



HOUSE OF COMMONS  
CHAMBRE DES COMMUNES  
CANADA

# **IN HOT WATER—LOBSTER AND SNOW CRAB IN EASTERN CANADA**

**Report of the Standing Committee on Fisheries and Oceans**

**Ken McDonald, Chair**

**JUNE 2019  
42<sup>nd</sup> PARLIAMENT, 1<sup>st</sup> SESSION**

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## **NOTICE TO READER**

### **Reports from committee presented to the House of Commons**

Presenting a report to the House is the way a committee makes public its findings and recommendations on a particular topic. Substantive reports on a subject-matter study usually contain a synopsis of the testimony heard, the recommendations made by the committee, as well as the reasons for those recommendations.

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# **THE STANDING COMMITTEE ON FISHERIES AND OCEANS**

has the honour to present its

## **TWENTY-SIXTH REPORT**

Pursuant to its mandate under Standing Order 108(2), the Committee has studied the migration of lobster and snow crab in Atlantic Canada and the impact of changes to lobster carapace size and has agreed to report the following:



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# LIST OF RECOMMENDATIONS

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*As a result of their deliberations committees may make recommendations which they include in their reports for the consideration of the House of Commons or the Government. Recommendations related to this study are listed below.*

## **Recommendation 1**

**That Fisheries and Oceans Canada monitor and measure the current and potential future economic impacts on local harbours and economies resulting from changes in population distribution of lobster and snow crab stocks..... 13**

## **Recommendation 2**

**That Fisheries and Oceans Canada increase its consultation with the fishing industry to improve the collection of data and understanding of scientific information relevant to the health of lobster and snow crab stocks. .... 14**

## **Recommendation 3**

**That Fisheries and Oceans Canada, in partnership with the fishing industry, increase its funding for scientific research on the impact of climate change on the biomass and distribution of lobster and snow crab. .... 16**

## **Recommendation 4**

**That Fisheries and Oceans Canada deepen its research and consideration of climate impacts on the fishery and put forward operational adaptation options for Canada’s commercial fisheries. .... 16**

## **Recommendation 5**

**That Fisheries and Oceans Canada undertake analysis of the socio-economic implications of climate change on Canada’s fish resources and of adaptation scenarios for the industry. .... 16**

**Recommendation 6**

That Fisheries and Oceans Canada monitor and measure any changes in the stock levels of groundfish and other species that commonly prey on lobster and lobster larvae for potential impacts and develop management plans to address changes in stock levels. .... 16

**Recommendation 7**

That Fisheries and Oceans Canada, in partnership with fishing organizations, conduct a detailed study to gain knowledge on the rock crab population and the importance of the rock crab in the lobster's diet, critical to the growth and carrying capacity of lobster stocks. .... 16

**Recommendation 8**

That Fisheries and Oceans Canada consider market impacts, both positive and negative, as well as effects on biomass when making decisions regarding changes to minimum legal lobster carapace size regulations..... 20

**Recommendation 9**

That Fisheries and Oceans Canada, in collaboration with the fishing industry, review lobster nursery grounds, such as Browns Bank, and identify other areas that could be classified as potential lobster nurseries to help the biomass in future years if the stock comes under pressure from overfishing or environmental changes. .... 21

**Recommendation 10**

That Fisheries and Oceans Canada conduct a study on the use of the precautionary approach and reference points to determine future management of fish stocks, and the economic and environmental impact of this approach as it relates to the lobster and snow crab fisheries. .... 22



# IN HOT WATER—LOBSTER AND SNOW CRAB IN EASTERN CANADA

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## OBJECTIVES OF THE COMMITTEE’S STUDY

Lobster and snow crab are, economically, the most important species harvested in Eastern Canada. In the context of climate-driven warming ocean temperatures causing “mass mortalities”<sup>1</sup> of lobster in the southern portion of New England, United States, the House of Commons Standing Committee on Fisheries and Oceans (the committee) undertook a study to assess the impacts of shifting ocean conditions on the population distribution of lobster and snow crab stocks in Eastern Canada.<sup>2</sup> The study also aimed to evaluate the effect of the minimum legal carapace size restrictions as a conservation measure for lobster.

## CHANGING OCEAN CONDITIONS IN EASTERN CANADA

According to Andrew Pershing, Gulf of Maine Research Institute, the “waters from Cape Hatteras [North Carolina] to Newfoundland have warmed at nearly four times the global average rate [over the last 30 years]. This makes this region one of the fastest-warming ocean regions on the planet.”<sup>3</sup> The Scotian Shelf ecosystem figures among the global marine hotspots, areas that are warming faster than 90% of the oceans.<sup>4</sup> Warmer water initially accelerates the growth rate of marine organisms, but rising temperatures also have metabolic effects and can increase the susceptibility to disease of these organisms. Thus, some species may shift to deeper waters or move northward in response to ocean warming.<sup>5</sup>

According to Fisheries and Oceans Canada (DFO), in the Atlantic aquatic basin, a population decline for shrimp, crab, Greenland halibut and Atlantic salmon is likely in the

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1 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

2 House of Commons, Standing Committee on Fisheries and Oceans, [Minutes of Proceedings](#), 6 December 2018.

3 Andrew Pershing, Chief Scientific Officer, Gulf of Maine Research Institute, [Evidence](#), 10 April 2019.

4 Hobday and Pecl, “[Identification of global marine hotspots: sentinels for change and vanguards for adaptation action](#),” *Reviews in Fish Biology and Fisheries*, Vol. 24, No. 2, June 2014, pp. 415-425.

5 Campbell et al., “[Food Production](#),” Chapter 4 in *Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation*, Warren and Lemmen (Ed.), Government of Canada, Ottawa, 2014, pp. 99-134.



southern range of these species.<sup>6</sup> On the other hand, the productivity of certain other species, such as lobster and mackerel, is expected to be enhanced, although their population distribution may shift northward.<sup>7</sup>

## ECONOMIC IMPORTANCE OF LOBSTER AND SNOW CRAB

### A. American Lobster

American Lobster (*Homarus americanus*) is Eastern Canada's most valuable fishery. According to Paul Lansbergen, Fisheries Council of Canada, Canadian exports of lobster were worth \$2.2 billion in 2018.<sup>8</sup> Lobster landings have been steadily increasing since the 1980s with the collapse of the groundfish fisheries (Figure 1). As referenced in the 2013 Senate Standing Committee on Fisheries and Oceans (Senate Committee) report on the lobster fishery, this fishery remains the economic pillar for coastal communities in Quebec and Atlantic Canada.<sup>9</sup>

In 2017, Nova Scotia accounted for \$802 million or 55% of the total Canadian lobster landing values.<sup>10</sup> According to Bernie Berry, Coldwater Lobster Association, Lobster Fishing Area (LFA) 34 alone is responsible for 25% of the Canadian landings.<sup>11</sup> That LFA is located off the southwest coast of Nova Scotia. Pat O'Neill, Prince Edward Island Fishermen's Association, also indicated that the Prince Edward Island (P.E.I.) fishery contributes to "over 30% of the total Canadian lobster harvest and is one of the main economic drivers on P.E.I., with over 9,000 industry-related jobs and a direct landed value of \$250 million annually."<sup>12</sup>

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6 Fisheries and Oceans Canada [DFO], [\*Short-Term Stock Prospects for Cod, Crab and Shrimp in the Newfoundland and Labrador Region \(Divisions 2J3KL\)\*](#), Canadian Science Advisory Secretariat Science Response 2014/049, November 2014.

7 Le Bris et al., "[\*Climate vulnerability and resilience in the most valuable North American fishery\*](#)," *PNAS*, Vol. 115, No. 8, 20 February 2018, pp. 1831-1836.

8 Paul Lansbergen, President, Fisheries Council of Canada, [\*Evidence\*](#), 1 May 2019.

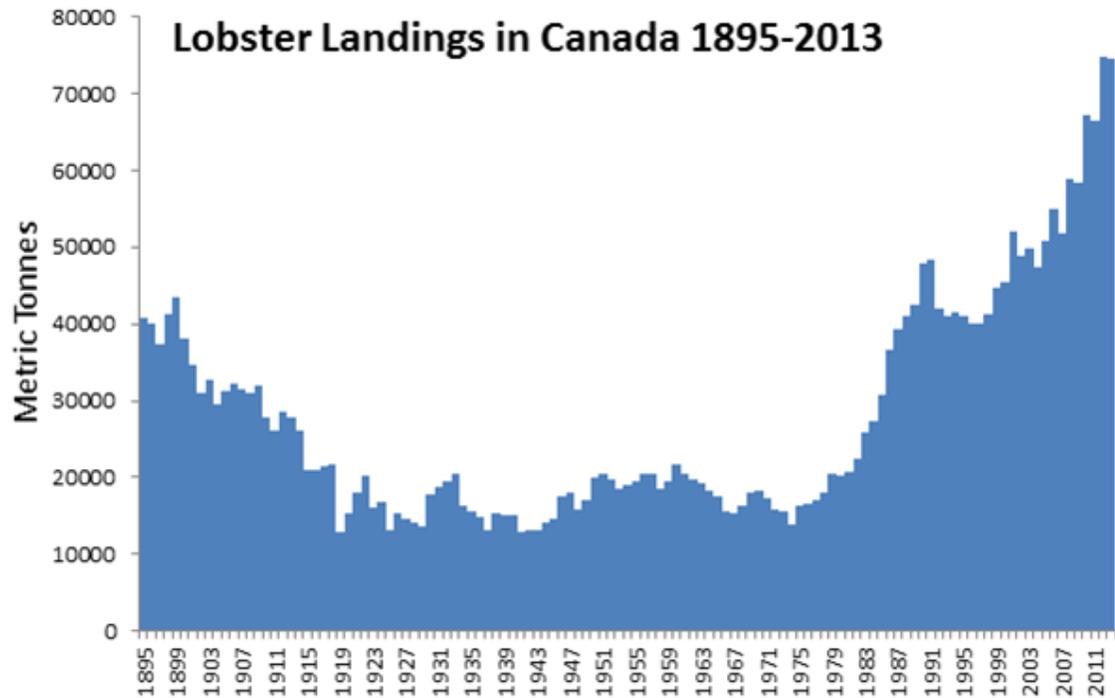
9 Senate, Standing Committee on Fisheries and Oceans, [\*The Lobster Fishery: Staying the Course\*](#), Tenth Report, 1<sup>st</sup> Session, 41<sup>st</sup> Parliament, 28 May 2013.

10 DFO, [\*2017 Value of Atlantic Landings\*](#).

11 Bernie Berry, President, Coldwater Lobster Association, [\*Evidence\*](#), 10 April 2019.

12 Pat O'Neill, Interim Executive Director, Prince Edward Island Fishermen's Association, [\*Evidence\*](#), 10 April 2019.

Figure 1—American Lobster Landings in Canada, 1895-2013



Source: Fisheries and Oceans Canada, [Lobster](#), 2015.

In 2018, 53% of live lobster exports went to the United States and 26% went to China (Figure 2).<sup>13</sup> According to a 10-year outlook from DFO, “the Canada–U.S. lobster market is highly integrated, and projections show the two countries will continue to be each other’s largest destination for lobster exports.”<sup>14</sup> As a result of the Chinese government imposing a 25% tariff on lobster imports from the United States,<sup>15</sup> it is believed that China will increasingly buy its lobster from Canada.<sup>16</sup> DFO projects that lobster’s share of Canada’s seafood export market will increase from about 30% to 40% by 2027.<sup>17</sup>

13 Statistics Canada, [Trade Data Online](#).

14 DFO, Economic Analysis and Statistics Directorate, [Outlook to 2027 for Canadian Fish and Seafood](#), 7 November 2018.

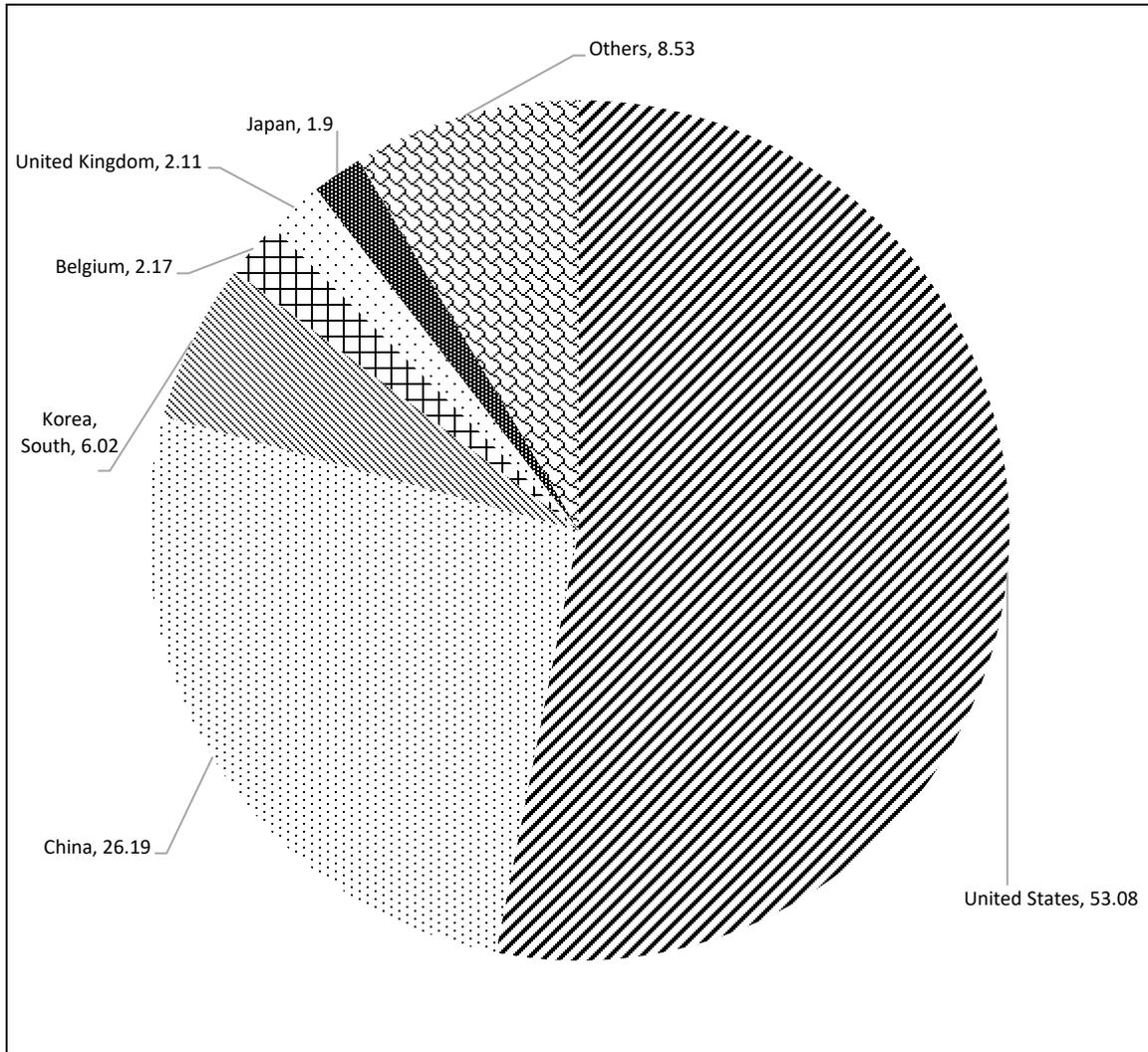
15 Food and Agriculture Organization of the United Nations, [“Trade war affecting the lobster market,” GLOBEFISH - Information and Analysis on World Fish Trade](#), 15 October 2018.

16 Jason Huffman, [“Canada ready to seize more China lobster sales in Trump trade spat,” Undercurrent News](#), 18 June 2018.

17 DFO, Economic Analysis and Statistics Directorate, [Outlook to 2027 for Canadian Fish and Seafood](#), 7 November 2018.



**Figure 2—Live American Lobster Exports, by Country, 2018 (in Percentage)**



Source: Figure prepared using data obtained from Statistics Canada, [Trade Data Online](#).

## B. Snow Crab

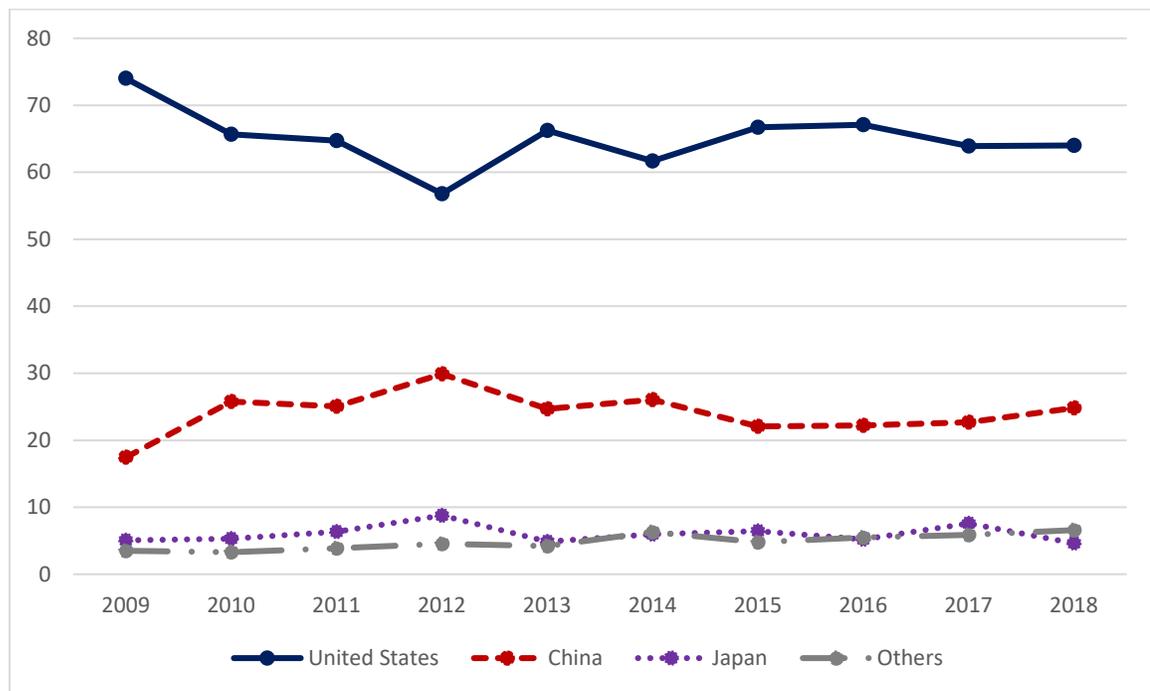
Snow crab (*Chionoecetes opilio*) is a growing segment of the East Coast fishery, with 92.5 million tonnes of live landings in 2017 representing \$968 million in landed value.<sup>18</sup> Newfoundland and Labrador accounted for \$325 million or 34% of the 2017 total

18 DFO, [2017 Volume of Atlantic Landings](#); and DFO, [2017 Value of Atlantic Landings](#).

Canadian landed values.<sup>19</sup> All the Atlantic provinces and Quebec experienced a substantial increase in landed values of snow crab between 2016 and 2017.

In 2018, \$1.3 billion worth of crab (\$886 million of which was snow crab)<sup>20</sup> was exported from Canada. Of the total exports, 63% went to the United States and 24% to China (Figure 3).<sup>21</sup> According to a 10-year outlook from DFO, global demand for snow crab will be increasingly dominated by China due to increasing levels of disposable income among its population.<sup>22</sup>

**Figure 3—Crab Exports by Country (in Percentage) from 2009 to 2018**



Source: Figure prepared using data obtained from Statistics Canada, [Trade Data Online](#).

19 DFO, [2017 Value of Atlantic Landings](#).

20 Paul Lansbergen, President, Fisheries Council of Canada, [Evidence](#), 1 May 2019.

21 Statistics Canada, [Trade Data Online](#).

22 DFO, Economic Analysis and Statistics Directorate, [Outlook to 2027 for Canadian Fish and Seafood](#), 7 November 2018.



## CHANGES IN POPULATION DISTRIBUTION

### A. American Lobster

The American lobster is a temperate species and, according to Richard Wahle, University of Maine,

The centre of the American lobster abundance is currently the southern Gulf of St. Lawrence and the northeast Gulf of Maine. It ranges northward into Labrador and Newfoundland and extends into the deep waters off the U.S. mid-Atlantic states. There is scientific consensus that the upper physiological limit in temperature is around 20°C and the lower limit is around 12°C, which is the minimum temperature for larval development.<sup>23</sup>

As the population distribution of lobster is largely determined by near-surface ocean temperatures, lobsters in the Gulf of St. Lawrence are “mostly limited to depths shallower than 50 metres. Those further south extend considerably deeper, into offshore banks and shelf waters.”<sup>24</sup> The committee also heard that the “growth and the onset of maturity [of lobster] are also temperature-dependent. In warmer regimes, lobsters grow faster but mature at a smaller size.”<sup>25</sup> Therefore, the downward trends in the size of lobster at maturity over the past few decades can be linked to the warming of the ocean.

With shifting ocean conditions, the optimal thermal envelope for lobsters has been moving northward.<sup>26</sup> Consequently, the population distribution of lobsters has shifted in the same direction by a rate of 11 km per year over the last 30 years.<sup>27</sup> Andrew Pershing indicated that the “shift has coincided with the dramatic increase in landings in Maine, New Brunswick and Nova Scotia, but a severe decline in catches in Rhode Island and New York.”<sup>28</sup> He clarified, however, that lobsters “have not crawled from Rhode Island to Maine,” but the northward shift in lobster’s geographic abundance has been driven by increased reproduction and survival in the north and decreased reproduction and survival in the south.

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23 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

24 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

25 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

26 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

27 Andrew Pershing, Chief Scientific Officer, Gulf of Maine Research Institute, [Evidence](#), 10 April 2019.

28 Andrew Pershing, Chief Scientific Officer, Gulf of Maine Research Institute, [Evidence](#), 10 April 2019.

Although the warming ocean is a critical factor explaining the geographic range shift of the lobster, Richard Wahle added that the “depletion of predatory groundfish in the Gulf of Maine and the Gulf of St. Lawrence has also likely contributed” to increased abundance of the species in those regions.<sup>29</sup> The committee also heard from Bernie Berry that lobster is being increasingly found in deeper waters. He stated:

The shift in where lobsters are harvested in LFA 34 over the past 30 years is dramatic. In the 1970s and 1980s, 90% to 95% of lobsters caught were in 50 fathom and shoaler. In today's catch, 50% to 60% is harvested in 50 fathom and deeper. This is an important trend that is worth noting.<sup>30</sup>

While lobster productivity is currently at historically high levels, there are parts of Atlantic Canada where the species may be more vulnerable. According to Richard Wahle, summer warming can be extreme in areas such as the Northumberland Strait near P.E.I. because waters there are shallow.<sup>31</sup> DFO also cautioned that “population movements benefit certain fishing areas, such as those north of Prince Edward Island. However, the lobster population in [the] Northumberland Strait has decreased because the summer temperature already exceeds 22°C, which is close to the lethal level for the lobster.”<sup>32</sup>

## B. Snow Crab

According to Darrell Mallowney, DFO, snow crab is a subarctic species and is “typically found in temperatures ranging from about -1.5°C to about 4°C,” corresponding to “depths of roughly 50 metres to 600 metres.”<sup>33</sup> The snow crab stock extends from central Labrador, in Northwest Atlantic Fisheries Organization (NAFO) division 2H, all throughout Eastern Canada and down to west of Halifax in southwestern Nova Scotia, in NAFO division 4X (Figure 4). The southern Gulf of St. Lawrence (sGSL), in division 4T, has the longest history of substantial snow crab fisheries. There is also an important snow crab fishery in the Grand Banks division 3LNO. The stock harvest has been in the range of 80,000 tonnes to 100,000 tonnes for about two decades in divisions 4T and 3LNO.

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29 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

30 Bernie Berry, President, Coldwater Lobster Association, [Evidence](#), 10 April 2019.

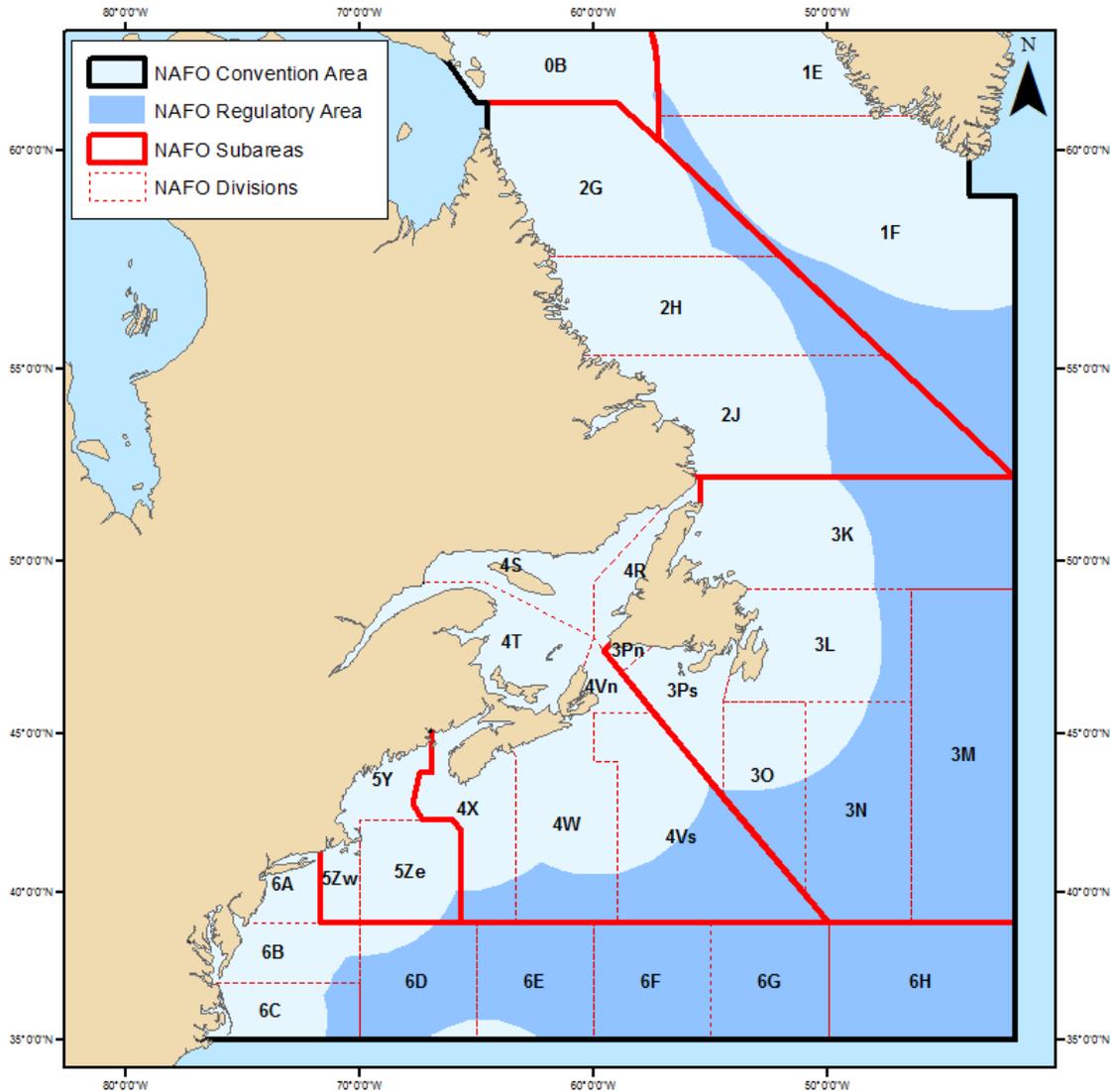
31 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

32 DFO, [Snow Crab and lobster in hot water](#).

33 Darrell Mallowney, Biologist, Shellfish Science, Newfoundland and Labrador Region, DFO, [Evidence](#), 3 April 2019.



Figure 4—Northwest Atlantic Fisheries Organization Convention Area



Source: Northwest Atlantic Fisheries Organization, [NAFO Regulatory Area](#).

The committee heard that the geographic range of snow crab in Newfoundland and Labrador has not been expanding northward.<sup>34</sup> Darrell Mallowney pointed out that, in fact, the fishery has migrated southward:

34 Darrell Mallowney, Biologist, Shellfish Science, Newfoundland and Labrador Region, DFO, [Evidence](#), 3 April 2019.

The 2H fishery has come down to be predominantly in what's called 2J now. As the stock has shrunk in this area, it's contracted back to the heart of its range, which is south. The biggest part of the stock is in 3LNO, on the Grand Banks, so the biggest biomass is in the south, along with 4T [Figure 4].<sup>35</sup>

In contrast to lobster, Darrell Mallowney indicated that the warming ocean “from about the mid-1990s to the 2000s was dampening the stock productivity. On the stock level as a whole, that was under a regime of light exploitation by the fishery and low top-down control by finfish predation.”<sup>36</sup> The committee heard that since then, the stock productivity potential has actually improved as bottom water temperatures have gotten colder in Newfoundland and Labrador since 2012. However, in his view, the stock population continued to decline as fishing pressure has increased.<sup>37</sup>

Pat O’Neill shed more light upon the effects of warming ocean temperatures on snow crab in the sGSL:

Climate change and the increase in water temperatures over time in the Gulf of St. Lawrence have been red-flagged at snow crab stock assessments, due to what is known on the impact on moulting, movement and reproductive behaviour in snow crab.<sup>38</sup>

## ENHANCING RESEARCH CAPACITY TO REDUCE CLIMATE VULNERABILITY

Eastern Canada’s lobster fishery is currently benefitting from the species’ range shift northward. However, according to Andrew Pershing, climate projections suggest that the northwest Atlantic Ocean will continue to warm at an above-average rate with resulting conditions that will be less favourable for lobster in the Scotian Shelf and the sGSL in the long-term.<sup>39</sup> He indicated:

Beyond 2050, the fate of lobster will depend on global carbon emissions. If carbon emissions are reduced as envisioned in the Paris Agreement, then Maine and Atlantic

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35 Darrell Mallowney, Biologist, Shellfish Science, Newfoundland and Labrador Region, DFO, [Evidence](#), 3 April 2019.

36 Darrell Mallowney, Biologist, Shellfish Science, Newfoundland and Labrador Region, DFO, [Evidence](#), 3 April 2019.

37 Darrell Mallowney, Biologist, Shellfish Science, Newfoundland and Labrador Region, DFO, [Evidence](#), 3 April 2019.

38 Pat O’Neill, Interim Executive Director, Prince Edward Island Fishermen's Association, [Evidence](#), 10 April 2019.

39 Andrew Pershing, Chief Scientific Officer, Gulf of Maine Research Institute, [Evidence](#), 10 April 2019.



Canada will likely hold on to valuable lobster fisheries. However, under business-as-usual emissions, these fisheries will be much smaller.

To reduce the vulnerability of the most valuable fishery resources in Eastern Canada to climate-driven warming ocean temperatures, witnesses called for enhanced research capacity for lobster and snow crab stocks. In their view, it is critical to understand these species' ecosystem and biomass, and the interactions of environmental changes and fishery management measures in driving fishery productivity. The committee heard that a robust scientific capacity is required to devise effective conservation efforts and sustainable harvest levels, and to build lobster and snow crab's resilience to environmental changes.

## A. Monitoring Activities

### 1. Detecting Emerging Trends

As a fish harvester, Alfred Fitzpatrick was puzzled by the changes to the lobster population he observed in the waters off the south coast of Newfoundland:

One thing I will say is that we're seeing a lot of very small lobsters being egg-bearing. A lot of the older fishermen in the area where I fish now say they've never seen it to the magnitude that it is now. I'm wondering if other LFAs around Atlantic Canada are seeing the same thing.

Is it normal? Does it bode well? With other stocks, they say that when smaller individuals start spawning and producing eggs, such as cod, it's a sign of a species under stress.<sup>40</sup>

Consequently, witnesses recommended increased monitoring activities as a step to build a robust scientific capacity in lobster and snow crab research. In the view of Bernie Berry, collecting baseline datasets can provide valuable insight into emerging trends affecting the fishery. He indicated:

Tracking lobster movement is critical in determining the change in lobster behaviour, primarily because of the warming water trend that we are seeing. The Gulf of Maine is the second-fastest warming body of water on earth. Determining where lobsters are moving, especially female lobsters, is critical. If female egg-bearing lobsters are going into deep water to release their eggs because the traditional areas, shoal water, have become too warm, then it is critical to track where the eggs and larvae are going. The direction of current and the strength of current in these new areas are different from

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40 Alfred Fitzpatrick, Independent Owner-Operator Fish Harvester, *Evidence*, 10 April 2019.

those in the inshore grounds and could lead to a different dispersal range from what used to exist.<sup>41</sup>

In Bernie Berry’s opinion, lobster tracking activities can also benefit the industry economically as they could “lead to a more cost-efficient harvest of the species.”<sup>42</sup> In fact, such activities could help harvesters identify “premium” lobsters based on location and time of harvest.

### **Recommendation 1**

**That Fisheries and Oceans Canada monitor and measure the current and potential future economic impacts on local harbours and economies resulting from changes in population distribution of lobster and snow crab stocks.**

## **2. Science Partnerships**

The vital importance of DFO-industry collaboration in data collection and research was highlighted by all witnesses. The committee heard testimony about successful DFO-industry collaboration, but also about the need for increased partnership in some regions. DFO indicated that much of the monitoring of snow crab and lobster populations is undertaken in collaboration with fish harvesters. Monitoring data is gathered from logbooks, landing reports, trap indices and collaborative surveys.<sup>43</sup> There have also been science partnership projects made possible by the Atlantic Fisheries Fund.<sup>44</sup> Regarding lobster specifically, Matthew Hardy, DFO, mentioned:

We have an ongoing project with Prince Edward Island Fishermen's Association, with the Province of P.E.I. and with the Gulf Nova Scotia Bonafide Fishermen's Association, where we deploy bio-collectors. These are essentially large boxes that various species land on—lobster juveniles, rock crab juveniles, various other species—and we can measure those changes over time. That kind of project would be impossible without the collaboration of industry.<sup>45</sup>

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41 Bernie Berry, President, Coldwater Lobster Association, [Evidence](#), 10 April 2019.

42 Bernie Berry, President, Coldwater Lobster Association, [Evidence](#), 10 April 2019.

43 Matthew Hardy, Manager, Fisheries and Ecosystem Sciences Division, Gulf Region, DFO, [Evidence](#), 3 April 2019.

44 DFO, [Atlantic Fisheries Fund](#).

45 Matthew Hardy, Manager, Fisheries and Ecosystem Sciences Division, Gulf Region, DFO, [Evidence](#), 3 April 2019.



Examples of snow crab science partnerships in Newfoundland and Labrador were also provided by Darrell Mallowney. The following is one of such examples:

One major thing that we do in collaboration with FFAW [Fish, Food and Allied Workers Union] is a trap survey that spans the whole area of Newfoundland and Labrador. It's a massive survey of some 1,200 to 1,250 stations, and it's done every year. We work collaboratively, in that the science branch of DFO will design the survey and give the instructions on how it is to be carried out, but it's actually carried out by fishermen on fishing boats on the water, and the data is collectively owned by both sides. It's a really good example of a collaborative initiative.<sup>46</sup>

In the waters off southwest Nova Scotia, Bernie Berry observed, however, that there is room to increase DFO-industry collaboration. He also called for an expansion of the Lobster Node<sup>47</sup> into the region:

There really was not a whole lot of collaboration, at least in our area. We have to really focus on temperature monitoring, larvae settlement and things like that, and possibly on the extension of the Lobster Node, which is a very good vehicle for Southwest Nova. Southwest Nova is not at this present time involved in the Lobster Node.<sup>48</sup>

Considering the above evidence, the committee recommends:

## **Recommendation 2**

**That Fisheries and Oceans Canada increase its consultation with the fishing industry to improve the collection of data and understanding of scientific information relevant to the health of lobster and snow crab stocks.**

## **B. Ecosystem Approach**

Given that lobster geographic range shifts can have a significant economic impact on the industry, Pat O'Neill highlighted the need to use the ecosystem approach when

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46 Darrell Mallowney, Biologist, Shellfish Science, Newfoundland and Labrador Region, DFO, [Evidence](#), 3 April 2019.

47 In 2010, fish harvester associations from five provinces bordering the range of American lobster in Canada joined DFO research scientists and researchers from universities to establish the Lobster Node. The Lobster Node was formed to address knowledge gaps on lobster productivity, stock structure, and connectivity through collaborative research under the auspices of the Canadian Fisheries Research Network (CFRN). See: Rochette et al., "[The Lobster Node of the CFRN: co-constructed and collaborative research on productivity, stock structure, and connectivity in the American lobster \(\*Homarus americanus\*\)](#)," *Canadian Journal of Fisheries and Aquatic Sciences*, Vol. 75, No. 5, May 2018.

48 Bernie Berry, President, Coldwater Lobster Association, [Evidence](#), 10 April 2019.

conducting research to ensure a comprehensive outlook on the future sustainability of the species:

The fishery on P.E.I. is mainly dependent on lobster. It is vital that we have a good monitoring program in place to understand how climate change is affecting their habitat, biomass and moulting. Currently, there is no permanent funding in place to monitor this.

The Department of Fisheries and Oceans is mandated to study lobster stock biomass, but nothing beyond that. Fishers on P.E.I. are concerned with other aspects of the lobster population, including the species' carrying capacity—namely, food and habitat limitations.

Understanding that better would include a project to gain knowledge on the rock crab population, which are a main component of the lobster diet. DFO submitted a proposal on this in collaboration with the P.E.I. Fishermen's Association, but the project was rejected for funding.<sup>49</sup>

According to Arnault Le Bris, Fisheries and Marine Institute of Memorial University of Newfoundland, there is still a lack of understanding of the impacts of warming ocean conditions on the whole ecosystem, including on predators of shellfish:

We need to better understand how climate change and ecosystems drive the recruitment process, and also how predation affects the mortality of juvenile and adult lobsters. I think this is true for lobster but also for snow crab and, I will add, for shrimp.<sup>50</sup>

Regarding the predators of shellfish, the committee recalls the recommendation from its 2011 report on the snow crab industry asking DFO to “immediately put into place a plan, based on scientific evidence, to mitigate the impact of the rapidly growing population of grey seals on the snow crab resource in the Gulf of St. Lawrence, including the targeted removal of grey seals.”<sup>51</sup> The committee also notes that, according to Alfred Fitzpatrick, an ecosystem approach to research also needs to consider the impacts of industrial activities, such as seismic surveys, on the marine biophysical environment.<sup>52</sup>

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49 Pat O'Neill, Interim Executive Director, Prince Edward Island Fishermen's Association, [Evidence](#), 10 April 2019.

50 Arnault Le Bris, Research Scientist, Centre for Fisheries Ecosystems, Fisheries and Marine Institute of Memorial University of Newfoundland, [Evidence](#), 10 April 2019.

51 House of Commons, Standing Committee on Fisheries and Oceans, [Report on the Snow Crab Industry in the Atlantic Provinces and in Quebec](#), 1<sup>st</sup> Session, 41<sup>st</sup> Parliament, October 2011.

52 Alfred Fitzpatrick, Independent Owner-Operator Fish Harvester, [Evidence](#), 10 April 2019.



Given the above testimony, the committee recommends:

### **Recommendation 3**

**That Fisheries and Oceans Canada, in partnership with the fishing industry, increase its funding for scientific research on the impact of climate change on the biomass and distribution of lobster and snow crab.**

### **Recommendation 4**

**That Fisheries and Oceans Canada deepen its research and consideration of climate impacts on the fishery and put forward operational adaptation options for Canada's commercial fisheries.**

### **Recommendation 5**

**That Fisheries and Oceans Canada undertake analysis of the socio-economic implications of climate change on Canada's fish resources and of adaptation scenarios for the industry.**

### **Recommendation 6**

**That Fisheries and Oceans Canada monitor and measure any changes in the stock levels of groundfish and other species that commonly prey on lobster and lobster larvae for potential impacts and develop management plans to address changes in stock levels.**

### **Recommendation 7**

**That Fisheries and Oceans Canada, in partnership with fishing organizations, conduct a detailed study to gain knowledge on the rock crab population and the importance of the rock crab in the lobster's diet, critical to the growth and carrying capacity of lobster stocks.**

## **CONSERVATION MEASURES**

### **A. Minimum Legal Carapace Size of Lobster**

The carapace is defined as the longest section of the lobster's shell (i.e., the section from behind its eyes to the beginning of its tail). The carapace size is an indicator of the age and sexual maturity of the lobster. The *Atlantic Fishery Regulations, 1985* establish the

minimum carapace size for each of the LFAs as a conservation measure.<sup>53</sup> Lobsters with carapace sizes shorter than the minimum established for the LFA must be thrown back into the ocean. According to Arnault Le Bris, the “rationale is to help lobster reproduce at least once before they are caught in the fishery.”<sup>54</sup> The minimum legal carapace size for each LFA is illustrated in Figure 5.

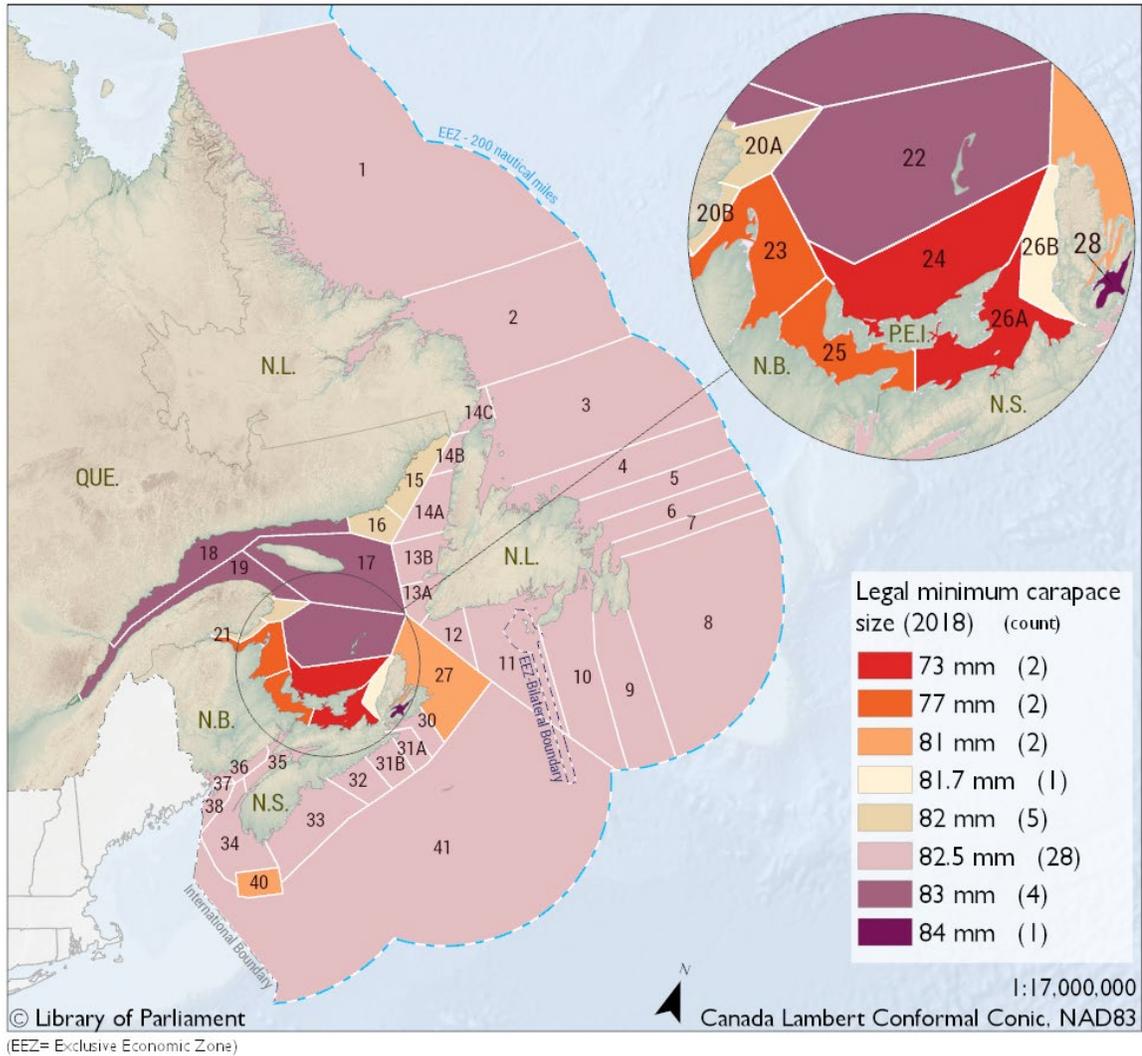
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53 [Atlantic Fishery Regulations, 1985](#), SOR/86-21.

54 Arnault Le Bris, Research Scientist, Centre for Fisheries Ecosystems, Fisheries and Marine Institute of Memorial University of Newfoundland, [Evidence](#), 10 April 2019.



**Figure 5—Lobster Fishing Areas in Eastern Canada and Minimum Legal Carapace Sizes, 2018**



Source: Map prepared by Library of Parliament, Ottawa, 2019, using data from Natural Resources Canada (NRCan), *Administrative boundaries in Canada—CanVec Series, “Administrative features”*, 1:5M, Ottawa, NRCan, 2018; Natural Resources Canada (NRCan), *Canadian Digital Elevation Model*, Ottawa, NRCan, 2015; *Atlantic Fisheries Regulations, 1985*, SOR/86-21, Schedule XIII; and Fisheries and Oceans Canada, *“Lobster conservation harvesting plan—New management measures for 2018 and beyond (LFA 23, 24, 25, 26A and 26B)”*, Notice to fish harvesters. The following software was used: Esri, ArcGIS Pro, version 2.3.0. Contains information licensed under [Open Government Licence—Canada](#). The [World Oceans Basemap](#) layer is the intellectual property of Esri and is used under licence. Copyright ©2014 Esri and its licensors. All rights reserved.

Despite rises in recent years,<sup>55</sup> the minimum legal carapace sizes in LFAs adjacent to P.E.I. are significantly lower than those in other provinces.<sup>56</sup> The minimum carapace sizes in P.E.I. are: 73 mm in LFAs 24 and 26A-1, 77 mm in LFA 25, and 76 mm in LFAs 26A-2 and 26A-3.<sup>57</sup> According to the 2013 Senate Committee report on lobster, the unique situation in P.E.I. stems from the smaller sized canner lobster, comprising 65% of the province’s lobster landings. The canner lobster is a niche market that is especially popular on cruise ships, and at casinos and buffets.<sup>58</sup>

Regulations allowing the harvesting of lobster of different sizes respond to the needs of the world market. Seafoodia, a French company specializing in Canadian lobster imports, informed the committee that the “European market, especially the French one which counts for 20% of the EU [European Union] import, is based on different lobster sizes assortment.”<sup>59</sup> It also noted that the availability of lobster imports of various sizes allows retailers to “diversify offers and final retail prices to consumers whether it is a premium or regular one,” and “adjust pricing depending on other shellfish products price level.” Nordic Seafood, a Danish importer, added that “American lobsters are perceived as an expensive product so we have big requests for the smaller sizes (all from 275 to 450g).”<sup>60</sup>

The committee was informed by Arnault Le Bris that lobster’s alongshore movements are in the “order of tens of kilometres, which is enough to connect some fishing ports, but rarely enough to connect fishing areas, as demonstrated by the recent studies from the Lobster Node project.”<sup>61</sup> Therefore, the minimum legal carapace size requirement for one LFA would have little impact on the resource in an adjacent LFA.

Arnault Le Bris applauded P.E.I.’s efforts in increasing the minimum legal carapace sizes. He observed that most of the minimum sizes are currently “below the length at 50%

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55 LFA 25’s minimum legal carapace size rose from 72 mm in 2015 to 77 mm for the 2018 season. In 2017, P.E.I. lobster fishers in LFA 24 in eastern P.E.I. also voted in favour of a 1 mm increase.

56 There are three LFAs in P.E.I., 24, 25 (shared with New Brunswick and Nova Scotia) and 26A (shared with Nova Scotia).

57 DFO, [\*Notice to fish harvesters: Lobster conservation harvesting plan – New management measures for 2018 and beyond \(LFA 23, 24, 25, 26A AND 26B\)\*](#), 25 April 2018.

58 Senate, Standing Committee on Fisheries and Oceans, [\*The Lobster Fishery: Staying the Course\*](#), Tenth Report, 1<sup>st</sup> Session, 41<sup>st</sup> Parliament, 28 May 2013.

59 Seafoodia, *Brief*, 19 April 2019.

60 Nordic Seafood, *Brief*, 16 April 2019.

61 Arnault Le Bris, Research Scientist, Centre for Fisheries Ecosystems, Fisheries and Marine Institute of Memorial University of Newfoundland, [\*Evidence\*](#), 10 April 2019.



maturity. This means that only a minority of lobster[s] reproduce before they become vulnerable to the fishery.”<sup>62</sup> Arnault Le Bris also noted that there are no maximum legal carapace sizes imposed in Canada. In his opinion, preserving large reproductive female lobsters “increases the egg production in the population and, consequently, the resilience of the fishery to future changes in the ecosystem.”<sup>63</sup>

The committee recommends:

### **Recommendation 8**

**That Fisheries and Oceans Canada consider market impacts, both positive and negative, as well as effects on biomass when making decisions regarding changes to minimum legal lobster carapace size regulations.**

## **B. Nursery Grounds**

To ensure the long-term sustainability of lobster stocks, witnesses stressed the critical role of nursery grounds and recommended that DFO identify potential new grounds as well as conserve the existing ones. Bernie Berry mentioned:

Browns Bank, LFA 40, has been closed to all lobster fishing for approximately 40 years because it was believed to be an offshore nursery for lobster. If lobster movement is tracked, we might be able to identify other areas that could be classified as potential lobster nurseries and treat them as safe havens, or closed areas, to help the biomass in future years if the stock comes under pressure from environmental changes.<sup>64</sup>

The committee also notes that there are Canada-United States science partnership opportunities in identifying and monitoring lobster nursery grounds, as Richard Wahle indicated:

I founded the American lobster settlement index. It's a collaboration of U.S. and Canadian academic institutions, industry members and fishery management agencies that monitor the pulse of baby lobsters that repopulate coastal lobster nurseries each

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62 Arnault Le Bris, Research Scientist, Centre for Fisheries Ecosystems, Fisheries and Marine Institute of Memorial University of Newfoundland, [Evidence](#), 10 April 2019.

63 Arnault Le Bris, Research Scientist, Centre for Fisheries Ecosystems, Fisheries and Marine Institute of Memorial University of Newfoundland, [Evidence](#), 10 April 2019.

64 Bernie Berry, President, Coldwater Lobster Association, [Evidence](#), 10 April 2019.

year at some 100 sites between Rhode Island and Newfoundland. For 30 years it has been an important early warning system for changes in this iconic fishery.<sup>65</sup>

Therefore, the committee recommends:

### Recommendation 9

**That Fisheries and Oceans Canada, in collaboration with the fishing industry, review lobster nursery grounds, such as Browns Bank, and identify other areas that could be classified as potential lobster nurseries to help the biomass in future years if the stock comes under pressure from overfishing or environmental changes.**

## C. Precautionary Approach Harvest Decision Rules

The precautionary principle recognizes that in the absence of scientific certainty, conservation measures can be taken when there is knowledge of a risk of serious or irreversible harm to the resources using best available information.<sup>66</sup> The precautionary approach to fisheries management decisions include the setting of reference points (limit reference and upper stock reference points) and removal rates at which a fish may be harvested depending on its stock status zone.<sup>67</sup>

According to DFO, harvest decision rules in the sGSL lobster fishery conform to the precautionary approach framework for that fishery.<sup>68</sup> Based on a 2014 Science Response from the Canadian Science Advisory Secretariat,<sup>69</sup> the upper stock reference point was set at 13,798 tonnes and the limit reference point was determined to be 6,899 tonnes. Therefore, the lobster stock would be in the cautious zone when landings fluctuate between 6,899 and 13,798 tonnes, and fishing effort adjustments would then be required.

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65 Richard Wahle, Research professor, School of Marine Sciences, University of Maine, [Evidence](#), 1 May 2019.

66 DFO, [Backgrounder - A Fishery Decision-Making Framework Incorporating the Precautionary Approach](#).

67 DFO defines a “limit reference point” as the “boundary between the cautious and critical zones. When a fish stock level falls below this point, there is a high probability that its productivity will be so impaired that serious harm will occur.” The “upper stock reference point” is used to mark the “boundary between the healthy and cautious zones. When a fish stock level falls below this point, the removal rate at which the fish are harvested must be progressively reduced in order to avoid serious harm to the stock.” See: DFO, [A fishery decision-making framework incorporating the precautionary approach](#).

68 DFO, [Precautionary approach harvest decision rules for the lobster fishery in the southern Gulf of St. Lawrence: Lobster Fishing Areas 23, 24, 25, 26A, 26B](#).

69 DFO, [“Reference point options for the southern Gulf of St. Lawrence lobster stock \(Lobster Fishing Areas 23, 24, 25, 26A, 26B\)”](#), Canadian Science Advisory Secretariat Science Response 2014/027, January 2014.



The 2014 Science Response recognized, however, that defining reference points for the sGSL lobster stock is “difficult because of the lack of key quantitative data including biomass indices and reliable exploitation rate estimates.” In addition, the document indicates that “under the present management regime (i.e. an input control fishery) and fisheries data collection programs, landings are considered to be poor indicators of stock status,” and “presently, the few fishery independent monitoring programs conducted in portions of the sGSL are not adequate to assess the status of lobster in the entire sGSL.”<sup>70</sup>

The findings of the 2014 Science Response are consistent with observations made by Matthew Hardy regarding the lobster populations in the United States:

What we saw there, over periods of time, was that the fishing landings maintained themselves during a period when recruitment was going down in terms of young lobster. We hope to have a complete understanding of the population by monitoring both adult and recruitment indices to have a sense of early detection if we start to see populations changing and whatnot.<sup>71</sup>

The committee heard Alfred Fitzpatrick stressing the importance for DFO to get the reference points “right,” given the socio-economic impacts of the Department’s fishery management decisions on coastal communities.<sup>72</sup> He perceived a “big disconnect” between DFO science data and management decisions:

We'll go into a meeting with DFO. The science will be there, but it seems what science recommends and what we agree to are not always followed, even though it makes sense for the stock and for the harvesters.

Bernie Berry also pointed out that fish harvesters are the “eyes on the water,” and, therefore, the precautionary approach harvest decision rules should “take the lead from industry and science.”<sup>73</sup>

The committee recommends:

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70 DFO, “[Reference point options for the southern Gulf of St. Lawrence lobster stock \(Lobster Fishing Areas 23, 24, 25, 26A, 26B\)](#),” Canadian Science Advisory Secretariat Science Response 2014/027, January 2014.

71 Matthew Hardy, Manager, Fisheries and Ecosystem Sciences Division, Gulf Region, DFO, [Evidence](#), 3 April 2019.

72 Alfred Fitzpatrick, Independent Owner-Operator Fish Harvester, [Evidence](#), 10 April 2019.

73 Bernie Berry, President, Coldwater Lobster Association, [Evidence](#), 10 April 2019.

## Recommendation 10

**That Fisheries and Oceans Canada conduct a study on the use of the precautionary approach and reference points to determine future management of fish stocks, and the economic and environmental impact of this approach as it relates to the lobster and snow crab fisheries.**

## CONCLUSION

Considering the critical socio-economic importance of the lobster and snow crab fisheries to Eastern Canada’s coastal communities, the committee urges DFO to increase its scientific research capacity and enhance collaboration with fish harvesters, academics, and American partners to better understand the implications of changing ocean conditions on these species. As indicated by Bernie Berry:

Changes in the environment are happening at an unprecedented pace, and collectively, we must act now to better understand the changes that have happened and will continue to happen, for the health of the stock and the economic viability of the fishery and the communities it supports.<sup>74</sup>

The committee also encourages the continued use of conservation measures, such as minimum legal carapace sizes for lobster and the protection of critical nursery grounds. The committee believes that the implementation of conservation measures, in meaningful consultation and partnership with fish harvesters, will help ensure that lobster and snow crab fisheries continue to be sustainable—both environmentally and economically—for generations to come.

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74 Bernie Berry, President, Coldwater Lobster Association, [Evidence](#), 10 April 2019.



## APPENDIX A LIST OF WITNESSES

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The following table lists the witnesses who appeared before the Committee at its meetings related to this report. Transcripts of all public meetings related to this report are available on the Committee’s [webpage for this study](#).

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Department of Fisheries and Oceans</b> Matthew Hardy, Manager Fisheries and Ecosystem Sciences Division, Gulf Region  Darrell Mallowney, Biologist Shellfish Science, Newfoundland and Labrador Region  Rowena Orok, Director Fish Population Science and Acting Director General, Ecosystem Science, National Capital Region  David Whorley, Director Resource Management Operations	2019/04/03	139
<b>As an individual</b>  Alfred Fitzpatrick, Independent Owner-Operator Fish Harvester	2019/04/10	140
<b>Coldwater Lobster Association</b>  Bernie Berry, President Heather Mulock, Manager	2019/04/10	140
<b>Fisheries and Marine Institute of Memorial University of Newfoundland</b>  Arnault Le Bris, Research Scientist Centre for Fisheries Ecosystems	2019/04/10	140
<b>Gulf of Maine Research Institute</b>  Andrew J. Pershing, Chief Scientific Officer	2019/04/10	140

<b>Organizations and Individuals</b>	<b>Date</b>	<b>Meeting</b>
<b>Prince Edward Island Fishermen's Association</b> Melanie Giffin, Marine Biologist and Program Planner Bobby Jenkins, President Pat O'Neill, Interim Executive Director Laura Ramsay, Research and Liaison Officer	2019/04/10	140
<b>As an individual</b> Richard A. Wahle, Research professor School of Marine Sciences, University of Maine	2019/05/01	142
<b>Fisheries Council of Canada</b> Paul Lansbergen, President	2019/05/01	142

# REQUEST FOR GOVERNMENT RESPONSE

Pursuant to Standing Order 109, the Committee requests that the government table a comprehensive response to this Report.

A copy of the relevant *Minutes of Proceedings* ([Meetings Nos. 139, 140, 142, 148 and 150](#)) is tabled.

Respectfully submitted,

Ken McDonald  
Chair

