

# FRCC Consultation – Yarmouth – April 22, 2010

Atlantic Groundfish Sustainability  
& Conservation Strategy –  
Denny Morrow (NSFPA)

# Grey Seal Impact

- Denny Morrow – Executive Director of Nova Scotia Fish Packers Association
- Chaired Grey Seal Research & Development Society from 2004 – 07
- ACOA/Industry research with Dr. McClelland on sealworm parasite impact
- Promoted commercial harvest of grey seals and market opportunities
- Initiated efforts for International Science Workshop focused on grey seal/groundfish impacts – Halifax – November 2007
- Participated in Follow-up Workshop in November 2008
- Member of DFO Grey Seal Task force 2010

# Grey Seal Impact

- 4X groundfish – cod – quota cut to 3000t- 2009
- Cod natural mortality estimated at 46% in the 2009 SAR – grey seals most likely cause
- Long-term groundfish sustainability & conservation can't be a reality unless grey seal impact is addressed
- Cod recruitment in 4X continues to be poor. If cod spawning aggregations are the target of grey predation, how can we expect spawning success? We know that intensive grey seal predation changes fish behaviour.
- Parasites are a huge issue
- A new grey seal breeding colony near the mouth of the Bay of Fundy has expanded from 120 pups born on two islands in 2007 to over 500 pups born on four islands in 2010. The population of that breeding colony seems to be doubling every year
- The new breeding colony is near Browns, German and Georges Banks. Cod and herring spawning areas. Diet analysis is urgent. Control measures before the new colony grows too large!

# Grey Seal Impact

- DFO Zonal Grey Seal Assessment – Fall of 2010 – Moncton - could result in a science statement linking grey seal population growth to cod decline and lack of rebuilding.
- Mike Sinclair/Bob O'Boyle retrospective analysis of grey seal impact on cod in 4VWN. Mike Sinclair historical research on grey seal population numbers for past 200 – 400 years.
- Doug Swayne's analysis of grey seal impact on 4T cod and lack of rebuilding – recent grey seal stomach samples taken from St. Paul's Island
- Growing interest and concern by fishermen and scientists in New England about the impact of growing grey seal breeding colony on islands near Cape Cod
- Fishermen and scientists concerned about impact on cod of growing grey seal population around UK and in North Sea – an assessment similar to our ZAP may be underway

# Grey Seal Impact

- Official science statements regarding grey seal impacts on cod and other species can affect public perception of the issue
- If science statements from the EU and New England were to coincide or follow the Canadian re-evaluation that is taking place...
- New political environment for making grey seal population management decisions could result
- If nothing is done, and the population on the Scotian shelf continues to grow with new colonies like the one off of Seal Island in SW Nova, the future of the groundfish industry in the region is...



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**To: Ross Claytor and Members of Grey Seal Task Force**

**From: Denny Morrow**

**Date: December 16, 2009**

**Subject: Response to Proceedings of the National Workshop on the Impacts of Seals on Fish Populations in Eastern Canada (part 2)**

My overall impression after reading the "Proceedings" and participating in the two workshops is that from an industry perspective, a renewed focus on the tragedy of the decline of groundfish stocks in this region and the role that the expanding seal populations may be having is long overdue. I led the industry call for such a scientific investigation four years ago and I think that the two workshops have brought some added clarity to the impact issues that have been identified. The 2<sup>nd</sup> "Proceedings" points to some important research questions that require further scientific work, but I have the sense that some of the scientists involved share a sense of urgency with industry.

From an industry perspective, the groundfish industry in Nova Scotia is challenged with survival at this point. Once fishermen and processors find it impossible or unprofitable to continue, important skills are lost and infrastructure dismantled. Promises of a stock recovery sometime in the (distant) future are not sufficient to keep an industry in place. The questions left hanging in this document require answers and time is running out.

My response will be somewhat haphazard and based on my thoughts as I read the document. Hopefully, what I am writing will help focus our discussion and result in some action.

### **Cod Natural Mortality Explanations (M)**

The "Stock-specific Summary of Factors Affecting Cod Dynamics" that begins on (Page 65) was a good idea. For most cod producing stock areas grey seal and/or harp seal impacts when considered as causes of the decline or as preventing rebuilding efforts were termed as "likely contributors". In fact, seals seemed to be the most likely factor in each check list of factors. Grey seal populations are

increasing and their geographic spread is also increasing. New breeding colonies are happening and the record of the last thirty years indicates that populations around these new breeding colonies can increase rapidly. We don't have much time if the seal impacts discussed in the document are as serious as some scientists have hypothesized.

### **Northern Gulf 4RS Cod**

The analysis and check list notes that grey seals are expanding in the area. Industry concurs. The analysis talks about harp seal predation on pre-recruits and says that that a model predicts a negative effect on spawner/recruit. The final conclusion on seal impact is that the significance of seal impact is uncertain.

### **Southern Gulf 4TVn**

The analysis of factors concludes that the impact of grey seals is the hypothesis with the most support. In fact on (P 76) 'one way to describe the change in species composition of the marine fish community is associated with the susceptibility of these species to predation by grey seals'.

### **4VsW & 4Vn**

The analysis includes – 'parasite loads are currently less than in **4X** but parasite impact can not be ruled out'. Processors that took some of the sentinel fish from this area several years ago reported that the cod was so heavily infested that processing was not worthwhile. If sampled fish currently from this area is less heavily infested, what happened to the fish that processors were seeing several years ago. (Fred Greene at Fisherman's Market is a good contact to verify what processors were seeing.)

(P 80) mentions that recruits/ per/spawner in this area have not declined and may even be somewhat higher recently – what evidence supports this statement?

Finally, the conclusion is that the level of grey seal impact is uncertain for two reasons: (1) there is uncertainty around the method for measuring the percentage of cod in grey seal diets in this area (2) the recovered otoliths from stomach samples taken on Sable Island indicate that grey seals are mainly preying on juvenile cod – the discussion indicates that there may be bias in the finding as grey seals may not eat the whole fish with larger cod (belly feeding) and it is known that the area around Sable Island has been a juvenile cod feeding area.

It is also interesting that the ecological population dynamics model described by Bundy & Koen-Alonso that concludes that the grey seal impact on this cod stock may have been previously underestimated and that an abundant grey seal population and an abundant cod stock in this region may not be possible is

certainly consistent with industry views. The authors are not ready to make a more definitive statement but experience over the past 16 years of the cod fishing moratorium in this area certainly leads industry to the same conclusion.

#### **4X**

'Parasitism can not be ruled out'. Industry agrees. Levels of infestation are climbing, not only in cod but in other groundfish species. Dr. McClelland speculated after examining his sampling results from 06-07 in 4X that levels of infestation on Browns Bank and German Bank were high, but had not reached the saturation point. I would assume that he meant that "saturation" would be the level where laboratory research has indicated that mortality could result.

The final conclusion indicates that impact depends on the "diet assumed" for grey seals in 4X and the assumption about the size composition of cod in the diet. **This conclusion calls for sampling of grey seals from Browns and German Bank areas. Some of this sampling should occur during periods of cod aggregation (spawning time). Also spatial/temporal overlap research of grey seals and cod during spawning time on some of the important 4x spawning banks should be done.** The check list analysis does not support an assertion by Trzcinski, Mohn and Bowen that unreported catch of cod is a possible factor. The analysis check list does not come up with any probable hypothesis other than grey seals. The research suggested above should be a high priority, given the 4x cod abundance trajectory looking more like the 4VsW trajectory and the fact that grey seal abundance/geographic spread/newly established breeding colonies are all on the increase in 4X.

#### **2J3KL**

The analysis suggests lack of capelin as a food source for cod may be preventing rebuilding. Harp seal impact is not supported by available evidence **but the** impact of competition between cod and harp seals for food (capelin) is unknown but **may be a non-trivial contributing factor to the level of M experienced by the cod stock.** This indirect impact of seals out-competing cod for a favoured prey species could be considered in other areas. One of the studies of Koen-Alonso referred to in the document suggested that northern cod were much less **opportunistic** in terms of prey than either harp seals or Greenland halibut. The decline of capelin stock abundance during the 90's seems to have affected Northern cod more than the other two species. Both harp seals and halibut switched to other prey as capelin during the 90's.

#### **3Ps**

Harp seals are transient in this area and grey seal numbers appear to be small. Seals are an unlikely source of M. The analysis does not mention that 3Ps cod did not collapse and the stock seems to respond to fisheries management measures.

### 3NO

The main factor identified in the analysis seems to be significant bycatch levels. Seals are not prevalent in this region. Recent surveys indicate some cod stock recovery underway now that over fishing by Europeans has been brought under control and TACs set for conservation and rebuilding seem to be working.

**ICES Report** – “Approaches to determining the Significance of Grey Seal Feeding on Cod in ICES Division Via”. This scientific paper came out last summer after Workshop II and discusses ways to measure the impact of grey seals on cod in the North Sea and around the coast of the UK. The herd in the North Sea has grown to an estimated 200,000 and the authors conclude that the impact of the herd on cod stocks is significant. Looking at the big picture – Iceland and Norway seem to have abundant, healthy cod stocks. Both countries have gone through periods of serious cod declines, followed by rebuilding periods and return to abundance during the past 30 years. Both countries have unofficial management measures in place to keep grey seals populations under 25,000. Iceland and Norway take the issue of parasites quite seriously as groundfish industries and their export revenues are important to both countries. The UK does not practice similar grey seal control measures. The herd is growing exponentially and cod stocks are in trouble as they are in most areas of Atlantic Canada. In Atlantic Canada, the analysis summarized above seems to indicate that cod stocks in 3Ps and 3NO and possibly in other northerly Nfld. coastal areas may be recovering. Those areas are either areas where grey seals are not prevalent or where harp seals (rather than grey seals) are the main species. Without a doubt, overfishing and poor management measures have had a significant impact on these cod stocks, but the stocks have gone into decline before and have recovered. Depleted stocks have produced some big recruiting year classes in the past. The analysis in the ICES paper and the analysis of the various Canadian cod stocks in the “proceedings document” all point to grey seals (and possibly harp seals in some areas) as the most likely hypothesis for the high level of “M” and lack of rebuilding during a time when little cod fishing is taking place.

It is also interesting that the issue of seal competition for capelin and the poor abundance of capelin as prey for cod have been raised as possible contributing factors in the discussion. I believe the Norwegian fishery faced a severe decline in capelin, a peak population of harp seals, and a negative impact on cod during the late 80’s and early 90’s. Seals were apparently starving to death and dying of disease. The capelin and cod stocks recovered. As the impact of the EU measures take effect and undermine the economics of the commercial harp seal hunt, we are likely to see once again an explosive growth in harp seals numbers. It will be interesting to see what happens to capelin stocks and the budding

northern cod stock recovery that seems to be underway. As well, fishermen are reporting an increased abundance of grey seals in Nfld. coastal areas as the herd continues to grow in the Gulf and on the Scotian Shelf.

### **Poor Recruitment**

4VsW and 4X cod stocks seem to not only suffer from unexplained elevated levels of natural mortality, but another important factor preventing rebuilding is the continued poor recruitment. The only hypothesis about poor recruitment that I have seen has been a statistical probability argument concerning the size of the spawning biomass. I think that a checklist analysis of possible causes of the continuation of poor recruitment in these areas needs to be done. The background to such a checklist should include reference to historical data during low cod abundance followed by rebuilding. Also, there must be some historical data on rebuilding and recruitment following low abundance in the Icelandic, Norwegian and UK fisheries. Possible factors to consider regarding causes of poor recruitment: overlap of grey seals with spawning aggregations of cod, possible disruption of spawning through forcing defensive behaviour. Obviously, conditions affecting egg/larval survival and juvenile fish survival until the age of recruitment would be considered. The document refers to spawner/recruit ratios for several areas. Is spawning stock biomass the only factor affecting spawner/recruit ratios?

### **Grey Seal Impact on Cod Behaviour**

Can we verify scientifically the behaviour change observed by Eastern Shore gill net fishermen in their fall herring roe fishery? These fishermen have gone on record at several herring RAPS with their observations that increasing numbers of grey seals seem to anticipate the location and time of arrival of spawn herring in inshore waters. These fishermen have observed the spawning herring spending less time on the shallow spawning grounds where they are harassed by the grey seals with the fish fleeing to deeper water for protection. If cod behaviour during spawning is affected similarly, we might expect lower rates of spawning success.

I think that it is very important to use satellite telemetry to answer the question about grey seal abundance and spatial/temporal overlap with cod spawning aggregations on shallow offshore banks in 4VsW and 4X. Even if most grey seals are not principally feeding on these cod aggregations, if enough specialists (grey seals) are there, the impact could be very serious on a depleted cod stock. This satellite telemetry information is referred to many times in the document for other areas like 4T and 4Vn. It must be available for 4X and 4VsW.

Spawning disruption through affecting behaviour is not the only possible consequence of increased numbers of greys seals overlapping cod aggregations. Cod may avoid historical feeding grounds due to predation pressure. This could

result in poor survival. Do we have historical data for 4VsW and 4X showing favoured cod feeding grounds and any information about whether there has been a change?

Since we have fisheries' closures during winter/spring cod spawning times on Brown's Bank, we have to guess at locations of aggregations and then make assumptions about grey seal spatial/temporal overlap. **Can we get some closed season acoustical data of cod spawning aggregations and locations on Browns – given the seriousness of the 4X cod decline and the need to understand the cause?**

### **Grey Seal Population Trends**

What evidence is there that cod abundance and grey seal abundance has coincided during the last 100 years? (P 46 Koen-Alonso and Bundy) Previously?

I read a recently published history of Sable Island. There was no mention of a vast seal herd by people picked up from ship wrecks. In fact, cattle were put on the island as a possible food source for shipwreck victims. If seals were readily available on the beaches, it would seem that they would have been an available food. What evidence is there that a large breeding colony existed in the past on Sable Island?

(P 4) suggests that it would be good to have a single document that describes the spatial/temporal changes in grey seal abundance numbers in the different areas... I agree with this suggestion and would find it useful.

I also think that we should include some documentation and history of the growth of breeding colonies on Sable Island, Hay Island, Cape Cod and the location of other new breeding colonies with projections of future populations if trends observed on the three above are repeated.

### **Parasites**

The recent sampling and cod and parasite analysis by Doug Swain and others in the Southern Gulf surprisingly seemed to show a significant positive relationship between parasite abundance and cod condition. I think that the sampling also showed both heavily infested juveniles and heavily infested larger, mature cod. These results seem to run counter to the study by Dr. Gary McClelland on American Plaice in 4VsW during the 90's to 2001 (?) when in the later sampling, the most heavily infested juveniles did not show up in expected numbers as heavily infested larger, mature fish. Dr. McClelland hypothesized that mortality may have resulted directly or indirectly as a result of the parasite load.

Granted, American Plaice and cod are two different species, but I think that plaice was chosen because it is a sedentary species and more reliable for such a

study than a migrating species like cod. I wonder if the fish in the Southern Gulf study had parasite loads comparable to the fish in 4VsW in the earlier study? Is there a saturation level where the effect of the parasites may overwhelm the fish? What might that effect mechanism be? Didn't Gary McClelland refer to some laboratory research with cod and parasite loads that seems to indicate that at a certain abundance level the parasites cause behaviour change in the host fish and even mortality?

Where do we stand in regard to parasite impact?

The sampling that was carried out by the industry with Gary McClelland in 06-07 seemed to indicate that 4x cod were approaching parasite infestation levels comparable to 4VsW levels during the 90's and that if the trend continues, the fish may be approaching the "saturation point". Is there a "saturation point" beyond which we can expect negative behaviour change in terms of survival or even mortality? Is there a time series available of parasite abundance levels in cod in any of the various regions where grey seal related parasites are an issue? Industry is certainly reaching the point where we find it economically impossible to process cod, haddock and other species from certain areas of 4X. It is counter intuitive to industry that such parasite loads in the fish are not affecting the survival of the most heavily infested fish. Experience with farm animals would certainly support the industry expectation.

At the very least, **the infestation levels that have been documented in 4X fish deserve to be highlighted in this report in language that everyone can understand. Industry would like to provide some processing cost information related to the current infestation level of cod, haddock and other groundfish species.**

### **Grey Seal Diet Questions**

The use of current 4VsW grey seal diet percentages for cod seems like a dubious assumption to make for use in 4X. It may even be dubious for 4VsW for reasons previously mentioned. **We need to do some sampling of grey seals in 4X at various times of the year. There is a new breeding colony in 4X on Flat and Noddy Islands. Let's do some sampling with that group. Let's sample some grey seals on Brown's Bank during cod spawning time.** Herring seiners are reporting increasing numbers of grey seals on German Bank during herring spawning time. We may witness an impact on herring if grey seal numbers continue to grow around the new breeding colony. There has been a herring spawning location just off nearby Seal Island. The herring industry is pessimistic about the future recovery of that spawning stock.

**4VsW cod seems to be a lost cause.** Let's focus research on the possibility of growing impact on 4X. The ecology population dynamics model by Koen-Alonso

and Bundy seems to capture what has happened in 4VsW. Maybe that work could be expanded and tested further. **There is some value in a retrospective post mortem on the decline of the 4VsW spawning cod biomass from about 21,000 mt in 1993 when the moratorium was imposed to the level of less than 6000 mt (?) today after 17 years of moratorium.**

(P 31) A heavy energy intake period for grey seals seems to be early February to early May – this period coincides with the cod spawning closure on Brown's Bank. **It should be a research priority to go to Brown's for stomach samples during this period and to document whether spatial/temporal overlap of the two species is occurring.**

### **Opportunistic Predators??**

There seems to be conflicting views in the document.

Bob O'Boyle cites cod in the grey seal diet percentages of between 7 – 22% from literature describing the NE Atlantic (Iceland, Norway, UK) and a lower range on this side of the Atlantic. Such ranges, however, seem to indicate that grey seals have some flexibility in the prey that they will eat. In fact, the list of prey species is impressive.

Although cod abundance in 4VsW is approaching extinction levels, grey seals still seem to consume cod. How is this possible? Could it be that the observations of the Eastern Shore herring fishermen that the seals seem to anticipate the arrival of herring spawning aggregations has some implications for the small cod stock? Herring might be more difficult prey at other times, but when large aggregations can be found in a small shallow area, predation might be very profitable for grey seals. Likewise, even a relatively small cod population might prove to be profitable prey on shallow spawning banks when aggregations are more compact and larger during spawning.

The question of cod **otolith size** from grey seal stomachs and whether they provide conclusive evidence that grey seals can't be responsible for unexplained M in larger, mature cod needs to be revisited. Some participants raised the point that otoliths analyzed from the Anticosti and Sable Island areas may have biased the sample because both areas are known as feeding areas for juvenile cod. As well, **some sampling of grey seals overlapping cod spawning aggregations on Browns Bank might provide more insight into whether large cod are part of the diet in greater percentages than previous evidence would indicate.**

The grey seal diet discussions during both workshops have emphasized the importance of sand lance as a prey species. **Sand lance is also an important**

**prey species for cod. What do we know about sand lance abundance during the period of cod decline and lack of recovery and the competition between grey seals and cod for this food source? Sand lance are likely concentrated on the shallow off-shore banks where both grey seals and cod like to feed. What would be the behavioural reaction of cod on these banks when large numbers of grey seals are feeding on sand lance in the same area?**

As a participant at both workshops, I heard opinions expressed that seals are opportunistic and that they change their diet according to the different species available and their abundance. I heard opinions that grey seals are not opportunistic and that their diet is rather consistent in terms of species and percentages. I also heard opinions that **some** grey seals may be specialists and that those diets may differ significantly from the norm. From an industry perspective, fishermen observe grey seals anticipating herring spawning aggregations, following vessels fishing for halibut and lobsters, tending groundfish gill nets alongside fishermen – in short – we see them as highly intelligent opportunistic predators. The study (P 25) of harp seal, Greenland halibut and northern cod diets discussed during the workshop seemed to support the conclusion that harp seals will change species and percentages as abundance levels of preferred species change, whereas cod are much less flexible and less opportunistic. It is hard to imagine why grey seals would be any less opportunistic than harp seals. It is hard to accept a grey seal impact model for 4X cod that assumes the same species diet percentages for seals in 4X as has been assumed for 4VsW. The cod abundance levels are different in the two NAFO areas as are herring and several other species abundance levels.

Whether grey seals are opportunistic predators is an important question. Fox populations in some areas seem to increase and decline with rabbit abundance while coyote populations don't follow the same pattern. Both species prey on rabbits, but coyotes seem more opportunistic and adaptable in terms of diet. It would seem that grey seals (if not opportunistic) would face a serious decline when their principle food source goes into decline. Do we have any evidence of that happening in the past? Or in other regions?

### **Sinclair/O'Boyle Model**

The conclusion on (P 39) is that grey seals are an important source of cod mortality on the Scotian Shelf and are inhibiting stock recovery efforts. The conclusions seem to be consistent with those of the Koen-Alonso and Bundy model. (and consistent with the ICES group last summer discussing grey seal impact on North Sea cod stocks). Will the research efforts of O'Boyle and Koen-Alonso and Bundy continue so that their models can be further refined and tested? Or do we accept the questionable assumptions in the Trzcinski, Mohn and Bowen study as definitive regarding grey seal impact in 4X?

### **Other Species**

Cod is not the only commercial species with unexplained high levels of M. In the southern Gulf, White Hake, American Plaice and Winter Skate are also in serious decline and grey seals are a likely significant factor. In 4X, White Hake, Cusk and Skates also seem to be in serious decline due to high M. Bycatch has been mentioned by some scientists as a possible cause (p 51). DFO has undertaken research using observers that should lead to a reliable estimate of bycatch of some of these species in the different fisheries. It is important that this research is completed and the results released so that the bycatch hypothesis can be evaluated. If it proves to be a minimal factor, then where do we look for another explanation?

### **Conclusions**

'The hypothesis for which there is the most support is that predation by grey seals is an important cause of elevated M' – (P 17) referring to the Southern Gulf cod stock – 4X has greater grey seal abundance than the Southern Gulf and grey seals numbers are concentrated on important offshore banks rather than being spread over the entire 4X area. Why aren't we even more suspicious that grey seals are an important cause of elevated M in 4X?

(P 45) "the predicted equilibrium biomasses from most model runs suggested that a system configuration with both seals and cod in high abundance appears unlikely, the most frequent predicted equilibrium output was a system with low cod and high seal biomass" Koen-Alonso and Bundy. The researchers are not prepared to defend this statement without further work on the model. I don't understand why DFO science would stand by the model presented by Trzcinski, Mohn and Bowen regarding grey seal impact on cod in 4X (or in 4VsW) when there was so much debate around bias in some of the basic assumptions of their model. We do not have much time in 4X. We need some conclusions followed by management measures if necessary to turn this cod stock decline around.

I apologize for the rambling nature of this response. I will try to focus my thoughts during January around how the above might apply to work of the Grey Seal Task Force. I am suspicious that there is no intention at the government level to take any action to reduce the impact of grey seals on cod and other groundfish stocks and that the Task Force is a waste of time in that respect. I do think, however, that from a science and industry perspective that we need to document what is taking place and state some probable conclusions. The decline of groundfish stocks and the loss of an important industry in this region requires more from DFO science than we have seen over the past 15 years. It is not acceptable to say "we don't know why this happened"!

Denny Morrow

December 17, 2009



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### Grey Seal Impact Presentation Seal Science Forum November 12, 2007 – Halifax, Nova Scotia

I am speaking this morning on behalf of the Nova Scotia Fish Packers Association as their Executive Director and on behalf of the employees who depend on those plants for their livelihoods, and also on behalf of the thousands of fishermen in Nova Scotia who supply our plants.

The Nova Scotia Fish Packers Association represents 52 companies throughout the province, but the concentration of our plants and member companies is from Halifax to Digby. We estimate our combined export sales of seafood last year to be in the range of \$400 million. Live lobster, fresh fish, scallops and herring products make up the bulk of our seafood exports. A few groundfish processors in SW Nova still freeze, salt and dry product for export and for the domestic market. Some of our companies are also involved in harvesting (groundfish, herring and scallops) as well as in processing. NSFPA members buy from thousands of inshore fishermen in Nova Scotia and other Atlantic provinces.

Although the number of plants in Nova Scotia that process groundfish has decreased significantly over the past twenty years, the industry's exports of haddock, cod and other species is in the \$80 million range. NSFPA members firmly believe that the continued decline of groundfish stocks in terms of abundance and quality in the Scotia Fundy region is the single biggest reason for plant closures and loss of employment and income by thousands of fishermen and plant workers in this region over the past twenty years. We have hoped for a recovery of groundfish stocks during that period. Except for haddock on Georges Bank, the groundfish picture continues to deteriorate with no hope of a rebound off of Eastern Nova Scotia and a worsening stock situation through much of 4X.

Sadly, this is happening at a time when demand for fresh, wild-caught fish is on an increase in most of our markets.

It is the unanimous view of our members that the impacts (there are several) on groundfish stocks and our industry from the rapid expansion of the grey seal herd in the Scotia Fundy region over the past thirty years have been almost catastrophic. Plants have closed, workers have lost their jobs and fishermen have moved on to other fishing or other work than catching groundfish. I know that I am speaking for fishermen as well as plant owners and workers when I say the grey seal impacts that we see are: **fish consumed directly through predation; fish behaviour affected due to the presence of large numbers of seals so that feeding and spawning in certain preferred areas is affected; fish health and condition deteriorating due to the increased infestation of seal worms in the fish; the disruption of fixed gear fishing due to the destruction of gear and destruction of the catch before it can be brought on board; and the devastating effect on the processing sector of increased labour costs due to parasite removal, loss of yield due to the poor condition of infested fish, and customer resistance to fish that has been riddled with large numbers of parasites.**

The survey comments from fishermen and plant staff in the Gulf and in Scotia Fundy that is included in the paper submitted by the industry and the Gulf Region DFO certainly capture the feeling of desperation felt by our industry as we watch the grey seal herd continue to increase in numbers and to spread geographically throughout our fishing waters and along our coastlines. These large, intelligent predators are here all 12 months of the year. They feed on our fish when they are aggregating to spawn, when the fish move up on shallow banks or into shoal waters to feed, they destroy the halibut and other groundfish on our longlines and in our gill nets before we can haul the fish aboard, and they have disrupted inshore bait fisheries and in some areas to the point where the fishermen have given up.

- (1) **Fish consumed directly through predation** – It is the industry observation that grey seals are intelligent, opportunistic predators. Fishermen from Cape North to Baccaro have observed grey seals feeding on whatever is the most prevalent prey species in the area at different times of year. When the herd on Sable Island only numbered about 30,000, the impact on commercial stocks was hardly a problem once you moved away from Sable Island. As the herd has increased ten fold in the last thirty years, we have seen areas that used to be productive with cod and other groundfish species become barren of those species. We have watched this desolation spread from waters around Sable Island eastward to Cape Breton and now westward

through eastern 4X and into the Gulf of Maine. The grey seal are feeding on cod and other groundfish, spawn herring, molting lobster and mackerel. I won't venture into estimates of tonnage, but I will say that fishermen in Scotia Fundy know what they see and the feeling is that we will never rebuild cod and other groundfish stocks in this region at the current grey seal population level. We know that scientists strive to put an estimate on consumption of particular species and we feel that those estimates likely undershoot the impact. **Our main point is that grey seals are intelligent, opportunistic predators. We don't think that if we are ever lucky enough to get a good year class of cod (and some other groundfish species) that there is any chance that a good juvenile year class will ever survive seal predation to reach spawning age.** Computer models can be constructed based on current diets of a few grey seals that might show seals preferring other species to cod, haddock, pollock, flounder, cusk and hake; but the observation of fishermen is that if concentrations of commercial groundfish start to appear, then grey seals will start to prey on those species.

- (2) **Impacts on fish behaviour** – Fishermen report that fish seem to head for deep water when grey seals are prevalent. Herring gill net fishermen on the Eastern Shore have reported at several Herring Stock Assessment meetings that when they are conducting their fall roe fishery that the arrival of grey seals causes the herring to flee the inshore into deeper waters. Herring scientists have acknowledged that herring seem to be staying close to bottom on the Scotian shelf making them appear more numerous in groundfish trawl surveys. (Perhaps, a misleading abundance indicator.) Mackerel fishermen have watched grey seals scatter schools of mackerel. Fixed gear fishermen have observed that cod especially have been chased from inshore waters to deeper water by grey seals. **We have to ask the question: what is the impact on spawning success of cod and other species when grey seals are feeding and harassing the fish in a spawning aggregation on a spawning bank?** These are intelligent, efficient predators. They know an easy meal when they see one and they are smart enough to anticipate spawning times. How can new year classes enter the fishery if they are never born? Lobster fishermen in Cape Breton have observed that seagulls following their boats have been joined by grey seals in order to get an easy feed of "tinkers" that must be returned to the water. Again, these are opportunistic, intelligent predators.

**We also have to ask: If our commercial groundfish species are continually chased off of their preferred shoal feeding grounds by grey seals could this not be one possible factor in the poor**

**length and weight at-age that we are seeing in haddock and cod on the Scotian Shelf.**

- (3) **Seal worm parasite infestation** – During the 80's, processors expected to see parasites in cod from areas around Sable Island, but the infestation has now spread to other species besides cod and to fishing areas far from Sable Island. The numbers of parasites in groundfish species like cod, haddock, flounder and cusk sometimes make the fish uneconomical to process. Cusk, for example, is now up for consideration as a "threatened species". We have processors that have given up on processing cusk due to the seal worm infestation in that species. Some comments from SW Nova processors during the week of November 5 – 9/07:
- (a) "My recent labour cost in preparing a load of clean haddock from Georges Bank into frozen IQF portions and blocks for food service customers was 75.5 cents/lb. I recently processed a load of Gulf cod for the same products and the labour cost was \$1.25/lb. due to having to candle twice in order to remove parasites. Some of the thicker fillets had to be sliced through the middle, thus moving the fillet from IQF to blocks. I lost money on this fish. My load of clean haddock went 70% IQF portions and 30% into lower priced blocks. My load of cod went 50% IQF and blocks. I not only lost money removing parasites, but I lost based on the ratio of end product due to quality considerations. The very worrisome thing is that the parasites are now showing up in haddock, flounder and even halibut. Clean areas are now becoming infested and it is more species." DB Kenney Fisheries
- (b) "I won't buy haddock from LaHave Bank any more. My labour cost doubles, but the biggest concern is quality. Much of the fish is poor yield and slinky. **The fish doesn't look healthy and when we process it, we find large numbers of parasites in the leanest fish. There has to be a connection. We see – the leaner the fish, the more parasites in the fish.** We won't process cusk any more. Too many parasites. I can't make money with that species." Clare Fisheries
- © "My plant is around Halifax and I have processed a lot of fish from Eastern Nova Scotia and eastern 4 x over the years. The parasites have become so bad in flounder from the area that I have to sell it for lobster bait instead of fillets. A recent load of haddock from LaHave Bank area was so infested that my typical haddock labour cost jumped from 50 cents/lb to \$1.00/lb. I have lost customers among the salters because there are too many parasites

in the cod that comes into our plant. Pollock is even starting to show some worms.” Sambro Fisheries

(d) “I process and export salt fish products. I won’t buy fish from eastern 4x any more. My workers complain. My labour cost is too high on the fish, and I can’t guarantee my customers that the product is free of parasites. I lost a customer in Portugal last fall due to parasites when I sent over a load of product made from local fish. Consumers in Europe don’t want to see parasites in the fish. Who does? The problem continues to spread as the grey seals spread.” SW Nova salt fish processor

**It is our belief that the level of parasite infestation in commercial groundfish species in eastern 4x is causing an increased natural mortality in that fish. The infestation is also rendering an increasing amount of fish caught in that area unfit for processing.**

It is equally troubling for the fishermen and processors who have been able to survive that fishermen are seeing increasing numbers of grey seals around Georges Bank. Breeding colonies have recently been identified on islands toward the mouth of the Bay of Fundy. Small numbers of parasites are starting to show up in Georges Bank fish.

Over the past two years, our industry has sponsored and participated in some research aimed at quantifying in some way how the sealworm infestation has spread to more groundfish species, and spread to new fishing areas since the findings detailed in research papers by Dr. Gary McClelland during the 1990’s. We had also wanted to begin research aimed at determining the degree to which the growing infestation is contributing to unexplained natural mortality rates in cod and other species in Scotia Fundy. We were not successful in finding the funds or a scientist to do that research. Finally, we had hoped three years ago that we might secure funding and interest some scientists in conducting research into the impact that the expanding grey seal herd might be having on fish behavior. Fishermen suspect that the impact may be just as important as the direct consumption of commercial species by grey seals. We were again unsuccessful in raising the research funding and in finding scientists to carry out the research.

Fixed gear fishermen increasingly are reporting that valuable catches of halibut are being stripped on the hook or rendered unfit for sale by grey seals before the fish can be hauled aboard. Gill net fishermen report more numerous instances of gear and catches being destroyed

by grey seals as the herd expands and spreads. The trend is there. Grey seals are becoming more numerous and gear and catch losses are nearing the breaking point for fixed gear fishermen. Fishermen along our Eastern Shore have given up their traditional pelagic bait fisheries because the grey seal population is now so numerous in that area that the bait fishery is impossible to conduct. Those fishermen now have to import expensive bait for their lobster and crab fisheries.

We feel that unless the grey seal herd is reduced by 50% over the next five years we may not see a groundfish industry survive in western Nova Scotia. The gradual loss of our groundfish industry is resulting in more pressure on the lobster fishery as fishermen and plants have no other species to turn to. More studies will only help those who earn their livings from conducting studies. The people who earn their living from the sea in this region will be forced to move on. It doesn't have to happen!

Thank you for your attention and for inviting me to address this important scientific forum.

Denny Morrow  
Executive Director  
Nova Scotia Fish Packers Association