

Commentary

The Newfoundland Fishery and Economy Twenty Years after the Northern Cod Moratorium

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Introduction

On July 2, 1992, Newfoundlanders received a terrible shock. The federal Minister of Fisheries and Oceans, Newfoundland's own John C. Crosbie, banned the commercial directed fishing of the northern cod stock, historically one of the great fisheries of the world. According to the initial estimates, which proved conservative, 9,000 fishermen and 10,000 plant workers would be displaced and eligible for emergency assistance payments of \$225 per week.¹

Nobody who saw the Minister's press conference will ever forget the vision of angry fishermen trying to enter the room while the police hustled Crosbie down a back staircase. The fishermen were angry at losing their livelihood while being offered a derisory replacement income.

Crosbie reported that since 1990, the spawning stock biomass had fallen by three-quarters "due primarily to ecological factors" and a two-year moratorium would be sufficient for the stock to recover to its long-term average.²

More than 20 years have passed since that fateful day. The northern cod stock did not recover in two years, nor has it recovered in twenty. As might be expected, during the 20 years since the moratorium was first declared, there have been dramatic changes in

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¹ "Fishermen, Plant Workers Eligible for Payments," *Fisheries and Oceans News Release NR-HQ-92-059*, July 2, 1992.

² "Crosbie Announces First Steps in Northern Cod (2J3KL) Recovery Plan," *Fisheries and Oceans News Release NR-HQ-92-058E*, July 2, 1992.

the Newfoundland fishery. There have also been significant changes in the population of Newfoundland, as well as in the Newfoundland economy.

In addition to its obvious importance to Newfoundlanders who saw their lives and communities upended by the moratorium, the importance to fishery scientists and managers of the commercial (and near biological) extinction of the northern cod stock is reflected in the enormous literature on the subject that has appeared in the past 20 years, and which continues to appear.

Schrank (2005) described the changes in the fishery that occurred in the first 10 years of the moratorium. Herein, we investigate events in the subsequent 10 years: what subsequent changes have occurred in harvests and species; what regulatory changes have been made to increase the efficiency of the commercial fishery; what conclusions have been drawn by scientists concerning the cause of the northern cod collapse; what are the prospects for the future of the Newfoundland fisheries; and what demographic changes have occurred in the province?

Superimposed on the decline of groundfish and the rise of shellfish as the basis of the Newfoundland fishery are dramatic exogenous factors; the development of an oil industry and the huge expansion of mining. How did the provincial government react to this cornucopia of riches? How did the provincial government respond to a sudden downturn in oil and mineral production?

The case of the northern cod is one of the rare examples of the near complete decimation of a major commercial demersal species. When such a relatively long-lived species enters a serious decline, there should be time for fishery managers to adjust their actions to compensate. This, however, requires an understanding of what is causing the stock collapse. We start by asking what consensus, if any, scientists have reached concerning the cause, or causes, of the northern cod collapse.

The Northern Cod—Then and Now

The idea that the problem would be solved within two years was soon scrapped. In June 1993, the Canadian Department of Fisheries and Oceans (DFO) reported that the stock had continued to decline in 1992 and that recovery was now anticipated by the end of the 1990s, if even then. Focus was still on ecological conditions: predation by harp seals, competition with seals for prey, scarcity of the forage fish capelin, migration of cod out of the area, ice conditions, and other effects of cold water, including low salinity. Note was also made of the fact that the stock of other species, including grenadier, American plaice, turbot, and capelin, subject to little fishing pressure, had also experienced sharp declines in recent years.³ It is highly unlikely that overfishing could have caused these declines.

Twenty years later, is there a consensus on what caused the collapse of the northern cod stock? We have seen that the blame for the collapse was initially placed on environmental causes. But even at the start, the idea of overfishing could not be avoided. Even Crosbie was quoted as saying to a crowd of fishermen angered at the forthcoming announcement, "I didn't take the fish from the God damned water, so don't go abusing me."⁴

³ "Northern Cod Continued to Decline in 1992," *Fisheries and Oceans News Release NR-NF-93-74E*, June 18, 1993.

⁴ On June 30th, the Canadian Broadcasting Corporation (CBC) reported that an announcement declaring a moratorium on the fishing of northern cod was imminent. The following day, Crosbie was to celebrate Canada Day in the fishing community of Bay Bulls, near the provincial capital of St. John's. The man walked into an ambush. The people of Bay Bulls were interested only in the details of the coming announcement. Crosbie said there would be an announcement the next day. That only enraged the crowd. In response to cries that "it isn't our fault," Crosbie, in anger, made the statement quoted here. The video and soundtrack are available from CBC Digital Archives, July 1, 1992, "Newfoundlanders Protest Cod Moratorium" <<http://www.cbc.ca/archives/categories/economy-business/natural-resources/fished-out-the-rise-and-fall-of-the-cod-fishery/cod-moratorium-protested.html>>. Accessed August 18, 2013.

Notwithstanding the Minister's remarks, however, overfishing as an explanation for the crash would clearly have laid the primary blame for the disaster at the feet of DFO, the agency responsible for regulating the industry (and those whose job it was to take fish from the water). Citing suddenly arising ecological factors as the likely cause enabled the department to deftly remove itself from that responsibility.

The question of the role of overfishing could not be avoided. DFO's stock status report for northern cod issued in July 1993 implicitly ascribed ecological as well as overfishing as causes of the collapse. The report discusses the mortality of the fish, noting that more than 60% of the fish were dying each year. Under the usual scientific assumption that the natural component of mortality was constant, fishing mortality would have to be very high. But at the moment, and for the previous year, fishing mortality was kept low by the moratorium (DFO 1993). Natural mortality must have been high, but how high, and why, was unknown then and still remains largely unknown.

A reaction to the ecological explanation was not long in coming. Hutchings and Myers (1994) (the latter a former DFO scientist) argued forcefully that the collapse could only have been caused by overfishing. Part of their argument was that water temperatures in the 1800s were colder at times than those experienced in the late 1980s and early 1990s, yet no collapse occurred. Hutchings and Myers noted that as a result of excessive historical fishing experience, the age structure had collapsed (fewer reproductive age classes and fewer numbers of fish in each age class). They claimed that "a lack of evidence for environmentally related influences on cod survival *lend overwhelming support to the hypothesis that human overexploitation precipitated the commercial extinction of northern cod*" (our emphasis) (Hutchings and Myers 1994, p. 2137).

A further twist on the overfishing theme is featured in Walters and Maguire (1996). These fisheries scientists are critical of the state of the art of fisheries biology, in particular stock assessment. They accept that the scientists overestimated the northern cod stock size from the time of the extension of Canadian fisheries jurisdiction in 1977, and that this overestimation led to fishery managers setting excessive total allowable catches. Of fundamental importance was the assumption that the measure of the productivity of fishing effort, catch per unit effort, is strictly proportional to stock size. That this assumption is seriously in error had been recognized even before the stock collapse (Alverson *et al.* 1987). Alverson recognized that fishing mortality had been consistently underestimated and, therefore, that stock size was overestimated, leading to excessively high total allowable catches being set by fishery managers. Walters and Maguire (1996) note that even Alverson's highest estimate of fishing mortality was still too low. They warn that it was unlikely that real progress in improving stock assessments would be made in the near future. The same statement can be made now, nearly 20 years later.

In his review of the role of climate variability in the decline of northern cod, Drinkwater (2002), a DFO scientist, essentially reconciled the two positions. With respect to Hutchings and Myers, Drinkwater notes their point that water temperatures at various times in the past had been lower than at the time of the collapse, but seeing this as evidence that precludes an environmental explanation of the stock collapse is too simplistic a view. The lower temperatures were now experienced for a longer time, and, probably as a result, the indirect effects of cold water; *e.g.*, "cod growth, condition, reproduction, distribution and recruitment...in combination with overfishing" increased mortality and led to the collapse. In the 1800s, greater diversity in the cod population (a wider range of year classes) could have buffered poor cod recruitment in certain years. As with natural mortality, *M*, little is known of the cause of poor recruitment in any specific case. Simple pairwise correlations are inadequate as evidence that environmental conditions played no role in the collapse of northern cod. Drinkwater also points out that, despite repeated attempts to explain what determines recruitment of northern cod to the fishery, no robust

dominant factor has been found.⁵ He concludes that overfishing was the primary cause of the stock collapse but that the decline of the northern cod stock was also affected by environmental conditions.

At a conference of the *International Council for the Exploration of the Sea (ICES)*, Caddy (2003) reported on a study of the recovery of depleted fish stocks. With respect to Canadian cod stocks, he notes that initial measures to reduce fishing pressure were too little and too late. Caddy allows some influence on environmental factors, saying that even when environmental factors are favorable, cod are sufficiently slow growing that recovery could take a long time. Finally, Caddy refers to the potential importance of having a good age structure with plenty of older and larger fish. He assumes there will be a recovery but that it could take a long time.

Halliday and Pinhorn (2009), senior DFO scientists, implicitly believe that Drinkwater does not go far enough, since he still assigns to overfishing the predominant role in the collapse. They argue that the environmental effects are driven by the North Atlantic Oscillation (NAO). Positive anomalies in the northern cod area are associated with cold water and the biological characteristics of the fish that vary with water temperature. They see that the collapse of northern cod, as well as the decline of other groundfish species simultaneously, is most “coherently” explained by a large-scale ecosystem change that occurred in the early 1990s. The excessive fishing hypothesis is firmly rejected despite their recognition that the influence of fishing is difficult to judge because of a lack of knowledge of historical mortality rates.

In a comprehensive review of factors affecting the Barents Sea and northern cod stocks, Lilly, Nakken, and Bratney (2013) conclude that it is very difficult to attribute the roles of anthropogenic and environmental effects to assess the different dynamics of the two stocks in the late 1980s and early 1990s (the period of the northern cod collapse) and thereafter. Anthropogenic effects (at least in the form of the reactions of fisheries managers to the perceived realities of the cod stocks—and those perceptions may have been wrong because of scientific error in stock assessment) played a role. Environmental effects, primarily the NAO (which may determine the extent to which the stock can withstand fishing pressure), also played a role. But the authors avoid weighting the relative effects.

Twenty years after the moratorium, there still appears to be no consensus as to the cause of the northern cod collapse. However, it does seem to be the case that, once again, greater emphasis is being placed on environmental factors.

What about the chances of recovery? Is there a consensus here? In a recent paper in *Science*, Hutchings and colleagues reported on a study of 153 depleted marine fish and invertebrate stocks from around the world (Neubauer *et al.* 2013). They concluded that the “interplay” between length of time the stock has been overfished, together with the extent of overfishing, work with other factors to determine the resilience to stock recovery. If action to stop overfishing is not taken immediately to protect decimated fish stocks, and in Newfoundland the reaction was slow until the collapse was complete, the stocks may never recover. Their emphasis is strictly on overfishing effects; environmental factors play no role in their analysis. This is consistent with the argument made by Hutchings and Myers in 1994. Their goal in recovery is to reach a biological level that would permit fishing at maximum sustainable yield (MSY). While this goal may be accepted internationally, and achieving a biomass consistent with MSY may be desirable, fishing at that level is a self-defeating goal. At least three of the papers briefly discussed above mention the lack of a wide range of year classes eligible for the fishery as possible factors in the collapse.⁶ The effects of MSY in limiting the age structure of a fish population was a critical factor in Larkin’s (1977) classic condemnation of MSY as a criteria for fishery managers.

⁵ Walters and Maguire appear to disagree, stating that “...northern cod is one of the very few examples of species where there appears to be a clear stock-recruitment relationship” (Walters and Maguire 1996, p. 130).

⁶ Hutchings and Myers (1994); Drinkwater (2002); Caddy (2003).

During 2003–2005, the northern cod stock hit rock bottom. In 2009, DFO introduced a conservative biomass limit reference point (LRP) that marked the biomass below which a stock had a “high probability that its productivity will be so impaired that serious harm will ensue” (DFO 2009). A stock below its LRP is in trouble. Retrospectively, the northern cod stock size in 2005 was estimated to be only 1% of the LRP. The usual annual inshore/offshore northern cod migration had virtually disappeared. The overwhelming proportion of what little cod remained were year-round residents of the inshore, a situation virtually unheard of before the stock collapse. From the perspective of 2012, the situation has improved. The population has increased to 15% of LRP. Inshore/offshore migration has resumed, and very few northern cod are overwintering inshore. The previous patterns have been restored (DFO 2013b).

Yet before one becomes too enthusiastic, note that at 15% of the LRP, the stock is still in serious trouble. Although fishing mortality is judged to be low, the sum of fishing and natural mortality is sufficiently high that, combined with the low level of recruitment, the spawning stock biomass will not be increasing in the near future. In addition, a recreational, or food fishery, is permitted but the recreational catch is unknown, a situation worsened by evidence of considerable discarding of small cod in the recreational fishery. A further potential negative factor concerns the cod’s primary prey: capelin and shrimp. Capelin stocks have been low but show some signs of improving, while shrimp stocks are declining (DFO 2013b). One may be mildly optimistic about the future state of the northern cod fishery from this assessment, but only very mildly.

Just in time for the twentieth anniversary of Crosbie’s announcement, Dr. George Rose was quoted in the *Globe and Mail* as saying that recent research indicates that cod are living longer and getting bigger, largely the result of favorable (warming) water conditions. He hedges his statement by noting that his results are preliminary and seem to relate only to certain areas. Nonetheless, his optimism is obvious.⁷ Lilly, Nakken, and Brattey (2013, p. 15) are also moderately optimistic but remain uncertain of the prospects for recovery. So much for a consensus.

Prospects for the Future of the Newfoundland Fishery

What are the prospects for the future? We have already seen that prospects for the northern cod stock are uncertain. Since the cod collapse, Newfoundland’s fishery has been dominated by snow crab and northern shrimp. How are they doing?

While projections for snow crab vary by fishing area, the overall perspective is that, while catches have remained high, productivity (CPUE) has been declining, exploitable biomass has been falling since 2009, recruitment has started to fall, and long-term prospects for recruitment are not favorable because of a continuing warming trend. The assessment’s “Conclusions and Advice” suggest that catches should be reduced (DFO 2012). The future is uncertain. Note the combination of ecological and fishing factors.

Short-term prospects appear to be better for northern shrimp. In the northern area, off the north and central Labrador coasts, the stock appears to be healthy and harvested at a safe level. The situation is different in the southern region of the shrimp fishery, NAFO Division 3K, where catches peaked in 2006 but fell by about 60% through 2010 while total mortality increased from 23% to 41% during the 2004 to 2010 period (DFO 2011). Prospects for the fishery are uncertain, at best.

⁷ Macdonald, Michael, “Cod Making a Comeback in Newfoundland, Research Shows,” *The Globe and Mail*, July 2, 2012 <<http://www.theglobeandmail.com/news/national/cod-making-a-comeback-in-newfoundland-research-shows/article-4385506>> (accessed May 25, 2013).

The Newfoundland Fishery—Then and Now

Harvesting

Led by cod, Newfoundland's groundfish catches, in both value and volume terms, fell dramatically between 1990 and 2002. Cod and flatfish catches continued to fall, by more than half, between 2002 and 2011.

The catch of capelin fell by nearly 90% during the first decade of the moratorium, but the 2011 catch was more than double that of 2002 (DFO 2013a). The rise in capelin catch suggests a recovery in the stock of this species, which, in turn, suggests that cod, for which capelin is traditionally a major prey species, may be set to improve. This requires an optimistic view of capelin prospects.

The changes from 2002 to 2011 are anything but dramatic. From a landings perspective, there was little change during the second decade of the moratorium. The value of the fishery is now much greater than it was before the moratorium. While shellfish harvesting and processing is considerably less labor intensive than groundfish, the displaced labor has at least partially made its adjustments. One may wonder what, if not sentimentality, is behind efforts to restore the northern cod fishery. However, if shellfish are sensitive to water temperature, as they seem to be, and the warming trend continues, Newfoundland's shrimp and crab industries might shrink or disappear. A recovered cod fishery might then be the salvation of the Newfoundland's fishing industry.

The Number of Fishermen

Following the moratorium, and effective in the mid-1990s, the Canadian government took two major steps to limit entry and reduce capacity in the inshore and nearshore fisheries.

First, the federal government (which has constitutional responsibility for fisheries management) ceased registering fishermen and abandoned the concepts of full-time and part-time fishermen. In its stead, the federal government agreed to accept registrations by a new body formed by Newfoundland provincial legislation: the Professional Fish Harvesters Certification Board (PFHCB). The PFHCB set three levels of fishermen: Apprentice Fish Harvester, Professional Fish Harvester—Level I, and Professional Fish Harvester—Level II. To enter the fishery as a crew member, one must qualify as an Apprentice Fish Harvester. To obtain this designation, the applicant must be sponsored by the head of a core enterprise (the concept of a core enterprise will be discussed below). Level II, the highest level, requires several years as a full-time fisherman plus land-based courses (PFHCB, nd). At the time the Board was established, active fishermen were grandfathered into one of the professional levels depending on their history in the fishery.

Between 1997 and 2003, the total number of certified fishermen fell from 14,500 to 12,430, largely due to approximately 2,000 Level II fishermen accepting federal buyout payments and leaving the fishery.⁸ The number declined to 10,371 in 2012.⁹ This figure is a 28% reduction from 1997.

⁸ Sources of information concerning the PFHCB: Schrank and Skoda (2003, p. 98) which also cites original sources; Schrank (2005); and PFHCB FAQs: <<http://www.pfhcb.com/faqs/#1>> (accessed May 10, 2013).

⁹ Personal communication, Oct. 30, 2013. This is a preliminary figure as of Oct. 29, 2013; a small number of harvesters are late registering for 2012.

Core Enterprises

The second major change, instituted in 1996, was even more important for limiting the size of the inshore fishery: the core enterprise system. As noted above, the core enterprise is the 'gatekeeper' to the harvesting sector; it is impossible to enter the industry without first obtaining employment with a core enterprise. To obtain a core license, an individual must be the head of an enterprise, have Level II PFHCB certification, hold "key" species licenses (in Newfoundland these include groundfish, snow crab, northern shrimp, lobster, etc.), and be committed to and dependent on the fishery. Of critical importance for policy, the core license holder must be the skipper of his vessel; he or she cannot sublet this role. While the enterprise may own more than one vessel >35', only one can be fishing at a time.

The critical aspect of the core enterprise system is that in 1996, 5,450 core licenses were issued, and DFO made the commitment that no more would ever be issued. To date, this promise has been honored. By 2000, DFO had reached its goal of 4,500 outstanding core licenses, the reduction occurring largely through government buybacks, the last round to that date averaging \$101,000 per license (Schrank and Skoda 2003, pp. 98–99). In 2003, there were 4,058 core enterprises. By 2010, this figure had fallen to 3,806.¹⁰

Since new core licenses will not be issued, the only way for a fisherman to obtain a core license is to buy an existing core enterprise. Partial sales are forbidden; sale of an enterprise involves the vessels, core license, and species licenses attached to the enterprise (technically, the licenses are reissued by DFO, since they are not actually owned by the enterprise). The original owner is then out of the fishery.

When the core system was established, there were a number of people grandfathered into it who would not have qualified for a core license. These people cannot sell their enterprises or their attached licenses and cannot pass them down within their family. When a non-core fisherman leaves the industry, the enterprise simply closes. The 12,251 non-core enterprises in existence in 1996 when the core system was established fell to 960 by 2003 and to 830 in 2010.¹¹

The Newfoundland fishery has traditionally been characterized by overcapacity. During periods of optimism, such as when Canada expanded its fisheries jurisdiction to 200 nautical miles in 1977, the fishery managers found it impossible to control the increasing number of people entering the fishery. The political pressure for expansion was just too great. Times have changed. The northern cod moratorium forced many from the industry. The ideas that sons would follow their fathers into the fishery or that daughters or sons could always find work in fish plants are long gone. These opportunities have not existed for a generation. Similarly, Newfoundlanders are, in general, better educated than their forebears, largely because the old opportunities for labor do not exist. In addition, as fishing and fish plant opportunities have disappeared from the outports, there has been a gradual depopulating of rural Newfoundland.

Introducing the core enterprise system was intended to ensure that the efficiency gains that have resulted from the shrinkage of the fishery as a source of employment would be maintained and extended. First, there was the commitment that no more core licenses would be issued. Such a promise in 1977 could not have been sustained in the face of political pressure. Were optimism to return to the fishery, the government should be able to resist pressures to expand; too much has happened. The old psychology is gone. Second, the non-core enterprises have been liquidated without too much fuss. Third, there are mechanisms for reducing the number of core enterprises. Initially, this was done through government financed buyout programs. In the case of lobster fishermen, there is such a program underway now. The government has also developed self-financing

¹⁰ Source: "Number of License Holders by Category by Province and Region" <<http://www.dfo-mpo.gc.ca/stats/commercial/licences/fishers-pecheurs/fpXX-eng.htm>>, where XX is the two-digit designation indicating the year (accessed May 11, 2013).

¹¹ Same source as the previous footnote.

schemes to reduce the number of core enterprises. These topics are discussed below. In effect, the core enterprise system is a relatively painless way to improve efficiency in the inshore and nearshore fisheries.

Combining Core Enterprises

The introduction of the enterprise-combining policy in 2008 provided a means of permanently reducing the size of the fishing fleet without DFO financial intervention. This “self-rationalization” policy permits an independent core enterprise to purchase one other independent core enterprise, while permanently retiring one vessel registration and one independent core enterprise (DFO 2008). Thus, the surviving core operator can, in general, double his or her quotas or harvesting levels of predominant (key) species. This option led to the obliteration of nearly 280 core enterprises.¹² The combining of enterprises may be interpreted as further evidence of overcapacity in the fishery.

Independent Core

The core enterprise has value and fishermen need financing to make the purchase. Historically, at least since the financial collapse of the industry in the early 1980s, banks have been loath to finance fishing operations. An unforeseen result of the concatenation of saleable licenses and the general absence of bank financing was that fish processors financed the inshore and nearshore fishermen’s purchases of core enterprises. Trust agreements were drawn up that restricted the operations of the core enterprise (DFO 2003). For instance, the agreement could give the processor first right of refusal to purchase the catch of the core enterprise. The fisherman would be entering a long-term indebtedness agreement while losing some control of his enterprise. This was an unsatisfactory situation reminiscent of that which existed into the late 1960s when it was changed under pressure from a new and ultimately powerful fishermen’s union.

In 2007, the government announced a new “Policy for Preserving the Independence of the Inshore Fleet in Canada’s Atlantic Fisheries (PIIFCAF)”, effective April 12, 2007 (DFO 2007). Essentially, this policy allowed a transition period during which the trust agreements had to be abandoned. By 2010, 3,648 of the 3,806 core enterprises fell into the new category of “independent core;” *i.e.*, independent of processor financing.¹³

Fishery Licenses as Collateral

This left the method of financing license purchases outstanding. Banks could make loans to fishing enterprises with licenses as collateral. But, since the licenses are formally owned by DFO, it was unclear whether the licenses constituted property that could be sold by a third party (*e.g.*, a bank). In 2008, the Supreme Court of Canada ruled, in the *Saulnier* decision, that since fishing licenses gave the holder both the ability to fish and the rights to the proceeds of the sale of the fish, the licenses could be used as collateral with the holder of the collateral having the right to sell the licenses on the open market

¹² 279 enterprises left the fishery through the combining of 165 inshore and 114 nearshore enterprises (Clift 2011, p. 19).

¹³ Source: “Number of License Holders by Category by Province and Region” <<http://www.dfo-mpo.gc.ca/stats/commercial/licences/fishers-pecheurs/fpXX-eng.htm>>, where XX is the two digit designation indicating the year (accessed May 11, 2013).

in the event of the debtor's default.¹⁴ To further encourage bank financing, the provincial government broadened its Fisheries Loan Guarantee Program in 2012 to permit, for example, loans of up to \$3,000,000 "to accommodate combining of enterprises and fishing license/quota acquisitions." The Fisheries Loan Guarantee Program was now able to refinance, through banks, loans originally made by fish processors to fish harvesters.¹⁵

Buyouts

The only buyout program now in place involves lobster licenses. For 2010, the latest year for which consistent data have been published, the value of lobster harvested in Newfoundland was \$18.9M.¹⁶ The number of lobster licenses was 2,866. Assuming that each license represents fishing activity (not merely latent effort), the average harvested value per license was therefore \$6,577.¹⁷ The low value per license for lobster suggests that an excessive number of licenses have been issued given the value of the catch. It is therefore not surprising that there was agreement among the federal and provincial governments and the fishermen's union that something had to be done. The federal and provincial governments would each pay about \$8M to fund the buyout, which works as a reverse auction. If a fisherman opts to accept the buyout for an early retirement, and his bid is accepted, he or she must surrender all the licenses held and thus there will be one less core or non-core enterprise in the Newfoundland fishery. The "retired" lobster fisherman can still crew on a fishing vessel and, after one year, he can buy out another core fisherman.¹⁸ So, unlike previous buyouts, the bought out fisherman can remain in the fishery, but in a way that does not increase the number of licenses or core enterprises. By March 2013, there had been seven "rounds" in the reverse auction. In the seventh round, 140 offers to sell were received, of which 32 were accepted. The number of bids accepted in all seven rounds was 225.¹⁹

Fishermen's Income

Earnings from the inshore fleet remain very low, about \$10,000 in fishing earnings per inshore crew member per year. This figure approximately doubles when employment insurance is added. Without employment insurance, the inshore fishery would be very small. The nearshore crew member does better; with shrimp or crab the main species, the earned fishing income is \$30,000 per year or more, to which employment insurance can be added.

¹⁴ "Saulnier v. Royal Bank of Canada, 2008 SCC 58," *Judgments of the Supreme Court of Canada, October 24, 2008* <<http://scc.lexum.org/decisia-scc-csc/scc-csc/scc-csc/en/item/6231/index.do>> (accessed May 12, 2013).

¹⁵ "Minister Announces Improvements to Fisheries Loan Guarantee Program," *The Telegram*, May 18, 2012.

¹⁶ Except for a trivial catch by nearshore vessels, the Newfoundland lobster fishery is entirely a small boat inshore fishery. While it is true that inshore vessels are cheaper to buy and run, an average gross revenue per license of \$6,577, even when employment insurance is added on, yields very low incomes to both skipper and one person crew.

¹⁷ Source: Licenses <<http://www.dfo-mpo.gc.ca/stats/commercial/licences-permis/species-especes/se10-eng.htm>>. Landings <<http://www.dfo-mpo.gc.ca/stats/commercial/land-debarq/sea-maritimes/s2010pv-eng.htm>>.

¹⁸ Personal communication with F. Phelan, Senior Policy and Economic Analyst, DFO St. John's, May 23, 2013.

¹⁹ "Lobster Sustainability Board Announces Round Seven Results," *Fish, Food and Allied Workers News and Events*, March 22, 2013.

Number of Vessels

The size of the inshore fleet has continued to fall, from 15,360 vessels in 1990 to 6,780 in 2010. There have been no major changes in the other fleets from 2002 to 2010, although we note that the number of offshore vessels has fallen from 75 in 1990 to 23 in 2010.²⁰

Catch of Major Species by Vessel Class

Major species caught by the <35' fleet are cod (\$8M), lobster (\$19M), and snow crab (\$31M). Major species caught by the nearshore fleet are northern shrimp (\$59M) and snow crab (\$121M). The large offshore vessels' major species are Stimpsons surf clams (\$35M) and northern shrimp (\$120M).²¹ Except for the smallest vessels, Atlantic cod is no longer an important species.

Processing

In 1990, there were 221 active fish plants in Newfoundland. By 2002, this figure had declined to 122 (Schrack 2005, p. 415). The number of fish processing plants has continued to fall. Only 83 primary production plants operated in 2012. Correspondingly, the number of fish processing workers has also declined, from 25,160 in 1990 to 14,770 in 2002, and down further to 9,214 in 2012 (DFA 2013).

As a result of a financial crisis affecting the industry in 1982, the federal and provincial governments consolidated the various companies with offshore operations into Fishery Products International, Ltd. (FPI). This company then was privatized through a stock sale in April 1987 (Schrack *et al.* 1995, pp. 364–366). For the next 20 years, FPI dominated Newfoundland's fish processing, trawler operations, and marketing. Following a battle for company control in 2001, the new directors promised expanded operations in Newfoundland, no layoffs, “and a change in operational philosophy that would ‘unlock the value.’” In fact, there were additional permanent plant closures; reduced profitability; and poor relationships with employees, communities, and the provincial government. Finally, in 2007 FPI was broken into two parts: the marketing and secondary processing functions of FPI went to Nova Scotia's High Liner Foods, Inc.;²² the primary production plants went to a Newfoundland company, Ocean Choice International, Inc. (OCI). Both companies made promises of employment and production to the Government of Newfoundland and Labrador since provincial law, the Fishery Products International Limited Act, had to be repealed to permit the breakup of the company. The commitments would last for five years, ending in 2011.

Of considerable importance was the Burin plant of FPI, the only major secondary processing plant in the province. The production of secondary fish products in Newfoundland grew from a little over 4,000 mt in 1997 to nearly 15,000 mt in 2002. Burin was a

²⁰ Source: “Number of Vessels by Length (in feet) By Province and Region”

<<http://www.dfo-mpo.gc.ca/stats/commercial/licences-permis/vess-embarq.veXX-eng.htm>>, where XX is the year (accessed May 15, 2013).

²¹ Sources:

<http://www.nfl.dfo-mpo.gc.ca/publications/reports_rapports/Land_Inshore_Debarquer_cotiere_2010_eng.htm>; <http://www.nfl.dfo-mpo.gc.ca/publications/reports_rapports/Land_Nearshore_Debarquer_Pres_De_La_Cote_2010_eng.htm>; <http://www.nfl.dfo-mpo.gc.ca/publications/reports_rapports/Land_Midshore_Debarquer_Semi_Hauturiere_2010_eng.htm>.

<http://www.nfl.dfo-mpo.gc.ca/publications/reports_rapports/Land_Offshore_Debarquer_Hauturiere_2010_eng.htm>.

²² High Liner is the former National Sea Products Ltd., whose name was changed in 1999.

major player in this post-moratorium expansion. High Liner agreed to keep the plant running for at least five years at a high production level.²³

With the expiration of the agreements in 2011, High Liner ceased production at the Burin plant in 2012 and permanently closed it in 2013. Similarly, OCI ceased production at its Port Union and Marystown plants in 2011, permanently closing them in 2012. Between 2009 and 2013, OCI closed five fish plants.

In one sense these closures are a betrayal of Newfoundland. They usually represent the only major employer in a small rural community. FPI was established to maintain rural employment, as long as it was commercially viable. The demise of FPI was a sign that the end was near for many of the communities.

But in another sense, these closures were long overdue. Newfoundland's fishing industry, both harvesting and processing sectors, were, in modern times, always characterized by excess capacity.

In a recent study based on data from 2006–2008, the conclusion was drawn that the Newfoundland seafood processing sector achieved “some” profitability in shrimp, crab, and pelagics but suffered losses in groundfish, with the level of profitability unacceptably below the average for Canadian fish processors. Further, even very small negative changes in raw material price, market price, and exchange rate shifts, particularly in the key shrimp and crab sectors, will have excessive impact on company revenues, yielding financial results that are highly variable from year to year (Clift 2011, p. 35).

The Newfoundland Economy—Then and Now

Unemployment Rate

As a metric for the economic state of the province and its parts, perhaps we cannot do better than view the unemployment rate. Historically, the provincial rate approached twice the Canadian national rate. The average unemployment rate for Newfoundland for the seven years from 1990 to 1996 was 18.9%. Since oil came on stream in 1997, the Newfoundland unemployment rate has trended downward. In 2012, the annual rates for Canada and Newfoundland were 7.2 and 12.5%, respectively. Newfoundland's rate is still the highest of all the provinces, but a rate this low has not been seen in Newfoundland since 1973.²⁴ The rate for the St. John's metropolitan area is 7.2%, the same as the Canadian rate. In previous years, this would have been unheard of. In comparison, the rate for the Burin Peninsula, before the moratorium one of the most economically developed of Newfoundland's rural areas, was 18.8% in 2012. The increased economic activity is concentrated in St. John's and the adjacent Avalon Peninsula.

Population

The fall in the population of Newfoundland in the decade following the northern cod moratorium was drastic, from 568,474 in census year 1991 to 512,930 in census year 2001, a drop of 9.8%. The population continued falling, until in census year 2006 the

²³ “Government Announces Approval in Principle for Sale of FPI Assets,” *News Release of the Government of Newfoundland and Labrador*; May 28, 2007 and “Binding Agreements Finalized for Sale of FPI Assets,” *News Release of the Government of Newfoundland and Labrador*; December 20, 2007.

²⁴ Sources: NSA 1994 and Statistics Canada Labour Force Survey via the Newfoundland and Labrador Statistics Agency web site: <www.stats.gov.nl.ca/statistics/Labour/PDF/UnempRate.pdf>.

population was only 505,470, a decline of 11% in 15 years. The improved economy led to an upward swing of nearly 2%, to 514,535 in census year 2011.²⁵

Oil

By 1971, the fishery had already taken a subordinate role in the overall Newfoundland economy. Fishing and trapping and the manufacture of fish products accounted for less than 5% of GDP. In 2002, the sum of “fishing, hunting, and trapping” plus “seafood preparation and packaging” was 3.4% (Schrank 2005, p. 417). By 2011, this figure accounted for only 1.7% of Newfoundland’s GDP of \$C33.6B.²⁶ While Newfoundland’s offshore oil wells started producing only in 1997, by 2002 oil production was already substantial, accounting for 12.4% of Newfoundland’s GDP. By 2011, four fields produced 97M barrels valued at \$10.4B. In 2012, oil production fell by more than one-quarter to 72M barrels valued at \$8.1B, the drop being attributed to “extended maintenance shutdowns and, to a lesser extent, natural production declines.”²⁷ Production is expected to return to previous levels in 2013.

Mining

In 2002, mineral production was dominated by iron ore shipments from Labrador. That year, iron ore shipments totaled \$729M, or 6% of GDP. The Voisey’s Bay nickel mine came on stream in 2005 and grew almost continuously until 2011 when Voisey’s Bay shipped \$1,261M of nickel and \$509M of copper. Iron ore shipments had also grown to \$2,560M in 2011.²⁸ Total mineral shipments in 2011 (mainly nickel, copper, and iron) were \$4,539M, falling to \$3,833M in 2012.²⁹

Gross Domestic Product (GDP)

In 2011, oil extraction and support activities accounted for 32.7% of the GDP of Newfoundland and Labrador, while mining accounted for an additional 10.4%. When resource extraction accounts for more than 43% of an economy, a hiccup in this sector has exaggerated effects on the overall economy. The net effect of the 2012 reduction in the oil and mining sectors was a reduction of 4.8% in the real GDP of Newfoundland. Except for a slight reduction in the real GDP of New Brunswick, Newfoundland was the only Canadian province to suffer a loss in overall output in 2012.³⁰

Not surprisingly, an economic base analysis using 1961–1994 data showed fisheries as a base industry, influential beyond its size (Roy, Arnason, and Schrank 2009). Rerunning the analysis with 1981–2010 data showed the fishery displaced by oil (Roy 2012).

²⁵ Source: <http://www.stats.gov.nl.ca/statistics/Census2011/PDF/HOU_OPD%20Char_CanNL_1971-2011.pdf> (accessed August 14, 2013).

²⁶ *The Economic Review 2012* (Department of Finance, Government of Newfoundland and Labrador), p. 52.

²⁷ Source: Canada-Newfoundland and Labrador Offshore Petroleum Board web site.

²⁸ The increase in iron ore production was probably a reaction to an enormous increase in price. Between July 2003 and July 2011 the price in \$US per dry metric ton rose from \$13.82 to \$172.98.

Source: <<http://www.indexmundi.com/commodities/?commodity=iron-ore&months=180>>.

²⁹ Source: <http://www.geoserv.gov.nl.ca/minesen/mineral_shipments/>.

³⁰ Sources: “Gross domestic product by industry, millions of chained (2007) dollars,” April 26, 2013 <<http://www.statcan.gc.ca/daily-quotidien/130426/t130426a001-eng.htm>>.

“Gross domestic product by industry: Provinces and territories, 2012,” April 26, 2013 <<http://www.statcan.gc.ca/daily-quotidien/130426/dq130426a-eng.htm>> (both accessed May 22, 2013).

Equalization

For more than fifty years Canada has had an “equalization” program under which federal funds are routed to “have not” provinces to bring their government revenues to a level where the receiving provincial government can supply a basic level of services. Historically, Newfoundland has been the archetypical “have not” province. However, the combined effects of higher Newfoundland government revenues (from oil and mining royalties and other sources) and the effects of the economic recession that started in 2007 on the tax receipts of former “have” provinces, rendered Newfoundland for the first time a “have” province, one of only three such provinces. The others, Alberta and Saskatchewan, are also oil producers.

The sum of equalization payments plus royalties from mining in 1997–1998 was a little more than \$1B. As production from offshore oil, Voisey’s Bay, and Labrador’s iron ore increased, equalization payments declined until they were discontinued in 2007–2008. Royalties continued to trend upward, exceeding \$3B in 2011–2012 but falling in 2012–2013 to the still substantial level of \$2.3B.

The Government’s Reaction to Increased Revenue

It appears that the provincial government’s approach to its increased revenues was to spend a good deal of the additional money while using the balance to pay down debt and reduce taxes. The province neither set up a contingency (“Heritage”) fund nor did it employ any policy to cushion the Newfoundland economy against an economic downturn. Possibly the government thought it could not happen. After all, while the rest of the world was suffering under the Great Recession and its aftereffects, the province of Newfoundland was experiencing a resource-driven economic boom like it had never seen before.

Government activity expanded in the face of increased royalty income, which in both the bumper year of 2011–2012 and the “depressed” year 2012–2013 amounted to 35% of government revenues. Some of the surplus money appears to have been allocated to pay off part of the government’s debt, which fell by nearly 25% from its peak year of 2007–2008 to 2012–2013.³¹ As well, the government lowered personal and corporate income tax rates, which had previously been among the highest in the country, to levels that were comparable to those prevailing in most other provinces. As further evidence of the expansion of government activity, government employment increased during the six years from 2005–2006 to 2011–2012 by 40%, to 12,726.³²

But then it happened. The provincial budget of 2012 showed no sign of potential problems. The 2013 budget claimed disaster was here.

Oil production in 2012 fell by 25%. The value of mining shipments fell as well. The effect was serious. As was noted earlier, the real Newfoundland GDP fell by a very substantial 4.8%, and there is every reason to believe that the downturn is indeed tem-

³¹ Source: *Newfoundland and Labrador Estimates 2012, Appendix 3*, “Newfoundland and Labrador Public Sector Debt, 2008 to 2012” <<http://www.budget.gov.nl.ca/budget2012/estimates/estimates2012.pdf>> (accessed August 15, 2013). This debt includes provincial direct debt and crown corporation debt, as well as student loans and certain other debt, less sinking funds held for redemption of direct and guaranteed debt.

³² CANSIM series v135232: Newfoundland and Labrador; Employment (Persons); Provincial and territorial general government; Unadjusted; March 2012. Source: Statistics Canada: “CANSIM Table 183-0002 - Public sector employment, wages and salaries, seasonally unadjusted and adjusted, monthly.” Last updated May 30, 2012 <http://dc1.chass.utoronto.ca/cgi-bin/cansimdim/c2_retrieveData.pl?seriescart=135232&lang=en&actionr eq=&a=&vectors_cart=135232&bdate=1981&edate=2012&display=timeseries&orient_tm=cols&format=plain&onegraph=0&data_quality=no> (accessed October 28, 2013).

porary.³³ The reasons given for the reduction in oil production were mainly attached to maintenance downtime. The huge Hebron oil field is expected to come on line in 2017.³⁴ The open pit Voisey's Bay mine is going underground. The Long Harbour processing plant to concentrate Voisey's Bay ore should open shortly.³⁵ There is no reason why the drop in GDP should not be reversed, even in 2013 when a substantial increase in oil production is expected.

Without a cushion, how did the provincial government react to this drop in GDP? The provincial budget for 2013 called for reductions in salary costs across the entire public service. The total reduction will be 4.7% in one year, but varying from a 21% reduction in salaries for the Department of Fisheries and Aquaculture to 2.8% for the Public Service Commission. The Finance Minister said the salary savings would be accomplished through a 5.4% reduction in the size of the "core" public service.³⁶ Others have claimed the figure is considerably larger. Regardless, the province made an error in not preparing for contingencies, and is now making an error in showing all the signs of panic. Some believe that the government is overextended and cutbacks are necessary (Locke 2011). This may be true, but there is no imminent danger and the cuts can be planned over a number of years. The mistakes need not be repeated.

Prudent fiscal planning would have involved a projection of the minimum revenue that could reasonably be expected over the medium term (say 10 years). Set current expenditures and essential capital expenditures to satisfy this constraint. Any excess revenue should be directed to three purposes: *i*) debt retirement; *ii*) an infrastructure fund; and *iii*) expansion of specialized areas of government; *e.g.*, those, like education, that build human capital.

The idea here is that the government should not commit itself to program expenditures that it cannot sustain; which is what it did.

Summary

Twenty years after the declaration of the moratorium on the commercial fishing of northern cod, the stock is no longer at its lowest point and historical migration patterns have been restored. Yet the stock remains in a terribly weakened state. Meanwhile, there is still no consensus among fishery biologists as to the cause of the stock collapse. Most would accept that both overfishing (partially encouraged by overoptimistic scientific advice) and environmental change played a role, but there is no agreement as to how much weight should be given to each factor.

Prospects for the future of the Newfoundland fishery are uncertain. Northern cod's recovery has been very slow, and ultimately it seems that a proper balance of fishing, predation, the availability of prey, and environmental conditions will be necessary for a full recovery. It is not clear that this will happen or, if so, how long it will take.

Within a very few years of the moratorium, there was a bloom of northern shrimp and snow crab, which dramatically increased the commercial value of the Newfoundland fishery while also dramatically reducing the need for fishermen, fishing vessels, fish processing facilities, and fish plant workers. It is not clear that the shrimp and crab fisheries will remain healthy as ocean water temperatures continue to rise.

³³ Statistics Canada: "Gross Domestic Product by Industry: Provinces and Territories, 2012" <<http://www.statcan.gc.ca/daily-quotidien/130426/dq130426a-eng.htm>> (accessed May 22, 2013).

³⁴ *The Economy 2013* (Department of Finance, Government of Newfoundland and Labrador), pp. 10-13.

³⁵ "Move Underground Extends Voisey's Bay Mine Life to 2035," CBC News, March 28, 2013. <www.cbc.ca/news/business/story/2013/03/28/nl-voiseys-bay-underground-mine-328.html> (accessed May 26, 2013).

³⁶ See 2013 provincial budget documents: <<http://www.fin.gov.nl.ca/fin/budget/budget.html>>.

The federal and provincial governments have taken steps to professionalize the fishery through introduction of a Professional Fish Harvesters Certification Board. The federal government has introduced the concept of a “core enterprise,” which requires top level certification for skippers (who are also the owners of the core enterprises) and places an implicit limit on the number of inshore and nearshore fishermen. The core enterprise system has been used to reduce the number of fishermen active in the industry, which continues to have excess capacity.

Newfoundland has always been associated with fish, which dominated the economy for hundreds of years. Since confederation with Canada in 1949, this changed; with the fishery’s share of GDP falling to 6.5% in the late 1980s (NSA 1994, Table F–4). Fisheries employment was disproportionately high for the province as a whole and the fishery (including fish processing) dominated the economy of most of the rural areas of the province. To some degree it still does.

But the big change in the Newfoundland economy since 1992 has been the development of an oil extraction industry, which together with mining now accounts for about 43% of the province’s GDP. As a result, Newfoundland’s government finances have improved, with the province going from have-not to have status. The province has expanded its services, increased the size of its civil service, and has paid down debt as the GDP increased. Then in 2012 there was a reduction in oil and mining activity, leading to a 4.8% reduction in the provincial GDP in a single year. Without a contingency fund, the government panicked and threatened sharp cutbacks in 2013. We will see what happens next.

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