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To Manage Quotas or Manage Fisheries? The Root Cause of Mismanagement of Canada's Groundfish Fishery

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The collapse of the Atlantic groundfish fishery is the result of a complex combination of factors including scientific uncertainties, overfishing, poor results in capacity control, and ecological conditions. It is argued that the root cause of the collapse is that the foundation of groundfish management since 1977 has been single species quotas rather than a sound set of principles for fisheries resource husbandry. The implications of this for science, management, and the fish are discussed and a principle based management structure is proposed.

Introduction

The collapse of the Atlantic groundfish fishery represents a devastating blow to the region's economy and our coastal communities. It also represents irrefutable evidence as to the failure of Canada's groundfish management system. Why did this happen? What went wrong with a management system once heralded and sold world-wide as a model for coastal states wishing to exercise their sovereign rights to the 200-mile fishing zones?

Fishermen blame the scientists for poor predictions. Managers blame fishermen for cheating and misreporting. Politicians are blamed by all for putting jobs before conservation. Inshore fishermen blame offshore fishermen. Fixed gear fishermen blame mobile gear fishermen. There is no shortage of finger pointing in the wake of the crisis. This is understandable but, quite frankly, of little benefit when trying to analyze in a constructive way what went wrong and how to prevent the same thing from happening again.

In this paper, I point my finger at the foundation of fisheries management in Canada—single species quotas. Since 1977, Canada has been managing, or trying to manage, an increasingly complex regime of quotas while concurrently losing sight of the objective of managing the fishery. This analysis will show that Canada's obsession with single species

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quotas has severely undermined the effectiveness of fisheries science, management, conservation, and most attempts at creating a partnership with the industry which it regulates.

During the mid to late 1980s when the industry was experiencing good catches and high prices, criticism of the management regime was not a popular pursuit. Now that the Canadian experiment in management of groundfish through quotas has failed, and I challenge anyone who would still argue otherwise, we must look to fundamental reform of the way we manage our fisheries.

I. *1977–1994*

The expansion of Canadian fisheries jurisdiction in 1977 to 200 nautical miles was viewed as a major opportunity to rebuild over fished stocks and to provide jobs for Canadians. At this time, developments in fisheries management theory and the requirements in the United Nations Convention on the Law of the Sea[1] to establish total allowable catches (TACs) led to a single species quota approach. The idea was that scientists, armed with the latest in mathematical modelling techniques, could evaluate and quantify the implications of various harvest levels on the health of individual stocks. If you fished above a certain threshold, the stock would be overexploited and depletion would result. If you fished below a certain threshold, the stock would stabilize and rebuild. Even more exciting was that these models could be used to project stock levels a decade ahead given various levels of exploitation.

In practical terms, this approach required that quotas be established for each groundfish species in each of the numerous statistical areas defined by the North Atlantic Fisheries Organization. Once the TACs were set, then they had to be allocated amongst the plethora of competing sectors: inshore, offshore, fixed gear, and mobile gear. As the decade of the 80s progressed, the number of fleet sectors increased as industry groups began to cluster their interests and lobby influence. By the mid to late 1980s, we had an ever increasing number of single species quotas being shared and managed among competing fleet sectors.

Science and management bought this system hook, line, and sinker. It was sold to the fishing industry on the promise of stock recovery,

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1. *Third United Nations Conference on the Law of the Sea*, U.N. DOC. A/CONF. 62/122 (1982); 21 I.L.M. 1261. Article 62(2) requires coastal states to establish total allowable catches as a basis for calculating the surplus to coastal state harvesting capacity and thereby quantifying the amount available for other states.

stability, and growth. The problem was that these linear equilibrium models, based on questionable data and mistaken assumptions as to the critical and dynamic variables of recruitment and natural mortality, have proven to be incapable of simulating the complexities of a fisheries ecosystem.

Canada was off and running with the commitment to conservation and high tech quota management. Multi-year projections on stock abundance became the backdrop and collateral for an unprecedented capitalization in fishing power[2] and processing capacity.

II. *Implications for Science*

Feeding the assessment models with data and calculating all of the various TACs became the bread and butter for Department of Fisheries and Oceans (DFO) science. Integrated research into ecosystem dynamics fell by the wayside. There was an assumption that more research cruises and more data would improve the reliability of the models. This was not to be so. Many scientists felt that the priorities placed on stock assessments and serving the insatiable demands of the management process was leaving a real void in their attempts to understand the Northwest Atlantic ecosystem as a whole. These views were quickly silenced under a regime which would not tolerate any dissention as to the validity of the quota system or its requirement for "applied" rather than "theoretical" research.

The introduction of quota controls also triggered the loss of the fishing industry as a reliable source of real time data. The incentives to misreport catches inherent in quota management rendered commercial data almost useless as an indication of fish abundance. Fishing log books once used only for data on catch and effort became important tools for enforcing the new quota regime.

Even of more concern was the widening credibility gap between fishermen and the scientists. A phenomenal resource of ship time and ecosystems knowledge was virtually lost to DFO science.

III. *Implications for Management*

Delivering this increasingly complex system of quotas became the focus for a growing DFO management bureaucracy. Once the quotas were established, the painful and adversarial process of allocating them to the

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2. Canada, *Resource Prospects for Canada's Atlantic Fisheries 1985–1990* (Ottawa: Communications Directorate, Fisheries and Oceans, 1985) Projections contained in this document were used as a basis for allocation of groundfish resources which in turn constituted the primary instrument of collateral to finance investment in new harvesting and processing capacity.

various user groups began. To DFO's credit, a comprehensive consultation process was developed for this purpose. Industry representation was ensured through an expanding plethora of area regional and Atlantic-wide advisory committees. Everyone got their chance to make a pitch for their share of the quota.

The problem was not the process but the agenda. No one was interested in discussing principles of fisheries management. In fact, I recall a day in 1988 when I raised this issue at a meeting of the Atlantic Groundfish Advisory Committee (AGAC). My thesis was that AGAC and all of its subordinate advisory committees were myopically focused on the exercise of negotiating the allocation of quotas, not managing the fishery. The meetings rarely discussed, in any meaningful way, issues such as the slaughter of spawning fish and juveniles or concerns about misreporting, dumping, and the general deterioration of the relationship between the fishermen and DFO.

In my presentation, I argued that fisheries management should be based on some fundamental principles of prudent resource husbandry, not some arbitrary reference point based on a linear mathematical model completely incapable of simulating the complex biological system it purported to represent. At the close of my presentation, I was thanked for my comments but told in no uncertain terms that the task of the meeting was to discuss allocation of quotas. The antagonistic, self-interest driven horse trading continued. It is interesting to note that DFO finally reached the same conclusions in 1993.[3] The report states:

> The tactics have been to control fishing effort through annual single species quotas for particular areas (i.e. management units). This tactic involving so-called output controls has not worked during the period under evaluation (1977–1993).[4]

The report goes on to say:

> There are fundamental problems in conducting a multi-species fishery with harvesting technology which cannot be targeted selectively. Single species quota management can exacerbate the problems by creating perverse incentives as quota limits are reached.[5]

The failure of quota management as an effective conservation and management tool was further exacerbated by ineffective implementation

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3. Canada, *Report of the Workshop on Scotia-Fundy Groundfish Management from 1977 to 1993* by J.R. Angel *et al.* (Dartmouth: Bedford Institute of Oceanography, 1994). In this refreshingly critical retrospective, the authors thoroughly document the mismanagement of the Scotia-Fundy groundfishery. Clearly, the conclusions reached are of equal relevance to the other regions of Atlantic Canada.
4. *Ibid* at 11.
5. *Ibid.*

of existing input controls. Vessel replacement rules were not enforced, limited entry had little impact on the increase in fishing power[6]. Minimum mesh size regulations were not regularly observed and there was limited use of closed areas for spawning and juveniles. Micro-management of the plethora of quotas and an increasingly complex array of fleet sectors chewed up so much administrative time that fisheries officers became desk bound paper pushers at the expense of on the ground enforcement and management.

IV. *Implications for the Fish*

The fish suffered the most under this system. One after the other, the cod and haddock stocks were fished to unprecedented lows, many to the point of near extinction. The decimation of spawning grounds and relentless pursuit of juvenile aggregations has left many of the stocks in such a depressed state that their ability to survive a climate of unfavourable oceanographic conditions is in question. One by one, DFO has been forced to close fisheries completely or severely restrict effort. The groundfish collapse is indeed an economic and social calamity of "biblical scale."[7]

V. *A New Approach*

The virtual closure of the Atlantic groundfish fishery represents a turning point in fisheries management. It is increasingly difficult for the quota management zealots to argue that the system has not failed miserably. Indeed, international experience with single species quota management has not been much better. A recent report by FAO concludes that quota controls and single species quota management is inappropriate in many cases:

> The fact that many conservatively-targeted quota management systems have failed, even for proprietary resources of EEZ's, should prompt a re-examination of all facets of the management procedure, from considerations of statistical validity of the sampling scheme, the possibility of misreporting, the appropriate population models used, and the accuracy of the parameter values entered in them. The degree to which quotas chosen

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6. The limitation placed on issuing new licenses had little impact on actual harvesting capacity. Larger capacity vessels within the length restrictions, increasingly sophisticated navigation, and fish detection technology all stymied the half-hearted attempts to control capacity. In fact, the only real implication of limited entry was to create a significant value in the fishing license.

7. Canada, *Charting a New Course: Towards the Fishery of the Future, Report of the Task Force on Incomes and Adjustment in the Atlantic Fishery* (Ottawa: Communications Directorate, Fisheries and Oceans, 1993) (Chair: R. Cashin) at vii.

> correspond to the projected fishing mortality rate has been questioned for some developed country fisheries. Even more serious in their effect is the degree to which subsequent catches can be maintained within the quota allocated, or when politico-economic considerations are allowed to 'stretch' the quotas proposed by fishery scientists.[8]

Their analysis in evaluating the relative merits of various management tools goes on to state that: "The objections to the management procedures (i.e. effort controls) need to be reassessed in light of the recent failures of quota control."[9]

The closure of Atlantic groundfish fisheries has reduced the debate over allocations. You cannot argue over quotas if there are none. The way is cleared for a real debate over alternative approaches to fisheries management. This debate is currently being presided over by the Fisheries Resource Conservation Council (FRCC). The most recent report from the FRCC[10] is full of recommendations on alternatives to quotas. Real consideration is being given to fish maturity targets, effort controls, closed areas, and harvesting fish at optimal time of season.

The current fiscal climate is also aiding in the push for reform. DFO can no longer afford an ineffective and extremely expensive micro management regime. There is a recognized need to provide a less antagonistic and more credible management regime in which the fishermen play a primary role in research, monitoring, and enforcement.

DFO reform includes a commitment to a more integrated research program designed to better understand the workings of the Northwest Atlantic ecosystem. The agenda also includes a focus on government industry co-management as one of the foundations of future programs. Increased use of more selective fishing gear and closed areas should begin to move us towards a system where we are focused on how many fish we are killing as opposed to how many tons we are recording as caught.

The real challenge for the future is whether we can resist the return to single species quota management once the stocks have begun to rebuild. Surely the lesson has been learned. The fishery of the future must be based

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8. FAO Fisheries Department, *Reference Points for Fishery Mismanagement: Their Potential Application to Straddling and Highly Migratory Resources*, FAO Fisheries Circular No. 864 (Rome: Food and Agricultural Organization of the United Nations, 1993) at 37.
9. *Ibid.* at 39.
10. Canada, *Conservation — Stay the Course: Fisheries Resource Conservation Council Report to the Minister of Fisheries and Oceans: 1995 Conservation Measures for the Atlantic Groundfish* (Ottawa: the Council, 1994) (Chair: Herbert M. Clarke). An excellent discussion on the impossibility of managing fish stocks through quota controls and an outline of what the authors call parametric management is contained in J.A. Wilson *et al.*, "Chaos, Complexity and Community Management of Fisheries" (1994) 18 Marine Policy 291.

on a clear set of principles of prudent resource husbandry supported by all participants.

We must recognize that sustainability does not equal stability. Government, scientists, and managers cannot provide stability and growth in fish stocks. Like all other natural systems, fish stock abundances will fluctuate. What we can and must do is provide a climate where fish stocks are maintained at a level where they are capable of surviving an unfavourable set of oceanographic and ecological phenomenon and capitalizing on a favourable set. This is the essence of sustainability in a natural ecosystem.

Fisheries science of the future must strive to utilize non-linear mathematics and integrated oceanographic research to better understand the complexities of the ecosystem. This will put us in a position of being able to better predict the timing and extent of the inevitable fluctuations in abundance we will face.

Conclusion

Canada has shown conclusively that a single species quota approach to groundfish management does not and cannot work. The collapse of the Atlantic groundfish stocks has been blamed on the politicians, on the fishermen, on the managers, on the scientists, and on mother nature. All have played a role, but the real culprit is a wonderfully complex and attractive model of management that has proven to be incapable of bringing all of the players together and focusing their efforts on ensuring a sustainable future for our fish and for our coastal communities.

The current crisis in the groundfish fishery should be all that is required to convince us that drastic change in the way we do things is required. There are already signs that some of our groundfish stocks are beginning to respond to the moratoria on fishing. There are signs that DFO and the fishing industry are willing to discuss alternative approaches to management. There is a window of opportunity here, and I hope we take full advantage of it.

To manage quotas or manage fisheries? The answer is as clear as the collapse of the Atlantic groundfish fishery.