

# Historical Trends in Niagara's Marine Commerce Sector, 2001 to 2022

## Introduction

Marine commerce refers to waterborne systems for transporting goods (cargo) and people (passengers) via waterways. Such systems could include boats, ships, sailboats or barges, and the waterways can involve oceans, lakes, canals and rivers. While the various means of marine transportation can be deployed for commercial, recreational, or military purposes, our focus in this study is on commercial uses.

Marine commerce is etched in the contours of Niagara's geography, much like hydroelectricity, which is discussed in another paper in this series. It is also deeply rooted in the region's cultural and economic history and has served as a vital support system facilitating the early settlement and socioeconomic prosperity of the region. Beyond its historical and cultural significance, the sector enhances the strategic significance of Niagara as a multimodal gateway between Canada and the United States. More importantly for our present purpose, marine commerce still constitutes one of Niagara's central economic drivers.

Marine shipping in the Great Lakes-St. Lawrence region, which runs through the heart of Niagara, not only directly generates a large number of jobs in the sector, it also serves as a fulcrum for other economic sectors in Niagara, including manufacturing and agribusiness.<sup>1</sup> The flows of marine cargo moving through Niagara's waters include domestic cargo moving between U.S. ports, domestic cargo moving between Canadian ports, cross-lake cargo moving between the U.S. and Canada, and international cargo moving between system ports and overseas ports. By one recent study, in 2022, 135.7 million metric tons of domestic and international cargo travelled at some point through the Great Lakes, its connecting rivers and/or the St. Lawrence

Seaway.<sup>2</sup> This cargo contained commodities that include steel, general cargo, iron ore/bulk, grain, stone/aggregate, cement, salt, other dry bulk, other liquid bulk, and coal.

## Research Methods

For purposes of data analysis, and consistent with our definition of the sector above, we focus on a set of industries and occupations listed under the four-digit North American Industry Classification System (NAICS) and National Occupation Classification (NOC) codes, respectively. Using NAICS codes, the sector is a composite of industrial activities related to "Ship and boat building;" "Deep sea, coastal and Great Lakes water transportation;" "Inland water transportation;" and "Support activities for water transportation." Drawing from NOC codes, the sector consists of 12 occupations, a list of which can be found in Table 6.

The data was sourced from Lightcast's Labor Market Analytics and consists of two distinct sets of data that serve as prisms for analyzing trends in marine commerce, namely, jobs by industry and jobs by occupation. While the distribution of jobs by industry (represented in NAICS codes) gives us a good picture of current trends across Niagara's marine commerce sector, another lens through which we can view such trends is the distribution of jobs by occupation (represented in NOC codes).

The importance of this "occupation" lens is that it sheds light on the human and talent dimensions of the marine commerce sector, providing insights into the nature of skillsets or expertise in the sector. NOC codes can help track changes in the types of jobs required within a sector or industry that NAICS cannot. They supply a framework to understand the composition, skill requirements, labour market trends, and other characteristics of economic sectors.

<sup>1</sup> *Economic Impacts of Maritime Shipping in the Great Lakes—St. Lawrence Region*. Published by Martin Associates economic analysis and consulting services, Lancaster, PA. July 2023. <https://bit.ly/3ucRVQk>

<sup>2</sup> *Ibid*

The NOC codes facilitate the identification of emerging job sectors and the decline of traditional occupations. This information in turn allows us to make inferences about the region's existing talent pool, its implications for innovation, adaptability and resilience of the marine commerce sector, and thus allows for effective policy responses. It is worth adding that research on marine commerce tends to use NOC data more heavily than NAICS data, and so incorporating this lens of analysis is even more important.

The data cover a 20-year period (2001 to 2022) and consist of absolute and percentage changes over time. This paper also includes the national location quotients (LQs) for each of the industries. We included the LQs because they indicate an area's level of specialization in each industry. Specifically, in this case, it allows us to compare a region's job concentration in its marine sector relative to total

jobs concentration in Ontario's marine sector. An LQ of 1.0 or higher shows a level of concentration above the standardized national average. A score of 1.5 or higher shows a high degree of specialization/concentration.

The data largely focuses on Niagara.<sup>3</sup> However, for comparative reasons, it also includes provincial and national figures, trends for the same period, as well as data from a select number of Census Metropolitan Areas (CMA) within Ontario that have sizeable marine commerce sectors. We chose midsized regions as comparators because in addition to their demographic characteristic as midsized CMAs, they have identified the sector in their economic development strategies as one of their lead economic drivers, have natural endowments favorable to the sector, have built facilities to leverage the potentials of the sector, and have undertaken active promotional activities as part of their economic development strategies.

## SECTION 1: CHANGES IN NIAGARA'S MARINE COMMERCE SECTOR, RELATIVE TO ONTARIO AND CANADA

In this section, we examine changes in Niagara's marine commerce sector, comparing trends in the region with those of the province of Ontario and Canada as a whole. The analysis covers both NAICS and NOC data, examining changes in jobs by industry and occupation. The discussion starts with NAICS data on industry trends and then proceeds to the NOC data on changes in occupation.

Table 1 presents a summary of changes in marine commerce jobs between 2001 and 2022, comparing Niagara with provincial (Ontario) and national trends. As the table indicates, Niagara has seen a decline of 37 per cent in the sector's jobs over the past two

decades, worse than the provincial average decline of eight per cent and even more dismal compared to the national average growth of 12 per cent.

Moreover, Figure 1 provides a visual indicating that the decline in the sector has been steady over the past two decades, except for a slight two-year rebound between 2013 and 2015. The decline stabilized around 2020, with the onset of the COVID-19 pandemic, and the sector seems to have seen a sharp upswing since then. However, the recent upswing has not accumulated enough to counter the overall depth of decline over the past 20 years. Nevertheless, the sector is projected to continue its upward trend over the next five years.

**Table 1:** Change in marine commerce jobs, 2001–2022; Niagara, Ontario and Canada compared

Region	2001 Jobs	2022 Jobs	Change	Percentage Change
Niagara	1,125	712	(413)	(37%)
Ontario	4,230	3,882	(348)	(8%)
Canada	34,821	38,915	4,094	12%

<sup>3</sup> It is important to note that for this study, we used the geographical area of the St. Catharines-Niagara CMA, which does not include Grimsby and West Lincoln. This was necessary to be able to compare the local sector to other CMAs (the geographic unit of economic analysis) in Ontario.

**Figure 1:** Industry job growth in marine commerce, 2001–2022; Niagara, Ontario and Canada compared

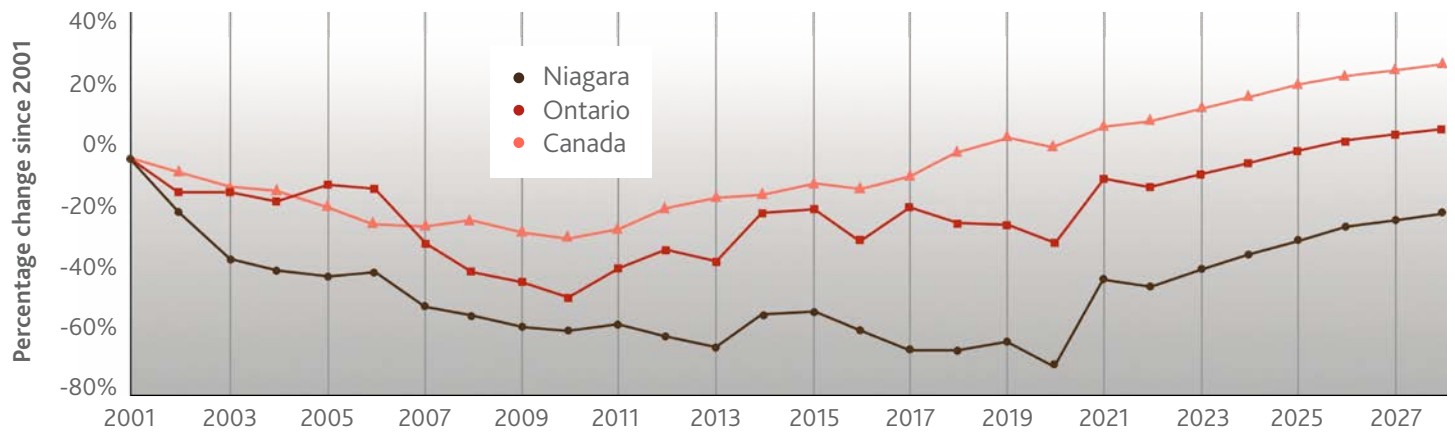


Table 2 provides a different lens on the region’s competitiveness relative to the province. In terms of jobs by industry, Niagara commands considerable strength in “Deep sea, coastal and Great Lakes water transportation” (4.51) and a fairly decent strength in “Support activities for water transportation” (1.32). This signifies that compared to all other regions across the province (and Canada), Niagara stands out. However, the region’s performance in “Inland water transportation” (0.21) and “Ship and boat building” (0.03) leaves much to desire.

**Table 2:** Niagara’s national location quotient for marine commerce jobs by industry, 2022, compared with Ontario

Industry	Niagara	Ontario
Deep sea, coastal and Great Lakes water transportation	4.51	0.32
Support activities for water transportation	1.23	0.26
Inland water transportation	0.21	0.07
Ship and boat building	0.03	0.26

Viewed through the lens of jobs by industry, Table 3 shows “Architectural, engineering and related services” leading the pack in 2001 and 2022. Relative to other jobs, “Deep sea, coastal and Great Lakes water transportation” has maintained its position among the top occupations, but a relatively modest one among the top performing jobs.

**Table 3:** Niagara’s top marine commerce industries by job count, 2001 vs 2022

Industry	2001
Architectural, engineering and related services	404
Motor vehicle parts manufacturing	233
Building equipment contractors	208
Deep sea, coastal and Great Lakes water transportation	110
Industry	2022
Architectural, engineering and related services	450
Building equipment contractors	287
Deep sea, coastal and Great Lakes water transportation	107
Motor vehicle parts manufacturing	<10

In terms of the top industries’ percentage change between 2001 and 2022, as Table 4 indicates, “Building equipment contractors” has seen the largest change at 38 per cent, followed by “Architectural, engineering and related services” with an increase of 11 per cent. While “Deep sea, coastal and Great Lakes water transportation” remains a top industry in the marine sector, it has seen a modest decline of two per cent over the past two decades.

**Table 4:** Top marine industries, percentage change in jobs, 2001–2022

Industry	Niagara
Building equipment contractors	38%
Architectural, engineering and related services	11%
Deep sea, coastal and Great Lakes water transportation	(2%)

## Occupations in Marine Commerce

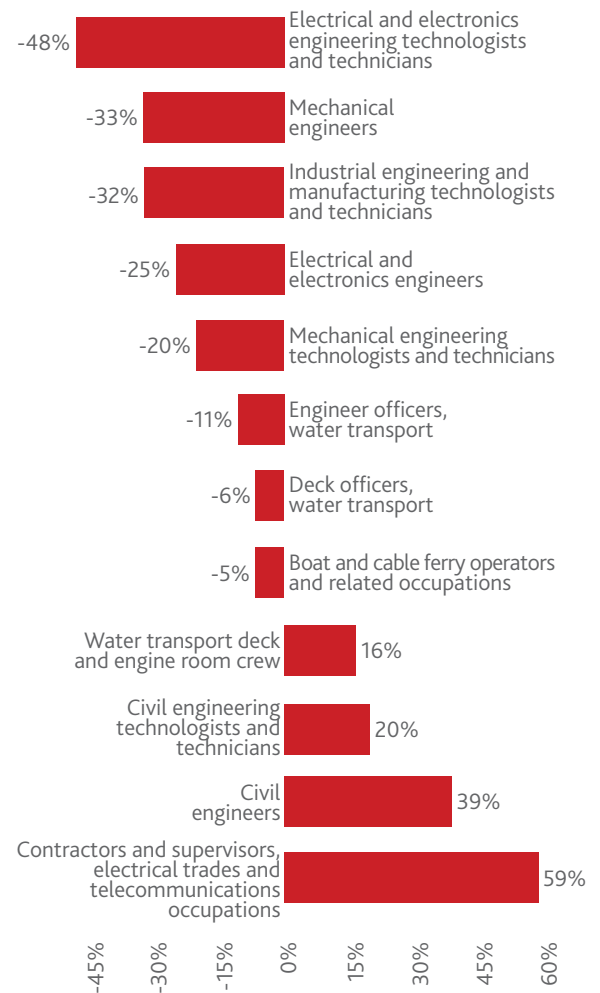
As noted earlier, while the distribution of jobs by industry gives us a good picture of current trends in Niagara's marine commerce sector, another lens through which we can view such trends is the distribution of jobs by occupation. The importance of this lens is that it shows us the types of jobs people hold in the sector, shedding light on the human and talent dimensions of the marine commerce sector and providing insights into the nature of required skillsets or expertise.

This information in turn allows us to make inferences about the region's existing talent pool and its implications for innovation, adaptability and resilience of the sector. Note that these job counts by occupation cut across sectors (e.g., the number of civil engineers will include those working in other sectors) however, these numbers still provide a focused lens on the make-up of the labour force necessary within a given sector.

Table 5 provides a detailed breakdown of Niagara's percentage change of jobs by occupation within marine commerce over the past two decades. The region reports positive growth trends in "Contractors and supervisors, electrical trades and telecommunications occupations" (59 per cent), "Civil engineers" (39 per cent), "Civil engineering technologists and technicians" (20 per cent), and "Water transport deck and engine room crew" (16 per cent). However, the region saw declining trends in occupations such as "Boat and cable ferry operators and related occupations" (-5 per cent), "Deck officers, water transport" (-7 per cent), "Engineer officers, water transport" (-11 per cent), and "Mechanical engineering technologists and technicians" (-20 per cent).

Figure 2 illustrates that the region witnessed the decline of most occupations required in the marine sector over the past two decades.

**Figure 2:** Niagara's percentage growth of marine sector jobs by occupation, 2001 to 2022



**Table 5:** Niagara's percentage growth in marine commerce jobs by occupation, 2001 to 2022; Niagara, Ontario and Canada compared

Occupation	Niagara	Ontario	Canada
Contractors and supervisors, electrical trades and telecommunications	59%	56%	72%
Civil engineers	39%	63%	84%
Civil engineering technologists and technicians	20%	43%	83%
Water transport deck and engine room crew	16%	41%	(9%)
Boat and cable ferry operators and related occupations	(5%)	21%	27%
Deck officers, water transport	(7%)	23%	29%
Engineer officers, water transport	(11%)	9%	50%
Mechanical engineering technologists and technicians	(20%)	24%	93%
Electrical and electronics engineers	(25%)	22%	20%
Industrial engineering and manufacturing technologists and technicians	(32%)	37%	110%
Mechanical engineers	(33%)	33%	46%
Electrical and electronics engineering technologists and technicians	(48%)	(30%)	(12%)

## Competitiveness (Location Quotient Scores)

Another lens through which we can understand the current state of marine commerce in Niagara is the location quotients (LQs) of jobs in the respective industries that make up the sector. As noted earlier, the LQ scores indicate an area's level of specialization in industries, with a score above 1.5 indicating a significant degree of specialization compared to other regions in the country. LQ scores above 1.0 (the national average) are also considered respectable indications of strength. As Table 6 indicates, Niagara has registered a general decline in competitiveness in almost all of its marine occupations over the past two decades. The only exception is "Water transport deck and engine room crew" and "Contractors and supervisors, electrical trades and telecommunications occupations", both of which saw slight upticks.

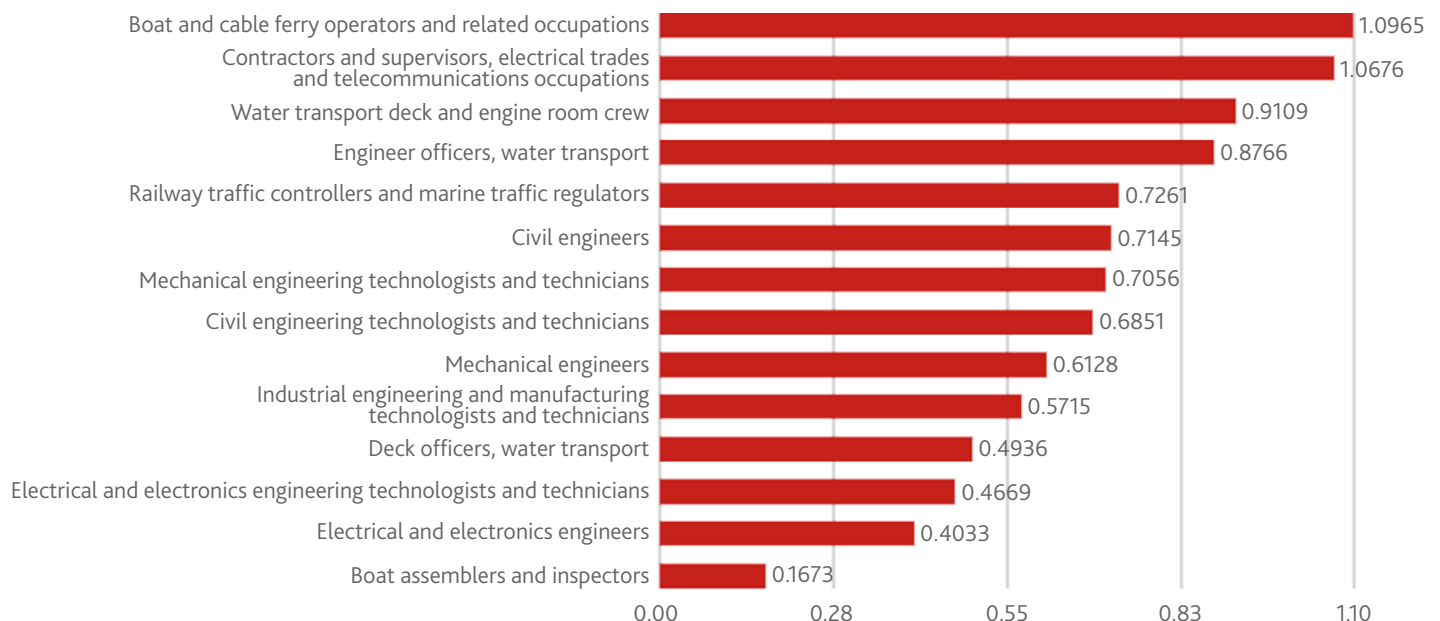
Although Table 6 indicates that "Boat and cable ferry operators and related occupations" saw a relative decline in competitiveness over the past two decades, it is still an area of comparative strength for Niagara. This is because while the LQ score is below the 1.5 threshold of occupational specialization, being above the national average of 1.0 still means a respectable occupational concentration compared to other regions in the country.

As Figure 3 illustrates, two occupations—"Boat and cable ferry operators and related occupations" and "Contractors and supervisors, electrical trades and telecommunications occupations"—register location quotient scores above the national average of 1.0. However, apart from these two occupations, the region does not have a competitive advantage that matches the national average in any other area of the marine sector. A key implication of these scores is that the marine commerce innovation ecosystem has pockets of critical mass, but its overall competitiveness compared to other regions in Canada is not what it used to be.

**Table 6:** Niagara's national location quotient in marine jobs by occupation, 2001 vs. 2022

Occupation	2001	2022
Boat and cable ferry operators and related occupations	1.22	1.10
Boat assemblers and inspectors	0.61	0.17
Civil engineering technologists and technicians	0.87	0.69
Civil engineers	0.78	0.71
Contractors and supervisors, electrical trades and telecommunications occupations	0.96	1.07
Deck officers, water transport	0.57	0.49
Electrical and electronics engineering technologists and technicians	0.66	0.47
Electrical and electronics engineers	0.54	0.40
Engineer officers, water transport	1.22	0.88
Industrial engineering and manufacturing technologists and technicians	1.47	0.57
Mechanical engineering technologists and technicians	1.42	0.71
Mechanical engineers	1.10	0.61
Railway traffic controllers and marine traffic regulators	0.75	0.73
Water transport deck and engine room crew	0.59	0.91

**Figure 3:** Niagara's location quotient for marine jobs by occupation, 2022 (sorted by highest to lowest)



**Table 7:** Niagara’s national location quotient for marine jobs by occupation, 2022, compared with Ontario

Occupation	Niagara	Ontario
Boat and cable ferry operators and related occupations	1.10	0.39
Contractors and supervisors, electrical trades and telecommunications occupations	1.07	0.94
Water transport deck and engine room crew	0.91	0.31
Engineer officers, water transport	0.88	0.40
Railway traffic controllers and marine traffic regulators	0.73	0.54
Civil engineers	0.71	0.90
Mechanical engineering technologists and technicians	0.71	0.85
Civil engineering technologists and technicians	0.69	0.63
Mechanical engineers	0.61	1.15
Industrial engineering and manufacturing technologists and technicians	0.57	0.98
Deck officers, water transport	0.49	0.25
Electrical and electronics engineering technologists and technicians	0.47	0.88
Electrical and electronics engineers	0.40	1.27
Boat assemblers and inspectors	0.17	0.42

Notwithstanding its limited competitiveness in marine occupations, as Table 7 reveals, Niagara outpaces the provincial scores in both of its two most competitive areas in the sector.

Table 8 shows the change in Niagara’s top marine occupations, comparing those in 2001 with those in 2022. The category “Pursers and flight attendants”<sup>4</sup> has maintained its position at the top over the past two decades whereas “Welders and related machine operators” has seen a relative decline in their status as top occupations in the sector.

**Table 8:** Niagara’s top marine jobs, by occupation—2001 vs 2022

Occupation	2001
Pursers and flight attendants	111
Welders and related machine operators	81
Industrial electricians	36
Other professional engineers, n.e.c.	31
Occupation	2022
Pursers and flight attendants	49
Other professional engineers, n.e.c.	24
Industrial electricians	11
Welders and related machine operators	<10

<sup>4</sup> As noted earlier, NOC codes cut across sectors and this category is a prime example of the challenge that poses when analyzing occupation numbers. Flight attendants being grouped in the NOC codes along with ship pursers leaves us in the dark about the exact number belonging to the latter.



## SECTION 2: CHANGES IN THE MARINE SECTOR, NIAGARA AND OTHER ONTARIO MIDSIZED REGIONS COMPARED

In this section, we examine changes in Niagara’s marine commerce sector by comparing trends in the region with those in a select number of other midsized regions. These regions were selected due their relative strength in the marine commerce sector as well as their demographic similarity to Niagara, also a midsized region. For simplicity, the analysis focuses on NOC data, examining changes in jobs by occupation.

It is worth noting that the choice to focus on occupation for this section is due to the fact that research on marine commerce tends to use NOC data more heavily than NAICS data. While some of these occupation numbers may cut across sectors, incorporating this lens of analysis remains important for this section because it allows us to make inferences about the region’s existing talent pool relative to other places, its implications for innovation, adaptability and resilience of the sector, and thus allows for effective policy responses in terms of competitive positioning.

Table 9 provides a breakdown of percentage changes in marine commerce jobs by occupation between 2001 and 2022, comparing Niagara with similar midsize regions in Ontario. Relative to these other regions, Niagara boasts some positive growth trends in “Contractors and supervisors, electrical trades and telecommunications occupations” (59 per cent), “Civil engineers” (39 per cent), “Civil engineering technologists and technicians” (20 per cent), and “Water transport deck and engine room crew” (16 per cent). Compared to the other regions, the growth trends in these areas present a mixed picture, but still a generally positive one. However, the rest of Niagara’s story of change for other marine occupations compared to its regional peers is not very encouraging. The region has seen a broad trend of decline even in occupations where its peers have seen growth over the same period.

**Table 9:** Percentage growth in marine commerce<sup>5</sup> jobs by occupation, 2001–2022; Niagara and other Ontario regions compared

Occupation	Niagara	Windsor	Hamilton
Contractors and supervisors, electrical trades and telecommunications	59%	51%	97%
Civil engineers	39%	12%	62%
Civil engineering technologists and technicians	20%	28%	36%
Water transport deck and engine room crew	16%	NSD	26%
Boat and cable ferry operators and related occupations	(5%)	NSD	NSD
Deck officers, water transport	(7%)	(39%)	32%
Engineer officers, water transport	(11%)	(38%)	(4%)
Mechanical engineering technologists and technicians	(20%)	(7%)	27%
Electrical and electronics engineers	(25%)	(5%)	7%
Industrial engineering and manufacturing technologists and technicians	(32%)	24%	2%
Mechanical engineers	(33%)	46%	11%
Electrical and electronics engineering technologists and technicians	(48%)	11%	(29%)

\*NSD=Not Sufficient Data. For industries/occupations where the job counts are close to zero, the generated tables tend to report 'Not Sufficient Data'. In such instances where this occurs across the board, the industry or occupation in question is removed from the analysis.

<sup>5</sup> Based on NOC codes

For an even clearer picture of how Niagara fares in each of these occupations compared to other regions in Ontario, we juxtapose Niagara’s LQ scores. Table 10 provides the jobs by occupation LQ scores of these regions with established reputation in the marine sector.

Relative to its regional peers, Niagara holds its head above water in “Boat and cable ferry operators and related occupations”. Even in “Contractors and supervisors, electrical trades and telecommunications occupations” where it trails Windsor and Hamilton, it still has an LQ score above the national average. However, all other occupations fall below the national average LQ of 1.

**Table 10:** National location quotient breakdown of marine jobs by occupation, 2022; Niagara and other regions compared

Occupation	Niagara	Windsor	Hamilton
Boat and cable ferry operators and related occupations	1.10	0.23	0.19
Contractors and supervisors, electrical trades and telecommunications occupations	1.07	1.05	1.21
Water transport deck and engine room crew	0.91	0.20	0.17
Engineer officers, water transport	0.88	0.45	0.17
Railway traffic controllers and marine traffic regulators	0.73	0.32	0.64
Civil engineers	0.71	0.87	0.77
Mechanical engineering technologists and technicians	0.71	1.75	0.96
Civil engineering technologists and technicians	0.69	0.99	0.67
Mechanical engineers	0.61	4.07	0.82
Industrial engineering and manufacturing technologists and technicians	0.57	2.36	0.85
Deck officers, water transport	0.49	0.22	0.12
Electrical and electronics engineering technologists and technicians	0.47	1.24	0.71
Electrical and electronics engineers	0.40	1.08	0.62
Boat assemblers and inspectors	0.17	0.28	0.84

### Wages

Another lens for determining the vitality of Niagara’s marine sector is comparing the industrial wage distribution of the sector to those of similar regions. As indicated in Figure 4, Niagara reported the lowest median wage of only \$38.43 an hour. While the difference with other regions is a matter of a few cents, that difference has a symbolic value in terms of its message about Niagara’s attractiveness to potential talents. In the current age of labour crunch, a region registering lower pay scales compared to its counterparts in other regions could spell long-term doom in the form of talent outmigration. While potential investors may find this an interesting number, it is not a story a region wishes to brag about from an ethical and industrial relations standpoint.

**Figure 4:** Median hourly wages in the marine commerce sector, 2022; Niagara and other Ontario regions compared

