

Making Waves:

THE ECONOMIC CONTRIBUTION OF THE SEAFOOD INDUSTRY TO NOVA SCOTIA



Photo Courtesy of Tourism Nova Scotia

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Glossary and Acronyms

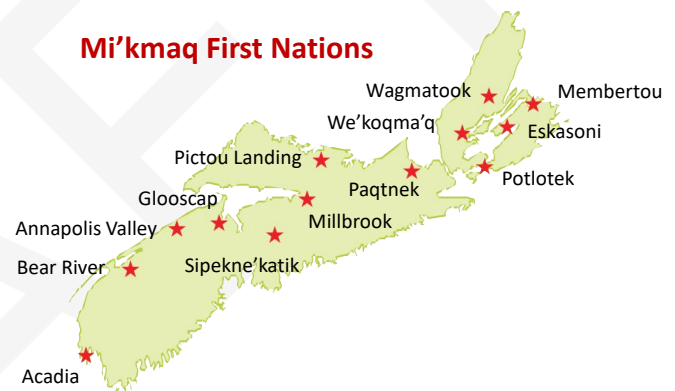
ACOA	Atlantic Canada Opportunities Agency
AICFI	Atlantic Integrated Commercial Fisheries Initiative
AFF	Atlantic Fisheries Fund
BRC	British Retail Consortium
CSSF	Canadian Seafood Stabilization Fund
COVID-19	Coronavirus pandemic that began in 2020
COVE	Centre for Ocean Ventures and Entrepreneurship
DFA	Department of Fisheries and Aquaculture, Government of Nova Scotia
DFO	Department of Fisheries and Oceans, Government of Canada
ENGO	Environmental non-government organizations
FACTAP	Fisheries and Aquaculture Clean Technology Adoption Program
GFSI	Global Food Safety Initiative
GDP	Gross Domestic Product
LFA	Lobster fishing area
IUU	Illegal, unreported, and unregulated fishing
MSC	Marine Stewardship Council
Net-Zero	Refers to the global commitment to be carbon neutral by 2050
NSFALB	Nova Scotia Fisheries and Aquaculture Loan Board
NSFSC	Nova Scotia Fisheries Sector Council
REGI	Regional Economic Growth Initiative
SQF	Safe Quality Foods

1.0 INTRODUCTION

The story of Nova Scotia's seafood industry is a story of people and communities. Aquaculture, harvesting, and processing are essential to the province's economic base. Every community in the province is touched by the fishery either directly or indirectly.

The seafood industry has contributed significantly to the history and culture of Nova Scotia. The province's hundreds of communities are spread along 8,122 kilometres of coastline. Almost 82% of the people in the province live within 10 kilometres of the sea and everyone lives within 100 kilometres¹.

The history of Mi'kmaw people extends back over 11,000 years. Mi'kma'ki, the traditional and Mi'kmaw territory, comprises all of Nova Scotia and Prince Edward Island, as well as large areas of New Brunswick, the Gaspé Peninsula, and Newfoundland.



The Mi'kmaq were the first fishers in Nova Scotia and harvested fish and sea plants, activities that continue to this day. Lobster, the highest value species in the province, has long been an important part of the diet of Indigenous people throughout the Eastern seaboard².

Today, First Nations are participating in commercial fisheries in traditional waters to help sustain their communities. These commercial fisheries operate alongside ongoing social and ceremonial, food, and moderate livelihood fisheries. While this report does not specifically examine First Nations' participation in the industry, impacts from First Nations' commercial harvests as well as processing and aquaculture facilities are included in economic outputs.

¹ Statistics Canada- Canada's oceans and the economic contribution of marine sectors.

² Townsend, 2011

The seafood industry creates new wealth **each and every year** by harvesting and processing seafood. Workers in the seafood industry are found in every county and most communities around the province. Strong ties with tourism and other sectors translate into additional jobs in communities. Seafood products are sold within Nova Scotia, traded across Canada, and exported to more than 60 countries.

International export sales in 2021 were a record \$2.5 billion, up from the prior record of \$2.3 billion in 2019. Growth in 2021 export sales was driven in part by the COVID-19 pandemic. With many restaurants remaining closed, the industry quickly pivoted to serve the retail sector as consumers more frequently prepared and consumed seafood at home.

The seafood industry generated \$1.6 billion in direct, indirect, and induced gross domestic product (GDP) for the province in 2018. On the same basis, the total Nova Scotia employment impact of the industry was 16,300 jobs and \$865 million in wages and salaries. This income supports community infrastructure, schools, and hospitals. Further, the wealth generated permits people to purchase food, other goods and services, and remain and prosper in coastal communities.

Wild and farmed seafood products are landed in vessels built and repaired in Nova Scotia. Gear for aquaculture and traditional harvesting is constructed here. People are employed to transport products to processing facilities, across Atlantic Canada and the rest of the country, and internationally. These support sectors employ individuals around the province, creating additional spinoff employment.

The protein harvested and processed by Nova Scotia fisheries can help feed the world's growing population. The United Nations' Food and Agriculture Organization (FAO) expects an 89% increase in seafood consumption by 2030 and a 32% increase in aquaculture production. World harvests of wild species have plateaued, so meeting the growth in demand for seafood will rely upon increased utilization of available resources and further investment in aquaculture.

The industry has changed since the recession of 2008, with a broad focus on innovation. Seafood processing technologies have changed. Processors are employing state-of-the-art equipment with

increased automation, resulting in improved product quality. Aquaculture, as well, is now a high-tech sector, using advanced systems for fish management and monitoring.

Industry players are giving more attention to sustainable fisheries management, including marine certifications that demonstrate to the world that our fisheries are sustainably managed. Industry leaders recognize the need to diversify and seek new global markets, and rose to the challenge, particularly over the past 10 years. This market diversification laid the groundwork for a successful response to the COVID-19 pandemic.

The processing sector may always need traditional line workers, but it increasingly requires advanced technical skills, as well as experience in computer science, marine biology, and other sciences. The industry has new and exciting opportunities for the current and next generations of seafood workers.

This study presents measures of employment, income, trade, GDP, and the value of Nova Scotia's seafood products. Where numbers are not available, qualitative benefits of the sector are provided through examples and vignettes. This is not just the story of an industry; it is the story of Nova Scotia's heritage.

This report is the result of unprecedented collaboration between an industry wanting to demonstrate seafood's importance, and Provincial and Federal governments wanting to ensure the industry is well understood. It includes a combination of both publicly available and specially purchased data, and information gleaned from interviews with industry experts, seafood processors and tech companies. The study highlights the size and impact of the seafood sector and shows how innovation is helping people adapt in the face of new challenges.

The Report: This study was commissioned by the Atlantic Canada Opportunities Agency (ACOA) in partnership with the Nova Scotia Department of Fisheries and Aquaculture (DFA). The Nova Scotia Seafood Alliance (NSSA), Seafood Producers Association of Nova Scotia (SPANS), and the Aquaculture Association of Nova Scotia (AANS) were valued members of the steering committee.

2.0 Seafood's Contribution to the Nova Scotia Economy

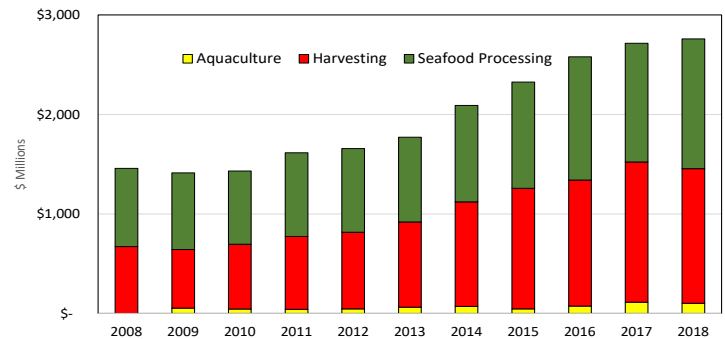
Nova Scotia is Canada's seafood leader. The province has the largest shellfish sector and is a leader in pelagic and groundfish species.

The gross output (the total value of seafood harvested and processed) of the Nova Scotia seafood industry in 2018³ was \$2.8 billion dollars. The harvesting sector accounts for \$1.4 billion of this total; processing, \$1.3 billion; and aquaculture, \$103 million. Since 2008, the growth in seafood industry output (89%) has outpaced the growth of provincial output (21%).

From 2008 to 2018, the seafood industry's GDP increased by 109%, driven by a 129% increase in the harvesting sector and a 50% increase in seafood processing. In comparison, nominal GDP for the province has increased by 25% and the goods sector by 2%.

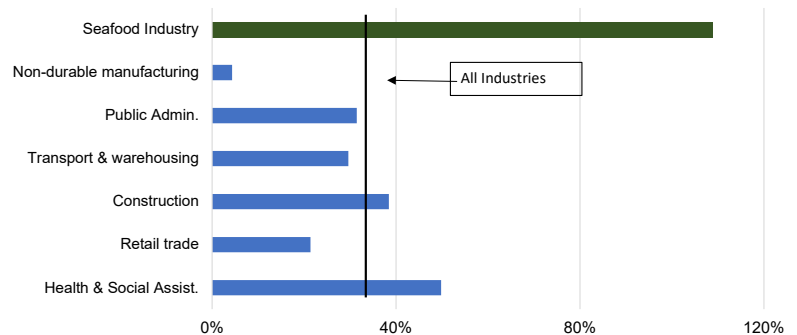
The goods sector can be simply explained as the foundation of an economy, where new wealth is created. This wealth is then used as the base for all economic activity. This is oversimplified, but the service sector, both in Halifax and the rest of Nova Scotia, would be much smaller if not for the seafood industry.

Output of the Seafood Industry
Nova Scotia, 2000 to 2018, \$ Millions



Source: Statistics Canada. Table 36-10-0488-01; Pisces Consulting

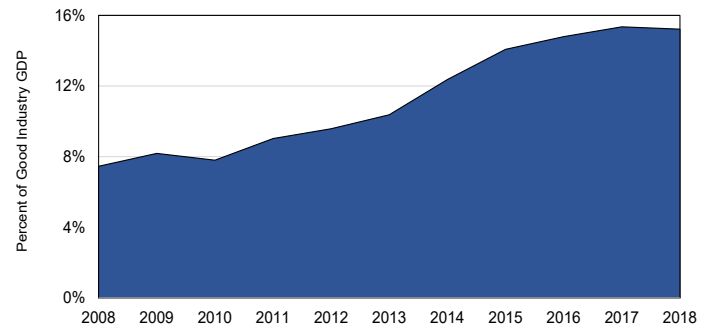
Percent Change in GDP by Selected Industries
Nova Scotia, 2008 to 2018



Source: Statistics Canada 36-10-0487-01; 36-10-0402-01; Pisces Consulting

³ The most comprehensive data set on industry output is found in Statistics Canada's System of National Accounts. The latest year for provincial level nominal GDP estimates is 2018.

Seafood Industry GDP as a Percent of Goods Industries GDP
Nova Scotia, 2008 to 2018



Source: Statistics Canada. Table 36-10-0487-01; Pisces Consulting

The seafood industry has increased in relative importance within Nova Scotia’s goods sector. Seafood accounted for 15% of the goods sector GDP in 2018, up from 7.5% in 2008.

The direct GDP for the seafood industry in 2018 was \$1.2 billion, representing 2.9% of Nova Scotia’s GDP. Direct labour compensation was \$610 million with 10,805 jobs⁴.

The total contribution of the seafood industry is much greater. Including direct, indirect, and induced impacts, the seafood industry contributed \$1.6 billion to Nova Scotia’s GDP in 2018. In the same manner, total employment derived from the industry was approximately 16,300 jobs and total employee compensation was approximately \$865 million⁵.

▶ Economic Impact to the Nova Scotia Economy (2018)

	GDP (\$ M)	Employment	Wages & Salaries (\$ M)
Direct	\$1,172	10,805	\$610
Indirect	\$228	3,122	\$157
Induced	\$238	2,350	\$99
Total	\$1,638	16,277	\$865

Source: Statistics Canada Input/Output Model; Pisces Consulting

⁴ This study uses various measures for employment. A special tabulation of tax filers results in a total of 16,240 seafood sector workers. 2018 data is presented here to be consistent with the latest year nominal GDP estimates are available from the system of National Accounts.

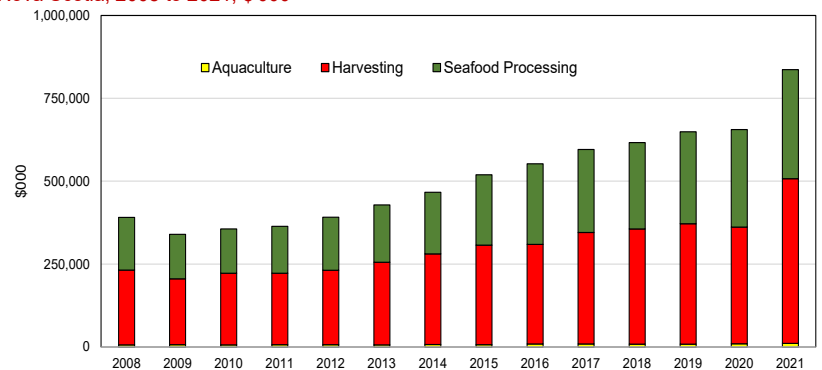
⁵ The table depicts the total impact of the seafood industry (harvesting, seafood processing, and aquaculture sectors). It is a special tabulation produced by Statistics Canada that removes double counting of jobs across the different sectors. Numbers in the tables that follow, which illustrate individual components of the industry, will not sum to the above total, given that the duplicative indirect and induced impacts have been adjusted.

Approximately 60% of Nova Scotia’s seafood trade is for international consumption. However, the Canadian trade in seafood is also important to the industry. In 2018, trade within Nova Scotia represented 21% of the industry output or \$545 million. This internal trade in seafood is directly related to the restaurant industry, local seafood consumption and the strong links between seafood and the tourist experience.

In terms of world fisheries, Canada represented 0.8% of global landings of all species in 2019 and Nova Scotia represented 0.3%. Nova Scotia, however, is a major world player in shellfish species such as American lobster, surf clam, and scallops.

Seafood Industry Workers Direct Compensation

Nova Scotia, 2008 to 2021, \$'000



Source: Statistics Canada. Table 36-10-0480-01; Pisces Consulting

For 2021, Statistics Canada reports

12,435 jobs in Nova Scotia’s seafood industry: 6,885 (55%) in harvesting, 5,330 (43%) in seafood processing facilities, and 220 (2%) in aquaculture⁶.

Total direct compensation for these jobs was \$836 million in 2021. The harvesting sector represented \$497 million in wages (60% of total compensation). Seafood processing represented \$329 million and aquaculture, approximately \$10 million. Indeed, 2021 was a banner year for the industry, with harvesting income up 37% over 2019 levels.

⁶ DFA reports that in 2021, 867 people are employed at some time during the year in Aquaculture. The Statistics Canada data is a measure of the stock of labour and not the number of different people.

2.1 Value from the Sea: Harvesting

The harvesting sector's GDP was \$827 million in 2018, with another \$458 million added to Nova Scotia's GDP through indirect and induced impacts. There were 5,665 jobs, with another 4,700 jobs created in the province through indirect and induced impacts.

Total harvesting employment increased 51% from 4,550 jobs in 2008 to 6,885 in 2021.

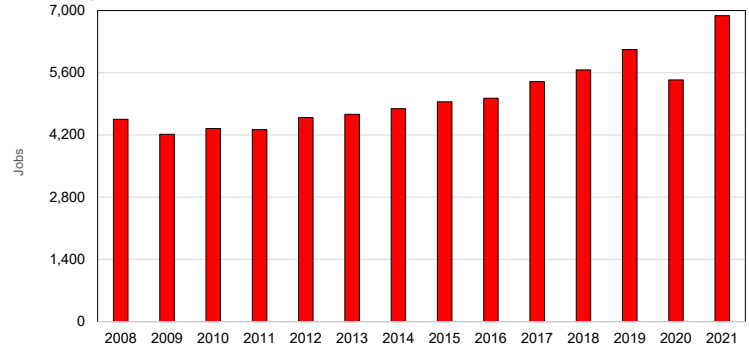
During the same period, total compensation increased 120% from \$226 million to \$497 million. This has outpaced most other sectors; by comparison, the total number of jobs in the

For every direct fishing job, an additional 0.8 jobs are created .

province increased 2% over the

same period, and compensation increased 43%.

Harvesting Jobs
Nova Scotia, 2008 to 2021



Source: Statistics Canada. Table 36-10-0480-01; Pisces Consulting

► Economic Impact of the Harvesting Sector (2018)

	GDP (\$ M)	Employment	Wages & Salaries (\$ M)
Direct	\$827	5,665	\$348
Indirect	\$246	2,687	\$152
Induced	\$212	2,017	\$96
Total	\$1,285	10,370	\$596

Source: Statistics Canada Input/Output Model; Pisces Consulting

Making Waves: Nova Scotia Boatbuilders

The Nova Scotia seafood industry is closely intertwined with the provincial boatbuilding sector, which provides critical repair, maintenance, and new boatbuilding services to the Nova Scotia and Atlantic harvesting sectors.

The approximately 65 boatbuilding, boat repair, and refit companies in Nova Scotia are primarily small family-run businesses that range in size from 10 to 200 employees. A 2019 survey indicates that about 50% of the annual sales were for new vessel construction and completion, and about 40% was for refit and repair.

Survey participants indicated that about 70% of their business came from within Nova Scotia. This is a valuable service to the local industry, but also an opportunity to export services to other regions—another example of Nova Scotians exporting their expertise.

Many provincial boatyards have long histories. A.F. Theriault & Son Ltd., for example, has built more than 1,000 vessels since 1938. The production staff includes over 150 highly trained professional boatbuilders, including engineers, tradespersons, project administrators and support staff. The company is a major economic contributor in Digby County.

ABCO is another fabrication company serving the harvesting, processing, and aquaculture sectors. It was founded over 75 years ago and produces engineered metal products for vessels and specialized equipment. ABCO recognizes that Atlantic Canada has a rich talent pool with some of the best technical schools in the world. They are expanding their Research and Development division to better serve the seafood industry. They are also becoming a global leader in advanced manufacturing and adopting digital technologies in the workplace. ABCO exports their products to over 60 countries.

Boatbuilding and repair are a critical component of the complex web needed to sustain coastal communities. This is another sector making waves in Nova Scotia.

SUPPORT, INNOVATE, DIVERSIFY!

2.2 On The Land: Seafood Processing

The Nova Scotia processing sector is vibrant, with investment being made to expand capacity and modernize processes. Greater shellfish supplies and value-added production have increased the output value on land, resulting in unprecedented export values.

► Economic Impact of the Seafood Processing Sector (2018)

	GDP (\$ M)	Employment	Wages & Salaries (\$ M)
Direct	\$300	4,950	\$260
Indirect	\$703	6,321	\$366
Induced	\$285	2,709	\$129
Total	\$1,288	13,980	\$756

Source: Statistics Canada Input/Output Model; Pisces Consulting

In 2018, the processing sector generated \$300 million in direct GDP, with additional indirect and induced impacts of \$985 million. In total, processing contributed \$1.3 billion to Nova Scotia's GDP.

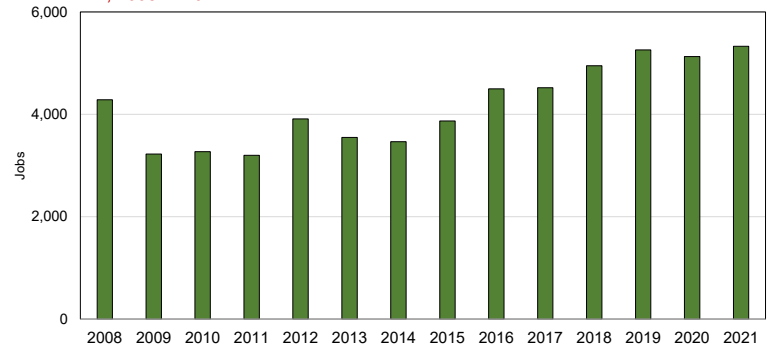
By the same method, the processing sector directly employed 4,950 people with additional indirect and induced employment of approximately 9,000. **For every job in the seafood processing sector, 1.8 jobs were created in other parts of the economy.**

Onshore logistics is supported by a mix of buyers selling to processors and processors

making direct purchases. In 2021, 210 licensed seafood processors and 296 buyers participated in the Nova Scotia industry.

Seafood Processing Jobs

Nova Scotia, 2008 to 2021



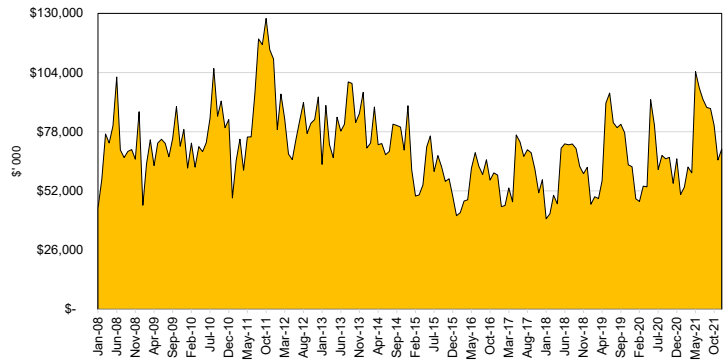
Source: Statistics Canada -36-10-0480-01

Total compensation for processing workers is estimated at \$328 million for 2021. Since 2008, total compensation for seafood processing jobs has increased by 107%. Industry experts indicate that wages and benefits have been increasing to attract and retain workers.

The number of jobs in the seafood processing sector has increased by 24% since 2008, and by 67% from the low of 3,200 in 2011. Increasing employment reflects increased activity and the expansion of the processing sector, both buoyed by rebounding prices for key species such as lobster.

The Nova Scotia processing industry operates year-round with peak production occurring from April through August. Production is directly related to landings; most species are processed soon after arrival at the wharf. This ensures freshness and high-quality products for discerning consumers. At-sea processing occurs year-round on large vessels that harvest primarily shrimp, clams, and scallops.

Monthly Production of Seafood
Nova Scotia, January 2008 to October 2021, \$000



Source: Statistics Canada Table 16-10-0048-01; Pisces Consulting

2.3 Farming from the Sea and on the Land: Aquaculture

The pristine waters around Nova Scotia offer an ideal location for a modern aquaculture industry, and a partial solution to the world’s protein crisis and growing global population. In comparison to land-based protein such as pork or beef, aquaculture protein has a relatively low carbon footprint. Finfish production emits 0.6 kilograms of CO² per serving of protein compared to 5.9 kilograms for beef and 1.2 kilograms for pork⁷. Shellfish and salmonid aquaculture are natural fits for Nova Scotia's marine environment.

⁷ [Global Salmon Initiative: A serving is 40g of edible protein.](#)

The GDP for the aquaculture sector was \$46 million in 2018. That year, it generated \$52 million in indirect and induced GDP. There were 190 jobs in aquaculture with 520 indirect and induced jobs. The sector generates 2.7 spinoff jobs in other sectors for every aquaculture job.

► Economic Impact of the Aquaculture Sector (2018)

	GDP (\$ M)	Employment	Wages & Salaries (\$ M)
Direct	\$46	190	\$8
Indirect	\$38	381	\$21
Induced	\$14	130	\$6
Total	\$98	701	\$36

Source: Statistics Canada Input/Output Model; Pisces Consulting

For every aquaculture job, 2.7 spinoff jobs are created.

Recent data from the Department of Fisheries and Aquaculture indicates that a total of 867 people were employed in 2021.

Nova Scotia Aquaculture Employment, 2021

Category	Full Time	Part-Time <6 months	Part-Time >6 months	Total
Shellfish	52	219	34	305
Finfish	181	13	60	254
Experimental	11	0	13	24
Other	217	7	60	284
Total	461	239	167	867

Source: Department of Fisheries and Aquaculture

2.4 Nova Scotia: Canada's Seafood Export Leader

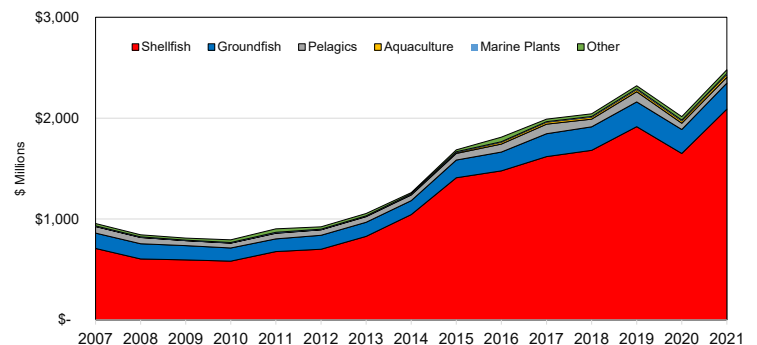
Nova Scotia seafood is consumed around the world. These exports bring new money into the economy that provides the foundation for other economic activity.

Nova Scotia has seen record export values for seafood. In 2020, products from Nova Scotia represented 31% of Canada's total seafood export value, and 78% of total lobster exports. Since 2007, export values have increased 160%. The United States remains the most important single export market for Nova Scotia; East Asia has emerged as the second most important market.

The market for seafood is constantly evolving. In 2007—before the 2008 banking crisis—Nova Scotia exported its seafood products to 92 countries. In 2021, products were sold to over 60 different countries. The seafood products purchased by the United States and China have resulted in a consolidation of product sales and reflects the dynamic nature of markets and the effectiveness of exporters to recognize market opportunities.

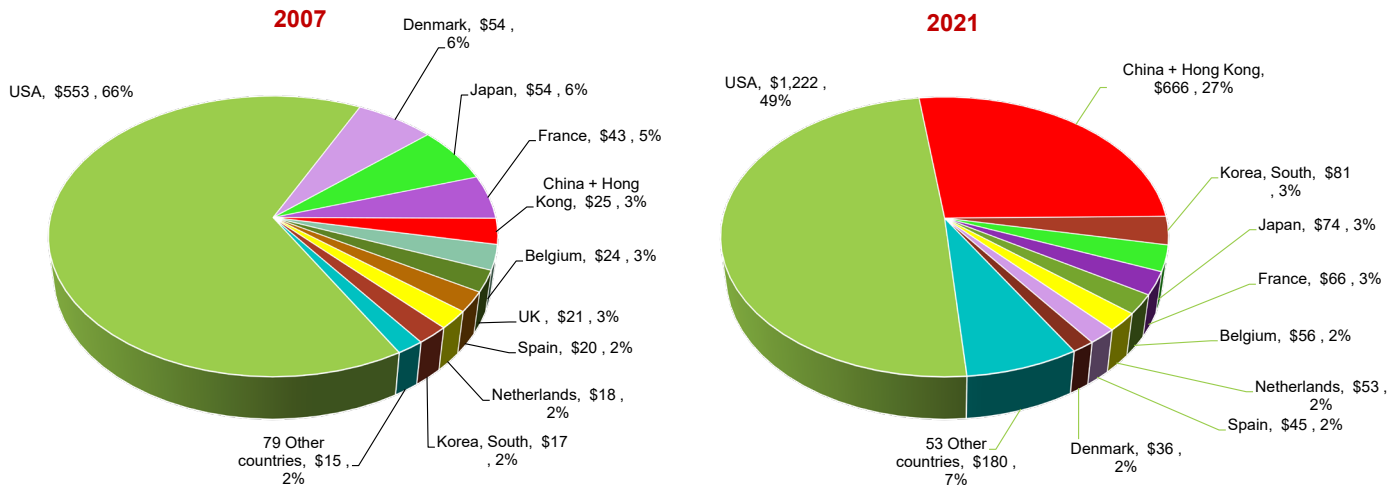
By contrasting export values and destinations in 2021 with those before 2007, we see indications of even deeper market penetration into East Asia. Exporters have become less reliant on the United States; the number of other destination countries has been reduced by about a third. Exporters focussed on high-value markets for their products and effectively responded to distribution challenges created by COVID-19.

Nova Scotia Exports by Major Species Group
2007 to 2021, \$M



Source: Industry Canada; Pisces Consulting

Top Destinations of Nova Scotia Seafood Exports, \$M



Source: Industry Canada; Pisces Consulting

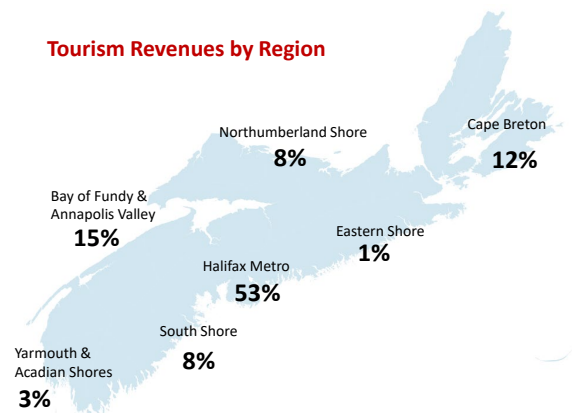
Shellfish made up 84% of Nova Scotia seafood exports in 2021. Lobster, the largest contributor to this number, increased 239% in export value from \$388 million in 2007 to \$1.3 billion in 2021. Crab export value has grown significantly, with exports increasing 262% from \$97 million in 2007 to \$351 million in 2021.

2.4 Linkages to Other Sectors

The seafood industry provides considerable spin-off benefits to other industries, businesses, communities, and families. Tourism, boat building and repair, and transportation all benefit from the seafood industry.

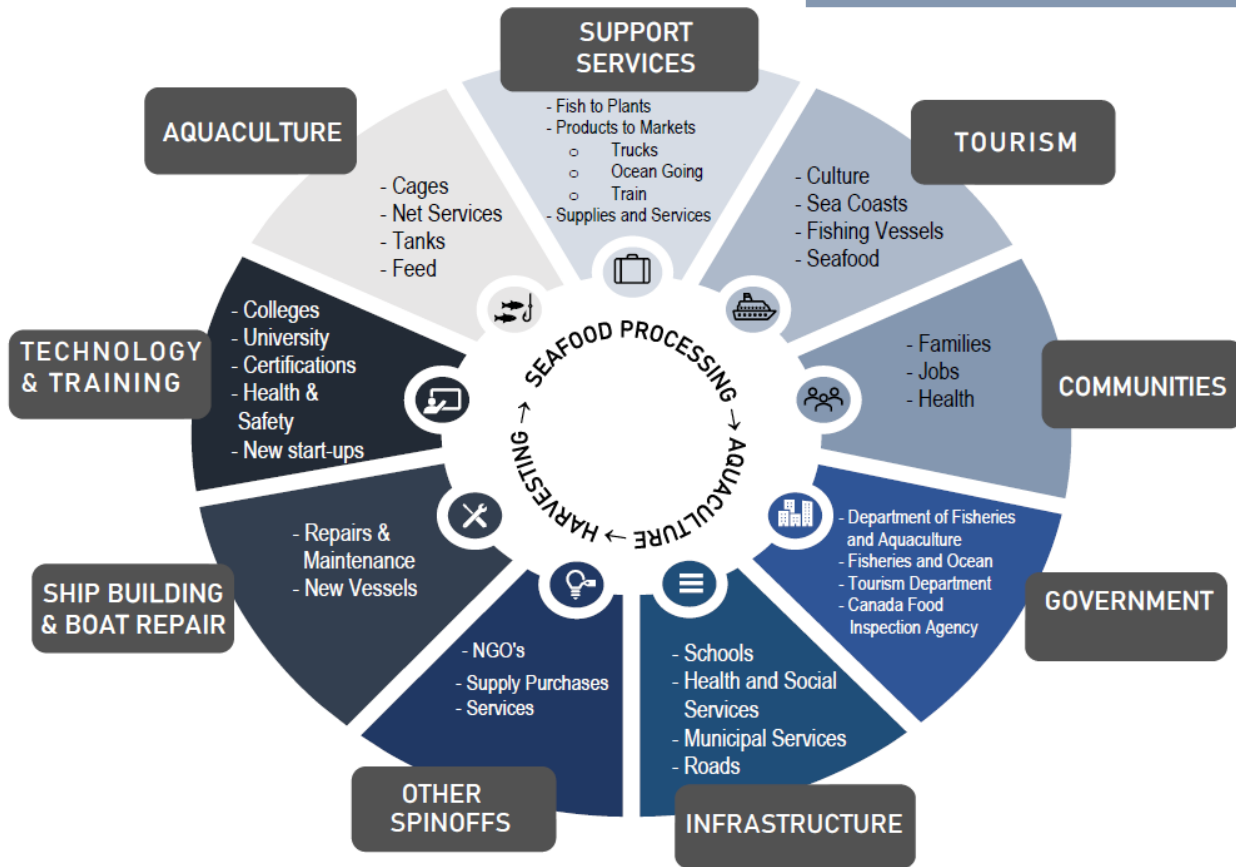
The seafood industry is critical to the Nova Scotia tourism industry; consuming seafood is an important aspect of the tourist experience. In a 2018 survey of tourists, 85% indicated that they participated in lobster-related or seafood events.

Tourism Revenues by Region



Source: Tourism Nova Scotia Strategic Plan 2018-2023

THE SEAFOOD SECTOR AND ITS LINKAGES

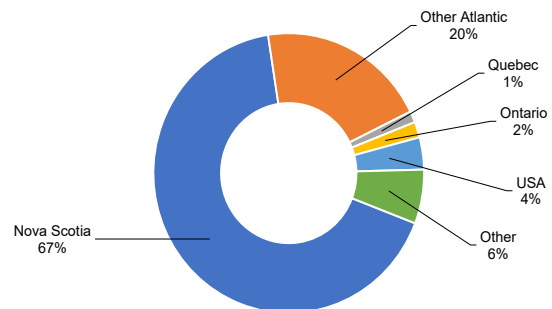


Tourism is a multi-billion-dollar industry that employs people in every part of the province. While the Halifax area is a service centre for tourists, activity is spread around the entire province.

The transportation sector is also vital to the seafood industry. All seafood must be moved to facilities and to market. Transport to market occurs by truck, rail, ocean-going container vessels, and air.

Trucks move some 500 million pounds of landed product annually, from landing ports to holding or processing facilities. This is equivalent to over 12,500 shipping containers of product. From these facilities, product moves to other holding facilities or is shipped directly to market.

Boat Builders' Marine Sales By Destination
Nova Scotia, 2018



Source: Nova Scotia Boat Builders Association; 2019 Survey of Members; Pisces Consulting

Shipbuilding is an important part of the history of the province and remains an important economic driver. Excluding Halifax, the 67 shipyards in Nova Scotia provide full-time year-round employment to almost 1,000 people.

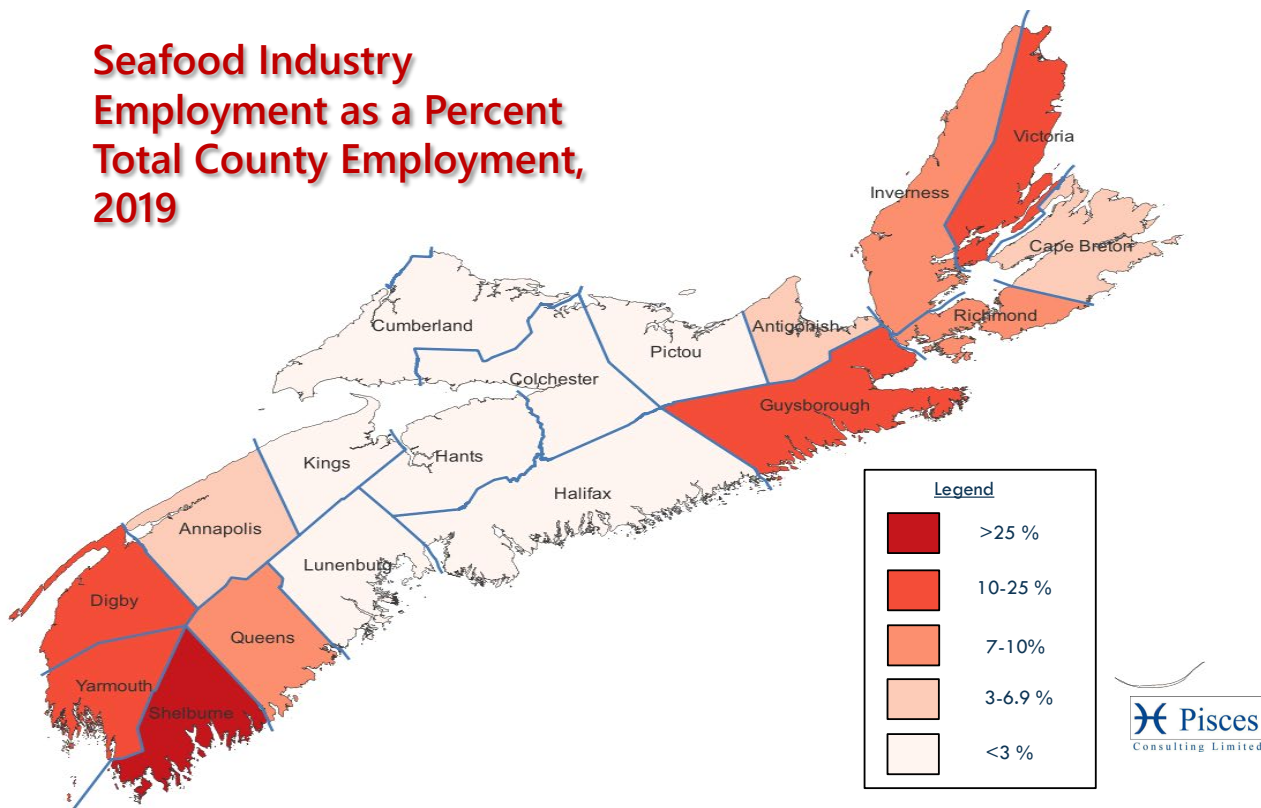
These shipyards provide valuable goods and services to Nova Scotian harvesters and to the seafood and other industries in Prince Edward Island, New Brunswick, Newfoundland and Labrador, and Quebec.

3.0 Seafood's Importance to Coastal Communities

The seafood industry employed 3.1% of all employed persons in Nova Scotia. The seafood industry is particularly important to coastal communities. The sector employed 3% of total Nova Scotia employed persons in 2019, but in several coastal counties, between 10% and 35% of employed persons worked in the seafood industry. The seafood industry is a core component of economic activity in the area.

While regional GDP data on the seafood industry is not available, there is \$17 billion of GDP generated outside Metro Halifax. With most seafood activity occurring in rural Nova Scotia, it is estimated that seafood industry comprises about 10% of this GDP.

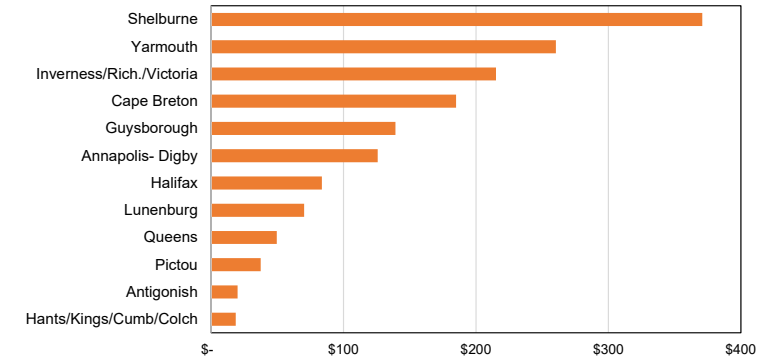
**Seafood Industry
Employment as a Percent
Total County Employment,
2019**



Reliance on the seafood industry for employment in 2019⁸ is highlighted by the fact that 16,240 people drew the majority of their income from the fishery. This number includes 4,540 self-employed harvesters, 6,310 harvesters who work onboard vessels for wages, 5,080 seafood processing workers, and 320 aquaculture workers.

Counties with high fishery employment also serve as regional labour markets for surrounding counties. This is especially true for areas that are not within commuting distance of Halifax. This regional labour market concept is especially evident in the Tri-County area of Digby, Shelburne, and Yarmouth (see Appendix 8). Workers commute to these areas to work in the fishery and other industries.

Landed Value by County
Nova Scotia, 2021, \$ Millions



Source: Special Tabulation, DFO: Pisces Consulting

Active Seafood Processing Facilities, 2021



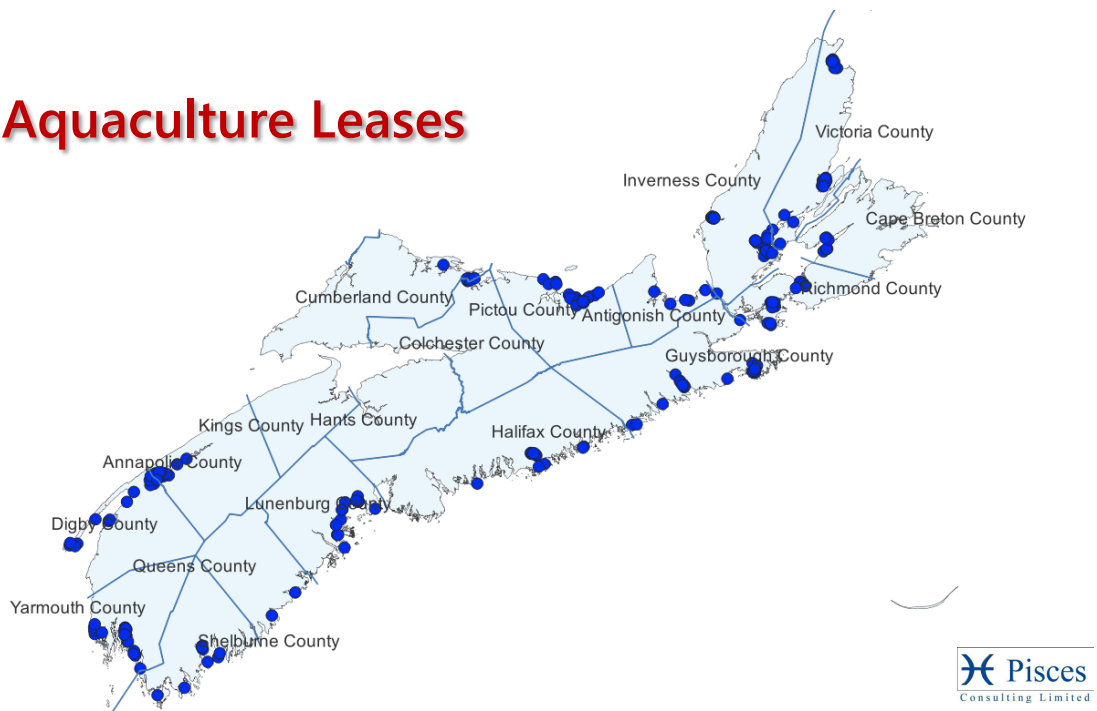
⁸ Statistics Canada typically reports employment in jobs or full-time equivalent. The 16,240 referenced here are the actual number of people whose primary source of income was from the seafood industry. In comparison, Statistics Canada reports 11,575 jobs for 2019, 10,805 in 2018 and 12,435 jobs in 2021.

Landings from Shelburne, Yarmouth, Annapolis, and Digby counties in 2021 totalled \$757 million, 48% of the overall value of the province's landings.

Seafood processing facilities operate in every county of the province, though the greatest concentration is found in the Tri-County area. Likewise, seafood processing workers are employed in almost every county.

As previously noted, Nova Scotia offers a partial solution to the world's protein crisis. Shellfish and salmonid aquaculture are natural fits to Nova Scotia's marine environment. Grow-out effort is concentrated in Nova Scotia's most protected bays. Lunenburg, Shelburne, Yarmouth, Digby, and Guysborough counties are major producing areas with a large portion of leases and production coming from these areas. Aquaculture activity complements the wild fisheries in these areas. Regions highly dependent on the wild fishery are also major aquaculture centres.

Marine Aquaculture Leases



Aquaculture offers both highly skilled and semi-skilled opportunities that can attract and retain young families in rural areas. Aquaculture has an extremely high reliance on support services from

other areas of the economy creating more spin-off benefits than other components of the seafood industry.

Total Income

In 2019, total income from all sources was \$1 billion for those employed in the seafood industry.⁹ Wage earning fish harvesters earned total income of \$468 million that was comprised of \$325 million in direct wages and \$143 million from other sources.¹⁰

Self-employed harvesters earned \$352 million (taxable income - net expenses + other income). It consisted of \$217 million (62%) in harvesting income and \$115 million from other sources.

In 2019, the incomes of processing workers from all sources totaled \$209 million, comprised of \$140 million in processing income and \$69 million from other sources.

In 2019, the total income recorded for aquaculture workers from all sources was \$15.4¹¹ million. Approximately \$11.4 million was from direct aquaculture employment (75%); self-employed earnings represented \$1.9 million (12%).

Average Income

Average incomes for seafood industry workers vary by occupation. The harvesting sector has higher average incomes than aquaculture or processing. The average total income of fish

⁹ Income components include net income from fishing, net self-employed income, taxable income, EI benefits, other transfers, and investment income.

¹⁰ Income is based on tax file data. Other income components include self-employed income, government transfers, investment income and other employment income.

¹¹ The harvesting sector consists of self-employed and wage-earning harvesters. Self-employed harvesters tend to be enterprise owners or co-adventurers. Wage-earning harvesters tend to be crew members and production workers on factory-freezer vessels.

harvesters varies by region. The provincial average for self-employed harvester income was \$77,630. County averages range from \$46,280 in Colchester to \$119,030 in Richmond.

In the larger fishing areas of Shelburne and Yarmouth, average self-employed harvester incomes are \$82,280 and \$75,720, respectively. Note that self-employed harvesters' income is net of expenses to catch the fish.

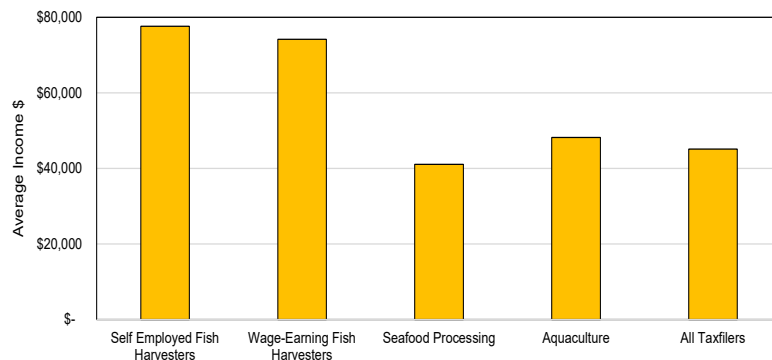
The average incomes for wage-earning harvesters vary more than those of self-employed harvesters. The provincial average wage was \$74,150; county averages range from \$43,950 in Pictou to \$118,040 in Halifax. Wage-earning harvesters can be crew onboard vessels who either earn a wage, a base wage plus a bonus percentage of catch, or who participate as co-adventurers and receive a percentage of catch after expenses.

The average income for fish processing workers is \$41,080, slightly lower than the provincial average for all employed workers (\$45,090). Average incomes for processing workers range from \$26,040 in Cape Breton to \$83,700 in Lunenburg. The range reflects the seasonality of industry by region as well as whether processing workers work onboard at-sea processing vessels.

For Aquaculture, the average income in 2019 was \$48,170 and was above the provincial average. County average incomes range from \$28,590 to 66,530 with the highest average income in Lunenburg county.

Average Income for Employed Taxfilers

All Income Sources, Nova Scotia, 2019



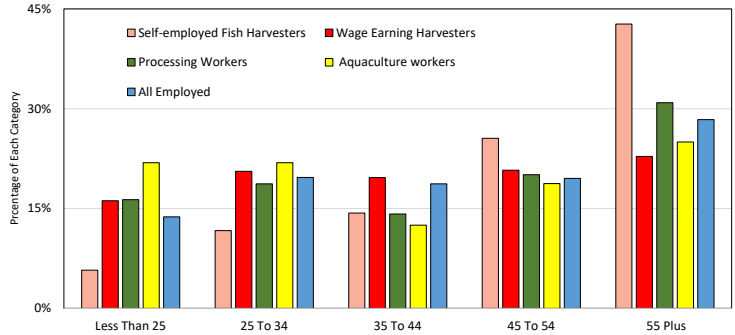
Source: Statistics Canada Special Tabulation- T1 Taxfiles

Age Distribution

The age of workers varies by sector. In 2019, self-employed harvesters were substantially older than other workers, with 68.3% aged 55 years or older. Wage-earning harvesters and aquaculture workers were generally younger.

The share of older workers has increased most dramatically among harvesting workers and processing workers. Self-employed harvesters were generally older in 2000, however the age gap has widened in terms of other seafood workers and members of the employed labour force.

Age Distribution of Taxfilers
Nova Scotia, 2019



Source: Statistics Canada Special Tabulation- T1 Tax files; Pisces Consulting

4.0 Pivoting in the Face of Challenge

The ocean has always been a source of sustenance and economic prosperity for people in Nova Scotia. The industry has changed radically since the days when the commercial fishery consisted primarily of groundfish and pelagic landings.

Many of the challenges facing the seafood industry are shared by other food exporters. Yet, because seafood is so broadly distributed, seafood exporters face challenges other food exporters do not. Products are highly perishable, prices are set internationally in commodity markets, and many shellfish species such as lobster and snow crab are considered luxury goods. Demand for luxury goods tend to decline during recessions or periods of economic uncertainty.

Through the Great Recession of 2008-09 and the COVID-19 pandemic, the seafood industry has continued to adapt. Stakeholders have invested in processing facility expansions and state-of-the-art vessels. They are selling in less traditional market segments and developing markets in East Asia. Exporters are poised to continue value growth of wild seafood, and to meet growing demand for cultured seafoods through planned expansion of Nova Scotia's aquaculture sector.

COVID-19

The pandemic affected the entire seafood industry due to uncertainties about employee safety, virus transmissibility, and about how buyers and consumers were going to respond to the changing economic landscape.

Collectively, Nova Scotia's industry responded with patience and understanding as fisheries were delayed, safety measures were put in place, financial supports were implemented, and producers worked with buyers to determine where best to place their products.

By all accounts, the response from buyers and consumers was surprising. Lockdowns resulted in many consumers learning how to prepare seafood at home—when they previously tended to only

eat seafood in restaurants. Producers seized the opportunity by pivoting to retail sales instead of focussing strictly on the food services sector. Most processors believe this has changed the market for the foreseeable future. In the long-term, many consumers will likely return to their habits of eating seafood primarily in restaurants. However, a new group of consumers now know how to prepare seafood at home and will seek that value alternative.

The Great Recession

The banking crisis that began in 2008 was a major disruptor to the seafood business. Concerns about inflation, increasing interest rates, and financial uncertainty resulted in reduced consumer spending.

Restaurant traffic dropped immediately, and demand for higher-priced seafood decreased. Consumers purchased less expensive seafood products, choosing farmed species such as tilapia and basa fish over higher-end products such as lobster, snow crab, salmon and scallops, resulting in price declines. Aquaculture production was negatively affected as the restaurant traffic dropped and logistical issues impeded transport to key markets.

The lobster sector was particularly hard hit. Prices dropped 17% in one year and by 2011 prices dropped 31% reaching their lowest point in over 10 years. Coupled with a US Dollar exchange rate that went to par from 2010 to 2014, returns to the lobster sector declined significantly. These factors largely account for the drop in prices from 2008 to 2014.

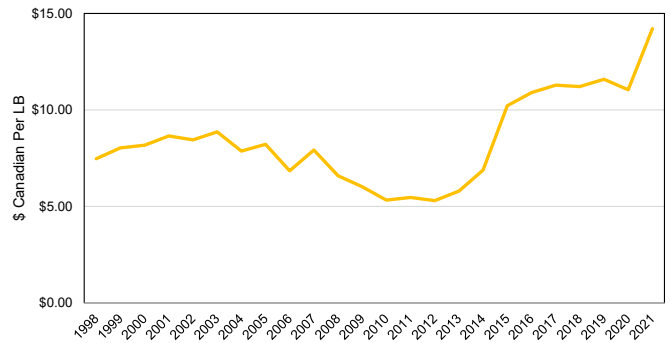
The seafood industry was in a crisis. At the request of industry stakeholders, governments launched several initiatives. There was support across the industry for reducing participation in the fishery and license buybacks were instituted. The Lobster Council of Canada was established and given priority to develop alternative markets to diversify Nova Scotia's export base beyond the United States.

After several years of effort by industry and with support from governments, demand for lobster increased in East Asian markets. Even with increased supplies, demand has remained strong and

the value of lobster steadily increased. This helped offset the challenges that would arise during the COVID-19 pandemic.

This resulted in both a higher landed value and higher export value. Post-recession, tourism increased and the importance of seafood, especially lobster, to the local and tourist market became increasingly evident. Seafood processors also began to produce more value-added products that increased overall market returns.

Prices for 1 1/4 lb Live Lobster, New England
\$ Canadian/LB, 1998-2021



Source: Urner Barry- Comtell; US Federal Reserve

Making Waves: First Nations Acquisition of Clearwater Seafoods

Mi'kmaw Nations in Nova Scotia have increased their presence in commercial fisheries through the acquisition of Clearwater Seafoods, a vertically integrated harvesting, processing, and marketing company. This acquisition provides a sustainable economic base for the First Nations and their surrounding areas.

In 2020, Clearwater Seafoods was 50% acquired by the newly established Mi'kmaq Coalition formed by seven Mi'kmaw Nations in Nova Scotia and Newfoundland and Labrador: Membertou, Miawpukek, Paqtnekek, Pictou Landing, Potlotek, Sipekne'katik, and We'koqma'q.

The purchase of Clearwater by a consortium of First Nations communities is a significant engagement of First Nations in local and world fisheries. Indeed, it is the single largest investment in the seafood industry by any Indigenous group in Canada.

The benefits of this participation will cross generations. As Membertou First Nation Chief Terry Paul indicated in a recent interview, the benefits of the purchase are seen in their own community-based commercial fisheries. The improved market access and market knowledge gained from the purchase of Clearwater have been positive for their harvesting fleet.

As part of the deal, First Nations were assigned the company's quotas. This is one of the first forays into quotas that cover such a broad area throughout Eastern Canada.

Clearwater was started by Nova Scotians and has grown to be an innovative powerhouse within the province. As a vertically integrated business it has a solid understanding of the entire industry, including its harvesting operations in Canada and abroad, its processing facilities, and its marketing efforts. Clearwater's seafood products are sustainably harvested and sold throughout the world with traceability back to the time and location of its catch.

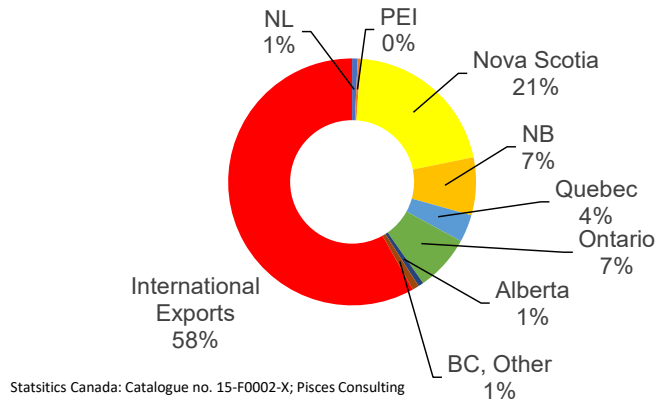
Employees from Clearwater work in hundreds of communities in the Atlantic region. The company provides a strong economic base for the province and for Mi'kmaw Nations.

Leadership, Economic Diversification, Community Engagement

5.0 Seafood's Contribution to the Canadian Economy

The impacts of the Nova Scotia seafood industry are felt across Canada. In 2019, Nova Scotia contributed 46% of the total landed value of the Canadian seafood industry and 36% of the landed weight. Shellfish (lobster, snow crab, scallops, shrimp, and clams) accounted for 88% of Nova Scotia's landed value.

Nova Scotia Trade in Seafood, 2018



As previously noted, approximately 21% of the output of the Nova Scotia seafood industry is produced for in-province use. This trade is directly related to the tourism sector where seafood products are a part of the Nova Scotia experience.

Nova Scotia exports its seafood to other Canadian provinces. Over 20% of demand is from other Canadian provinces, especially New Brunswick and Ontario (7% each) with Quebec the next largest market.

► Economic Impact to the Economy (2018)

	GDP (\$ B)	Employment	Wages & Salaries (\$ M)
Nova Scotia	\$1.6	16,280	\$865
Canada	\$2.1	20,280	\$1,106

Source: Statistics Canada Input/Output Model; Pisces Consulting

The spinoff benefits of Nova Scotia's seafood industry go beyond our provincial borders. The industry contributes a total of \$2.1 billion to Canada's GDP, including about one half a billion dollars to the GDP of other provinces. The provincial industry also creates 20,280 jobs nationally, which provide \$1.1 billion in wages and salaries.

6.0 The Innovation Ecosystem

The seafood industry has changed considerably over the past 10 years, led by a strong focus on innovation and diversification of its market base. New opportunities and technological innovations will continue to drive change.

Innovation refers to applying ideas or devices in new contexts and can be done by existing or new businesses. Technology adoption is a form of innovation, as is the development of new products.

The seafood industry has been supported by a broad range of government programs intended to help it adapt to the ever-changing landscape. Industry-led initiatives such as the national Ocean Supercluster bring together technology companies and other stakeholders to promote ground-breaking solutions in all aspects of the industry.

Many opportunities lie ahead for youth. High quality education and life-long learning are critical for the future workforce, and the many education institutions in Nova Scotia have accepted that challenge. The nature of work, even within hands-on occupations in harvesting, processing, and aquaculture, is fast-changing.

Making Waves: The Taste of Nova Scotia

Tourism is an integral part of the Nova Scotia seafood industry and is a direct complement to the industry. The picturesque landscape and seacoasts combine with the tasty seafood products such as lobster and Atlantic salmon to create a unique experience.

The importance of seafood/lobster to Nova Scotia's appeal as a pleasure travel destination is evidenced by the vital data on this experience. A 2018 survey found that 86% of tourists participated in lobster and seafood experiences over the five previous years. There are also high levels of awareness: visitors reported that seafood was important to their trip and was part of advance planning.

All of this points to solid links between seafood and the tourist experience. The industry has capitalized on this interest and has developed uniquely Nova Scotian approaches to promoting seafood and tourism.

The tourism industry has coordinated tourist events focused on Nova Scotia's culinary delights. The Lobster Trail and the Chowder Trail are just two examples. An interactive map allows participants to travel the province and collect points for each of the restaurants they visit or experiences they take in. They are eligible for prizes based on their visits.

Strong rural communities are an important part of a strong tourism sector. The people, the goods they produce, the services they provided, and their vibrant communities all co-exist to create the distinctly Nova Scotian experience.

Tasty, Innovative, Marketing

Hybrid fishing vessels are an innovation being adopted by Nova Scotian harvesters and aquaculture operators. Electric winches are being installed on vessels, and modern GPS and computer technology can be found in the wheelhouses of most vessels. The industry is moving toward electronic logbooks which will improve record keeping and fisheries management.

In processing facilities, many labour-intensive jobs and materials handling systems have been automated to meet labour challenges. Flow line technologies, vision systems, robotics, and real-time monitoring of water quality in holding tanks all contribute to the growth of the processing sector.

Aquaculture companies have embraced technology using robotics, computer monitoring of grow out facilities and feeding, and other innovations. Fish husbandry is monitored using precision computer and sensor systems. Similarly, live lobster holders employ remote monitoring technology to ensure water quality maintains lobster health.

Net zero initiatives create new opportunities. Harvesters and producers will gain a competitive market advantage if seafood products are demonstrably carbon neutral. Swift action will let Nova Scotia seafood keep its preferential placement in international markets. For Nova Scotia and Atlantic Canada, proactive net zero initiatives are an opportunity to show the world our commitment to an environmentally sustainable industry.

Governments have aided the industry through provincial and federal COVID-19 programs. ACOA, Perennia, and the Atlantic Fisheries Fund provide support that has spurred capital investment and been crucial in developing and implementing next-generation technologies.

Canada's Ocean Supercluster

Canada's Ocean Supercluster is an industry-led initiative focused on growing the ocean economy in a digital, sustainable, and inclusive way. It brings together start-ups, scale-ups, and mature organizations from coast-to-coast across the seafood, bioresources, offshore resources, marine renewables, defence, shipping, and ocean technology industries. The Ocean Supercluster has

approved more than 70 projects with a total value of more than \$360 million. Many of these projects could significantly benefit the seafood industry. Project Sentry, the Precision Fish Harvesting Project, and the ROC Fishing System Project are all good examples.

Project Sentry: Deep Trekker Visual Defence Inc. is creating a new remote aquaculture monitoring solution. With a total project value of over \$6 million, the Ocean Supercluster will provide \$3 million with the balance coming from project partners.

As part of this project, a remotely operated vehicle (ROV) will be deployed periodically to inspect various levels of the ocean. This solution will reduce the need for human divers to do inspections by instead using integrated video, sensors, and Artificial Intelligence (AI). The ROV will perform regular and consistent inspections.

Precision Fish Harvesting Project: Katchi, a rural Nova Scotia company, is leading development of SmartNet that will trawl for fish without contacting the sea floor. The net will also employ herding and deterring technology to harvest more effectively. Katchi seeks to deploy uncrewed service vessels (USVs) to provide information about fish aggregations to vessels, resulting in improved fishing efficiency (see Making Waves-Katchi).

ROC Fishing System Project: Under this \$1 million project, the ROC team will develop technologies to reduce the number of mammal entanglements in lobster and crab trap lines. The traditional vertical fishing line will be coiled on the seafloor in a contained unit with a recovery buoy. The ROC Fishing System Project will be instrumental in protecting marine species at risk from rope entanglements. This is a promising step towards a safe, transparent, and sustainable fixed-trap fishery.

Nova Scotia Fisheries Sector Council (NSFSC)

The NSFSC is the key fisheries human resource and training organization in the province focusing on the needs of employers and workers. Their main activities include:

Human resource planning: In support of the seafood industry, *ad hoc* labour committees have been established for both the seafood processing and aquaculture sectors. Further, labour market information [dashboards](#) have been developed for harvesting, seafood processing, and aquaculture.

Attraction and retention: The NSFSC have developed programming to attract new entrants to the industry while retaining the existing workforce. One project, FishJobs.ca, increases awareness of jobs in the seafood sector and provides information on careers, training, and employment opportunities. A dedicated Human Resource Project Officer has been hired to work directly with seafood processing companies to improve attraction and retention. Further, a collaborative labour market action plan is being developed for the seafood industry.

Industry capacity building and training: A five-year initiative, Fishing Safety Now, is underway with the goal of improving safety in the harvesting sector. It identifies and develops training materials and provides resources to harvesters.

Atlantic Fisheries Fund

The Atlantic Fisheries Fund (AFF) supports innovation in the seafood industry. It helps the industry meet growing market demand for sustainably sourced, high-quality seafood. It is a cost-shared partnership between Fisheries and Oceans Canada and the four Atlantic provinces.

The AFF focuses on three pillars:

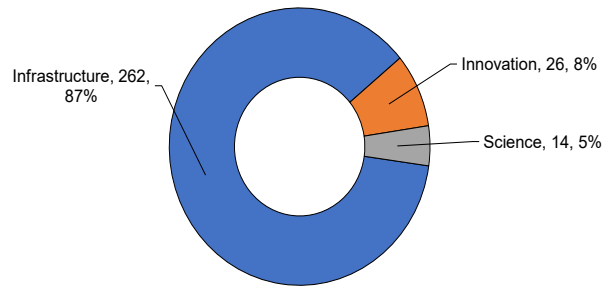
Innovation: Developing new products and technologies in the harvesting, aquaculture, and processing sectors.

Infrastructure: Using new technologies or processes to improve sustainability.

Science partnerships: Collaborating with universities and other research institutions to improve the industry's knowledge and understanding of key issues.

The AFF has received 483 applications from the Nova Scotia industry to date; 302 are currently active. The active projects represent total projects costs of \$154 million and AFF contribution commitments of \$90 million¹².

Atlantic Fisheries Fund Number of Projects by Pillar
Nova Scotia, 2018-2022



Source: Department of Fisheries and Aquaculture

The pillar with the most activity is infrastructure with 262 projects worth \$51 million. The 26 innovation projects with a commitment of \$28 million are intended to bring new ideas to bear in the sector.

Atlantic Canada Opportunities Agency

ACOA supports the seafood sector and the entire Atlantic Canadian economy through programs such as the [Regional Economic Growth Initiative](#) (REGI). REGI supports business scale-up, productivity, and regional innovation ecosystems. Businesses and ecosystem partners can apply for funding under REGI.

ACOA also delivered the Atlantic Canadian portion of the [Canadian Seafood Stabilization Fund](#) (CSSF). CSSF was launched in March 2020 at the start of the COVID-19 pandemic. It committed \$43 million for Atlantic Canada’s fish and seafood processors to help with costs incurred due to COVID-19. Businesses and non-profits in the seafood sector were eligible. The CSSF supported activities to increase storage capacity, invest in modified operations and safety procedures, and respond to new markets. Much of the CSSF support was repayable, except to non-profits and some funds related to reusable safety equipment.

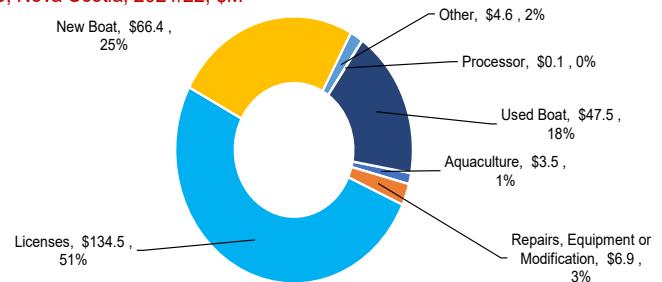
¹² Data is current to February 2022.

Fisheries and Aquaculture Loan Board

The Nova Scotia Fisheries and Aquaculture Loan Board (NSFALB) provides loans to the seafood industry. In place since 1936, NSFALB supports fishers and sea farmers in Nova Scotia. Its mandate was recently expanded to include all aspects of the industry.

Fisheries Loan Board Outstanding Loans by Purpose

NSFALB, Nova Scotia, 2021/22, \$M



Source: Nova Scotia Fisheries & Aquaculture Loan Board: Pisces Consulting

NSFALB programs provide financial support to new entrants and existing enterprises wishing to diversify and expand. The organization offers term rate financing for three-, five-, or 10-year options with one- to 20-year amortizations.

The current portfolio of loans, as of January 2022, is \$264 million, of which 97% is to harvesters. Loans to harvesters were for new licence purchases, new and used vessels, and vessel refits. Loans to aquaculture enterprises totalled \$4 million.

Centre for Ocean Ventures and Entrepreneurship (COVE)

COVE manages a 13-acre waterfront facility in Halifax to assist the ocean sector. Ocean technology companies, post-secondary researchers, and marine-based service businesses come to COVE for programming and short- and long-term tenancies. Approximately 60 ocean tech companies are on site at any time.

COVE offers unique solutions and facilities to companies. Some of their programs include:

- **Stella Maris:** A testbed for marine instrumentation and Eastern Canada's most versatile seabed technology platform.
- **Samqwane'jk:** Connects Indigenous ocean businesses and ocean technology companies in Atlantic Canada to share knowledge and expertise to create new, sustainable solutions.

- **SmartATLANTIC Alliance:** Supports operational efficiency, situational awareness, and safety in the marine environment. It also provides support to the country's coastal and ocean management efforts.
- **DeepSense:** Unites the next generation of AI and machine learning experts with companies that want to harness the potential of data and lead the smarter ocean economy.

Centre for Marine Applied Research (CMAR)

CMAR leads and supports science research projects in collaboration with industry, government, communities, and other marine user groups, to support the sustainable development of coastal resources in Nova Scotia. CMAR promotes innovation and science-based decision making by collecting and analyzing biophysical and socio-economic data. CMAR operates as an independent division under Perennia Food & Agriculture Inc, the provincial agriculture development agency.

Other Government Supports

Farm Credit Canada. This program provides financing support to primary producers in the agri-foods business, including aquaculture. Offices across Atlantic Canada service primary producers.

Atlantic Integrated Commercial Fisheries Initiative (AICFI). AICFI provides funding and support to Mi'kmaq, Maliseet, and Passamaquoddy Indigenous communities in the Atlantic. This initiative aims to maximize the potential of their communal commercial fishing enterprises and to strengthen community economic self-sufficiency.

Making Waves: Katchi – Innovative Trawling

Katchi, an innovative harvesting technology company led by CEO Marc d'Entremont, is developing a leading-edge trawl and fishing system. The fully integrated solution uses hydrodynamic blocks on the bridles of the trawl to ensure the net remains open, replacing existing trawl doors and reducing fuel consumption and greenhouse gas emissions.

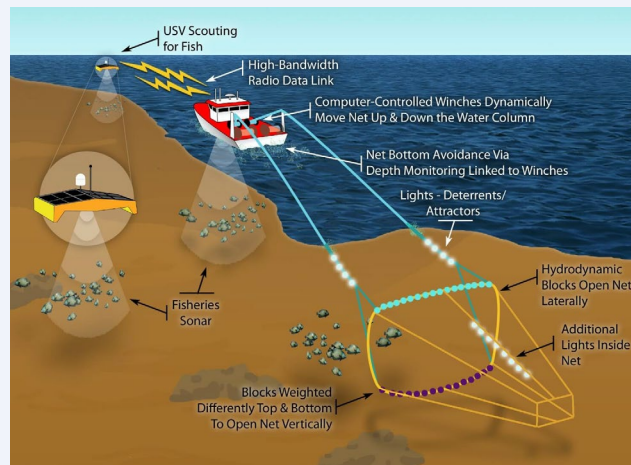
All of this is done with less weight and with lower drag meaning increased fuel efficiency and lower fuel costs. Lights and bioacoustics will ensure efficient capture of targeted species while simultaneously reducing by-catch. The vessel's depth sounder maps the seabed in advance of the net and communicates with the winches to automatically adjust the cable payout. This enables the net to move up and down the water column to the desired depth to target specific species.

The system can also lower operating costs by reducing fishing effort, allow for better targeting of capture species, and enable harvesters to fish an area longer with reduced by-catch issues. The system can be easily deployed on vessels using existing systems so no major retooling is required.

As part of its project, Katchi also seeks to develop and deploy uncrewed surface vessels (USVs) to improve the efficiency of conventional trawl fishing. With innovative energy optimization technology being developed by Rimot, Canadian designed and manufactured USVs by its partner ABCO, the USVs will scout for fish using hydroacoustic equipment that delivers information to vessels to reduce vessel search time.

The complete system will improve overall vessel operations, increase market returns and lower greenhouse gas emissions. This technology will lead the Canadian and North American industry in innovative trawl fishing and has the potential for export opportunities worldwide.

Innovation, Environmental Stewardship, Global Perspective



6.1 Innovation in Production and Processing

In 2009, approximately 46% of the landed volume of all seafood in Canada was discarded as waste¹³. A tremendous opportunity exists for the industry to extract greater value from this resource. Technology can help realize this goal.

The processing sector has invested in value-added production. Most of these projects focus on lobster as the primary ingredient. At least 10 lobster holders have added processing capacity for raw and cooked products since 2019.

Innovations in handling and processing, such as conveyor systems, have been introduced. New technologies in meat extraction and shell processing are being adopted. Processors are focused on quality, and they can increase the value of their product by getting new-shell lobsters to the processing line as soon as possible.

Technologies for monitoring live lobster holding have been broadly adopted by processors, buyers, and harvesters. Real-time monitoring of live holding tanks has reduced mortalities, especially for lobster being held for longer

Making Waves: Innovation and Value from Underutilized Species

Kenney & Ross Limited (K&R), founded in 1945 by local entrepreneurs Job Kenney and Reginald Ross, is an innovative company still operating in Shelburne. The founders believed that Nova Scotia possesses a rich source of marine by-products that could be processed for added value. During their early years in business, they manufactured several marine products including cod liver oil, pet food, and fish gelatin.

K&R has seen many changes over the years. The company was purchased in 2015 by Japanese-based Ajinomoto Trading Co. Originally specializing in technical grade fish gelatin, K&R now also makes food and pharmaceutical-grade fish gelatin and hydrolyzed fish collagen for export worldwide.

K&R sources fish skins from local and international suppliers to produce ingredients for customers in 30 countries. The company operates seven days a week, 24 hours a day, 365 days a year. Local raw materials now represent a small portion of the company's total supply; most raw material is sourced internationally.

Acadian Seaplants also generates value from one of Nova Scotia's previously under-utilized resources: seaweed. The company's passion and a prolific renewable resource have carried them onto the global stage. The company uses sustainably harvested seaweed to create products that supply plants, animals, and people with essential nutrients and organic compounds. It currently serves markets in more than 80 countries

Nova Scotia seaweed harvesters provide raw materials to Acadian Seaplants. The company monitors the stock harvesting regions, researching the potential impact of the harvest on the habitat architecture and associated fauna. The company maps shoreline seaweed beds using state-of-the-art technology, such as high-resolution satellite imagery and drone photography.

Leading, Innovating, Creating New Wealth

¹³ Manuel, *et al*, 2011

periods of time. Governments and industry have supported development of these innovative technologies and the industry has been quick to adopt them.

The operating environment for everyone in the seafood industry continues to evolve. Seafood businesses can no longer work alone. Changing demands from regulators, consumers, and export markets require collaboration across the entire industry.

Making Waves: Value Added Lobster

The Nova Scotia Seafood Alliance (NSSA) has 140 member companies. Under the Atlantic Fisheries Fund, NSSA administered 135 projects from June 2020 to July 2022. Most of these projects have been with companies that hold live lobster.

Refrigeration of live lobster holding systems allows processors to hold live lobster for up to one year. This means live lobster can be sold year-round or when market prices improve, increasing returns and permitting higher shore prices for harvesters. Four million pounds of live lobster holding capacity have been converted to refrigerated holding.

The survivability of live lobster has been further improved by automated water quality monitoring systems. Fifty per cent of the new refrigerated capacity includes systems that monitor water temperature, oxygen, and ammonia. Alarms notify the operator when any of these monitored conditions are out of tolerance, permitting immediate response that reduces the risk of lobster mortality. These systems meet the stringent requirement of the provincial Lobster Quality Certification Program.

Ten live lobster holders have added lobster processing capacity over the past two years, and more are planned. Value-added products including raw lobster tails and claws, whole cooked and raw lobster, and meat products are now being processed in Nova Scotia rather than shipped out of the province for processing. Expanded processing capacity has resulted in:

- Extended periods of employment that have increased incomes and helped retain workers.
- Increased financial returns as weak, small, and softshell lobster are no longer being sold at lower than purchase cost.
- Higher value products being exported from Nova Scotia.
- Exporters gaining understanding of the frozen lobster market.

Larger lobster processors have modernized their facilities, reducing labour needs, increasing throughput, and improving the type and quality of products being processed. This has permitted reassignment of workers to more highly skilled jobs. With unique products and innovative packaging, processors can now enter higher value, more discriminating markets.

More lobster value is being retained in Nova Scotia by modernizing processing facilities and increasing capacity to process value-added lobster products.

Nova Scotia now has state-of-the-art processing equipment in use. These technologies improve quality, shorten processing times, reduce costs, and improve product quality. New systems and processes are on the horizon. Examples include automation and robotics, AI, high-pressure

processing (including cooking, freezing, and thawing, pulse electric field), ultrasound, irradiation, pulsed light technology, microwave processing, enzymatic applications and ohmic heating. Novel packaging technologies like active packaging, intelligent packaging, and modified atmosphere packaging preserve fish and extend the fresh shelf life of food products. These innovative processing methods require specific skills, providing new and exciting career opportunities.

6.2 Innovation in Automation and Workforce Development

As the World Economic Forum points out in *The Future of Jobs Report 2020*, work is moving away from traditional roles toward new technical skills. AI, robotics, and new computer technologies have already changed how we do business—and more changes are ahead.

Aquaculture is now a high-tech sector. Technicians and marine operators will be required as this sector continues to expand. Educational institutions and businesses are investing in training that will allow workers to keep pace with this evolution.

Advances in seafood processing methods and information systems also require new skills. Remote monitoring and control systems, coupled with processing data analytics, will permit technicians to actively control and improve numerous facilities. The industry has begun to develop a new labour force strategy for the industry that should result in a comprehensive roadmap to attract and retain a new generation of young workers.

The move to net zero is a driver of technology changes onboard vessels. New skills and life-long learning will be required to keep pace with innovation. Continued investment in human capital is integral to doing business now and in the future.

6.3 Innovation in Sustainability, Traceability, and Safety

Traceability is a long-standing trend in the seafood sector¹⁴. Illegal and unregulated fisheries are a concern for seafood importing nations. Illegally caught fish undermine fishery management goals and resource sustainability. Accelerating the adoption of a comprehensive traceability system will help counteract illegal profit incentives, and protect seafood resources, markets, and consumers.

In 2021, the Government of Canada undertook a review of seafood traceability in Canada and is developing a new policy framework. The initial consultation phase focused on three areas:

- Consumer protection and food safety (as it relates to fish and seafood).
- Sustainability and fisheries management related to traceability and combatting global illegal, unreported, and unregulated (IUU) fishing.
- Market access, trade, and marketing of Canadian fish and seafood.

Fisheries and Oceans Canada introduced the Canadian Catch Certification Program in 2018¹⁵. The program traces the source of products through chain of custody requirements created by an independent third party. This program was launched in response to the European Union's requirement that fish exports to the EU be accompanied by a catch certificate issued in the country of origin and is an effort to fight IUU.

Today's seafood buyers want third-party assurance that products will be consistently high-quality. In Canada the most common accreditations are from the British Retail Consortium (BRC) or Safe Quality Food (SQF)¹⁶. These food safety certifications enhance business-to-business trade, particularly when selling to large, discriminating international buyers.

¹⁴ Seafood traceability for fisheries compliance: <https://www.fao.org/3/i8183en/I8183EN.pdf>

¹⁵ [Catch Certification Program](#)

¹⁶ [Safe Quality Food](#)

The Nova Scotia Seafood Accelerator Program¹⁷, delivered through Perennia, provides support for seafood producers in Nova Scotia who want to achieve certification under the Global Food Safety Initiative program.

The Global Food Safety Initiative (GFSI) provides accreditation by several third-party service providers using a suite of standards. One of their key programs is the Race to the Top Framework. This framework applies GFSI-recognized certification and audits to improve trust, transparency, and confidence¹⁸.

The BRC's Climate Action Roadmap is a commitment from United Kingdom (UK) retail industry members to achieve net zero in their own operations and the products they sell by 2040¹⁹. The roadmap commits to sustainable sourcing of food and to sharply reducing their carbon footprint. Low-emissions seafood will eventually be a requirement to sell in the UK. This is an opportunity for Nova Scotia's industry to get in early; delaying implementation of a net-zero strategy may limit market access in the future.

The Marine Stewardship Council (MSC) has become synonymous with sustainability in the market. Receiving MSC certification is a major step forward in traceability for Nova Scotia seafood products. Many of the seafood resources in Nova Scotia have achieved certification, including lobster, crab, scallop, haddock, and others. Starting in the late 2000s, Canadian fisheries sought and received certification of major east coast fisheries. Today, nearly 60% of the seafood landings in NS are MSC certified.

¹⁷ [Perennia](#)

¹⁸ [Race to the Top](#)

¹⁹ [Climate Action Roadmap](#)

6.4 Innovation in the Face of Global Challenges

Emerging technologies will change how the seafood industry operates in the near and mid term. With the rapid pace of innovation, technologies that have not even been conceived of yet will soon be introduced. It will be critical for the industry to remain poised for rapid evolution.

The development and adoption of new technologies provides a significant growth opportunity for other sectors of the economy. Innovation can help develop new spin-off industries that can contribute to sustaining coastal Nova Scotia.

Many technologies will likely be incorporated into the seafood industry's daily operations. Electrification of harvesting vessels will change on-board operations and will displace hydraulic systems. AI and real-time catch reporting will permit more effective fisheries management.

Vessels are being modified to permit multi-day trips and reduce the number of outings. Equipment changes have been made to reduce strenuous and repetitive tasks, letting aging fishers work longer. Implementing additional onboard handling methods will further reduce labour demand.

The new logistics centre at the Halifax airport offers considerable opportunity to export more premium seafood products to the European markets. This is a competitive advantage for Nova Scotia producers. European countries are a lucrative market and could become a major buyer of high-quality products like blue mussels.

Communities, counties, and regions play an essential role in diversifying local economies and supporting their primary economic sectors. Communities should seize the moment and work together toward a common goal of achieving sustainable economies.

With support from provincial and federal governments, the seafood industry has successfully responded to challenges including COVID-19, the Great Recession, new trade regulations, and environmental concerns.

AFF, the Ocean Supercluster, and ACOA program funding are initiatives that assist stakeholders to adapt and develop technology and innovation. The seafood industry recognizes the human resource challenges it faces and is taking proactive action through the Fisheries Sector Council.

Nova Scotia has some of the finest education institutions in the country and indeed in the world. This gives the province a competitive edge over many global competitors.

Stakeholders can harness this brain trust to lead the way in innovation for the seafood industry and coastal economies.

Since the groundfish stock collapse of the early 1990s, the Nova Scotia seafood industry has achieved improvements in scientific research, in its understanding of the ocean ecosystem, and in developing a more transparent decision-making process. This is due to effective collaboration between regulatory agencies, harvesters, environmental non-government organizations (ENGOS), and research institutions.

Industry stakeholders now participate in many science peer-review and advisory processes,

including collaboration with Environmental and Non-Government Organizations (ENGOS) on research initiatives to protect vulnerable habitat and species. Industry is also actively working with

Making Waves: Seeking New Markets

Geopolitical issues or prohibitive trade practices can quickly and dramatically affect traditional seafood markets.

Branding and promotion can result in the successful development of alternative markets.

The Canadian Association of Prawn Producers (CAPP) successfully pivoted after the 2014 Russian Federation ban on seafood imports. At the time, Canada was exporting 20,000 metric tons of shell-on shrimp annually; a major market disappeared overnight.

As part of a planned market diversification, several promotional campaigns for shrimp had been trialed in China. These, along with initial market research, identified the best outlets and promotion strategies in the country, including social media, TV celebrity chefs, and in-store promotions.

Expansion of the promotion strategy provided a ready market. China took all the shrimp previously destined for the Russian Federation, and effective promotion provided higher prices.

IDENTIFY, PLAN, EXECUTE

research institutions to improve fishing methods and supplement scientific information regarding fish stocks and ecosystems.

Much of this collaborative effort is sponsored by stakeholder associations and many supplemental research activities are supported through the government and private sectors. The result of efforts over the past 30 years include:

- Third-party certification of wild and aquaculture sustainability measures.
- Implementation of voluntary and mandatory closure areas to protect vulnerable habitats and species.
- Development of gear exclusion devices to reduce bycatch.
- Modification of gear to minimize impact on habitat.

Much has been done, yet further improvements can be made in efforts to reduce gear losses, integrate technologies to develop “smart” fishing systems, and responsibly manage the use of plastics and packaging to reduce waste streams.

Aquaculture can be a long-term sustainable solution for the province, particularly for coastal communities. It offers a mix of high skilled and semi-skilled employment opportunities that can attract and retain young families.

Aquaculture is an important facet of the coastal economy, and through continued growth it can sustain this importance well into the future. Further growth opportunities for land-based aquaculture may emerge as new technologies are developed. Offshore facilities—away from coastal areas and migration grounds of wild species—are another recent innovation. Floating production systems are being developed in Norway that could provide alternative methods of aquaculture.

Shellfish aquaculture is in its infancy but offers considerable opportunities for coastal areas. More effective marketing of local products such as oysters and blue mussels may result in higher returns, attracting more people to the sector. Given the number of currently leased hectares, it is possible that farmed shellfish output could double in the coming years.

Cultured mussels have a superior taste and quality that can be promoted. Infrastructure developed for lobster, including the established air transport routes and logistical networks, could be used to distribute mussels and other farmed shellfish to more international markets.

Making Waves: Sustainable Low Carbon Protein

The aquaculture sector has the potential to offer sustainable and renewable long-term benefits for rural Nova Scotia communities that will complement existing infrastructure such as suppliers, boatyards, and processing facilities.

The global need for protein is increasing and, in a carbon-conscious world, environmentally sustainable production is on everyone's mind. Aquaculture can play an important part in the future of the world's seafood by providing ecologically responsible products.

Salmon requires less feed than many other sources of protein.

“Salmon aquaculture requires fewer resources than many other protein sources. For example, while approximately 6-10 pounds of feed are needed to produce one pound of beef, only 1.15 to 1.70 pounds of feed are needed to produce one pound of salmon.”

—World Wildlife Fund

Gone are the days when feed was manually fed to fish from bags using scoops. The aquaculturists of today are highly skilled workers. Fish farming operations are now controlled by remote high-tech control facilities and feed is dispersed via computerized feeding systems managed from centralized control rooms. Site conditions are monitored remotely. Remote site monitoring has also become a feature of lobster holding facilities, a technological transfer from one part of the industry to another.

One major company operating in Nova Scotia is Kelly Cove Salmon, a division of Cooke Aquaculture. The company operates 11 sites in the province and has more than 200 full-time employees with over \$10 million in payroll. The company works with more than 300 Nova Scotia suppliers and 1,200 from Atlantic Canada. These include divers, mechanics, boat repair facility owners, hardware providers, welders, heavy equipment operators, crane operators, marine suppliers, fuel distributors, environmental consultants, electricians, boat brokers, boatbuilders, engine suppliers, and the operators of hotels, restaurants, and ferries. Kelly Cove Salmon's strong community links are a perfect illustration of how aquaculture has become an important sector for the people and families working in the area.

Another long-time operator in the province is the D'Eon Oyster Company, founded in 1996 by Nolan D'Eon. The D'Eon Oyster Company manages 50 acres of leased space across three sites and employs eight people. Each oyster is grown on the water's surface with floating culture technology. It is a community-based business. Nolan is known locally as “the oysterman” and is a pillar of both the community and the aquaculture sector.

Innovation, Sustainable, Renewable.

Multi-tiered farms are being developed around the world where different species are grown on the same site. Complementary species can feed on nutrients from other sites. Several countries, China especially, have made significant progress in this area.

The aquaculture industry should continue its expansion in existing and new species. Many lessons have been learned over the years as the industry has grown, and a robust regulatory framework has been introduced that can address stakeholder concerns while allowing business operators and communities to prosper.

7.0 Conclusion

The Nova Scotia seafood industry has been faced with many challenges, but it has risen to meet each one, continuing to prosper and grow. The industry has demonstrated that it is nimble and able to adjust quickly as the world changes. Even more opportunities lie ahead.

The move toward net zero by 2050 places new responsibility on the seafood industry to reduce its carbon footprint. This is an opportunity for the industry to emerge as a leader in environmental stewardship, while extracting high socioeconomic value from available resources.

The seafood industry has responded to traceability requirements and the need to properly manage resources. These efforts ensure that seafood being harvested and sold is caught legally from sustainable fisheries, and that food safety remains paramount. Similarly, Marine Stewardship Council certifications provide assurances that the seafood being sold is from properly managed fisheries, which lets sellers access discriminating markets.

Seafood businesses, workers, industry associations, technology developers, and the federal and provincial governments are working as partners. Together, all partners are facing the outside world united with a common purpose of extracting the highest benefits from the province's marine resources.

New opportunities exist in coastal areas for youth as the seafood industry embraces new and emerging technologies. Innovation, technology, and more effective use of resources will continue to provide long-term socioeconomic benefits for Nova Scotia's communities.

APPENDIX 1: DATA LIMITATIONS

1. DFO landings data and related information was incomplete for 2020 and 2021 and best estimates (forecasts) were prepared by Pisces for 2020 and 2021 for both provincial and regional data. At the county level, catch related data was combined for certain regions due to data confidentiality. These include Annapolis and Digby Counties; Inverness, Richmond and Victoria Counties; and, Hants, Kings, Cumberland and Colchester Counties.
2. There are different data sets from different years used in the report. GDP numbers are based on 2018 tax filer data from Statistics Canada. There is often a three-to-four-year lag in the data at the industry level that complicates the analysis. The most recent data for GDP and industry output are only available for 2018, tax filer data has been specially compiled up to 2019 and there are other data such as export data and employment available for 2021. Wherever possible the most recent data was used.

GDP was calculated for each sector (industry) using Statistics Canada multipliers for GDP, employment (jobs), and labour compensation based on sector output for NAICS 1125, 1140 and 3117. For fish harvesting (1140) some data often includes trapping. Employment in this area is very small (<50 people) and is immaterial to the industry level analysis.

Direct impacts - Directly attributable to the sector.

Indirect Impacts- Measures the total value of production required from all industries across all stages of production to produce one unit of output for final use less the direct impacts.

Induced - Measures the value driven by household expenditures associated with labour income (for example, wages) generated from the direct and indirect effects.

Economic Impacts include Statistics Canada Special Tabulation from their Input/Output Model. Sector level calculations are based on tables -36-10-0595-01; 36-10-0487-01; 36-10-0480-0.

GDP data and impacts cannot be summed across the three sectors to get a seafood sector total due to indirect impacts being duplicated across all sectors. As such the I/O output simulation prepared by Statistics Canada corrects for this duplication to arrive at a Seafood Industry (fish harvesting, seafood manufacturing, aquaculture) total impact. The Canada total was also calculated given the importance of trade in seafood products from Nova Scotia with the rest of Canada.

3. Employment numbers used throughout the report are from various sources. The system of National Accounts data was used for full time equivalent. Tax filer data was used for the number of individuals. The 2021 census data by occupation was not available at time of publication.
4. Labour productivity data is based on real output and labour content. A capital productivity calculation is not available for the seafood industry nor its individual sectors. This is due to insufficient or confidential data. As well, detailed capital or operational expense data are not

available for either the harvesting or processing sectors. For fish processing and aquaculture, revenue and net income calculations are based on the revenue from goods produced.

5. Taxfiler data is based individual tax files linked to the specific sectors. This was a special tabulation by Statistics Canada and allows for a regional analysis. The tabulation was prepared for 2000, 2010 and 2019. It is a rich data set and can be reproduced each year for modest cost. There is data suppression for less than 20 people in a cohort. In most cases, the suppressed data is generally included in the total provincial numbers. The methodology was based on special tabulations initially developed by Statistics Canada and the Newfoundland and Labrador Statistics Agency.
6. Goods producing industries (11-33N) include the following sectors: forestry, logging, and support (11N), mining, quarrying, and oil and gas extraction (21), utilities (22), construction (23) and manufacturing (31-33).
7. Table 15-F0002, the interprovincial and international trade flows data, shows the origin and destination of trade flows by product among Canadian provinces and territories (including Canadian territorial enclaves abroad) and from and to the rest of the world. Trade figures are valued at basic prices, that is, they do not include the value of transportation, distributive trade and taxes embedded in the purchase price; transportation, distributive trade and taxes are shown as separate transactions from the product to which they apply. Hence export values differ from those from other data sources.

APPENDIX 2 Harvesting

The harvesting sector in Nova Scotia is primarily small boats fishing in nearshore waters. Larger vessels, however, venture throughout the waters of the North Atlantic fishing typically within the 200-mile limit from Nunavut to the Southern Grand Banks and George's Bank.

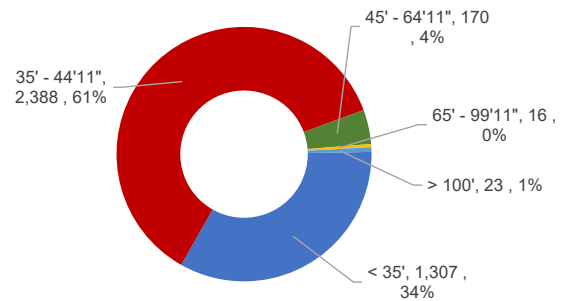
In 2020, there were 6,002 license holders operating from 3,904 fishing vessels²⁰. About 95% fished from vessels less than 45 feet in length²¹. The inshore vessels are the traditional fleets that have plied Atlantic waters for generations.

There were 16 vessels 65-99 feet and 23 over 100 feet. Some of the larger vessels have the capability to harvest and freeze at sea, resulting in very high-quality products destined for discerning markets.

The fleet is opportunistic with fishing enterprises typically having access to more than one licence type. The fleet holds around 20,000 different species designations. Lobster is the largest single category with 3,200 designations.

Mackerel²² and groundfish are the next highest categories with about 2,500 and 2,400 licenses, respectively. There are 680 crab licenses, 830 clam, 490 scallop and 57 shrimp licences.

Number of Vessel Licenses by Boat Size
Nova Scotia, 2020



Source: DFO; Pisces Consulting

²⁰ Note that the number of vessels is the primary vessels attached to each license.

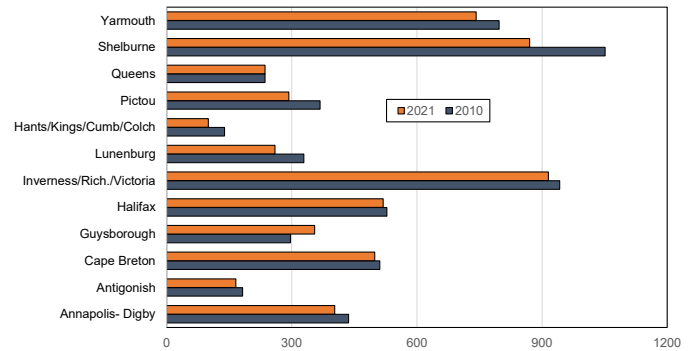
²¹ Recent policy changes by DFO will allow this sector increase overall vessel length.

²² Mackerel fishery was closed in 2022.

By region, the largest number of fishing vessels are found in Shelburne, Yarmouth, and the Inverness-Richmond-Victoria counties²³.

There has been some consolidation in the industry since 2010. The total number of vessels has declined by 8%. In Shelburne, the total number of vessels declined 17% while Guysborough saw a 20% increase.

Fishing Vessels by County
Nova Scotia, 2010, 2021

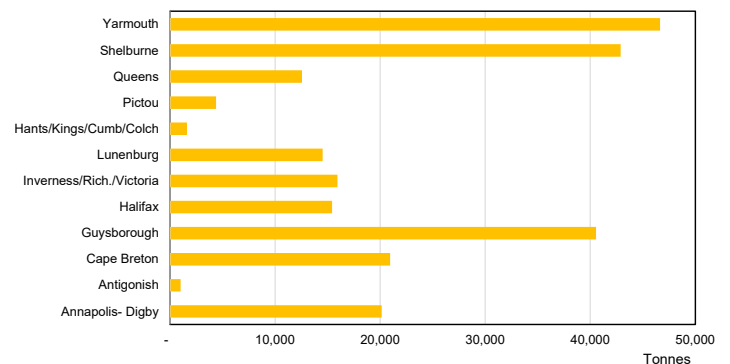


Source: Special Tabulation, DFO: Pisces Consulting

The fishery is a rural and coastal based industry. As previously noted, the fishery is either the primary or major economic base for about half of the province's counties. Counties such as Shelburne, Yarmouth and Digby have seafood as the core of their local economies.

Corresponding to the number of licenses is the volume of landed product in each county. Yarmouth, Digby, Shelburne, and Guysborough are the areas with the highest landings.

Landed Weight by County
Nova Scotia, 2021, Tonnes



Source: Special Tabulation, DFO: Pisces Consulting

Landings and Landed Value

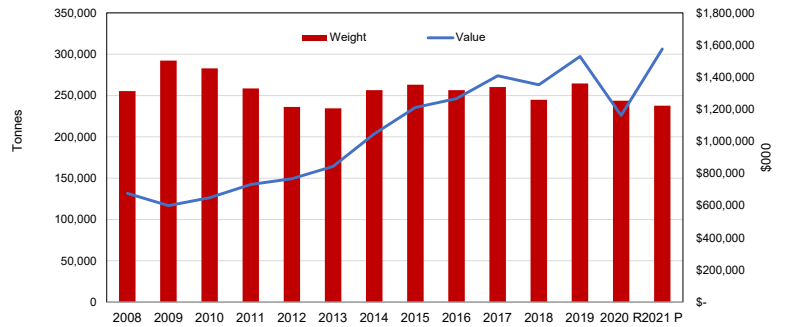
In 2019, Nova Scotia represented 46% of the total landed value of the Canadian seafood industry and 36% by landed weight. Shellfish, comprised of lobster, snow crab, scallops, shrimp, and clams, is the largest component representing 88% of the total value of the industry.

²³ Some operators have more than one vessel and they operate in more than one fishing area. As such, the county data include harvesters that operate in more than one county and there is some double counting.

The groundfish sector consists primarily of haddock and halibut, representing 77% of all groundfish. Groundfish represented 6% of the total Nova Scotia landed value.

Nova Scotia pelagic landings represent about 45% of total Canadian Pelagic landings. Herring and mackerel, are the most important species. Nova Scotia pelagic landings are about half the level of the early 2000's and in 2019 represented 6% of the Nova Scotia total.

Landings and Landed Value
Nova Scotia, 2008-2021



Source: DFO; Pisces Consulting; R- Revised; P- Preliminary

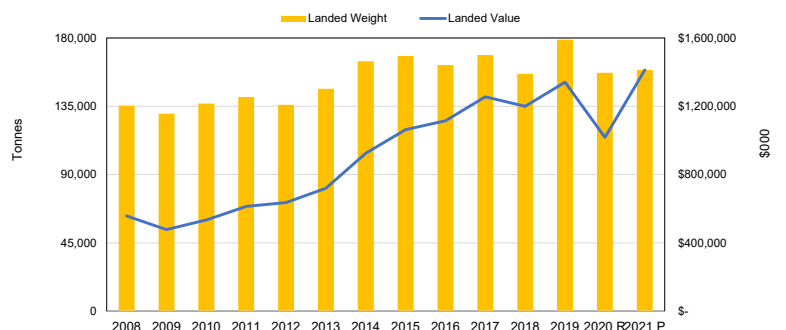
Since 2008 the value of fish landed has increased over 133% to \$1.58 billion. This is a record value for the province. Higher values were driven by record prices for lobster, snow crab and other shellfish species. Landed weight has dropped by 7% to 238,000 tonnes due primarily to lower landings of groundfish and pelagic species.

Prices in 2021 were driven by robust consumer demand and favourable exchange rates. The 2020 season was delayed due to COVID-19, markets were volatile, and prices dropped from 2019 levels. As well low levels of tourist activity impacted both in-province and Canadian consumption. The industry rebounded in 2021.

Shellfish

Overall shellfish landings have increased by 17.4% from 2008 to 2021 to approximately 159 thousand tonnes with a record value of \$1.4 billion. In 2021 shellfish represented 90% of the total provincial landed value and 67% of landed weight.

Shellfish Landings and Landed Value
Nova Scotia, 2008-2021



Source: DFO; Pisces Consulting; R- Revised; P- Preliminary

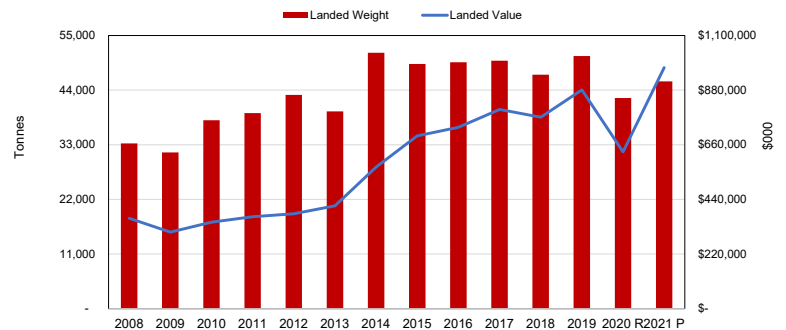
Lobster

Lobster is the highest valued product in the province with the total value approaching \$970 million in 2021. It represents just 19% of total landed weight but 62% of landed value.

Landings have increased since 2008 due to healthy lobster populations. Favourable growing conditions combined with new management measures introduced over the past 10 years have improved overall recruitment.

Most landings are by the small vessel fleet operating throughout the province's coastline. The financial health of the industry and its many participants is driven by lobster.

Lobster Landings and Landed Value
Nova Scotia, 2008-2021



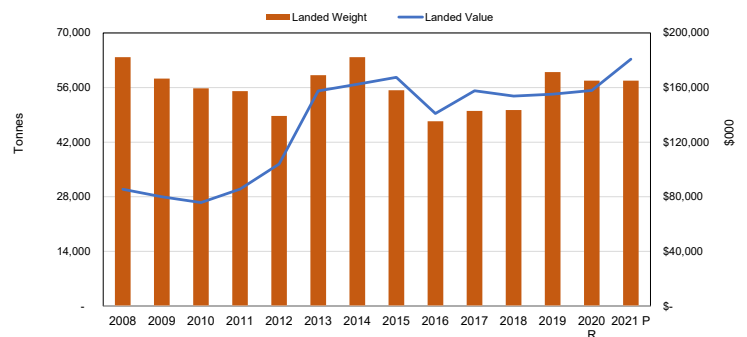
Source: DFO: Pisces Consulting; R- Revised; P- Preliminary

Scallop

Landings for 2020 totaled 57,000 tonnes²⁴ with a value of \$158 million. Landings are down from 2008 levels but have increased over the past five years.

Scallop landings are from two separate types of vessels, offshore vessels that fish for 10-14 days and inshore vessels that fish for 1-4 days. The fishery is prosecuted year-round.

Scallop Landings and Landed Value
Nova Scotia, 2008-2021



Source: DFO: Pisces Consulting; R- Revised; P- Preliminary

²⁴ Shellstock weight

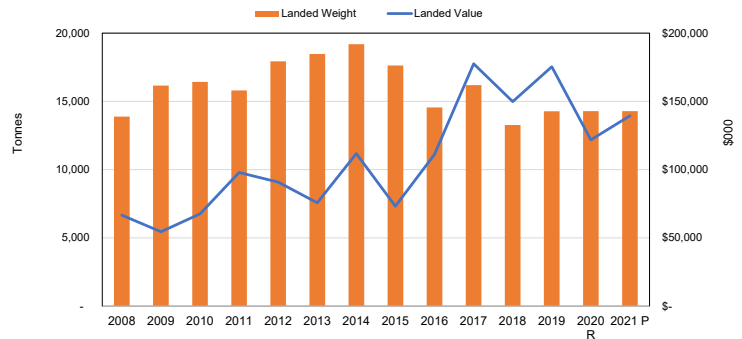
Snow Crab

Snow crab are the predominant crab species landed in the province. Landings of snow crab can vary from year-to-year based on stock abundance that fluctuates based on recruitment.

On average approximately 15,000 tonnes of snow crab are landed each year and the quotas are normally fully fished.

The value has increased almost 110% since 2008. Prices for snow crab fluctuate according to market demand and have increased significantly in recent years due to higher demand by the US retail sector as well as favourable exchange rates.

Snow Crab Landings and Landed Value
Nova Scotia, 2008-2021



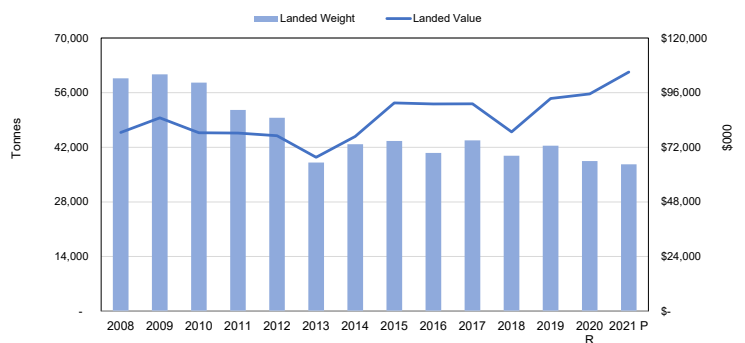
Source: DFO; Pisces Consulting; R- Revised; P- Preliminary

Groundfish

Groundfish landings have remained at the 40,000-tonne level in recent years, down considerably from the 60,000-tonne peak due primarily to a reduction in haddock stocks.

Groundfish landings overall are down 37% since 2008 and value is up 34%. This is due to a higher percent of halibut, which is the most valuable species, higher market prices and more favourable exchange rates.

Total Groundfish Landings and Landed Value
Nova Scotia, 2008-2021

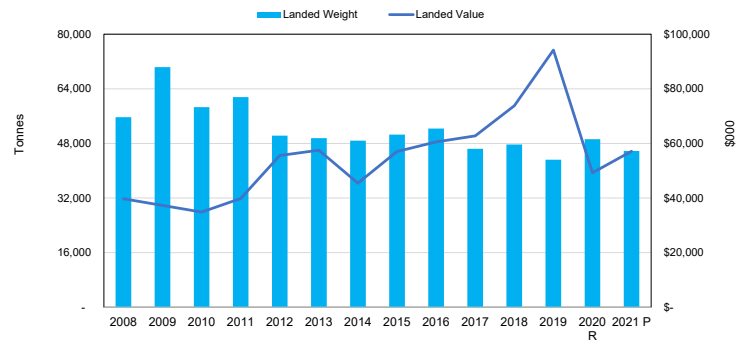


Source: DFO; Pisces Consulting; R- Revised; P- Preliminary

Pelagic Species

Pelagic landings have dropped more than 50% since 2000 and 18% since 2008. Herring and mackerel stocks continue to be at historic low levels in most areas, resulting in herring quota reductions and the recent closure of the mackerel fishery.

Total Pelagic Landings and Landed Value
Nova Scotia, 2008-2021



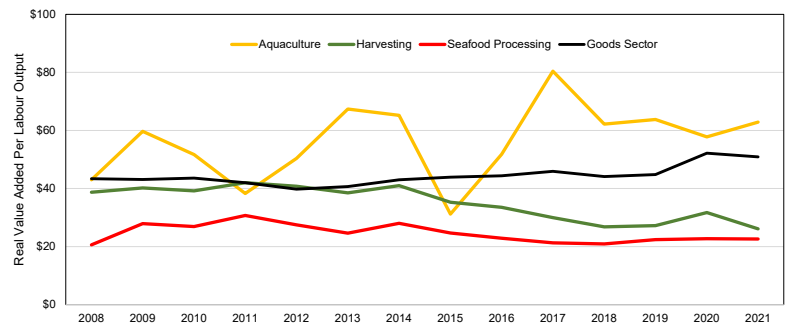
Source: DFO; Pisces Consulting; R- Revised; P- Preliminary

APPENDIX 3 Labour and Productivity

Labour productivity is mixed across all sectors. There has been a general decline in productivity in harvesting and fish processing whereas productivity has greatly improved in the aquaculture sector.

Overall, the seafood industry is less productive than the "all industries" category and other food producers. This reflects the highly seasonal nature of many fisheries and other factors that are unique to the seafood industry.

Labour Productivity By Sector (1)
Nova Scotia, 2008 to 2021



Note: (1) Labour productivity is the ratio between real value added and hours worked.
Source: Statistics Canada, Table 36-10-0480-01; Pisces Consulting

The harvesting sector has seen a significant decline in productivity over the 2008 to 2021 period. Labour productivity has declined 33% since 2008. The change in productivity is believed to be a result of increased participation in the fishery with high raw material prices attracting crew members onboard vessels.

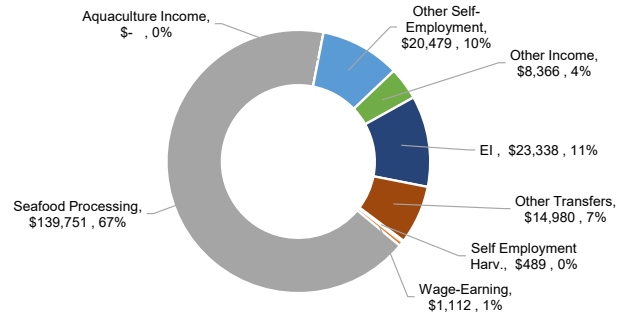
The processing sector has seen modest growth in productivity, it is up 10% since 2008 but there has been a decline in recent years. In the past two years, lower levels of labour market participation prompted automation of many operations.

Aquaculture productivity has increased 46% in recent years. This reflects increased automation and incorporation of new technologies such as improved feed conversion and remote monitoring of fish health and the environment.

APPENDIX 4 Seafood Processing

Seafood manufacturers employed over 5,520 people in 2019 across all counties. Total personal income derived from seafood manufacturing was \$209 million with \$140 million derived from seafood manufacturing with other income from various sources including self-employment and work onboard fishing vessels.

Seafood Processing Workers Total Income by Source
Nova Scotia, 2019, \$ 000

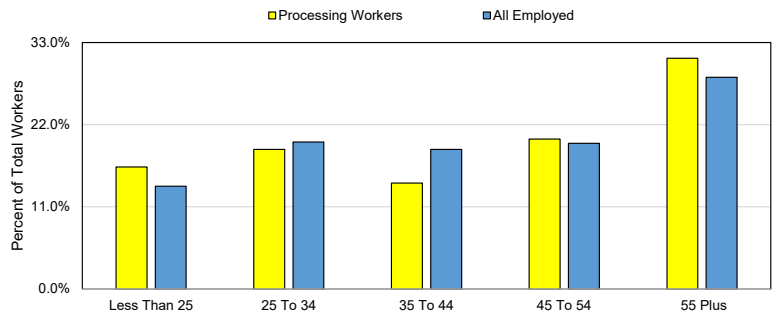


Source: Statistics Canada Special Tabulation- T1 Taxfiles; Pisces Consulting

Total compensation for processing workers is estimated at \$328 million for 2021. Since 2008, total compensation has increased by 107% compared with a 43% increase for the "all industry" total. Industry experts indicate that wages and benefits have been increasing to attract and retain workers.

In 2019, 36% of processing workers were female and 64% male. There is variation by region with some regions seeing a higher proportion of female workers.

Age Distribution of Seafood Processing Taxfilers
Nova Scotia, 2019



Source: Statistics Canada Special Tabulation- T1 Tax files; Pisces Consulting

The age of processing workers is like the total employed tax filers for Nova Scotia albeit it is slightly younger. In 2019, approximately 49% of processing workers were less than 45 years of age compared with 47% of employed tax filers.

Not all processing licenses are active and in 2019, only 110 of the 210 processors reported production. In 2021, there were 69 inactive licenses.

Buyers also are licensed in the province. The role of buyers is to act as intermediaries between harvesters and seafood processors, providing services in major landing ports and more importantly being the primary, or only, service provider in remote locations.

Number of Seafood Production and Buying Licences and Seafood Processing Employment by County, 2021

COUNTIES	Seafood Producers	FISH BUYERS (all species)	Processing Workers, 2019
Shelburne	57	74	680
Yarmouth	38	68	960
Digby	33	40	960
Queens	3	3	150
Annapolis	8	6	170
Lunenburg	7	12	150
Kings	0	4	60
Hants	0	1	20
Halifax	19	26	460
Colchester	1	2	50
Cumberland	5	4	70
Pictou	6	11	230
Guysborough	9	6	210
Antigonish	2	2	40
Inverness	4	6	170
Richmond	6	4	130
Cape Breton	10	18	550
Victoria	2	4	30
Out of Province	0	5	430
Total	210	296	5,520

Source: Department of Fisheries and Aquaculture: Statistics Canada- Special Tabulation-T1 Tax Files & Table 32-10-0218-01; Pisces Consulting

Note: For employment, Out of Province Refers to Temporary Foreign Workers

APPENDIX 5 Aquaculture

Growout effort is concentrated in the protected bays found around the Nova Scotia shoreline.

Lunenburg, Shelburne, Yarmouth, Digby, and Guysborough counties are major producing areas. Activity is a complement to the wild fisheries found in those areas. Regions highly dependent on the fishery also are major aquaculture areas.

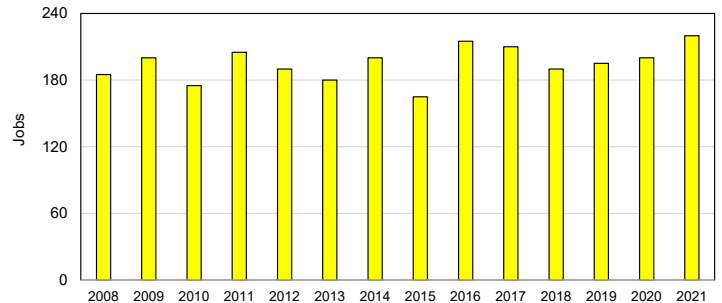
Since 2008 employment in aquaculture has fluctuated between 160-200 jobs. Employment in 2021 was at a ten-year high of 220 jobs.

Shellfish aquaculture first began in Nova Scotia in 1867 and finfish aquaculture got its start with the first hatchery in in 1875. Finfish species produced include Atlantic salmon, brook trout and rainbow trout. Shellfish production consists primarily of mussels and oysters.

Based on tax filer data, there were 320 workers reporting income from the aquaculture sector in 2019²⁵. About 77% were male and 23% were female. In 2019, the total income from tax filers for aquaculture workers from all sources was \$15 million.

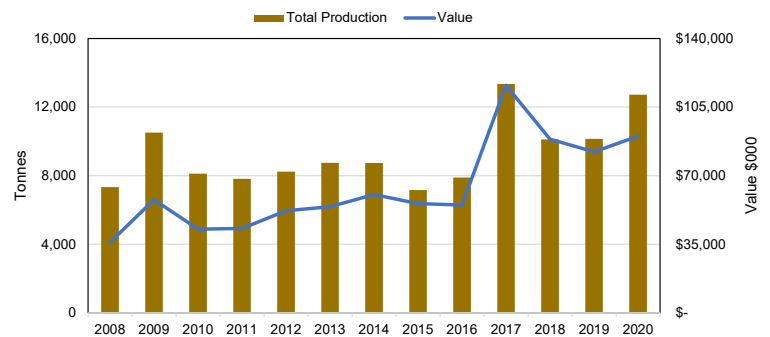
In 2020, the total value of production was \$104 million, up 90% since 2008. Finfish sales totaled \$80 million, and molluscs totaled \$11 million, up 30% over 2008.

Aquaculture Jobs
Nova Scotia, 2008 to 2021



Source: Statistics Canada. Table 36-10-0480-01; Pisces Consulting

Aquaculture Production
Nova Scotia, 2008-2020, Tonnes, \$ 000

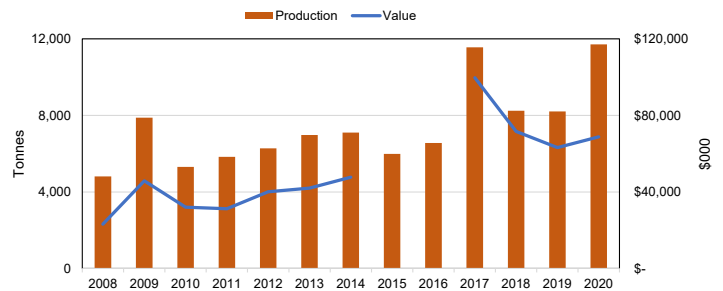


Source: Statistics Canada. 32-10-0107-01; DFA; Pisces Consulting

²⁵ The differences between tax filer data are due in part to the nature of the data sets. The tax filer data is based on individuals reporting income from specific sectors. The Jobs data from Statistics Canada is based on survey data. In surveys, people self-declare their occupations and industry.

Salmon production is the largest component of the sector, representing 76% of total weight and value in 2020. Atlantic salmon production has increased 102% since 2008. Nova Scotia produced 8% of Canada's total Atlantic salmon. This is up from 5% of the Canadian total in 2008.

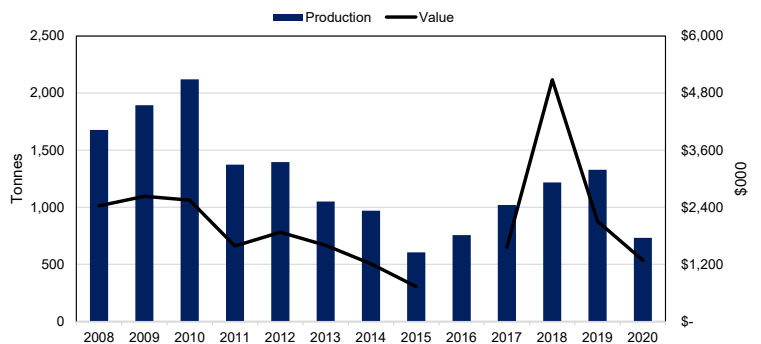
Atlantic Salmon Aquaculture Production
Nova Scotia, 2008-2020, Tonnes, \$ 000



Note: Value data is not available for 2015 & 2016
Source: Statistics Canada. 32-10-0107-01

Trout production has also increased with total production increasing from 133 tonnes in 2009 to 1,991 tonnes in 2020 with a value of \$11 million. Expansion has been driven by new farms and increased production.

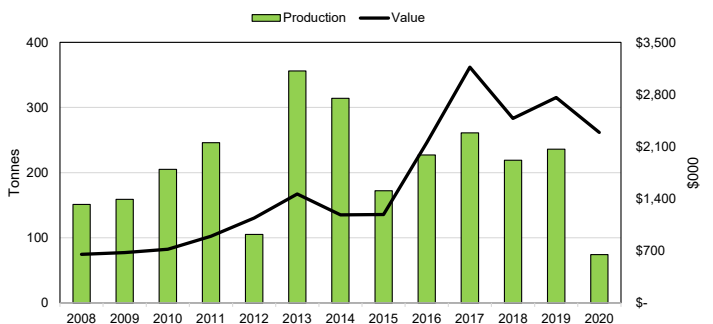
Mussel Aquaculture Production
Nova Scotia, 2008-2020, Tonnes, \$ 000



Source: Statistics Canada. 32-10-0107-01

Shellfish production has declined in recent years due to the impact of invasive tunicates and wild duck predation. During the height of the COVID-19 pandemic, the sector also experienced a drastic decrease in restaurant traffic and logistical issues impacting product demand. Mussel production has declined 61% from 2008 due to ongoing challenges.

Oyster Aquaculture Production
Nova Scotia, 2008-2020, Tonnes, \$ 000



Source: Statistics Canada. 32-10-0107-01

In 2020, oyster production was down 53% since 2009. Logistical issues related to COVID-19 stymied production in 2020. Otherwise, output volume and value increased in recent years. Operators have aggressively marketed oysters, positively impacting per unit value.

In 2021, there were 235 licensed aquaculture sites in the province. There was a total leased area of 6,183 hectares, approximately 465 hectares for finfish and 5,718 hectares for shellfish.

Nova Scotia has a competitive advantage in aquaculture given its proximity to markets and its unique marine environment. The proximity to market results in lower transport cost versus competitors in Chile and Norway. The United States is a major market for both finfish and mollusc aquaculture products.

Since the revision of Nova Scotia's aquaculture regulations in 2015 the sector has seen significant growth. According to a recent review of the sector, production is expected to double in the near term.

Further growth will be realized by expansion of finfish operations, molluscs and through investment in hatcheries and early growth phases.

Developments in onshore and offshore technologies offers significant opportunities. Many environmental groups have encouraged land- based facilities, however the economics remain challenging when competing with lower cost, open-pen operations. Further, greenhouse gas emissions are higher for land-based operations.

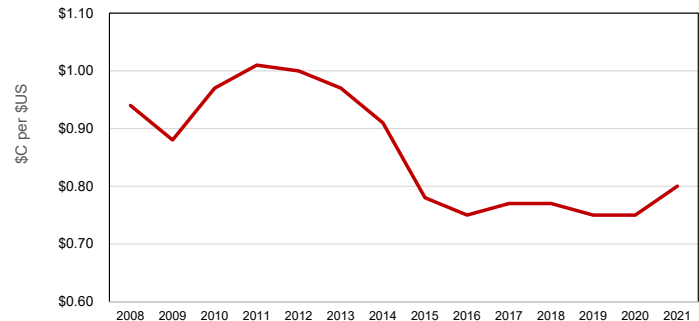
The sector is regulated by both the provincial and federal governments. The industry is supported by active programs within the Department of Fisheries and Aquaculture, the Nova Scotia Fisheries and Aquaculture Loan Board, and ACOA. The industry is represented by the [Aquaculture Association of Nova Scotia](#) and the Nova Scotia Sector Council.

APPENDIX 6 Seafood Trade

The value of seafood exports can be impacted by factors that the industry cannot influence. International transactions are affected by the exchange rate. The US dollar is the common currency used in many markets, and changes in the exchange rate result in varying returns to processors.

For example, if the 2021 value of the Canadian dollar was the same as in 2011, the value of shipments to the United States would be approximately \$250 million lower.

Canada - US Exchange Rates
2008 to 2021



This exchange rate volatility is just one factor faced by exporters. Others include traceability requirements, product quality, pricing, market logistics and market access.

Source: Bank of Canada; Pisces Consulting

Market Price Volatility

As noted, Nova Scotia represents a small portion of the world's fisheries and is subject to substantial volatility in price levels. Prices can fluctuate considerably, and the price paid by the markets ultimately determine the price paid through the entire supply chain.

Trade Agreements

Most of the countries where Nova Scotia seafood products are traded are members of special trade arrangements. Some of these include:

- **The World Trade Organization (WTO):** There are 164 member countries including China. All the provinces major trade destinations are WTO members.
- **The Canada-United States-Mexico Agreement (CUSMA):** This North American agreement provides special trading provisions for the three participating countries.
- **Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP):** This agreement includes Australia, Japan, Mexico, New Zealand, Singapore, Vietnam (not yet in force for Brunei Darussalam, Chile, Malaysia, Peru)
- **Canada-European Union Comprehensive Economic and Trade Agreement (CETA):** This agreement provides access to the 27 European Union members at preferred rates. The agreement resulted in substantive reductions in tariffs for seafood species such as lobster, shrimp and groundfish.
- **Canada-United Kingdom Trade Continuity Agreement:** The agreement is primarily based on CETA and allows for continued trade with the United Kingdom post their exit from the European Union.

All these agreements provide reduced tariffs on seafood products. The WTO is the first level of agreements with individual country or region agreements that provide improved access and reduced or zero tariffs.

Diverse Markets for Our Seafood Products

Nova Scotia is a major seafood producer. Product is consumed nationally, in-province and internationally. Target markets can vary significantly by species, though the US remains the primary market for almost all species. The primary markets for key species include:

- **Lobster:** Live lobster are sold around the globe though the primary markets are the US, China, and Europe.

Live lobster not suitable for shipment are normally diverted to processing facilities in NS and NB. These lobsters are either frozen whole raw, whole cooked or processed into meat and raw tail packs. The whole frozen products are exported primarily to China for consumption or reprocessing. Meat and tail products are exported primarily to US and Europe.

- **Snow crab:** All snow crab is cooked and packed primarily into section packs as either a consumer ready product for retail (2-5 pound) or a commodity pack (30 pound) for institutional, retail or food service buyers. Previous attempts to export live snow crab to Asia, though successful at the time, were quickly displaced by Russian supplies that were landed in Korea and re-exported to countries across East Asia.

- **Scallop:** Exports are all scallop meats exported both fresh and frozen with small quantities of treated or value-added products.

The primary markets for scallop are the United States and France that normally comprise ~80% or more of sales value, with many of the exports sold into high value markets in Northwest Europe.

- **Shrimp:** Whole frozen shrimp are exported primarily to China and to eastern Europe and Morocco for hand peeling and re-export to Scandinavian countries. Smaller whole shrimp are destined to Denmark or Iceland for peeling and re-export to the UK market. Peeled shrimp are sold primarily into the UK and US markets.

- **Haddock and halibut:** Haddock and halibut are primarily exported fresh headed and gutted to the US market and fresh or frozen to Canadian retail and restaurant markets.

Pelagics: Some stocks of pelagic species fished by Nova Scotia companies, such as herring and mackerel, have seen reduced abundance and availability in recent years. Nonetheless, these stocks

continue to be used for high-value production, such as canned and frozen fillet products, but there is much less available for local bait markets.

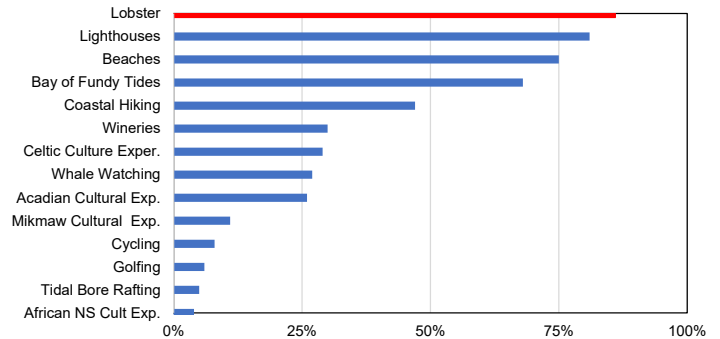
APPENDIX 7 Other Sectors

Tourism

The seafood industry is part of the foundation of the Nova Scotia tourism industry and consuming seafood is an important component. In a 2018 survey of tourists, 85% indicated that they participated in some event related to lobster.

Tourism is a multi-billion-dollar business that employs people in every part of the province. The Halifax Metro area is likely the greatest beneficiary given its role as a service centre; however, activity is spread around the entire province. Cape Breton and the Bay of Fundy are also big generators of activity.

Tourist Activities and Experiences: Participation in Past 5 Years
Nova Scotia, 2018



Source: Tourism Nova Scotia

In 2019, the value of the industry was estimated at \$2.6 billion. Nova Scotians generated approximately 38% of total revenue and non-resident visitors generated about 62%.

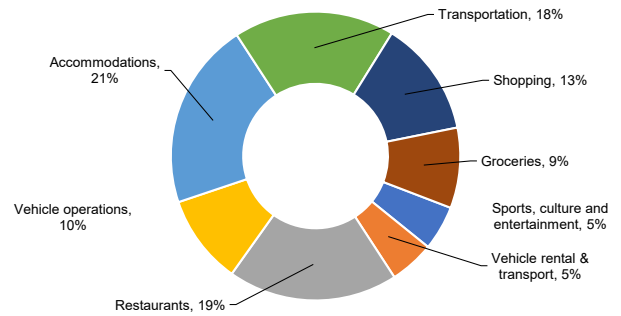
The tourism sector was especially hard-hit by the COVID-19 pandemic and values plummeted to \$1.0 billion for each of 2020 and 2021. The industry's strategic plan had been pushing for the tourism value to increase to \$4.0 billion by 2023/24.

In 2019, a survey of expenditures shows a diverse range of expenditures across many areas. Dining out at restaurants represented 19% of spending. Similarly, in a recent survey of visitors to Nova Scotia, the importance of seafood shines through as 42% of respondents indicated that seafood was one of the best aspects of their dining experience.

The 2019 survey of tourists indicates that 45% of tourists (1.14 million visitors) came for pleasure and another 36% (736,000) came to visit family and friends. Business travelers were next at 13% (217,000).

As previously noted, the internal provincial trade in fish is estimated at about 20% of industry output. This is a big part of the tourist trade with consumption of seafood in restaurants or at home.

Tourist Expenditures by Category, Nova Scotia, 2019



Source: Tourism Nova Scotia; Pisces Consulting

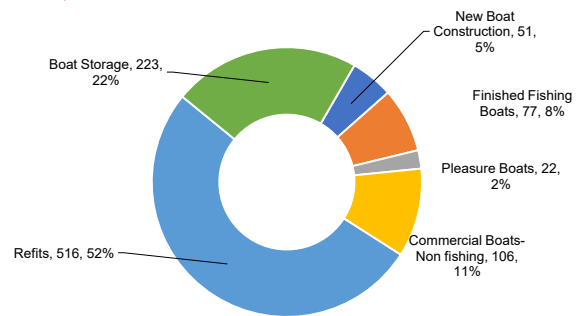
Shipbuilding and Repair

Shipbuilding has been an important part of the history of the province and remains an important economic driver to the province. Excluding Metro Halifax, the 67 shipyards in Nova Scotia provide full-time year-round employment to almost 1,000 people.

These shipyards provide valuable goods and services to Nova Scotian harvesters and to the seafood and other industries in Prince Edward Island, New Brunswick, Newfoundland and Labrador and Quebec.

Based on a 2019 survey, approximately two thirds of activity was for Nova Scotia based vessels and the balance from along the Eastern seaboard.

Boat Builders' Marine Sales Nova Scotia, 2018



Source: Nova Scotia Boat Builders Association; 2019 Survey of Members; Pisces Consulting

Fisheries dependent areas such as Shelburne, Yarmouth, Digby, and Pictou were the larger centres²⁶. As with most occupations in the province, the attraction of young workers to the sector is critical for the long-term viability of the sector. In 2020, the Nova Scotia Boat Builders Association conducted a youth survey. Some of the key findings include improving education and awareness of the sector in high schools.

Transportation

The transportation sector is critically important to the seafood industry. All product processed must be moved to facilities and finally to markets. Transport to market occurs through rail, ocean going container vessels and via airline. Trucks move the 500 million pounds of landed product from landing ports to holding or processing facilities. This is equivalent to over 12,500 shipping containers of product. From these facilities, product moves to other holding facilities or is shipped directly to market.

In 2018, lobster was the largest single commodity shipped from Halifax Stanfield International Airport (HIAA). Of the \$232 million²⁷ worth of seafood air freighted from the province, HIAA comprised \$215.7 million or 11,495 metric tonnes.

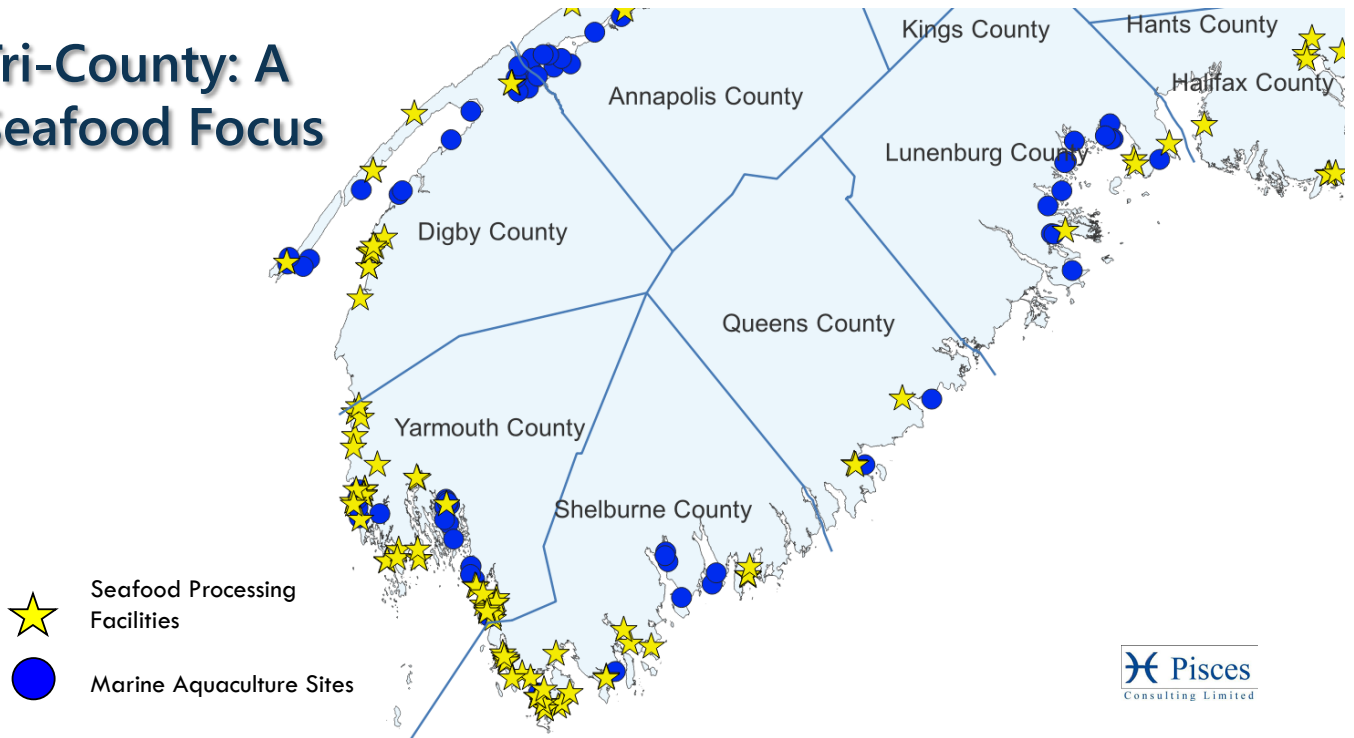
To support the industry, a new \$36 million Air Cargo Logistics Park has been constructed at HIAA. This new facility will enhance transportation infrastructure, support seafood products flow, and improve cargo handling. In the past, bottlenecks at the airport created challenges for the industry and the new facility has greatly improved logistics.

²⁶ Employment is based on the 2016 census. Employment as shipbuilders in Halifax was 1,115 and it is expected that some of the workers in the adjacent counties may travel to Halifax for work. The Irving Shipyard reports employment of 2,100. Some workers from the census are classified in other occupations.

²⁷ [Airport World](#)

APPENDIX 8 Rural Profile

Tri-County: A Seafood Focus



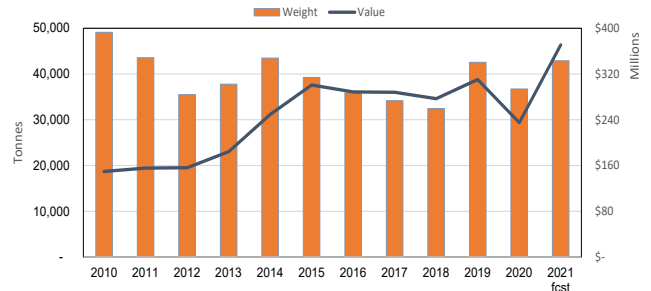
The following profiles four counties that have the seafood industry as their primary economic base.

Shelburne County

The fishery is the dominant employer in Shelburne County with over 35% of its employed tax filers working in the industry. It is a vibrant region with a strong attachment to the land and the sea, Barrington, one the municipalities in Shelburne, boasts it is the lobster capital of Canada. This illustrates a keen understanding of the fishery and the importance of lobster to local communities.

Landings and Landed Value

Shelburne County, 2010 to 2021



Source: Special Tabulation, DFO: Pisces Consulting

Shelburne County has the highest landed value of the province's counties estimated at \$371 million in 2021.

Landed value has increased consistently since 2012 though landings have declined since 2010 from 49,000 tonnes reaching its low of 34,000 tonnes in 2018.

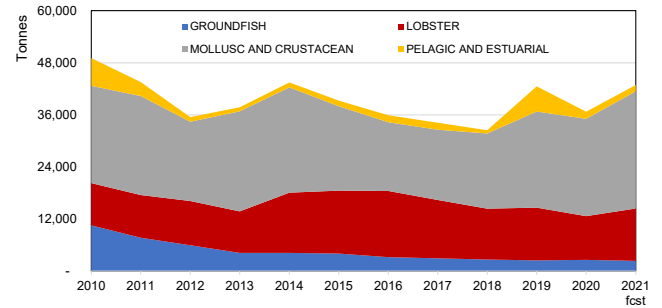
The decline in landings is a result of lower groundfish and pelagic landings. Groundfish landings have declined 78% and pelagic landings are down 77% from 2010 to 2021. Fortunately for the region, shellfish has shown growth with lobster landings up 24% and other shellfish up 20%.

Lobster dominates the landed value and has increased 195% since 2010 and other shellfish by 150%.

This increase in landed value has improved incomes for those employed in harvesting and seafood manufacturing. In 2019 total incomes for the seafood industry was \$220 million. Self-employed harvesting income from all sources was \$63 million, wage -earning harvesters was \$128 million, fish processing \$29 million and aquaculture was \$1.7 million.

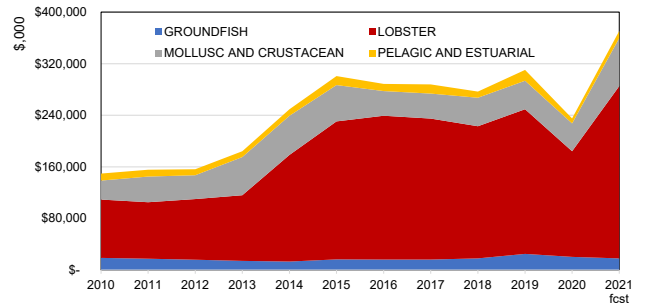
Seafood industry employment in 2019 included 1,410 wage earning harvesters, 770 self-employed harvesters and 680 seafood processing workers.

Landings by Major Species Group
Shelburne County, 2010-2021, Tonnes



Source: Special Tabulation, DFO: Pisces Consulting

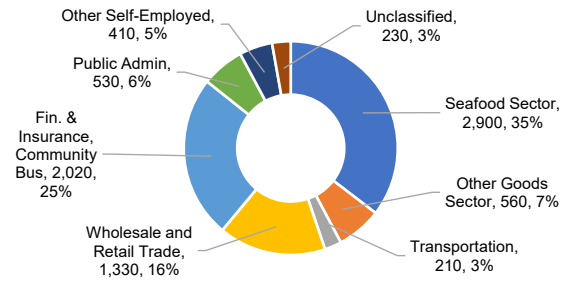
Landed Value by Major Species Group
Shelburne County, 2010-2021, \$ 000



Source: Special Tabulation, DFO: Pisces Consulting

Shelburne County tax filer data illustrates the importance of the seafood industry. Other occupations in the service sector are primarily the local services needed for a community to survive. There are lower levels of public and administration than larger centres as well as finance and other business services. Wholesale and retail trade employment is slightly higher than for the province.

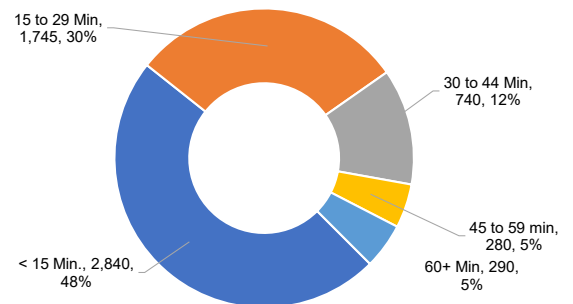
Employed Taxfilers by Industry, Shelburne County, 2019



Source: Statistics Canada Special Tabulation T1 taxfiles; Pisces Consulting

Many workers travel to and from Shelburne County. Commuters employed in the area are commuters from outside counties or towns such as Clare, Digby, Yarmouth, and Annapolis.

Commuting to Work by Travel Time, Shelburne County, 2016



Source: Statistics Canada 2016 Census 98-400-X2016324

Components of Total Income, Shelburne, 2019

County	Self Employed Harvesters	Wage-Earning Harvesters	Seafood Processing Workers	Aquaculture Workers	Total Seafood Sector
Self-Employed Harvesting incomes	\$ 44,559,900	\$ 1,637,500	\$ 46,800	\$ -	\$ 46,244,200
Wage Earning Harvesting income	\$ 975,800	\$ 99,546,000	\$ 311,600	\$ -	\$ 100,833,400
Fish Plant Worker Income	\$ -	\$ 540,400	\$ 18,122,000	\$ -	\$ 18,662,400
Aquaculture Income	\$ -	\$ -	\$ -	\$ 1,294,800	\$ 1,294,800
Other Self-Employment Income	\$ 2,559,200	\$ 6,808,000	\$ 3,297,500	\$ 228,400	\$ 12,893,100
Other Income	\$ 3,925,000	\$ 4,491,000	\$ 1,680,900	\$ -	\$ 10,096,900
UI/EI Benefits	\$ 8,582,400	\$ 12,503,300	\$ 3,237,000	\$ -	\$ 24,322,700
Other transfers	\$ 2,583,900	\$ 2,524,800	\$ 2,341,400	\$ 96,300	\$ 7,546,400
Total Income	\$ 63,355,600	\$ 127,985,700	\$ 28,947,600	\$ 1,690,400	\$ 221,979,300

Note: Totals will not add due to rounding and data suppression
Source: Statistics Canada Special Tabulation- T1 Taxfiles: Pisces Consulting

Queens, Lunenburg, and Halifax counties being the next destination. A small number (15 people) work outside the province.

There were 150 people employed in boatbuilding and repair in Shelburne County in 2016. The 870 vessels that fish out of Shelburne County have provided the economic base for the development of this part of the associated industry.

Yarmouth County

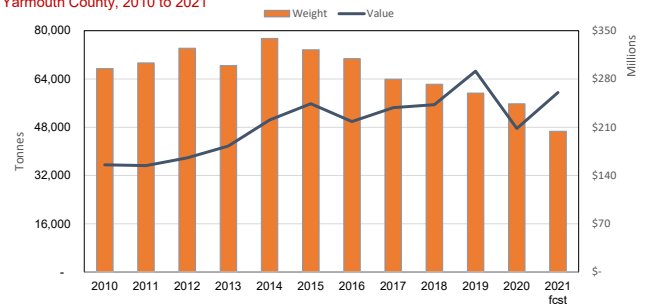
Yarmouth County and the City of Yarmouth are regional centres for the southern part of the province. Medical facilities, government offices and major retail outlets are in the county and the City of Yarmouth.

There is a strong recognition of the importance of the fishery and fisheries related tourism. During the summer Yarmouth County realizes a population boost of 25,000 people with summer residences²⁸.

Seafood landings have declined 31% since 2010; however, higher prices for species such as lobster and other shellfish species increased the landed value 67% during the same period.

Landings and Landed Value

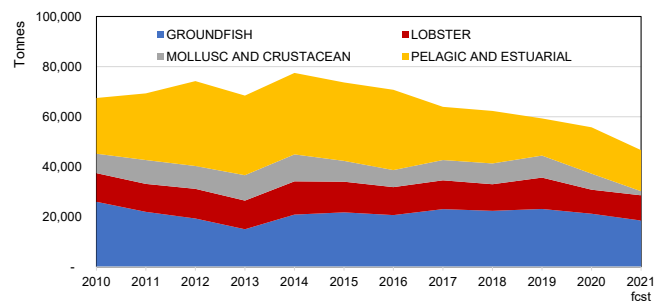
Yarmouth County, 2010 to 2021



Source: Special Tabulation, DFO: Pisces Consulting

Landings by Major Species Group

Yarmouth County, 2010-2021, Tonnes

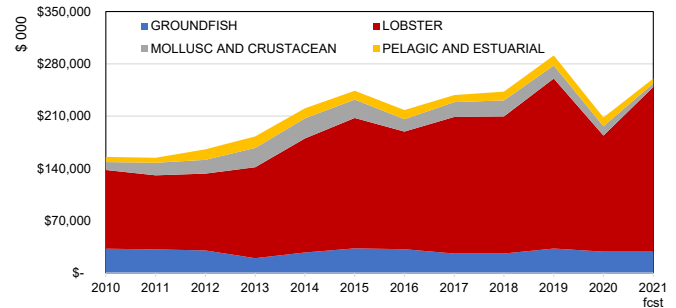


Source: Special Tabulation, DFO: Pisces Consulting

²⁸ [Business View Magazine](#)

The value of lobster landings has increased 109% since 2010 to \$260 million. Other species groups have declined with pelagic value down 7%, groundfish down by 12% to \$29 million and other shellfish down by 55% to \$5 million.

Landed Value by Major Species Group
Yarmouth County, 2010-2021, \$ 000



Source: Special Tabulation, DFO: Pisces Consulting

The incomes for those employed in harvesting, seafood manufacturing and aquaculture totaled \$189 million in 2019. Self-employed harvesting income from all sources was \$33 million, wage-earning harvesters was \$120 million, seafood processing was \$36 million, and aquaculture was \$0.8 million.

Components of Total Income
Yarmouth , 2019

County	Self Employed Harvesters	Wage-Earning Harvesters	Seafood Processing Workers	Aquaculture Workers	Total Seafood Sector
Self-Employed Harvesting incomes	\$ 18,799,600	\$ 1,437,600	\$ -	\$ -	\$ 20,237,200
Wage Earning Harvesting income	\$ 967,500	\$ 93,094,400	\$ 320,400	\$ -	\$ 94,382,300
Fish Plant Worker Income	\$ -	\$ 962,000	\$ 24,710,400	\$ -	\$ 25,672,400
Aquaculture Income	\$ -	\$ -	\$ -	\$ 530,600	\$ 530,600
Other Self-Employment Income	\$ 2,692,000	\$ 7,739,600	\$ 3,348,500	\$ -	\$ 13,780,100
Other Income	\$ 4,714,000	\$ 4,260,000	\$ 1,208,000	\$ -	\$ 10,182,000
UI/EI Benefits	\$ 4,088,000	\$ 9,626,800	\$ 3,332,000	\$ -	\$ 17,046,800
Other transfers	\$ 1,189,800	\$ 2,193,500	\$ 3,159,000	\$ -	\$ 6,542,300
Total Income	\$ 32,559,600	\$ 119,360,000	\$ 35,980,800	\$ 781,200	\$ 188,681,600

Note: Totals will not add due to rounding and data suppression
Source: Statistics Canada Special Tabulation- T1 Taxfiles: Pisces Consulting

Seafood industry employment in 2019 included 2,690 workers with 1,280 wage earning harvesters, 430 self-employed harvesters and 960 seafood processing workers and about 20 workers in aquaculture.

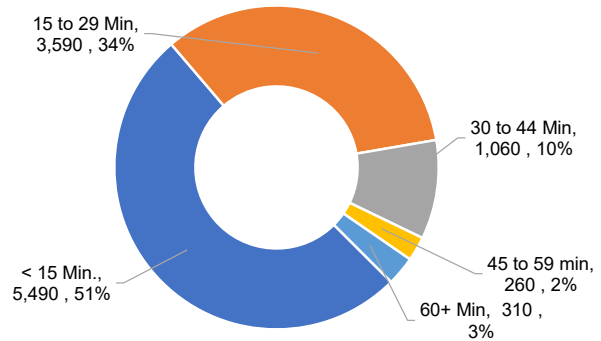
Many workers travel to and from Yarmouth County. Commuters employed in the area are commuters from outside counties or towns such as Clare, Barrington, Digby, and Argyle areas. All are within a reasonable daily commuting distance.

Over 92% of workers commute within Yarmouth County. Approximately 7% travel to Barrington, Clare, Digby, Argyle and Halifax areas. A small number (65 people) work outside the province.

There were 140 people employed in boatbuilding and repair in Yarmouth County in 2016. The 742 vessels that fish out of Yarmouth County have provided the needed economic base for the development of this part of the fisheries economic cluster. As well, its location has provided the energy needed to develop as a regional centre.

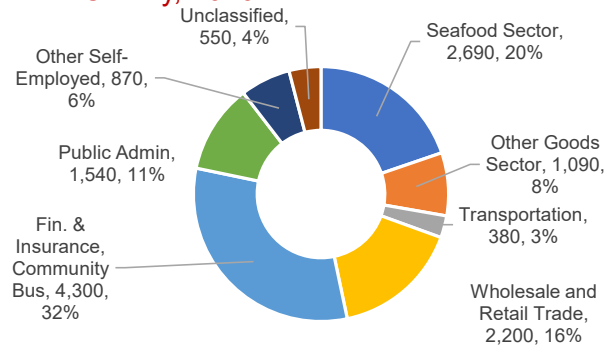
Tax filer data illustrates the areas role as the regional service centre. Public administration, finance and business administration and the wholesale and retail trade sectors are well developed and between them provide 59% of employment. The seafood industry is significant, providing 20% of the employment.

Commuting to Work by Travel Time Yarmouth County, 2016



Source: Statistics Canada 2016 Census 98-400-X2016324

Employed Taxfilers by Industry Yarmouth County, 2019



Source: Statistics Canada Special Tabulation T1 taxfiles; Pisces

Digby County²⁹

Digby County and its communities are proud of their sea-going heritage. Scallops and lobster are major income generators in the region. Tourist events focus on the rich history and high quality seafood such as the annual [Scallop Days](#) or the [Lobster bash](#).

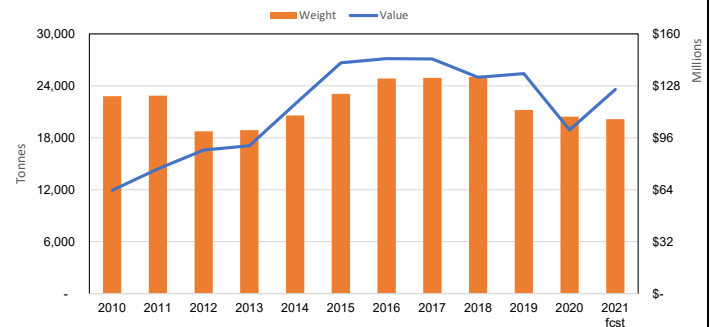
Fish landings in the area have declined in recent years however higher prices for species such as lobster and other shellfish species have helped sustain the fishery.

Landed weight declined 12% since 2010 yet landed value increased by 98% during the same period.

Groundfish landings dropped by 46% and pelagic landings have declined by 17%. Lobster landings are down modestly by 9%, and other shellfish including scallops have increased by 8%.

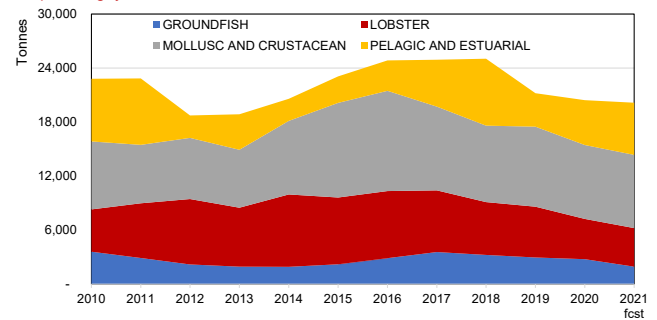
As with the fishery in general, the landed value has increased buoyed by higher prices. Lobster has increased in value by 109% since 2010 to \$95 million and other shellfish has increased by 120%. The landings of pelagic and estuarial species were \$4 million, up 75% over 2010 but down 44% from peak value in 2019.

Landings and Landed Value
Annapolis-Digby Counties, 2010 to 2021



Source: Special Tabulation, DFO: Pisces Consulting

Landings by Major Species Group
Annapolis/Digby, 2010-2021, Tonnes

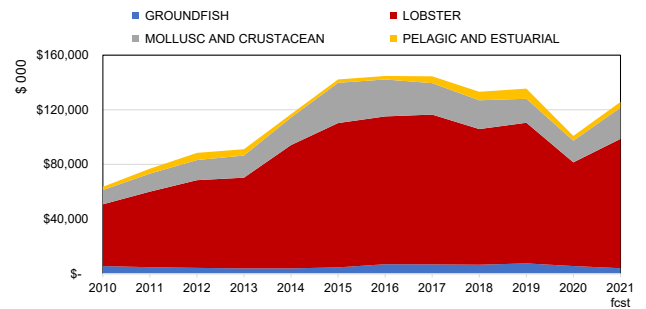


Source: Special Tabulation, DFO: Pisces Consulting

²⁹ Note that for confidentiality reasons Digby catch information has been merged with Annapolis County. However, Digby County represents the largest portion of catch and value.

The incomes for those employed in harvesting, seafood manufacturing, and aquaculture totaled \$102 million in 2019. Self-employed harvesting income from all sources was \$13 million, wage-earning harvesters was \$52 million, seafood processing was \$36 million, and aquaculture was \$2.8 million.

Landed Value by Major Species Group
Annapolis/Digby Counties, 2010-2021, \$ 000



Source: Special Tabulation, DFO: Pisces Consulting

Seafood industry employment was 2,090 workers in

Components of Total Income
Digby , 2019

County	Self Employed Harvesters	Wage-Earning Harvesters	Seafood Processing Workers	Aquaculture Workers	Total Seafood Sector
Self-Employed Harvesting incomes	\$ 6,350,300	\$ 196,000	\$ -	\$ -	\$ 6,546,300
Wage Earning Harvesting income	\$ 219,400	\$ 36,042,600	\$ 265,800	\$ -	\$ 36,527,800
Fish Plant Worker Income	\$ -	\$ 129,600	\$ 26,323,200	\$ -	\$ 26,452,800
Aquaculture Income	\$ -	\$ -	\$ -	\$ 1,584,800	\$ 1,584,800
Other Self-Employment Income	\$ 1,089,000	\$ 4,396,200	\$ 1,909,600	\$ 265,000	\$ 7,659,800
Other Income	\$ 1,624,000	\$ 2,168,000	\$ 931,500	\$ -	\$ 4,723,500
UI/EI Benefits	\$ 2,150,800	\$ 6,534,000	\$ 3,973,000	\$ -	\$ 12,657,800
Other transfers	\$ 672,100	\$ 2,270,400	\$ 2,580,500	\$ 140,400	\$ 5,663,400
Total Income	\$ 12,491,300	\$ 51,754,800	\$ 36,115,200	\$ 2,056,000	\$ 102,417,300

Note: Totals will not add due to rounding and data suppression
Source: Statistics Canada Special Tabulation- T1 Taxfiles: Pisces Consulting

2019 including 860 wage-earning harvesters, 230 self-employed harvesters and 960 seafood processing workers and 40 workers in aquaculture.

Many workers travel to and from Digby County. Commuters employed in the area are from outside counties or towns such as Clare, Argyle, Yarmouth and Annapolis areas. All are within a reasonable daily commuting distance.

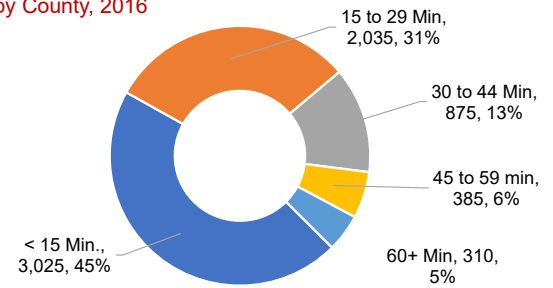
About 85% of workers commute within Digby County. This is lower than the levels seen in Yarmouth and Shelburne. Approximately 7% travel to Barrington, Clare, Argyle and Yarmouth. A small number (35 people) work outside the province.

The seafood industry is a significant employer in Digby County representing 21% of employed tax filers. Finance and business services is the largest employer followed by wholesale and retail trade at 14%. The other goods sector is 11% and reflects the role of agriculture, forestry and construction has in the region.

There were 205 people employed in boatbuilding and repair in Digby County in 2016. There are approximately 450 vessels that fish out of Digby.

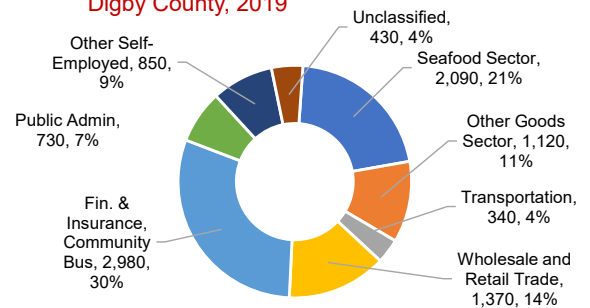
The population in Digby County has declined by 13% from 2001 to 2021. As was seen in Yarmouth County, the rate of change corresponds to lower landings. The rate of population decline has slowed since 2014.

Commuting to Work by Travel Time
Digby County, 2016



Source: Statistics Canada 2016 Census 98-400-X2016324

Employed Taxfilers by Industry,
Digby County, 2019



Source: Statistics Canada Special Tabulation T1 taxfiles; Pisces Consulting

Guysborough County

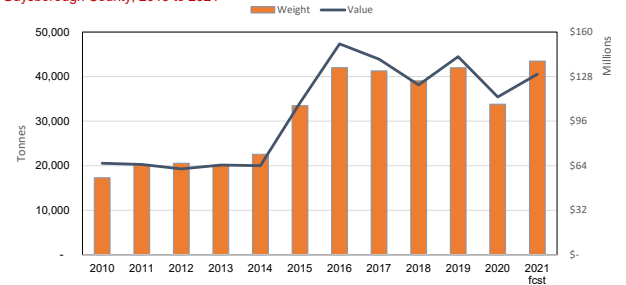
Guysborough County has a long history in the fishery. Canso is the first permanent European fishing port on the continent. The economy is very diversified, but the fishery remains very important to the region.

There are major developments being considered for the region with a possible LNG facility on the table³⁰. It is an important tourism destination for many with its scenic coastline and proximity to the ferry in North Sydney.

Fish landings in the area have increased 97% and landed value is up 152% since 2010. Landed weight is up due to higher surf clam landings though snow crab and lobster remain the most important for smaller vessels.

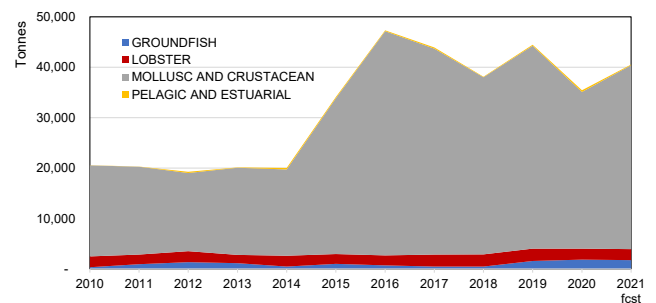
Groundfish landings, small in comparison to other aspects of the fishery in the region, have increased by 431%. Pelagic landings are also up. Lobster landings remain virtually unchanged over the period. Other shellfish such as clams and snow crab increased more than 100%.

Landings and Landed Value
Guysborough County, 2010 to 2021



Source: Special Tabulation, DFO: Pisces Consulting

Landings by Major Species Group
Guysborough County, 2010-2021, Tonnes



Source: Special Tabulation, DFO: Pisces Consulting

³⁰ [CBC News](#)

The landed value has increased driven by both higher landings and higher prices. Lobster value is up 127% over 2010 to 41.6 million and other shellfish is up 140% to \$84.7 million. Groundfish and Pelagic species total \$12.8 million up from \$1.7 million in 2010.

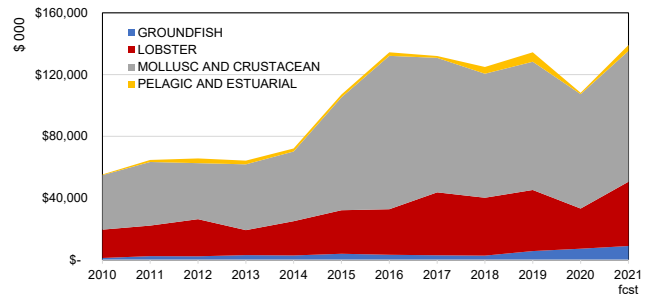
The incomes for those employed in harvesting, seafood manufacturing and aquaculture totaled \$48.3 million in 2019. Self-employed harvesting income from all sources was \$27 million, wage-earning harvesters was \$12 million, seafood processing was \$10 million.

Seafood industry employment in 2019 included 700 workers with 200 wage-earning harvesters, 290 self-employed harvesters and 210 seafood processing workers.

Many workers travel to and from Guysborough County. Commuters employed in the area are commuters from outside counties or towns such as St. Mary's, Antigonish, Inverness and Richmond. All are within a reasonable daily commuting distance.

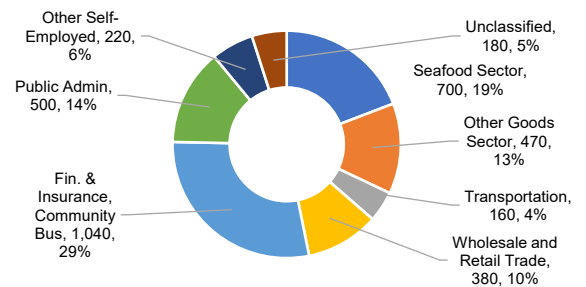
About 64% of workers commute within Guysborough County. This is lower than the levels seen in Yarmouth and Shelburne. Approximately 34% travel to areas such as Antigonish County, Inverness County and Port Hawkesbury.

Landed Value by Major Species Group
Guysborough County, 2010-2021, \$000



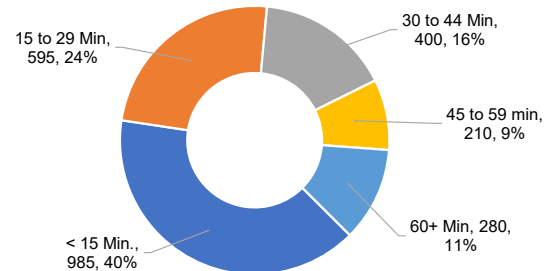
Source: Special Tabulation, DFO: Pisces Consulting

Employed Taxfilers by Industry,
Guysborough County, 2019



Source: Statistics Canada Special Tabulation T1 taxfiles; Pisces Consulting

Commuting to Work by Travel Time
Guysborough County, 2016



Source: Statistics Canada 2016 Census 98-400-X2016324

The seafood industry is significant in Guysborough County representing 19% of employed tax filers. Finance and business services is the largest employer (29%) followed by the other goods sector at 13% and reflects the role agriculture, and construction has in the region.

Components of Total Income
Guysborough , 2019

Component	Self Employed Harvesters	Wage-Earning Harvesters	Seafood Processing Workers	Aquaculture Workers	Total Seafood Sector
Self-Employed Harvesting incomes	\$ 17,144,800	\$ -	\$ -	\$ -	\$ 17,144,800
Wage Earning Harvesting income	\$ -	\$ 6,684,000	\$ -	\$ -	\$ 6,684,000
Seafood Plant Worker Income	\$ -	\$ -	\$ 5,571,300	\$ -	\$ 5,571,300
Aquaculture Income	\$ -	\$ -	\$ -	\$ -	\$ -
Other Self-Employment Income	\$ 844,000	\$ 1,668,600	\$ 595,800	\$ -	\$ 3,108,400
Other Income	\$ 2,475,200	\$ 325,600	\$ 280,800	\$ -	\$ 3,081,600
UVEI Benefits	\$ 5,041,400	\$ 2,564,800	\$ 2,340,900	\$ -	\$ 9,947,100
Other transfers	\$ 972,400	\$ 411,600	\$ 733,500	\$ -	\$ 2,117,500
Total Income	\$ 26,836,600	\$ 11,742,000	\$ 9,681,000	\$ -	\$ 48,259,600

Note: Totals will not add due to rounding and data suppression
Source: Statistics Canada Special Tabulation- T1 Taxfiles: Pisces Consulting

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