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Impact Estimates for the Freshwater Center

Jim Robey
W.E. Upjohn Institute for Employment Research, jim.robey@upjohn.org

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Authors
Jim Robey, *W.E. Upjohn Institute for Employment Research*

Upjohn Author(s) ORCID Identifier
https://orcid.org/0000-0002-4668-2567

Impact Estimates for the Freshwater Center

Prepared for
Lake Superior State University
650 West Easterday Avenue
Sault Sainte Marie, MI 49783

Prepared by
Regional and Economic Planning Services
W.E. Upjohn Institute for Employment Research
300 South Westnedge Avenue
Kalamazoo, MI 49007
269-343-5541

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FOR EMPLOYMENT RESEARCH

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Executive Summary

Lake Superior State University, in support of a U.S. Economic Development Administration (EDA) grant application, asked the Regional and Economic Planning Services Team at the W. E. Upjohn Institute for Employment Research (Upjohn) to estimate the economic impact of building and operating the Freshwater Center (Center) in Sault Ste. Marie, Michigan.

The region for estimating economic impacts is referred to as the Eastern Upper Peninsula (EUP) and the region includes Luce, Chippewa, and Mackinac counties. The impact estimates include both the building and operations of the Center. The estimates from building the Center are combined into a single year and include hard and soft costs. This phase of the project adds more than $8.3 million in personal income and just over 200 jobs to the study region.

Estimates for longer-term returns from the Center are based in forecasts for operations, students, visitors, research labs, and the hatchery. Estimates of economic impacts were created for a 10-year time horizon. Impacts from the operations of the Center, which begin in Year 2 of the analysis, are estimated at 65 jobs and $3 million in personal income. By the final year of the analysis (Year 11), these estimates are forecast to grow to more than 267 additional jobs over the baseline and just under $15.7 million in personal income. These estimates are based in the "but for" condition that the impacts would not be in the region except for the building of the Center. Reported impacts are annualized and will occur beyond the 10-year time horizon.

Introduction

Lake Superior State University, in support of a U.S. Economic Development Administration (EDA) grant application, asked the Regional and Economic Planning Services Team at the W. E. Upjohn Institute for Employment Research (Upjohn) to estimate the economic impact of the building and operations of the Freshwater Center (Center) in Sault Ste. Marie, Michigan.

To create the needed estimates for the application, Center staff provided Upjohn with detailed data on the costs of construction and the series of inputs on the operations of the Center after construction is completed. The team at Upjohn used an economic impact model from Regional Economic Models, Inc. (REMI: www.remi.com). The model was custom designed to estimate the impacts for the study region. The study region for this project was defined as the Eastern Upper Peninsula of Michigan and included Chippewa, Mackinac, and Luce counties. Impacts are reported for the study region and the economic contribution to the state of Michigan.

The differentiating factor between an economic impact and contribution is based on the source of the spending or shock to the study region. For many of the inputs, such as visitors and students, expenditures from residents of the study area were excluded to avoid the issue of the "substitution effect," where residents can make choices among spending options in a region. These choices made by residents do not generally change the aggregate economic wealth of a region. Most economists assume that only dollars from grants and contracts, students, and visitors that are new to the region and come from outside the region create an economic impact. These are the factors that change the wealth of a region. Given the lack of alternatives to higher education in the study region, it could be argued that were it not for the university and the Center, leakage of students to alternative sources of higher education outside of the study region would have occurred and that the value of the leakage should be included. However, the Upjohn team chose the more conservative approach by excluding spending by residents local to the study region.

There are a few caveats to the input data and related impact estimates. First, the build data are collapsed into a single year. This was done for several reasons: (1) the project will likely occur over two calendar years and REMI is an annualized model. This made it easier to model the project; and (2) some costs, such as soft costs (e.g., legal and architectural) occur well in advance of the build. However, for this project, exact timing and expenditures are not available. Another issue is based on the REMI model: Anything prior to 2019 would not be able to be modeled in the current version (2.4.3) of the REMI model. This is due to the last history year of the current model being 2018, with forecasts beginning in 2019. In the end, this creates a larger single-year set of estimates for construction than would occur more organically, but it is believed to be consistent with the combined set of activities associated with the build.

The second caveat to the data is that with any set of pro formas based on future demand and expenditures, the inputs are estimates. Inputs for visitors, students, and other operations-related impacts in the near term are more grounded in experience and planning,

while the data for out years are based on estimates of growth and change. In all cases of operational inputs, the team at Upjohn worked with the Center to verify and validate the assumptions of the inputs.

The following sections provide a set of estimates for each area of inputs as well as a combined set of estimates with 10 years of operating impacts.

Inputs into REMI

Lake Superior State University provided Upjohn with estimates for building and operating the Center, managing a research lab, providing a visitor center, educating students, and providing a hatchery for the provision of fish to the Michigan Department of Natural Resources.

The estimated costs of the base project are currently $14.2 million. In addition to the base costs, additional site prep and other expenditures will occur. These include a road to the Center that needs to be constructed ($500,000), acquisition of land ($500,000), equipment purchases for the labs ($1.2 million), soft costs ($300,000) for activities such as architecture, and the University will have staff ($90,000) with project oversight. While all these activities will occur between November 2019 and April 2021, available data did not permit the distribution of activities across the three calendar years. Given this, all activities are combined into a single year. The implication of this is that the construction year estimates are likely enhanced for a single year relative to distributing them across three project years. However, it is also likely that if the spending-based impacts were estimated for each of the three years and then aggregated together, the single-year impacts would be similar.

The estimates of operations are for a 10-year time frame. Escalators for increases for all categories are included as the Center grows from the base year. As an example, for the first year of operations the current pro forma shows 16 staff including administration, faculty, and student employees. By Year 10 that number is forecast to grow to 35. Similarly, while research grants and contracts begin at just over $2.7 million and with four visiting scientists in Year 1, the value of grants and contracts is expected to grow to more than $4.3 million and to 10 visiting scientists.

As awareness of the Center grows, visitors are expected to grow from 15,000 in Year 1 to 75,000 by Year 10. Estimates of the cost of lodging and food for visitors are taken from federal per diem rates. These rates are also used in estimating the daily living costs for visiting scientists. Students are expected to grow from 25 in Year 1 to 300 by Year 10. For both visitors and students, spending for either group by residents of the three-county area are excluded due to the substitution effect.

Economic Impacts: All Activities

Table 1 contains a summary of the economic impacts on the study region. These impacts include all activities across the timeline, from construction in Year 1 to all operations-related activities in Year 11. While it is not possible to add jobs together across all years, as jobs are temporal and cannot be accumulated, average employment across the 11 years is 193.3 jobs. When only private sector non-farm jobs are included, the average jobs per year is 166.8. This last employment estimate includes not only agricultural jobs, but also those in the public sector. Unlike jobs, impacts from dollars can be added and accumulated over time. The building and operations-related activities of the Center add more than $241 million in output, or sales, to the three-county economy over the study period from Year 1 to Year 11. Similarly, gross regional product, or value added, increase in the region by slightly more than $151 million. Finally, the accumulated activities from all 11 years add almost $100 million in personal income to the eastern Upper Peninsula.

Economic Impacts: Detailed Activities

Tables 2 through 8 contain the estimates of economic impacts broken out by detailed activities. It is important to note that adding up the tables may not sum to the values in Table 1 due to rounding errors. Also, REMI is a dynamic model that is sensitive to changes in costs, employment, and trade flows. When the individual runs that generate these sets of tables are combined into a single simulation, aggregate results may also vary slightly from the sum of the individual activity estimates due to the dynamism of the model.

Also, worthwhile to note in this section is Table 2: Construction and Operations. It is interesting that while investment and activity occur only in Year 1, the REMI model forecasts that the effects of a construction project provide persistent, although diminishing effects over time.

Economic Contribution: The State of Michigan

Table 9 contains data on the economic contribution of the construction and operation phases of the Center on the state of Michigan. These data estimate the impact of economic churn within the state economy. In the impacts section, it was noted that only the importing of dollars into the region by non-residents was included to avoid the substitution effect. In looking at economic churn, again, only non-residents of the region were included in the estimates for the churn statewide. As some of the expenditures in the study region likely come from residents of the state, the substitution effect rule is violated.

Table 1: REMI Inputs

			YR1	YR2	YR3	YR4	YR5	YR6	YR7	YR8	YR9	YR10
Construction		Project Funding ($14.2 million)	$14,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Road to the Center	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Land Purchase	$500,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Equipment for Labs (Grant)	$1,200,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
		Early Designs to Architect (pre-2018)	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
		LSSU Personnel Time (One Year)	$90,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operations		Center Staffing (Number)	0	16	23	25	28	29	29	32	33	35
		Visiting Scientist Nights	0	480	720	720	960	960	960	1,200	1,200	1,200
		Visitors (Number)	0	15,000	30,000	50,000	50,000	75,000	75,000	75,000	75,000	75,000
		New Students (Number)	0	25	50	100	150	200	225	250	275	300
	Operational Expenses	Salary & Fringes - Manager & 10 Students	$0	$98,800	$100,776	$102,792	$104,847	$106,944	$109,083	$111,265	$113,490	$115,760
		Supplies & Equipment	$0	$9,155	$9,338	$9,525	$9,715	$9,910	$10,108	$10,310	$10,516	$10,727
		Travel (In-State)	$0	$1,500	$1,530	$1561	$1592	$1,624	$1,656	$1,689	$1,723	$1,757
	In-kind contributions	Cloverland Electric (Heat, Space)	$0	$20,000	$20,400	$20,808	$21,224	$21,649	$22,082	$22,523	$22,974	$23,433
		MI Department of Natural Resources (Food, Service)	$0	$5,000	$5,100	$5,202	$5,306	$5,412	$5,520	$5,631	$5,743	$5,858

Source: Lake Superior State University

Table 2: All Activities; Eastern Upper Peninsula

		Build	Operations								
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
All Activities; Eastern Upper Peninsula	Total Employment	201.5	65.0	99.2	139.8	162.8	210.2	223.9	239.7	252.4	264.0	267.4
	Private Non-Farm Employment	184.1	51.7	85.1	122.3	141.8	183.8	193.6	206.0	215.6	224.5	225.8
	Gross Domestic Product*	$14,900	$5,300	$6,400	$8,900	$10,600	$13,800	$15,400	$17,000	$18,400	$19,800	$20,800
	Output*	$25,700	$8,500	$10,200	$14,300	$16,800	$22,000	$24,500	$26,800	$28,900	$31,000	$32,600
	Personal Income*	$8,300	$3,000	$4,100	$5,400	$6,600	$8,500	$9,800	$11,300	$12,800	$14,300	$15,700

*In thousands
Note 1: The difference between total and private non-farm is that the latter doesn't include farm or public sector employment.
Note 2: Build incorporates all activities into single year.

Table 3: Construction

		Build	Operations								
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Construction	Total Employment	201.5	12.2	7.2	3.4	1.5	0.5	0.2	0.1	0.2	0.3	0.5
	Private Non-Farm Employment	184.1	2.9	1.8	0.3	-0.5	-0.7	-0.7	-0.6	-0.4	-0.2	0.0
	Gross Domestic Product*	$14,900	$2,300	$800	$400	$200	$0	$0	$0	$0	$0	$0
	Output*	$25,700	$3,800	$1,300	$600	$300	$100	$0	$0	$0	$0	$0
	Personal Income*	$8,300	$1,300	$1,000	$700	$600	$500	$400	$400	$300	$300	$300

*In thousands
Note 1: The difference between total and private non-farm is that the latter doesn't include farm or public sector employment.
Note 2: Build incorporates all activities into single year.

Table 4: Operations

		Build	Operations								
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Operations	Total Employment	0.0	21.6	31.9	35.8	40.3	42.3	42.7	46.7	48.6	51.5	52.0
	Private Non-Farm Employment	0.0	20.0	28.8	31.6	35.2	36.6	36.6	40.0	41.4	43.8	44.0
	Gross Domestic Product*	$0	$1,200	$2,000	$2,300	$2,700	$3,000	$3,100	$3,400	$3,700	$4,000	$4,200
	Output*	$0	$1,900	$3,100	$3,700	$4,200	$4,600	$4,800	$5,400	$5,700	$6,200	$6,500
	Personal Income*	$0	$900	$1,500	$1,800	$2,100	$2,400	$2,600	$3,000	$3,300	$3,700	$3,900

*In thousands
Note 1: The difference between total and private non-farm is that the latter doesn't include farm or public sector employment.
Note 2: Build incorporates all activities into single year.

Table 5: Research Lab

		Build	Operations								
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Research Lab	Total Employment	0.0	5.6	6.4	6.8	8.8	8.7	10.9	11.1	12.8	12.9	14.8
	Private Non-Farm Employment	0.0	5.2	5.8	6.0	7.8	7.6	9.5	9.7	11.2	11.2	12.9
	Gross Domestic Product*	$0	$300	$400	$500	$600	$700	$800	$900	$1,100	$1,100	$1,300
	Output*	$0	$500	$700	$800	$1,000	$1,100	$1,300	$1,400	$1,700	$1,800	$2,000
	Personal Income*	$0	$200	$200	$300	$400	$400	$500	$600	$700	$700	$900

*In thousands
Note 1: The difference between total and private non-farm is that the latter doesn't include farm or public sector employment.
Note 2: Build incorporates all activities into single year.

Table 6: Visitors

		Build	Operations								
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Visitors	Total Employment	0.0	17.3	35.3	59.3	61.1	90.1	92.0	93.4	94.3	94.8	95.1
	Private Non-Farm Employment	0.0	15.9	31.8	52.8	53.0	78.7	78.8	78.9	78.9	78.7	78.5
	Gross Domestic Product*	$0	$1,000	$2,200	$3,900	$4,400	$6,400	$7,000	$7,400	$7,700	$8,000	$8,300
	Output*	$0	$1,700	$3,800	$6,700	$7,500	$11,000	$11,900	$12,500	$13,000	$13,500	$13,900
	Personal Income*	$0	$400	$1,000	$1,900	$2,300	$3,500	$4,000	$4,500	$5,000	$5,500	$5,900

*In thousands
Note 1: The difference between total and private non-farm is that the latter doesn't include farm or public sector employment.
Note 2: Build incorporates all activities into single year.

Table 7: Students

		Build	Operations								
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Students	Total Employment	0.0	7.7	17.8	34.0	50.6	68.0	77.6	87.7	95.8	103.7	104.2
	Private Non-Farm Employment	0.0	7.3	16.5	31.2	46.0	61.3	69.1	77.5	84.1	90.5	90.0
	Gross Domestic Product*	$0	$300	$800	$1,600	$2,500	$3,600	$4,300	$5,100	$5,800	$6,500	$6,800
	Output*	$0	$400	$1,100	$2,300	$3,600	$5,100	$6,200	$7,300	$8,300	$9,300	$9,800
	Personal Income*	$0	$100	$300	$700	$1,100	$1,700	$2,200	$2,800	$3,400	$4,000	$4,600

Table 8: Hatchery

		Build	Operations								
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
Hatchery	Total Employment	0.0	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Private Non-Farm Employment	0.0	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	Gross Domestic Product*	$0	$110	$130	$130	$140	$140	$140	$150	$150	$150	$160
	Output*	$0	$160	$190	$200	$200	$210	$210	$220	$220	$220	$230
	Personal Income*	$0	$20	$20	$30	$30	$40	$40	$40	$40	$50	$50

*In thousands
Note 1: The difference between total and private non-farm is that the latter doesn't include farm or public sector employment.
Note 2: Build incorporates all activities into single year.

Table 9: All Activities; Michigan

		Build	Operations									
		Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11
All Activities; Michigan	Total Employment	233.0	77.9	115.0	156.9	180.0	230.0	244.2	260.7	274.3	286.4	290.0
	Private Non-Farm Employment	214.5	63.6	99.8	138.1	157.7	202.1	212.2	225.1	235.6	244.8	246.3
	Gross Domestic Product*	$18,100	$6,800	$8,300	$11,200	$13,100	$16,900	$18,800	$20,700	$22,500	$24,200	$25,400
	Output*	$30,800	$11,300	$13,400	$18,100	$21,000	$27,200	$30,200	$33,100	$35,900	$38,500	$40,500
	Personal Income*	$10,400	$4,100	$5,400	$7,000	$8,200	$10,600	$12,100	$13,800	$15,500	$17,200	$18,700

*In thousands
Note 1: The difference between total and private non-farm is that the latter doesn't include farm or public sector employment.
Note 2: Build incorporates all activities into a single year.

The REMI Model

The Upjohn Institute uses a model to estimate economic impacts developed specifically for the study region by Regional Economic Models, Inc. (REMI, www.REMI.com). The team's project director has over 20 years of experience with REMI to estimate economic impacts across a wide range of economic activity including visitor/tourism activities, industrial development, mixed-use development, and forecasting future economic and labor conditions. The REMI model is the preeminent model of its type and is widely recognized to be at the forefront of modeling, with clients not only in North America but also in the European Union.

REMI is a dynamic model that creates estimates using equations rather than a simple input/output (I/O) table. This allows sensitivity in the analysis for both timing and scale/scope issues that are not found in other models. Features that are unique to REMI include:

- It is calibrated to local conditions using a relatively large amount of local data, which is likely to improve its performance, especially under conditions of structural economic change.
- It has an exceptionally strong theoretical foundation.
- It combines several different kinds of analytical tools (including economic-base, input-output, and econometric models), allowing it to take advantage of each specific method's strengths and compensate for its weaknesses.
- It allows users to manipulate an unusually large number of input variables and gives forecasts for an unusually large number of output variables.
- It allows the user to generate forecasts for any combination of future years, allowing the user special flexibility in analyzing the timing of economic impacts.
- It accounts for business cycles.
- It has been used by many users under diverse conditions and has proven to perform acceptably.

Terms Used in this Study

Jobs Created or Retained

The estimated number of jobs created or retained by project activities are simply "jobs" as counted by the U.S. Bureau of Economic Analysis (BEA) and can be either full- or part-time positions. They are likely distributed across multiple industries. In any given industry, a "job" may represent a summation of positions across several industries in which each industry has less than one complete position. For example, the impact study may report one "job," but the spending patterns in the study may generate positions in three industries. However, each industry may require only one-third of a person. In this case, the three industries that employ one-third of a person each to meet demand would sum to one "job" in the REMI model.

Employment is composed of three elements:

- Direct – The employment created by actual investment, growth, or change
- Indirect – The employment created by the need of the new firm to purchase goods and services, essentially the local supply chain
- Induced – The household that supplies goods and services to the workers in the prior two elements. Examples include education, dry cleaners, accountants, gas stations, lawyers, and grocers.

Gross Domestic Product

Gross domestic product is an economic measure of the value of goods and services produced within the United States. It is the broadest measure of economic activity within a region or country. It consists of compensation of employees; taxes on production and imports, less subsidies; and gross operating surplus. It does not include intermediate inputs; it is a measure of the value contributed by labor and capital to production.

Personal Income

Income is the goods and services produced by citizens and residents in the study region (i.e., gross national product) minus the consumption of fixed capital (i.e., depreciation).

Output

Gross output includes both GDP and expenditures on intermediate inputs. In that way, it is considered double counting, but it is an essential statistical tool to understand the interrelationships between industries. Gross output is principally a measure of an industry's sales or receipts.

About the Upjohn Institute

The W.E. Upjohn Unemployment Trustee Corporation was incorporated on October 24, 1932, as a Michigan 501(c)(3) nonprofit corporation, and is doing business as the W.E. Upjohn Institute for Employment Research. The W.E. Upjohn Institute for Employment Research has been conducting economic research and consultation for 75 years, since its founding in 1945.

The Upjohn Institute is governed by a Board of Trustees, which employs a President who is responsible for the overall operation of the Institute. The President of the Upjohn Institute is Dr. Michael Horrigan.

The Upjohn Institute currently employs 104 individuals. Upjohn's research and consultation program is conducted by a resident staff of professional social scientists, 12 of whom are Ph.D.-level economists (senior staff). Senior staff is supported by a staff of research analysts and additional support staff. Upjohn also administers the federal and state employment programs for its four-county area through the local Workforce Investment Board. Upjohn also publishes books on economic development, workforce development, and other employment-related topics.

The Ph.D.-level economists have more than 175 years of collective experience, conducting research on a broad variety of economic and employment topics. Their experience includes, but is not limited to, employment program evaluation, labor market dynamics, labor-management relations, employment and training programs, economic and workforce development, income replacement policy, worker adjustment, the role of education in labor markets, employment and compensation, disability, international comparison of labor adjustment policies, site selection experience, and state, regional, and local economic analysis.

The Upjohn Institute also has a Regional Economic and Planning Services team of specialists who provide economic insights and analysis regionally and statewide in Michigan, in other individual states, and nationally. The team has experience in:

- Economic impact analysis
- Fiscal/cost-benefit impact analysis
- Labor market analysis
- Facilitating and conducting effective one-on-one interviews, focus groups, workshops, and charrette sessions in a diverse array of environments
- Economic and workforce development and education strategies
- GIS mapping abilities
- Rural and urban land use and economic development planning services
- Regional data analysis

For questions or information about this report, contact Jim Robey, Director of Regional and Planning Economic Services, 269-365-0450, or jrobey@upjohn.org.