Economic Impact Assessment of the

Fisheries Sector in

New Brunswick

CRAB
SHRIMP

For:
Le Conseil des Pêches de la Péninsule acadienne

By:

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Introduction

The purpose of this assessment is to quantify the economic impact of two sectors of the fishing industry on the New Brunswick economy. More specifically, an analysis is done of the economic importance of crab and shrimp to the various regions of New Brunswick.

Objective of the Study

The objective of the study is twofold. First, we evaluate the total economic contribution of each species both at the provincial and the county level. The analysis incorporates the impact of the fishery itself (primary production) as well as the impact of the processing of these species (secondary production). The reference year used is 1997, the last year for which all data were available at the time the analysis was carried out. Second, we estimate the economic impact of a variation in the landed quantity (1,000 tonnes in our scenario).

Methodology

This type of analysis must be carried out with the help of a proven economic model, in this case, the input-output model. We got our baseline data from various representatives of the sector (Fisheries and Oceans Canada, Agriculture, Fisheries and Aquaculture, processing plant managers, industry representatives, and so forth.) We therefore obtained information about the crab and shrimp fisheries as well as about the processing of these two species.

We then used an input-output model to quantify with relative accuracy the total, detailed economic impact of the two sectors. The baseline data used in this analysis were obtained during our consultations. The principle of the input-output model is that it basically tracks the money spent by the sector. For example, a processing plant may purchase packaging from a factory in Moncton or Saint John which, as a result of this, hires employees, buys raw materials, etc. These expenditures in turn lead to more expenditures, i.e., the employees spend their wages, pay their taxes, and so on. The input-output model takes into account the different facets of the economy and has a special characteristic in that it is based on the inputs (purchases) and outputs

(production) of various large sectors of the economy. Our model has the added advantage of breaking these down geographically, by county.

Obviously, a study such as this one is based on certain general hypotheses. In other words, averages are used at various levels. By definition, averages provide a general picture and do not reflect specific cases. For instance, not all plants and boats have the same cost structure. The baseline data used therefore provide an overall profile of the sector rather than a snapshot of one case in particular.

Economic Impact of Crab on the New Brunswick Economy

Direct wages (jobs related directly to the sector):

We estimated the direct wages generated by persons directly involved in this sector as follows:

Table 1: Direct wages in the New Brunswick crab sector, 1997

	Gloucester	Westmorland	Total
Plants	$5,210,000	$520,000	$5,730,000
Fishermen	$16,930,000	$0	$16,930,000
Other[1]	$3,910,000	$0	$3,910,000
Total	$26,050 000	$520,000	$26,570,000

It should be noted that all crabbers in New Brunswick fish out of ports on the Acadian Peninsula, which is in Gloucester County. Consequently, fishermen and those in the "Other" category (marine observers, dockside monitors, etc.) are found only in this county. There are crab processing plants in two counties: Gloucester and Westmorland.

For a year with conditions similar to those in 1997, the total payroll for persons directly involved in crab sector activities would therefore be about $26.5 million.

[1] This category includes marine observers, dockside monitors, etc.

Jobs related directly to the sector (person-years):

We estimated the number of jobs (calculated in person-years) held by individuals directly involved in crab sector activities as follows:

Table 2: Direct jobs in the New Brunswick crab sector, 1997

	Gloucester	Westmorland	Total
Plants	339.2 person-years	33.9 person-years	373.1 person-years
Fishermen[2]	364.5 person-years	0	364.5 person-years
Other	141.9 person-years	0	141.9 person-years
Total	845.6	33.9	879.5

These data were obtained using the following hypotheses:

- Fishermen: an average of 4.5 persons per boat.
- Plants and "Other" category: the total payroll was calculated on the basis of an estimated average wage of $10 per hour and 48 weeks of work per year.

  ➔If, for example, the number of weeks worked were 12, then the number of person-years would have to be multiplied by 4, giving the following results:

  - Persons, Plants - Gloucester: 1357 persons
  - Persons, Plants - Westmorland: 260 persons
  - Persons, Other - Gloucester: 568 persons.

Direct economic impact, 1997:

The following data show the economic impact of the crab sector, by county and for New Brunswick as a whole, excluding the impact of the direct jobs presented above.

[2] In the "Fishermen" category, rather than person-years, an approximation of the total number of fishermen is used.

- *Sales generated:*

Table 3: Sales generated

Region	Sales ($)
Gloucester	$82,120,000
Westmorland	$15,350,000
Saint John	$7,270,000
York	$7,150,000
Northumberland	$6,990,000
Restigouche	$5,160,000
Carleton	$2,220,000
Madawaska	$1,830,000
Victoria	$1,460,000
Other counties	$4,200,000
New Brunswick	$133,730,000

This table shows the geographic distribution in New Brunswick of the sales generated by the crab sector, which total approximately $134 million.

- *Jobs generated (in addition to jobs related directly to the sector):*

Table 4: Jobs generated (in addition to jobs related directly to the sector)

Region	Person-years
Gloucester	335.1
Westmorland	115.5
Saint John	60.0
York	63.7
Northumberland	58.9
Restigouche	43.7
Carleton	15.5
Madawaska	13.7
Victoria	13.0
Other counties	16.3
New Brunswick	735.4

The jobs generated by this sector, in addition to the jobs related directly to the sector, are presented in the table above. It shows that jobs equivalent to about 735 person-years are generated by the crab sector.

- *Contribution to gross domestic product (GDP):*

Table 5: Contribution to gross domestic product (GDP)

Region	GDP
Gloucester	$66,110,000
Westmorland	$6,560,000
Saint John	$2,830,000
York	$2,760,000
Northumberland	$2,730,000
Restigouche	$2,020,000
Carleton	$890,000
Madawaska	$730,000
Victoria	$570,000
Other counties	$1,650,000
New Brunswick	$86,860,000

The preceding table shows the crab sector's contribution to the gross domestic product. This contribution totals nearly $87 million in production value.[3]

- *Tax revenue generated:*

Table 6: Tax revenue generated

Region	Federal	Provincial	Total
Gloucester	$12,910,000	$9,100,000	$22,010,000
Westmorland	$1,160,000	$900,000	$2,060,000
Saint John	$490,000	$360,000	$850,000
York	$450,000	$340,000	$800,000
Northumberland	$450,000	$340,000	$800,000
Restigouche	$330,000	$250,000	$580,000
Carleton	$160,000	$110,000	$260,000
Madawaska	$130,000	$80,000	$210,000
Victoria	$100,000	$70,000	$170,000
Other counties	$240,000	$20,000	$440,000
New Brunswick	$16,420,000	$11,760,000	$28,180,000

The economic activity related directly or indirectly to the crab sector generates annual revenues of over $16 million for the federal government and over $11 million for the provincial government, for a total in excess of $28 million.

[3] An earlier table presented the value of the sales generated by the sector whereas this table presents the value of production.

Economic impact of a 1000-tonne variation in crab landings on the New Brunswick economy

The section that follows describes the economic impact of a 1000-tonne increase in the quantity of crab that is landed and processed. It should be noted that these results were not extrapolated from the results in the preceding section but were calculated exclusively on the basis of an analysis of variable factors as opposed to fixed factors.

Direct wages (jobs related directly to the sector) associated with a 1000-tonne variation:

Table 7: Direct wages in the New Brunswick crab sector associated with a 1000-tonne variation

Plants	$640,000
Fishermen	$0
Other	$0
Total	$640,000

It can therefore be seen that the impact of a 1000-tonne increase on the "Plants" category is a $640,000 increase in the total payroll. In the "Fishermen" and "Other" categories, we hypothesized that the impact would be nil.

Jobs related directly to the sector (person-years):

We estimated the number of jobs (calculated in person-years) resulting from a 1000-tonne variation as follows:

Table 8: Direct jobs in the New Brunswick crab sector following a 1000-tonne variation

Plants	41.7 person-years
Fishermen	0
Other	0
Total	41.7 person-years

Direct economic impact:

The data below show the economic impact of the crab sector, by county and for New Brunswick as a whole, excluding the impact of the direct jobs presented above.

- *Sales generated:*

Table 9: Sales generated

	Sales ($)
New Brunswick	$14,130,000

From this table, we can see that the sales generated by the variation in the quantity of crab represent about $14 million.

- *Jobs generated (in addition to jobs related directly to the sector):*

Table 10: Jobs generated (in addition to jobs related directly to the sector)

	Person-years
New Brunswick	81.9

The jobs generated by the sector following a variation in the quantity of crab, in addition to the jobs related directly to the sector, are presented in the table above. It shows that additional jobs equivalent to about 81.9 person-years are generated by the crab sector.

- *Contribution to gross domestic product (GDP):*

Table 11: Contribution to gross domestic product (GDP)

	GDP
New Brunswick	$10,580,000

The sector's additional contribution to the gross domestic product is over $10 million.

- *Tax revenue generated:*

Table 12: Tax revenue generated

	Federal	Provincial	Total
New Brunswick	$1,760,000	$1,260,000	$3,020,000

The 1000-tonne increase in the quantity of crab generates revenues of more than $1.7 million for the federal government and more than $1.2 million for the provincial government, for a total in excess of $3 million.

Economic impact of shrimp on the New Brunswick economy

The next section presents the analysis of the shrimp sector. Here again, all of the boats are located on the Acadian Peninsula, i.e., in Gloucester County. Furthermore, all of New Brunswick's shrimp processing plants are located in Gloucester County as well.

Direct wages (jobs related directly to the sector):

We estimated the direct wages generated by persons directly involved in this sector as follows:

Table 13: Direct wages in the New Brunswick shrimp sector, 1997

Plants	$1,000,000
Fishermen	$2,550,000
Other	$110,000
Total	$3,660,000

For a year comparable to 1997, the total payroll for persons directly involved in shrimp sector activities would therefore be about $3.6 million.

Jobs related directly to the sector (person-years):

We estimated the number of jobs (calculated in person-years) held by individuals directly involved in shrimp sector activities as follows:

Table 14: Direct jobs in the New Brunswick shrimp sector, 1997

Plants	65.1 person-years
Fishermen[4]	80 persons
Other	4 person-years
Total	179.1

These data were obtained according to the following hypotheses:

- Fishermen: an average of 4 persons per boat.
- Plants and "Other" category: the total payroll was calculated on the basis of an estimated average wage of $10 per hour and 48 weeks of work per year.

  ➔If, for example, the number of weeks worked were 16, then the number of person-years would have to be multiplied by 3, giving the following results:

  - Persons, Plants: 195 persons
  - Persons, Other: 12 persons.

Direct economic impact, 1997:

The following data show the economic impact of the shrimp sector, by county and for New Brunswick as a whole, excluding the impact of the direct jobs presented above.

[4] In the "Fishermen" category, rather than person-years, an approximation of the total number of fishermen is used.

- *Sales generated:*

Table 15: Sales generated

Region	Sales ($)
Gloucester	$13,050,000
Westmorland	$2,050,000
Saint John	$620,000
York	$1,050,000
Northumberland	$890,000
Restigouche	$1,090,000
Carleton	$280,000
Madawaska	$20,000
Victoria	$20,000
Other counties	$1,470,000
New Brunswick	$20,550,000

This table shows the geographic distribution in New Brunswick of the sales generated by the shrimp sector, which total just over $20 million.

- *Jobs generated (in addition to jobs related directly to the sector):*

Table 16: Jobs generated (in addition to jobs related directly to the sector)

Region	Person-years
Gloucester	52.1
Westmorland	19.0
Saint John	10.8
York	8.1
Northumberland	8.6
Restigouche	6.1
Carleton	0.7
Madawaska	0.2
Victoria	0.5
Other counties	2.8
New Brunswick	109.0

The jobs generated by the shrimp sector, in addition to the jobs related directly to the sector, are equivalent to about 109 person-years.

- *Contribution to gross domestic product (GDP):*

Table 17: Contribution to gross domestic product (GDP)

Regions	GDP
Gloucester	$9,540,000
Westmorland	$800,000
Saint John	$250,000
York	$410,000
Northumberland	$350,000
Restigouche	$430,000
Carleton	$110,000
Madawaska	$10,000
Other counties	$590,000
New Brunswick	$12,480,000

The shrimp sector therefore generates about $12.5 million in production value.[5]

- *Tax revenue generated:*

Table 18: Tax revenue generated

Region	Federal	Provincial	Total
Gloucester	$2,090,000	$1,390,000	$3,480,000
Westmorland	$130,000	$100,000	$230,000
Saint John	$40,000	$40,000	$80,000
York	$80,000	$50,000	$130,000
Northumberland	$60,000	$50,000	$110,000
Restigouche	$70,000	$60,000	$130,000
Carleton	$20,000	$20,000	$30,000
Other counties	$90,000	$80,000	$170,000
New Brunswick	$2,580,000	$1,790,000	$4,370,000

The economic activity related directly or indirectly to the shrimp sector generates annual revenues of over $2.5 million for the federal government and nearly $1.8 million for the provincial government, for a total in excess of $4 million.

[5] Here again, an earlier table presented the value of the sales generated by the sector whereas this table presents the value of production.

Economic impact of a 1000-tonne variation in shrimp landings on the New Brunswick economy

The section that follows describes the economic impact of a 1000-tonne increase in the quantity of shrimp that is landed and processed. Again, it should be noted that these results were not extrapolated from the results in the preceding section but were calculated exclusively on the basis of an analysis of variable factors as opposed to fixed factors.

Direct wages (jobs related directly to the sector) associated with a 1000-tonne variation

Table 19: Direct wages in the New Brunswick shrimp sector associated with a 1000-tonne variation

Plants	$200,000
Fishermen	$0
Other	$0
Total	$200,000

It can therefore be seen that the impact of a 1000-tonne increase on the "Plants" category is a $200,000 increase in the total payroll. As with crab, in the "Fishermen" and "Other" categories, we hypothesized that the impact would be nil.

Jobs related directly to the sector (person-years):

We estimated the number of jobs (calculated in person-years) resulting from a 1000-tonne variation as follows:

Table 20: Direct jobs in the New Brunswick shrimp sector following a 1000-tonne variation

Plants	13 person-years
Fishermen	0
Other	0
Total	13 person-years

Direct economic impact:

The data below show the economic impact of the shrimp sector, by county and for New Brunswick as a whole, excluding the impact of the direct jobs presented above.

- *Sales generated:*

Table 21: Sales generated

	Sales ($)
New Brunswick	$4,840,000

From this table, we can see that the sales generated by the variation in the quantity of shrimp represent about $5 million.

- *Jobs generated (in addition to jobs related directly to the sector):*

Table 22: Jobs generated (in addition to jobs related directly to the sector)

	Person-years
New Brunswick	27.8

The jobs generated by the sector following a variation in the quantity of shrimp, in addition to the jobs related directly to the sector, are presented in the table above. It shows that additional jobs equivalent to about 27.8 person-years are generated by the shrimp sector.

- *Contribution to gross domestic product (GDP):*

Table 23: Contribution to gross domestic product (GDP)

Region	GDP
New Brunswick	$3,700,000

The sector's additional contribution to the gross domestic product is over $3.5 million.

- *Tax revenue generated:*

Table 24: Tax revenue generated

Region	Federal	Provincial	Total
New Brunswick	$610,000	$440,000	$1,050,000

The additional economic activity generated directly or indirectly by a 1000-tonne variation in shrimp landings represents revenues of over $600,000 for the federal government and over $400,000 for the provincial government, for a total in excess of $1 million.

Conclusion

The economic impact of these two sectors on the New Brunswick economy is very significant. The table below presents a synthesis of the results:

Table 25: Synthesis of principal results

	Crab	Crab: 1000-tonne variation	Shrimp	Shrimp: 1000-tonne variation
Direct jobs (person-years)	879.5	41.7	179.1	13.0
Sales ($000)	133.73	14.13	20.55	4.84
Additional jobs (person-years)	735.4	81.9	109.0	27.8
Gross domestic product ($000)	86.86	10.58	12.48	3.7
Government revenues ($000)	28.18	3.02	4.37	1.05

One element that the study brings out is the relatively large economic impact of variations in quantity. This merely shows that variable factors have a greater impact on the provincial economy than fixed factors.

Appendix: Statistics

Table A1: Number of licences issued per species, 1999

		Shrimp	Crab
Gulf		21	253
Gulf – N.S.			142
	District 1		29
	District 2		75
	District 3		19
	District 12		3
	District 13		16
Gulf - N.B.		21	81
	District 65	13	11
	District 66	6	16
	District 67	2	52
	District 75		1
	District 78		1
P.E.I.			30
	District 82		7
	District 87		1
	District 88		3
	District 92		16
	District 93		2
	District 95		1

Source: DFO

Table A2: Crab landings, 1997, 1998, 1999 (tonnes and $000)

		1997		1998		1999	
		tonnes	$000	tonnes	$000	tonnes	$000
Laurentian Region		11,436	41,833	10,344	28,647	11,414	54,530
Newfoundland Region		45,789	91,753	52,704	102,080	69,121	236,124
Maritimes Region		1,688	8,740	2,364	7,052	3,673	12,688
Gulf Region		12,504	59,601	9,879	37,531	11,091	60,457
Gulf – N.S.		2,430	12,412	2,548	8,600	2,683	15,962
P.E.I.		1,116	5,419	612	2,415	859	4,547
Gulf – N.B.		8,958	41,771	6,719	26,515	7,549	39,947
	District 63	1	4				
	District 64	6	18				
	District 65	1,598	7,126	1,024	4,042	1,083	5,732
	District 66	1,568	6,917	1,240	4,894	1,194	6,320
	District 67	5,785	27,705	4,455	17,579	5,272	27,896

Source: DFO

Tableau A3: Shrimp landings, 1997, 1998, 1999 (tonnes and $000)

		1997		1998		1999	
		tonnes	$000	Tonnes	$000	tonnes	$000
Laurentian Region		12,974	23,159	15,104	23,814	14,917	25,022
Newfoundland Region		39,174	108,239	64,348	151,977	66,727	154,225
Maritimes Region		20,853	58,957	23,946	72,478	29,594	88,021
Gulf Region		3,904	5,637	4,759	6,986	4,762	6,723
Gulf - N.B.		3,904	5,637	4,759	6,986	4,762	6,723
	District 65	2,426	3,510	2,699	3,945	2,858	4,078
	District 66	1,456	2,091	1,930	2,829	1,903	2,644
	District 67	22	36	129	212		

Source: DFO

Table A3: Crab landings by fishing area, 1997, 1998, 1999 (tonnes and $000)

	1997		1998		1999	
	tonnes	$000	tonnes	$000	tonnes	$000
Area 12	10,015	47,188	7,006	27,433	8,031	42,909
Areas 25 & 26	697	3,396	592	2,336	674	3,566
Area 18	406	1,989	293	969	407	2,333
Area 19	1,386	7,028	1,988	6,793	1,979	11,649
Total	12,504	59,601	9,879	37,531	11,091	60,457

Source: DFO