



THE SCHOOL
OF PUBLIC POLICY

Master of Public Policy Capstone Project

Overfishing in Canada and the United States: A Comparative Study of Policy and
Legislation

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Executive Summary:

The purpose of this Capstone project was to first explore the causes of overfishing, then to explore how the issue is both viewed and dealt with in terms of policy and legislation in two highly comparable jurisdictions: Canada and the United States.

The research draws to attention that there is a distinct lack of effective coastal commercial fisheries management in Canada and when compared to the United States, the degree of mismanagement becomes even more apparent. It is discovered that despite the magnitude of the collapse of the Atlantic cod fishery in Newfoundland, Canada has still yet to develop sufficient policy and legislation to effectively combat the ongoing issue of overfishing in coastal Canadian waters. This is sharply contrasted by U.S. fisheries management under the federal *Magnuson-Stevens Act* that by nearly all accounts has been monumental in the country's progress in controlling overfishing.

Researching the causes of overfishing and comparing fisheries policy and legislation in both countries gleans the conclusion that not only can overfishing issues be solved through strong federal fisheries management, but the United States is currently doing so through effective legislation that Canada desperately requires. Furthermore, it is recommended that Canada should achieve stronger federal fisheries management through the legislative measure of amending the federal *Fisheries Act* to not only recognize overfishing but to include rebuilding plans for overfished stocks. The recommended rebuilding plans are inspired by the stock rebuilding measures laid out in the United States' federal *Magnuson-Stevens Act*.



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1.1: Introduction to Overfishing

What is Overfishing?:

Overfishing can be defined as the practice of commercial and non-commercial fishing in lakes, rivers, streams, and oceans at an intensity in which stocks, subpopulations of a particular species of fish, are depleted to levels in which replenishment can no longer occur naturally. This creates a situation where replenishment often requires stringent human developed recovery efforts. In this paper, overfishing will be explained using the example of the unsustainable commercial fishing occurring by Canadian and American commercial fishermen on the coastal waters of the Atlantic and Pacific Oceans.

Causes:

The leading causes of overfishing can effectively be divided into two main categories: intensity and institutional. Quite often, these causes occur simultaneously with tremendous consequences, as shown in the case of the collapse of the Atlantic cod fishery off of the coast of Newfoundland. Each of these causes will be further explained in depth below.

Intensity:

Increased fishing intensity is perhaps the most significant element of overfishing. Intensity is often influenced heavily by demand and technological improvements, which greatly exacerbate the issue. Overfishing is a relatively new phenomenon; with revered English biologist Thomas Huxley famously declaring in

the late 19th century that fisheries were inexhaustible and that fishermen, regardless of technology or intensity, could not conceivably make a discernible impact on total stock populations.¹ Prior to the introduction of steam powered fishing vessels in the 1870s, this assessment would have been accurate, as fishermen simply did not have the means to overfish as their vessel's storage capacity, fishing equipment, and mobility did not allow them to harvest fish at a rate that could be deemed as unsustainable.² With modern advancements such as massive factory ships, global positioning systems (GPS), and techniques that allow ships to deploy hooks and nets at tremendous depths, overfishing is a contemporary issue that will continue into the future.³ In his book *The Unnatural History of the Sea*, Marine biologist Dr. Callum Roberts claimed, "the twentieth century heralded an escalation in fishing intensity that is unprecedented in the history of the oceans, and modern fishing technologies leave fish no place to hide".⁴ Furthermore, a growing world population that is demanding more food than ever creates an impetus for unsustainable fishing, though it has been suggested that in the coming decades more

¹ Smith, Tim. *Scaling Fisheries*. Cambridge University Press, Cambridge. 1994.
<https://books.google.ca/books?id=Z-IVWLY151AC&pg=PR6&lpg=PR6&dq=Smith,+Tim.+1994.+Scaling+Fisheries.+Cambridge+University+Press,+Cambridge.&source=bl&ots=RC-FM>

² Ibid.

³ Ocean Sentry. "Overfishing: Oceans are Dying". *Ocean Sentry*. 2010.
<http://www.oceansentry.org/lang-en/overfishing/campaign.html>

⁴ Roberts, Callum. *The Unnatural History of the Sea*. Island Press. 2007.
<https://books.google.ca/books?id=kPUdwlxmda0C&pg=PA364&lpg=PA364&dq>

sustainable harvesting methods such as fish farming, otherwise known as aquaculture, could potentially begin to abate the ever-growing issue.⁵

Institutional:

There are a myriad of cases in which governments have indirectly induced overfishing within their jurisdictions. These situations have manifested themselves in the form of overly ambitious and seemingly arbitrarily Total Allowable Catches (TAC's) and quotas, discretionary powers, exceedingly generous subsidies to fishermen, and general mismanagement of fisheries.⁶ These will each be discussed in further detail later in the paper in the context of the infamous collapse of Newfoundland's Atlantic cod fishery.

Effects of Overfishing:

The effects of overfishing are substantial, having significant negative impacts not only environmentally, but also socio-economically.

⁵ Food and Agriculture Organization of the United Nations. "Fish Farms to Produce Nearly Two-Thirds of Global Food Fish Supply by 2030". *Food and Agriculture Organization of the United Nations*. 2014.
<http://www.fao.org/news/story/en/item/213522/icode/>

⁶ Harris, Michael. *Lament for an Ocean: The Collapse of the Atlantic Cod Fishery*. McClelland & Stewart. 1998.
https://books.google.ca/books?id=l2D5RgjXWBUC&pg=PA1962&lpg=PA1962&dq=1989+TAC+COD+125000&source=bl&ots=Q2MES-Mukr&sig=2Xi0UM0n52oT1uKvwdfH_BdJXgs&hl=en&sa=X&ved=0CB4Q6AEwAGoVChMIg6jp-rizxwIVF0-1Ch0gdQLj#v=onepage&q=1989%20TAC%20COD%20125000&f=false

Environmental:

Overfishing not only affects the sustainability of the stocks, but often has a domino effect which negatively impacts other species as well. A recent study conducted by researchers from the Future of Marine Animal Populations (FMAP) determined that the overfishing of sharks off of the coast of North Carolina has subsequently increased the amount of cownose rays in the ecosystem.⁷ This has had the result of devastating the populations of the prey the rays feed on, prey that includes the bay scallop, which provides a significant amount of revenue for commercial fishermen in the area.⁸ The unprecedented decrease in bay scallops led to a moratorium on the North Carolina bay scallop fishery, which lasted nearly ten years.⁹ Furthermore, untargeted species are often unintentionally harmed during netting practices, an example of this presenting itself in the statistic that for every ton of shrimp caught by American shrimp fishermen, three to fifteen tonnes of untargeted fish known as “by-catch” are caught and disposed.¹⁰ Additionally, intense bottom trawling, the process of dragging nets with a capacity capable of holding a fleet twelve Boeing 747s along the ocean floor, stirs up sediment and destroys coral reef among other ocean floor organisms.¹¹

⁷ Census of Marine Life. “Effects of Shark Decline” *Census of Marine Life*. 2009.
http://www.coml.org/discoveries/trends/shark_decline_effects

⁸ Ibid.

⁹ Ibid.

¹⁰ Hall, Martin. Dayton Alverson, and Kaija Metuzals. “By-Catch: Problems and Solutions. *Marine Pollution Bulletin*. Volume 41. 2000.

¹¹ Blackford, Mansel G. “Fishers, Fishing, and Overfishing: American Experiences in Global Perspective, 1976-2006”. *Business History Review*. Vol 83, 2.
<http://www.jstor.org.ezproxy.lib.ucalgary.ca/stable/40538842?pq-origsite=summon>

Socio-economic:

As mentioned previously, the economic impact of overfishing is often considerable. For example, the collapse of the Atlantic cod fishery terminated employment for approximately 40,000 Canadians in a total of five provinces who were either directly or indirectly employed by the fishery, Newfoundland being the most hard hit with a loss of 30,000.¹² This is a very significant number when considering that the province's population was at the time was approximately 450,000. Secondary effects of this massive sudden unemployment included stress on EI as well as severe out-migration westward.¹³

1.2: The Tragedy of the Commons

What is a Tragedy of the Commons?:

"The Tragedy of the Commons" or "Open Access Resource Problem", is a term coined in 1967 by Garrett Hardin that describes a particular theoretical situation in which individuals acting independently and rationally according to their self-interest behave contrary to the best interests of a particular group by depleting some common resource.¹⁴ The example Hardin provides in his work is an empty

¹² Heritage: Newfoundland and Labrador. "Economic Impacts of the Cod Moratorium". *Government of Newfoundland and Labrador*. 2015.
<http://www.heritage.nf.ca/articles/economy/moratorium-impacts.php>

¹³ Ibid.

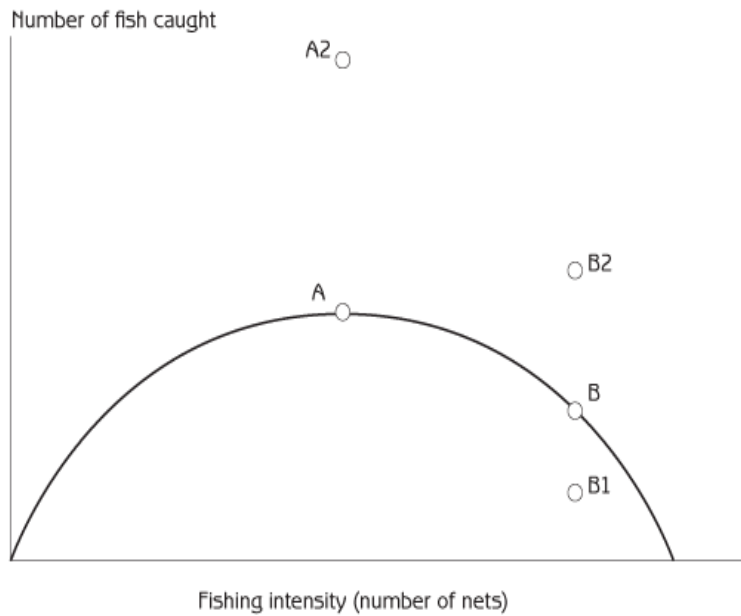
¹⁴ Hardin, Garrett. "The Tragedy of the Commons". *Science*. 1968. Vol. 162 No. 3859
http://www.geo.mtu.edu/~asmayer/rural_sustain/governance/Hardin%201968.pdf

grazing field in which various ranchers leave their cattle to graze.¹⁵ It is in each rancher's best interest to maximize their private benefit by allowing as many cattle to graze in this limited area. The result is an overgrazed pasture that becomes decimated as a result of each rancher attempting to maximize his or her private benefit. The Tragedy of the Commons has been employed to describe a broad range of common property issues involving: intellectual property rights, green house gas (GHG) emissions, water pollution, public roads, deforestation, and most importantly, the topic of this paper, overfishing.

Overfishing is rational:

It is in a fisherman's best interest to fish as intensely as possible, as it is assumed that his or her income will subsequently increase with an increase in the quantity in the amount of fish he or she catches and brings to market. The situation that inevitably occurs is that while high intensity fishing may be in the best interest of the individual, it is not in the best interest of the fish populations, and therefore for the entire group of fishermen. The average fisherman simply does not realize the influence he or she is having on stocks as in general, they cannot individually affect total stock counts themselves, as stocks are simply too large to display discernible population changes by a single fisherman or vessel. The outcome of this practice is simple, the depletion of stocks to levels that are unsustainable and necessitate stringent recovery measures to rebuild stocks and prevent similar situations from reoccurring in the future.

¹⁵ Ibid.



Fishing Intensity: Tragedy of the Commons (gerrymarten.com)

Borrowed from Dr. Gerald Marten, the figure located above is highly useful for illustrating the rationality and consequences of overfishing. Point A represents the number of nets that should be employed by fishermen to produce the most positive outcome for the collective group, a sustainable fishery.¹⁶ A2 represents a situation in which a small group of fishermen employ an increased amount of nets.¹⁷ In this theoretical situation, a small group of fishermen simply cannot cause a significant change in the overall quantity of fish; therefore the end result is an increase in their yield without a significant decrease in the total population. Point B represents a situation in which all fishermen increase the amount of nets (increased intensity), which produces the outcome of significantly depleted stocks.¹⁸ B2 is a situation even more unsustainable than B. In B2, fishermen are attempting to

¹⁶ Marten, Gerald. *Human Ecology: Basic Concepts for Sustainable Development*. Earthscan Publications, 2001. <http://gerrymarten.com/human-ecology/chapter10.html>

¹⁷ Ibid.

¹⁸ Ibid.

outcompete one another by further increasing fishing intensity.¹⁹ While the number of fish caught increases, the outcome is the same as Hardin's grazing example, destruction of the common resource. Finally, B1 represents a situation in which a fisherman employs a proportionally smaller amount of nets while others are overfishing.²⁰

How do we combat a Tragedy of the Commons?:

Garrett Hardin provided two intuitive solutions for the Tragedy of the Commons: private ownership and government regulation.

Private Ownership:

Often presented by libertarians as a rational and sustainable solution to combat a Tragedy of the Commons, private ownership of the world's oceans could perhaps provide a solution to the ongoing issue of overfishing. Norwegian fisheries economist Dr. Rognvaldur Hanneson believes that not only is the privatization of ocean fisheries more efficient economically, but also could effectively solve overfishing. Dr. Hanneson recommends transferable private rights in the form individual transferable quotas (ITQs) that according to his research are extremely efficient and create sufficient incentive to influence prudent management.²¹

¹⁹ Ibid.

²⁰ Ibid.

²¹ Hanneson, Rognvaldur. *The Privatization of the Oceans*. MPS Regional Meeting Iceland.
[http://webcache.googleusercontent.com/search?q=cache:VGzeU1ckFb8J:http://www.montpelerin.org/montpelerin/members/papers/iceland/Prof%](http://webcache.googleusercontent.com/search?q=cache:VGzeU1ckFb8J:http://www.montpelerin.org/montpelerin/members/papers/iceland/Prof%20)

According to Dr. Hanneson, efficiency is improved through ITQs as fishermen who have the capital to pay the most for the transferable quotas in theory are the same fishermen who can derive the most profit out of the quotas, whether that happens to occur through superior equipment, knowledge, or fishing at a lower cost.²²

Additionally, if overcapacity develops within the industry, the most efficient fisherman could purchase the quotas from less efficient fishermen, increasing efficiency and reducing the amount of vessels competing for the same resource.²³

Furthermore, ownership is argued to provide incentive to sustain the value of the quotas. Dr. Hanneson argues that because the value of ownership is based on the present value of future rents in the fishing industry, and poor management will reduce future rents and thereby the value of the use rights, owners will have tremendous incentive to influence far-sighted rather than myopic management of fisheries.²⁴ Countries such as Iceland have had notable success in solving overfishing issues through the implementation of ITQs.²⁵

These recommendations are often contested, with counterarguments most often delivered in the form of a philosophical argument that governments should not have the ability grant exclusive rights to public resources that can increase in value and be bought and sold. Furthermore, there is not sufficient evidence to determine that privatization will undoubtedly lead to far-sighted fisheries management. Humans are generally regarded as myopic and it would not be

²² Ibid.

²³ Ibid.

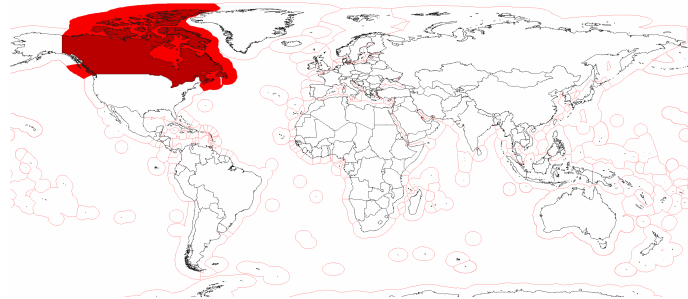
²⁴ Ibid.

²⁵ Gissurarsson, Hannes. *Overfishing: The Icelandic Solution*. Institute of Economic Affairs. 2010. <http://billhutten.s3.amazonaws.com/fw/docs/301.pdf>

unprecedented to observe a situation in which short-term profit would eclipse long-term sustainability.

Government Ownership:

To establish rights over the use and exploration of state's marine resources, the UN Convention on the Law of the Sea formally established Exclusive Economic Zones (EEZ) in



Canada's Exclusive Economic Zone (EEZ)

1982, which stretch from the baseline to 200 nautical miles from the coast.²⁶ Both Canada and the United States have adopted the UN developed Exclusive Economic Zones and have jurisdiction over coastal fisheries under the *Fisheries Act* and *Magnuson-Stevens Act*, administered by the Department of Fisheries and Oceans (DFO) and National Marine Fisheries Service (NMFS), respectively.

1.3: Coastal Overfishing in the United States – Historical and Contemporary

Prior to technological advancements such as purse seiners, long liners, and diesel-powered vessels in the 19th century and early 20th centuries, coastal

²⁶

United Nations. "United Nations Convention on the Law of the Sea of 10 December 1982 Overview and Full Text". *Division for Ocean Affairs and the Law of the Sea. 2013.*
http://www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm

overfishing in the United States was not a significant issue. The Alaskan salmon fishery had historically been an exceptionally strong fishery but due to a combination of weak federal management and severe overfishing, the fishery nearly collapsed by the mid 1950s.²⁷ In 1959, when Alaska was granted statehood, fisheries management was transferred from the federal government to the state.²⁸ In 1973, the state introduced the *Limited Entry Act*, which aimed to limit open access to the Alaskan salmon fishery through the implementation of ITQs, becoming the first to do so in the United States.²⁹ The implementation of ITQs had the effect of greatly limiting the amount of new fishermen entering the Alaskan salmon industry and subsequently tremendously increased salmon stocks.³⁰

The contemporary status of overfishing in the United States can be described as imperfect, but steadily improving. According to the 2014 Status of U.S. Fisheries Report to Congress, the amount of domestic fish stocks deemed as overfished or subject to overfishing is currently at the lowest total since 1997.³¹ These positive results can be attributed to the science-based management system under the *Magnuson-Stevens Act*; most particularly the mandatory rebuilding plans legislated

²⁷ Clark, John et al. "The Commercial Salmon Fishery in Alaska". *Alaska Fishery Research Bulletin*. Vol 12, No. 1. 2006.
<http://www.adfg.alaska.gov/static/home/library/PDFs/afrb/clarv12n1.pdf>

²⁸ Ibid.

²⁹ Ibid.

³⁰ Ibid.

³¹ National Oceanic and Atmospheric Administration. "U.S. Fisheries Continue to Rebuild; Overfishing and Overfished Numbers at All-Time Lows". *National Ocean and Atmospheric Administration*. 2015.
<http://www.noaanews.noaa.gov/stories2015/20150415-us->

in 1996.³² In 2014, three stocks were deemed “rebuilt”, four stocks were added to the overfishing list, and six were removed.³³

Despite the continued improvement, a number of stocks remain on the overfishing and overfished lists. Overfishing refers to a stock that is subject to a harvest rate that is beyond the rate that produces maximum sustainable yield (MSY), the rate that is the largest long term yield that can be taken under prevailing conditions.³⁴ Overfished refers to the condition in which a stock has a biomass level depleted to a degree that the stock’s capacity to produce MSY is jeopardized.³⁵ There are currently thirty-seven stocks on the overfished list, and twenty-five on the overfishing list, with the majority being located in the coastal New England and South Atlantic areas.³⁶

1.4: Coastal Overfishing in Canada – Historical and Contemporary

Whether it is the case of a limited amount of available data or simply a legitimate absence of overfishing, there is a distinct lack of information regarding coastal overfishing in Canada prior to the mid twentieth century. By the middle of the decade in the 1960s, fisheries biologists in British Columbia began to take note

³² Ibid.

³³ Ibid.

³⁴ National Ocean and Atmospheric Administration. “Overfishing VS. Overfished: The Same Thing”? *National Ocean and Atmospheric Administration*. 2014. http://www.fishwatch.gov/features/overfishing_overfished_same_thing.htm

³⁵ Ibid.

³⁶ Ibid.

of falling biomass estimations of Pacific herring off of the province's coast.³⁷ In previous years, up to 250,000 tonnes of herring had been caught yearly, and by 1965 the remaining herring left to spawn was approximately 15,000 tonnes.³⁸ Due to the highly unsustainable harvests of herring, the federal government suspended all commercial herring fishing in British Columbia for a period of four years.³⁹ Unlike cod, herring have the ability to reproduce at a significant rate and within four years, the fishery was reopened.⁴⁰ This case was an impetus of increased fisheries management on the west coast and in the following years the fishery was closed for a combined period of only two years caused by low biomass due to natural factors.⁴¹ The most significant event in the history of Canadian fisheries is the infamous collapse of the Atlantic cod fishery off of the coast of Newfoundland and Labrador, an event that nearly caused the province's economy to collapse and devastated a world class fishery that has still not recovered to this day. This example has been written on extensively and will be the topic of a case study in the coming sections.

While general public knowledge of domestic overfishing is generally limited to cod, there is a significant amount of other species currently at risk due to overfishing. In 2011, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) concluded that the abundance of spawning individuals of the highly valuable Atlantic bluefin tuna stocks had declined by 69% over the past 2.7

³⁷ Canadian Encyclopedia. "History of Commercial Fisheries". *The Canadian Encyclopedia*. 2013. <http://www.thecanadianencyclopedia.ca/en/article/history-of-commercial-fisheries/>

³⁸ Ibid.

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ Ibid.

generations due to overfishing.⁴² COSEWIC has made recommendations to reduce landings of Atlantic bluefin tuna as well as suggested measures to increase post-release survival.⁴³ Furthermore, with a decline in biomass of nearly 90% over a period of forty years, the porbeagle shark is also heavily overfished in Canadian coastal waters and has subsequently become an endangered species.⁴⁴ While the DFO continues to monitor the porbeagle shark's populations and has placed measures prohibiting the removal of fins as well as limiting permits to fish the species, there currently is not a plan in place to rebuild the shark's numbers.⁴⁵ Alas, any future rebuilding measures, however unlikely, would perhaps be too late, as it is uncertain that the decline of the species is reversible.⁴⁶ Additionally, industrially significant species such as the North Atlantic swordfish, winter skate, Atlantic salmon, haddock, yellow tail flounder, sole, and Atlantic halibut have all been deemed as overfished in Canadian coastal waters.⁴⁷

⁴² Department of Fisheries and Oceans. "Recovery Potential Assessment for Western Atlantic Bluefin Tuna (*Thunnus Thynnus*) in Canadian Waters". *Canadian Science Advisory Secretariat Science Advisory Report*. 2011. <http://www.dfo-mpo.gc.ca/Library/344451.pdf>

⁴³ Ibid.

⁴⁴ Species at Risk Public Registry. "Species Profile: Porbeagle". *Species at Risk Public Registry*. 2014. http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=810

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Greenpeace. "Which Fish can I Eat"? *Greenpeace*. 2014. <http://www.greenpeace.org/international/en/campaigns/oceans/which-fish-can-i-eat/>

Case Studies:

2.1: The Collapse of the Atlantic Cod

Background:

For nearly 500 years, Newfoundland's Atlantic cod stocks were regarded as one of the world's greatest fisheries. There is documentation of Europeans fishing for cod off of the coast of Newfoundland beginning in 1504 with French, English, Spanish, and Portuguese fishermen fishing off of the shore of Newfoundland by 1520.⁴⁸ Unsurprisingly, the fishing methods were fairly basic with small vessels employing gillnets and hook and lines with total harvests amounting to less than 100,000 tonnes in the 16th, 17th, and 18th centuries eventually reaching 300,000 tonnes in the late 19th century.⁴⁹ During these centuries, war was often an influential factor in determining total harvests with the War of the Spanish Succession, War of the Austrian Succession, Seven Years' War, American War of Independence, and the Napoleonic wars all severely affecting the ability of countries to man and finance ships to fish the coast.⁵⁰ In the years between 1900 and 1949, France and the Dominion of Newfoundland accounted for more than 90% of the total cod catches in Newfoundland's coastal shores.⁵¹ Between 1960 and 1975,

⁴⁸ Cadigan, Sean and Jeffrey Hutchings. "Nineteenth-Century Expansion of the Newfoundland Fishery for Atlantic Cod: An Exploration of Underlying Causes". University of Dalhousie.
http://myweb.dal.ca/jhutch/publications_pdfs/b_cad_hut.pdf

⁴⁹ Ibid.

⁵⁰ Ibid.

⁵¹ Ibid.

overfishing began to occur with nearly 8 million tonnes of cod harvested, an amount that exceeded the total harvests in the entire period between 1500 and 1750.⁵²

By the mid 1970s, noticeable declines were observed in the annual harvests of Atlantic cod off of the coast of Newfoundland, with 1975's annual catch falling by more than 60% from historical highs in 1968.⁵³ Numbers continued to fall before technological advancements in sonar and satellite navigation managed to discover and exploit the few remaining stocks in the mid 1980s.⁵⁴ By 1992, the fishery had collapsed and newly minted DFO Minister John Crosbie was forced to issue a moratorium on the fishery. Put into the context of sheer numbers, the cod's biomass fell to 1% of its historical numbers, two billion individual cod were lost, and the loss of the stocks, put into human weight, was the equivalent of a loss of approximately twenty-seven million people.⁵⁵

According to Dr. Jeffrey Hutchings, multiple factors compounded to exacerbate the issue, resulting in the collapse. Among them was increased harvesting efficiency (technological advances), changes in temporal and spatial changes in fishing effort (fishing intensity), errors in estimating stock abundance,

⁵² Ibid.

⁵³ Greenpeace. "The Collapse of the Canadian Newfoundland Cod Fishery." *Greenpeace*. 2009.
<http://www.greenpeace.org/international/en/campaigns/oceans/seafood/understanding-the-problem/overfishing-history/cod-fishery-canadian/>

⁵⁴ Ibid.

⁵⁵ Greenberg, Paul. *Four Fish: The Future of the Last Wild Food*. Penguin Press. New York. 2010.
<https://books.google.ca/books?id=ZVvK7yp1FzkC&pg=PT108&lpg=PT108&q=cod+biomass+equal+to+27million+people&source>

overly ambitious economic policy, and industrial greed.⁵⁶ In one event, the Department of Fisheries and Oceans (DFO) recommended that the total allowable catch (TAC) should be 125,000 tons, a figure that was calculated by using a maximum sustainable yield (MSY) model.⁵⁷ These models are often inaccurate and overly simplified, and when taken literally, can lead to devastating effects. An example of multiple factors compounding to exacerbate the issue occurred when the incumbent Minister of the DFO, Tom Siddon, pressured by industry, decided to arbitrarily increase the TAC to 235,000 tons.⁵⁸ While it has not been proven, it can be suggested that the 125,000 tons was perhaps a significant overestimation.⁵⁹ Within three years, the fishery would collapse and a moratorium would be issued.

The socio-economic effects of the collapse and subsequent moratorium on Newfoundland's cod fishery were tremendous. Not only was the cod fishery an economic pillar in the lives of everyday Newfoundlanders, but also a significant cultural one. The moratorium created the single largest layoff in any region or

⁵⁶ Hutchings, Jeffrey, and Ransom A. Myers. "The Biological Collapse of Atlantic Cod Off Newfoundland and Labrador": An Exploration of Historical Changes in Exploitation, Harvesting Technology, and Management". http://ram.biology.dal.ca/~myers/papers/papers-total/biological_collapse.pdf

⁵⁷ Harris, Michael. *Lament for an Ocean: The Collapse of the Atlantic Cod Fishery*. McClelland & Stewart. 1998.

⁵⁸ Ibid.

⁵⁹ Ibid.

industry in Canadian history, with nearly 30,000 Newfoundlanders or nearly 12% of the workforce laid off in the wake of the closure.⁶⁰

Due to the massive layoff of approximately 30,000 workers, the federal government provided several social assistance programs for the suddenly unemployed Newfoundlanders previously employed by the cod fishery. Between 1992 and 1998, the federal government provided two programs, the Northern Cod Adjustment and Rehabilitation Program (NCARP) and The Atlantic Groundfish Strategy (TAGS).⁶¹

Almost immediately after the announcement of the moratorium, the federal government introduced the NCARP aid package to the affected workers. The package provided weekly payments to unemployed fishery workers based on the average unemployment insurance payments they received between 1989 and 1992, weekly payments that ranged between \$225-\$406 per week.⁶² This program allowed the affected workers to receive, on average, approximately the same yearly earnings as the year before.⁶³ Recipients were required to take part in educational and training courses to upgrade their skills related to or unrelated to the fishery

⁶⁰ Heritage: Newfoundland and Labrador. "Economic Impacts of the Cod Moratorium". *Government of Newfoundland and Labrador*. 2015. <http://www.heritage.nf.ca/articles/economy/moratorium-impacts.php>

⁶¹ Government of Newfoundland and Labrador. "Northern Cod Moratorium Support Programs". *Government of Newfoundland and Labrador*. 1993. http://www.economics.gov.nl.ca/archives/E1993/SF_Northern%20Cod%20Moratorium%20Support%20Programs.pdf

⁶² Ibid.

⁶³ Ibid.

industry.⁶⁴ Those who did not participate in the educational program had their weekly benefits reduced to the minimum amount of \$225 per week. In total, nearly 28,000 unemployed Newfoundlanders received benefits from the NCARP.⁶⁵

In 1994, TAGS was implemented by the federal government in an effort to provide income and educational support for Newfoundlanders affected by the moratorium. There were a number of different avenues provided by TAGS to reach this goal including: skills training, support for relocation expenses, early retirement, career counseling, and finally, license retirement where an average of \$115,000 was awarded to fishermen who surrendered their groundfish licenses.⁶⁶

When viewing the TAGS program, it is not difficult to see what the underlying purpose of the program was, an effort by the federal government to decrease the amount of fishermen in Newfoundland. This goal was reached with little success. It has been argued that the TAGS program was highly unsuccessful in the sense that it did not reach its goal of decreasing the number of fishermen in Newfoundland and subsequently led to the issue of increasing the number of people dependent on assistance from the federal government.⁶⁷

⁶⁴ Ibid.

⁶⁵ Ibid.

⁶⁶ Government of Newfoundland and Labrador. The Atlantic Groundfish Strategy: Highlights of TAGS Interventions. *Government of Newfoundland and Labrador*. <http://www.gov.nl.ca/publicat/tags/text/page9.htm>

⁶⁷ Heritage: Newfoundland and Labrador. "Economic Impacts of the Cod Moratorium". *Government of Newfoundland and Labrador*. 2015. <http://www.heritage.nf.ca/articles/economy/moratorium-impacts.php>

2.2: Canadian Fisheries Policy and Legislation:

The Constitution Act 1867 states that the federal government has exclusive authority over “Seacoast and Inland Fisheries”, though section 91 (12) did not effectively transfer the responsibility of inland fisheries to the federal government, leaving solely seacoast fisheries as being exclusive jurisdiction of the federal government.⁶⁸ Today, the *Fisheries Act* is the federal law that governs Canadian coastal fisheries with the Department of Fisheries and Oceans administering the act.

Currently, Canada’s main policy directed towards the rebuilding of depleted stocks is the *Guidance for the Development of Rebuilding Plans under the Precautionary Approach Framework: Growing Stocks out of the Critical Zone*.⁶⁹ While the policy is strongly result oriented and delivers serious devotion to short and long-term objectives in terms of rebuilding stocks, it is merely toothless in comparison to the legislative “bite” provided by the *Magnuson-Stevens Act*.⁷⁰ On the surface, the strategies appear to be sound, but offer little in the way of actual objectives in terms of numbers, making it very difficult to judge the effectiveness of the strategies, a condition that has been criticized by the auditor general.⁷¹ The

⁶⁸ Government of Manitoba. “Legislative Framework Overview”.

<http://www.gov.mb.ca/waterstewardship/fisheries/regulations/leg.pdf>

⁶⁹ Department of Fisheries and Oceans. *Guidance for the Development of Rebuilding Plans under the Precautionary Approach Framework: Growing Stocks out of the Critical Zone*. 2013. <http://www.dfo-mpo.gc.ca/fm-gp/peches-fisheries/fish-ren-peche/sff-cpd/precautionary-precaution-eng.htm>

⁷⁰ Ibid.

⁷¹ Hutchings, Jeffrey. Canada has Geographical, Moral Imperative to Protect Health of Oceans and its Species”. *The Hill Times*. 2009.

http://myweb.dal.ca/jhutch/media_pdfs/Canadas_imperative.pdf

lengthy policy contains “overfishing” only once in the entire document, leading one to believe that the DFO has not put in sufficient stock into overfishing policy.

Canadian fisheries legislation can be criticized for its apparent lack of science based management, and failure to recognize and deal with overfishing as a serious issue. For example, in a report on sustaining Canada’s marine biodiversity by a Royal Society of Canada expert panel, it was discovered that in the eighty-eight sections of the *Fisheries Act*, the words “overfishing”, “rebuild”, and “target” are not mentioned with the word “recovery” occurring only once, twice in the context of recovering legal costs and only once in the context of the recovery of a fish stock.⁷² Three years later in 2015, this remains the case. This is contrasted by the *Magnuson-Stevens Act* containing “overfishing” forty five times, “rebuild” twenty seven times, “target” twenty two times, and “recovery” on twelve occasions.⁷³ Furthermore, the Department of Fisheries and Oceans website lists a chronology of updates titled “Chronology of Canada’s Actions to Curb Overfishing and Improve International

⁷² Hutchings et. al. “Sustaining Canada’s Marine Biodiversity: Responding to the Challenges Posed by Climate Change, Fisheries, and Aquaculture”. *The Royal Society of Canada Academies of Arts, Humanities and Sciences of Canada*. February 2012.
http://rsc.ca/sites/default/files/pdf/RSCMarineBiodiversity2012_ENFINAL.pdf

⁷³ Ibid.

Fisheries and Oceans Governance”.⁷⁴ The chronology, first updated in 2008, was last updated three years ago in 2012.⁷⁵

Further, it is argued that the Fisheries Act is highly discretionary, rather than proscriptive, in the sense that the Act fails to specify conditions under which the Minister must respond to particular situations.⁷⁶ Because of this, the Minister of Fisheries and Oceans has a disproportionate amount of discretionary power which as identified earlier, has had devastating effects in the past.⁷⁷

Additionally, the Act does little to hold decision makers accountable. When aggressively questioned in regards to the issuing of the moratorium in 1992, incumbent DFO Minister defended himself by exclaiming, “There’s no need to abuse me, I didn’t take the fish from the goddamn water”.⁷⁸ Furthermore, Canadian fisheries expert Dr. Jeffrey Hutchings asserts, “There are few if any political costs in this country to making bad ocean management decisions” and that “If there were

⁷⁴ Department of Fisheries and Oceans. “Canada’s Actions: Chronology of Canada’s Actions to Curb Overfishing and Improve International Fisheries and Ocean Governance”. *Department of Fisheries and Oceans*. 2012. <http://www.dfo-mpo.gc.ca/international/isu-act-eng.htm>

⁷⁵ Ibid.

⁷⁶ Hutchings, Jeffrey. Canada has Geographical, Moral Imperative to Protect Health of Oceans and its Species”. *The Hill Times*. 2009. http://myweb.dal.ca/jhutch/media_pdfs/Canadas_imperative.pdf

⁷⁷ Ibid.

⁷⁸ Roberts, Callum. *The Unnatural History of the Sea*. Island Press. 2007. <https://books.google.ca/books?id=kPUdwlxmda0C&pg=PA364&lpg=PA364&dq>

political costs, we wouldn't see these types of decisions being made on an almost routine basis."⁷⁹

The *Fisheries Act* existed during a period where the single greatest lay off in Canadian history occurred, an event that was mismanaged prior, during, and after the collapse. Furthermore, the Act is currently overseeing contemporary overfishing issues and is doing little to alleviate the situation, as highlighted earlier. Needless to say, as it currently stands, the Act does not have an impressive track record.

2.3: US Case Studies

To illustrate the success the *Magnuson-Stevens Act* has had in recovery efforts for overfished stocks in US coastal fisheries, several case studies will be employed.

Pacific Lingcod:

After being determined by the federal government in 1999 that the current spawning potential of Pacific lingcod was at 7.5% of the average level and thus being deemed as "overfished", the Pacific lingcod was subject to a ten year rebuilding plan as set out by the *Magnuson-Stevens Act*.⁸⁰ The rebuilding plan suggested that there was a 60% chance that levels rebuild to the maximum sustainable yield (MSY) in ten

⁷⁹ Contenta, Sandro. "Scientists Fear Canada Will Fish Bluefin Tun and Other Species to Extinction". *The Toronto Star*. 2012.
<http://www.thestar.com/news/insight.html>

⁸⁰ National Oceanic and Atmospheric Administration: Federal Register. Department of Commerce. *National Oceanic and Atmospheric Administration*. Volume 65, Issue 172. 2000. <http://www.gpo.gov/fdsys/pkg/FR-2000-09-05/html/00-22547.htm>

years.⁸¹ The rebuilding plan stipulated multiple conditions to achieve the goal of a rebuild within ten years, steps which included: suspension of commercial fishing of ling cod for six months of the spawning year (January-April, December-January), increased size limits and decreased day bag limits for recreational fishermen, gear restrictions, as well as other restrictions tailored to various reasons.⁸² The rebuilding plan was a massive success. In 2005, it was determined that stocks had been rebuilt with populations being 60% greater than expected, accomplishing the goal four years earlier than scheduled.⁸³ The rebuilding plan set out by the *Magnuson-Stevens Act* is commonly associated as the reason for the overwhelming success of the resurgence.⁸⁴

Atlantic Sea Scallop:

In the early 1990s, the once burgeoning Atlantic sea scallop industry began to collapse due to low harvests induced by overfishing. Beginning in 1994, fisheries managers adopted various measures in an attempt to rebuild the once prosperous fishery. The managers developed limits on crew size as well as limiting the amount of days that each vessel could fish to reduce fishing pressure on scallops.⁸⁵

⁸¹ Ibid.

⁸² Ibid.

⁸³ Natural Resources Defense Council. "Successfully Rebuilding American Fisheries Under the *Magnuson-Stevens Act*. *Natural Resources Defense Council*. 2014. <http://www.nrdc.org/oceans/files/rebuilding-fisheries-successes-FS.pdf>

⁸⁴ Ibid.

⁸⁵ National Oceanic and Atmospheric Administration. "Fish Watch: Atlantic Sea Scallop". *National Oceanic and Atmospheric Administration*. 2015. http://www.fishwatch.gov/seafood_profiles/species/scallop/species_pages/atlantic_sea_scallop.htm

Furthermore, a rotational access area program was implemented for the scallop fishery where areas around concentrations of young sea scallops on Georges Bank and off the Mid-Atlantic states were closed to enable them to grow undisturbed and reproduce.⁸⁶ The results were tremendous. Atlantic sea scallops rebounded in seven years to levels ten times higher than that of 1993 levels and today the Atlantic sea scallop industry is the second most valuable fishery in the United States and the single most valuable sea scallop fishery in the world.⁸⁷ Again, the *Magnuson Stevens Act* has often been noted as the legislation, which allowed for the proper rebuilding.⁸⁸

2.4: United States Fisheries Policy: The *Magnuson Stevens Act*

Prior to 1976, there was essentially no federal management of fisheries in the United States.⁸⁹ The federal government's role primarily consisted of research, exploratory fishing, financial assistance, gear development, and participation in international agreements and treaties.⁹⁰ The act, originally named the *Fishery Conservation and Management Act of 1976*, is administered by the National Marine Fisheries Service (NMFS), informally known as the NOAA. The act currently lists seven purposes in which it strives to achieve: acting to conserve fishery resources,

⁸⁶ Ibid.

⁸⁷ Ibid

⁸⁸ Ibid.

⁸⁹ Food and Agriculture Organization of the United Nations. "Fishery Country Profile: the United States. *Food and Agriculture Organization of the United Nations*. 2005. ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_US.pdf

⁹⁰ Ibid.

supporting enforcement of international fishing agreements, promoting fishing in line with conservation principles, providing for the implementation of fishery management plans which achieve optimal yield, establishing regional fishery management councils to steward fishery resources through the preparation, monitoring, and revising plans, developing underutilized fisheries, protecting essential fish habitats, and finally, reducing by catch and establishing fishery information monitoring systems.⁹¹

Sustainable Fisheries Act:

The most significant amendment to the *Magnuson-Stevens Act* occurred in 1996 when the *Sustainable Fisheries Act* brought forth several key additions to the Act. In addition to the inclusion of fourteen new definitions that had become relevant in the twenty years since the implementation of the original act, most importantly the mandate that for species deemed overfished, plans must be enacted allowing them to recover to quantitatively specified target population levels (usually about one-third of the estimated pre-fishing population) within ten years.⁹² This amendment has often been commended for the significant improvement of stocks and according to leading Canadian expert on overfishing, Dr. Jeffrey Hutchings, is essential for Canada to adopt in the country's efforts against

⁹¹ National Oceanic and Atmospheric Administration. "*Magnuson-Stevens Fishery Conservation and Management Act*". *National Oceanic and Atmospheric Administration*. 2007.
http://www.nmfs.noaa.gov/msa2005/docs/MSA_amended_msa%20_20070112_FINAL.pdf

⁹² Ibid.

overfishing.⁹³ Since the reforms in 1996, a total of thirty four stocks have been rebuilt, two thirds of overfished stocks have been rebuilt or are currently making progress, and a 92% increase (54% adjusted for inflation) in commercial revenues for these stocks has been achieved.⁹⁴

3.1: Recommendation: The *Magnuson-Stevens Act* in Canada

It has been identified that current federal management of Canadian coastal fisheries has been mismanaged to the detriment of both fish stocks and the fisheries industry. While the current and future consequences of mismanaged fisheries may never approach the magnitude of the collapse of the Atlantic cod fishery in 1992, it remains that there are still a significant amount of livelihoods and species in potentially serious danger.

The proposed recommendation would be legislation inspired by the current *Magnuson-Stevens Act*, most specifically the 1996 *Sustainable Fisheries Act* amendment outlined in previous pages. The inclusion of an act similar to the *Magnuson-Stevens Act* would effectively provide the legislative “bite” that Canadian fisheries policy currently lacks in the pursuit of correcting overfishing issues. When a stock is deemed overfished, the power would be available to immediately cease fishing operations and develop a rebuilding plan that would attempt to rebuild the

⁹³ CBC News. “Some Fish Species May Never Come Back, Says Study”. *CBC News*. 2013. <http://www.cbc.ca/news/canada/nova-scotia/some-fish-species-may-never-bounce-back-says-study-1.1390243>

⁹⁴ Natural Resources Defense Council. “Successfully Rebuilding American Fisheries Under the *Magnuson-Stevens Act*”. *Natural Resources Defense Council*. 2014. <http://www.nrdc.org/oceans/files/rebuilding-fisheries-successes-FS.pdf>

stock within a period of ten years, a period of time that has been shown to be sufficient to effectively rebuild stocks.⁹⁵ This type of proscriptive management was severely lacking during the collapse of the cod fishery and could perhaps have successfully rebuilt the depleted stocks or prevented the collapse from happening. The recommendation not only provides safety for biodiversity, but for the fisheries industry as well. Sustainable fisheries create sustainable fishery economies, a reality that can effectively bridge the gap between good politics and good policy.

With the *Fisheries Act* being the controlling act of federal fisheries management in Canada, the current Act would require an amendment to include the recommendation. This could be accomplished through the use of an amending act, which would prevent the *Fisheries Act* from having to be completely rewritten. Alternatively, if an amending act would not be sufficient in the event that the amendment were too convoluted or beyond the scope of the original act, another route that could be taken would be to have a separate bill introduced in parliament. The bill would require the standard procession of a first reading, second reading, committee stage, report stage, third reading, and finally, royal assent from the Governor General prior to becoming law.

4.1: The *Magnuson-Stevens Act* in Canada: Feasibility

From studying Canada's neighbors to the south, it becomes increasingly apparent that taking a page from the United States' fisheries policy would not only

⁹⁵ McNutt, Ryan. "Don't Call it a Comeback: New Study Casts Doubt on Cod Recovery". *Dal News*. 2013. <http://www.dal.ca/news/2013/04/26/don-t-call-it-a-comeback--new-study-casts-doubt-on-cod-recovery.html>

help to sustain Canada's fisheries biologically, but also socio-economically. The *Magnuson-Stevens Act*, particularly the 1996 *Sustainable Fisheries Act* amendment has been by nearly every account extremely effective in not only preventing overfishing, but also rebuilding stocks when they succumb to depleted populations due to overfishing. Still, with everything considered, one glaring question remains. "If overfishing issues in Canada could be greatly assisted by legislation inspired by the United States' *Magnuson-Stevens Act*, then why has it not already been done"? This is a question that is extremely difficult to answer, with little if anything devoted to the apparent conundrum in the literature. Despite the lack of concrete answers, there are several suggestions that can be made to address the question.

To begin, it would not be a stretch to present the hypothesis that there has historically been little public or political interest in developing strong federal management of fisheries in Canada. As shown previously, the federal response to the collapse of the cod fishery in Newfoundland as well as the decades of overfishing prior was extremely slow to develop and tangible conservation measures since then has been few and far between. Fisheries in Canada appear to be viewed staunchly as issues pertaining to remote areas on opposite ends of the country, rather than a unified Canadian issue. Furthermore, the Maritime Provinces wield little political clout in Parliament, affecting their ability to leverage Parliament to take fisheries conservation seriously. For example, Newfoundland currently has 7 of 308 seats in the House of Commons, a figure that makes up only 2.3% of the total House seats in

Parliament.⁹⁶ Collectively, Newfoundland, Prince Edward Island, Nova Scotia, and New Brunswick make up a total of 10.4% of House seats.⁹⁷

Furthermore, historically there has been significant influence on fisheries management by unions and industry in the Maritime Provinces.⁹⁸ Stringent fisheries management is not profitable in the short term, therefore it is not implausible to foresee backlash from unions and industry when faced with increased restrictions and regulations.

Additionally, a possible obstacle occurs when considering that the DFO also has a mandate to promote Canada's fisheries industry. While it may come as being fairly intuitive that the promotion and execution of sustainable fisheries is a situation that all stakeholders should desire to pursue, the reality is often different.

5.1: Lessons

The current lack of effective fisheries management by Canada's federal government has put Canada's fisheries at a severe risk of overexploitation, a situation that has been shown to have tremendously negative consequences in the past. It has been determined that the United States has had significant success pertaining to overfishing through effective federal management of coastal fisheries,

⁹⁶ Elections Canada. "House of Commons Seat Allocation by Province". *Elections Canada*. 2012.
<http://www.elections.ca/content.aspx?section=res&dir=cir/red/allo&document=index&lang=e>

⁹⁷ Ibid.

⁹⁸ Parliament of Canada. "Northern Cod: A Failure of Canadian Fisheries Management". *Committee Report*.
<http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=2144982&File=21>

particularly through the *Magnuson-Stevens Act*. Furthermore, several other states including Iceland, Australia, and Chile have also effectively combatted overfishing through effective fisheries management. While in each example success was derived through different approaches, the common theme is that when identified, overfishing issues could be remedied, proving that the overfishing of fish stocks does not always result in the total destruction of the fishery. Stronger federal management at the time of the collapse in Newfoundland could perhaps have lessened the blow or even have prevented the event from occurring. With Canada boasting the world's longest coastline, a considerable history of commercial fishing, and the value of Canadian marine fisheries amounting to nearly \$6.5 billion annually and employing nearly 80,000 Canadians in the industry, a weak and discretionary approach to federal fisheries management simply is not sufficient.⁹⁹

⁹⁹ Department of Fisheries and Oceans. "Canada's Fisheries: Fast Facts 2014. *Fisheries and Oceans Canada*. 2014.:<http://www.dfo-mpo.gc.ca/stats/facts-Info-13-eng.htm>

Bibliography

- Blackford, Mansel G. "Fishers, Fishing, and Overfishing: American Experiences in Global Perspective, 1976-2006". *Business History Review*. Vol 83, 2. <http://www.jstor.org.ezproxy.lib.ucalgary.ca/stable/40538842?pq-origsite=summon>
- Cadigan, Sean and Jeffrey Hutchings. "Nineteenth-Century Expansion of the Newfoundland Fishery for Atlantic Cod: An Exploration of Underlying Causes". University of Dalhousie. http://myweb.dal.ca/jhutch/publications_pdfs/b_cad_hut.pdf
- Canadian Encyclopedia. "History of Commercial Fisheries". *The Canadian Encyclopedia*. 2013. <http://www.thecanadianencyclopedia.ca/en/article/history-of-commercial-fisheries/>
- CBC News. "Some Fish Species May Never Come Back, Says Study". *CBC News*. 2013. <http://www.cbc.ca/news/canada/nova-scotia/some-fish-species-may-never-bounce-back-says-study-1.1390243>
- Census of Marine Life. "Effects of Shark Decline" *Census of Marine Life*. 2009. http://www.coml.org/discoveries/trends/shark_decline_effects
- Clark, John et al. "The Commercial Salmon Fishery in Alaska". *Alaska Fishery Research Bulletin*. Vol 12, No. 1. 2006. <http://www.adfg.alaska.gov/static/home/library/PDFs/afrb/clarv12n1.pdf>
- Contenta, Sandro. "Scientists Fear Canada Will Fish Bluefin Tun and Other Species to Extinction". *The Toronto Star*. 2012. <http://www.thestar.com/news/insight.html>
- Department of Fisheries and Oceans. "Canada's Actions: Chronology of Canada's Actions to Curb Overfishing and Improve International Fisheries and Ocean Governance". *Department of Fisheries and Oceans*. 2012. <http://www.dfo-mpo.gc.ca/international/isu-act-eng.htm>
- Department of Fisheries and Oceans. "Canada's Fisheries: Fast Facts 2014". *Fisheries and Oceans Canada*. 2014.:<http://www.dfo-mpo.gc.ca/stats/facts-Info-13-eng.htm>
- Department of Fisheries and Oceans Canada. "Global Consequences of Overfishing". 2009. <http://www.dfo-mpo.gc.ca/international/isu-global-eng.htm>

- Department of Fisheries and Oceans. "Recovery Potential Assessment for Western Atlantic Bluefin Tuna (*Thunnus Thynnus*) in Canadian Waters". *Canadian Science Advisory Secretariat Science Advisory Report*. 2011. <http://www.dfo-mpo.gc.ca/Library/344451.pdf>
- Elections Canada. "House of Commons Seat Allocation by Province". *Elections Canada*. 2012. <http://www.elections.ca/content.aspx?section=res&dir=cir/red/allo&document=index&lang=e>
- Food and Agriculture Organization of the United Nations. "Fish Farms to Produce Nearly Two-Thirds of Global Food Fish Supply by 2030". *FAO*. 2014. <http://www.fao.org/news/story/en/item/213522/icode/>
- Food and Agriculture Organization of the United Nations. "Fishery Country Profile: the United States. *FAO UN*. 2005. ftp://ftp.fao.org/FI/DOCUMENT/fcp/en/FI_CP_US.pdf
- Government of Manitoba. "Legislative Framework Overview". <http://www.gov.mb.ca/waterstewardship/fisheries/regulations/leg.pdf>
- Government of Newfoundland and Labrador. "Northern Cod Moratorium Support Programs". *Government of Newfoundland and Labrador*. 1993. [http://www.economics.gov.nl.ca/archives/E1993/SF Northern%20Cod%20Moratorium%20Support%20Programs.pdf](http://www.economics.gov.nl.ca/archives/E1993/SF%20Northern%20Cod%20Moratorium%20Support%20Programs.pdf)
- Government of Newfoundland and Labrador. The Atlantic Groundfish Strategy: Highlights of TAGS Interventions. *Government of Newfoundland and Labrador*. <http://www.gov.nl.ca/publicat/tags/text/page9.htm>
- Greenpeace. "The Collapse of the Canadian Newfoundland Cod Fishery". *Greenpeace*. 2009. <http://www.greenpeace.org/international/en/campaigns/oceans/seafood/understanding-the-problem/overfishing-history/cod-fishery-canadian/>
- Greenpeace. "Which Fish can I Eat"? *Greenpeace*. 2014. <http://www.greenpeace.org/international/en/campaigns/oceans/which-fish-can-i-eat/>
- Hannesson, Rognvaldur. *The Privatization of the Oceans*. MIT Press: Cambridge. 2004.
- Hannesson, Rognvaldur. *The Privatization of the Oceans*. MPS Regional Meeting Iceland. <http://webcache.googleusercontent.com/search?q=cache:VGzeU1ckFb8J:https://www.montpelerin.org/montpelerin/members/papers/iceland/Prof%>

- Hardin, Garrett. "The Tragedy of the Commons". *Science*. 1968. Vol. 162 No. 3859
http://www.geo.mtu.edu/~asmayer/rural_sustain/governance/Hardin%201968.pdf
- Harris, Michael. *Lament for an Ocean: The Collapse of the Atlantic Cod Fishery*. McClelland & Stewart. 1998.
https://books.google.ca/books?id=l2D5RgjXWBUC&pg=PA1962&lpg=PA1962&dq=1989+TAC+COD+125000&source=bl&ots=Q2MES-Mukr&sig=2Xi0UM0n52oT1uKvwdFH_BdJXgs&hl=en&sa=X&ved=0CB4Q6AEwAGoVChMIg6jp-rizxwIVF0-ICCh0gdQLj#v=onepage&q=1989%20TAC%20COD%20125000&f=false
- Heritage: Newfoundland and Labrador. "Economic Impacts of the Cod Moratorium". *Government of Newfoundland and Labrador*. 2015.
<http://www.heritage.nf.ca/articles/economy/moratorium-impacts.php>
- Hutchings, Jeffrey, and Ransom A. Myers. "The Biological Collapse of Atlantic Cod Off Newfoundland and Labrador": An Exploration of Historical Changes in Exploitation, Harvesting Technology, and Management".
http://ram.biology.dal.ca/~myers/papers/papers-total/biological_collapse.pdf
- Hutchings, Jeffrey. Canada has Geographical, Moral Imperative to Protect Health of Oceans and its Species". *The Hill Times*. 2009.
http://myweb.dal.ca/jhutch/media_pdfs/Canadas_imperative.pdf
- Hutchings, J.A., and Rangeley, R.W. 2011. "Correlates of Recovery for Canadian Atlantic Cod". *Canadian Journal of Zoology* 89: 386-400.
- Hutchings et. al. "Sustaining Canada's Marine Biodiversity: Responding to the Challenges Posed by Climate Change, Fisheries, and Aquaculture". *The Royal Society of Canada Academies of Arts, Humanities and Sciences of Canada*. February 2012.
http://rsc.ca/sites/default/files/pdf/RSCMarineBiodiversity2012_ENFINAL.pdf
- Marten, Gerald. *Human Ecology: Basic Concepts for Sustainable Development*. Earthscan Publications: 2001. <http://gerrymarten.com/human-ecology/chapter10.html>
- McNutt, Ryan. "Don't Call it a Comeback: New Study Casts Doubt on Cod Recovery". *Dal News*. 2013. <http://www.dal.ca/news/2013/04/26/don-t-call-it-a-comeback--new-study-casts-doubt-on-cod-recovery.html>

National Oceanic and Atmospheric Administration: Federal Register. Department of Commerce. *National Oceanic and Atmospheric Administration*. Volume 65, Issue 172. 2000. <http://www.gpo.gov/fdsys/pkg/FR-2000-09-05/html/00-22547.htm>

National Oceanic and Atmospheric Administration. "Fish Watch: Atlantic Sea Scallop". *National Oceanic and Atmospheric Administration*. 2015. http://www.fishwatch.gov/seafood_profiles/species/scallop/species_pages/atlantic_sea_scallop.htm

National Oceanic and Atmospheric Administration. "Fish Watch: Overfishing VS Overfished: The Same Thing?". *National Oceanic and Atmospheric Administration*. 2014. http://www.fishwatch.gov/features/overfishing_overfished_same_thing.htm

National Oceanic and Atmospheric Administration. *Magnuson-Stevens Fishery Conservation and Management Magnuson Act*. *National Oceanic and Atmospheric Administration*. 2007. http://www.nmfs.noaa.gov/msa2005/docs/MSA_amended_msa%20_20070112_FINAL.pdf

National Oceanic and Atmospheric Administration. "The Road to End Overfishing: 35 Years of *Magnuson-Stevens Act*". *National Oceanic and Atmospheric Administration*. 2011. <http://www.nmfs.noaa.gov/stories/2011/20110411roadendoverfishing.htm>

National Oceanic and Atmospheric Administration. "Status of Stocks 2014: Annual Report to Congress on the Status of U.S. Fisheries". *National Oceanic and Atmospheric Administration*. 2014. http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/archive/2014/2014_status_of_stocks_final_web.pdf

National Oceanic and Atmospheric Administration. "U.S. Fisheries Continue to Rebuild; Overfishing and Overfished Numbers at All-Time Lows". *National Oceanic and Atmospheric Administration*. 2015. <http://www.noanews.noaa.gov/stories2015/20150415-us-fisheries-continue-to-rebuild-overfishing-and-overfished-numbers-at-all-time-lows.html>

Natural Resources Defense Council. "Successfully Rebuilding American Fisheries Under the *Magnuson-Stevens Act*". *Natural Resources Defense Council*. 2014. <http://www.nrdc.org/oceans/files/rebuilding-fisheries-successes-FS.pdf>

Parliament of Canada. "Northern Cod: A Failure of Canadian Fisheries Management". *Committee Report*.
<http://www.parl.gc.ca/HousePublications/Publication.aspx?DocId=2144982&File=21>

Smith, Tim. 1994. *Scaling Fisheries*. Cambridge University Press, Cambridge.
<https://books.google.ca/books?id=Z-IVWLY151AC&pg=PR6&lpg=PR6&dq=Smith,+Tim.+1994.+Scaling+Fisheries.+Cambridge+University+Press,+Cambridge.&source=bl&ots=RC-FM>

Species at Risk Public Registry. "Species Profile: Porbeagle". *Species at Risk Public Registry*. 2014. http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=810

United Nations. "Overfishing: A Threat to Marine Biodiversity". *United Nations*.
<http://www.un.org/events/tenstories/06/story.asp?storyID=800>

United Nations. "United Nations Convention on the Law of the Sea of 10 December 1982 Overview and Full Text". *Division for Ocean Affairs and the Law of the Sea*. 2013.
http://www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm

World Bank. "Raising More Fish to Meet Demand". *World Bank*. 2014.
<http://www.worldbank.org/en/news/feature/2014/02/05/raising-more-fish-to-meet-rising-demand>