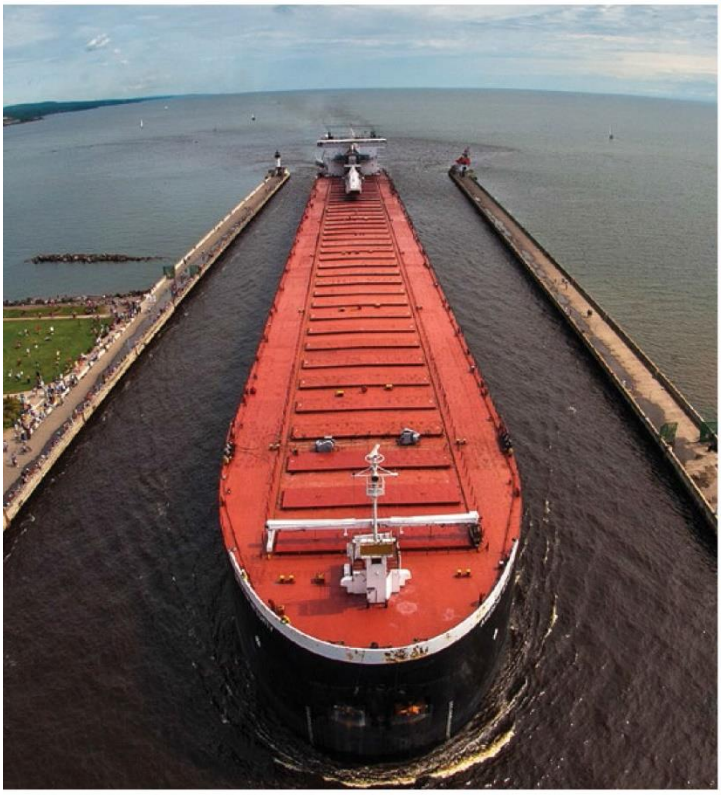
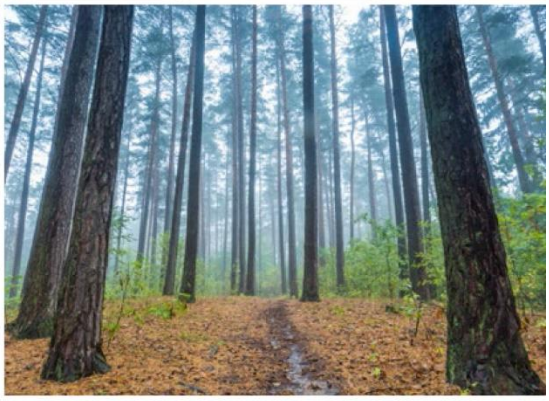
THE ECONOMIC IMPACT OF THE CANADA/NORTHEASTERN MINNESOTA TRADE RELATIONSHIP

on the Arrowhead Region of Minnesota

August 15, 2018







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The Consulate General of Canada and the Embassy of Canada to the United States provided the majority of inputs for this report, via data provided by The Trade Partnership and Dun & Bradstreet. Where data was not available from the Consulate General of Canada, the BBER utilized IMPLAN and other secondary data sources. The report is conditional upon the completeness, accuracy, and fair presentation of that data and information. The BBER does not promise or guarantee the outcome of these results but rather is providing projections based upon inputs and outputs using IMPLAN software.

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Executive Summary

The Consulate General of Canada contacted the Bureau of Business and Economic Research (BBER), a research entity of UMD's Labovitz School of Business and Economics, to study the economic impacts of the trade relationship between Canada and northeastern Minnesota to increase awareness, understanding, and appreciation of that relationship. More specifically, the BBER was asked to assess the local economic impacts resulting from regional exports to Canada and Canadian Foreign Direct Investment (FDI) in the seven counties of the Arrowhead region.

The economic modeling software used was IMPLAN. Data used was the most recent IMPLAN data, which is for year 2016. Results of modeling are reflected in 2018 dollars.

Inputs for estimating the economic impacts from the Arrowhead region's exports to Canada and Canadian FDI were provided by the Embassy of Canada to the U.S., in Washington, D.C., using data sourced from The Trade Partnership and Dun & Bradstreet. Data consisted of total exports in U.S. dollars (goods and services) from the Arrowhead region to Canada and Canadian FDI by company, measured by number of employees.

In 2016, goods exports to Canada totaled $178 million, while service exports totaled nearly $31 million. The following year, 2017, goods exports had increased significantly, to $255 million. Service export estimates were not available at the time of modeling, therefore, a similar value ($31 million) was projected for 2017. In addition, Canada was directly invested in 25 businesses with 2,603 employees within the study area as of 2018.

The economic impacts from exports were modeled for the years 2016 and 2017 to show a range of effects. In 2016, the economic impacts from exports to Canada totaled more than $300 million in output for the seven-county region, added $62 million in wages, and supported roughly 1,400 jobs. In 2017, the impacts resulting from exports to Canada increased to more than $400 million in output, roughly $85 million in wages, and over 1,700 jobs. Of the 1,700 jobs supported by exports in 2017, roughly 1,115 (65%) were due to exports of goods and roughly 600 (35%) to services.

Iron ore exports represented the largest share of goods exported, while the largest share of service exports came from the travel industry. In 2016, Canadian tourists spent more than $12 million on travel-related expenses in the Arrowhead region, including hotels, restaurants, retail, and entertainment.

Finally, while impacts from exports are significant, our models show that Canadian FDI has a much larger effect. It is estimated that Canadian FDI in the study area supported over 5,100 jobs in the Arrowhead region through direct, indirect, and induced effects. Nearly half of the jobs directly supplied by Canadian FDI in the study region were in the rail transportation industry, the result of Canadian ownership of the Duluth, Missabe, & Iron Range Railway. Other impacted industries include office administrative services and wholesale trade.

Over $1.1 billion in output can be tied to Canadian FDI, and the overall economic impact from Canadian FDI in the study area is more than twice as large as the impacts from exports.

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The Economic Impact of the Canada/Northern Minnesota Relationship on the Arrowhead region of Minnesota

I. Introduction

The Consulate General of Canada in Minneapolis, which represents Canada in five Upper Midwest states, including Minnesota, contacted the UMD Labovitz School of Business and Economics' research entity, the Bureau of Business and Economic Research (BBER) to revisit its 2016 study on the economic impacts of the trade relationship between Canada and northeastern Minnesota.

The economic modeling data and software used in the study was IMPLAN 3.1. The study used IMPLAN's economic multiplier analysis and input-output modeling.[1] Data was the most recent IMPLAN county data, which is for year 2016. Results are shown in 2018 United States dollars (USD).

State and National Trade

The purpose of this report is to increase awareness, appreciation, and understanding of the important trade relationship between northeastern Minnesota (Arrowhead region) and Canada. This section summarizes the U.S. and Minnesota relationship with Canadian trade and Foreign Direct Investment (FDI) more broadly and provides context for the volume of exports and FDI in the Arrowhead region.

According to the United States Trade Representative, the value of the trade and investment relationship between the two nations was estimated to be $1.4 trillion in 2017. An estimated $674 billion in trade and an additional $735 billion in investment make it one of the largest and most comprehensive trade relationships in the world.

In 2017, Canada was the United States' largest goods export market (at $283 billion) with the top three largest U.S. goods exports to Canada being automobiles, machinery and electrical machinery. Although historically service exports from the U.S. to Canada have represented a small share of total exports, that share has grown significantly over the past decade. The top three exported services from the U.S. to Canada included travel, intellectual property, and professional and management services (Office of the United States Trade Representative 2018).

Foreign Direct Investment (FDI) occurs when a company in one country has significant influence over a company from another country.[2] For example, in 2014, Burger King (U.S.) merged with Tim Hortons (CAN) to form a new Canadian multinational fast food company, Restaurant Brands International. Consequently, all Burger Kings in the United States are now considered to be FDI, as the entity owning Burger King operates outside of the United States. In 2017, Canada had $1.1 trillion invested in foreign countries (Global Affairs Canada 2018). Roughly $372 billion of Canadian FDI resides in the United States, and Canada invested $23.4 billion more in the U.S. during 2017 than in 2016 (Global Affairs Canada 2018).

According to the State Trade Fact Sheet for Minnesota produced by the Embassy of Canada to the United

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[1] For more information on input-output modeling, including data sources and assumptions used in the IMPLAN model, see Appendix A.

[2] According to Investopedia, the generally accepted criteria for significant influence is owning at least 10% of a company's voting stock.

States in Washington, DC,[3] Canada is the number one export market for 33 U.S. states, one of which is Minnesota. Minnesota has a $14.9 billion bilateral trade relationship with Canada, with $5.1 billion in exports to Canada and $9.8 billion in imports from the country. The top three goods exported from Minnesota to Canada were automobiles, medical equipment, and ore. The top three service exports were business, professional and technical services, travel, and transportation services.

Finally, according to FDI data from Dun and Bradstreet (2018) as provided by the Embassy of Canada to the United States, Canada firms had operations in 193 Minnesota businesses and supported nearly 40,000 jobs in the state, making it the most highly invested foreign influence in Minnesota (Department of Employment and Economic Development 2018).

Study Area

The geographic scope for this economic impact analysis was the Arrowhead region of northeastern Minnesota. Counties included are Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, and St. Louis.

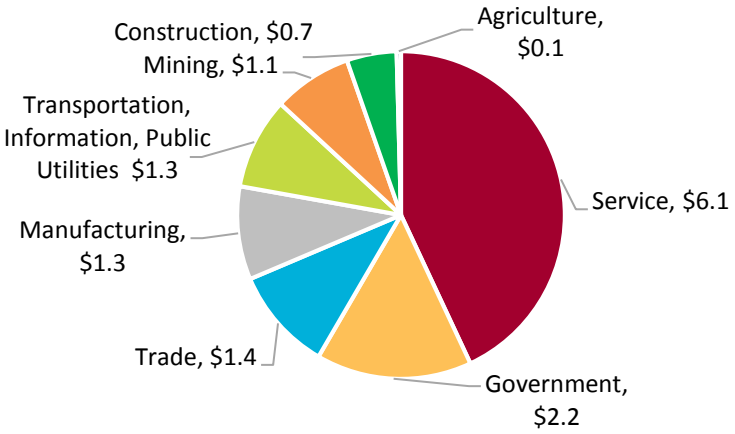
IMPLAN provides data on each county included in the subject area as well as data on each industry's contribution to the region's GRP, also referred to as value added. Data shown represents the most recent IMPLAN data available, which is for the year 2016.

According to IMPLAN's database, employment in the study area in 2016 totaled more than 186,000. Industries with the highest employment levels included hospitals, government, wholesale trade, restaurants, health care, real estate, and retail.

Figure 1. MN Arrowhead Counties

SOURCE: BBER, 2016

Figure 2. Contribution to Arrowhead region's Gross Regional Product, by Sector, 2016 (Billions of USD)



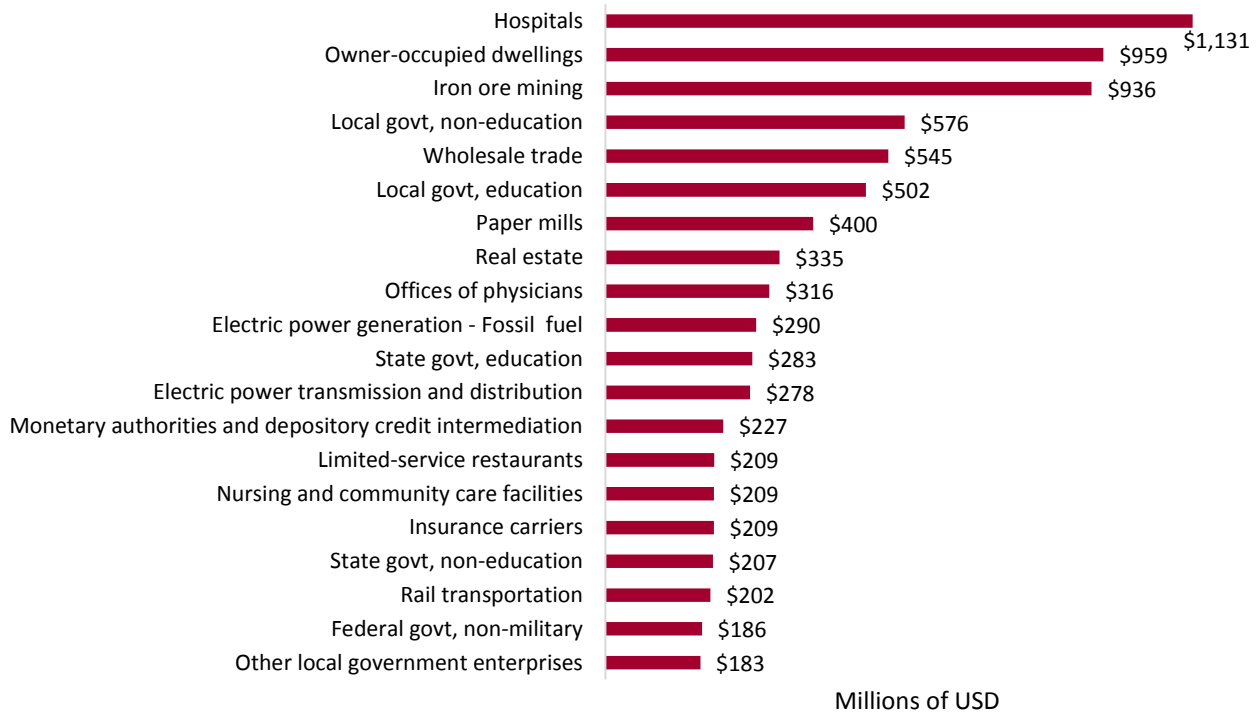
Total Gross Regional Product: $14.1 Billion

SOURCE: IMPLAN

[3] Sources of information for this paragraph are listed on the State Trade Fact Sheet for Minnesota and are the following: U.S. Census Bureau: goods trade, Canada's export ranking (2/2018 release). U.S. Bureau of Economic Analysis: goods & services trade (3/2018 release). Trade Partnership: 2016 services exports (12/2017 release).

Figure 2 (previous page) shows the breakdown of the study area's gross regional product (GRP) by sector. GRP measures the market value of all final goods and services produced in a certain region and is one of the most important measures of the strength of an area's economy. In 2016, the Arrowhead region's GRP totaled more than $14 billion dollars. The service sector was the largest contributor to the region's GRP, with a total contribution of more than $6 billion. The service sector includes education, hospitality, health care, and social services, among other industries. The second largest contributor to GRP was the government sector, which contributed more than $2 billion to the region's economy in 2016.

Figure 3. Top 20 Industries in Arrowhead region by Contribution to GRP (Millions of USD)

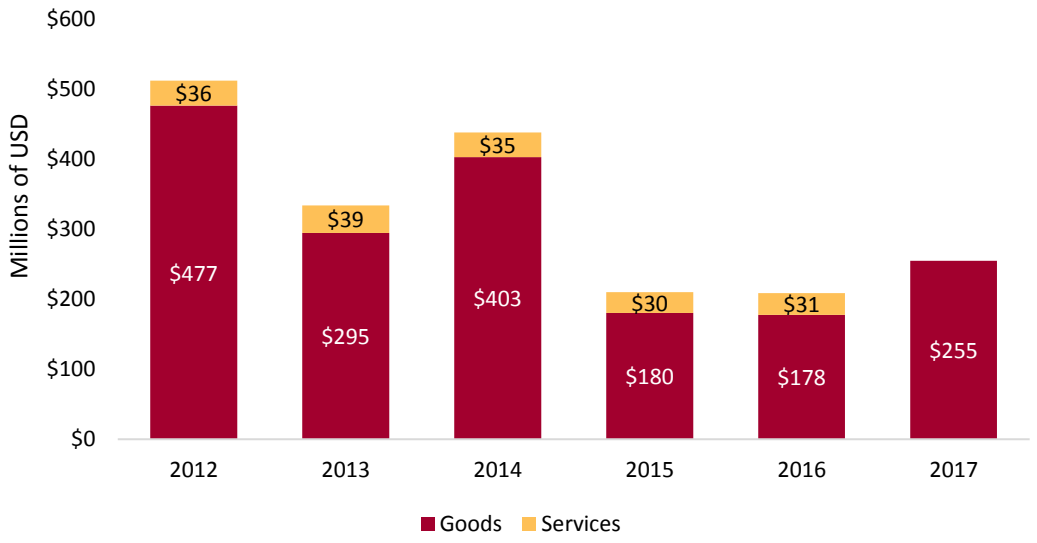


SOURCE: IMPLAN

Figure 3 above, shows the top twenty industries in the Arrowhead region based on each industry's contribution to the region's GRP (value added). In that year, area hospitals generated more than $1.1 billion (8%) of the region's total GRP. The industry, owner-occupied dwellings, includes imputed rental activity by homeowners. In this case, market rents are used to estimate the value to the property owner. Other major industries, as measured by value added, include iron ore mining, local government, and wholesale trade.

Exports

Figure 4. Goods and Services Exports from Arrowhead region to Canada (Millions of USD), 2012-2017

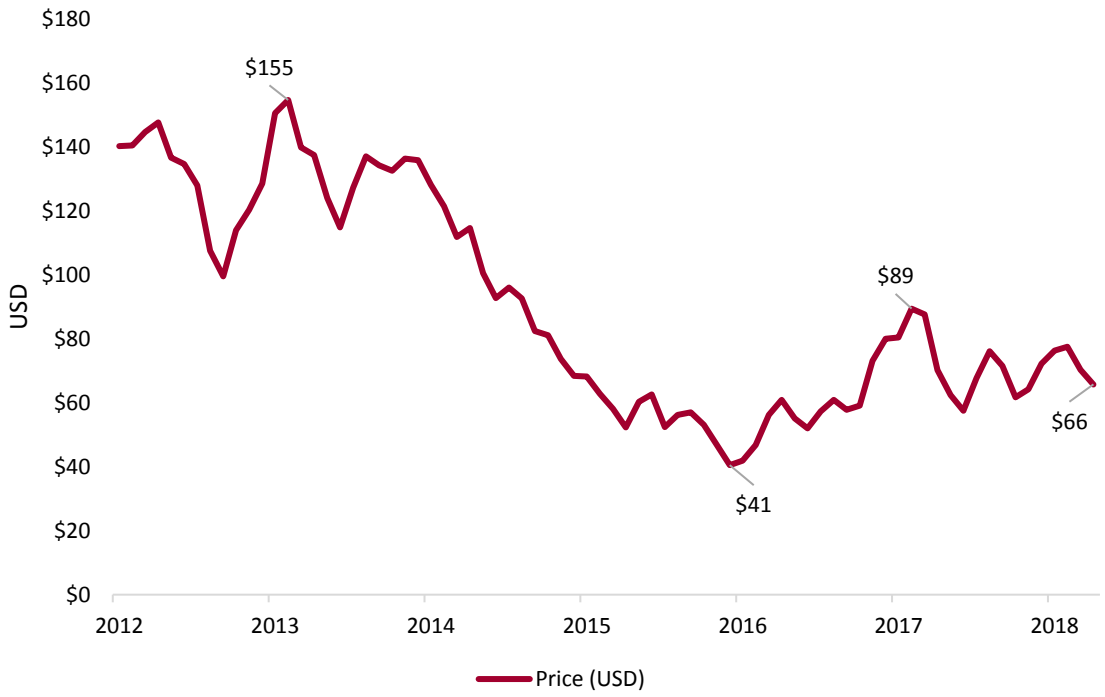


SOURCE: EMBASSY OF CANADA TO THE UNITED STATES, 2016

Figure 4 shows the total value of exports from the Arrowhead region to Canada between 2012 and 2017, as reported by the Embassy of Canada to the United States. As shown in the figure, goods exports made up the largest share of the region's total exports each year, but they also show greater fluctuation. In 2012, the Arrowhead region exported $477 million in goods to Canada. By 2016, that number had fallen to $178 million and then recovered slightly in 2017 to $255 million. Service exports were much more stable, only varying by around $10 million in the past six years. However, services represent only a small portion of total exports.

The strength of the U.S. dollar is a contributing factor in the fluctuation in exports from the Arrowhead region to Canada. Today, $1 United States dollar (USD) can be exchanged for approximately $1.3 Canadian dollars (CAD), whereas in 2012, the USD and CAD were roughly equal (Bloomberg Markets 2018).

Figure 5. Price of Iron Ore per Dry Metric Ton (USD), 2013-2018



SOURCE: INDEX MUNDI, 2018

Another reason for the large variation in goods exports from year to year is the fluctuation in the price of iron ore. Figure 5 shows the price of the commodity from 2012 to 2018 with its peak ($155) in 2013. From 2012-2016, the price steadily declined, reaching a low of $41 in early 2016. Since then, the price has been slowly recovering, leading to a brief spike in 2017 followed by fluctuations between $60 and $80 per ton within the past year. The considerable change from the peak price of $155 in 2013 to the current price of $66 marks a 57% drop in the price of iron ore.

One effect of the fluctuation in the price of iron ore is that revenue from metal ore exports to Canada as a proportion of total export revenue has been somewhat volatile. In 2016, the Arrowhead region exported $47 million in metal ore to Canada. That represented 26% of the region's total revenue from exports (U.S. Bureau of Economic Analysis 2018, as provided by the Embassy of Canada to the United States). In 2017, metal ore exports grew to $143 million and represented 56% of the region's export revenue.

While the revenue from iron ore exports has fluctuated quite a bit between 2012 and 2017, the volume of iron ore shipped to Canada through the Duluth-Superior Port had actually increased, according to data from the Duluth Seaway Port Authority (See Appendix B). In 2012, 5.5 million tons of iron ore and concentrates were shipped to Canada; roughly 31% of all the iron ore that left the Duluth-Superior Port was headed to Canada. In 2017, that amount had increased to 7.2 million tons and 36% of all iron ore shipments. More details on the port's annual shipping statistics can be found in Appendix B.

Foreign Direct Investment

According to Dun & Bradstreet, Canada is directly invested in 25 businesses in the Arrowhead region with 2,603 employees as of 2018. More than half of these workers are employed in the rail transportation industry, employed by the Duluth, Missabe & Iron Range Railway. This railroad company, which was acquired by Canadian National in 2004, operates in northern Minnesota and Wisconsin and distributes iron ore and taconite to the Great Lakes ports located in Duluth and Two Harbors.

II. Inputs

Inputs for estimating the economic impacts from the Arrowhead region's exports to Canada and Canadian FDI were provided by the Embassy of Canada to the United States. Data consisted of total exports in U.S. dollars (goods and services) from the Arrowhead region to Canada and Canadian FDI by company, measured by number of employees. Results were calculated with the assumption that the Embassy of Canada to the United States used the most accurate and up-to-date data available for the project. In instances where data were not provided by the Embassy of Canada to the United States, IMPLAN estimates and secondary data sources were utilized as inputs.

Goods Exports

Goods exports for the years 2016 and 2017 were used as the direct input for modeling. These two years provide a useful range of impacts, with 2016 representing a more modest, or conservative, year in terms of export revenue ($178 million in goods exports) and 2017 representing a more productive year ($255 million). Dollar amounts were then reclassified to the appropriate IMPLAN industry sector.[4] In cases where multiple IMPLAN industries were associated with one NAICS code, the respective percentages were distributed based on the industry's output level in the study area, according to IMPLAN's database. For example, NAICS code 1111 includes the IMPLAN sectors of oilseed and grain farming. The combined output for the two industries totaled just under $7 million in 2016, 41% of which came from oilseed farming and 59% from grain farming (IMPLAN). The total value of exports for that industry was distributed based on those ratios.

[4] A NAICS to IMPLAN bridge table was used to identify the appropriate IMPLAN industry associated with each NAICS code.

Table 1. Top 20 Arrowhead Industries Exporting Goods to Canada (Millions of USD), 2016-2017

4-digit NAICS code	*Description*	*2016*	*2017*
2122	Metal ores	$47.1	$143.4
3364	Aerospace products and parts	$42.7	$21.6
3331	Ag. and construction machinery	$12.1	$15.2
3221	Pulp and paperboard mill products	$14.4	$13.9
3222	Converted paper products	$4.5	$5.7
3251	Basic chemicals	$7.7	$4.5
3272	Glass and glass products	$2.7	$3.0
3279	Misc. nonmetallic minerals	$2.9	$2.8
3361	Motor vehicles	$2.6	$2.4
3329	Misc. fabricated metal products	$2.3	$2.3
3342	Communications equipment	$2.3	$2.2
3259	Misc. chemical preparations	$1.6	$1.8
3339	Misc. general purpose machinery	$1.9	$1.8
3352	Household appliances	$1.9	$1.7
3261	Plastics products	$1.3	$1.4
3211	Sawmill and wood products	$1.5	$1.3
3363	Motor vehicle parts	$1.3	$1.3
3311	Iron and steel and ferroalloys	$1.2	$1.2
3212	Veneer, plywood and engineered wood	$1.2	$1.1
3262	Rubber products	$1.2	$1.1
	All others Industries (n=81)	$23.8	$25.5
	Total goods exports	$178.1	$255.1

SOURCE: EMBASSY OF CANADA TO THE UNITED STATES, 2018

Table 1 shows the top 20 industries exporting goods from the Arrowhead region to Canada based on the goods exports data obtained from the Embassy of Canada to the United States. Exports are shown from highest to lowest based on 2017 revenue estimates. A complete list of export revenue for all goods-exporting industries in 2016 and 2017 is included in Table 7, Appendix C: Detailed Inputs.

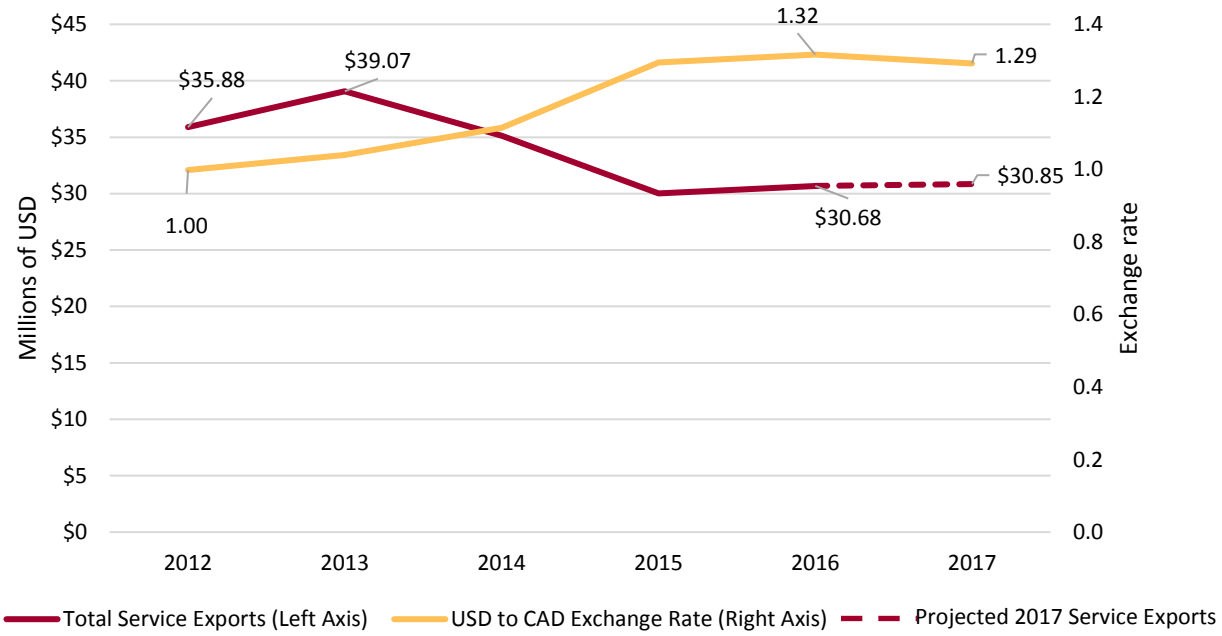
The metal ores industry was the largest exporter, exporting just over $47 million in 2016 and $143 million in 2017. Aerospace products and parts also exported a considerable amount of goods from the Arrowhead region to Canada in ($43 million in 2016). However, exports in this industry fell in 2017 ($22 million). Conversely, the agriculture and construction machinery industry saw positive growth in export revenue in 2017. This industry includes a large number of local businesses that specialize in construction, farm, and mining machinery manufacturing.

In 2016, goods exports equaled $178 million, making it the year with the lowest value of goods exports in the past five years. By 2017, goods exports rebounded slightly, totaling roughly $255 million. Despite many industries seeing a decline in goods exports between the two years, the total revenue from exports increased by nearly $100 million, due almost entirely to the increase in metal ores exports.

Services Exports

Service exports for 2012-2016 were from The Trade Partnership and provided by the Embassy of Canada to the United States. Service exports data from 2017, however, was not available at the time of this analysis. Instead, 2017 values were projected using a simple linear regression analysis comparing the value of service exports and the USD to CAD exchange rate.

Figure 6. USD to CAD Exchange Rate and Total Service Exports 2012-2017



SOURCE: EMBASSY OF CANADA TO THE UNITED STATES & XE.COM

Figure 6 shows the relationship between the USD to CAD exchange rate and total service exports from the Arrowhead region to Canada. The graph shows that there is an inverse relationship between the two values. The 2017 projected service exports value is represented by the dashed line in Figure 6. Once the total service export value was projected, values for each industry were distributed based on the average percentage of total service exports in each industry for the years 2015 and 2016. In 2012, the value of the Canadian and U.S. dollars were virtually equal, with an exchange rate of 1.0. At the same time, service exports were relatively high ($35.88 million in 2012). But as the U.S. dollar has increased in strength relative to the Canadian dollar, service exports declined. Since 2015, the USD to CAD exchange rate had been nearly 1.3, while service exports to Canada had fallen to about $30 million. Using this relationship, the value of service exports for the year 2017 was projected for use in modeling. The projected value for service exports, $30.8 million, is roughly equal to the 2016 reported value of $30.7 million.

Table 2. Top 20 Arrowhead Industries Exporting Services to Canada (Millions of USD), 2016 and 2017 Projected

Description	*2016*	*2017 (Projected)*
Travel	$12.4	$13.1
Other freight and port services	$6.7	$6.6
Installation, maintenance, and repair of equipment	$3.5	$3.3
Insurance services	$2.6	$2.6
Other financial services	$0.9	$0.9
Trademarks	$0.9	$0.9
Computer and data processing services	$0.6	$0.6
Franchise fees	$0.5	$0.5
Architectural, engineering, and other technical services	$0.5	$0.5
Construction	$0.3	$0.3
Advertising	$0.3	$0.2
Industrial processes	$0.2	$0.2
Industrial engineering	$0.2	$0.2
Other bookkeeping, payroll, & tax services	$0.2	$0.2
Legal services	$0.2	$0.2
Ocean freight and port services	$0.1	$0.1
Operation leasing	$0.1	$0.1
Management and advisory services	$0.1	$0.1
Computer software	$0.1	$0.1
Telecommunications	$0.1	$0.1
All other industries (n=32)	$0.3	$0.2
Total	$30.7	$30.8

SOURCE: EMBASSY OF CANADA TO THE UNITED STATES

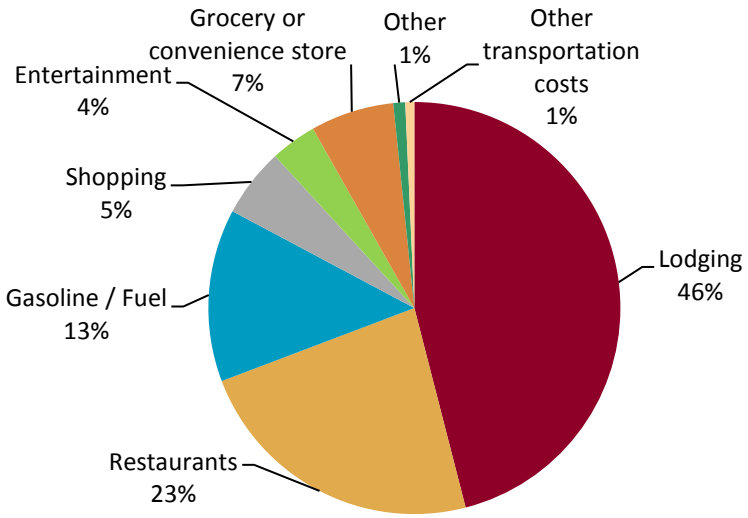
Table 2 shows the top 20 service exports from the Arrowhead region to Canada. The table includes 2016 reported values and 2017 projected values. A complete list of export revenue for all service-exporting industries in 2016 and 2017 (projected) is included in Table 8, Appendix C: Detailed Inputs.

Travel was the largest service export to Canada, with a 2017 projected value of more than $13 million. The second largest service-exporting industry was other freight and port services, which earned $6.7 million in 2016 by providing services to Canadian firms. Installation, maintenance, and repair of equipment was next, at roughly $3.3 million.[5]

According to the Bureau of Economic Analysis, travel includes all expenditures by foreign travelers – in this case, Canadian visitors to the Arrowhead region. Services within the travel industry include restaurants, lodging, recreation, retail, entertainment, local transportation, and other items incidental to a foreign visit.

[5] Unlike goods exports, service exports are not assigned to a specific NAICS industry. Rather they are categorized based on the description of the service (e.g. advertising, computer software, travel). Therefore, the reported 2016 values and projected 2017 values were assigned to the appropriate IMPLAN industry using IMPLAN's sector search feature.

Figure 7. Estimated Travel Spending by Canadian Visitors to Northeast Minnesota



SOURCE: BBER

Because of the wide variety of activities that are included in the travel sector, the values reported for travel exports could not be assigned solely to one IMPLAN industry. To determine the appropriate allocations of travel exports, relevant studies focusing on tourism spending (particularly tourism spending in Minnesota's northeast region) were evaluated. Each study's spending estimates were categorized into lodging, restaurants, grocery or convenience stores, gasoline or fuel, other transportation costs, entertainment, shopping, and other expenditures. In each report, the industries were measured as a percentage of total travel expenditures in the area. These percentages were used to develop a typical tourist spending pattern, (see Figure 7) and allocated to the appropriate IMPLAN sectors. Figure 7 shows that roughly half of typical expenditures are spent on lodging (46%), followed by restaurants (23%), and gasoline/fuel (13%).

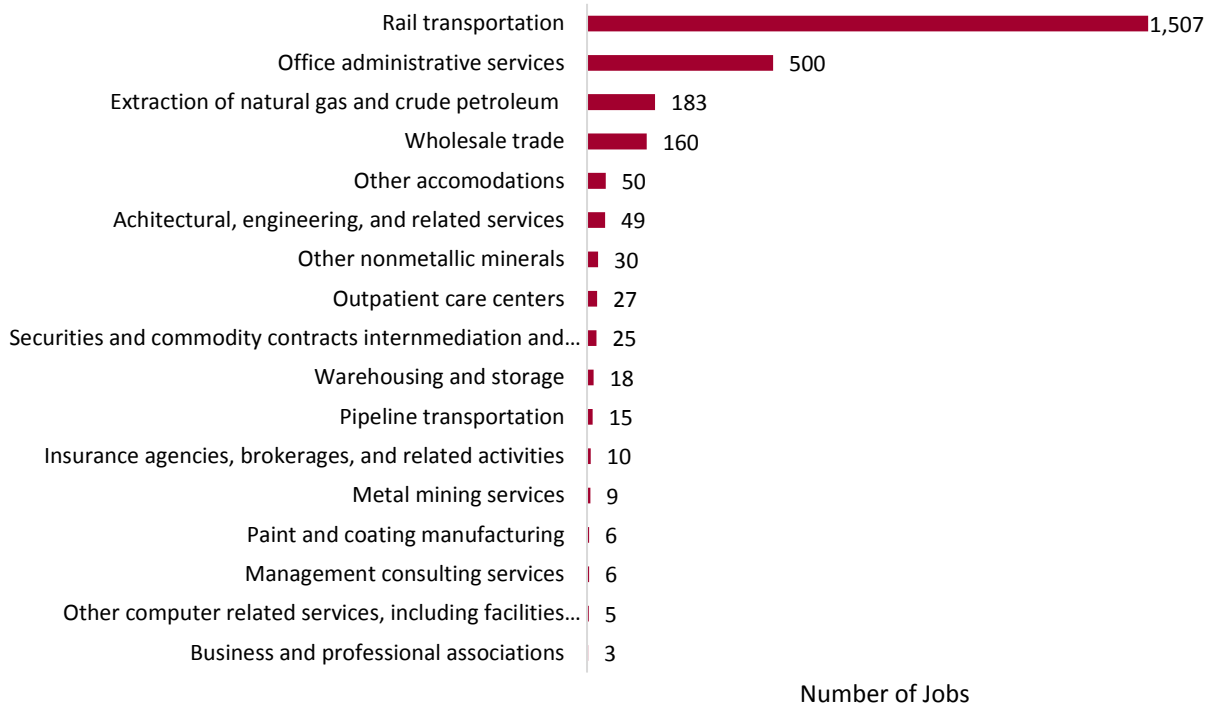
Foreign Direct Investment

To assess the economic impact of Foreign Direct Investment (FDI) by Canada in the Arrowhead region, all Canadian-owned firms were identified using Dun and Bradstreet data provided by the Embassy of Canada to the United States.[6] This list was narrowed to include only those firms within the seven counties of the Arrowhead region. The data provided the firm name and the number of employees working at each firm.[7] In the Dun and Bradstreet data, each company was assigned a line of business that described the nature of the business, and this description was used to bridge the companies into IMPLAN codes. By using the number of employees and appropriately classifying each firm by industry in the IMPLAN software, the economic impact that currently exists as a result of Canadian FDI was estimated. The FDI was modeled separately from goods and services exports, as the two measures are not mutually exclusive. That is, if a Canadian FDI firm located

[6] Enbridge Energy was not included in the Dun and Bradstreet data but has a significant presence in the Arrowhead region. Enbridge Energy is a Canadian firm but its numbers were not included for the Arrowhead region, presumably because its U.S. headquarters are located in Houston. To account for the omission, employment data were collected directly from the firm and added to the Dun and Bradstreet data for use in modeling FDI. Its employees were included in the oil and gas extraction sector.
[7] During the writing of this report, news was released that a Canadian company, Heliene Inc., purchased a once-shuttered solar panel manufacturing plant in Mountain Iron, Minnesota (located in the seven-county study area) and intends to employ 130 workers. The firm's effects are not included in this report but will create additional impacts once operational.

in Minnesota manufactures a product and exports it to Canada, the value would be counted both in FDI (number of employees) and Minnesota exports (value of sales).

Figure 8. Number of Workers Directly Employed by Canadian-Operated Firms in the Arrowhead region (by Sector), 2018



SOURCE: DUN AND BRADSTREET, ENBRIDGE ENERGY

Figure 8 shows the number of workers employed by Canadian-operated firms in the Arrowhead region by sector. In total, Canadian FDI supports more than 2,600 jobs in the Arrowhead region. The Duluth, Missabe & Iron Range Railway employed the majority of workers, supporting employees in both the rail transportation industry as well as office administrative services. Other prominent industries include extraction of natural gas and crude petroleum, wholesale trade, other accommodations (which includes hotels and motels), and architectural, engineering, and related services. While the wholesale trade industry encompasses employment from many different lines of business, employment in many of the other industries (e.g. other accommodations and architectural, engineering, and related services) represents the contribution of a single firm.

III. Findings

This section provides the direct, indirect, and induced economic impacts resulting from the exports of goods and services from the Arrowhead region to Canada along with the impacts of Canadian FDI in the region. Impacts are measured in employment, output, and value added.

Exports

As noted previously, the value of exports, particularly exports of goods, can vary widely from year to year. For example, between 2016 and 2017, exports of goods to Canada increased from $178 million to $255 million. Therefore, the economic impacts from exports were modeled for both years (2016 and 2017) to show a range of effects.

Table 3. Total Economic Impact of Goods and Services Exports from the Arrowhead Region to Canada, 2016 (Millions of USD)

Export Type	*Employment*	*Labor Income*	*Value Added*	*Output*
Goods Exports	842	$43.0	$92.8	$236.3
Services Exports	584	$19.0	$30.6	$68.4
Total Exports	1,426	$62.0	$123.4	$304.7

SOURCE: IMPLAN

Table 3 depicts the combined total economic effects of goods and service exports to Canada from the Arrowhead region in 2016. The left column, labeled employment, indicates the number of jobs that the Arrowhead region's trade relationship with Canada is estimated to support directly and indirectly.[8] Employment estimates are in terms of jobs, not full-time equivalent employees. The total amount of jobs created for the Arrowhead region as a result of exporting to Canada was estimated to be just over 1,400 in 2016.

The second column, labeled labor income, depicts all employee compensation, including wages, benefits, and proprietor income. In 2016, it is estimated that $62 million of employee wages and benefits in the study area could have been attributed to exports to Canada. The third column, value added, represents the economic impacts of the expenditures by Canadians in the study area that are put specifically towards wages, rents, interest, and profits related to the study area exports. Value added indicates the contribution to GDP made by an individual producer, industry, or sector. The value added for the study area exports of goods and services to Canada in 2016 was just over $123 million. Lastly, the far right column, labeled output, represents the value of all local production and was equal to just over $300 million in 2016. In all measures – employment, labor income, value added, or output – goods exports contribute the majority.

Table 4. Total Economic Impact of Goods and Projected Services Exports from the Arrowhead Region to Canada, 2017 (Millions of USD)

Export Type	*Employment*	*Labor Income*	*Value Added*	*Output*
Goods Exports	1,115	$65.6	$148.2	$339.6
Projected Services Exports	599	$19.3	$30.9	$69.3
Total Exports	1,714	$84.9	$179.1	$408.9

SOURCE: IMPLAN

Table 4 summarizes the combined total economic effects of goods and the projected services exports to Canada from the Arrowhead region in 2017. As shown in the table, the economic impacts resulting from exports to Canada increased to more than $400 million in output, roughly $85 million in wages, and over 1,700 jobs.

[8] All definitions used in the report can be found in Appendix D.

These values serve as a reference point to identify the recent increase in regional exports from the Arrowhead region to Canada. As mentioned previously, 2016 marked a historically low year ($178 million) for goods exported from the Arrowhead region to Canada (see Figure 4, page 4), however, the recent increase has had significant economic impacts on the study area as a whole. For example, the total number of jobs created for the Arrowhead region as a result of exporting to Canada has increased 20% from 2016 to 2017. Similarly, labor income, value added, and regional output have also recognized sizable growth over the past year. Specifically, regional output recognized $100 million in growth in 2017, a 25% increase from 2016.

It is notable that while service exports represented only 15% of the overall revenue from exports to Canada in 2017, they accounted for 35% of the estimated jobs created – of the 1,700 jobs supported by exports in 2017, nearly 600 were the result of service exports. This is likely due to the labor intensive nature of the travel and tourism industry, which employs a large number of people in the region but includes many part-time and seasonal positions.

Table 5. Goods and Projected Services Exports Impact Details 2017 (Millions of USD)

Impact Type	*Employment*	*Labor Income*	*Value Added*	*Output*
Direct Effect	978	$54.8	$127.5	$301.7
Indirect Effect	356	$15.7	$26.4	$60.4
Induced Effect	380	$14.5	$25.2	$46.7
Total Effect	1,714	$84.9	$179.1	$408.9

SOURCE: IMPLAN, BBER

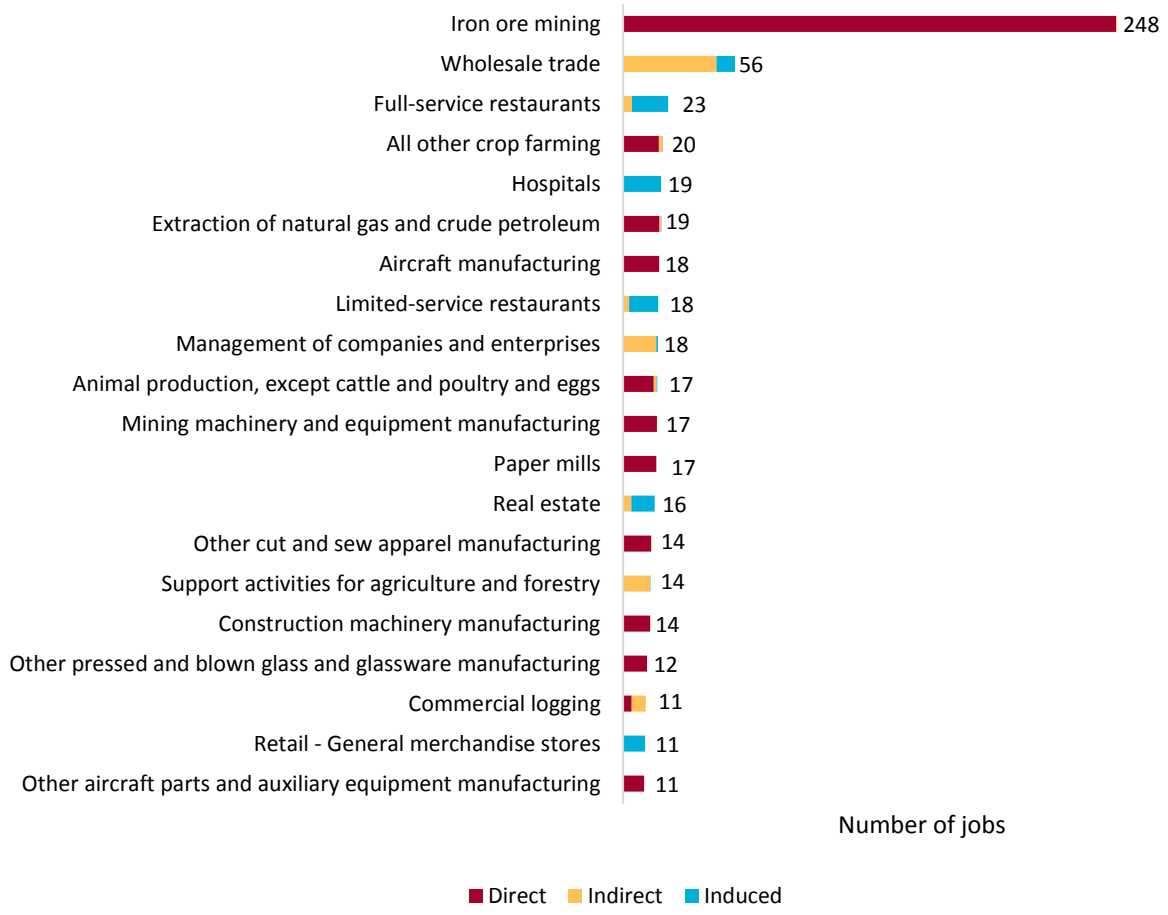
Table 5 shows the detailed economic impacts of goods and services exports to Canada from the Arrowhead region in 2017.[9] In this table, the total effects of exports are broken down by impact type – direct, indirect, and induced. The inputs provided by the Embassy of Canada to the United States (Tables 1 and 2) represent the direct effects. In this case, the sum of all goods exports in 2017 ($257.5 million) and the projected value of service exports ($44.2 million) are shown as direct output, equaling $301.7 million in total exports. All other direct effects (wages, employment, and value added) were calculated based on the value of output, using IMPLAN's modeling software. It is estimated that 978 jobs, $54.8 million in wages, and $127.5 million in value added spending were directly created in the Arrowhead region to support the more than $301 million in exports to Canada.

The second row of the table shows indirect effects resulting from exports to Canada. Indirect effects represent the additional economic activity among industries as a result of the direct effects. In this case, industries that support and do business with exporting industries saw $60.4 million in additional spending and the addition of 356 jobs because of the trade relationship between the Arrowhead region and Canada. Many of the businesses that benefit from these indirect effects may not export but still see economic benefits from partnering with those industries that do business with Canada.

Induced effects measure the amount of increased spending by residential households as a result of the direct effects. It includes, for example, spending on health care costs, household items, housing, and recreation. In this case, $46.7 million in new revenue, $25.2 million in value added spending, $14.5 million in wages, and 380 jobs can be attributed to increased spending by Arrowhead residents as a result of the trade relationship with Canada.

[9] A similar table showing goods and services exports impact details for 2016 can be found in Appendix E.

Figure 9. Top 20 Industries Impacted by Goods Exports to Canada, by Employment 2017

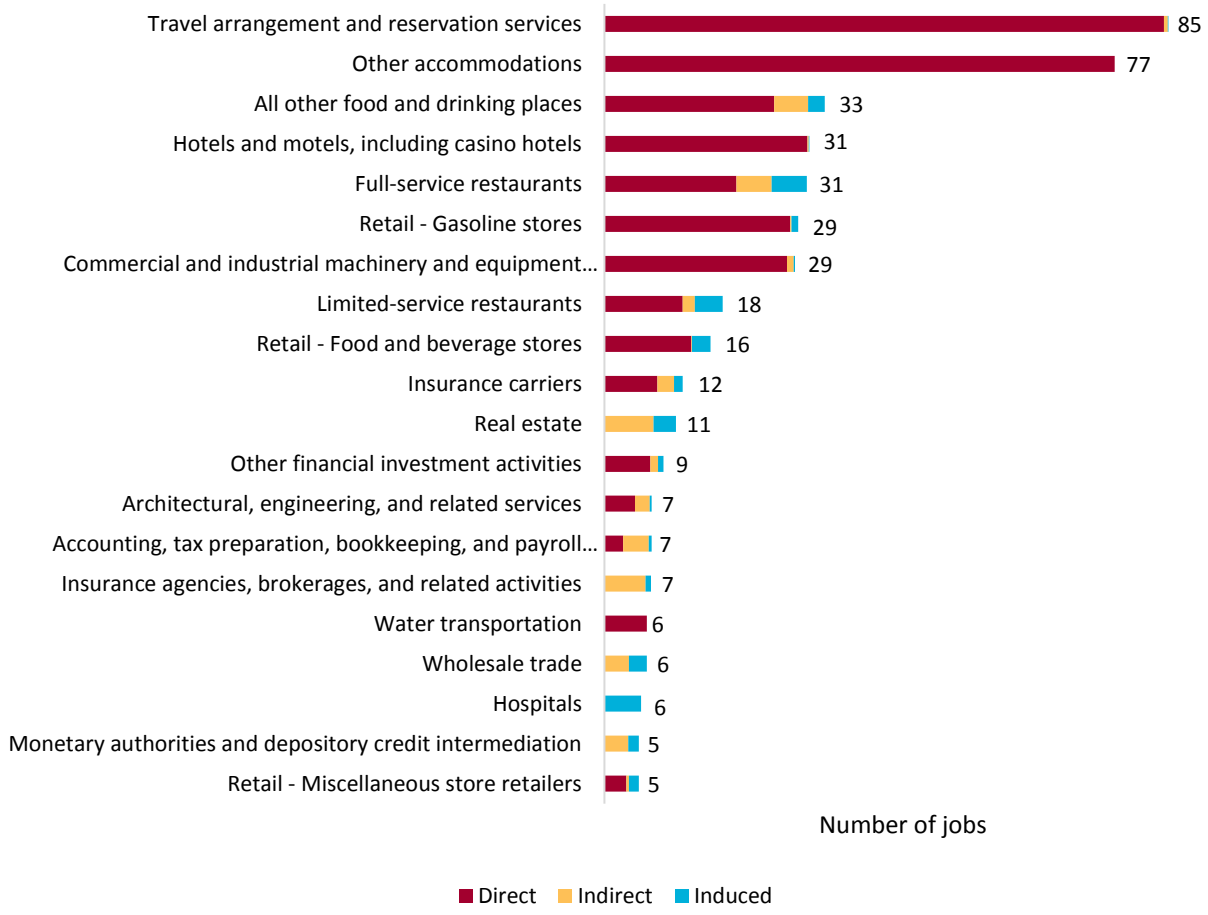


SOURCE: IMPLAN

Figure 9 shows the top 20 industries impacted by goods exports to Canada as measured by employment.[10] Employment effects are shown in terms of direct, indirect, and induced jobs. Iron ore mining is the industry that is most impacted by the trade relationship with Canada in terms of employment and by a significant margin. Roughly 250 jobs were directly supported in iron ore mining as a result of trade with Canada. Canadians import metal ore more than any other Arrowhead good, and this spending stimulates the mining industry. Of note, the second industry shown in the figure is wholesale trade, even though that industry does not export to Canada. Impacts are primarily indirect, the result of increased inter-industry spending, presumably from the iron ore mining industry and other direct exporters. In fact, eight of the top twenty industries most impacted by goods exports to Canada do not directly export but still saw significant benefits through indirect and induced spending.

[10] A similar figure showing GRP (value added) impacts by industry for 2017 can be found in Appendix E.

Figure 10. Top 20 Industries Impacted by Service Exports to Canada, by Employment 2016



SOURCE: IMPLAN

Figure 10 shows the top 20 industries in the study area impacted by exports of services to Canada in 2016, the most recent year where data was available.[11] Industries are shown based on the number of jobs created due to exports to Canada. Of note is that the top five (as well as nearly half of the top twenty) industries all fall into the broad category of travel. Travel was the largest exported service to Canada at $12 million in 2016, and it also supports the most jobs. Based on typical tourist spending patterns, it is estimated that the majority of the impacts resulting from service exports would be in the lodging and restaurant industries.

[11] A similar figure showing GRP (value added) impacts by industry for 2016 can be found in Appendix E.

Foreign Direct Investment

Foreign Direct Investment (FDI) was modeled separately from exports to avoid doubling count impacts. As previously stated, if a Canadian FDI company in the Arrowhead region were to export to Canada, the value would be included in Canadian-owned FDI and Arrowhead exports. As a result, modeling results from Exports and FDI are not mutually exclusive and, consequently, cannot be summed. Results are shown here in Table 6.

Table 6. FDI Impact Detail (Millions of USD), 2018

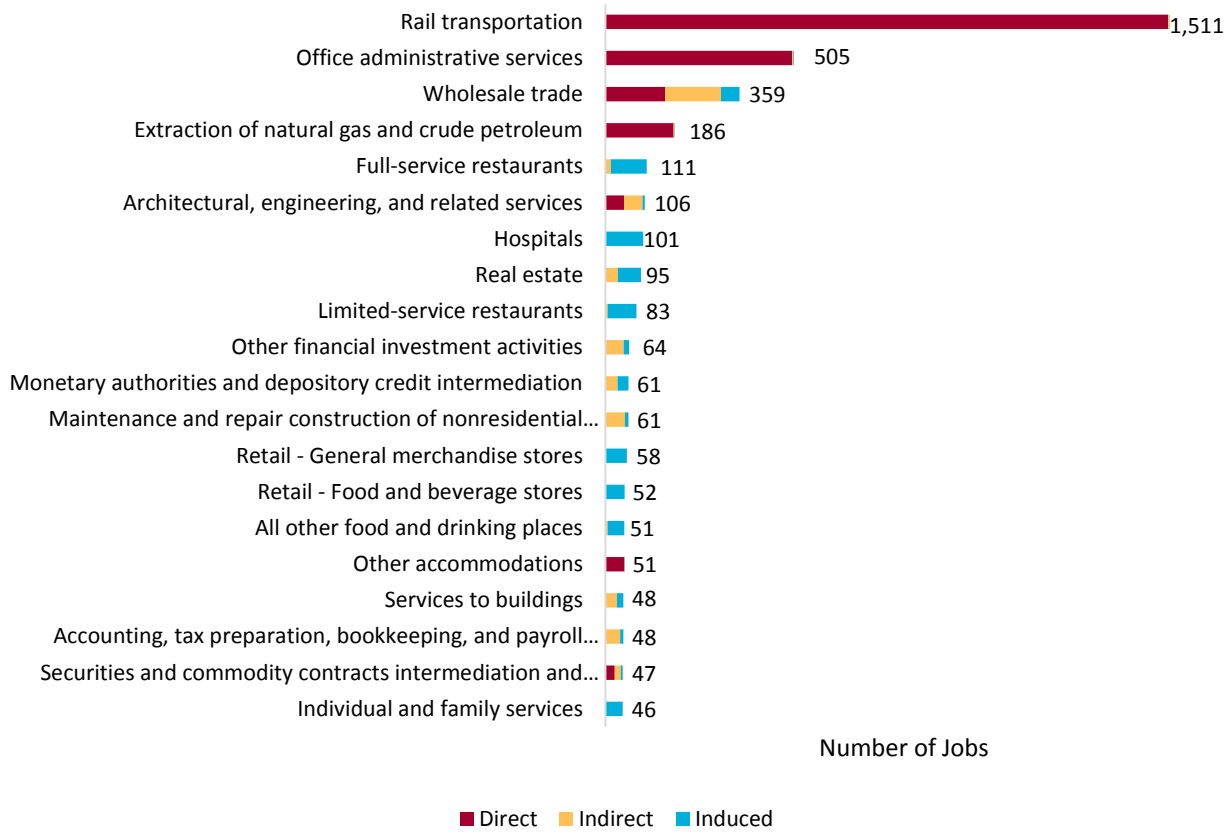
Impact Type	*Employment*	*Labor Income*	*Value Added*	*Output*
Direct Effect	2,605	$248	$477	$806
Indirect Effect	943	$40	$60	$127
Induced Effect	1,556	$59	$103	$191
Total Effect	5,105	$348	$640	$1,125

SOURCE: IMPLAN

Findings suggest that 2,605 jobs and over $805 million in expenditures can be directly tied to Canadian FDI in the Arrowhead region. Indirectly, 943 jobs were supported by FDI and $60 million in additional value added spending was the result of that relationship. Lastly, the induced effect of FDI supported 1,556 jobs in the study area and added nearly $60 million to labor income.

It is notable that the impacts in the study area resulting from Canadian FDI are much larger than the impacts from exports. It is estimated that Canadian FDI added more than 5,100 jobs and more than $1.1 billion in output, compared to 1,700 jobs and $409 million in output from exports (See Table 3). Canadian FDI also contributed more than twice as much value added to the study area as compared with exports.

Figure 11. Top 20 Industries Impacted by Canadian FDI by Employment, 2018



SOURCE: IMPLAN

Figure 11 shows the top 20 industries impacted by Canadian FDI, as measured by total number of jobs (direct, indirect, and induced).[12] Most jobs directly supplied by Canadian FDI in the study region were in the rail transportation industry, as shown in Figure 11 above.[13] Other impacted industries, in terms of employment, were office administrative services, wholesale trade, and extraction of natural gas and crude petroleum.

For additional results not shown here, including detailed impacts from 2016 exports and a list of top industry contributors to GRP from exports and FDI, readers may refer to Appendix E.

NOTE - Readers are encouraged to remember the UMD Labovitz School's BBER was asked to supply an economic impact analysis only. Any subsequent policy recommendations should be based on the "big picture" of total impact.

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[12] A similar figure showing GRP (value added) impacts by industry for 2017 can be found in Appendix E.

[13] In total, the railroad industry employs 2,007 workers in the Arrowhead region. However, not all of these employees were categorized in IMPLAN's rail transportation sector. Many workers employed by Canadian-owned rail companies were described as working in "Office administrative services." Hence, those employees were placed into the corresponding IMPLAN category of office administrative services to reflect the impacts associated with their profession better. This explains why direct employment in the rail transportation sector is measured at 1,507, not 2,007.

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Appendix A. Input-Output Modeling

This study uses the IMPLAN Group's input-output modeling data and software (IMPLAN version 3.1). The IMPLAN database contains county, state, zip code, and federal economic statistics, which are specialized by region, not estimated from national averages. Using classic input-output analysis in combination with region-specific Social Accounting Matrices and Multiplier Models, IMPLAN provides a highly accurate and adaptable model for its users. IMPLAN data files use the following federal government data sources:

- U.S. Bureau of Economic Analysis Benchmark Input-Output Accounts of the U.S.
- U.S. Bureau of Economic Analysis Output Estimates
- U.S. Bureau of Economic Analysis Regional Economic Information Systems (REIS) Program
- U.S. Bureau of Labor Statistics Covered Employment and Wages (CEW) Program
- U.S. Bureau of Labor Statistics Consumer Expenditure Survey
- U.S. Census Bureau County Business Patterns
- U.S. Census Bureau Decennial Census and Population Surveys
- U.S. Census Bureau Economic Censuses and Surveys
- U.S. Department of Agriculture Census

IMPLAN data files consist of the following components: employment, industry output, value added, institutional demands, national structural matrices, and inter-institutional transfers. Economic impacts are made up of direct, indirect, and induced impacts. The data used was the most recent IMPLAN data available, which is for the year 2016. All data are reported in 2018 dollars.

The following are suggested assumptions for accepting the impact model:[14]

Backward-Linkages: IMPLAN is a backward-linkage model, meaning that it measures the increased demand on industries that produce intermediate inputs as a result of increases in production. However, if an industry increases production, there will also be an increased supply of output for other industries to use in their production. Models that measure this type of relationship are called forward-linkage models. To highlight this concept, consider the example of a new sawmill beginning its operations in a state. The increased production as a result of the sawmill's operations will increase the demand for lumber, creating an increase in activity in the logging industry, as well as other supporting industries, such as electric transmission and distribution. IMPLAN's results will include those impacts but will exclude effects on any wood product manufacturers located nearby that might be impacted by the newly available supply of lumber.

Fixed Production Patterns: Input-output (I-O) models assume inputs are used in fixed proportion, without any substitution of inputs, across a wide range of production levels. This assumes that an industry must double its inputs (including purchases and employment) to double its output. In many instances, an industry will increase output by offering overtime, improving productivity, or improvements in technology.

Industry Homogeneity: I-O models typically assume that all firms within an industry have similar production processes. Any industries that fall outside the typical spending pattern for an industry should be adjusted using IMPLAN's Analysis-by-Parts technique.

[14] Bureau of Economic Analysis https://www.bea.gov/papers/pdf/WP_IOMIA_RIMSII_020612.pdf

Fixed Prices and No Supply Constraints: IMPLAN is a fixed-price model. This means that the modeling software assumes no price adjustment in response to supply constraints or other factors. In other words, the model assumes that firms can increase their production as needed and are not limited by availability of labor or inputs and that firms in the local economy are not operating at full capacity.

Employment: IMPLAN input-output is a production-based model, and employment numbers (from U.S. Department of Commerce secondary data) treat both full- and part-time individuals as being employed.

Leakages: A small area can have a high level of leakage. Leakages are any payments made to imports or value added sectors, which do not in turn re-spend the dollars within the region. What's more, a study area that is actually part of a larger functional economic region will likely miss some important linkages. For example, workers who live and spend outside the study area may actually hold local jobs.

Appendix B. Duluth Seaway Port Authority Data

PORT OF DULUTH-SUPERIOR MARINE TONNAGE REPORT - JANUARY 2013 & SEASON FINAL 2012 (In Short Tons of 2,000 lbs.)

	JANUARY 2012	JANUARY 2013	YEAR TO DATE 2011	YEAR TO DATE 2012
TOTAL CANADIAN	**424,859**	**226,916**	**6,708,871**	**6,493,171**
Canadian Exports	**368,560**	**205,841**	**6,194,703**	**6,141,380**
Coal & Coke	0	0	830,351	515,567
Grain & By-Products for Transshipment	0	0	247,252	42,509
Iron Ore & Concentrates	368,560	205,841	5,069,782	5,553,003
Misc. Bulk	0	0	47,318	30,290
Other	0	0	0	9
Canadian Imports	**56,300**	**21,075**	**514,168**	**351,791**
Dry Bulk	56,300	21,075	431,082	351,706
Grain & By-Products	0	0	83,086	0
Other	0	0	0	85
TOTAL DOMESTIC	**748,505**	**668,206**	**29,035,743**	**28,018,923**
Domestic Receipts	0	0	**3,830,169**	**3,349,605**
Coal & Coke	0	0	326,885	252,242
Dry Bulk	0	0	292,176	295,494
Limestone	0	0	3,211,108	2,801,869
Domestic Shipments	**748,505**	**668,206**	**25,205,574**	**24,669,318**
Coal & Coke	169,731	57,538	12,769,701	12,242,441
Grain, Bulk	0	0	307,480	325,297
Iron Ore & Concentrates	576,857	607,406	12,059,200	12,033,994
Liquid Bulk	1,917	3,263	69,193	67,586
TOTAL OVERSEAS	**0**	**0**	**1,356,940**	**2,160,957**
Overseas Exports	0	0	**1,332,733**	**2,117,922**
Coal & Coke	0	0	367,775	1,371,538
General Cargo	0	0	0	18,698
Grain & By-Products	0	0	878,157	697,541
Misc. Bulk	0	0	86,800	30,145
Overseas Imports	0	0	**24,207**	**43,036**
General Cargo	0	0	24,207	25,933
Other	0	0	0	17,103
TOTAL WATERBORNE COMMERCE	**1,173,364**	**895,123**	**37,101,554**	**36,673,052**

	JANUARY 2012	2013	YEAR TO DATE 2011	2012
US Flag Arrivals	15	14	596	614
Canadian Flag Arrivals	13	7	228	231
Subtotal Lake Arrivals	**28**	**21**	**824**	**845**
Overseas Vessel Arrivals	0	0	70	68
TOTAL VESSEL ARRIVALS	**28**	**21**	**894**	**913**

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Labovitz School of Business and Economics
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PORT OF DULUTH-SUPERIOR MARINE TONNAGE REPORT - JANUARY 2018 & SEASON FINAL 2017 (In Short Tons of 2,000 lbs.)

	JANUARY		YEAR TO DATE	
	2017	2018	2016	2017
TOTAL CANADIAN	**365,619**	**179,065**	**5,964,167**	**7,553,698**
Canadian Exports	**262,008**	**149,406**	**5,639,164**	**7,238,940**
Coal & Coke	0	0	436,784	54,480
Grain & By-Products for Transshipment	0	0	304,352	0
Iron Ore & Concentrates	262,008	149,406	4,898,028	7,184,298
Other	0	0	0	163
Canadian Imports	103,612	29,659	325,003	314,757
Dry Bulk	103,612	29,659	316,890	314,070
Other	0	0	8,113	687
TOTAL DOMESTIC	**245,861**	**418,050**	**22,715,462**	**26,602,734**
Domestic Receipts	**0**	**0**	**3,229,185**	**3,805,520**
Coal & Coke	0	0	154,528	113,966
Dry Bulk	0	0	213,768	266,489
Iron Ore & Concentrates	0	0	85,504	0
Limestone	0	0	2,775,386	3,425,065
Domestic Shipments	**245,861**	**418,050**	**19,486,277**	**22,797,214**
Coal & Coke	80,050	0	9,465,824	9,963,678
Grain, Bulk	0	0	224,414	230,915
Iron Ore & Concentrates	163,834	416,738	9,734,070	12,529,855
Liquid Bulk	1,978	1,312	61,969	72,767
TOTAL OVERSEAS	**0**	**0**	**1,419,124**	**1,095,342**
Overseas Exports	**0**	**0**	**1,354,628**	**1,014,626**
Coal & Coke	0	0	1,354,628	1,014,626
General Cargo	0	0	0	243
Grain & By-Products	0	0	1,160,499	773,900
Misc. Bulk	0	0	32,633	30,109
Overseas Imports	**0**	**0**	**64,496**	**80,716**
General Cargo	0	0	23,744	8,532
Other	0	0	40,752	72,183
TOTAL WATERBORNE COMMERCE	**611,480**	**597,115**	**30,098,753**	**35,251,774**

	JANUARY		YEAR TO DATE	
	2017	2018	2016	2017
US Flag Arrivals	6	13	450	512
Canadian Flag Arrivals	8	6	175	265
Subtotal Lake Arrivals	**14**	**19**	**625**	**777**
Overseas Vessel Arrivals	0	0	82	61
TOTAL VESSEL ARRIVALS	**14**	**19**	**707**	**838**

SOURCE: DULUTH SEAWAY PORT AUTHORITY

Appendix C. Detailed Inputs

Table 7. Goods Exports from Arrowhead region to Canada (Thousands of USD), 2016 &2017

4-Digit NAICS Code	*Description*	*2016 Exports*	*2017 Exports*
1111	Oilseeds & grains	$80.3	$92.6
1112	Vegetables & melons	$778.2	$799.3
1113	Fruits & tree nuts	$92.0	$76.9
1114	Greenhouse & nursery products	$53.5	$57.7
1119	Misc. Crops	$367.7	$339.8
1121	Cattle	$27.9	$112.8
1122	Swine	$2.9	$3.4
1123	Poultry & eggs	$217.3	$234.7
1129	Misc. animal products	$1,127.6	$309.0
1132	Forestry products	$217.3	$276.2
1133	Timber & logs	$75.6	$332.1
1141	Marine products	$23.3	$20.7
2111	Oil & gas	$986.1	$1,915.6
2122	Metal ores	$47,119.5	$143,431.7
2123	Nonmetallic minerals	$409.5	$371.6
3111	Animal foods	$13.9	$9.4
3112	Grain & oilseed milling products	$227.1	$235.3
3113	Sugar & confectionery products	$57.1	$27.1
3114	Preserves & specialty foods	$37.6	$37.1
3115	Dairy products	$15.0	$12.3
3116	Meat products	$161.0	$208.9
3117	Prepared seafood products	$7.7	$8.8
3118	Bakery & tortilla products	$127.1	$107.7
3119	Misc. foods	$43.9	$53.8
3121	Beverages	$219.6	$181.2
3132	Fabrics	$11.7	$12.6
3133	Finished & coated textile fabrics	$0.8	$1.7
3141	Textile furnishings	$161.8	$206.1
3149	Misc. Textile products	$994.7	$835.0
3151	Knit apparel	$9.8	$11.1
3152	Apparel	$1,062.8	$2,048.4
3159	Apparel accessories	$75.6	$58.1
3161	Leather & hide tanning	$3.5	$14.5
3162	Footwear	$105.7	$88.4
3169	Misc. leather products	$22.2	$18.1
3211	Sawmill & wood products	$1,484.2	$1,334.2
3212	Veneer, plywood & engineered wood	$1,164.9	$1,074.3
3219	Misc. Wood products	$1,090.0	$1,066.5
3221	Pulp & paperboard mill products	$14,449.2	$13,898.9
3222	Converted paper products	$4,538.4	$5,673.6
3231	Printed matter & related products	$25.4	$23.0
3241	Petroleum & coal products	$175.9	$190.4
3251	Basic chemicals	$7,660.6	$4,470.7

3252	Resins & synthetic fibers	$24.7	$26.5
3253	Pesticides & fertilizers	$824.7	$953.6
3254	Pharmaceuticals & medicines	$218.2	$200.4
3255	Paints, coatings & adhesives	$291.9	$278.3
3256	Soaps, cleaning agents & toiletries	$905.4	$679.3
3259	Misc. chemical preparations	$1,599.2	$1,806.0
3261	Plastics products	$1,308.2	$1,428.0
3262	Rubber products	$1,190.2	$1,057.0
3271	Clay & refractory products	$66.4	$82.3
3272	Glass & glass products	$2,680.6	$3,005.0
3273	Cement & concrete products	$1,139.8	$893.3
3274	Lime & gypsum products	$15.7	$10.9
3279	Misc. nonmetallic minerals	$2,920.7	$2,772.1
3311	Iron & steel & ferroalloys	$1,229.7	$1,204.4
3312	Products from purchased steel	$3.4	$3.1
3313	Aluminum	$602.1	$729.1
3314	Nonferrous metal products	$242.2	$278.1
3315	Foundry products	$731.1	$883.1
3321	Crowns, closures & seals	$77.8	$84.1
3322	Cutlery & handtools	$159.0	$152.3
3323	Architectural & structural metals	$156.2	$158.2
3324	Boilers, tanks & containers	$98.8	$106.4
3325	Hardware	$962.8	$1,034.9
3326	Springs & wire products	$124.8	$104.4
3327	Bolts, nuts & misc. Turned prods	$72.9	$64.3
3329	Misc. fabricated metal products	$2,283.6	$2,262.5
3331	Ag. & construction machinery	$12,088.4	$15,233.1
3332	Industrial machinery	$266.5	$318.9
3333	Comm. & serv. industry machinery	$204.1	$249.8
3334	Hvac & refrigeration equipment	$786.9	$989.2
3335	Metalworking machinery	$275.1	$274.7
3336	Engines & turbines	$123.2	$155.1
3339	Misc. general purpose machinery	$1,866.3	$1,790.9
3342	Communications equipment	$2,309.3	$2,191.4
3343	Audio & video equipment	$982.7	$1,101.2
3344	Semiconductors & components	$157.3	$202.5
3345	Navigational & meas. instruments	$97.6	$110.2
3346	Magnetic & optical media	$158.3	$157.2
3351	Electric lighting equipment	$201.5	$217.0
3352	Household appliances	$1,898.6	$1,700.5
3353	Electrical equipment	$853.1	$936.4
3359	Electrical equipment & components	$790.2	$821.3
3361	Motor vehicles	$2,581.2	$2,406.0
3362	Motor vehicle bodies & trailers	$46.0	$53.2
3363	Motor vehicle parts	$1,260.6	$1,294.4
3364	Aerospace products & parts	$42,664.4	$21,579.3
3365	Railroad rolling stock	$384.6	$265.8
3366	Ships & boats	$598.5	$539.8

3369	Misc. transportation equipment	$427.4	$332.4
3371	Household & institutional furniture	$278.1	$266.5
3372	Office furniture & fixtures	$165.4	$139.8
3391	Medical equipment & supplies	$373.5	$324.0
3399	Misc. manufactured commodities	$576.2	$633.2
9100	Scrap products	$106.6	$206.9
TOTAL		$177,977.8	$255,029.8

SOURCE: EMBASSY OF CANADA TO THE UNITED STATES

Table 8. Services Exports to Canada from Arrowhead region (Thousands of USD), 2016 & 2017 Projected

Description	*2016 Exports*	*2017 Exports (Projected)*
Travel	$12,417.5	$13,054.5
Other Freight & Port Services	$6,749.6	$6,582.4
Installation, maintenance, and repair of equipment	$3,483.4	$3,280.9
Insurance Services	$2,566.2	$2,556.2
Trademarks	$914.7	$949.1
Other Financial Services	$933.3	$873.6
Computer and data processing services	$637.6	$625.0
Architectural, engineering, and other technical services	$489.6	$508.9
Franchise Fees	$491.4	$476.6
Construction	$285.6	$311.5
Advertising	$282.8	$214.8
Other BPT	$181.5	$207.3
Industrial Processes	$207.5	$206.9
Industrial Engineering	$205.1	$187.0
Legal Services	$174.0	$154.8
Ocean Freight & Port Services	$136.3	$125.0
Computer Software	$66.5	$81.0
Operation Leasing	$79.7	$79.8
Management and advisory services	$68.5	$67.6
Telecommunications	$56.4	$61.5
Accounting, auditing, and bookkeeping	$51.6	$48.8
Research and development and testing services	$42.6	$45.2
Securities Transactions	$37.2	$37.5
Management and consulting services	$25.0	$21.9
Sound Recording	$25.4	$21.5
Other Intangibles	$27.6	$19.2
Air Freight & Port Services	$17.4	$18.3
Passenger Fares	$14.0	$14.5
Credit-Related Services	$10.8	$11.6
Film & Television Distribution	$3.0	$3.2
Database and information services	$0.0	$0.1
TOTAL	$30,681.9	$30,846.2

SOURCE: EMBASSY OF CANADA TO THE UNITED STATES

Appendix D. Definitions Used in This Report

Direct Effect: Initial new spending in the study area resulting from the project.

Employment: Estimates (from U.S. Department of Commerce secondary data) are in terms of jobs, not in terms of full-time equivalent employees. Therefore, these jobs may be temporary, part-time, or short-term.

Foreign Direct Investment: An investment made by a firm or individual in one country into business interests located in another country.

Gross Output: The value of local production required to sustain activities.

Indirect Effect: The additional inter-industry spending from the direct impact.

Induced Effect: The impact of additional household expenditures resulting from direct and indirect impact.

Labor Income: All forms of employment income, including employee compensation (wages and benefits) and proprietor income.

Value Added: A measure of the impacting industry's contribution to the local community; it includes wages, rents, interest, and profits.

Appendix E. Additional Findings

Appendix E includes additional findings not shown in Section III.

Table 9. Good and Services Exports Impact Details 2016 (Millions of USD)

Impact Type	*Employment*	*Labor Income*	*Value Added*	*Output*
Direct Effect	839	$38.2	$84.1	$224.1
Indirect Effect	310	$13.2	$20.8	$46.6
Induced Effect	278	$10.5	$18.4	$34.1
Total Effect	1427	$62.0	$123.4	$304.7

SOURCE: IMPLAN

Table 10. Goods & Services Exports Impact Detail 2016 (Millions of USD)

Export Type 2016	*Impact type*	*Employment*	*Labor Income*	*Value Added*	*Output*
Goods	Direct Effect	451	$26.7	$65.5	$180.4
	Indirect Effect	199	$8.9	$14.5	$32.3
	Induced Effect	193	$7.3	$12.8	$23.7
	Total Effect	842	$43.0	$92.8	$236.3
Services	Direct Effect	388	$11.5	$18.6	$43.7
	Indirect Effect	111	$4.3	$6.3	$14.3
	Induced Effect	85	$3.2	$5.6	$10.4
	Total Effect	585	$19.0	$30.6	$68.4

SOURCE: IMPLAN

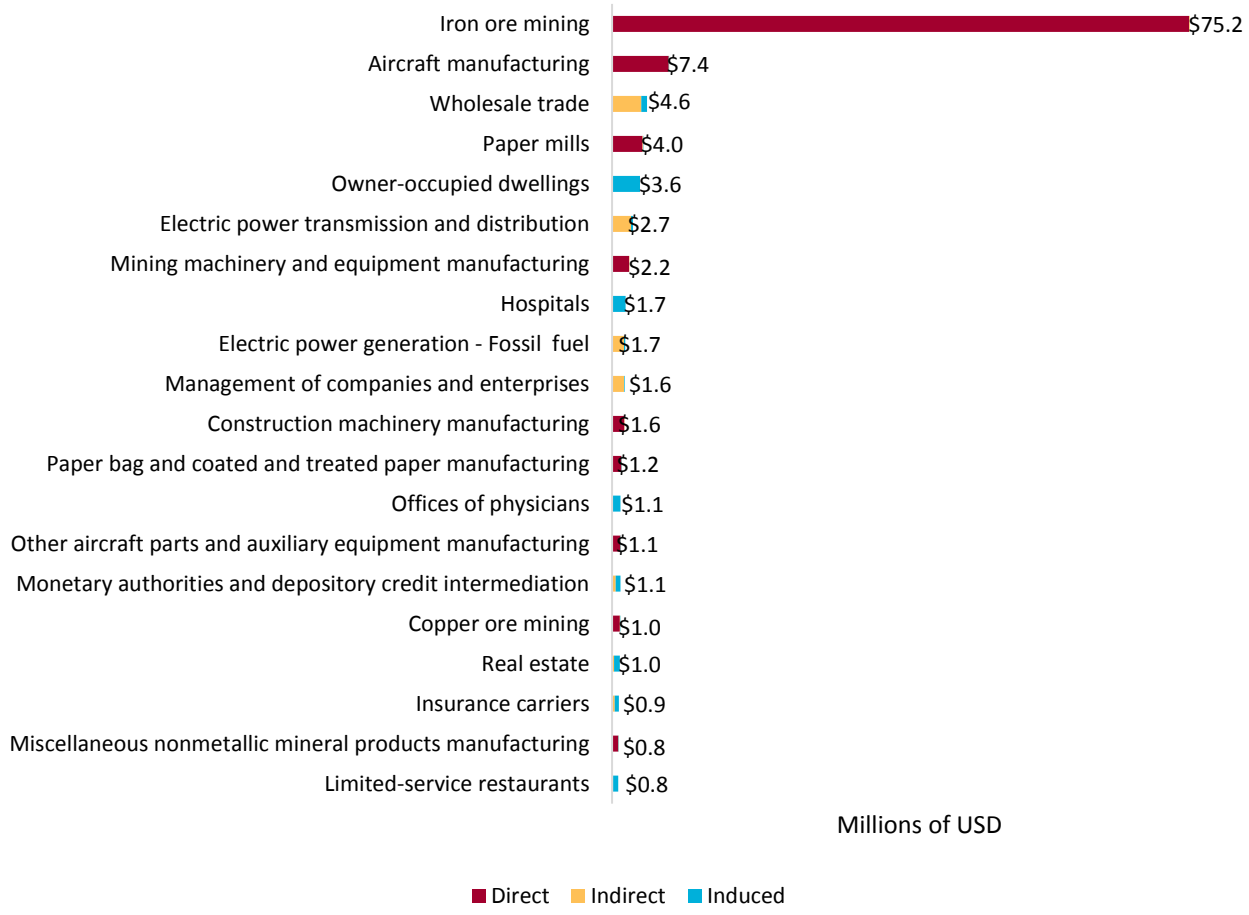
Table 11. Goods & Services Exports Impact Details 2017 (Millions of USD)

Export Type 2017	*Impact Type*	*Employment*	*Labor Income*	*Value Added*	*Output*
Goods	Direct Effect	578	$43.1	$108.7	$257.5
	Indirect Effect	243	$11.3	$20.0	$46.0
	Induced Effect	294	$11.2	$19.5	$36.1
	Total Effect	1,115	$65.6	$148.2	$339.6
Services (Projected)	Direct Effect	400	$11.6	$18.8	$44.2
	Indirect Effect	113	$4.4	$6.4	$14.5
	Induced Effect	86	$3.3	$5.7	$10.6
	Total Effect	599	$19.3	$30.9	$69.3

SOURCE: IMPLAN, BBER

Tables 9 and 10 show the detailed economic impacts from exports to Canada for 2016 and 2017. In this table, the total effects of exports of goods and services are broken down by impact type of direct, indirect, and induced effect. Impacts are shown for both goods and services. The inputs provided by the Embassy of Canada to the United States (Table 1, page 7 and Table 2, page 9) represent the direct effects and are the basis for quantifying the full economic effects of the project.

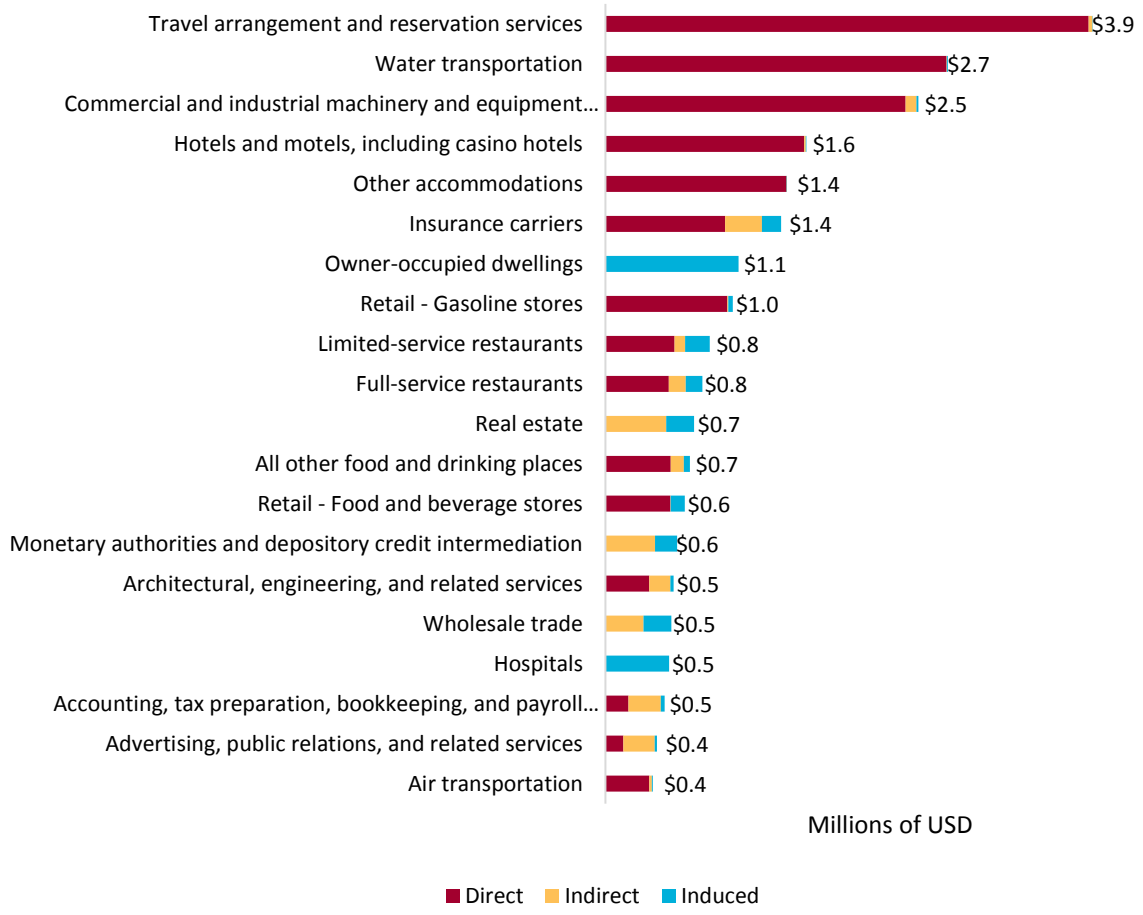
Figure 12. Top 20 Industries Impacted by Goods Exports to Canada, by Contribution to GRP, 2017



SOURCE: IMPLAN

Figures 12 shows the top industries impacted by the export of goods to Canada in 2017, as measured by increased value added spending. Value added is a measure of the impacting industry's contribution to the local community; it includes wages, rents, interest, and profits. It is also the best measure of how much the industry or project increases the local economy, as measured by Gross Regional Product (GRP).

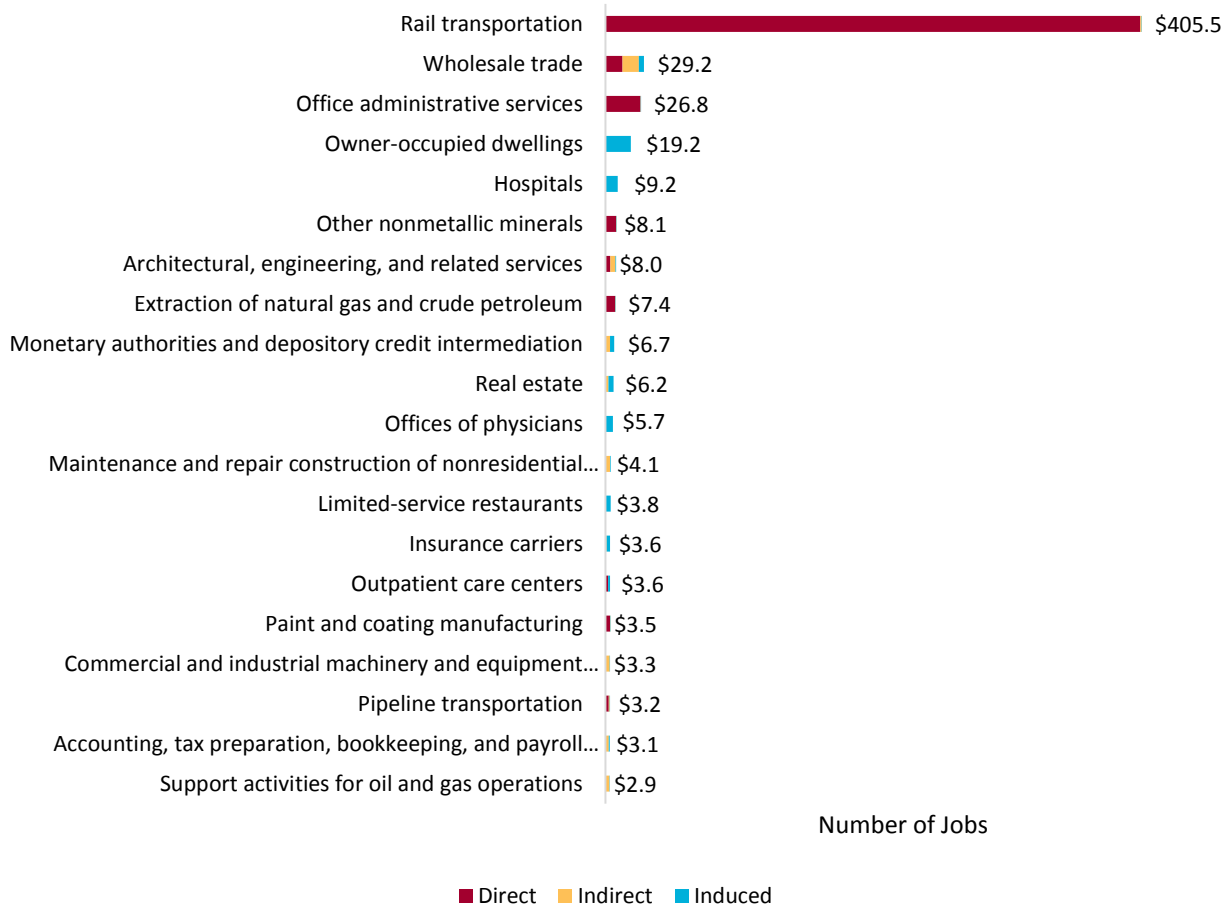
Figure 13. Top 20 Industries Impacted by Service Exports to Canada, by Contribution to GRP, 2016



SOURCE: IMPLAN

Figure 13 highlights the top industries impacted by exports of services to Canada, as measured by their contribution to GRP. Again, many tourism-related industries (e.g. lodging, restaurants) see significant impacts from service exports to Canada (i.e. Canadian tourists). Other impacted industries include insurance carriers, real estate, and monetary authorities and depository credit intermediation services.

Figure 14. Top 20 Industries Impacted by Canadian FDI, by Contribution to GRP (Millions of USD)



SOURCE: IMPLAN

Figure 14 shows the value added by Canadian FDI in the study area. Canadian rail transportation contributes over $409 million in value added spending to the Arrowhead region's GRP. This is nearly fourteen times as much as the next highest industry, of Wholesale Trade.