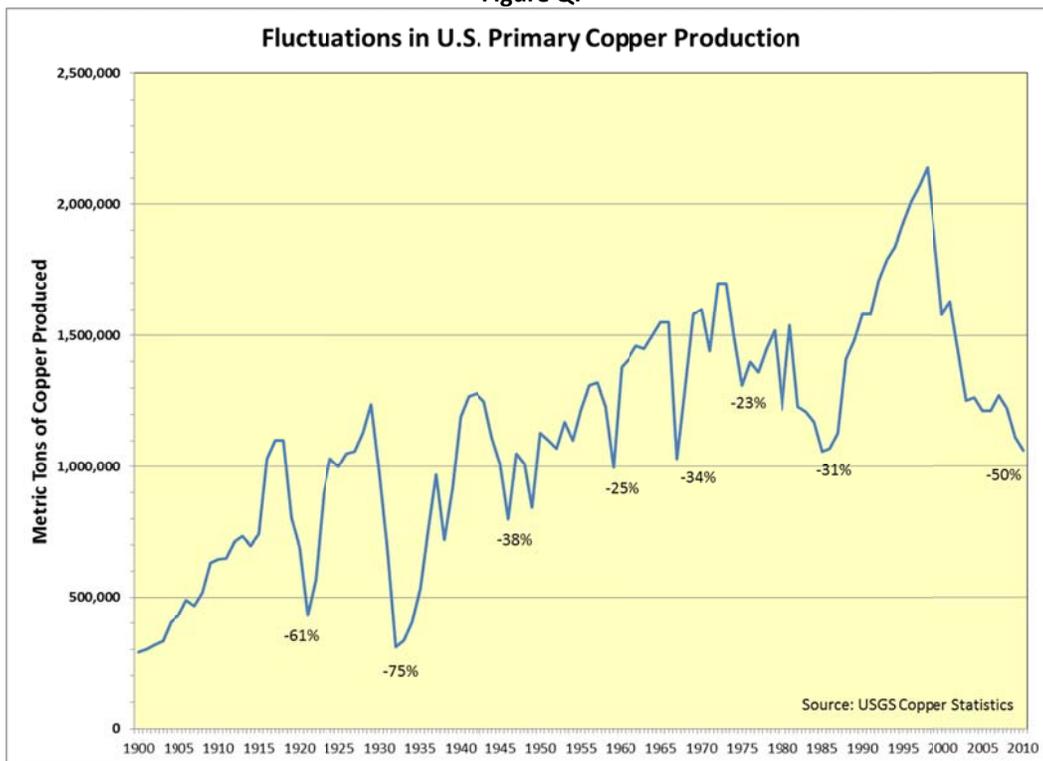


Figure Q.



The collapse in American copper production from ore between 1998 and 2010, when primary copper production was cut in half, makes it clear that fluctuations in copper production and employment are not just a problem of the past. An indication of the potential for such instability in mine employment is provided by the Copperwood Project that has been proposed in Gogebic County about 20 miles southwest of the old White Pine mine location along the southern shore of Lake Superior.

The Copperwood Project Feasibility Study<sup>36</sup> emphasized that the financial viability of the project depends on the price of copper: “The tables show that the project is highly leveraged to copper price.” (p. 10) “The success of the project will be highly dependent on the copper price...” (p. 11). “The major project risk, as demonstrated by the financial analysis, is the realization price of copper and silver metal...” (p. 258) The Study also shows that the internal rate of return goes to zero if the price of copper falls more than 10 percent below the base case assumption of \$2.75 per pound, i.e. to below \$2.50 per pound. (Figure 22.1) If the copper price is below that level, the internal rate of return is negative, no return is earned on the investment and the investment cannot be fully recovered.

Copperwood analysts have said that the mining project will be viable as long as copper prices remain above \$2.50 per pound. One can look back across the history of copper prices in the U.S. to see how often prices, with the effects of inflation removed, have been at or above this Copperwood target level

For long historical periods real copper prices have been below that level: for 32 years from 1920 to 1952 and for 24 years from 1981 to 2005. For 56 of the 112 years, half of the time for which we have data, the price of copper was below the level necessary for Copperwood to be financially feasible. See Figure R below.

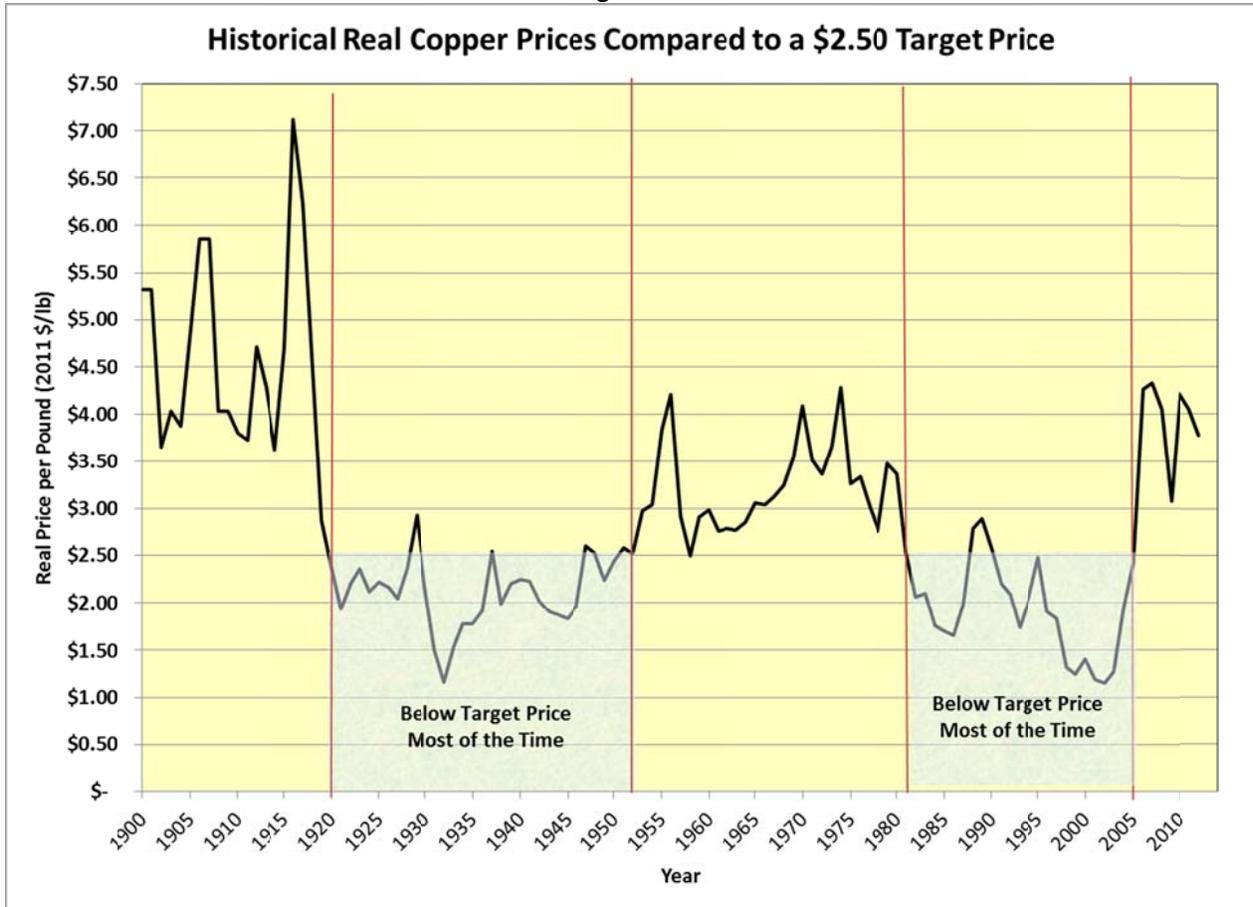
Copper prices, like most internationally traded raw material prices vary with market conditions, i.e. prices fluctuate as supply and demand conditions around the world fluctuate. When prices are low, mines cut back on production at their most costly units. As the supply of copper falls, ultimately supply and demand come into balance and prices stabilize. But often the cutbacks in production overshoot what is necessary and prices start to rise. If prices rise enough both existing mines where production has been reduced as well as new known deposits can move into production. The increased supply can also overshoot the demand, stabilizing and then driving copper prices back down again. This can be seen in the copper prices over the last century in Figure R below. Note the regular declines in copper prices of as much as 70 percent

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<sup>36</sup> “Feasibility Study of the Copperwood Project, Upper Peninsula, Michigan, USA,” prepared by Joseph M. Keane, et al. for Orvana Resources US Corporation. March 21, 2012. That feasibility analysis is from a pre-operation point of view. I.e. for the mine to be feasible it must provide a return of and return on the capital investment in building the mine and mill. It is not a “break even operational analysis” where one asks whether the value of the metal being produced more than covers the variable cost of operation. In that type of analysis fixed costs such as a return on capital investment, depreciation, interest costs, property taxes, etc. would be ignored.

with regular declines of 40 percent or more. Such price declines can lead mining companies to shut down their more costly operations or cease production completely.

Figure R.



Source: USGS Copper Statistics

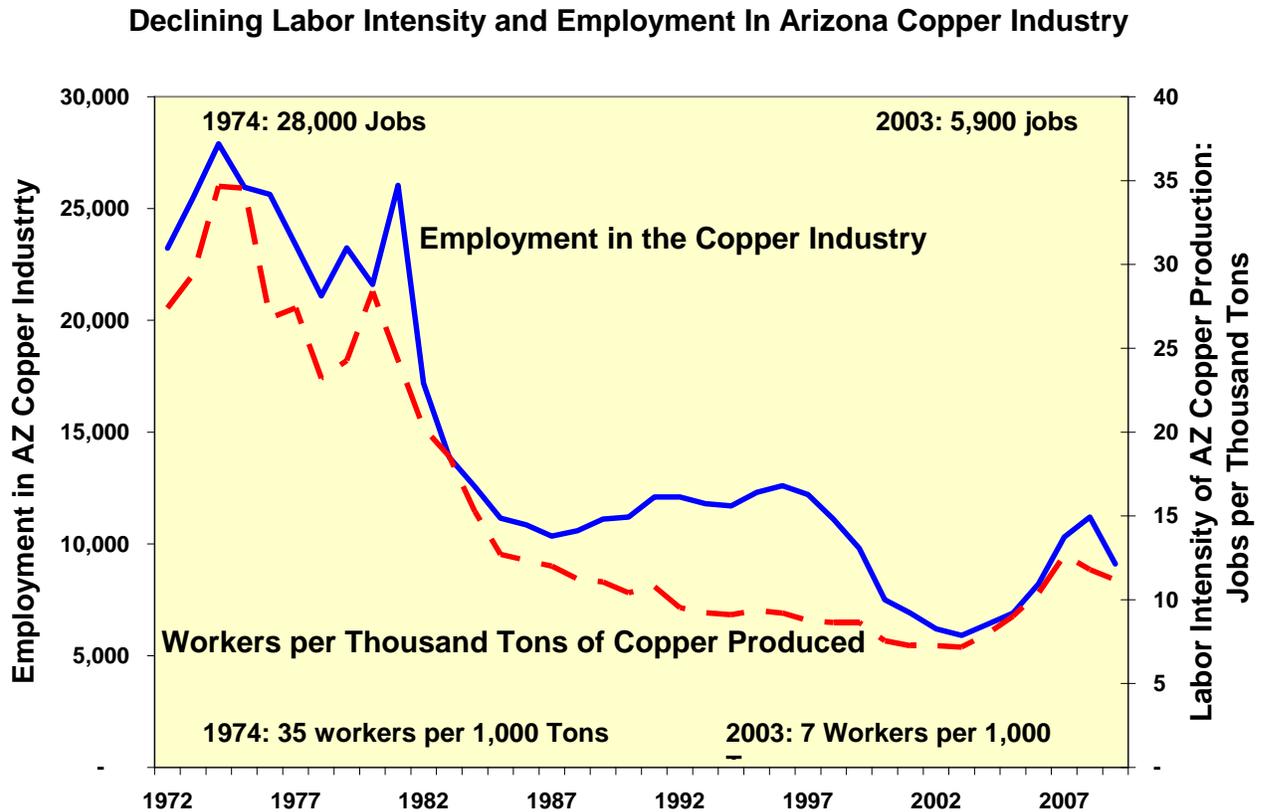
As will be discussed in detail below, these periodic booms and busts in copper production and employment have disruptive impacts on the communities in the vicinity of the copper mines that prevent the high wages associated with copper mining from having a reliable positive impact on local economic vitality and stability.

### B. The Impact of Technological Change on Copper Mining Employment

Technological change is constantly reducing the number of jobs associated with any given level of copper production. There is not a data series for Michigan showing how labor productivity in copper mining varied over time. Such data is available for Arizona, a state that has a long history in copper mining. In Arizona's copper industry, copper output per worker has increased fivefold since 1974. Put the other way around, the labor requirements to produce a unit of copper have been cut to a fifth of what they were in 1974, from 35 workers per 1,000 tons of copper produced to just 7 workers. Of course copper employment in Arizona plummeted too.

See Figure S below.<sup>37</sup> But the decline in employment between 1974 and 1997 of 15,000 copper mining jobs took place when Arizona copper production was increasing. It was technological change in copper mining that was eliminating the majority of the jobs, even during a period of booming copper production. Of course, there is no reason to believe that technological change has come to a permanent halt and that going forward technology will no longer displace part of the workforce.

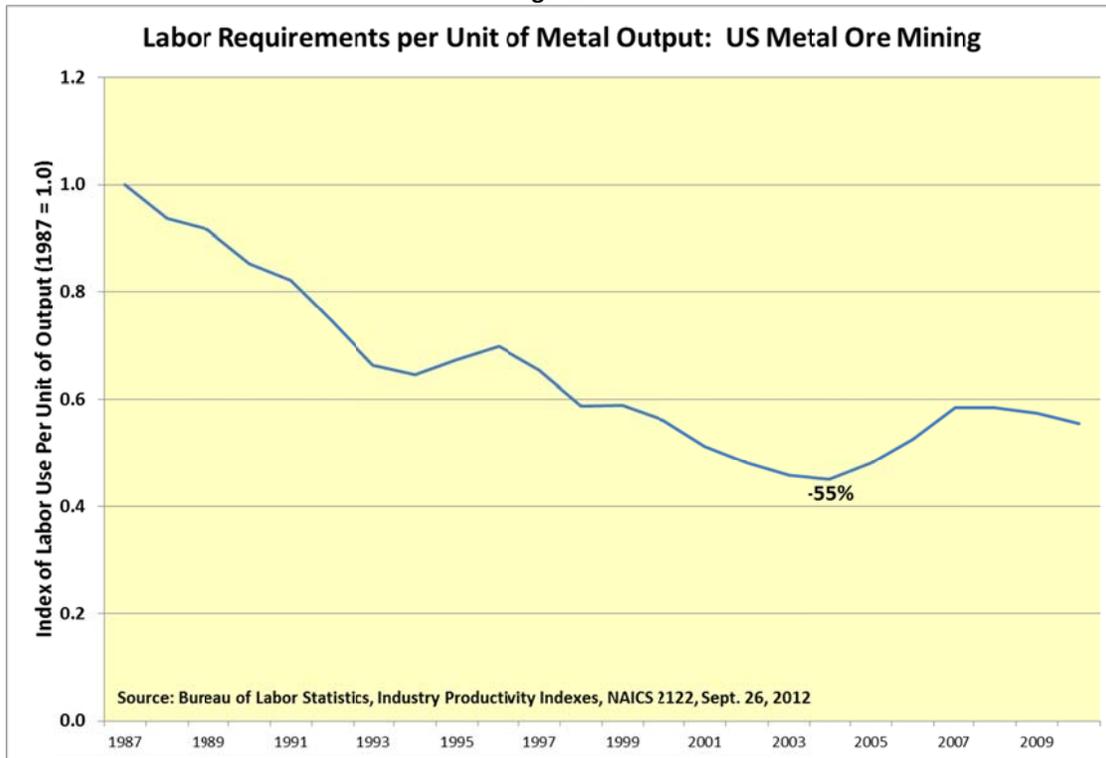
Figure S.



This pattern of copper mining job losses despite expanded copper production was not unique to Arizona or to copper. Between 1987 and 2004 labor requirements per unit of metal produced fell by 55 percent across all metal mining. That is, in a seventeen year time period, the labor force needed to mine any given quantity of metal ore was more than cut in half. See Figure T.

<sup>37</sup> Data from the Arizona Department of Mining and Mineral Resources and from the Western Economic Analysis Center annual reports on "The Economic Impact of the Arizona Copper Industry," George F. Leaming.

Figure T.



This labor-displacing technological change has helped copper mining companies control costs and remain competitive while processing lower and lower grade ores. The higher labor productivity also supports the high wages paid. The downside of this growth in labor productivity for workers and communities is that the labor required per unit of production has continued to fall, reducing the number of jobs associated with the industry. Thus even if production is stable, employment continuously falls. Only constantly expanding mineral development can maintain stable employment, and this is rarely possible over the long run in any particular area. A tiny part of the impact of declining employment in the copper industry has been offset by rising wages for the remaining workers: While metal mining jobs in Michigan fell 72 percent, metal mining payroll declined “only” 68 percent.

### C. The Mobility of Miners and Income Leakage out of the Mining Area

Most employees of mines usually do not live adjacent to the mines. This is rational behavior since miners know that mining employment is cyclical and mining creates environmental hazards and tends to scar the landscape in a permanent way. To protect the investment they have made in the value of their homes, miners tend to locate those homes at some distance from the immediate impact area of the mine.

For instance, in 1991 White Pine Mine payroll records indicated that less than one in five of the White Pine employees lived in the community of White Pine itself. 82 percent of the White Pine workforce lived outside of the town. That is one reason that one cannot analyze mine impacts in terms of their impact on the town where the mine is located. Those mining towns are rarely

relatively complete integrated economies by themselves. White Pine employees lived as far as northern Houghton County, 83 miles from White Pine. Ten percent of White Pine workers lived in Houghton County. Others lived across the border in Wisconsin. For instance, six percent of the workforce lived in Iron County, WI, some fifty miles from White Pine. About a third of the workforce lived in various Gogebic County communities, 30 to 40 miles from White Pine. About 30 percent of the workforce lived in Ontonagon County communities *other than* White Pine. Thus, a little less than half of the White Pine workforce actually lived in Ontonagon County.<sup>38</sup>

A little less than a decade later, 2000 Census data indicated that workers in the Western UP were still quite mobile, commuting to the most attractive jobs within a reasonable distance. In 2000 in each of the counties in our Western UP study area (Keweenaw, Houghton, Baraga, Ontonagon, and Gogebic Counties) had a significant number of workers who lived in that county but did not work in that county and commuted out to a job elsewhere. At the same time, workers living in other counties left their county of residence and commuted into that county to work. Combine those commuting out of a county with those commuting into the same county to work, and on average, the equivalent of almost a third (30.7 percent) of the resident workers are either commuting in or out to work.<sup>39</sup> See Table F.

**Table F.**

<b>The Mobility of Workers in the Western Upper Peninsula of Michigan, 2000.</b>					
County	In-Commuting Workers to the County	Out-Commuting Workers from the County	<b>Net</b> Out-Commuting from County	Number of Workers Residing in the County	Percent of Workers Commuting
Baraga	870	421	-449	3,440	38%
Gogebic	1,326	1,398	72	6,590	41%
Houghton	1,237	1,953	716	14,918	21%
Keweenaw	179	548	369	894	81%
Ontonagon	215	742	527	3,090	31%
Total Commuting	3,827	5,062	1,235		
Total Resident Workers	28,932	28,932	28,932	28,932	
% of Total Resident Workers	13.2%	17.5%	4.3%		30.7%

U.S. Census Bureau, 2000, County-to-County Worker Flow

<sup>38</sup> *Riding the Resource Roller Coaster: A Comparison of Socioeconomic Well-Being in Two Midwestern Metal-Mining Communities*, Lisa J. Wilson, pp. 133-134, University of Wisconsin Ph.D. dissertation, 2001.

<sup>39</sup> The 2010 Census did not collect worker flow data. However the American Community Survey conducted by the U.S. Census Bureau did collect data on workers working outside their county of residence for the combined years 2006-2010. That data suggest much lower out-commuting from Gogebic and Houghton counties (2.8 and 7.3 percent, respective, rather than the 21 and 13 percent implied by the table above. For the other counties the out-commuting was similar to the table above. The American Community Survey data does not provide data on in-commuting by county. ACS Table S0801 Commuting Characteristics by Sex. Note that we are not asserting that a third of the residents of all these counties were either commuting in or commuting out. We are comparing the *sum* of the in- and out-commuting associated with each county to the number of resident workers. Of course one county's in-commuters are another county's out-commuters. So for the region taken as a whole this statistic overstates the level of commuting.

Because of this worker mobility and avoidance of “mining towns” by miners, the impact of a new mine on the local area immediately around the mine will be much smaller than the employment and payroll associated with the mine suggests. That payroll will not flow primarily to local residents. Much of it will immediately “leak out” of the local economy to the towns and counties where the many in-commuting mine workers actually live. That can be seen during the expansion and contraction of the White Pine mine complex. Because many of the workers did not live in Ontonagon County, part of the White Pine payroll was paid to non-residents who lived 30 to 50 miles or more away. That “leakage” of payroll out of the county where the jobs are into the counties where many of the workers reside can be seen in federal economic statistics that make a “residence adjustment” when calculating the actual income being received by residents of a county. The income being earned in a county where there is a large industrial facility has to be reduced to reflect only the part of the payroll going to local residents. In turn, a significant part of the payroll that was earned in that county has to be assigned to the counties of residence of the different workers. That part of the payroll does not benefit the local economy but becomes a source of income actually flowing into those other communities, some at a relatively long distance from the mine location.

Figure U.

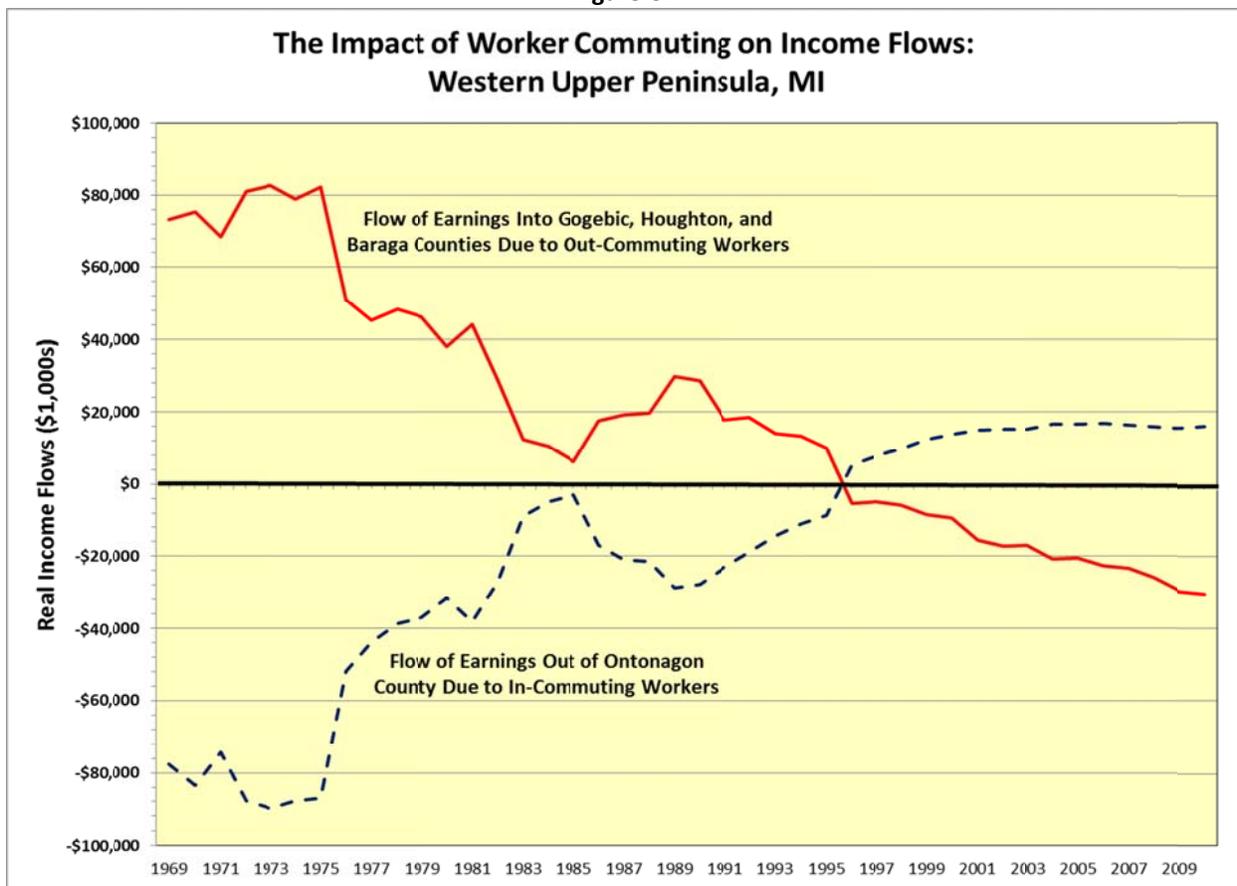


Figure U above shows these income flows out of Ontonagon County into the adjacent counties of Gogebic, Houghton, and Baraga. Note that one line is nearly the mirror image of the other.

Also note the size of the income flow at its peak. The flow out of Ontonagon County was \$90 million a year. A flow almost as large flowed into the three adjacent counties. When the White Pine Mine complex was operating at full capacity, this represented almost 50 percent of the White Pine payroll leaking out of Ontonagon County to the surrounding area of Michigan and Wisconsin. In later years as employment declined, the leakage associated with mine workers commuting in to work in White Pine was in the range of 30 to 40 percent of the mine complex payroll. After the mine shut down, workers were no longer commuting into Ontonagon County and, instead, workers in Ontonagon County commuted out to find jobs.

This mobility of workers should also be kept in mind when thinking about the impact of a copper mining project on the closest town. Typically, if the mine and mill will employ 200 workers, it will be said that 200 new jobs will be created for residents of the town. But people who live in a town often do not work in that town and those that work in that town often do not live there. In addition, how much of residents' or workers' income actually gets spent in that town is largely determined by whether that town is a regional trade center or largely just a residential location.

Census data on our five-county study area for 2006-2010 indicate that of the people living in an identified town or city, the majority worked outside of that town or city. In Keweenaw County almost three-quarters worked outside of the place where they lived. In Gogebic 62 percent worked outside of the town in which they lived and almost 20 percent worked across the state line in Wisconsin. For Houghton and Baraga Counties about 50 percent worked away from where they lived. For Ontonagon a third worked outside of the town where they lived.<sup>40</sup>

When relatively high-paid jobs are created, all residents within commuting distance can be expected to compete for the jobs and the new business is likely to hire the most qualified of those who apply. As a result, the jobs will often go to people who commute in to work there. This means that the economic benefits of the mining and milling become relatively widely dispersed throughout the region and do not primarily flow to local residents. This partially explains why mining towns often are not as prosperous as the high wages and payroll would suggest. This mobility of workers and the dispersion of the impact to a broader geographic area including the closest trade centers are also why we have defined a five-county study area in which most of the impacts are likely to be felt.

#### **D. Depletion of Mineral Deposits**

Another source of declining employment and earnings in mining is that mineral deposits are always, ultimately, exhausted, and the industry has to shift to new geographic areas. The life of modern mining operations has become relatively brief. For instance, the proposed Copperwood Project on the shore of Lake Superior in Gogebic County is designed to operate for only 13 years. The White Pine copper mining complex just to the northeast of the proposed Copperwood Project began operating in 1954, largely shut down in 1984, recovered in 1986

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<sup>40</sup> Ibid.

and operated with about 1,100 workers until the mid-1990s, over 40 years later. Recall Figure N above.

In addition, because of the high profits that are associated with periods of high metals prices and profit squeezes when metal prices fall, there tends to be ongoing struggles between miners and mining companies over the sharing of those profits and losses. This has led to often bitter and extended strikes and lockouts, such as were experienced at the White Pine Mine, that also take a toll on local communities, adding still another source of economic instability to adjacent communities.

### **E. The Economic Implications of Environmental Degradation**

Finally, as discussed in more detail earlier in this report, the quality of the local natural and social environments are crucial to supporting several important sources of local economic vitality: Holding and attracting new residents and businesses, attracting the foot-loose income associated with retirees and investors, attracting business activity linked to professional and technical services, high tech manufacturing, and information workers, and encouraging a diversified visitor economy. Mineral extraction tends to be land-intensive, imposing a disruptive footprint on the natural landscape and contributing to significant environmental degradation. This makes mining-dependent areas less attractive places to live, work, and do business, depressing economic diversification and development.

Put somewhat differently, all economic activities are not necessarily compatible with all other economic activities. That is why all economic activities do not take place in the same location. Certain economic activities, because of their characteristics, can and do displace other types of economic activities. The environmental degradation associated with mining will tend to displace those economic activities that thrive on attractive natural and social environments. Obviously tourism and recreation, and the rest of the visitor economy, which rely on attractive natural landscapes, will be displaced by industrial activities that degrade those landscapes. But, as will be discussed below in Chapter V, this is not primarily a matter of “tourism.” Natural and social amenities can attract new permanent residents, entrepreneurs, new businesses, as well as retirees. “Amenity supported” economic development can also be short-circuited by industrial activities that damage attractive local characteristics. Mining, because it is landscape intensive in its operations and brings instability to communities dependent upon it, can do exactly that.

The well-known economic instability of mining-dependent economies leads businesses and households to be very cautious about the investments they make in areas dependent on mining. Since workers, residents, businesses, and local governments do not know how long the employment and payrolls will last, they reduce their risk by avoiding fixed investments that may be lost if the mineral industry enters a period of decline. As a result, mineral workers commute long distances to jobs, maintaining residences at some distance from the mineral development. Businesses are hesitant to develop local commercial infrastructure and local governments are hesitant to finance public infrastructure with debt. Entrepreneurial talent also tends to avoid

or leave “company” towns because the mine tends to dominate the town economically and politically creating a culture of dependence rather than one of innovation. The result is a less fully developed local economy and more income leakage out of the local economy. In short, excess dependence on mining tends to constrain local economic development, leading to the depressed economic conditions that have come to characterize many mining-dependent areas.

The policy implications of this description of the problem are straightforward:

- a. A commitment to mining is probably not a good economic development strategy because of the instability it can bring to the local economy.
- b. In addition, avoiding additional environmental damage associated with new mining and repairing the damage associated with past mining is important in making the community an attractive place for current and new residents and businesses which promotes long-term economic development.
- c. Projecting that a mine will operate continuously for an indefinite period with more or less constant employment and payroll is unrealistic because it ignores the market cycles in metal prices and production and the ongoing deployment of labor-saving technology. For more than a century, metal production and employment have fluctuated widely disrupting communities that depend on mining. There are no twenty- to thirty-year periods when major expansions and then contractions did not take place. Recall Figure Q above.
- d. Assuming that all of the jobs associated with a mining project will be filled by local residents who will then continue to live in the area immediately around the mine and, therefore, that the mine payroll will primarily circulate within that local economy is unrealistic. Many of the jobs will go to in-migrating and in-commuting workers from a broad geographic area. As a result, that payroll and its impact on the economy will quickly leak out of the local area and be diffused across a broad geographic area.

#### **4. Metal Mining’s Potential Economic Connections to Western UP Communities: Using the Proposed Copperwood Mine as an Example**

In order to move beyond generalities and/or rely on the experiences of other communities with experience with copper mining, we will use the Copperwood mine and mill proposed for Gogebic County to estimate the *positive* economic impacts that such a copper mine and mill could have on the regional economy in terms of jobs and income. This type of *economic impact modeling* is usually presented as if it were a complete listing of the economic effects of such a mine. Because the focus of such impact analysis is on additional jobs, additional payroll, and additional tax revenues to state and local governments, all of which are seen as good things, this type of analysis is a *pure benefit* analysis. The mine is assumed to produce benefits but no

costs. That is, the mine is presented as a “free lunch” that any rational person would enthusiastically support. It **always** depicts “an offer that is too good to refuse.”

In general, economics warns us that “there is no such thing as a free lunch.” That is, almost all real world economic situations require us to weigh benefits against costs and make a decision that involves a tradeoff: the acceptance of some significant costs in return for the associated benefits if the benefits sufficiently exceed the costs. When someone offers benefits without costs, they are likely hiding significant costs.

Above we have discussed the economic characteristics associated with metal mining that have often prevented metal mining from bringing durable prosperity to the region around the mine and its associated industrial facilities. Here we will discuss employment and income benefits as if they were that illusive pure economic benefit, the free lunch. We will then return to put the full set of benefits and cost in a more realistic context.

### **A. The Proposed Copperwood Mine and Mill**

To make this analysis more concrete we will use a copper mine and mill similar to the proposed Copperwood Project, an underground copper mine proposed for a site near the shore of Lake Superior in Gogebic County, MI. The actual Copperwood Project would be about 30 miles northeast of Ironwood in Gogebic County and 20 miles southwest of the White Pine in Ontonagon County. The mine complex would include a mill and concentrator that produces copper ore concentrates that would be shipped elsewhere to be converted into copper metal. A surface tailings disposal facility will be constructed to separate liquid and solid wastes from the concentration process. That will require a partially excavated pond about 1.25 by 0.5 miles in size surrounded by earthen embankments as high as 140 feet above the existing ground surface.<sup>41</sup>

In order to make our analysis more broadly useful, what we model is a mine and mill *like* the Copperwood Projects, but located somewhere within our five-county economic study areas: Gogebic, Ontonagon, Houghton, Keweenaw, and Baraga Counties. We adopt this approach because none of the individual counties in the Western UP can be thought of as stand-alone integrated economies. The worker commuting data discussed above, both the more recent data and that associated with the old White Pine Mine complex in Ontonagon County, indicate that the population of this region is quite mobile, living in one location, working in another, and shopping, potentially, in a third location. By combining the five counties we reduce in- and out-commuting from our study area and incorporate the two major trade centers, Houghton and Ironwood. This approach allows us to capture more of the economic impacts associated with the copper mine and mill within the study area.

Following the feasibility study for the Copperwood Project, we assume that the mine and mill would operate for 13 years, annually producing, on average, 2.3 million tons of ore and ore

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<sup>41</sup> Feasibility Study of the Copperwood Project, Upper Peninsula, Michigan, USA, prepared for Orvana Resources US Corporation by K D Engineering, March 21, 2012, Figure 20.3 and p.192.

concentrates containing 56.2 million pounds of copper. Averaged over the life of the mine, the annual value of ore concentrates produced from the mine and mill would be about \$140 million.<sup>42</sup> Over the life of the mine \$1.8 billion worth of ore concentrate would be produced.

The mine at full production would require 112 workers engaged in production, another 156 providing service and support, and 32 supervisors, managers, and professionals. The total workforce associated with the mine would be 188.<sup>43</sup> The mill and concentrator would require another 85 workers<sup>44</sup> for a total of 273 workers associated with the proposed Copperwood Project. Average annual pay, including overtime and benefits, for these workers would be quite high, almost \$87,000 per year.<sup>45</sup>

### **B. The Distributions of the Economic Value Created at a Copper Mine**

As mentioned above the Copperwood Project is expected to produce \$140 million dollars a year worth of copper and silver ore concentrates, mostly copper. Over the 13 year life of the mine that represents almost two billion dollars' worth of output. The way this economic value created by the mine is distributed among stakeholders partially determines the local economic impact of the mine.

The total value of output from the mining complex can be divided into two parts: that which was created at the mine and mill and that associated with the outputs of other businesses that were purchased to use at the mine. The mine and mill will require complex mining equipment that is not manufactured locally. It will require electricity that will not be generated on site but purchased from an existing electric utility. It will also require chemical reagents that will be imported from distant chemical manufacturers. The value associated with those productive inputs cannot be attributed to the mine and mill. That value was created elsewhere. Economists distinguish the new value created by a business from the value purchased from other businesses by identifying the *value added*: The value of the mine's output minus the value of the mine's inputs purchased from other firms.

In the case of the Copperwood Project about 75 percent of the value of the copper and silver ore concentrates that are shipped from the mine will be tied to value created by the mining and milling operation itself. The other 25 percent of the value will be associated with purchases

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<sup>42</sup> Ibid. Table 22.2. The assumed copper price was \$2.75 per pound and the silver price assumed was \$20 per ounce. Over 90 percent of the value is associated with the copper. The value of the contained copper and silver, of course, would be higher (\$152 million), but that would require the additional cost of the smelting and refining of the ore concentrates. Since the value of the copper and silver ore concentrates depends on the assumed market price for copper and silver and the cost of shipping, smelting, and refining the concentrates, the actual value of the ore concentrates produced could span a fairly wide range. The Copperwood Project's estimate of the expected value is in the same range as the IMPLAN model's estimate.

<sup>43</sup> Ibid. Table 16.14.

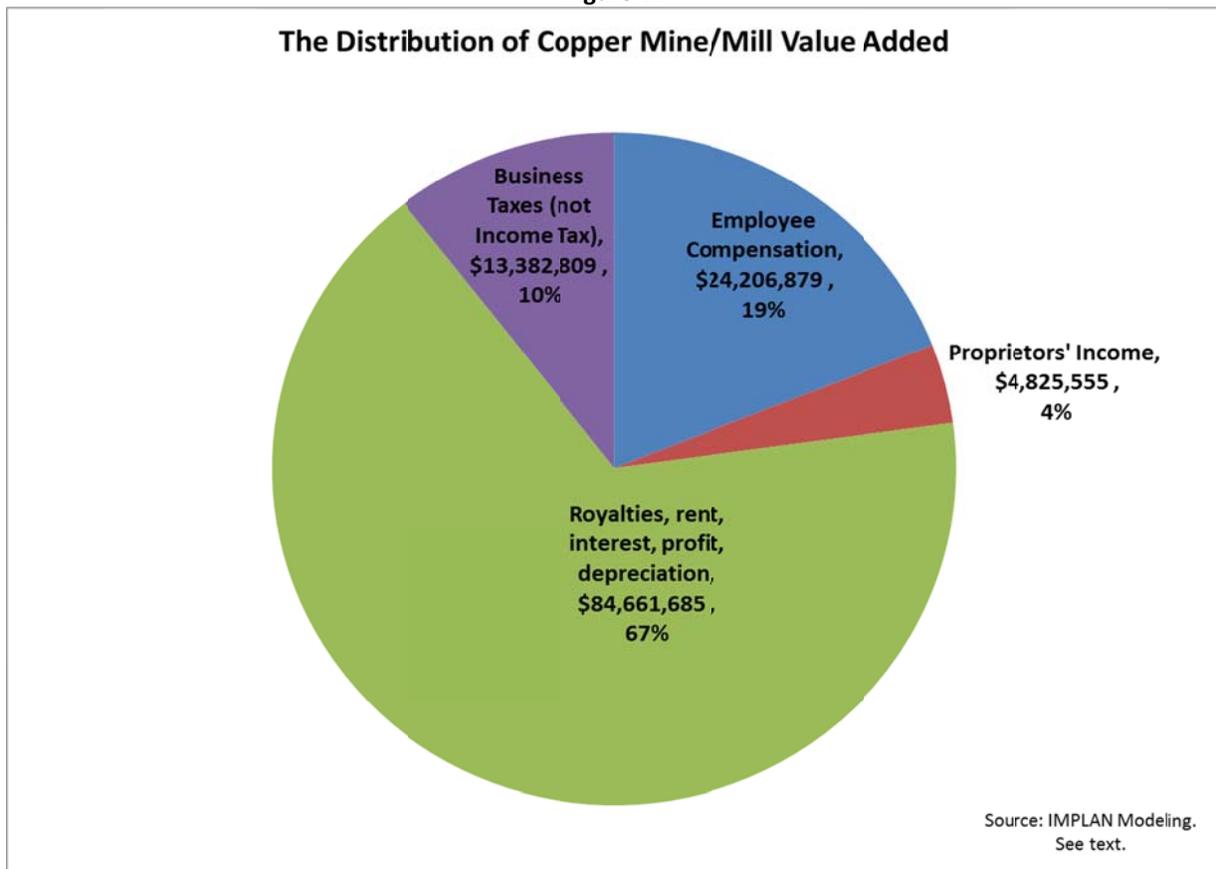
<sup>44</sup> Ibid. Table 21.14

<sup>45</sup> Ibid. Table 16.14, pp. 151-153, for the mine workers; Table 21.14 for the mill workers. These "wages and salaries" include 30 to 35 percent in benefits depending on whether they are salaried or hourly workers. The benefits explicitly described for the mine workers were also assumed to be received by the mill workers.

from other businesses. This is not surprising. Mining primarily involves the extraction of the “gift of nature” rather than the purchase of materials from other companies and the fabrication of a new product from those purchased goods. The earth is the source of the primary materials, not some other firm. To the extent that *local* firms can provide some of the inputs required by the mine and mill, additional economic activity may be stimulated locally. These potential “indirect” impacts of the mine will be discussed below.

That *value added* by the mine and mill, in turn, can be broken down into the productive contribution of the workforce, the capital invested in building the mine and mill, the “gift of nature,” the productivity of the mineral deposit being developed, and the entrepreneurial efforts of the management and investors. Because metal mining tends to be capital and land intensive and because technological developments have tended to be labor-displacing, wages and salaries represent a relative small part of the value added by the mine and mill.

Figure V.



Modeling of the proposed Copperwood project confirms this. Compensation paid to employees would represent less than a fifth, 19 percent, of the total direct value added or about one-seventh of the total value of the ore produced. Two-thirds of the value added by the mine and mill would be tied to payments made to the owners of the land, mineral deposit, mine, and mill as well as those who have lent money to the Copperwood project. See Figure V above.

This is important information relevant to the likely local economic impacts. Payments to stockholders and other investors are unlikely to be spent locally both because the capital for developing a mining complex is raised on national and international capital markets and the return will flow to those distant locations and because the return on and of that capital is unlikely to be spent on consumption goods; it is more likely to be reinvested in other ventures around the world.

Wages and salaries paid to the local workforce, on the other hand, *are* more likely to be spent within the commuting region in which the workers live and shop. That may not be the immediate area around the mine, but it will be within the larger economic area in which the mine is embedded. For that reason, the larger the share of the value created that goes to employee compensation, the larger the local and regional impacts are likely to be. However, this does not mean that *all* of that money will go into the local economy. Much of workers' pay checks in a small town or rural area quickly leaks out of the local economy. State and federal tax payments, large purchases from distant trade centers as well as online purchases, investments elsewhere, money spent on travel, etc. can account for a significant fraction of the dollars that are earned.

The "indirect business taxes" are primarily property taxes and sales (excise) taxes. Most of them (90 percent) are state and local taxes. How big an impact they have on the local study area depends on how large the state share of these taxes is and how much of that state share automatically flows back to support local government budgets in the vicinity of the mine and mill.

The Proprietor's Income is the money earned by self-employed individuals and unincorporated businesses. It is unclear what part of this income flow from the mine and mill activities is likely to circulate in the local economy.

### **C. Tax Revenues and Increased Demand for Public Services: Fiscal Balance**

One of the "benefits" of metal mining that the mining companies emphasize is the revenues that flow to local and state governments as a result of taxes levied on the mining activity and the potential payments of royalties in which local and state governments may share. Totaling up all of the taxes paid on salaries and mining companies' profits, the increased property tax base associated with the building of the mine, the ore milling and hauling equipment, and potentially new homes and business, as well as the sales tax revenues associated with both the mine and workers purchasing goods and services in the local economy can lead to a very sizable increase in revenues flowing to local and state governments.

These additional government revenues are often treated as a pure benefit: Because of the building and operating of the mine, it is assumed that local and state governments will be much more flush in cash allowing local government to either offer more or higher quality services to

residents and businesses and/or reducing what households and businesses have to pay for the existing level of public services.

This “free lunch” approach to the impact of metal mining on local communities is obviously misleading since it ignores the reason that taxes are levied in the first place: to fund a certain level of services to support local households’ and business’s needs. Tax levies are the cost of providing the local road system to allow businesses and residents to move conveniently and safely through the region, the cost of providing classrooms and teachers for the children of workers, the cost of expanding sewer, water, and electric infrastructure to support the new industrial operations and population, the cost of maintaining a sufficient police and firefighting force to protect business and household property and lives. In addition, local and state governments often inherit the job of monitoring air and water quality and intervening to repair environmental damage if a mining company goes bankrupt.

The additional costs associated with serving the public service needs associated with new mineral extraction projects often are so high that states have passed laws requiring mineral extraction companies to pre-pay taxes so that there are revenues available before the mining begins to handle those public costs. Where public roads are used as mineral “haul roads,” some local governments have required significant additional payments by the mineral companies to support the maintenance, repair, and expansion of the public road system. To protect against a financially failing mineral company abandoning a mine site without mitigating the environmental damage, many states require that a sizable bond be put up by the mineral company to cover expected reclamation and mediation costs. Often those bonds are inadequate to the task and the public is left to cope with those environmental costs.

Treating projected tax and other revenue flows to local and state governments as pure economic benefits is a serious economic error since a whole set of additional costs that those government revenues will have to finance are ignored. What is necessary *before* approving a mining project is a careful and unbiased study of the *fiscal balance* especially at the local government level. The cost of meeting the additional demand for services has to be compared to the increased flow of revenues to those local governments. This requires site specific analysis since the impacts on public services and the mix of taxes levied on mining activities varies from mineral site to mineral site and from state to state. This information should be available to the public before government authorities begin deliberating on the required mining permits and before the public are asked to comment on the proposed mining proposal.

#### **D. The Distribution of the Economic Impacts of a Copper Mining Project**

The fact that much of the employee compensation is likely to circulate within the study area where most of the employees are likely to reside and shop is important in determining the overall impact of the mine and mill on the study area. As the mine employees shop in towns in the study area, that spending will help put additional workers to work at retail stores, local eating and drinking establishments, health facilities, etc. in the study area. The “ripple” effects of this employee spending is one of the sources of the “multiplier” effect, and is shown in the

fact that more jobs are created in total than just the number of workers directly employed at the mine. The impact of employee spending on the study area economy is called the “induced” impact of the mine. Its size is dependent on the ability of the local economy to capture, hold, and recirculate that income. If there are limited opportunities for workers to spend their income locally because the range of local businesses is limited, most of that worker payroll will also leak out of the local community. On the other hand, if there is a relative well-developed commercial infrastructure, that payroll can get spent locally and circulated within the local economy creating additional jobs and income.

There is one other type of local impact associated with a new business enterprise in an area. Almost all business enterprises need to purchase inputs in order to operate. The mine and mill, for instance, will need electricity, fuel for its vehicles, chemical reagents for the ore concentrator, etc. When these are purchased locally, they are like payroll, they cause money to flow into the study area businesses that can provide those necessary inputs to the mining and milling process. Economists have labeled the impact of these supply activities as “indirect” impacts. As with induced impacts, the size of these impacts will be partially determined by how complete and diverse the local economy is. If, for instance, much of what the mine needs cannot be purchased locally because there was little previous need for it (e.g. explosives, ore extraction chemicals, specialized equipment, etc.) the *indirect* impacts are likely to be limited as the mine is forced to go outside of the local economy to obtain what it needs.

The discussion above makes clear that for any given sized project, the study area economic impacts will be greater in areas that have well-developed trade centers and the local economic impacts will be smaller the more purely rural a study area is. In the context of the Western UP there are two trade centers: The Houghton-Hancock urban area of about 12,000 and the Ironwood-Hurley urban area with about 7,000 residents. These should allow the study region to capture more of the employment and income impacts associated with a copper mine and mill than would be possible in a purely rural area.

### **E. Modeling the Impacts of the Copperwood Project on the Western UP**

We have applied the IMPLAN economic impact model to a mine and mill similar to the proposed Copperwood Project. IMPLAN is a mathematical model that seeks to describe the economic interconnections between different business enterprises as well as between those business enterprises and the workforce, households, and governments. As discussed above, the model seeks to trace the wages and salaries that are paid to workers and the purchases of inputs by businesses and workers. It also tracks revenue flows from businesses and workers to and from government agencies through taxes and government spending.

We have used the description of the workforce and wages and salaries contained in the Copperwood project feasibility study discussed above: In particular the mine and mill complex would employ 273 workers with an average annual pay (including benefits and overtime) of about \$87,000. Because of the very high pay associated with each job at the mine and mill, a

significant number of lower paid jobs are created by both the purchases the mine makes of necessary inputs and the expenditures of workers of their paychecks.

As the 273 mine workers spend their paychecks in the study area, 256 additional jobs are created paying about \$22,500 per year, about a quarter of what the mine jobs pay and a third below the average pay per job in the five-county study area in 2010. The indirect jobs created by the mining company’s expenditures create 264 jobs paying about \$31,600 per year, about 7 percent below the average pay in the study area. The total employment impact in the study area is almost 800 jobs, almost three times the 273 mining jobs. Because of the lower pay associated with the induced and indirect jobs, however, the total wages and salaries associated with all of the jobs, direct, indirect, and induced, are just 60 percent higher than the pay earned at the mine despite the total of the induced and indirect jobs being almost 200 percent larger than the mine employment. The additional economic value created as the copper mine’s expenditures circulate through the study area adds only 20 percent to the value created at the mine. This reflects the capital and land intensive character of a metal mine compared to most regional businesses. See Table G below.

Table G. <sup>46</sup>

<b>Economic Impact of a Copper Mine the Size of the Proposed Copperwood Mine Built in the Western UP Five County Study Area</b>				
<b>Annual Impacts during the Operation of the Mine</b>				
<b>Impact Type</b>	<b>Employment</b>	<b>Employee Compensation</b>	<b>Value Added</b>	<b>Output</b>
Direct Effect	273	\$24,206,879	\$127,076,928	\$168,382,473
Indirect Effect	264	\$8,326,180	\$16,773,177	\$34,155,378
Induced Effect	256	\$5,741,579	\$13,857,757	\$24,458,403
<b>Total Effect</b>	<b>793</b>	<b>\$38,274,639</b>	<b>\$157,707,861</b>	<b>\$226,996,254</b>
Source: IMPLAN Modeling. See Text				

Table G also underlines why describing the mine in terms of the value of its output or the value added by the mine would be misleading from a local impact point of view. If the impact of the mine were to be expressed in terms of the value of the output produced by the mine, the

<sup>46</sup> “Employment” includes both full and part-time jobs; these jobs are reported on an annual basis, i.e. a job for a year. The employee compensation includes benefits and any overtime pay. Value added is the value of production less the cost of purchased inputs. It consists primarily of worker payroll and payments to owners of the invested capital (profits and interest) and owners of the land and mineral rights. Value of production is the sales value of the copper ore as it leaves the mine and concentrator site. Employee compensation is the average annual pay multiplied by the number of workers.

impact would appear to be **seven times** greater than the actual mine wages and salaries received by residents of the study area. Even if the measure of the mine's impact were stated in terms of value added at the mine, the apparent impact would still be over five times the mine payroll. This is just a reflection of how capital and land intensive the mining process is and how little of the value created flows to workers. If we look at the total impact of the mine, the value of total output created is almost six times larger than the size of the total payroll that workers will receive. See Table G above.

Specifying the number of jobs or the annual payroll that may be created as the result of a new economic activity is not actually very informative since it does not tell us what the relative importance of that change in employment or income is. Some reference to total number of jobs or total payroll in the study area is necessary to judge the relative importance of a particular change.

The 273 new jobs at the mine would represent less than one percent of total study areas jobs in 2010 which numbered 32,800. Because of the high pay associated with those mining jobs, however, the payroll associated with those jobs would represent slightly over 2 percent of total labor earnings in 2010.<sup>47</sup> The 793 total job impact of the mine on the study area, including indirect and induced jobs, would represent 2.4 percent of 2010 employment and the total employee compensation impact would have represented 3.4 percent of total labor earning in the five-county study area.

Between 1984 and 2010 jobs in the five-county study area grew at about 300 jobs per year. That quarter century period includes the recovery from the double-dip recession in the early 1980s, the recessions of 1990 and 2001 as well as the Great Recession that started in December of 2007. However, there was little or no job or payroll growth in the 2000-2010 period in the study area. But between 1984 and 2000, job growth was about 540 jobs per year. Similarly, real payroll growth between 1984 and 2010 averaged \$11.8 million per year. For the shorter, faster growing period of 1984 to 2000, real payroll growth was almost twice as fast, \$20.7 million per year.

Using this past growth in jobs and payroll to put the copper mine's impacts in context, the total job impact of the mine would represent 2.6 years of the slower job growth and 3.2 years of payroll growth. At the faster growth rate on the 1980s and 1990s, the mine's total job impact would represent 1.5 years of job growth and somewhat less than 2 years of real payroll growth.<sup>48</sup>

Over the mine's projected 13-year life, if job and payroll growth were similar to the 1984 to 2010 period, almost 4,000 jobs would be added in the study area from "normal growth" of the economy and over \$150 million in payroll would be added. If job and payroll growth were to

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<sup>47</sup> U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System.

<sup>48</sup> Ibid.

return to the 1984-2000 levels, 7,000 jobs would be added over a 13-year period and 270 million in annual payroll would be added by “normal” economic growth.

The point of this latter comparison is simply to indicate how large the job and payroll loss could be if the restarting of metal mining and processing in the region were to damage future regional economic vitality because it made the region less attractive as a place to live, engage in business, and raise a family. As discussed above, quality of life and the quality of the natural environment have proven to be important determinants of the location of economic activity. Undermining that quality of life could reduce economic vitality in a way that eliminates far more jobs and payroll than the new environmentally damaging industrial activity creates.

It is also important to keep in mind that just because the mining company projects 13 years of continuous high-paid mine employment does not necessarily mean that is what the mine will deliver. The viability of any mining project depends on expected mineral prices being realized. If they are not, the mine will periodically shut down, laying off its workers, and may permanently shut down long before the mining company originally forecast. The unstable history of employment at the White Pine Mine that was located in the same vicinity as the proposed Copperwood Project should remind us of that.

This brings us back to the fact that most economic choices involve evaluating both costs and benefits. Mining companies are very familiar with the importance of this economic calculus. Just because there are copper ore deposits at a particular location does not mean that mining companies will rush in to develop them. Instead mining companies will carefully evaluate all of the costs they would have to face to bring those ores to the surface and process them into a marketable product. The mining company will also analyze what the future value of the metals produced is likely to be. The risks involved due to fluctuating costs and metal values and unexpected complication in the process of mining and processing the ore will also be evaluated. In most settings, mining companies will find that the costs exceed the benefits and/or that the risks are too great and will decide not to proceed with mining. That is why there are so many known ore deposits, some known for over a century, that have not been developed. Walking away from a known ore deposit the development of which would involve costs that exceed benefit or unacceptable financial risk would not be considered economically irrational. It is exactly what any rational business would do.

Because mining tends to do permanent damage to land, landscapes, water, and other environment resources, mining companies unavoidably have to make use of public resources. That is why mining is regulated and required to obtain a broad range of permits. Just as a mining company would not pursue a mineral deposit without analyzing the costs and risks, the public should not do so either. The costs about which the public needs to be concerned, however, are the potential damage to public environmental resources or the disruption of local communities. The public also has to be concerned about the risk that the benefits will not be as great as the mining company projects and/or that the public costs will be higher than the mining company projects. The volatility of mining employment and payroll discussed earlier is part of this risk analysis.

Just as it is not irrational when a mining company decides not to proceed with the development of a mineral deposit because the benefits do not justify the costs, citizens and their governments are not acting irrationally if they reject a mining proposal because in their judgment the public costs appear to be greater than the public benefits and/or because the risks are judged to be too great.

## 5. Summary

The economic attraction of metal mining is that mining and ore processing pay wages that are substantially higher than the average. Between 1990 and 2000 the average annual pay associated with metal mining in Michigan was 81percent larger than the average annual pay across all Michigan wage and salary jobs. After 2000, metal mining as an industry had shrunk so much that statistics on it were no longer presented at the state and county level. The National Mining Association reported average annual pay in American metal mining in 2010 as being 74 percent above all private sector jobs: \$81,300 compared to \$46,751. Metal mining provides some of the highest paid jobs available to blue-collar workers.

Despite the high wages paid in metal mining, the communities that rely on mining have not, in general, shown signs of widespread prosperity and economic vitality. Employment, population, and total community income have grown much slower in mining communities than in communities not dependent on mining. Often unemployment and average income per person have also been lower. This feature of mining communities across the United States and around the world has led economists to study the apparent “curse of natural resource abundance.”

The Western UP has had long experience with mining, but it is difficult to detect signs of unusual prosperity that has flowed from that experience. Instead, there has been a series of booms and busts that have left communities in economic difficulty. We identify five reasons for this “anomaly of mining”: The failure of the high pay in mining to bring prosperity to mining communities.

- i. The instability of mine production, employment, and payroll tied to fluctuations in demand and price on national and international markets.
- ii. The impact of ongoing labor-displacing technological change that constantly reduces the workforce requires for any given level of mine production.
- iii. Mine employees are very mobile, commuting long distance to work while maintaining their residences outside of the area immediately impacted by the mining and milling. This leads much of the mining payroll to “leak” out of the region immediately around the mine.

- iv. Mines, ultimately, always deplete their economically viable ore deposits and shut down. The average life of a metal mine has declined significantly in recent decades. For instance, the copper mining activities in Butte, Montana, have lasted 125 years, albeit, employing a drastically reduced workforce. The White Pine mine operated for almost 45 years. But the proposed Copperwood project in Gogebic County is estimated to last 13 years.
- v. Mining is land intensive and as a result can have nearly permanent impacts on the natural environment. Environmental degradation can significantly reduce the attractiveness of a mining area as a place to live, work, and raise a family.

Metal mining is often described as a pure benefit: Valuable “treasure,” including gold and silver, is removed from the earth by paying workers much higher wages than could be earned anywhere else. But, as outlined above, there are clearly costs that are incurred alongside the benefits. Rational decision making requires the costs and benefits to be carefully weighed and there is no reason to believe that the benefits of mining always exceed the costs. Mining companies know this. They do lots of exploration to find mineral deposits and then do lots of drilling and economic-engineering analysis to determine if the value of the mineral once extracted and processed justifies the costs that would have to be incurred. Mining companies regularly decide not to actively mine a known ore deposit because the costs are expected to exceed the value produced. Mining companies regularly leave mineral deposits in place because that is the economically rational thing to do.

The public should be as rational and hardnosed as mining companies: The public should carefully study both the costs and benefits of new metal mining, but from a public interest point of view. If the costs appear to exceed the benefits, the public should reject the proposed mine just as a mining company would if the private costs exceeded the private value produced.

## **V. Thinking about the Economic Future of the Western UP Region**

### **1. Thinking *Too* Locally: Looking at Regionally Integrated Economies**

Residents of small towns and rural areas often tend to conceptualize the *local* economy as the geographic area immediately around their residence. In that context “economic development” appears to require that the same mix of employment and shopping opportunities exist in each small town or rural area as is found in larger urban trade centers. That not only is unlikely but would also eliminate some of the attractive qualities of small towns and rural areas: low population density, open space, a “slower” way of life, etc. Such an approach to regional economic development, if it were possible, would “urbanize” rural areas and small towns.

The economic well-being of people living in small towns and rural areas is often tied to the larger regional economy that is within a reasonable travel time of their residence. Most households living in rural areas, even farm households, depend on the larger regional economy for employment opportunities. Many members of farm households are employed in non-agricultural jobs. It is that non-farm income that allows farm households to have standards of living similar to those of urban households. The same thing can be said about small towns. Many residents of those towns do not work in those towns or the immediate rural area surrounding them. They commute out for employment. In addition many of the people who shop in a small town, do not live in those towns but in the surrounding rural areas. Small towns are usually trade centers for certain types of goods and services for a larger rural area. For very specialized and/or very expensive purchases, both the residents of small towns and the residents of rural areas are likely to travel to larger trade centers to make the purchases.

This means that rural and small town residents significantly rely on commuting to larger trade centers for their provisioning and for employment opportunities and household income. At the same time, those larger trade centers rely on the surrounding small towns and rural areas to market their goods and services. Because of this, “the local economy” has to be defined as a larger geographic area that includes most of the sources of jobs and income and most of the shopping opportunities by which households provision themselves. “Economic development” of that larger region provides economic opportunities and improved economic well-being to the larger region, including small towns and rural areas. The “local economy” is an integrated set of economic opportunities that links people together across a relatively broad geographic region.

That does not mean that small towns and rural areas are necessarily “helpless” or “dependent.” *How* they interact with the larger regional economy and what share of the benefits they obtain from economic development across the broader economic region are partially determined by actions taken close to home. We will discuss this in more detail below.

## **2. The Dangers of the Economic Rear-View Mirror**

We have discussed the limitations of taking an “only exports matter” view of the local economy and its economic potential. One important problem with that view (besides the fact that it is incomplete and misleading) is that it guides our thinking about the future of our communities and the economies that support them into a very narrow set of opportunities that are increasingly not very hopeful in terms of maintaining local economic vitality. In that sense, the *export base* approach paints us into an unproductive corner in terms of local economic development policy.

As discussed above, the export base approach to what it is that energizes the local economy tends to encourage us to look into the rear-view mirror and assume that any reliable economic future must look something like our economic past. If it was logging and forest products, metal mining and processing, and/or agriculture that originally allowed the Western Upper Peninsula

to be settled by European-Americans, we should stick with those industries since they are tied to resources that we know we have and that supported our livelihoods for long periods in the past.

Alternatively, the economic base approach suggests we should look for something like metal ore extraction and processing or forest products. For instance, if it is unlikely that a new mine will be developed similar to the White Pine copper complex in Ontonagon County that at its peak employed 3,000 workers, we could try to recruit some other industrial facility, like automobile or household appliance assembly, to locate in the Western Upper Peninsula. That sort of “smokestack chasing” has been undertaken by tens of thousands of communities, using tax breaks and subsidies to lure such a manufacturing facility to relocate to *their* communities.

Neither approach is likely to bring prosperity to the Western Upper Peninsula. Both approaches have lost their capacity to support sustainable community economic development.

Traditional land-based natural resource industries have spent a century dramatically reducing the number of workers needed to maintain even a steadily increasing level of production. Agriculture provides the most dramatic example: Increased mechanization and automation of crop and livestock production has allowed high levels of production with a steadily shrinking, almost disappearing, workforce. Regions and communities that are primarily farm and ranch dependent have been losing population for almost a century. Also most farm and ranch families rely heavily on family members working off the farm in non-agricultural pursuits to support their lives on the farm. The same has been true of metal mining and processing and forest products. Where thousands of workers had previously been required, now similar levels of production require only a few hundred or, even, just dozens of workers.

This change in the contribution to the local economy that a mining project can make is obvious when comparing the White Pine Mine complex in Ontonagon County between the early 1950s and the mid-1990s with the proposed Copperwood mining project proposed for 20 miles southwest of White Pine in Gogebic County. At its peak the White Pine Mine complex employed 11 times as many workers, 3,000 workers versus 270, and the operation lasted over 40 years as opposed to the projected 13 years for the proposed Copperwood project. The copper output per worker at the White Pine operation at its peak employment was 52,000 pounds of copper per year. Copperwood is projected to produce 206,000 pounds of copper per worker per year, four times as much.

A significant part of this difference in apparent labor productivity is tied to the fact that the White Pine operation was a fully integrated operation that included a smelter and refinery in addition to the mine and concentrator. That is, the White Pine operation was capable of producing refined copper while the proposed Copperwood project would only produce copper ore concentrates that would have to be shipped elsewhere to be processed into pure copper. That, of course, requires an additional workforce elsewhere. But the jobs associated with a

contemporary copper mine will be only about 9 percent the size of the earlier copper operation and the duration of that employment would be only a third as long.<sup>49</sup>

“Smokestack Chasing,” recruiting existing manufacturing facilities through subsidies and tax breaks to relocate to the local area, has also become a questionable strategy. Although over the last half-century many manufacturing plants *did* move from urban to rural areas, it was to take advantage of a lower cost labor supply. Many of those facilities then moved on to developing countries in the pursuit of an even lower cost workforce. Many of those that remained in rural areas recruited immigrant workers, both legal and illegal for their workforce rather than local residents.

### 3. Relying on “Outside Saviors” Versus “Local Economic Gardening”

Both of the above economic strategies focus on some type company coming into the community and putting residents to work. In those approaches, community economic development depends on an external agent *bringing* economic development to an area. The local community itself is conceived of as a passive recipient of a gift except for the reciprocal gifts the community may have to give to the new company to encourage it to locate in the community. (Of course, that exchange of “gifts” often leaves ambiguous just what the net balance of benefits is for the community.) This assumed community passivity can result in very little actual local economic development taking place because the new industrial operation puts down few roots in community and a passive dependency is encouraged, something that is the opposite of an entrepreneurial culture. At its extreme, this results in a “company town” mentality in which very little community-based economic development takes place. Instead the community waits for one “outside savior” after another to deliver a fully formed industrial facility to the local area.

An alternative to this strategy of passive dependence involves a strategy that does not wait for large industrial facilities to magically appear in a timely fashion to maintain local economic vitality and avoid stagnation. Instead the local economy is seen as having its own entrepreneurial energy that with encouragement and modest support can blossom into a variety of small enterprises that have the capacity to grow, interact with other local businesses and the local workforce to provide employment and income opportunities. In this vision of diversified organic economic development, the local area is not a passive participant. The site-specific characteristics of the community are crucial to encouraging and maintaining local economic vitality: environmental amenities, both social and natural, the quality of the local

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<sup>49</sup> Data on the Copperwood Project is from the “Feasibility Study of the Copperwood Project, Upper Peninsula, Michigan, USA” prepared for the Orvana Resources US Corporation by KD Engineering, March 2012, Table 22.2, Copper Contained. The information on the White Pine Mine complex came from *Riding the Resource Roller Coaster: A Comparison of Socioeconomic Well-Being in Two Midwestern Metal-Mining Communities*, Lisa J. Wilson, 2001, Ph.D. dissertation, University of Wisconsin-Madison, Figures 2.1 and 2.2, adjusted for the historical information on page 64.

workforce, schools, public and private infrastructure, cultural richness and openness, independent entrepreneurial spirit, etc.

Protecting and enhancing the qualities that make a location an attractive place to live, raise a family, and do business becomes central not only to local quality of life but also to maintaining and enhancing local economic vitality. What is good for local quality of life also, often, is good for a vital local economy. Rather than there being some tragic tradeoff we have to make, purposely accepting damage to our quality of life in order to encourage someone to “create jobs” for us, we can simultaneously improve both quality of life and economic vitality.

This is not a prescription for a community to passively sit back and wait for something to happen. Rather it involves an active nurturing of existing businesses and support for new start-ups. The Keweenaw Economic Development Alliance’s apt phrase for this is an “Economic Gardening” strategy.<sup>50</sup> A productive garden requires active management that understands, respects, and supports the natural system in which it is embedded. The same is true of a vital local economy.

#### **4. The Importance of Quality of Life, Knowledge, and an Entrepreneurial Context**

This emphasis on local qualities as crucial to local economic vitality has recently been described as “the rural growth trifecta: outdoor amenities, creative class and entrepreneurial context” by one of the leading economists within the U.S. Department of Agriculture, David A. McGranahan.<sup>51</sup> McGranahan and his colleagues had noticed that during the 1990s about a fifth of non-metropolitan counties grew faster than the average rate of growth of metropolitan counties. The challenging question was why? What was unique about those rural counties that were showing considerable local economic vitality while many other rural economies were in decline or, at best, lagging the rest of the nation?

McGranahan and other economists sought to understand these differences in non-metropolitan growth by carrying out a statistical analysis of all 2,100 non-metropolitan counties.<sup>52</sup> These counties occupy 97 percent of the U.S. land area. A data base of the objective characteristics of each county was developed. Quantified measures of environmental quality were also developed. The social, educational, and racial characteristics were included. The relative importance of different industries was quantified. Measures of past and present

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<sup>50</sup> “An Economic Overview of the Development of the Keweenaw Peninsula Economy & of an Entrepreneurial Support System,” Phil Musser, <http://kedabiz.com/about.html#historical>.

<sup>51</sup> David A. McGranahan. See “The rural growth trifecta: outdoor amenities, creative class and entrepreneurial context,” *Journal of Economic Geography*, 11(3):529-557, 2011, David A. McGranahan, Timothy R. Wojan and Dayton M. Lambert.

<sup>52</sup> To be classified as a metropolitan area there has to be a central urban area with a population of at least 50,000 and adjacent territory that has a high degree of social and economic integration with the urban core as measured by commuting ties. Most metropolitan areas (97 percent of them) have at least 100,000 residents.

economic growth and change were included. Anything that might significantly affect the economic trajectory a rural county that could be quantified was included.

One set of features associated with most of the growing non-metropolitan areas was the high quality natural amenities found at those locations as measured by an index that included a variety of quantifiable local natural amenities including four different climate measures, varied topography, surface water features, and outdoor recreation potential. McGranahan documented the statistical association of the index of natural amenities with rural population growth.<sup>53</sup> But the question remained, how did these local amenities lead to local economic vitality? What was the causal connection?

Typically the assumed economic mechanism between high quality natural amenities and rural economic vitality had been assumed to be through tourism, commercial outdoor recreation, second homes, and the in-migration of retirees. But, as discussed above, there may be a broader economic connection associated with those natural amenities drawing relatively footloose economic agents, including

- owners of small companies,
- self-employed professionals providing technical services to regional and national markets,
- entrepreneurs who want to start businesses in places where they would also like to live and raise families, and
- workers who are willing to sacrifice some income for higher quality of life, effectively providing a relative low cost and reliable local labor supply.

In order to quantify the economic impact that amenities were having on economic development in rural areas, McGranahan and his colleagues focused on the interaction between three characteristics:

- the quality of local outdoor natural amenities and community social amenities
- the presence of skilled professional and technical “knowledge” workers, and
- the existence of a local entrepreneurial spirit that leads to a high density of self-employment, new small startup companies, and a proliferation of new business establishments.

Each of these characteristics of the local work force and the mix of different industries was quantified in terms of skill levels, educational attainment, and the level of autonomous decision making associated with different types of occupations. The characteristics of the technology and business organization of the firms being studied were also quantified.

That allowed these analysts to statistically study the relationships between the natural and recreational amenities, the character of the work force, and the types of business firms found in

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<sup>53</sup> McGranahan, D.A. (1999) *Natural Amenities Drive Rural Population Change*, AER-781, Economic Research Service, U.S.: Department of Agriculture. Also, McGranahan, D.A. (2008) “Landscape influence on recent rural migration in the U.S.,” *Landscape and Urban Planning*:41: 197-216.

each of these 2,100 counties. It was the analysis of the characteristics of all of these counties and the relationship between those characteristics and the divergent economic vitality found in the counties that led them to conclude that it was a “trifecta” of factors, natural landscape and recreational amenities, highly skilled knowledge workers, and new entrepreneurial firms, that were driving the expansion of employment opportunities in those rural areas that were high in all three characteristics.

The economic mechanism they identified that was at work involved all of the following:

1. Local areas high in outdoor natural amenities and certain social and business amenities associated with small urban areas attract skilled professional and technical knowledge workers who prefer those natural and social amenities to the characteristics of larger metropolitan areas.<sup>54</sup>
2. The choice of a non-metropolitan, high amenity area increases the likelihood that these skilled professionals will have to create their own economic opportunities since that are not moving to locations that are likely to have expansive opportunities in already established technical and professional services sectors. The act of moving, itself, is a reflection of entrepreneurial energy.
3. These new entrepreneurial efforts are likely to deploy technologically advanced production processes and to make use of more sophisticated and decentralized management practices that engage their largely skilled work force in more of the decision making and control of the production process. This focus on advanced manufacturing processes encourages interactions within the new startup business community in the search for solutions to emerging technical and management problems.
4. The result is ongoing “home grown” local economic vitality in new business sectors and expanded employment opportunities. Areas with high quality natural and social amenities are likely to be able to retain and expand their own local workforce. That local labor supply becomes one of the important economic resources supporting the expanding economy. The high amenity characteristics also make it possible to attract additional professional and technical personnel at relatively low cost.

The local community clearly has a role to play in supporting this type of economic development process. To begin with, it needs to protect and enhance the natural and social amenities that

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<sup>54</sup> Richard Florida coined the phrase “creative class” for this group of professionals. McGranahan has narrowed the definition of that group to those most likely to make entrepreneurial decisions and applied it outside of the larger metro areas on which Florida had focused. For Florida’s approach see *The Rise of the Creative Class* (New York: Basic Books) 2002 and *Cities and the Creative Class* (New York: Routledge) 2005. For McGranahan’s modification of the definition of the *Creative Class* see “Ambient Returns: Creative Capital’s Contribution to Local Manufacturing Competitiveness,” Timothy R Wojan and David A. McGranahan, *Agricultural and Resource Economics Review*, 26(1): 133-148, 2007.

make it an attractive place for professional and technical workers to seek out. Those amenities, from outdoor recreation opportunities on high quality natural landscapes to good schools that are successfully turning out skilled and adaptable young people to rich social and cultural institutions and activities, improve the quality of life for both existing residents and in-migrating new residents and economic actors.

In addition, the community's economic development agencies can focus their efforts on providing modest support for existing small businesses and new startup businesses. This is the "economic gardening" approach: Not recruiting larger outside firms to relocate but focusing on economic potentials that are already present. The aptly named new business "incubators" carries the economic gardening metaphor forward. Many small businesses fail simply because they ignored or under-emphasized some of the most basic of accounting, finance, and management fundamentals. Professional advice can help new startups avoid making costly mistakes that undermine what is otherwise a viable business concept.

## **5. Emerging Developments in American Manufacturing**

It might seem fanciful to imagine that economic development in a non-metropolitan area like the Western UP could be "grown" from relatively small startup companies. But given all of the empty factories and industrial parks around the nation, especially, in the upper Midwest, joining the national competition to lure a branch factory operation from one low cost area to another after years of off-shoring and out-sourcing American manufacturing operations to low wage countries does not seem a very realistic strategy either.

However, there are changes taking place in both the United States and in developing countries like China that may lead some manufacturing operations to shift back to the United States. One of the changes is that as the Chinese have grown more prosperous, Chinese wages have grown substantially. By one measure, in dollar terms, they have increased five-fold over the last decade. Those Chinese wage levels are expected to keep rising at double digit rates for the foreseeable future as a broad middle class develops in China, narrowing the wage advantage of U.S. manufacturing plants locating there.

The original optimistic "high-wage strategy" behind off-shoring almost all of American manufacturing involved the assumption that the United States would keep most of the high paid jobs: the product conception, the research and development, the market analysis, the design and engineering of the product and its manufacturing, its retail marketing, etc. The routine production was "all" that would be turned over to relatively unskilled workers in developing countries. Although this has been a spectacular success in terms of developing China's manufacturing capacity and delivering one technological marvel after another very cheaply to American consumers, the ten thousand mile supply chain linking producers and consumers has become more and more problematic.

Given the constant development of new products and upgrades of existing products, it has become more and more important to design and engineer products, produce them, and deliver them to retailers very quickly. Delays can mean the loss of a share of the market and failure. Separating the innovating designers and engineers from the production line and supply chain of components can lead to delays, lower production line productivity, deterioration of quality, and difficulty in adapting to changing consumer preferences and competition. As speed in innovating, design, production and delivery to customers has become crucial for effective competition and marketing, separating operations that need to be closely integrated has become dysfunctional and costly.

As a result, American firms are beginning to reintegrate their operations closer to their ultimate customers, i.e. they have begun to explore “in-sourcing” or the repatriation of the manufacturing of components and assembly of the product. The person designing a new product or a product that is constantly being redesigned cannot be removed from the production line if the product is going to be produced cheaply with reliable quality and meet the designer’s and customers’ expectations. Shipping products half-way around the world by truck, rail, and boat also adds delays that can be costly in the competition for customers.

Finally, trade secrets and product design are hard to protect when all of the details of manufacturing a product are turned over to a set of independent factories and suppliers over which the nominal producer has only limited control. The opportunity for “knock-off” substitute products quickly flooding the market is greatly enhanced.

In any case, the reintegration of design and engineering with the actual manufacturing of components and assembly of the product is bringing relatively small scale manufacturing back to the United States, one product at a time, Observers believe that this will ultimately rebuild, albeit on a smaller scale and with a higher skill level, a manufacturing base in the United States. That represent a new set of economic development opportunities for certain types of communities.<sup>55</sup>

## **6. The Western Upper Peninsula and the Potential for “Economic Gardening”**

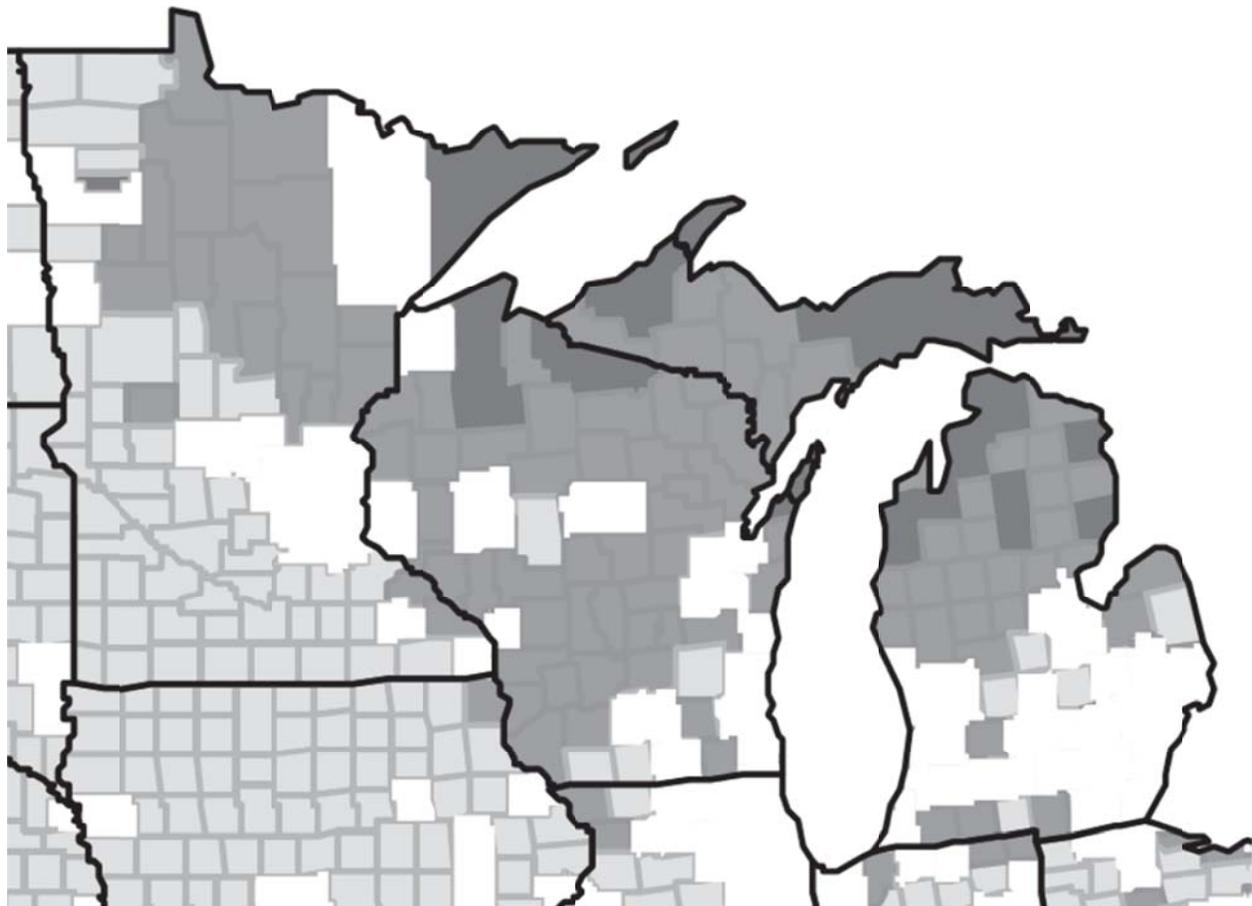
Empirical analysis of the Houghton-Keweenaw region indicates that local “economic gardening” has a significant potential. Quantitative comparison of the Houghton- Keweenaw Area with the growing non-metropolitan counties nationwide indicates that at least three of the prerequisite characteristics are already present: the natural outdoor amenities, the concentrations of professional and technical workers, and the presence of significant urban areas (Houghton-Hancock and Ironwood).

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<sup>55</sup> See, for instance, “The Insourcing Boom,” Charles Fishman, *The Atlantic*, December 2012, pp. 45-52. Also “Mr. China Comes to America,” James Fallows, *The Atlantic*, December 2012, pp. 54-66.

Keweenaw, Houghton, and Ontonagon Counties make up one set of contiguous counties that were in the top quarter of all U.S. non-metropolitan counties in terms of the quality of outdoor amenities. Gogebic and Baraga Counties were in the top half of U.S. non-metro counties according to that index. Iron and Vilas Counties just across the state line from Gogebic County were also in the top quarter. See Figure W below.

Figure W.

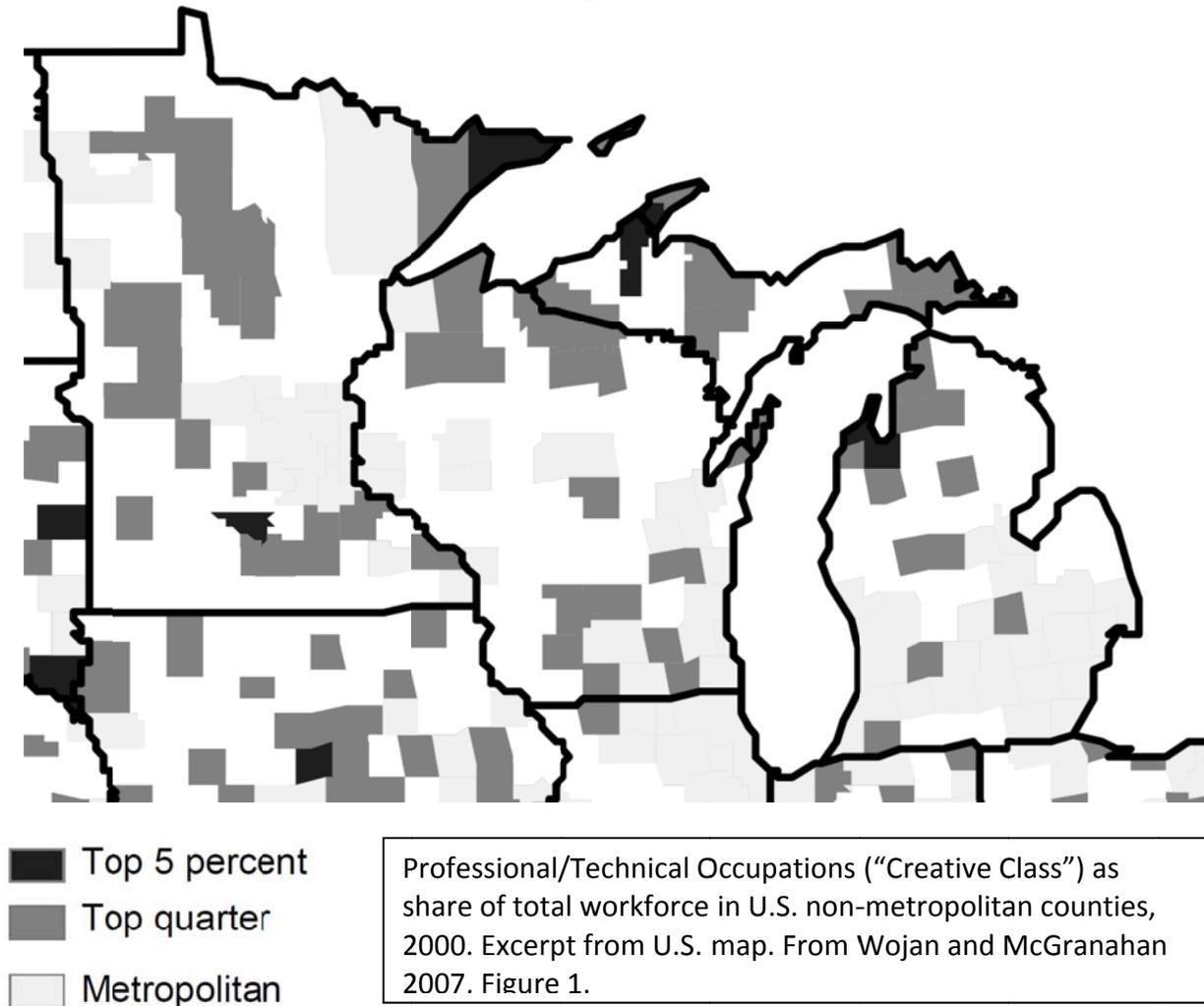


Amenity score  
 ■ Top quarter  
 ■ Middle half  
 ■ Bottom quarter  
 □ Metropolitan

Map of U.S. rural counties ranked by outdoor amenities. Upper Great Lakes excerpt. From McGranahan et al. 2011, Figure 2.

In terms of concentrations of professional-technical “knowledge” or “creative” workers, Houghton County is in the top 5 percent of all U.S. non-metropolitan counties in terms of the density of these “creative” workers. Adjacent Keweenaw County is in the top quarter. Gogebic County was also in the top quarter of non-metropolitan counties as were the adjacent counties across the state line in Wisconsin: Iron, Vilas, and Oneida. See Figure X below.

Figure X.



The Keweenaw Economic Development Alliance (KEDA) has also recognized the economic potential represented by this combination of a concentration of professional/technical workers, a vibrant urban center that is also home to two institutions of higher education, and the high quality of life associated with the Upper Peninsula-Lake Superior location. As mentioned above, KEDA has adopted an “economic gardening” approach focusing on creating a business support system for technology firms, including high tech incubators and customized business assistance. KEDA has experienced technology commercialization professionals on staff to provide assistances at its three technology incubator facilities.

KEDA reports initial success:

Since start up, a technology sector of 35-40 companies has been created through: the spin-off of research products developed at Michigan Technological University; the relocation of high tech firms wanting to have access to the

technological resources of the University and wanting to enjoy a rural quality of life; and the decision by established technology companies—more recently, GE Aviation and Grand Rapids-based Dematic—to locate branch offices in the Keweenaw to have immediate access to Michigan Tech graduates, many of whom prefer to remain in the local area following graduation.<sup>56</sup>

This KEDA example emphasizes the interaction with a local technical university. Obviously Michigan Tech and the Greater Houghton's status as a college town is an important asset in the Western UP's generally rural setting. It can only add to the potential for the type of rural growth that both KEDA and McGranahan have linked to a critical mass of professional-technical workers, and an entrepreneurial culture.

The broader conclusion is that quality of life matters *economically*: protecting natural landscapes, air and water quality, wildlife, and recreational opportunities protects an important part of a locale's economic base. Similarly with urban and community amenities: good schools, attractive public spaces, diverse and interesting culture and cultural opportunities. An independent and active business and non-profit community is also important in supporting entrepreneurial activity.

Mining and mill towns have the potential to undermine most of these important local qualities both because they are land and natural resource intensive, potentially, seriously, even permanently, degrading them. The uncertainty and volatility associated with metal mining and processing also creates economic insecurity that can undermine community, leading to long commutes and significant leakage of payroll out of the community. That uncertainty can also discourage investment in the community and a certain level of passiveness or fatalism which does not support entrepreneurial activity. Instead, a "company town" mentality of passive dependence may emerge.

Some may find the "economic gardening" approach to local economic development far too slow and plodding compared to that imaginary mine or mill or factory employing thousands of workers that someone with the powers of an economic magician can cause to parachute out of the sky and land in any given community. "Easy come; easy go," should be kept in mind. Such economic transplants often do not set down any roots in the community and draw little on the community for workers or supplies. Because of those "footloose" characteristics, such facilities can disappear as quickly as they arrived, leaving, however, environmental and social disruption in their wake. The "industrial transplant" approach may appear to be a much faster route to economic development, but such transplants may not involve hardly any development in the sense of transforming the community and economy in permanent and positive ways while developing into an integral part of that community. That sort of economic relationship typically has to grow in and with the community. It is no doubt slower than what an economic magician might be imagined to do, but it is also more steady, more compatible with a community's

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<sup>56</sup> Phil Musser, "An Economic Overview of the Development of the Keweenaw Peninsula Economy & of an Entrepreneurial Support System," Keweenaw Economic Development Alliance, p. 3. Undated.

identity, respectful of a sense of place, and more likely to have a positive and enduring, if changing, impact on the community.

## 7. Looking Beyond the Houghton-Hancock Area

The example above of an economic gardening strategy being applied in the Western UP focused on some characteristics that are relatively unique to the Houghton area: The presence of a two universities including a technological university and the specialized knowledge workers a university town attracts. Rural counties such as Ontonagon and Baraga that are more rural in character do not have these characteristics and even the more urban Ironwood area in Gogebic County, despite having a community college, is not really a “university town.” Given the emphasis in the Houghton area example on high densities of knowledge workers<sup>57</sup>, technically oriented entrepreneurs, and university connections, the particular “economic gardening” development strategy discussed may appear to be largely inapplicable to the rest of the Western UP.

But such a conclusion would be based on the false assumption that economic development involves all parts of a region playing the same role in the ongoing economic change taking place. As discussed earlier, the Western UP needs to be thought of as an integrated economy in which different areas and different economic actors play different roles. Everyone does not imitate everyone else. That would be the opposite of entrepreneurial behavior. Similarly, there is a shared interdependency, not a one-way colonial dependence.

Most of the Western UP does have one of the characteristics emphasized in the above example of economic gardening in the Houghton area, the high quality recreational opportunities associated with Lake Superior and the region’s mountains, forests, rivers, and wetlands.

In addition most of our study area is within commuting distance of an urban trade center: Houghton-Hancock, Ironwood, and Marquette. If one draws 50-mile radius circles around Ironwood, Houghton, and Marquette, those commuting ranges take in most of our five-county study area. See Figure Y below.

It should also be noted that there is a university in Marquette as well as community colleges in Ironwood and Baraga. These provide cultural centers, technical training, and potential business spinoffs.

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<sup>57</sup>“Knowledge” worker is a term that has been coined to refer to workers whose primary task is non-routine problem solving. Typical examples include software engineers, architects, engineers, scientists and lawyers. A shorthand definition might be workers who “think for a living.” (Thomas H. Davenport, *Thinking for a Living*, Harvard Business Press, 2005) The degree of “original thinking” or “creative work” necessary to be included in this category continues to be discussed and debated.



The economic gardening principles apply outside of the regional trade centers in the same way they apply within those urban centers. The general principle is to maintain and develop the attractive characteristics of each area as well as to support the entrepreneurs who are working at more fully developing the economic potentials of the area. The small towns and rural areas provide a complementary set of economic activities that support people who want to live in an ex-urban setting while continuing to enjoy ready access to urban amenities. Those small towns and rural areas also enrich the lives of the urban residents by maintaining the recreation infrastructure that allows those urban residents to easily enjoy the recreational opportunities. Of course, the urban trade centers also provide urban amenities to rural residents: cultural events, entertainment, diverse restaurants, as well as a broader range of professional services. That urban-rural interdependence allows a symbiotic relationship that shares the fruits of regional economic development.

## **8. The Place of Metal Ore Mining and Processing in the Western UP**

Metal mining has historically caused considerable environmental damage. However, each new proposed mine confidently asserts that “this time it will be different.” Promises are made that new technologies will be deployed that will meet the more stringent environmental standards that are in place today. But that has rarely proved to be true.

A recent review of projected water quality associated with metal mines before those mines were developed with the water quality that actually resulted from the mine during and after operations indicated that despite projections that with the pollution control measures in place there would be no violation of water quality standards, “52 percent of the case study mines clearly had mining-related exceedances of standards for surface water surface water quality.” The same was true of projections that ground water pollution would be effectively controlled: “...most mines predict no impacts to groundwater quality after mitigation was in place, but in the majority of case study mines, impacts have occurred...the ameliorating effect of mitigation on groundwater quality was overestimated in the majority of the case study mines.” “...76 percent of the case study mines had mining related exceedances in surface water or groundwater.”<sup>58</sup>

The overly optimistic projections during environmental permitting before mining began were due to several problems:

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<sup>58</sup> “Comparison of Predicted and Actual Water Quality at Hardrock Mines: The Reliability of Predictions in Environmental Impact Statements,” James R. Kuipers, et al. Kuipers & Associates and Buka Environmental, 2006, p. ES-8 and 9. It should be pointed out that this study also concluded that proximity to water resources including discharges from the mine and moderate to high acid drainage or contaminant leaching potential significantly increased the risk of water quality impact and was a good indicator of future adverse water quality impacts. (p. ES-12)

- i. the geochemical character of the ore surrounding rock was not accurately established;
- ii. the hydrological conditions at the mine were not accurately characterized; and
- iii. the proposed pollution control technologies did not perform as projected.<sup>59</sup>

It would not be surprising if the environmental analysis of the mining companies tended to be overly optimistic about risk of serious environmental impacts. However, many of these studies were done for government agencies by what were supposed to be independent contractors. There appears to have been a “conspiracy of optimism” that affected all metal mine analysts when it came to how well future mines and environmental controls would operate.

This recent past performance of metal mines underlines the necessity of extremely careful analysis before a metal mine is permitted and the need to be very cautious and skeptical of assertions of near zero air and water emissions.

Given the increasing importance of local landscape amenities in supporting non-metropolitan economic vitality, the potential long term environmental damage associated with metal mining has to be very carefully considered.

Also given the much lower local economic payoff associated with metal mining because of the deployment of labor-displacing technology that has dramatically reduced the number of jobs created and the much shorter lives of contemporary metal mines, the public benefit-cost ratio has declined significantly. When the actual historical experience in the Western UP and across America’s mining districts with “riding the mining roller coaster” through the booms and busts is also considered, the risk of economic and social disruption has to be included in the public economic evaluation too.

Metal mining does **not**, in general, present a community with a costless source of high paying jobs. Metal mining proposals are **not** economic offers that, generally, are “too good to refuse.” Metal mining is almost always accompanied by economic costs that can impose long-term burdens on communities. For that reason, communities must carefully and critically evaluate the **net** impact of such mines on the long term health and vitality of the local economy.

Our analysis in this report has documented all of the following:

- i. There are significant costs associated with mining activities that tend to offset the positive impacts of the high pay associated with mining jobs.
- ii. The economies of the Western Upper Peninsula have been successfully transitioning away from past reliance on unstable land-based, export-oriented economic activities.
- iii. The attractiveness of a place in terms of its social and natural amenities is an important part of that place’s economic base and future economic vitality.

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<sup>59</sup> Ibid. p. ES-13

- iv. For that reason, economic activities that damage those attractive local characteristics are incompatible with the current sources of economic vitality and, if allowed to develop, will displace other important economic activities in the region.
- v. The Western Upper Peninsula has begun to develop a cluster of entrepreneurial manufacturing firms build around social and cultural assets, high tech knowledge workers, attractive small urban areas, and high quality recreational amenities.

For all of these reasons, it is our professional judgment that a return to reliance on metal ore mining and processing in the Western Upper Peninsula would damage, not improve, regional economic well-being and vitality. Instead, the economic development focus should continue to be on local “economic gardening” and further developing the economic trends already under way.

## **9. Summary**

The most common type of “economic development” strategy urged on communities is to go searching for large companies and try to lure them into locating in your community, thus putting residents to work at, hopefully, relatively high wages. In that approach, community economic development depends on an external agent bringing economic development to an area. The local community itself is conceived of as a passive recipient of a gift except for the reciprocal gifts the community may have to give to the new company to encourage it to locate in the community. This assumed community passivity can result in very little actual local economic development taking place because the new industrial operation puts down few roots in the community and a passive dependency is encouraged, something that is the opposite of an entrepreneurial culture. At its extreme, this results in a “company town” mentality in which very little community-based economic development takes place. Instead the community waits for one “outside savior” after another to deliver a fully formed industrial facility to the local area.

In contrast to this strategy of passive dependence is an alternative strategy that does not wait for large industrial facilities to magically appear in a timely fashion to maintain local economic vitality and avoid stagnation. Instead the local economy is seen as having its own entrepreneurial energy that with encouragement and modest support can blossom into a variety of small enterprises that have the capacity to grow, interact with other local businesses and the local workforce to provide employment and income opportunities. In this vision of diversified organic economic development, the local area is not a passive participant. The site-specific characteristics of the community are crucial to encouraging and maintaining local economic vitality: environmental amenities, both social and natural, the quality of the local workforce, schools, public and private infrastructure, cultural richness and openness, independent entrepreneurial spirit, etc.

Protecting and enhancing the qualities that make a location an attractive place to live, raise a family, and do business becomes central not only to local quality of life but also to maintaining and enhancing local economic vitality. What is good for local quality of life also, often, is good for a vital local economy. Rather than there being some tragic tradeoff we have to make, purposely accepting damage to our quality of life in order to encourage someone to “create jobs” for us, we can simultaneously improve both quality of life and economic vitality.

This is not a prescription for a community to passively sit back and wait for something to happen. Rather it involves an active nurturing of existing businesses and support for new start-ups. The Keweenaw Economic Development Alliance’s apt phrase for this is an “Economic Gardening” strategy. A productive garden requires active management that understands, respects, and supports the natural system in which it is embedded. The same is true of a vital local economy.

Empirical analysis of the Western UP indicates that local “economic gardening” has a significant potential to sustain regional economic development. Quantitative comparison of the Western UP with growing non-metropolitan counties nationwide indicates that at least three of the requisite characteristics are already present: the natural outdoor amenities, the concentrations of professional and technical workers, and the presence of significant urban areas (Houghton-Hancock and Ironwood).

Keweenaw, Houghton, and Ontonagon Counties make up one set of contiguous counties that were in the top quarter of all U.S. non-metropolitan counties in terms of the quality of outdoor amenities. Gogebic and Baraga Counties were in the top half of U.S. non-metro counties according to that index. Iron and Vilas Counties just across the state line from Gogebic County were also in the top quarter.

In terms of concentrations of professional-technical “knowledge” or “creative” workers, Houghton County is in the top 5 percent of all U.S. non-metropolitan counties in terms of the density of these “creative” workers. Adjacent Keweenaw County is in the top quarter. Gogebic County was also in the top quarter of non-metropolitan counties as were the adjacent counties across the state line in Wisconsin: Iron, Vilas, and Oneida.

The Keweenaw Economic Development Alliance (KEDA) has also recognized the economic potential represented by this combination of a concentration of professional/technical workers, a vibrant urban center that is also home to two institutions of higher education, and the high quality of life associated with the Upper Peninsula-Lake Superior location. KEDA has adopted an “economic gardening” approach focusing on creating a business support system for technology firms, including high tech incubators and customized business assistance. KEDA has experienced technology commercialization professionals on staff to provide assistance at its three technology incubator facilities. KEDA reports initial success in this economic development strategy.

But the general idea of “economic gardening” is not limited to larger urban areas with universities. It also applies to the surrounding small towns and rural areas that can take advantage of their proximity to larger urban centers to both provide recreation and other services to urban residents as well as an attractive quality of life to those who find more dense urban settlements less attractive. In turn, the proximity of the larger urban centers allows residents of smaller towns and rural areas to “have their cake and eat it too”: enjoy a rural life style while also having access to urban amenities and economic opportunities.

Quality of life matters economically: protecting natural landscapes, air and water quality, wildlife, and recreational opportunities protects an important part of a locale’s economic base. Similarly with urban and community amenities: good schools, attractive public spaces, diverse and interesting culture and cultural opportunities. An independent and active business and non-profit community is also important in supporting entrepreneurial activity.

Mining and mill towns have the potential to undermine most of these important local qualities both because they are land and natural resource intensive, seriously, even permanently degrading them. The uncertainty and volatility associated with metal mining and processing also creates economic insecurity that can undermine community, leading to long commutes and significant leakage of payroll out of the community. That uncertainty can also discourage investment in the community and a certain level of passiveness or fatalism which does not support entrepreneurial activity. Instead, a “company town” mentality of passive dependence can emerge.

Also given the much lower local economic payoff associated with metal mining because of the deployment of labor-displacing technology that has dramatically reduced the number of jobs created and the much shorter lives of contemporary metal mines, the public benefit-cost ratio has declined significantly. When the actual historical experience in the Western UP and across America’s mining districts with “riding the mining roller coaster” through the booms and busts is also considered, the risk of economic and social disruption has to be included in the public economic evaluation too.

Our analysis in this report has documented all of the following:

- i. There are significant costs associated with mining activities that tend to offset the positive impacts of the high pay associated with mining jobs.
- ii. The economies of the Western UP have been successfully transitioning away from past reliance on unstable land-based, export-oriented economic activities.
- iii. The attractiveness of a place in terms of its social and natural amenities is an important part of that place’s economic base and future economic vitality.
- iv. For that reason, economic activities that damage those attractive local characteristics are incompatible with the current sources of economic vitality and, if allowed to develop, will displace other important economic activities in the region.

- v. The Western UP has begun to develop a cluster of entrepreneurial manufacturing firms built around social and cultural assets, high tech knowledge workers, attractive small urban areas, and high quality recreational amenities.

For all of these reasons, it is our professional judgment that a return to metal ore mining and processing in the Western UP would damage, not improve, regional economic well-being and vitality. Instead, the economic development focus should continue to be on local “economic gardening” and further developing the positive economic trends already under way.

## Bibliography

Borts, G., Stein, J. *Economic Growth in a Free Market*. New York: Columbia University Press. 1964.

Bureau of Labor Statistics, Quarterly Census of Employment and Wages.  
[http://www.careerinfonet.org/industry/ind\\_highest\\_paying.aspx?id=&nodeid=49&stfips=00&from=highest](http://www.careerinfonet.org/industry/ind_highest_paying.aspx?id=&nodeid=49&stfips=00&from=highest)

Bureau of Labor Statistics, Regional Economic Information System.  
<http://www.bea.gov/regional/index.htm>

Cardiff, P. Profiles of Poor Counties: Some Empirical Evidence, Patrick Cardiff. US Census Bureau, Small Area Income and Poverty Estimates. FB3-1065, Washington, DC 20233. 1999.  
<http://www.census.gov/hhes/www/saipe/asapaper/Cardiff99.pdf>

Cook, P., Mizer, K. Revised ERS County Typology: An Overview. Economic Research Service, Rural Development Research Report Number 89. US Department of Agriculture. 1994.

Deavers, K., Brown, D. Natural Resource Dependence, Rural Development, and Rural Poverty. Economic Research Service, US Department of Agriculture. Rural Development Research Report No. 48. 1985.

Fallows, J. Mr. China Comes to America. *The Atlantic*, December 2012, pp. 54-66

Fishman, C. The Insourcing Boom. *The Atlantic*, December 2012, pp. 45-52.

Florida, R. *Cities and the Creative Class*. New York: Routledge. 2005.

Florida, R. *The Rise of the Creative Class*. New York: Basic Books. 2002.

Freudenburg, W., Wilson, L. Mining the Data: Analyzing the Economic Implications of Mining for Non-metropolitan Regions. *Sociological Inquiry*. 72(4). Fall 2002.

Harmon, David. 2012. "Reinventing the Keweenaw and the Western U.P.: New Strategies, Changing Perceptions, and the Emergence of a Quality-of-Life Economy,"  
<http://www.folkminingeducation.info/reinventing-the-keweenaw-and-the-western-u-p/>

Keane, J. Feasibility Study of the Copperwood Project, Upper Peninsula, Michigan, USA. Prepared for Orvana Resources US Corporation. March 21, 2012.

Kuipers, J. Comparison of Predicted and Actual Water Quality at Hardrock Mines: The Reliability of Predictions in Environmental Impact Statements. Kuipers & Associates and Buka Environmental. 2006.

Leaming, G. The Economic Impact of the Arizona Copper Industry. Western Economic Analysis Center annual reports.

McGranahan, D. Landscape influence on recent rural migration in the U.S. *Landscape and Urban Planning*, 85: 228-240. 2011.

McGranahan, D. Natural Amenities Drive Rural Population Change. AER-781, Economic Research Service, U.S.: Department of Agriculture. 1999.

McGranahan, D. The rural growth trifecta: outdoor amenities, creative class and entrepreneurial context. *Journal of Economic Geography* 13(3):529-557. 2011.

Musser, P. An Economic Overview of the Development of the Keweenaw Peninsula Economy & of an Entrepreneurial Support System. Keweenaw Economic Development Alliance. 2012.  
<http://kedabiz.com/about.html#historical>

National Mining Association. The Economic Contributions of U.S. Mining in 2010. September 2012. [http://www.nma.org/pdf/economic\\_contributions.pdf](http://www.nma.org/pdf/economic_contributions.pdf)

Power, T., Barrett, R. *Post-Cowboy Economics: Pay and Prosperity in the New American West*. Island Press, Spring 2000.

Robertson, G. A Test of the Economic Base Hypothesis in the Small Forest Communities of Southeast Alaska. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, General Technical Report. PNW-GTR-592, December 2003.  
[http://www.fs.fed.us/pnw/pubs/pnw\\_gtr592.pdf](http://www.fs.fed.us/pnw/pubs/pnw_gtr592.pdf)

Tiebout, C. A Pure Theory of Local Expenditures. *Journal of Political Economy*. 64(2):160-164. 1956.

U.S. Census Bureau. American Fact Finder. Census 2010 and the American Community Survey.

Ullman, E. Amenities As a Factor in Regional Growth. *Geographic Review*, 44(1):119-132. 1954.

Wilson, L. Riding the Resource Roller Coaster: A Comparison of Socioeconomic Well-Being in Two Midwestern Metal-Mining Communities. Pp.133-134. University of Wisconsin Ph.D. dissertation, 2001.

Wojan, T., McGranahan, D. Ambient Returns: Creative Capital's Contribution to Local Manufacturing Competitiveness. *Agricultural and Resource Economics Review*, 26(1): 133-148. 2007.

## Appendix A: Questions and Answers on the Role of Metal Mining in the Development of the Western Upper Peninsula Economy

- Q. In addition to copper, other metals such as nickel, silver, gold, and platinum group elements may be involved in new mining in the Western Upper Peninsula. How would the conclusions expressed in this report differ in the case of, for example, a deposit that contained both nickel and copper as primary metals, in sulfide form?
- A. The relative size of the impact would be similar regardless of the type of metal being mined. The impact would largely be proportional to the size of the workforce and the planned level of ore production and concentration. Two things could change this. First most mining proposals involve extracting relatively low grade ores, concentrating the ores, and shipping them somewhere else for smelting or refining. If smelting and refining were proposed to take place in the Western UP both the employment and environmental impacts would be higher. Second, if the ores being mined are sulfide ores, there are likely to be greater environmental impacts in both the short- and long-run.
- Q. Since mining generally pays high wages by blue-collar standards, why are mining communities often in poor economic shape?
- A. There are five primary reasons:
- i Fluctuations in the demand for and price of the mineral on national and international markets cause instability in mine production, employment, and payroll. That uncertainty about the reliability of the jobs and payroll damage the local economy.
  - ii The impact of ongoing labor-displacing technological change is constantly reducing the workforce required for any given level of mine production. Actual employment falls over time.
  - iii Mine employees are very mobile, commuting long distance to work while maintaining their residences outside of the area immediately impacted by the mining and milling. This leads much of the mining payroll to “leak” out of the region immediately around the mine.
  - iv Mines, ultimately, always deplete their economically viable ore deposits and shut down. The average life of a metal mine has declined significantly in recent decades. For instance, the copper mining activities in Butte, Montana, have lasted 125 years, albeit, employing a drastically reduced workforce. The White Pine mine operated for almost 45 years. But the proposed Copperwood project in Gogebic County is estimated to last 13 years.

- v Mining is land intensive and as a result has nearly permanent impacts on the natural environment. Environmental degradation can significantly reduce the attractiveness of a mining area as a place to live, work, and raise a family. That undermines one of the most important sources of local economic vitality.
- Q. How, in general, do mining-dependent counties differ from rural counties that are not mining-dependent, from an economic standpoint?
- A. Most measures of local economic vitality are lower in mining-dependent communities.
- i. Population growth is significantly slower
  - ii. Growth in the total income available to residents is slower.
  - iii. Growth and level of average income per person is slower.
  - iv. Unemployment rates tend to be higher.
  - v. Entrepreneurial energy is lower in “company towns.”
  - vi. Poverty rates and measures of social dysfunction are likely to be higher.
- Q. Even in areas where mining is going on continuously, unemployment rates are often high. Why?
- A. Because of fluctuating demand for the minerals being mined, mine workers face regular layoffs until demand bounces back. In addition, labor-displacing technological change constantly reduces a mine’s demand for workers. Finally, the very high wages paid in mining draw an excess of potential mine workers hoping to get one of the high paying jobs. In addition, people laid off by the mine do not search for other jobs because the pay is some much lower in any other job.
- Q. Diverse economies are often healthy economies. Are diverse economies often present in areas with extensive mining? If not, why not?
- A. Mining tends to displace other types of economic activity. The environmental damage discourages the in-migration of new residents and businesses and the growth of the visitor economy. The higher wages in mining draw workers away from other jobs, making it more costly for other local businesses to obtain the workforce they need. The economic uncertainty about jobs and payrolls discourages investments in new businesses because the uncertainty about futures spending by mining families. Finally, dominant industries tend to encourage a level of passivity that undermines the entrepreneurial energy necessary for successful start-up companies.
- Q. Has copper mining in the Western UP generally led to economic stability? Why not?
- A. Copper mining in the Western UP has gone through the same boom/bust cycles that copper mining across the US has gone through. The last major copper mining boom in the Western UP at White Pine peaked in the mid-1970s and then by the mid-1980s had almost completely shut down. It staged a recovery in the late 1980s and then shut down

permanently in the mid-1990. These booms and busts disrupted the local economy and the communities in which the miners lived.

- Q. Is it likely that the mineral riches of the Western UP that are exploited in future mining will largely benefit local communities or largely benefit mining companies and their shareholders?
- A. Of the “mineral riches” created only one in seven of the dollar value of the ore will flow to workers at the mine. About half of that value will flow to the owners of the mine and minerals in the form of royalties, rent, dividends, profit, etc. About a quarter will pay for equipment and supplies necessary to run the mine. The payments to owners are likely to flow out of the local area. Given the rural character of the Western UP, most of the equipment and supplies the mine needs will have to be imported. Even the wages paid to workers are likely to flow out of the immediate area of the mine because of the mobility of miners and their tendency to live at some distance from the mine.
- Q. Is there a mining scenario that would provide for stable economic growth?
- A. Not as long as the minerals produced are sold into worldwide markets where supply and demand fluctuate. Fluctuating demand, prices, employment, and payroll are part of the market setting in which mining takes place.
- Q. In the case of the White Pine Mine, did high mining-related wages largely benefit Ontonagon County? If not, why not?
- A. No. Only about a fifth of the workforce lived in the town of White Pine. Over half of all the workers lived outside of Ontonagon County. In addition White Pine and Ontonagon County did not have the mix of businesses that could supply the workers and their families. As a result, much of the income earned by workers who did live in the county flowed out to larger trade centers rather than circulating in the local economy.
- Q. The price of copper largely determines the economic viability of a copper mine. What might happen if a mining company is depending on a certain copper price for economic viability but that copper price drops below a critical value? Is the proposed Copperwood Mine in Gogebic County highly dependent on the price of copper?
- A. The feasibility studies done by independent analysts on the Copperwood Mine emphasized that the financial viability of the mine depended entirely on high copper prices continuing. Over the last century, copper prices in 2012 dollars were below the level required for the Copperwood Mine to be feasible.
- Q. Nationwide, is mining employment rising or declining? Why? Does it generally make good economic sense for a community to depend on an industry with a trend of decreasing employment opportunities?

- A. As a result of labor-displacing technological change, employment in mining has declined even in mines that have continued to operate. Between 1999 and 2010 mining employment (excluding oil and gas) has declined nationwide from 235,000 jobs to 205,000 jobs. The White Pine Mine, at its peak, employed 3,000 workers. The proposed Copperwood Mine is expected to employ less than a tenth of that, 273 workers. For communities dependent on mining, this means an ongoing depressing effect on the overall economy.
- Q. How did the closure of the White Pine Mine affect the Ontonagon County economy?
- A. The changes included all of the following
- i. About 2,500 jobs, over 40 percent of all the jobs in Ontonagon County, were lost between 1975 and 1985.
  - ii. About \$200 million in payroll (in 2012 dollars) was lost.
  - iii. Ontonagon County lost 4,600 residents, about 40 percent of its 1976 population.
  - iv. Because population declined faster than income declined, average income per person (in inflation adjusted terms) grew about as much as it did nationwide.
  - v. Because only half of the workers at the mine worked in Ontonagon County, the impact of the mine shutdown was distributed over a wide geographic area just as the earlier impact of the mine's operation had been.
- Q. In a small rural county, is it likely that most mine workers would live in that county and spend their paychecks largely in that county?
- A. No. Miners are very mobile. Some commute-in from distant residences. Other miners leave their families at their permanent residences hundreds of miles away and temporarily relocate, sending their paycheck back to their families. In addition, rural areas often do not have the full set of businesses to support mining families and much of the paycheck gets spent in distant trade centers.
- Q. Are technological advances decreasing the number of miners needed to mine the same amount of copper or other metals?
- A. Yes. Technological advances usually are focused on reducing the amount of labor that is needed to operate the mine. Mine production that once required thousands of workers, now requires hundreds or even dozens.
- Q. Is there a negative aspect to high-paying mining jobs? Does that increase the likelihood that highly-qualified individuals can afford to commute a considerable distance to a mine, thereby decreasing the likely need for employing local workers?
- A. The very high pay that miners receive is partially tied to the complex equipment and processes they have to operate. Local workers may or may not have those skills. Even if

they do, they will face competition from workers drawn by the high wages, workers who may be more skilled and have more mining experience. As a result, especially in rural areas, the mining jobs often go to in-commuting or in-migrating workers.

- Q. Some degree of economic stability was achieved in copper and iron mining areas of the Western UP in the past because of the long duration of continuous mining activity. Are future mines likely to have the same longevity? Without that longevity will economic stability be less likely with future mining than with past mining?
- A. The much longer life of past mine did not eliminate the “flicker” or booms and busts during the life of the mine, but that longer life did increase the likelihood that if miners could hang on, many of them would be re-employed when “good times” returned. That led to more social stability (despite the financial suffering). Contemporary mines last only a decade or so. As a result, the employment they provide is more like a temporary pulse of jobs that comes and goes.
- Q. Mining always leads to land disturbance and negative environmental impacts. Are individuals less likely to want to live and work in areas with highly-disturbed natural landscapes and in areas of environmental contamination, or of the risk of such contamination? What quantitative evidence supports this assertion?
- A. For a half-century economists have been studying the movement of Americans from one location to another to understand what is driving that residential migration. Those studies have systematically documented the positive role that attractive local characteristics or amenities have played in holding existing residents and drawing new residents and the role that noxious characteristics play in pushing people out of or away from other areas. Most local economic development organizations now recognize this and seek to emphasize positive features and minimize negative features. Both economists and real estate professionals have quantified the positive attraction of local amenities and the negative impact of noxious local characteristics.
- Q. For what reasons might a community not want to become economically dependent on a mine?
- A. Given the increasing importance of local landscape amenities in supporting non-metropolitan economic vitality, the potential long term environmental damage associated with metal mining has to be very carefully considered. Also given the much lower local economic payoff associated with metal mining because of the deployment of labor-displacing technology that has dramatically reduced the number of jobs created and the much shorter lives of contemporary metal mines, the public benefit-cost ratio has declined significantly. When the actual historical experience in Western UP and across America’s mining districts with “riding the mining roller coaster” through the booms and busts is also considered, the risk of economic and social disruption has to be included in the public economic evaluation too.

- Q. What is the economic downside of a community depending on an "export economy" (shipping its resources out of the area)?
- A. Export-oriented firms are the "conduit" through which fluctuations in international and national business cycles are funneled into the local economies. As a result a heavy emphasis on exports, especially exports in one industry, can destabilize the local economy. In addition, if the emphasis is primarily on exports, the local economy may become "under-developed" and residents and businesses will have to go outside the community to "import" most of what they want. That "leakage" drains income out of the community before it can circulate in the local economy and stimulate more economic activity.
- Q. Does it make economic sense for a community to try to provide economic stability through a diversity of economic opportunities while allowing for, but not depending upon, large corporate employers such as mines and major factories?
- A. Diversity in the range of economic activities that take place within the community both increases the stability of the overall economy and boosts the "multiplier" impacts of new dollars drawn into the local economy by capturing and recirculating them. Growing the web of commercial relationships within the community are crucial to both economic development and stability.
- Q. How can a focus on producing for local consumption and use as opposed to exporting products improve the economic health of a community?
- A. Local economic development *requires* the development of local interdependency among residents and businesses. If at a particular place large quantities of valuable commodities are exported and the income flowing back from those exports is used exclusively to import things that local businesses and households need and want, almost no economic development will take place. It will be like the North Slope of Alaska where billions of dollars' worth of oil have been exported but there is almost no "local economy" present.
- Q. What is a "second paycheck," and why is that important to a community's economy?
- A. Because people care where they live, they are willing to sacrifice a certain amount of income in the pursuit of what they perceive to be higher quality living situations. That is what leads people to be willing to pay more for residential property in attractive locations (less crime, congestion, pollution, etc. and better schools, parks, cultural opportunities, etc.). In some locations, where residential property is not in short supply, the "entry fee" to more attractive locations may be lower pay and more limited economic opportunities. Just as the qualities of a more attractive neighborhood justify the sacrifice of paying more for housing, the lower pay in other locations may be justified by the attractive qualities. In these setting, people's economic well-being is determined not only by their monetary

paychecks but also by a “second paycheck” in the form of the value of the positive qualities of life associated with those areas.

Q. Do cultural, recreational, and educational opportunities often attract quality workers to an area and keep them there? Can this be quantified?

A. Yes. Because people care where they live and act on those preferences, we can study people’s location decisions to determine how much they value certain local characteristics. Real estate professionals have been doing this for as long as they have existed. They have no difficulty figuring out how lower crime, better schools, more pleasing landscapes and views, less noise, pollution, and congestion, etc. affects what people are willing to pay for property. Economists have been using the same tools to understand what it is that leads to in-migration to certain areas and what it is those in-migrants effectively pay for the locally specific amenities.

Q. The number of jobs in the Western UP has nearly doubled in the last 40 years, in spite of the closure of the White Pine Mine. Why is this?

A. There are two primary sets of reasons:

- i. More and more of household income has been coming from sources other than paychecks. Instead it comes from investment income, retirement income, and other non-commercial transfers of income to individuals and households. In the Western UP, these sources of “non-employment” income are almost as large as people’s wages and salaries. This type of income has been stimulating job creation.
- ii. More and more family members have sought to work at least part of the time outside of the home. This allows them to combine obligations within the home with higher household income and the social satisfaction associated with such work. This work outside of the home has also increased the demand for products produced by local businesses and the array of commercial businesses that are viable: Day care for children, eating outside the home, hiring non-family members to do part of the maintenance of the home, etc. We have been increasingly “taking in each other’s wash” which produces a larger more diverse economy and developing economy.

Q. The real Income of Ontonagon County residents has remained fairly constant over the past 40 years, in spite of the closure of the White Pine Mine. Why is this?

A. There are several reasons:

- i. Less than half of the employees at the White Pine Mine lived in Ontonagon County. So it was not only Ontonagon that carried the burden of the mine shutdown.
- ii. The level of employment outside of mining and other land-based economic activities increased, especially those in locally-oriented economic activities.

- iii. Residents of Ontonagon County commuted out to work just as many workers had commuted in to work at White Pine Mine when it was operating.
- iv. Non-employment income (investment income, retirement income, and income support programs such as workers unemployment compensation) increased and was spent in the community.

Q. What fraction of total employment in the Western UP is associated with extractive industries such as mining and logging? Was this fraction much higher when the White Pine Mine was operating?

A. Between 1969 and 1977, when the White Pine Mine was operating, about two-thirds of the jobs in Ontonagon County were in the traditional export sectors. In the period 2001 to 2010 only one-fifth of jobs were in those sectors.

Q. The percentage of total income in the Western UP that is generated by labor is decreasing with time. Why, and is this significant as far as the need for large employers such as mines and large factories?

A. In the early 1970 about a quarter of the income received by residents of the Western UP came from sources other than pay for work. By the 2001-2010 period the contribution from these non-employment sources of income had risen to 40 percent or more. Clearly this reduced the relative importance of wages and salaries in the overall local economy.

Q. Currently, approximately what percentage of income in the Western UP is associated with wages and salaries and other compensation for work?

A. In the 2001-2010 period employment earnings represented about 60 percent of income received by residents of the Western UP. During the Great Recession this declined to about 55 percent because of the importance of income support payments such as Unemployment Compensation, Medicaid, and Food Stamps.

Q. Will the Western UP's large retirement population likely be an increasingly important source of income and spending?

A. Yes, if the Western UP can retain its current retirees and attract others. About half of the non-employment income flowing into the Western UP is retirement-related. That represents about 20 percent of total income. As more and more "boomers" retire, this could be a growing source of income flowing into the region.

Q. Are mines necessary to provide an increase in per capita income in the Western UP?

A. No. Per capita income is determined by a variety of factors other than what the pay level in a particular type of job happens to be. Income flows to residents of a county can come from a wide variety of different sources in addition to the payroll of a particular industry,

e.g. jobs from a diverse set of economic activities, investment and retirement income, income from commuting to jobs outside your community of residence, etc.

- Q. How many workers will be employed at the proposed Copperwood Mine, averaged over 13-year life of the mine? By what percentage is that likely to increase total employment in the Western UP?
- A. The Copperwood Mine projects that 273 workers will be directly employed each year over the life of the mine. That would represent less than one percent of the total jobs in the Western UP study area in 2010.
- Q. What is the total amount of income received by employees at the proposed Copperwood Mine likely to be over the expected 13-year life of the mine?
- A. The annual payroll for these workers would be about \$24 million. This would add about 2 percent to total labor earnings in the Western UP study area in 2010.
- Q. What percentage of the value of metals removed from the mine will **not** go toward employee income?
- A. Only about 14 percent or one-seventh of the value of the minerals produced would go to pay the workers at the proposed Copperwood Mine. The other 86 percent of the value of the metal ores will go to owners, investors, equipment and input supplying firms, and governments.
- Q. Will money generated by the mine flow to the local area in ways other than by employee spending?
- A. Mine employee spending is the most likely source of economic impacts of the proposed mine. To the extent that trade centers like Houghton and Ironwood can provide some of the equipment and supplies needed by the mine, that mine spending could also have an impact. This impact is likely to be limited because of the relatively small size of these trade centers.
- Q. Where will most of the money generated by the mine go?
- A. About half of the value of the minerals produced by the mine will go to mine and mineral owners in the form of royalties, rents, interest, profits, etc. About a quarter will go to those who sell equipment and supplies to the mine. About a seventh will go to workers at the mine. The remaining ten percent will go for taxes and payments to self-employed professionals.
- Q. A mine like the Copperwood Mine would provide economic benefit to the local area through employee spending and business taxes. Is there an economic *cost* to the local

area as well? What factors contribute to this cost? Can these costs be quantified, or at least estimated?

- A. All economic activities have costs associated with them. “There is no such thing as a free lunch.” Mining, because it is landscape intensive and involves industrializing rural landscapes, tends to displace other types of economic activities. In particular, it tends to displace economic activities that rely on high quality landscapes as well as natural and social environments. Holding and attracting new residents and businesses and the visitor economy are two sources of economic vitality most likely to be affected. Business taxes are payments for a share of the public services that need to be provided to the business and its employees and suppliers. They help cover the costs of maintaining roads, providing law enforcement, funding schools for workers’ children, etc. There also may be long-run cleanup and monitoring costs that the public may have to pay if the bonds required of the mining companies are not sufficient to cover those costs. A careful, detailed, and independent analysis of these costs can provide estimates of those costs.
- Q. How can it be beneficial to a community to work to create jobs within the existing community structure rather than hoping that some entity will come in and “give them jobs”? In other words, why is it good for a community to actively try to create jobs within that community rather than passively hoping for an “outside savior” to bring jobs to the community?
- A. Community economic development ultimately relies on the entrepreneurial energy of the residents who see opportunities, both commercial and public, to create new value in the community. “Entrepreneurial” is the opposite of passive or dependent. The latter leads to “company towns” in which there is little home-grown innovation and the quality of the community’s commercial and public infrastructure systematically deteriorates despite the payroll provided by the dominant outside firms.
- Q. Are entrepreneurial businesses more likely to move to communities with significant cultural, recreational, and educational amenities than to communities that are mining-dependent? Is there quantitative evidence for this? Why would such businesses shy away from mine and mill towns?
- A. Skilled and innovative entrepreneurs face a broad range of possible locations in which to locate and start businesses. They can afford to make choices based on both their personal preferences and the likelihood that a community will provide a supportive environment in which they can interact with other innovators. Empirical evidence clearly shows that they are drawn to communities with high quality natural environments and outdoor recreational opportunities. They are also drawn to communities with a critical mass of other entrepreneurs and other skilled knowledge workers. Mining, because of the damage it does to the environment, its tendency to industrialize rural areas, and its past pattern of encouraging a “company town” syndrome may well make a region unattractive to such entrepreneurial innovators.

- Q. Mining companies are often quick to tout their mines as "state-of-the-art," to claim that *new mining* does not come with the negative environmental impacts of *old mining*, and that existing regulations are adequate to prevent significant environmental damage. In general, are their claims justified?
- A. Mining companies have a direct financial interest in convincing residents and public officials that "this time will be different." If the past environmental and economic damage associated with mining can be ignored as irrelevant, mining companies can seek lower levels of regulation and higher levels of allowed emissions. That lowers their costs and boosts their profits. A systematic review of the environmental impact statements associated with new metal mines over the last several decades indicates that water pollution associated with those mines has been regularly underestimated because the effectiveness of the pollution controls was overestimated, the hydrology of the mines mischaracterized, and the chemistry of the metal ores was incorrectly described.

## Appendix B: Study Approach

### 1. Description of the Western Upper Peninsula Economy and Analysis of Trends

The U.S. Bureau of Economic Analysis within the U.S. Department of Commerce maintains the Regional Economic Information System that provides detailed economic information for every county in the United States. That data series begins in 1969 and, at the time this study was undertaken, the latest data was for 2010.

The economic information obtained for each county included:

- i. Components of personal income by county of residence including investment income (dividends, interest, and rent), transfer payments unrelated to current employment larger from government agencies, and income from out-commuting to another county to work.
- ii. Employment (jobs) by county of work and industry. Between 1969 and 2000 employment was reported for 14 different industrial categories. Between 2001 and 2010 employment data was available by 24 different industrial categories.
- iii. Labor earnings (wages and salaries and net income of the self-employed) by place of work were available for about 80 industrial categories between 1969 and 2000 and for about 90 industrial categories after 2001.
- iv. It is important to note that in rural counties such as in the Western UP, there are often so few businesses in these detailed industries that the economic information cannot be released because of privacy concerns for individual businesses. That means that the actual detail in the data available for rural counties is much less than the number of industrial categories mentioned above suggests.
- v. Transfer payments that are not related to current work are available broken into about 25 different categories including Social Security, Medicare, Medicaid, Unemployment Compensation, Family Assistance, Food Stamps, and Veterans Benefits.
- vi. All income data was converted to dollars of 2010 purchasing power (inflation removed) using the Consumer Price Index.
- vii. From U.S. Bureau of the Census we obtain data on the commuting to work patterns among the Western Upper Peninsula counties.

This set of economic data on employment and income over a forty year period was used to determine the sources of increases and decreases in employment and income, i.e. the sources of local economic vitality or decline. It also allowed us to study changes in the structure of the local economy over time.

## 2. Analysis of the Local Economic Impacts of Mining

In order to study the impact of mining on local economic vitality over a multi-decade period, we identified approximately 100 U.S. counties, including Marquette County in the Upper Peninsula, in which there was substantial mining activity in the 1980 to 1990 period and then studied different measures of local economic vitality in those counties between 1980-1990, 1990-2000, and 2000-2008. We used growth in employment, real income, population, and per capita income to measure local economic vitality. We also studied the *level* of per capita income in mining counties as opposed to non-mining counties. In addition we studied unemployment rates in over 100 counties that had significant coal mining employment and compared that unemployment to that of non-coal mining counties in the same state. We also drew on an established economics literature dealing with the relationship between reliance on natural resource industries and long term economic development.

We also looked closely at the Upper Peninsula's last experience with copper mining, the White Pine Mine in Ontonagon County and historical information from the U.S. Geological Survey on fluctuations in copper prices and copper production in U.S. mines. In addition, we drew on a Ph.D. dissertation from the University of Wisconsin-Madison that analyzed the local impacts of the White Pine Mine in Ontonagon County as a case study.

## Appendix C: Mine Dependent Counties: 1980-1990

Walker, AL	Muhlenberg, KY	Campbell, TN
Gila, AZ	Ohio, KY	Claiborne, TN
Greenlee, AZ	Perry, KY	Marion, TN
Pinal, AZ	Pike, KY	Scott, TN
Gunnison, CO	Union, KY	Carbon, UT
Lake, CO	Webster, KY	Emery, UT
Las Animas, CO	Garrett, MD	Grand, UT
Moffat, CO	Marquette, MI	San Juan, UT
Ouray, CO	Presque Isle, MI	Buchanan, VA
Routt, CO	Itasca, MN	Dickenson, VA
San Juan, CO	St. Louis, MN	Russell, VA
Washington, GA	Iron, MO	Tazewell, VA
Caribou, ID	Washington, MO	Wise -Norton, VA
Owyhee, ID	Phillips, MT	Barbour, WV
Shoshone, ID	Cibola, NM	Boone, WV
Franklin, IL	Eddy, NM	Fayette, WV
Gallatin, IL	Grant, NM	Grant, WV
Macoupin, IL	McKinley, NM	Logan, WV
Perry, IL	Esmeralda, NV	Marion, WV
Saline, IL	Eureka, NV	McDowell, WV
Sullivan, IN	Lincoln, NV	Mingo, WV
Wabash, IL	Pershing, NV	Monongalia, WV
Bell, KY	Storey, NV	Nicholas, WV
Clay, KY	White Pine, NV	Preston, WV
Elliott, KY	Belmont, OH	Raleigh, WV
Harlan, KY	Harrison, OH	Upshur, WV
Hopkins, KY	Meigs, OH	Webster, WV
Johnson, KY	Monroe, OH	Big Horn, WY
Knott, KY	Vinton, OH	Campbell, WY
Leslie, KY	Craig, OK	Carbon, WY
Letcher, KY	Clarion, PA	Converse, WY
Magoffin, KY	Greene, PA	Fremont, WY
Martin, KY	Indiana, PA	Lincoln, WY
McCreary, KY	Lawrence, SD	Sheridan, WY
		Sweetwater, WY

## Appendix D: Coal Mining Dependent Counties: 1998

<b>ALABAMA</b>		KNOTT COUNTY	KY	<b>TEXAS</b>	
FAYETTE COUNTY	AL	LESLIE COUNTY	KY	FREESTONE COUNTY	TX
JEFFERSON COUNTY	AL	LETCHER COUNTY	KY	HARRISON COUNTY	TX
TUSCALOOSA COUNTY	AL	MARTIN COUNTY	KY	LEON COUNTY	TX
WALKER COUNTY	AL	MC LEAN COUNTY	KY	MILAM COUNTY	TX
<b>ARIZONA</b>		MUHLENBERG COUNTY	KY	PANOLA COUNTY	TX
NAVAJO COUNTY	AZ	PERRY COUNTY	KY	RUSK COUNTY	TX
<b>COLORADO</b>		PIKE COUNTY	KY	TITUS COUNTY	TX
GUNNISON COUNTY	CO	UNION COUNTY	KY	<b>UTAH</b>	
MOFFAT COUNTY	CO	WEBSTER COUNTY	KY	CARBON COUNTY	UT
ROUTT COUNTY	CO	<b>MONTANA</b>		EMERY COUNTY	UT
<b>ILLINOIS</b>		BIG HORN COUNTY	MT	SEVIER COUNTY	UT
GALLATIN COUNTY	IL	ROSEBUD COUNTY	MT	<b>VIRGINIA</b>	
JEFFERSON COUNTY	IL	<b>NEW MEXICO</b>		BUCHANAN COUNTY	VA
LOGAN COUNTY	IL	MCKINLEY COUNTY	NM	DICKENSON COUNTY	VA
MACOUPIN COUNTY	IL	SAN JUAN COUNTY	NM	LEE COUNTY	VA
PERRY COUNTY	IL	<b>NORTH DAKOTA</b>		RUSSELL COUNTY	VA
RANDOLPH COUNTY	IL	MCCLEAN COUNTY	ND	TAZEWELL COUNTY	VA
SALINE COUNTY	IL	MERCER COUNTY	ND	WISE COUNTY	VA
WASHINGTON COUNTY	IL	<b>OHIO</b>		<b>WEST VIRGINIA</b>	
WHITE COUNTY	IL	BELMONT COUNTY	OH	BOONE COUNTY	WV
<b>INDIANA</b>		HARRISON COUNTY	OH	BROOKE COUNTY	WV
CLAY COUNTY	IN	JACKSON COUNTY	OH	CLAY COUNTY	WV
DELAWARE COUNTY	IN	JEFFERSON COUNTY	OH	FAYETTE COUNTY	WV
GIBSON COUNTY	IN	MEIGS COUNTY	OH	HARRISON COUNTY	WV
GREENE COUNTY	IN	MONROE COUNTY	OH	KANAWHA COUNTY	WV
KNOX COUNTY	IN	MORGAN COUNTY	OH	LOGAN COUNTY	WV
PIKE COUNTY	IN	<b>PENNSYLVANIA</b>		MARION COUNTY	WV
SULLIVAN COUNTY	IN	ARMSTRONG COUNTY	PA	MARSHALL COUNTY	WV
VIGO COUNTY	IN	CAMBRIA COUNTY	PA	MCDOWELL COUNTY	WV
WARRICK COUNTY	IN	CLEARFIELD COUNTY	PA	MINGO COUNTY	WV
<b>KENTUCKY</b>		GREENE COUNTY	PA	MONONGALIA COUNTY	WV
BELL COUNTY	KY	INDIANA COUNTY	PA	NICHOLAS COUNTY	WV
BREATHITT COUNTY	KY	JEFFERSON COUNTY	PA	UPSHUR COUNTY	WV
FLOYD COUNTY	KY	SCHUYLKILL COUNTY	PA	WAYNE COUNTY	WV
HARLAN COUNTY	KY	SOMERSET COUNTY	PA	WEBSTER COUNTY	WV
HENDERSON COUNTY	KY	WASHINGTON COUNTY	PA	WYOMING COUNTY	WV
HOPKINS COUNTY	KY			<b>WYOMING</b>	
				CAMPBELL COUNTY	WY
				CONVERSE COUNTY	WY