



The Economic Assessment of the White River (Michigan)

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CONTRIBUTING AUTHORS

Christian Glupker, MBA, Primary Researcher

Paul Isely, Ph.D., Primary Researcher

RESEARCH ASSISTANTS

Jonelle Shannon

Ashley Bush

Brady Woodruff

Kevin Prabhakar

Matthew Streeter

Myles Kerner

Robert Johnson

Ramatu Kanneh

Jacob Welch

Jacob Vandenberg

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L. William Seidman Center
50 Front Avenue SW
Grand Rapids, MI 49504
gvsu.edu/seidman

SUMMARY OF ECONOMIC IMPACT

- There were 69,543 visitors to the White River in the past year, with 35,329 visitors coming from outside the local region.
- The local primary river users visited the river 49.3 times per year and nonlocal primary river users visited the river 14.7 times per year.
- The nonlocal primary river users averaged \$15.84 in spending per person, per day, resulting in \$9.0 million in total direct spending.
- The nonlocal primary river users generated \$8.3 million in economic output, adding \$4.2 million to the local GDP, and support for 80 jobs.
- There was \$75,539 in additional tax revenue generated by the nonlocal primary river users.
- Local businesses added \$538,000 in economic output, with support for 34 jobs.
- The total economic impact, including local users and businesses, is valued at \$20 million in economic output and support for 223 jobs.
- The hedonic valuation is estimated at \$25.0 million



ABOUT THE WHITE RIVER

The White River spans Newaygo County, Oceana County, and Muskegon County. The source of the river is the Oxford Swamp, located in Newaygo County. The river flows Southwesternly through the southern end of the Manistee National Forest. The river discharges into White Lake, which discharges into Lake Michigan near Whitehall and Montague.

The White River covers a diverse range of landscapes, including forests, wetlands, farmlands, and urban areas. One of the notable features of the river is its relatively cold waters, which are conducive to supporting a variety of aquatic life. The White River is designated as a State of Michigan Natural River, which includes zoning laws that prevent land development within 400 feet of the riverbank.¹ The river offers opportunities for fishing (Trout, Steelhead, and Salmon), kayaking, and tubing.

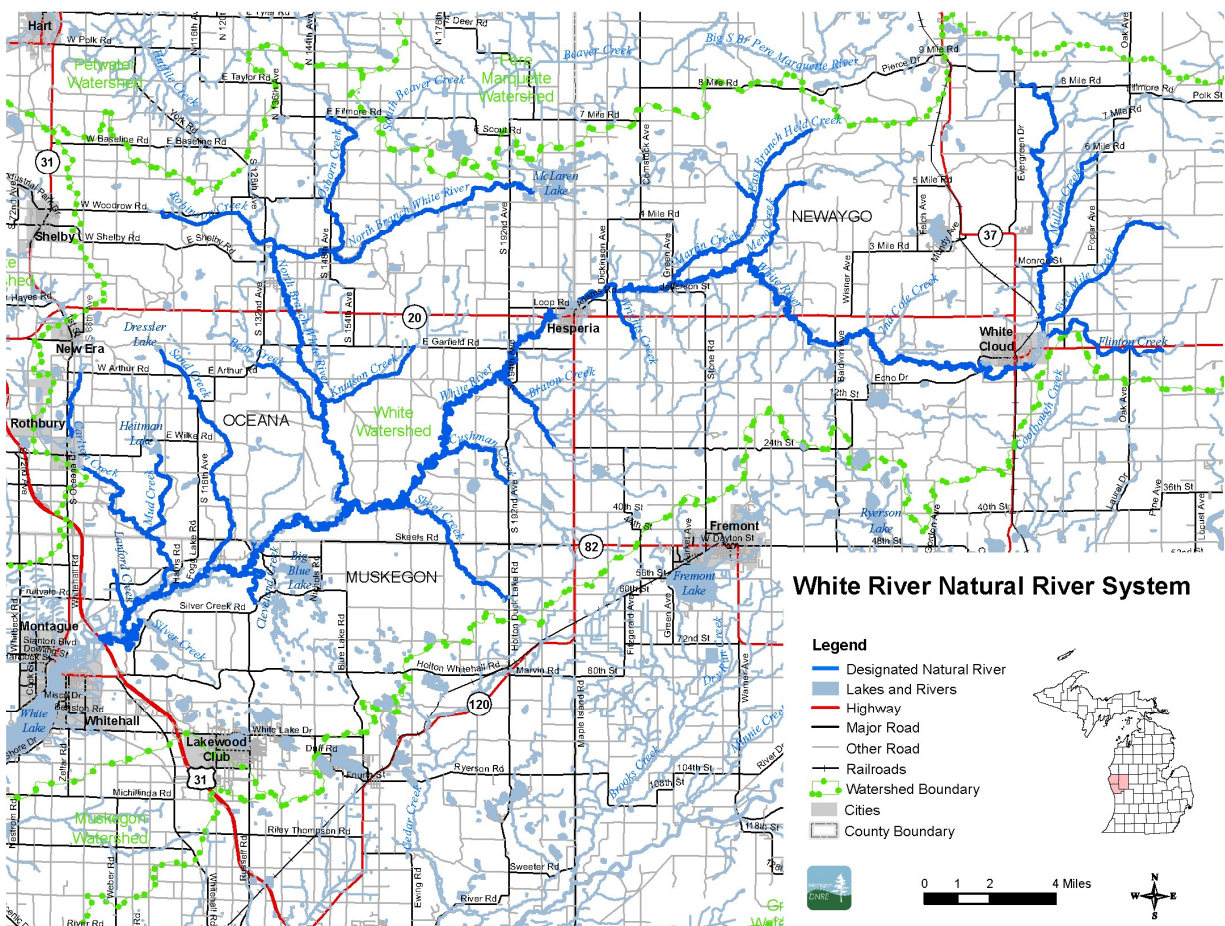


Image source: https://swmtu.org/wp-content/uploads/2021/06/White_River_MI_map.png

¹ <https://www.nearnorthnow.com/news/the-white-river-newaygo-countys-forgotten-river-part-ii>

SCOPE OF WORK

This study assesses the economic impact the White River recreation has on local communities and property values in Muskegon, Newaygo, and Oceana counties. This study will quantify the number of river users, spending patterns by those users, and the indirect/induced values as a result of that spending. Every effort is made to exclude substitute spending. This substitute spending may come in the form of local residents along with visitors who were in the local region for other reasons. For the purpose of this report, the local region is defined as zip codes within Muskegon County, Newaygo County, and Oceana County (more on this later).

METHODOLOGY



There were three surveys conducted during the research period (July 2022 through July 2023). The first survey focused on the river users and their spending patterns, the second survey focused on local residents, and the third survey focused on local businesses along the river.²

The first survey, known as a visitor survey, was an intercept survey administered weekly from July 2022 through July 2023. The surveying was conducted at various river access points.³ We relied on the Grand Valley State University student research team to administer the survey. Data gathered includes zip code, length of visits, party size, spending patterns, and general demographics.

The second survey, known as an orthogonal survey, was an intercept survey that occurred at random community events within the local region⁴. Data gathered included zip code and if they visited the White River in the past year. This survey was used to calculate the total number of river users.

The third survey was a business survey administered in July 2023. The survey was conducted via a Qualtrics email survey.

In calculating the economic impact of river users, we only count spending that is associated with nonlocal river users (outside the defined local region). This nonlocal spending is considered ‘new’ money to the local economy. We will also note the spending associated with the local river users.

² More information available in Appendix A2: Survey Details

³ A list of survey locations is available in Appendix A2: Survey Details

⁴ A list of events is available in Appendix A2: Survey Details

The economic impact is estimated using the IMPLAN model. IMPLAN is a regional economic analysis software application that is designed to estimate the impact or ripple effect (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model.⁵ This modeling system uses multipliers that provide a way to measure the complete economic impact that the initial change in demand has on the local economy. The results of an input-output model are broken down into three effects.⁶



Direct Effects A set of expenditures applied to the input-output multipliers. The direct effect is often referred to as direct spending or initial change in demand. This direct spending, or initial change in demand, is determined by the researcher or analyst. Applying these initial changes to the multipliers in IMPLAN will then display how a region will respond economically to them

Indirect Effects Indirect effects are the business-to-business purchases in the supply chain taking place in the economic region that stem from the initial change in demand or direct spending (direct effects). In other words, this is the increase in sales by businesses that are suppliers to restaurants, hotels, retail stores, etc.

Induced Effects: Increased economic activity from household spending of labor income, after the removal of taxes and savings. The induced effects are generated by the spending of employees within the business' supply chain.

The IMPLAN model will report economic impact in four ways:⁷

Output **Gross output** is the total economic activity, including the sum of intermediate inputs and the value they add to the final good or service. The intermediate inputs are the resources used in the production of final goods and services. It should be noted that gross output can be overstated if the intermediate inputs are used multiple times in the production of other goods and services.

⁵ Full IMPLAN disclaimer can be found in Appendix A1: IMPLAN Disclaimer

⁶ <https://blog.implan.com/understanding-implan-effects>

⁷ Expanded definitions can be found in Appendix A1: IMPLAN Disclaimer

Labor Income	The increase in wages, salaries, and proprietors' income as a result of the initial change in demand (direct effects).
Employment	The total number of jobs supported by direct spending or initial change in demand. This measurement does not distinguish between a full-time or part-time employee. It also does not account for employees who moved from one job to another within the defined economic region. Thus it does tend to overstate the number of jobs created.
Value Added	The contribution to the economic region's gross domestic product (GDP).

In many cases, the findings of the economic impact analysis are rounded to the nearest million to avoid giving the reader a false sense of precision about the results. Readers should keep in mind the figures presented are estimates generated by economic models and not the result of an audit. The intent is not to obscure, but to provide reliable results without misleading the readers as to the overall level of precision.

Due to data limitations, the hedonic model will rely on the benefit transfer model. This model involves the transfer of economic values from existing studies conducted in similar settings to the one of interest. Instead of conducting new, site-specific valuation studies, the model uses existing data to provide estimates of the value of a resource or



environmental attribute. This approach can be useful when time, budget, or data limitations prevent direct valuation studies from being conducted for a particular area or resource. For this study, we will use the 2002 paper “The Value of Suburban Forest Preserve: Estimates from Sales of Vacant Residential Building Lots” by Paul Thorsnes.⁸ We will also use parcel data provided by Newaygo County GIS.⁹

⁸ <https://le.uwpress.org/content/78/3/426>

⁹ <https://www.newaygocountymi.gov/gis/gis/>

RIVER USER SURVEYING AND DEMOGRAPHICS



To assess the economic impact of river users, we collected survey data to determine user count, user days visited, and user spending. To collect this data, we used two different surveys: the visitor survey and the orthogonal survey.¹⁰

VISITOR SURVEY

The visitor survey collected the primary economic impact data. The survey was administered on random days from July 2022 through July 2023. We relied on the Grand Valley State University student research team to administer the survey. Data gathered includes zip code, length of visits, party size, spending patterns, river activities, and general demographics. Data from this survey was used to determine visitor origins (local vs. nonlocal), visitor days, and visitor spending.



Respondents had to be 18 years old or older to be included in the survey. During the surveying period, there were 335 interview requests with 280 surveys completed. This equates to a total response rate of 83.6%. The sample size is smaller than our target (383), however it still provides a 90% confidence level, and a 5% margin of error.¹¹

The results show visitors from over seven states. Figures 1 and 2 show the geographic distribution of the survey respondents within the United States and Michigan area.

¹⁰ Additional details can be found in Appendix A2: Survey Details.

¹¹ Although our overall survey count does meet our sample size requirement, after data cleaning and removing outliers, there was 270 usable surveys for the spending estimates.

Figure 1: Zip code distribution for the United States

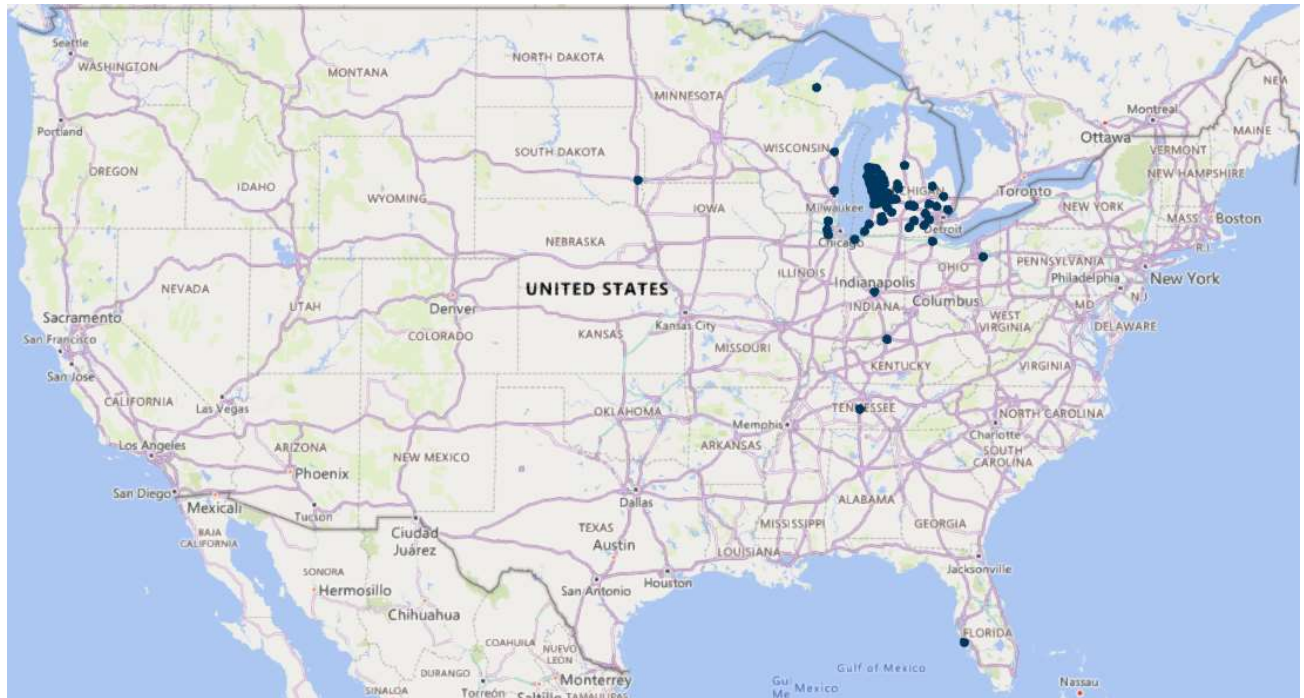
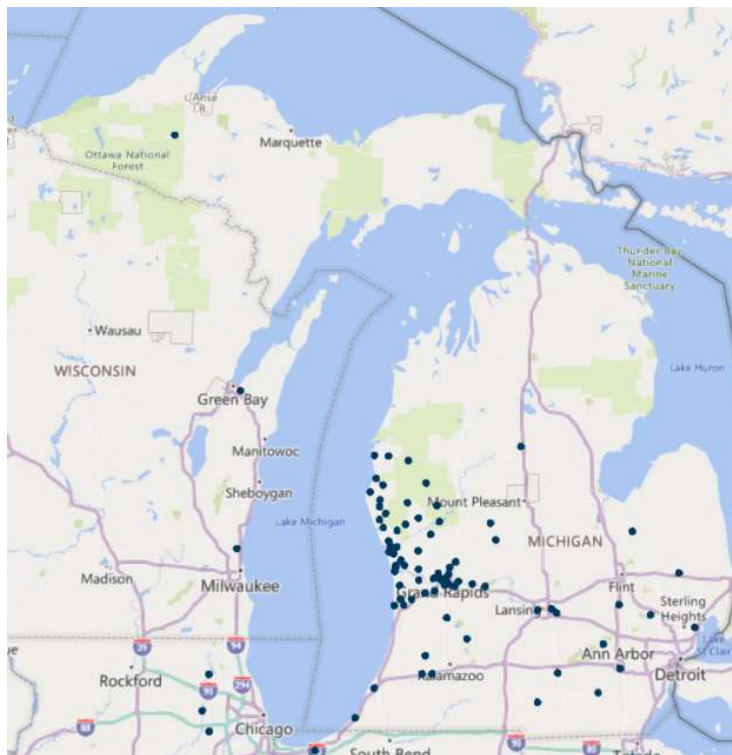


Figure 2: Zip code distribution for the Michigan area



VISITOR ACTIVITIES AND DEMOGRAPHICS

The visitor survey asked users about their primary river activity, preferred river access points, and general demographic questions. These demographic questions included age, gender, income, and education. The figures below present this data.¹²

Figure 3: Average number of visits per year to the White River for recreational purposes

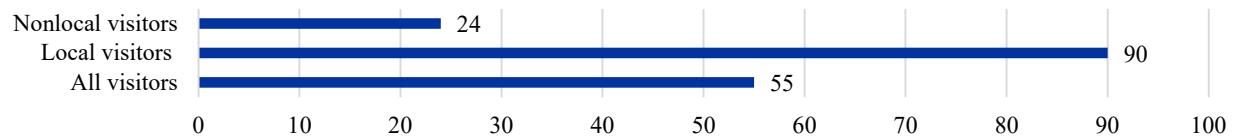
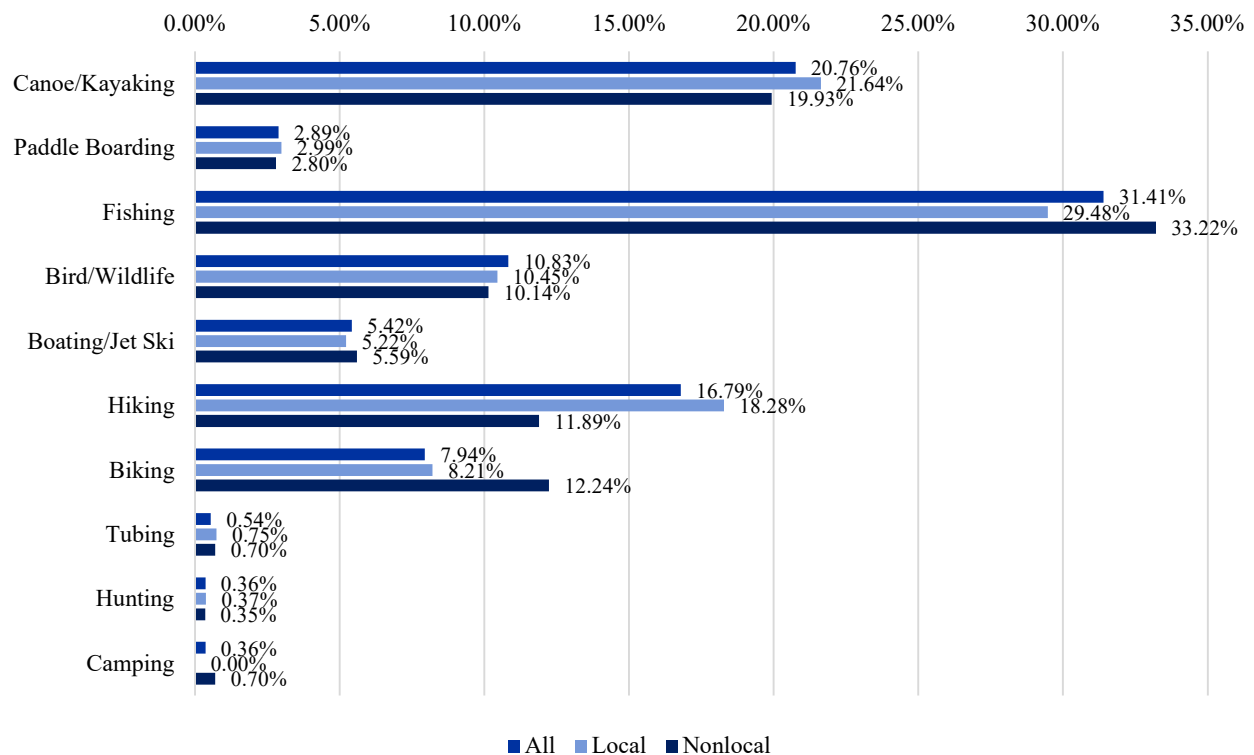


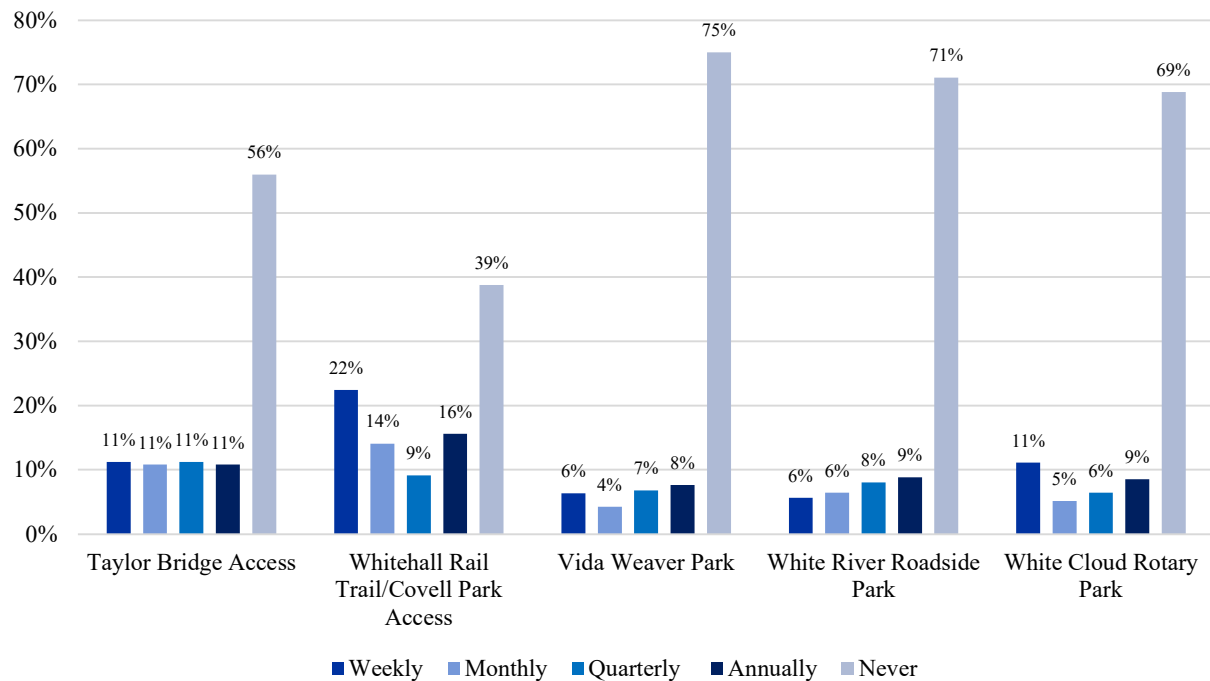
Figure 4: Primary river activity for all users¹³



¹² The figures include the orthogonal survey responses where they indicated they have visited the White River in the past 12-months.

¹³ The primary river activity distribution was consistent among local and nonlocal river users

Figure 5: Frequency of river use by the access point



Other popular access points include Goodrich Park (n=29), Pines Point Campground (n=20), and River Rock Campground (n=18).

Figure 6: Satisfaction with White River recreational experience (1 = lowest 7 = highest)

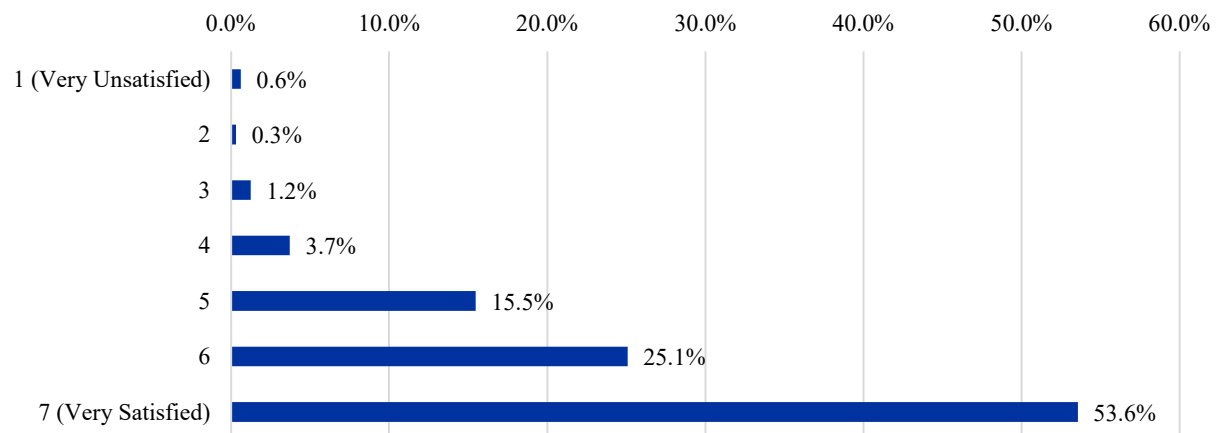


Figure 7: Percentage of household budget spent on recreation each year

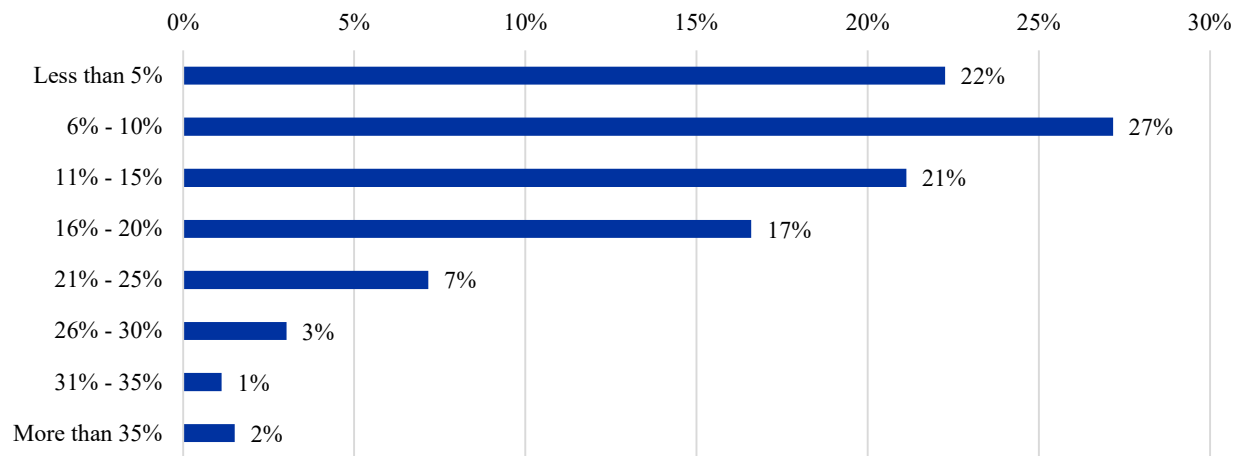


Figure 8: Age distribution

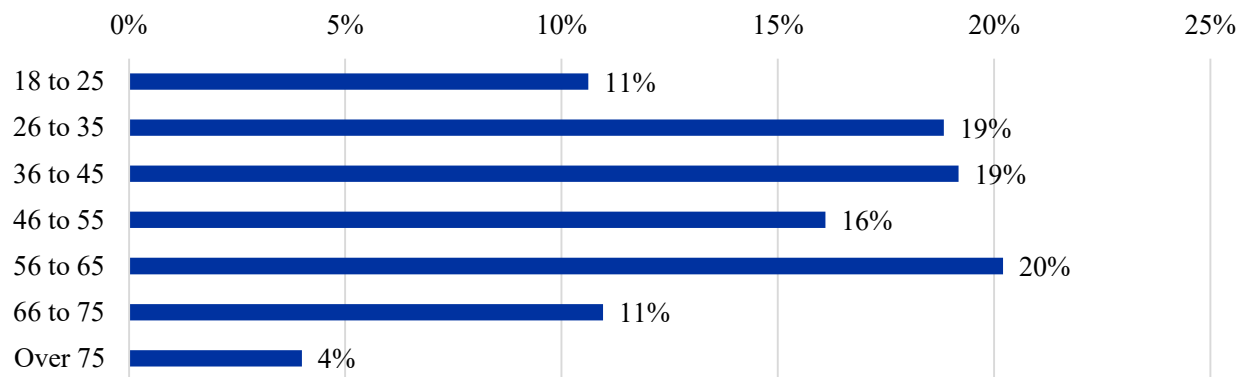


Figure 9: Income distribution

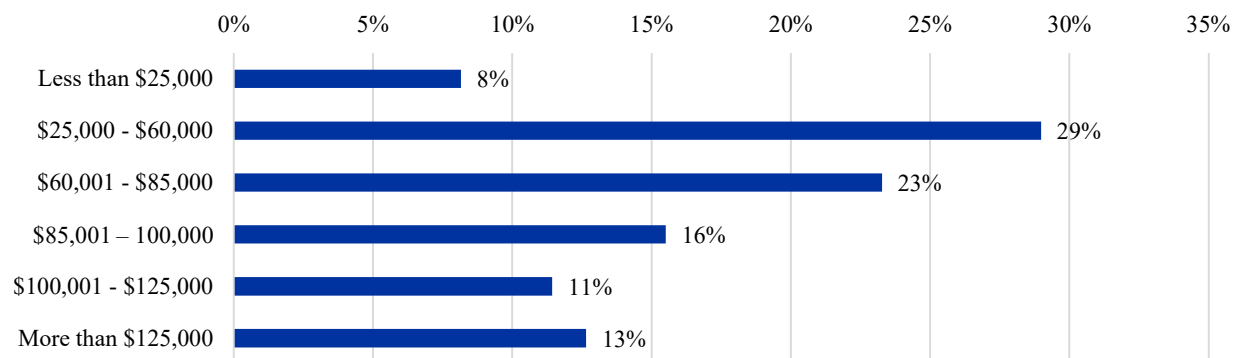


Figure 10: Education distribution

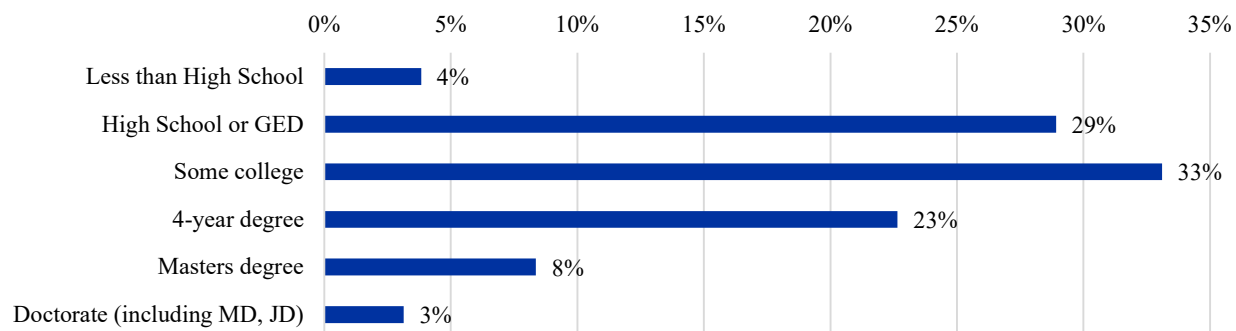
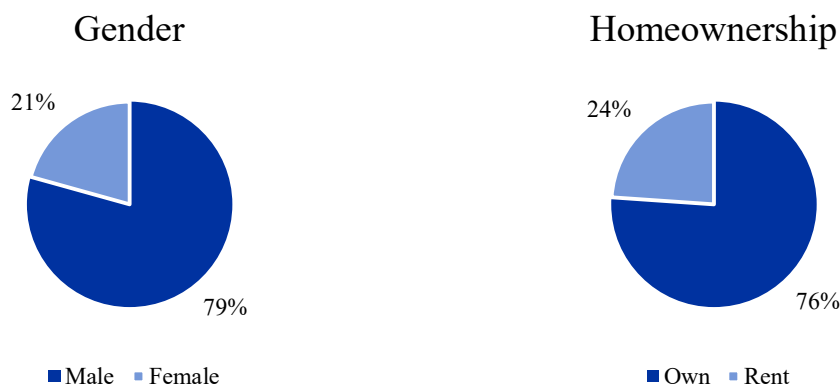


Figure 11: Other distributions¹⁴



ORTHOGONAL SURVEY

The White River passes through three counties. This openness makes it difficult to accurately count river users. We used data from an orthogonal survey to estimate attendance. The orthogonal survey occurred during four different community events.¹⁵ The result was 185 survey requests with 99 usable surveys. Approximately 60 local residents completed the survey.

¹⁴ It should be noted .35% reported as transgender, however due to rounding the data does not show in the figure.

¹⁵ A list of community events is available in Appendix A2: Survey Details

DEFINING THE ECONOMIC REGION

To properly determine who is a visitor to the river, we must first define the local region. For the purpose of this report, we define the local region by zip codes (see Table 1).¹⁶ We believe this defined region represents a conservative approach to determining the economic impact of the river users. Figure 12 displays the map of the defined economic region.¹⁷



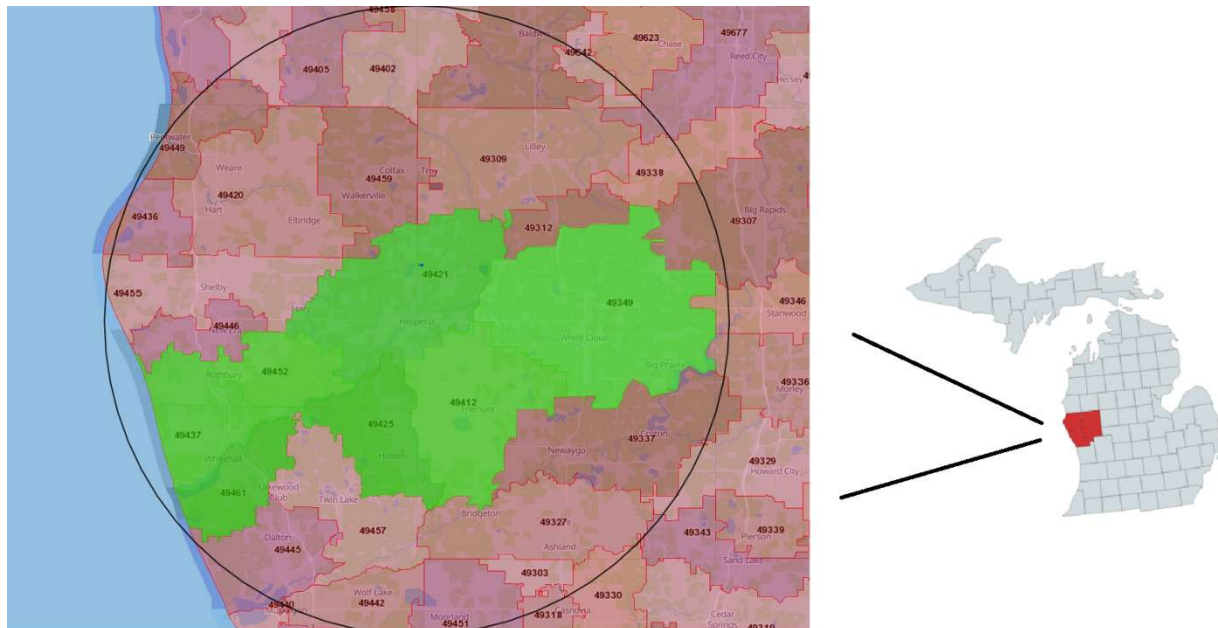
Table 1: Defined local region

Zip code	Land Area (sq miles)	County	Post Office	Population
49349	186.45	Newaygo County	White Cloud, MI	8,087
49412	106.18	Newaygo County	Fremont, MI	11,065
49421	123.92	Oceana County	Hesperia, MI	5,991
49452	43.28	Oceana County	Rothbury, MI	1,952
49425	62.11	Muskegon County	Holton, MI	3,660
49437	64.51	Muskegon County	Montague, MI	6,902
49461	42.69	Muskegon County	Whitehall, MI	8,929

¹⁶ <https://www.unitedstateszipcodes.org>

¹⁷ <https://www.mapchart.net/usa-counties.html>

Figure 12: The defined economic region



VISITOR TYPES

To calculate the economic impact of the river users we should consider only new spending that occurred specifically because of the river. To accomplish this, survey respondents are categorized into three groups:¹⁸

Local Visitors: Spending by residents is not generally counted in the economic impact because the spending would have happened regardless of river usage. All survey forms ask for zip codes, which identify the local residents.

Non-Local Visitors: Spending by non-local visitors is the key driver in economic impact studies. These visitors' primary residence must be outside the defined economic region and the primary reason for their visit must be river usage.

¹⁸ Crompton, J. L., Lee, S., & Shuster, T. J. (2001). A Guide for Undertaking Economic Impact Studies: The Springfest Example. *Journal of Travel Research*, 40(1), 79-87. doi:10.1177/004728750104000110

Casual Visitors: These visitors were already in the region for other reasons (camping, hiking, biking, family outings, relatives, etc.). Generally, the spending of these visitors cannot be included in the economic impact because they were already in town, and they would likely have spent the money regardless of the river usage. This method does have a drawback, as it will cause us to miss some spending by individuals who, while not visiting specifically for the river, ended up spending more than they would have because of the river.

To determine the reason the visitor was in the region, we asked the survey respondents if the river was their primary reason for visiting. The results from this question are found in Figures 13 and 14.

Figure 13: Local versus nonlocal visitors

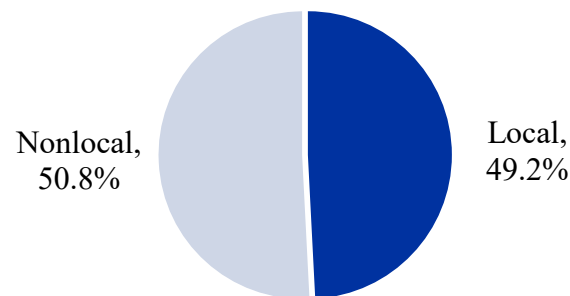
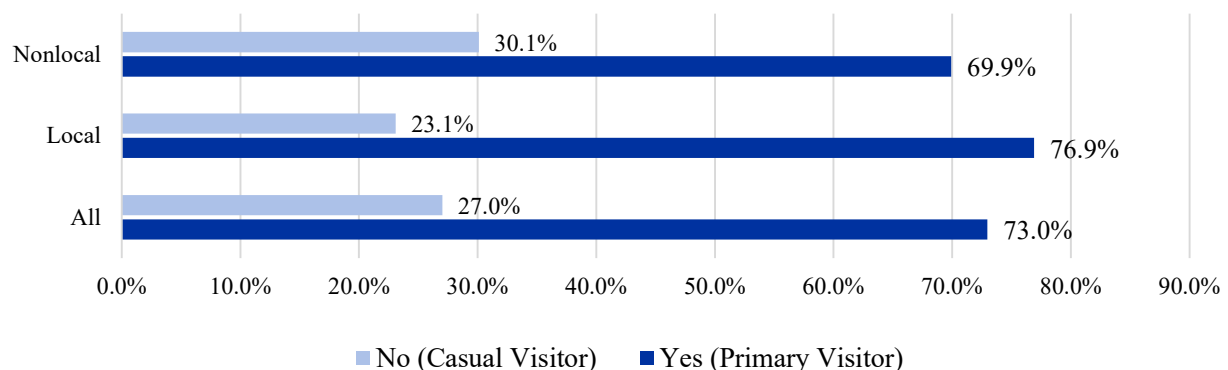


Figure 14: Was the White River your primary reason for visiting the region?



ESTIMATING THE NUMBER OF VISITORS AND VISITOR DAYS

To measure the economic impact of river users it is necessary to have an accurate count of visitors to the river. The open and geographically spread-out nature of the river creates challenges for the estimation of attendance. We used an orthogonal survey to estimate local and nonlocal visitors.¹⁹ Based on this data, we estimate 69,543 total visitors with 51% of the visitors originating outside the local region. Approximately 77% of all the local visitors and 70% of all the nonlocal visitors stated the White River was their primary reason for visiting. Table 2 presents this information.

Table 2: Total visitors based on visitor type

	All visitors	Primary visitors	Casual visitors
Local visitors	34,214	27,182	7,048
Nonlocal visitors	35,329	24,903	10,479
Total visitors	69,543	52,085	17,527

The local primary river user visited the river 49.3 times a year, proving the high value locals place on river recreation. The nonlocal primary river user visited the river 14.66 times a year. It is assumed the local primary river user visited one day during each visit, however, the nonlocal primary river user visited on average 1.55 days per visit.²⁰ Table 3 below presents this data along with resulting visitor days.

Table 3: Local and nonlocal primary visitor days

	The average number of visits per year	The average number of days per visit	Visitor days
Local primary visitors	49.3	1	1,341,151
Nonlocal primary visitors	14.66	1.55	565,873
Total visitor days			1,907,024

¹⁹ Detailed methodology can be found in Appendix A3: Estimating the Number of Visitors and Visitor Days

²⁰ It is assumed one day per visit because the survey data showed \$0 spent on accommodations.

ECONOMIC EFFECTS



This section will estimate the economic impact of the river users. The economic impact will be broken into four components: Primary visitors and casual visitors, local business impact, and hedonic impact (property values). This section will also include the fiscal (tax revenue) impact.

ESTIMATING VISITOR SPENDING

Survey respondents were asked how much their party expected to spend on Meals, Retail Shopping/Other Shopping, Lodging (including camping and Airbnb), Transportation, and Gear Rental.²¹ The initial spending by visitors is referred to as ‘direct effect’ or ‘direct spending’. The direct spending is calculated as the product of the visitor per-person/per-day spending and total visitor days. It should be noted that categories that include retail pricing must be adjusted for retail margins. That



is, retail prices will include the cost of manufacturing, the majority of which occurs outside the defined economic region. The estimated economic impact of visitor spending should not include these manufacturing costs. The IMPLAN economic modeling will adjust for retail margins, which in defined economic regions are estimated at 38.25% for retail spending and 10.58% for transportation spending.

ECONOMIC IMPACT OF PRIMARY VISITORS

To determine the economic impact of the river users we should only consider nonlocal spending that occurred specifically because of the river. This will not include local visitor or casual visitor spending because it is assumed that spending would have happened during this period in the absence of their river usage. This method is the most conservative estimate of new spending in the economy.

²¹ Detailed methodology can be found in Appendix A5: Estimating Visitor Spending



This method does have a drawback, as it will cause us to miss some spending by individuals who, while not visiting the region primarily for river recreation, ended up spending more than they would have because of their river usage. This includes local residents who would have spent money in the absence of their river usage but ended up spending more as a result of using the river.

Our preferred method in calculating economic impact is to focus solely on those who claimed the river was their primary reason for visiting the region. These visitors will include locals and nonlocals. With local spending included, there is concern this impact figure will be inflated due to substitute spending. Therefore we will also break out local and nonlocal data to provide some context to the overall economic impact.

Unfortunately, the sample size was not large enough to break out spending between day trippers and overnight trippers.

Based on the survey data, all primary visitors spent on average \$12.86 per person, per day, with nonlocal primary visitors spending \$15.84 per person, per day (see Figure 15 below). These spending figures result in \$21.9 million in direct spending by all primary visitors, with approximately 41% coming from nonlocal visitors (see Table 4 below).

Figure 15: Average per person, per day spending for primary visitors

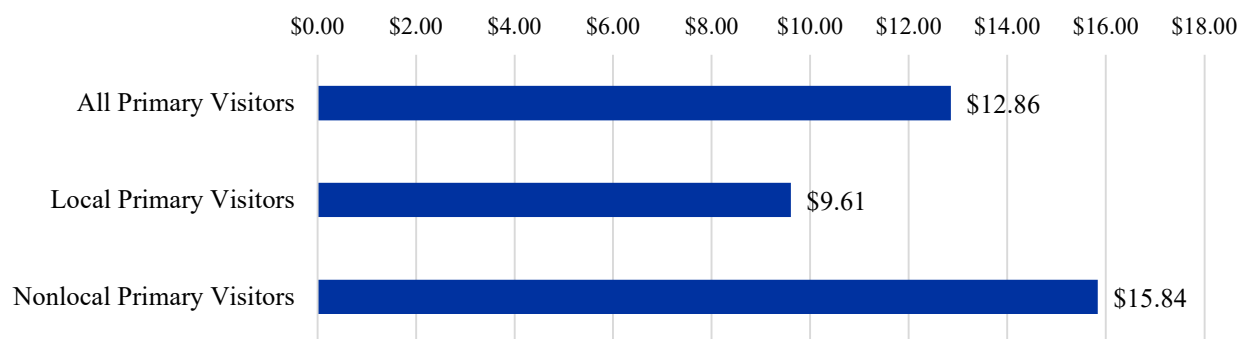


Table 4: Total direct spending by primary visitors

	Primary visitors
Local visitor	\$12.9M
Nonlocal visitor	\$9.0M
All visitors	\$21.9M

This direct spending by visitors leads to indirect and induced spending. For example, a visitor to the area purchases from local retail stores (direct spending). These retail stores must then purchase more supplies from local distributors (indirect spending). Retail store owners and employees receive more income from the spending of visitors, and they spend some of that greater income in the local area (induced spending). The dollar amount and effect on employment of indirect and induced spending can be estimated using the IMPLAN economic modeling software.

A true measure of new spending focuses on primary nonlocal visitors. Using the IMPLAN model, we estimate their economic impact at \$8.3 million in output, \$2.3 million in earnings, \$4.2 million in value-added (GDP), and support for 80 jobs (see Table 5).



Table 5: Total economic impact of nonlocal primary visitors

Nonlocal Primary Visitors	Output	Value-Added (GDP)	Earnings	Jobs
Direct Impact (Spending)	\$7.7M ²²	\$3.9M	\$2.2M	76
Indirect Impact	\$489,900	\$215,100	\$149,500	3
Induced Impact	\$91,100	\$47,000	\$22,100	1
Total Impact	\$8.3M	\$4.2M	\$2.3M	80

²² This is the \$9.0M from Table 4 with retail margins applied.

Using the IMPLAN model, we estimate the total economic impact of **ALL** (local and nonlocal) primary visitors at \$19.5 million in output, \$5.5 million in earnings, \$9.8 million in value-added (GDP), and support for 189 jobs (See Table 6).

Table 6: Total economic impact of all (local and nonlocal) primary visitors

All Primary Visitors	Output	Value-Added (GDP)	Earnings	Jobs
Direct Impact (Spending)	\$18.2M ²³	\$9.2M	\$5.1M	180
Indirect Impact	\$1.2M	\$503,900	\$350,500	7
Induced Impact	\$215,200	\$111,000	\$52,200	1
Total Impact	\$19.5M	\$9.8M	\$5.5M	189

As noted, the impact figures in Table 6 include substitute spending from local visitors because it is assumed their spending would have occurred during this period in the absence of river use. As mentioned earlier, this assumption does have a drawback, as some locals may have ended up spending more than they would have because of their river usage.

The local primary visitors contributed \$11.2 million in economic output, \$3.2 million in earnings, \$5.7 million in value-added, and support for 109 jobs. These figures are included in Table 6 above, however, it is unknown how much of this spending would have occurred regardless of the river, therefore these figures should be used with caution.

ECONOMIC IMPACT OF CASUAL VISITORS

The economic impact supported by the river focuses on spending by those who stated the White River was *not* their primary reason for visiting the area. These are referred to as casual visitors. Per Table 2, there were 17,512 casual visitors to the river, with 60% of those visitors coming from outside the economic region.

²³ This is the \$21.9M from Table 4 with retail margins applied.

The impact of casual visitors is not included in the overall economic impact because they were in the area for reasons other than river recreation (camping, hiking, visiting family, etc.). Thus, their spending would have occurred in the absence of their river usage. What is unknown is if these visitors stayed more days or spent more than they normally would because of the river. The data for casual visitors are presented here for informational purposes only.

Based on the survey data, all casual visitors spent on average \$17.05 per person, per day, with nonlocal casual visitors spending \$16.48 per person, per day (see Figure 16 below). These spending figures result in \$12.2 million in direct spending by all casual visitors, with approximately 31% coming from nonlocal visitors (see Table 7 below).

Figure 16: Average per person, per day spending for casual visitors

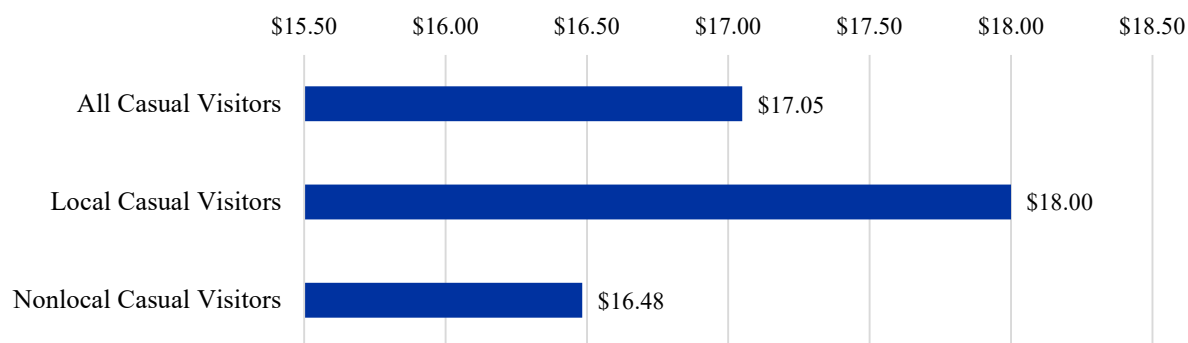


Table 7: Total direct spending by casual visitors

	Casual visitor
Local visitor	\$8.4M
Nonlocal visitor	\$3.8M
All visitors	\$12.2M

To consider only new spending, we should focus on casual nonlocal visitor spending. Using the IMPLAN model, we estimate their economic impact at \$3.9 million in output, \$1.1 million in earnings, \$1.9 million in value-added (GDP), and support for 41 jobs (see Table 8).

Table 8: Total economic impact of nonlocal casual visitors

Nonlocal Casual Visitors	Output	Value-Added (GDP)	Earnings	Jobs
Direct Impact (Spending)	\$3.7M ²⁴	\$1.8M	\$1.0M	39
Indirect Impact	\$238,500	\$105,800	\$74,800	2
Induced Impact	\$42,500	\$21,900	\$10,321	0
Total Impact	\$3.9M	\$1.9M	\$1.1M	41

The estimated total economic impact of **ALL** (local and nonlocal) casual visitors at \$12.2 million in output, \$3.4 million in earnings, \$6.0 million in value-added (GDP), and support for 122 jobs (See Table 9).

Table 9: Total economic impact of all casual visitors

All Casual Visitors	Output	Value-Added (GDP)	Earnings	Jobs
Direct Impact (Spending)	\$11.3M ²⁵	\$5.6M	\$3.1M	116
Indirect Impact	\$733,200	\$322,700	\$225,800	5
Induced Impact	\$131,400	\$67,800	\$31,900	1
Total Impact	\$12.2M	\$6.0M	\$3.4M	122

As mentioned previously, these impact figures include substitute spending from local visitors therefore these figures should be used with caution. The local casual visitors contributed \$8.2 million in economic output, \$2.3 million in earnings, \$4.1 million in value-added, and support for 81 jobs.

²⁴ This is the \$3.8M from Table 7 with retail margins applied.

²⁵ This is the \$12.2M from Table 7 with retail margins applied.

FISCAL IMPACT OF RIVER USERS

The increase in economic activity also produces additional tax revenue at the local, state, and federal levels. The IMPLAN economic model estimates these fiscal impacts. The tax at the county and sub-county levels consists of property taxes. At the state level, the majority of the tax is sales tax. As shown in Table 10 below, direct spending from primary nonlocal visitors generated \$75,539 for the economic region (Muskegon, Oceana, and Newaygo counties). This table is the best representation of “new” tax revenue caused by recreation on the White River.



Table 10: Fiscal impact of nonlocal primary visitors

	Counties	Sub-County: Municipalities	Sub-County: Special Districts	Michigan
Direct Impact	\$73,249	\$70,656	\$179,778	\$576,816
Indirect Impact	\$1,731	\$1,720	\$4,250	\$14,840
Induced Impact	\$559	\$542	\$1,373	\$4,545
Total Impact	\$75,539	\$72,918	\$185,401	\$596,200

The casual nonlocal visitor spending added \$27,202 in tax revenue for the counties, \$26,332 for local municipalities, and \$66,766 for special districts. As mentioned earlier, the impact of casual visitors is not included in the overall economic impact because they were in the area for reasons other than recreation on the river. The data for casual visitors are presented here for informational purposes only.

LOCAL BUSINESS ECONOMIC IMPACT



Three businesses operate directly on the White River: Happy Mohawk Canoe Livery, White River RV Park & Campground, and River Rock Campground. All three businesses completed a survey in July 2023. Based on these survey results, the three businesses add \$538,000 in annual economic output, \$247,000 in earnings, \$321,000 to GDP, and support for 34 jobs (see Table 11 for details).

Table 11: Total annual economic impact of business operations

	Output	Value-Added (GDP)	Earnings	Jobs
Direct Impact	\$501,400	\$303,800	\$235,700	34
Indirect Impact	\$27,000	\$12,600	\$8,900	0
Induced Impact	\$9,700	\$5,000	\$2,300	0
Total Impact	\$538,000	\$321,400	\$246,900	34

Two of the three businesses indicated they had made investments in their businesses in the past 12 months (construction and capital equipment). One business indicated that they would make additional investments (construction and capital equipment) in the next 12 months. These investments result in additional economic output of \$426,300 and support for 4 jobs. It should be noted that this is not an annual economic impact. These impact figures only occur during the construction phase of the projects.²⁶

The economic activity generated by the local businesses does generate additional tax revenue. The IMPLAN economic model estimates these fiscal impacts. The business operations result in \$4,583 for the economic region (Muskegon, Oceana, and Newaygo counties).

²⁶ No adjustments were made for inflation. For confidentiality reasons, the survey responses from the businesses will not be disclosed.

HEDONIC IMPACT

Numerous factors impact a home's valuation. Examples of housing attributes that play a role in determining a house's value include its size and the number of bathrooms. Additionally, aspects such as the quality of the local school system and the characteristics of the neighborhood hold significance.

Through a statistical approach known as a hedonic model, the overall value of a property can be deconstructed into distinct elements, one of them being the property's proximity to the river.



Due to data limitations, the hedonic model will rely on the benefit transfer model. This model involves the transfer of economic values from existing studies conducted in similar

settings to the one of interest. For this study, we will use the 2002 paper “The Value of Suburban Forest Preserve: Estimates from Sales of Vacant Residential Building Lots” by Paul Thorsnes.²⁷ This study estimates the market value associated with the proximity to forest preserves, which has been incorporated into the sale prices of vacant building lots within residential subdivisions that share a border with these preserves. The data for this paper came from three single-family developments in the Grand Rapids, Michigan, metropolitan area. Each subdivision borders a tract of preserved forest land. Although not waterfront property, we believe the characteristics are similar to parcels on the White River. We will use parcel data provided by Newaygo County GIS however, this parcel data did not include housing characteristics or housing sales data needed for the hedonic model. Thus our reliance on the benefit transfer model.²⁸

The premium for a house next to the White River was \$12,078. Aggregating all the properties within a one-half mile of the river, the added value of the houses near the White River (compared to the same houses without the presence of the river) totals \$25.0 million.²⁹ This increase in property values is generally attributed to the restricted land development and aesthetic amenities provided by the river.

²⁷ <https://le.uwpress.org/content/78/3/426>

²⁸ <https://www.newaygocountymi.gov/gis/gis/>

²⁹ Detailed methodology can be found in Appendix A6: Hedonic Valuation

CONCLUSION



The White River spans Newaygo County, Oceana County, and Muskegon County and offers opportunities for fishing, kayaking, and tubing. The river attracted 69,543 visitors in the past year, with 51% originating from outside the economic region. Approximately 75% of all visitors stated recreation on the White River was their primary reason for visiting the local area.

The local primary river users visited the river 49.3 times a year and nonlocal primary river users visited the river 14.7 times a year. This proves the high-value locals and nonlocals place on river recreation.

These primary visitors (local and nonlocal) spent approximately \$21.9 million, resulting in a total economic output of \$19.5 million, supporting 189 jobs. Approximately 43% of this economic activity is

attributed to nonlocal primary visitors. The three local businesses added \$538,000 in economic activity and support for 34 jobs. See Table 12 for a summary of the economic impact.³⁰

Table 12: Summary of the annual economic impact of primary river users

Summary	Direct Spending	Output	Value-Added (GDP)	Earnings	Jobs
Primary local visitors	\$12.9M	\$11.2M	\$5.6M	\$3.2M	109
Primary nonlocal visitors	\$9.0M	\$8.3M	\$4.2M	\$2.3M	80
Local Business	NA	\$538,000	\$321,400	\$246,900	34
Total Impact	\$21.9M	\$20.0M	\$10.1M	\$5.7M	223

³⁰ The \$426,000 in economic output from business investment is not included in the summary because it is a one-time economic impact that occurs during the construction period. See the “Local Business Economic Impact” section for more details.



As noted before, the impact figures in Table 12 include substitute spending from local visitors therefore these figures should be used with caution.

The impact of casual river users is not included in the overall economic impact because they were in the area for reasons other than recreation on the White River (camping, visiting family, etc.). Thus, their spending would have occurred in the absence of the event. What is unknown is if these visitors spent more than they normally would because of their river recreation.

There were 17,527 casual visitors to the area, with 60% of those visitors coming from outside the local region. These casual visitors spent \$12.2 million, with 31% coming from nonlocal visitors. This spending generated \$12.2 million in economic output and support for 122 jobs.

The increase in economic activity also produces additional tax revenue. The direct spending by nonlocal primary river users generated \$75,539 in tax revenue for the local region and local business activity generated \$4,583 for the local region.

Our estimated total economic impact likely underestimates the actual impact as the estimate was derived using relatively conservative assumptions and methods. Moreover, a measure of the economic impact of recreation excludes long-run economic and cultural impacts. Namely, new visitors to the area may return in the future given their positive experience while enjoying the White River.

The foundation of the hedonic model lies in the assumption that residences can be understood as a collection of features, including aspects like lot size, floor area, number of bathrooms, and, crucially for this study, proximity to a waterfront. By examining a multitude of home sales, an analyst can carefully isolate the impact of each feature on the final sale price.

Housing data provided by Newaygo County GIS included parcels that were within 800 meters (one-half mile) of the White River. The housing data was limited in scope, therefore the benefit transfer mode was used. The benefit transfer model showed riverfront property results in a sales price premium of \$12,078 per parcel. With 2,068 parcels located within proximity to the White River, this results in an amenity value of \$25.0 million. [Ω](#)

A1: IMPLAN DISCLAIMER AND DEFINITIONS

IMPLAN is a regional economic analysis software application that is designed to estimate the impact or ripple effect (specifically backward linkages) of a given economic activity within a specific geographic area through the implementation of its Input-Output model. Studies, results, and reports that rely on IMPLAN data or applications are limited by the researcher's assumptions concerning the subject or event being modeled. Studies such as this one are in no way endorsed or verified by IMPLAN Group, LLC unless otherwise stated by a representative of IMPLAN.

IMPLAN provides the estimated Indirect and Induced Effects of the given economic activity as defined by the user's inputs. Some Direct Effects may be estimated by IMPLAN when such information is not specified by the user. While IMPLAN is an excellent tool for its designed purposes, it is the responsibility of analysts using IMPLAN to be sure inputs are defined appropriately and to be aware of the following assumptions within any I-O Model:

- Constant returns to scale
- No supply constraints
- Fixed input structure
- Industry technology assumption
- Constant byproducts coefficients
- The model is static

By design, the following key limitations apply to Input-Output Models such as IMPLAN and should be considered by analysts using the tool:

- **Feasibility:** The assumption that there are no supply constraints and there is a fixed input structure means that even if input resources required are scarce, IMPLAN will assume it will still only require the same portion of production value to acquire that input unless otherwise specified by the user. The assumption of no supply constraints also applies to human resources, so there is assumed to be no constraint on the talent pool from which a business or organization can draw. Analysts should evaluate the logistical feasibility of a business outside of IMPLAN. Similarly, IMPLAN cannot determine whether a given business venture being analyzed will be financially successful.
- **Backward-linked and Static model:** I-O models do not account for forward linkages, nor do I-O models account for offsetting effects such as cannibalization of other existing businesses, diverting funds used for the project from other potential or existing projects, etc. It falls upon the analyst to take such possible countervailing or offsetting effects into account or to note the omission of such possible effects from the analysis.
- **Like the model, prices are also static:** Price changes cannot be modeled in IMPLAN directly; instead, the final demand effects of a price change must be estimated by the analyst before modeling them in IMPLAN to estimate the additional economic impacts of such changes.

The IMPLAN model will report economic impact in four ways:

Output	<p>Gross output is the total economic activity, including the sum of intermediate inputs and the value they add to the final good or service. The intermediate inputs are the resources used in the production of final goods and services. It should be noted that gross output can be overstated if the intermediate inputs are used multiple times in the production of other goods and services.</p> <p>Direct output is the same as the direct effect (direct spending). The indirect output represents the value of economic activity generated because of direct business-to-business spending. Induced output is the total value that all industries take in as a result of household spending.</p>
Labor Income	<p>The increase in wages, salaries, and proprietors' income as a result of the initial change in demand (direct effects).</p> <p>Direct labor income is the total wages, benefits, and payroll taxes associated with the business or organization responsible for the direct effects. Indirect labor income represents the amount of compensation that is supported by business-to-business transactions. Induced labor income is the value of employee compensation and proprietor income that comes from the household spending of the employees connected to the business/organization and supply chain.</p>
Employment	<p>The total number of jobs supported by direct spending or initial change in demand. This measurement does not distinguish between a full-time or part-time employee. It also does not account for employees who moved from one job to another within the defined economic region. Thus it does tend to overstate the number of jobs created.</p> <p>Direct employment is the jobs supported at the business or organization responsible for the direct effects. Indirect employment represents the number of jobs that are supported by business-to-business transactions. Induced employment is the number of jobs supported by the household spending generated by the business activity.</p>
Value Added	<p>The contribution to the economic region's gross domestic product (GDP).</p> <p>Direct value added is associated with the business or organization responsible for the direct effects. Indirect value added is the specific value generated by the business-to-business transaction as a result of the direct effects. Induced value added is the specific value associated with household spending as a result of the direct effects.</p>

A2: SURVEY DETAILS

To assess the economic impact of the White River we collected survey data to determine visitor count, visitor days, and visitor spending. To collect this data, we used three different surveys: the visitor survey, the orthogonal survey, and a business survey.

VISITOR SURVEY

The visitor survey collected the primary economic impact data. The survey was administered multiple times a month from July 2022 through July 2023. We relied on a Grand Valley State University student research team to administer the survey. Respondents had to be 18 years old or older to be included in the survey. A copy of the survey is available upon request.

Figure A2-1: Survey locations

Location	# of times surveyed	Survey Requests
Taylor Bridge River Access	11	54
Videa Weaver Park	2	5
White Cloud Rotary Park	10	69
White River Roadside Park	2	19
Covell Park (Whitehall)	11	144
Pines Point Campground	3	13
River Rock Campground	1	10
White River RV Park & Campground	1	21

ORTHOGONAL SURVEY

The second survey, known as an orthogonal survey, was an intercept survey that occurred at random community events within the local region. Data gathered included zip code and if they visited the White River in the past year. This survey was used to calculate the total number of river users. A copy of the survey is available upon request.

Table A2-1: Orthogonal survey results

Event	Date	Survey Requests	Completed Surveys	Weather
Montague Pumpkin Fest	10/9/2022	15	14	Rain
Whitehall Arts and Crafts Fair	6/17/2023	93	47	Sunny
Hesperia Family Fun Fest	7/3/2023	13	12	Rain
White Cloud Celebration	7/8/2023	64	26	Sunny

A3: ESTIMATING THE NUMBER OF VISITORS AND VISITOR DAYS

We used the orthogonal survey to estimate local and nonlocal visitors. Table A3-1 shows the results of these two surveys. Tables A3-2 and A3-3 walk you through the methodology to estimate the number of visitors and visitor days (for local and nonlocals).

Table A3-1: Orthogonal survey results

	Number	% of all zip codes
Total zip codes collected	99	100.00%
Local zip codes	60	60.61%
Nonlocal zip codes	39	39.39%
Zip codes that visited the river in the past 12 months	146	65.66%
Local zip that visited the river in the past 12 months ³¹	42	70.00%

³¹ Stated as a percentage of total local zip codes, not all zip codes.

Table A3-2: Local visitors and visitor days

		Primary visitors	Casual visitors
The population of the seven zip codes ³²	36,476		
% of the local population that visited the river	70%		
% Primary and casual visitors ³³		76.92%	23.08%
Estimated number of local adult visitors	25,533	19,640	5,893
Local visitors' children per adult ³⁴	.34	.384	.196
Total local visitor party size	34,214	27,182	7,048
Avg. number of visits per year	47.9	49.3	43.7
Avg. number of days per visit	1.0	1.0	1.5
Total local visitor days	1,638,867	1,341,151	468,268

Table A3-3: Nonlocal visitors and visitor days

		Primary visitors	Casual visitors
Total zip codes collected	335		
Total number of local zip codes	159		
Total number of nonlocal zip codes	176		
The ratio of nonlocal zip codes to local zip codes	1.11		
Estimated number of nonlocal visitors ³⁵	28,263		
% Primary and casual visitors ³⁶		69.93%	30.07%
Estimated adult visitors by visitor type	28,263	19,764	8,499
Nonlocal visitors' children per adult ³⁷	.25	.26	.233
Total nonlocal visitor party size	35,329	24,903	10,476
Avg. number of visits per year ³⁸	13.81	14.66	11.7
Avg. number of days per visit ³⁹	1.64	1.55	1.87
Total nonlocal visitor days	800,141	565,873	229,268

³² Zip codes: 49349,49421,49412,49425,49452,49437,49461. Population over the age of 18. Per the Census, 21.7% of the population is under 18. <https://www.census.gov/quickfacts/>

³³ Data taken from visitor survey

³⁴ Ibid

³⁵ Calculated as: Ratio * Estimated number of local adult visitors (see Table A3-2)

³⁶ Data taken from visitor survey

³⁷ Ibid

³⁸ Ibid

³⁹ Ibid

A4: ESTIMATING VISITOR SPENDING

ESTIMATED SPENDING: PRIMARY VISITORS

Table A4-1: Estimated average spending per person, per day (PPPD) for ALL primary visitors

	All Primary	Local Primary	Nonlocal Primary
Meals	\$4.09	\$3.20	\$4.96
Retail Spending	\$2.87	\$2.53	\$3.18
Accommodations	\$0.24	\$0.00	\$0.43
Transportation	\$5.13	\$3.42	\$6.68
Other Spending	\$0.53	\$0.46	\$0.59
Gear Rental	\$0.00	\$0.00	\$0.00
Total Average Spending PPPD	\$12.86	\$9.61	\$15.84

Using the average category spending for each visitor type and the number of visitor days, we can estimate total direct spending. Table A4-2 presents the total direct spending (direct effects or direct output) for each category and each type of visitor.

Table A4-2: Estimated total direct spending for each category and each primary visitor type

	All visitors ⁴⁰	Local visitors	Nonlocal visitors
Meals	\$7,098,412	\$4,291,685	\$2,806,728
Retail Spending	\$5,192,588	\$3,393,113	\$1,799,475
Accommodations	\$243,325	\$0	\$243,325
Transportation	\$8,366,766	\$4,586,738	\$3,780,028
Other Spending	\$950,794	\$616,930	\$333,865
Gear Rental	\$0	\$0	\$0
Total Direct Spending	\$21,851,886	\$12,888,466	\$8,963,421

⁴⁰ This was treated as the sum of local and nonlocal visitor spending.

ESTIMATED SPENDING: CASUAL VISITORS

Table A4-3: Estimated average spending per person, per day for ALL casual visitors

	All Casual	Local Casual	Nonlocal Casual
Meals	\$8.23	\$7.51	\$8.74
Retail Spending	\$1.38	\$2.57	\$0.61
Accommodations	\$1.60	\$0.08	\$2.66
Transportation	\$5.67	\$7.73	\$4.26
Other Spending	\$0.17	\$0.11	\$0.21
Gear Rental	\$0.00	\$0.00	\$0.00
Total Average Spending PPD	\$17.05	\$18.00	\$16.48

Using the average category spending for each visitor type and the number of visitor days, we can estimate total direct spending. These spending figures are based on the average of the two data cleaning methods. Data from this table was used in Table 7 in the main report.

Table A4-4: Estimated total direct spending for each category and each casual visitor type

	All visitors ⁴¹	Local visitors	Nonlocal visitors
Meals	\$5,520,494	\$3,516,694	\$2,003,800
Retail Spending	\$1,344,220	\$1,203,449	\$140,770
Accommodations	\$647,313	\$37,461	\$609,852
Transportation	\$4,596,394	\$3,619,713	\$976,680
Other Spending	\$99,656	\$51,510	\$48,146
Gear Rental	\$0	\$0	\$0
Total Direct Spending	\$12,208,077	\$8,428,828	\$3,779,248

⁴¹ This was treated as the sum of local and nonlocal visitor spending.

A5: ECONOMIC IMPACT OF PRIMARY VISITORS

IMPLAN was used to estimate the economic impact of visitor spending and was summarized in Table 5 and Table 6 in the main report. Per the IMPLAN model, the top five industries impacted by primary visitor spending are presented in tables A5-1 (output) and A5-2 (employment). These tables are based on all primary visitors. There is no significant change when focused solely on nonlocal spenders.

Table A5-1: Top five industries impacted by visitor spending stated as total output.

Category	% of Total Output
Transportation	43%
Meals and Dining	37%
Retail Shopping	12%
All Lodging	2%
Other real estate	1%

Table A5-2: Top five industries impacted by visitor spending stated as a percentage of indirect/induced employment and total employment.

Category	% of Total Employment
Meals and Dining	45%
Transportation	36%
Retail Shopping	12%
All Lodging	2%
Other real estate	1%

A6: HEDONIC VALUATION

Due to data limitations, the hedonic model will rely on the benefit transfer model. This model involves the transfer of economic values from existing studies conducted in similar settings to the one of interest. This approach can be useful when time, budget, or data limitations prevent direct valuation studies from being conducted for a particular area or resource.

For this study, we will use the 2002 paper “The Value of Suburban Forest Preserve: Estimates from Sales of Vacant Residential Building Lots” by Paul Thorsnes.⁴² This study estimates the market value associated with the proximity to forest preserves, which has been incorporated into the sale prices of vacant building lots within residential subdivisions that share a border with these preserves. The data for this paper came from three single-family developments in the Grand Rapids, Michigan, metropolitan area. Each subdivision borders a tract of preserved forest land. Although not waterfront property, we believe the characteristics are similar to parcels on the White River. We will use parcel data provided by Newaygo County GIS however, this parcel data did not include housing characteristics or housing sales data needed for the hedonic model. Thus our reliance on the benefit transfer model.⁴³

According to the benefit transfer paper, properties situated along a permanent forest preserve command a premium in sales price ranging from \$9,866 to \$14,289. The parcel data provided by Newaygo County GIS included 2,068 samples within one-half mile of the White River. This results in a total value of all parcels with a location along the White River in Newaygo County at \$25.0 million. Table A6-1 outlines the methodology.

Table A6-1: Methodology for White River hedonic valuation

2002 Price premium for properties along a forest preserve – low	\$9,866
2002 Price premium for properties along a forest preserve – high	\$8,400
Average 2002 price premium	\$7,100
Adjusted for 2022 dollars ⁴⁴	\$12,078
Number of parcels within one-half mile of the White River ⁴⁵	2,068
Hedonic value of the White River	\$24,976,388

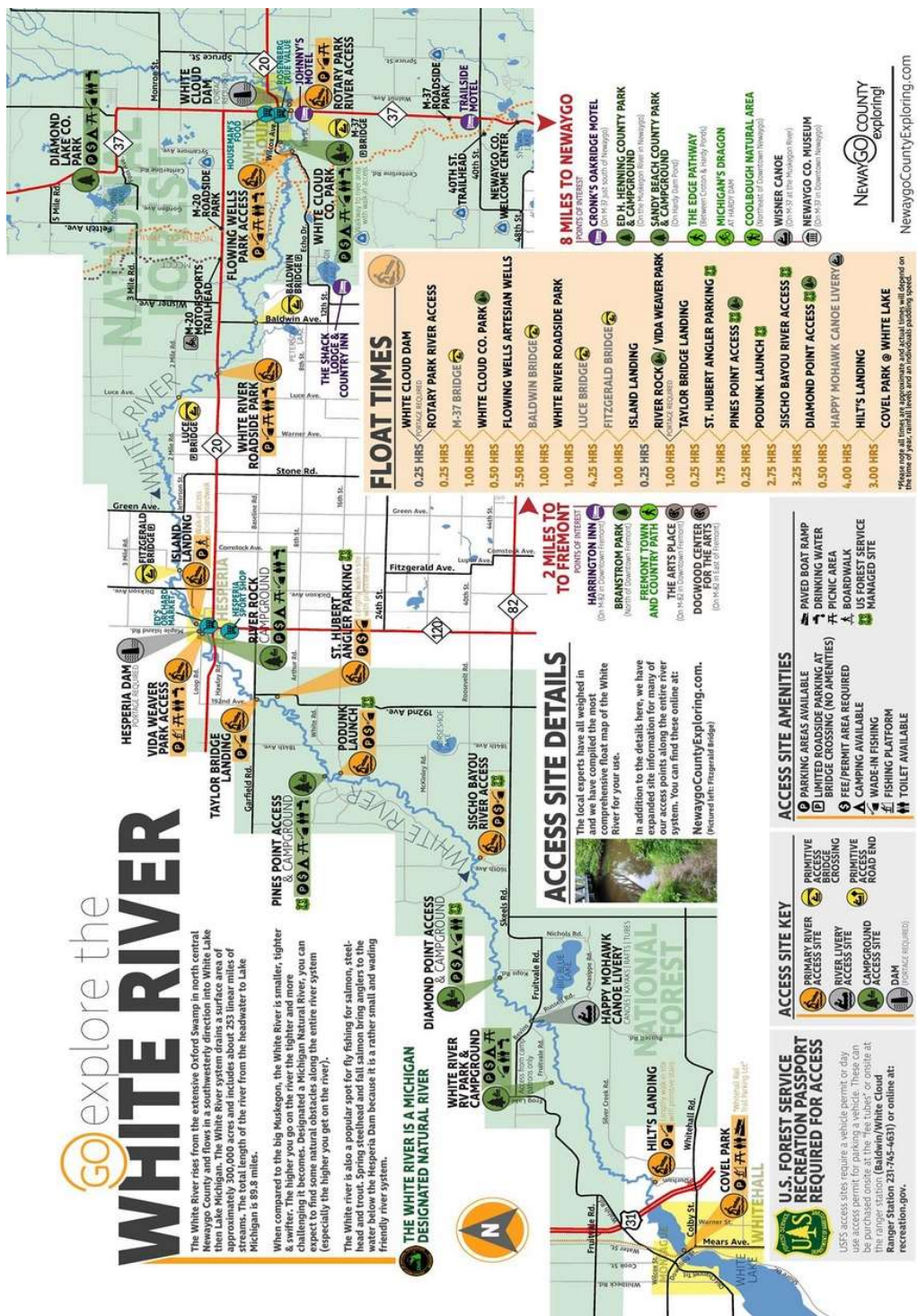
⁴² <https://le.uwpress.org/content/78/3/426>

⁴³ <https://www.newaygocountymi.gov/gis/gis/>

⁴⁴ The house price index for Newaygo County indicated a 70.11% increase in value.
<https://fred.stlouisfed.org/series/ATNHPIUS26123A>

⁴⁵ As provided by Newaygo County GIS. U.S. Government owned properties were removed from the sample.

A7: EXPLORE THE WHITE RIVER MAP⁴⁶



⁴⁶ Newaygo County Facebook

PHOTO CREDITS

Page #	Location	Source
Cover	Taylor Bridge Access	Brady Woodruff – Research Assistant
3	Ashley Bush Research Asst at Taylor Bridge Access	Christian Glupker – Primary Author
5	Rotary Park-White Cloud	Brady Woodruff – Research Assistant
6	Taylor Bridge Access	Brady Woodruff – Research Assistant
7	River Rock Campground	River Rock Campground Facebook
8	White River Roadside Park	Google Park Reviews – Public Image
14	Pines Point Campground	Google Park Reviews – Public Image
18	Hilts Landing	Google Park Reviews – Public Image
19	White River Roadside Park	Google Park Reviews – Public Image
20	River Rock Campground	River Rock Campground Facebook
24	Taylor Bridge Access	Brady Woodruff – Research Assistant
25	Happy Mohawk Canoe Livery	https://happymohawk.com/
26	Flowing Wells Artesian Park	Google Park Reviews – Public Image
28	Rotary Park-White Cloud	Brady Woodruff – Research Assistant
29	Taylor Bridge Access	Brady Woodruff – Research Assistant