Court File No. *T-2172-02*

FEDERAL COURT - TRIAL DIVISION

Between:

NORTH OF SMOKEY FISHERMEN'S ASSOCIATION

Applicant

-and-

ATTORNEY GENERAL OF CANADA

-and-

THE MINISTER OF FISHERIES AND OCEANS

Respondent

APPLICATION PURSUANT TO sections 18 and 18.1 of the *Federal Court Act??????*

AFFIDAVIT OF RANSOM A. MYERS

I, Dr. Ransom A. Myers, of the City of Halifax, in the Province of Nova Scotia SWEAR THAT:

1. I have personal knowledge of the matters deposed to in this Affidavit, save and except where I depose to a matter based on information from a source I identify, in which case I believe that information to be true.

Background and Expertise

2. I am a quantitative fishery population biologist by training and experience. I received a B.Sc. in Physics from Rice University in 1974, a M.Sc. in Mathematics from Dalhousie University in 1981 and a Ph.D. in Biology from Dalhousie University in 1984. Between 1983 and 1997, I was employed as a research scientist for the Canadian Department of Fisheries and Oceans. In 1997, I was awarded the Killam Chair in Ocean Studies at Dalhousie University, which is an endowed research professorship. My areas of specialty include population dynamics (i.e. the study of

the mechanisms that regulate the abundance of plants and animals) and management of marine fish and invertebrates.

3. I have published over 100 refereed scientific papers and 6 book chapters in my area of specialty. This includes approximately 22 papers that concern the population biology and management of fish and invertebrate stocks in the area known as North Atlantic Fisheries Organization ("NAFO") Division 4), which includes the Southern Gulf of St. Lawrence and the Scotian Shelf. I regularly lecture and make presentations at conferences in my specialty, both in this country and abroad. I have served on a number of government and private commissions and committees established to study the population dynamics of marine organisms. For example, I have served on the Board of Directors of the Ocean Institute of Canada, and the Board of Directors of the Natural Resource Modeling Association.

4. Within the last year I have supervised 10 graduate students, 2 honours students, and 4 postdoctoral fellows working on population dynamics of marine species. In particular I am supervising graduate students carrying out research on …One of my graduate students, Mike James, has carried out field work for the last 4 years in the Sydney Bight region.

5. Although I resigned my position as a research scientist with the Department of Fisheries and Oceans in 1997 to take up the first Killam Chair in Ocean Studies at Dalhousie University, I have continued to work very closely with scientists at the DFO. During the last four years, my students and I have carried out joint research with the DFO on many critical fisheries management topics. This research includes: methods for standardizing research surveys; two papers on the population dynamics and management of coho salmon in which habitat requirements were analyzed; three papers on meta-analytic methods to improve stock assessments and estimate the area of habitat required for fish species (which include data on fish stocks on Georges Bank); improved population dynamics models for porbeagle shark assessment and management (which includes Georges Bank) and improved models of the population

dynamics and habitat requirements of *Alosa* (alewife, blueback herring, and shad); an analysis of pelagic longline fishing (which is examining Division 5Z in detail); a study of the leatherback turtle in the Northwest Atlantic using satellite tags (which includes movements in Division 5Z); and a study of the interactions between the cod and shrimp populations in the North Atlantic (which again includes data from the 5Z region).

6. Research that I have done on fish and shellfish in Division 4 has included an analysis of the interactions of cod and snow crabs in the region (Worm and Myers 2003). I have carried out long-term research on population regulation of groundfish (including cod, haddock, and yellowtail flounder) in Division 4 (Myers and Cadigan 1993a,b; Myers et al. 2001). This research has focussed on using long term survey data to determine the life-history stage and mechanisms that regulate fish populations.

7. I have served as an expert witness and provided scientific advice for commercial fishing interests, conservation organizations, tribal fishing issues, and power companies. In 2000, I provided a declaration for the Conservation Law Foundation on a suit against the US National Marine Fisheries Service concerning the reopening of closed areas of Georges Bank (on the US side of Division 5Z). My background and training are further set forth in my curriculum vitae, which is attached as Exhibit "A".

8. I would like to address the following issues:

    a) The present state of the cod stocks in the Southern Gulf of St. Lawrence is too low to allow any directed fishing.
    b) Any cod fishery in the Sydney Bight area will result in some bycatch of the local cod stock in Sydney Bight, which is unacceptable because of its low abundance.
    c) A mixed stock fishery is inherently non-precautionary from a conservation point of view.

d) The concentrated physical impact of the bottom draggers in 4Vn poses an unacceptable risk to the ocean bottom structures that are fish habitat by fisheries outside the region;
e) Dragging in the Sydney Bight region will cause mortality of important species such as snowcrab and white hake.
f) Cod are very concentrated in the winter in the Sydney Bight region, so that fishing mortality be high at very low population sizes; this is non-precautionary given the uncertain stock status
g) Continued overfishing is inconsistent with the goal of optimum yield.

The State of the Cod Stock in the Southern Gulf of St. Lawrence is Too Low to Allow Any Directed Fishery

9. The 2002 cod fishery in the Southern Gulf of St. Lawrence was allowed to occur in spite of an assessment by DFO that the quota of 6000 metric tonnes would result in a 12% decline in spawning biomass from their already low levels. Allowing any fishery on this stock contravenes the principles of resource conservation that is claimed to be the mandate of the department of fisheries and oceans.

Any cod fishery in the Sydney Bight area will result in some bycatch of the local cod stock in Sydney Bight, which is unacceptable because of its low abundance.

10. The stock in the Sydney Bight (NAFO Div. 4Vn) has been closed since ??. TO BE ADDED.
11. Cod from at least 3 stocks mix off of Northern Cape Breton in the winter: the Southern Gulf of St. Lawrence, Sydney Bight, and some fish from the Eastern Scotian Shelf. Furthermore, these large “stocks” almost certainly consist of mixtures of populations. Cod are the most variable in this region in the world; in the past spawned in many places and times, but these have been gradually eliminated by overfishing.
12.

13. Recent tagging studies (Comeau, Campana and Castonguay MS) clearly show that the bycatch rate will be high for the local Sydney Bight stock. ADD MORE DETAIL

A mixed stock fishery is inherently non-precautionary from a conservation point of view

14. The maintenance of populations is necessary for the maximum production of fisheries as well (Ricker 1958, Ricker 1973). However, it is difficult to maintain multiple populations of a species when they are jointly exploited by a common fishery when they vary in their maximum reproductive rate and vulnerability to fishing (Ricker 1958). Unfortunately, multiple populations within a given assessment area are rarely fully considered in fisheries management, especially for highly migratory species such as cod. It is easy to ``explain away'' variations in local abundance as being reversible effects due to environmental fluctuations. The loss of a locally adapted population means the loss of life-history adaptations that are specific to local conditions, e.g. migration patterns to specific geographic regions for reproduction or feeding. Their loss contributes to the degradation of adaptive genetic diversity within species. This degradation and the loss of local stocks means that it is impossible for a species to recovery its original potential productivity (Ricker 1958, Myers 2003). Thus, fishing on a mixed stock, as is being proposed for NAFO Div. 4Vn is inheriently non-precautionary.
15. There is abundant evidence that Canada has already lost many of its former cod populations. An examination of the tagging data from before the beginning of industrial fishing, i.e. those carried out in the 1920's and 1930's, clearly show many local cod stocks on the Scotian Shelf and the Southern Gulf of St. Lawrence (McKenzie 1956).

The concentrated physical impact of the bottom draggers in 4Vn poses an unacceptable risk to the ocean bottom structures that are fish habitat by fisheries outside the region

16. All demersal fish and invertebrates require habitat to survive. The *Fisheries Act* defines the elements of habitat as spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes. By the definition in the *Fisheries Act*, all of the bottom types in Division 5Z would classify as fish habitat in my opinion, because they are frequently used by spawning and juvenile fishes, provide critical protection from predation, and provide important food sources for juvenile fishes.

17. In the case of demersal fish or fish that live near the ocean floor, also known as "groundfish," the bottom serves as important habitat for the juveniles of these commercially-fished species. The majority of available evidence suggests that the juvenile stage is the limiting life-history stage for demersal fish (Myers and Cadigan 1993a,b). Thus, the abundance of fish that can eventually be harvested is primarily limited by the survivorship of juveniles. Field observations along the coast of Nova Scotia have clearly shown that survival of juvenile cod, and many other fish, clearly depends upon complex structure, i.e. the number of places juvenile fish have to hide from predation (Tupper and Boutilier1995a, b, Steele 1997). The gravel and cobble habitats such as those in NAFO Div. 4Vn have been determined to be important for juvenile ground fish (Murawski et al. 2000). The elimination of habitat complexity will be expected to reduce the eventual abundance of adult fish dependent upon that structure in their early juvenile stages.

18. Experimental research has demonstrated that abundance of structural shelter for fish that are prey of other fish such as juvenile groundfish often limits the quantity of fish (Hixon 1991). This is because bottom structures offer juvenile fish a refuge from predators, and may reduce competition from other juvenile fish.

19. The link between predation and structural complexity has been clearly demonstrated in a wide variety of experimental studies on groundfish (Forrester 1995; Steele 1997; Hixon and Carr 1997; Beukers and Jones 1998). Lindholm et al. (1999) found a reduction in predation on juvenile cod in areas where habitat structure was

experimentally increased. There is a vast amount of empirical data from field observations, laboratory and field experiments, and from theoretical analysis that shows that survival of juvenile fish is greater when there is complex habitat structure available to juvenile fish to escape predation (Walters and Juanes 1993, Lindholm et al. 1998).

20. Furthermore, observations of ground fish on North Atlantic continental shelves show that juveniles die at a higher rate when there are greater numbers of juvenile fish around (Myers and Cadigan 1993a, 1993b). This implies that one of the main factors limiting groundfish production is the "bottleneck" that occurs during the juvenile stage. The limitation of habitat, e.g. places for juvenile fish to hide, serves as a limitation for the adult population size. In ecological terms, there is strong density-dependent mortality during the juvenile stage for groundfish that limits production of these stocks (density-dependent mortality is mortality that increases with the number of animals present; it is what normally regulates fish populations) These mechanisms have largely been unraveled by field experiments that examine how food limitation interacts with predation. This interaction is explained by what is know as the "growth mortality hypothesis" that proposes that greater competition for food increases the time required to grow to a size where fish are less vulnerable to predation (Ricker and Forester 1948). If more juvenile fish have habitat to shelter them, then more will be able to grow to a size where they have reduced natural mortality. As a result there will be more recruits to the fishery. This is in essence the essential link between habitat availability, fish survival and fish yields.
21. There have been several reviews of the on the effects of fishing gear on fish habitat in the scientific literature (Collie et al. 2000, ICES 1992a; ICES 1992b; ICES 1992c; Dayton et al. 1995; Hutchings 1990; Jones 1992; Messieh et al. 1991), which have generally concluded that mobile gear, including groundfish bottom dragging gear, has varying effects on fish habitat, and the severity and nature of these effects are dependent on bottom type (Auster and Langton 1999).

22. There are some bottom types, for example high energy sand environments, on which the use of mobile fishing gear will likely have no impact on fish habitat or fish productivity. Generally, bottom types that provide complex structural habitat for fish are more vulnerable to the impacts of dragging.

23. Biogenic structures are habitats among the most vulnerable to the impacts of dragger gear. A single pass of a trawl from a dragger can cause long-term damage to habitat-forming species such as sponges, and the recovery of these sponges is very slow in cold water (Freeze et al. 1999). Experiments have shown that sponges can provide juvenile fish habitat (Lindholm, Auster and Kaufman 1999).

24. Studies indicate that the production of important groundfish species is limited by the amount of juvenile habitat available to those fish (Rijndorp et al 1992, Myers et al. 2001). Thus, the elimination of habitat by dragging will result in the reduction of fish production for those species that use the habitat. Bottom trawling or dredging can greatly reduce, or destroy habitat by, among other things, reducing the structural complexity of habitat. If trawling reduces the structural complexity of the bottom, then trawling is reducing the "amount" of habitat available to juvenile demersal fish. With fewer places to hide, the density of fish is more apparent and the "bottleneck" becomes smaller. As a result fewer juveniles escape this period of high mortality and there will be fewer adult fish. Therefore dragging, in some instances, can reduce the number of adult fish in an area.

25. I am not aware of any science produced by the Department of Fisheries and Oceans that shows that all bottom types in Division 4Vn are resilient to the effects of dragging.

26. Although there is uncertainty about the exact effect of dragging in all regions, it is generally accepted it has a negative effect of fish habitat. It is unreasonable for the local fishermen in Div. 4Vn to be faced with results of dammage of their local habitat from dragging from fishermen from other regions.

Dragging in the Sydney Bight region will cause mortality of important species such as snowcrab and white hake.

27. The fishery for snow crab provides by far the largest income for fishermen in the Div. 4Vn region. CHECK THIS AND ADD DETAIL.

28. White Hake. ADD DETAIL.

Cod are very concentrated in the winter in the Sydney Bight region, so that fishing mortality be high at very low population sizes; this is non-precautionary given the uncertain stock status.

29. TO BE ADDED

Continued Overfishing is Inconsistent with the Goal of Optimum

30. One goal of Canada's fisheries management has been to achieve optimum yield of commercial fish stocks. One fundamental limitation that impedes the atainment of optimum yield for Canadian cod stocks is that fishing has continued even when stocks have been reduced to very low levels. Without responsible fisheries management the Department of Fisheries and Oceans will not be able to eventually obtain optimum yields. The Department of Fisheries and Oceans is thus unable to fulfill its mandate to manage fisheries at the optimal sustainable yield levels unless fishing it is willing to stop fishing when the scientific advice clearly suggests that fishing should cease. This is the case for the cod stocks in the Southern Gulf of St. Lawrence and the Sydney Bight region.

31. Attached as Exhibit "B" to this affidavit is a true copy of a bibliographic list that I prepared of all of the scientific references that appear in my affidavit.

Summary

32. In summary, it is my opinion that dragging for cod should not be allowed at this time in the Sydney Bight (NAFO Div. 4Vn) management region. This fishing will further endanger the southern Gulf of St. Lawrence cod stock (the target species), local cod stocks, and other fish species such as white hake. It may harmfully alters, damages, disrupts and destroys fish habitat. Specifically, habitat that offers refuges to juvenile groundfish species is jeopardized through the. In my opinion the Department of Fisheries and Oceans' has failed to adequately examine the potential adverse effects of this opening on commercial groundfish and invertebrate, e.g. snow crabs, populations or recovering commercial species. As the result of my work and investigations, that dragging for cod in the 4Vn should not occur at this time.

Sworn before me at the)
City of Halifax in the)
Province of Nova Scotia on)
__ of January, 2003.)
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Commissioner for Taking Affidavits in the)
Province of Nova Scotia)

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Ransom A. Myers