

CHAPTER 4

Dialogue following World Fisheries: Problems and Lessons Learned

The effects of the British Columbia krill fishery on the food chain

Robert Kreutziger, who noted that he is one of the last commercial fishermen on the West Coast of British Columbia, commented on the krill fishery in British Columbia and expressed his concerns about the disruption of the food chain caused by this extensive fishery. He noted that while krill fishing in Washington, Oregon, California and Alaska has been banned, in British Columbia, they are still taking approximately 1,000 tonnes out of one of the richest bodies of water in the world and it is mainly being used for farm fish feed. He commented that this is feed that could be used by up to one million tonnes of hake that winter in Georgia Strait, just off Nanaimo.

He noted that he has brought this issue (the overfishing of krill) to the attention of both the provincial and federal ministers of fisheries and has not had a response. “I don’t know how we can enhance our West Coast fishery until we start regulating some of these causes of collapse... What has the Government of Canada or the Province of British Columbia done to reduce the decline of our fishery?”

Reg Watson replied that it has generally been the path of least resistance to move on and fish lower down the food chain; that is, when a top predator has gone we move on to fish what was its food. In terms of the East Coast of Canada example, following the collapse of the cod fishery, there are people who have done very well in the shrimp fisheries and in other fisheries as well. These are fisheries that were not traditional fisheries in the past but they have come in when those ‘fished down’ predators have been removed. He noted the example of the fisheries of the Antarctic where although there are management systems in place, they are still looking at big expansions of the krill fishery. However, they are not debating what will happen to those fisheries with regard to the animals that eat krill.

He added that we seem to have this view that we can grind it all up and it all belongs to us. In the case of fisheries around Canada, we have, as human beings in the past, just adapted and moved on to something else. However, fishermen can adapt to harvesting something else. That does not mean that the ability to bring it back to its former state has not been jeopardized. In his opinion, we are guilty of being so adaptable that soon we will even forget that the Atlantic cod was a targeted species. Increasingly around the world we now have fisheries that are targeted on the low parts of the food web, for example, jellyfish, that now seem to be liberated as the top parts of the

system are removed. He noted that the fisherman in the Gulf of Mexico are now starting to have targeted fisheries for jellyfish – something that they really abhor, but they will get by, if they have to, by fishing these. In other words, we lose the incentive to try to do the hard thing which is to attempt to return the traditional fishery to its former state.

Why fisheries do not respond to closures

Malcolm Windsor commented on Jeff Hutchings presentation and his reference to the fact that the fishery did not seem to respond to closures and instead there appeared to be other bigger causes of the decline. He noted that they have noticed exactly the same thing in the North (east) Atlantic. He cited the example of the salmon fishery where despite the fact that the Greenland fishery, thought to be a major cause of decline, was cut from 2.5 thousand tonnes to nothing, the salmon have not returned at all. He commented that this suggests that there is something bigger going on.

Jeff Hutchings commented that many hypotheses have been proffered with respect to explaining why these animals have not recovered – be it salmon or otherwise. One can talk about the larger scale environmental issues and to some degree this is important, except that they happen in fairly slow time frames, at least in the northwest Atlantic, mainly because it is so cold there. What would be very useful, at one level, would be to have some good satellite imagery analyses of changes, if any, in primary productivity over the years, and at the very baseline level. He noted that there has been some work published on this topic recently in *'Nature'*. This information would be useful in assisting us to determine whether or not there is a problem at the primary productivity level.

At another level, he is always struck by the fact that the system has so completely changed. When looking at time frames it is difficult to consider what is normal and what is typical and, as Daniel Pauly put it so well a few years ago, our time frames often extend back only five or ten years and, sometimes, ten or twenty or even fifty is not far enough back to draw conclusions. For cod in the Northwest Atlantic, we have gone from just under three billion spawning individuals to a couple of hundred million; that is just one species, notwithstanding what has happened to haddock and pollack and a variety of other species. In his opinion, we have knocked things down to such low levels that such things as the Allee effect and the difficulty the populations have in terms of recovering is because 1) they are so low and 2) they have altered interactions with other species such that the Allee effect might be a lot more important than was thought previously. Therefore, this might well be keeping them down (for biological reasons), apart from any longer scale environmental changes.

Comparing cod management with salmon management

Brian Riddell commented that if we appreciate the sort of analogies and similarities that were described between large marine ecosystems and enormous abundances of cod that we have lost and if we reflect on the basic messages, in every case there are analogies to Pacific salmon management. With respect to Dr. Hutchings comments about denial of the obvious and delays in response it is clear that they knew for years that there were enormous declines in salmon abundance, and yet there were always reasons why the data were questioned or not responded to, so that now there are 'recovery' plans. These plans are showing, exactly as was shown with respect to cod and North Atlantic salmon, that recovery does not always occur. In fact, the recovery that we have seen recently in terms of Pacific salmon is not to do with good management but rather with improved ocean survival. There is a serious concern about being complacent about recovery and it does not always occur, as has been pointed out.

The value of genetic material

Referring to the comments made about the genetics of cod, Dr. Riddell noted that we currently have a debate in British Columbia around establishing a Wild Salmon Policy and the merits and value of the genetic material. In his opinion, anyone who continues to deny the value of genetic material is just ignoring the obvious and that is the future. Whether you are concerned about production, or about diversity, it is the fish that we have now and it is very likely that we are interjecting genetic change in those fish.

Shifting baselines and harvest rates

Brian also addressed the comments made by Reg Watson with respect to shifting baselines. He noted that we can become really complacent about having ‘some’ fish. He noted that Dr. Watson’s comments with respect to the harvest rates in cod are exactly in line with what we see in fishing small salmon populations; that is, you can have small catches that do not change the long-term exploitation. Since there is a great ability to fish we have to always be cognizant that we can find those fish. We are very creative and have great capability of doing that and small populations just increase the challenge for proper management. He explained that the information presented on cod and other species fisheries is totally applicable to salmon.

We need a different default hypothesis

Randall Peterman referred to the plan for fisheries management that Brian Riddell was discussing. He commented: “The default assumption has been that if you see a large variation in the data, and cannot contribute cause uniquely to an observed decline, then you assume that it is something else until you are really sure it is that factor you are concerned about. I thought what you were leading up to was the idea that what we really need is a different default hypothesis - such as when you see enough examples of the sorts of things that Jeff Hutchings summarized that show the effects of certain factors such as fishing. Maybe the null hypothesis should be, ‘there is an effect until you show otherwise and take appropriate action.’ I think this is one of the syndromes we are in, referred to by Jeff Hutchings as the ‘scientific professional syndrome’. We are trained to say that there is no effect until we can show it. Maybe it is a change in mindset that we need to consider, where we assume there is an effect until we cannot show it.”

The perceived failure to link science and management in fisheries

Mark Saunders referred to the strong statement made by John Fraser in his opening remarks that science has failed to articulate the dangers and solutions to the public and the media. He asked the presenters if they could comment on this perceived failure in the link between science and fisheries management, and how we might improve it.

Reg Watson replied that it seems that in order to attract the attention of the public we have to come up with something that is more and more spectacular - usually it is a great catastrophe. Unfortunately, it is that kind of wake-up call that many people seem to need in order to put the pressure back up through the system to carry out the management changes that are very unpopular. And as John Fraser pointed out, if you tend to have a one-sided message, which is that it is all doom, then you can actually alienate people in the process and they will not want to know about it anymore. He believes that we have to have a message that is clear, simple and very easy to articulate. We almost have to take it to the marketing professionals and get them to distill it down, but that is something a scientist would abhor. The message is very important and it really has not changed for years - yet we have not seen the kind of response that is required. Obviously, we, as scientists, are going to have to adapt as well.

Jeff Hutchings added that it is very important to come up with solutions. He noted that when we look at the past, the trend is one of ascribing blame and saying what went wrong, as opposed to

saying, “this is what we did, here is what we have learned and let’s move on – let’s stop dwelling in the past and start from today and move forward.” In the case of the Northern cod, we cannot change the past. However, what has not helped us is the lack of clear management objectives and targets for recovery. These can be, at the first level (and probably ought to be), socio-economic targets. From a cod fishery perspective, how many fishermen do you want to derive an income from the Northern cod fishery? What should that income level be and how many communities should be supported? Once those decisions have been made then the next approach is to ask the biologist what has to be done to have ‘X’ number of cod in the ocean to meet these socio-economic objectives. Right now we have no recovery objectives for cod and that has not helped us in designing responsible management plans.

Another point is, as a society, we have to bear in mind that those who make the decisions, at the end of the day, are politicians. The buck stops with the Minister. We need to make it more politically palatable for these conservation measures to take place. He described a conversation he had with an Member of Parliament three years ago with regard to the Species at Risk Act. The Minister was unsure as to whether the Act was going to be passed and indicated that the difficulty was that there was nothing to be gained for his political party. From his perspective nobody liked this bill - the environmentalists did not like it, new scientists did not like it, the agriculture industry did not like it – and the mindset was, “What is there to be gained by us?” From the political level, my perception is that there needs to be more to be gained. Right now it is just negatives. If a minister closes a fishery and reduces allocations, it is all seen as ‘negative’ - very few people see it as a positive. We need to engage the broader Canadian society and engender the sense that it is OK to take these strong conservation measures, such as the federal Fisheries Minister recently did with the coho - those were tough decisions to make. Whatever we can do in that regard would be appropriate.

Generation time - comparing salmon with rockfish

Jeff Marliave commented that we get spoilt with salmon, which are at the very low end of longevity and have a tendency to have good year classes fairly regularly. In contrast, on the British Columbia coast there are two species of rockfish, which are in some areas quite depressed; that is, the yellow rockfish and the quillback rockfish, which in each case have only had three successful year classes in the entire last century. Species such as these are extraordinarily long-lived and have very ‘chancy’ reproductive success. Is there any possibility of gleaning from whatever data may be available whether there is any truth in the critical period hypothesis wherein a constellation of ideal circumstances will result in very high larval survival and maybe something which may not have happened for Atlantic cod in the last decade and-a-half?

Jeff Hutchings replied that Jeff Marliave had identified one of the key things - generation time. Longevity and age at maturity comes back to the link between an individual’s life history and the population level maximum rate of increase. The maximum level of increase determines sustainable rates of exploitation and maximum population growth rate is a consequence of what individuals do in terms of their age and maturity. Jeff Marliave is identifying a species whose persistence is dependent upon reproducing multiple times throughout a very long period of time and it is almost the worst kind of lottery possible. Given those circumstances, you are almost certainly going to be dependent upon having the larvae emerge at a time that matches algal productivity. However, this is, perhaps, less important for something as long-lived as those species than it is for shorter-lived species. Having said that, if we curtail the longevity of those long-lived species then it becomes incredibly important we give those species the time over which to play the lottery or clearly those species are going to suffer as a consequence.

Going back to the cod situation, in the 1960s there was no trouble in finding cod that were twenty years and older. In the early 1960s it was estimated that cod aged ten and older contributed more than half the total number of eggs to the Northern cod population. Today, we cannot find a cod aged ten and older. This is a species whose reproductive strategies are dependent on reproducing multiple times throughout a long life. If that life is curtailed then the number of opportunities is curtailed. In itself, it is not any more important, but if you curtail the longevity, it becomes increasingly important.

Predation as a factor affecting recovery rate

Wayne Harling addressed *Jeff Hutchings*'s comment that factors, other than fishing, are more important to recovery of the depleted stocks. He noted that he believes many of us are in denial of this and instead we seem to think that if we just curtail fishing all will be well. The impact of predators on a depleted stock is an intriguing idea. We cannot do much about factors such as climatic regime shifts but we could reduce predation, if the elimination of fishing effort is not enough to rebuild these stocks. He posed the question: For Atlantic cod, what are some of the predation sources and what might be done about it in order to help rebuild that stock?

Jeff Hutchings noted that this is the question that is on the 'phone-in' talk shows in Newfoundland on a very regular basis. Seals are clearly eating cod, harp seals are eating cod, inshore fish are eating cod, and conners are eating cod. As well, large cod eat smaller cod and in fact cod are one of the most cannibalistic species there is. The issue, from the seal predation perspective, really comes down to (notwithstanding the ethical and moral issues about increasing the hunt) taking a cold hard look and saying how many seals would we have to remove to have a demonstrable impact on recovery? There are estimated to be roughly 5.2 – 5.5 million harp seals out there. To have a demonstrable impact on recovery, we would almost certainly have to remove 2-4 million of these harp seals. It is not even physically possible to do that, let alone morally or ethically responsible. Furthermore, there is virtually no reason to believe that this would make a difference in recovery rate.

In multi-species interactions, it is too simplistic a view to identify causal relationships of such a strength between two of all of those species. One of the things that is ironic, in this regard, is that the Department of Fisheries and Oceans and many management agencies have been lambasted for taking single species perspectives on fisheries management. Many of those same individuals are then taking the two-species model and saying that if we knock seals down then cod will automatically come back. There is good reason to believe that it is not as simple as that and, secondly, you would have to remove a large number of harp seals to have any hope of seeing a demonstrable impact. This still may not be successful because of the fact that other fishes and other species are consuming cod as well.

Genetic implications for the Northern cod

Noel Wilkins posed the questions: In the case of the cod, if there is a significant Allee effect and it is in a serious decline, then you might expect genetic evidence for changes in the allele frequencies or the variance of frequencies in the populations. Do you see that? Secondly, is it biologically legitimate to take the Northern cod population and treat it as a closed entity to which there is no recruitment from outside and nothing from inside to other stocks?

Jeff Hutchings replied that there have been no genetic studies which examined large-scale temporal variability in cod. There have been some studies to look at five or six microsatellite low Si not selectively neutral low Si but not selectively important quantitative genetic traits. He noted that they actually have cod samples that go back (from archaeological work) to the 18th Century

and it would be instructive to take that time frame. In terms of whether there have been any broad scale studies at this time, the answer is “no”.

With reference to the second question as to whether that is an appropriate biological unit, he replied that the answer is, almost certainly no. However, having noted that it probably contains a meta-population model, which is probably a more appropriate way to describe Northern cod with reference to the question. Is there evidence that recruitment is coming from outside into this area; the answer is “no”, not in the past, and certainly not today. There is some evidence of mature fish moving up from the south coast into the northern cod zone but then they go back again at spawning time and are not actually contributing offspring to that area. The better way to view the Northern cod situation is as one that was historically made up of many sub-populations. Some cod stayed inshore all year round, some stayed offshore all year round, and some moved back and forth and there were many in the latitudinal gradient that really did not mix very much at all. What has probably been observed is a loss of a number of those sub-populations, which will almost certainly impact the likelihood of recovery. This ties in with Brian Riddell’s comments with regard to the lack of genetic variability.