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## **Environmental Change as Seen Through the Eyes of a Local Industry: The New Bedford Fishing Community**



(New Bedford Harbor, March 1, 2015: Photo Courtesy of *New York Times*)

The secondary effects of climate change sometimes manifest themselves in the most unusual of places. An hour south of Boston you will find the city of New Bedford, Massachusetts - the most successful fishing village in the United States for the past 15 years. The total catch of seafood in 2013 weighed in at 130 million pounds and was valued at \$379 million.<sup>1</sup> At first glance, an outside observer may look at the enormity of this catch and emphatically state that the fishing industry is alive and thriving. For some, fishing has certainly become a lucrative profession but there are others who are left on the fringes. A combination of global warming, worldwide supply and demand, and some well-intentioned but ill-planned regulations have all helped force many out of their livelihoods. These factors not only oust some from their professions but they feed a vicious cycle that further degrades the ocean eco-system. This paper will examine the ill effects of climate change through the eyes of the local fishing industry in New Bedford.

### New Bedford: Past and Present

New Bedford has a rich maritime history dating back to the 1800s when it was once the whaling capital of the world. Azorean immigrants came in droves to fulfill the demand for able seaman and competent mariners. The town's descendants still take pride in their rich and diverse Portuguese heritage. The city's motto, *Lucem Diffundo*, means "I spread light,"...a reference to the fact that the blubber from whale oil was used throughout the world's lamps for much of the 19<sup>th</sup> century. Ironically, the demand for whale products subsided with the discovery of real oil and there was no longer any need to hunt great leviathans. All that now remains of the once great whaling industry is the New Bedford Whaling Museum and Herman Melville's great novel *Moby Dick*. Given the technological advances in whaling, the industry would have self-destructed regardless given the rampant and unregulated overfishing. But despite the death of the whaling industry, many denizens of New Bedford and the surrounding communities have always turned to the sea for their livelihood. Exact estimates may be difficult based on part-time and some modicum of undocumented labor but there is on average just 1,000 fishermen out of New Bedford at any given time.<sup>2</sup> This has decreased from just over 3,000 fishermen a mere two

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<sup>1</sup> Rebecca Laliberte, "New Bedford Declared America's Top Fishing Port," *New Bedford Area Chamber of Commerce*, November 19, 2014, accessed March 20, 2015. <http://newbedfordchamber.com/2014/11/new-bedford-declared-americas-top-fishing-port/>.

<sup>2</sup>"Jobs," Southcoast Urban Innovator's Project, accessed March 23, 2015, <http://southcoastindicators.org/economy/jobs/>.

decades ago.<sup>3</sup> That was right before strict regulations came into effect and the fish stocks became noticeably depleted

Jim Kendall, a local former scallop boat captain who is now the Executive Director for New Bedford Seafood Consulting, paints a cautiously optimistic picture of the local industry, “It is a small abstract of the American economy as there are the haves and the have nots. Trawlers (boats that catch ground fish such as cod, dogfish, flounder, etc) are not just hurting they are destitute (*Trawling is synonymous with ground fishing and not to be confused with fishing from land*).”<sup>4</sup> Jim has seen it all in his fifty plus years in the seafood industry. Along the way, he has made enemies and friends with environmentalists, other fishermen, government officials, and marine scientists. He takes an immense sense of pride in his fishing heritage and of the community bonds that have been developed over generations. But hard times have strained these bonds and the community is always at risk of both tangible and intangible loss. He echoes the sentiments of his fellow fishermen and their families as he states, “the boat will sink the house.”<sup>5</sup> This is a reference to how difficult and straining it can be to survive in an industry that can be unforgiving.

Over 80% of the seafood catch brought into New Bedford consists of sea scallops. This burgeoning mollusk industry is flourishing due to regulations which allowed the scallop population to flourish in and around the George’s Bank area. George’s Bank, an 11,000 square mile elevated portion of the North Atlantic’s Continental Shelf, was once a fertile spot for fish such as cod and haddock (see Figure 1). It was closed by the National Marine Fisheries Service in the mid-1990s with the hope that those fish stocks would rebound but a moratorium on scallop fishing was lifted in the late 1990s. A portion of the Bank is opened to scallop fishermen every year in a form of aquatic crop-rotation and there are yearly catch limits which are strictly enforced. As a result, the scallop population has rebounded and harvests are plentiful. A single boat can profit close to half a million dollars on a two-week voyage with some crew members

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<sup>3</sup> Daniel Georgianna and Debra Shrader, “Employment, Income and Working Conditions in New Bedford’s Offshore Fisheries,” Report for *National Marine Fisheries Service*, June 22, 2005, pg 25.

<sup>4</sup> Jim Kendall, Interview by Author, New Bedford, MA, March 6, 2015.

<sup>5</sup> Ibid.

earning close to six figure salaries in a year's time frame.<sup>6</sup> This is the part of fishing industry that has flourished and enabled New Bedford to maintain itself as the nation's number one port for seafood.

The “have nots” are often the fishermen who must trawl for their catch. Declining fishing stocks and strict regulations have forced many ground fishermen out of the business. The most demanded and depleted fish is cod – the main ingredient in the popular and ubiquitous “fish and chips” found in any self-respecting seafood restaurant. The local ground fishing fleet shrank from 120 vessels twenty years ago to roughly thirty to forty today. Much of the remaining vessels have been consolidated by a singular business entity which is able to hold a monopoly on the ground fish catches and state-issued fishing permits.<sup>7</sup> Family owned boats whose livelihood is tied to the sea are unable to spread out the risk of “bad fishing days” on their own and as a result many of them have been forced out of the industry. The exorbitant cost of state-issued scallop permits, which can run as high as \$3.5 million, makes it impossible for them to adapt and fish for the more lucrative catch. It is in these circumstances when “the family boat will actually sink the house” and many are forced to sell their boat and move on.<sup>8</sup>

However, a monopoly on ground fishing cannot save all fishing boats and their crews from ruin. Not even strictly-enforced draconian catch limits over the years have been able to undo the damages caused by climate change, ocean pollution, and excessive overfishing. The total value of ground fish caught in New Bedford has decreased by over 40% in the past two years and many boats are forced to operate at losses. If more boats are forced to move elsewhere then this will not only affect fishermen and their families but a sizable portion of the supporting industries that are required to keep local fishing up and running.<sup>9</sup>

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<sup>6</sup> John Dyer, “Scallops Brining a Decent Living to New Bedford Fishermen,” *Boston Globe*, December 1, 2013, accessed February 23, 2015 at <http://www.bostonglobe.com/business/2013/12/01/scallops-bringing-decent-living-new-bedford-fishermen/P9WxPWm05vYN5xaBSZY8I/story.html>.

<sup>7</sup> Carlos Rafael, Interview by Danny McDonald, New Bedford, MA, May 24, 2013. Accessed on March 19, 2015 at <http://www.vice.com/read/carlos-rafael-fish-interview>.

<sup>8</sup> Jim Kendall.

<sup>9</sup> Simon Rios, “King of New England groundfishing plans to sell his fleet out of New Bedford,” *South Coast Today*, January 4, 2015, Accessed on March 11, 2015 at <http://www.southcoasttoday.com/article/20150104/NEWS/150109720>.

## Rising Temperatures

When asked if fishermen could have a greater impact if they were better educated about global warming Jim Kendall laughs. He is of the mind that in order to be a good fisherman one must naturally have a respect for conservationism. Many fishermen are well aware of nature's cycles and just exactly how climate change has subsequently impacted them. The truth is that some, like Jim, noticed subtle changes long before anyone else did. Jim illustrates how he always religiously recorded the water temperature on his fishing boats and noticed that local waters had started to slowly warm right around 1984. At the time, scientists stated it was part of the El Nino effect and was just a natural occurrence. Regardless of why local water temperature started to rise in 1984 is a moot point now. The question of whether or not fishermen were keenly aware of climate change did not offend him but he does highlight the mistrust that many fishermen have in scientists and policy makers. The local harvesters of the sea have an innate knowledge of their local eco-system, tides, and currents and many of them feel as if their knowledge and input is discounted by officials and scientists. A common phrase that is shouted at closed door meetings throughout Massachusetts is, "every time we give you information it is used against us."<sup>10</sup>

The oceans absorb roughly 90% of the heat generated on earth in a perpetual cycle of endothermic and exothermic reactions. A good proportion of this is natural and is directly caused by sunlight but another portion of this is caused by CO<sub>2</sub> and other greenhouse gas emissions.<sup>11</sup> The good news is that temperatures in the ocean will rise less than they will on land but the bad news is that the oceans eco-systems are far more sensitive to subtle changes in temperature. Ocean temperatures have risen, on average, only 0.1 degrees Celsius in the past one hundred years but this has still contributed to reduced fish stocks.<sup>12</sup> Temperatures increased surprisingly more however in the area around George's Bank by over 1 degree Celsius just since

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<sup>10</sup> Jim Kendall.

<sup>11</sup> LuAnn Dahlman, "Climate Change: Ocean Heat Content," National Oceanic and Atmospheric Administration, Last modified September 23, 2014 at <http://www.climate.gov/news-features/understanding-climate/climate-change-ocean-heat-content>.

<sup>12</sup> "Sea Temperature Rise: Warmer Oceans Have Far-Reaching Effects," National Geographic Society, Accessed on March 21, 2015 at <http://ocean.nationalgeographic.com/ocean/critical-issues-sea-temperature-rise/>.

1970 alone.<sup>13</sup> This is the temperature that Jim Kendall referred to earlier and which is meticulously documented in his log books.

New England cod fishermen are already disadvantaged enough without the added pressures of warm oceans. The moratorium on cod fishing in George's Bank will amount to little if cod are forced to the oxygen rich colder and deeper waters in order to survive. Temperature increases may cause fish stocks to thrive in certain areas but it will push them further and further north. A further one degree increase in water temperature is likely to significantly decrease the cod stock in and around George's Bank and will make the local industry untenable (See Figure 2).<sup>14</sup> The increase in water temperatures has also gradually pushed other species further and further north and this has led to competition for food among different fish stocks. Furthermore, if rising temperatures cause the Arctic ice cap to significantly melt, nobody really knows just how devastating that will be on North Atlantic cod stocks. What scientists and industry experts do know is that, at best, a "wrench" would be thrown into the system.<sup>15</sup> If the New England fishing fleet has to go further and further afield to find cod then fuel usage alone will not only further degrade the environment but also eat significantly into profit margins.

There is another problem that rising temperatures will bring to the ocean eco-system other than a full frontal assault on fish stocks and that is the negative effects of acidification. Rising levels of carbon dioxide results in more CO<sub>2</sub> being absorbed into the oceans, lakes, and streams. This absorption causes a significant decrease in the pH water levels. This makes it very difficult for shellfish such as clams, oysters, and scallops to form the right amounts of calcium in order for their shells to fully mature.<sup>16</sup> Fortunately for the local community, ocean acidification has not affected the New Bedford scallop industry in any great capacity. However, that does not mean that it is not a dynamic threat. Acidification has been both directly and partially linked to the decimation or outright eradication of other mollusk beds in other parts of the United States and the world. In the coastal waters of British Columbia, the scallop population lost 95% of its

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<sup>13</sup> "Climate Hot Map: Global Warming Effects Around the World," Union of Concerned Scientists, Accessed on March 21, 2015 at <http://www.climatehotmap.org/global-warming-locations/new-bedford-ma-usa.html>.

<sup>14</sup> Ken Drinkwater, "The response of Atlantic cod to future climate change," in *ICES Journal of Marine Science*, Volume 62, Issue 7 (2005): 1327-1337.

<sup>15</sup> Madeleine Hall-Arber, Interview by Author, Cambridge, MA, March 11, 2015.

<sup>16</sup> The University of Cambridge Intergovernmental Panel on Climate Change, "Climate Change: Implications for Fisheries and Aquaculture," University of Cambridge Institute for Sustainability Leadership, (2013), pg 6.

strength in the first six months of 2013 due to acidification. This was devastating not only on the local eco-system but also a portion of the local community which depended on the scallop harvest for its livelihood.<sup>17</sup>

The increased frequency and severity of winter storms has also caused significant, though less pronounced, damage to the local fishing industry. This past winter has, on several occasions, forced the entire New Bedford fleet to hole up in port and simply wait out the storm. The number of fishing trips that each boat took was significantly reduced this year due to the enormity of an unusually harsh and long New England winter.<sup>18</sup> This resulted not only in lost revenue but also potentially put fishermen's lives and boats in jeopardy as some captains will often choose to run the gauntlet in order to fill quotas. Fishing is a precarious vocation and the sea can be unforgiving enough as it is. As far as fishermen are concerned, Mother Nature does not need any man made help to artificially increase the scope of storms.

It is not difficult to see how climate change has already negatively impacted the livelihoods of some members of this coastal community. Some may argue that overfishing is the primary culprit in terms of depleted fish stocks or that there are other natural factors beyond our control and these variables should not be discounted in an assessment of any local fishing industry. But there is no doubt that local waters have warmed and storms have increased and this has affected ground fishermen the most. Ocean acidification has not deeply cut into the New Bedford scallop industry but it may just be a matter of time. If the same scenario that happened in the waters off of British Columbia occurred in the waters of George's Bank then the "haves" would quickly become the "have nots."

### Global Supply and Demand

If one walks into a local New England grocery store and purchases seafood, chances are high that it may not come from local waters. It might not be readily apparent to local consumers depending on the labels but if you peruse the packaging you might find that your fish fillets or shrimp may come from half a world away. Markets are driven by supply and demand and

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<sup>17</sup> Eric Zerkel, "Millions of Scallops Dead Due to Ocean Acidification," *The Weather Channel*, February 28, 2014, Accessed on March 19, 2015 at <http://www.weather.com/science/environment/news/millions-scallops-dead-ocean-acidification-20140227>.

<sup>18</sup> Matt Blanchette, "Fishermen in New Bedford battle harsh winter," *ABC6 News*, Updated March 3, 2015 at <http://www.abc6.com/story/28130399/fisherman-in-new-bedford-battle-harsh-winter>.

American consumers enjoy consuming shrimp and tuna which come from Vietnamese and Indonesian waters respectively while European consumers delight in the delectable taste of scallops caught off of the coast of New England. There is nothing wrong with consumers having preferences but this has created a terrible irony in terms of environmental sustainability.

A good portion of seafood that is caught in the developed world is certified as sustainable, meaning that the fishery that initiated the catch adheres to appropriate size regulations, limits, bycatch procedures, etc. The Marine Stewardship Council (MSC) is an international organization which will certify a local seafood industry if it uses sustainable practices and adheres to proper fishing regulations. If MSC determines that a fishing industry is sustainable then the produce from that industry is allowed to be marketed with a sticker of a blue fish. The sticker is a signal to consumers that minimal harm to the eco-system was exacted in the harvesting and process of that seafood.

Unfortunately, a certification from the MSC costs money depending on the size and type of a fishery. Therefore, a fledgling fishery stands the risk of not obtaining or losing certification even if sustainable practices are followed throughout the process. This has the potential to further disenfranchise local fishermen as consumers may punish them for not being “sustainable.” A recent independent audit on an MSC certified Canadian swordfish fishery found that it actually caught 5 times as many sharks by accident as it did swordfish.<sup>19</sup> This is why some in the industry criticize MSC as focusing too much on their own profit rather than improving the lives of others or protecting the environment. MSC certification assesses no less than 28 performance indicators across three different principles but none of those indicators measure the carbon costs of transporting seafood half a world away (Figure 3).<sup>20</sup> This is a small but relevant fact that many consumers are not cognizant of. If MSC did include a carbon cost metric in their indicators or on their food labels then it may come under less criticism. Therefore, eating local seafood that is not MSC certified may actually sometimes be more eco-friendly than buying the produce with the blue sticker.

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<sup>19</sup> New York University, “Sustainable fishing certification too lenient and discretionary,” in *Science Daily*, Accessed March 23, 2015 at <http://www.sciencedaily.com/releases/2013/04/130410154902.htm>.

<sup>20</sup> Marine Stewardship Council, *Stakeholder’s Guide to the Marine Stewardship Council*, (London, UK, 2011), 6.



The ravenous demand for seafood consumption in the developed world has actually created externalities in far off places. By demanding to consume certain seafood at a lower price as opposed to slightly higher priced local seafood, we have not only helped to marginalize our own local neighbors but we have inadvertently caused irreparable environmental damage in far off places such as Vietnam. Hundreds of thousands of acres of mangrove swamps have been eradicated in this coastal nation to make way for industrial-sized shrimp farming. The deforestation of the coastal mangrove swamps will no longer provide a hedge against rising sea levels due to climate change.<sup>21</sup> Needless to say, most farmed shrimp from Vietnam is not certified as sustainable but trade laws do not prohibit their import into the developed world. The shrimp farms do provide living wages for many Vietnamese but at a detrimental cost to that country's environment. By rightly insisting that our own fisheries follow certain sustainable practices and then hesitating to eat the local catch, we have artificially and unintentionally created the market conditions for unsustainable practices in other parts of the world.

Local fishermen have actually tried to fight supply and demand curves by promoting different types of seafood. Such is the case of the dogfish. Dogfish are technically small sharks which are edible but have less culinary appeal as other water borne species. They are despised by fishermen because of their profligacy and propensity to prey upon more desirable species such as cod. If the proper supply and demand could be created for this local fish then it has the potential to alleviate the suffering of some trawler fishermen in the southeastern Massachusetts communities.<sup>22</sup> Integrating the dogfish into the palettes of Americans may take some time but, if harvested with proper enforcement and regulations, it would be a step in the right direction by simultaneously bolstering a local industry and alleviating externalities that are environmentally manifested half a world away. Perhaps the first step in this endeavor is getting the dogfish to change its name to something more appealing; nobody wants to eat a dog.

### Regulations: Good or Bad Ideas?

Though more related directly to sustainability than to climate change, few in the fishing industry would doubt that moratoriums on fishing in certain areas or on certain species have had

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<sup>21</sup> Paul Greenberg, *American Catch: The Fight For Our Local Seafood*, (New York: Penguin, 2014), 129.

<sup>22</sup> "Fishermen seek help touting once-hated dogfish," *Gloucester Times*, July 8, 2013, accessed on March 23, 2015 at [http://www.gloucestertimes.com/news/local\\_news/fishermen-seek-help-touting-once-hated-dogfish/article\\_40222b26-91f0-5daa-9743-d96026988b2a.html](http://www.gloucestertimes.com/news/local_news/fishermen-seek-help-touting-once-hated-dogfish/article_40222b26-91f0-5daa-9743-d96026988b2a.html).

positive results in helping fish populations replenish. A new train of scientific thought suggests that size limits on individual fish caught are counterproductive to the natural evolution of fish stocks. By extracting only the biggest members of a population the most prolific members of the species are eliminated and the fecundity of the stock is artificially stunted. As a result of strictly enforced catch length regulations, the population that is left in the ocean is not representative of the population that would be left if nature was allowed to take its natural course. In the case of cod, this actually makes the fish stock more vulnerable to prey from other fish and can upset the balance of power in the local waters.<sup>23</sup>

Harvesting crustaceans requires considerably different practices and management techniques than fishing but perhaps policy makers should take a lesson from the lobster industry. Commercial and recreational lobster boats are subject to U.S. federal minimum and maximum catch lengths. There are several reasons for this but the most salient is that it ensures that the best lobsters for breeding are allowed to reproduce in their natural environment and the youngest ones are given a chance to develop.<sup>24</sup> Ground fishing is certainly quite different from lobster trapping but applying the same type regulations may have a positive impact on replenishing the fish stocks that have already been depleted. Regulations of this type may not be the panacea to the marginalized subset population of a sleepy New England town but it may be a step in the right direction.

### Moving Forward

Climate change, excessive demand, and sometimes counter-productive regulations have certainly taken a toll on a local community. Some in the local community have done quite well despite these existential threats but others have been forced to move on. However, the family-operated fishing boats that were seminal to developing the industry many years ago have waned considerably in the past two decades. Madeleine Hall-Arber, an anthropologist at the Massachusetts Institute of Technology's Sea Grant College Program, sums it up best "the generational passing of fishing knowledge will dissipate...there are fewer families in fishing

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<sup>23</sup> Menakhem Ben-Yami (Israeli Fisheries Advisor), forwarded email message to author, March 7, 2015.

<sup>24</sup> U.S. Government Publishing Office, "Title 50, Chapter VI, Part 697, Subpart B, §697.20, Size, harvesting and landing requirements," in *Electronic Code of Federal Regulations*, Current as of March 24, 2015 and accessed on March 25, 2015 at <http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=a008480dc59133724ec61b8f5ac8007b&rgn=div8&view=text&node=50:13.0.1.1.5.2.1.4&idno=50>.

today and as a result you are losing the family connection.”<sup>25</sup> Unfortunately, not much is likely to change in the near future. It is estimated that total loss in the fishing industry due to climate change will be between \$17 and \$41 billion by the year 2050. Acidification is likely to take a substantial toll on the global shellfish industry as well.<sup>26</sup> These are signs that do not bode well for a global population let alone a small Massachusetts community.

There is hope despite all the challenges. Humankind has the desire to master nature and the bountiful harvests of the sea are no exception. Our current form of dominance has led to externalities half the world away and in our own backyard. The community of New Bedford, humble as it is, is just one example of how we have marginalized ourselves by our own hubris. Living in harmony with the oceans would be the ultimate form of mastery and would preserve the artisanal fishing heritage of our local community and communities worldwide. In the age of ever expanded globalization, holistic change is needed now more than ever. This change must occur at all levels if we are to properly cultivate our ocean food sources.

Looking at climate change through the lens of a local population may be one medium by which to convince governments and individuals that climate change has enormous potential to harm a local community. Climate change has already beaten up a sizable portion of the New Bedford livelihoods and if it continues on its current path it may deliver a swift and sudden culling blow to the scallop industry. Furthermore, it is the duty of consumers to become educated about where their seafood comes from. Sustainably certified seafood is currently not necessarily the best choice in the long run and better and more equitable metrics must be developed. 95% of the scallops caught in our own coastal waters are shipped overseas while Americans clamor for shrimp that is grown half the world away.<sup>27</sup> The mantra of think globally but act locally may not apply to all things but it does in this instance. Let us revel in the local merroir before we demand that our palettes be filled with exotic tastes that come with a higher carbon price. Finally, scientists and policy makers must not take a one size fits all approach to crafting regulations. The input of local fishermen must not be discounted because fishermen are, after all, some of the best conservationists for one simple reason: if they aren't, neither we nor they will eat.

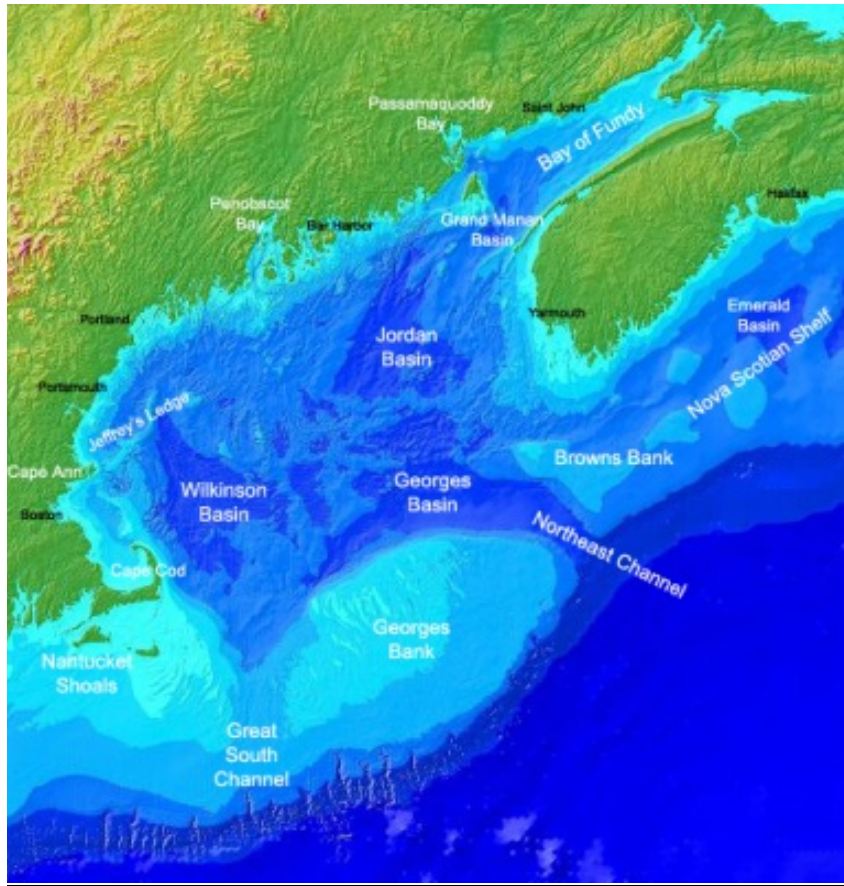
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<sup>25</sup> Madeleine Hall-Arber.

<sup>26</sup> The University of Cambridge Intergovernmental Panel on Climate Change, 5.

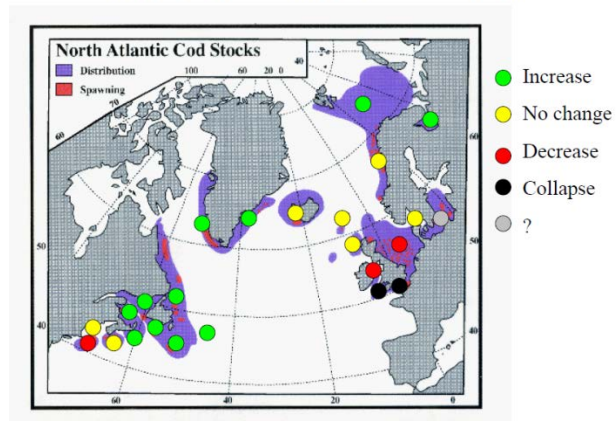
<sup>27</sup> Jim Kendall.

**Figure 1: George's Bank** (Photo courtesy of National Oceanographic and Atmospheric Administration)

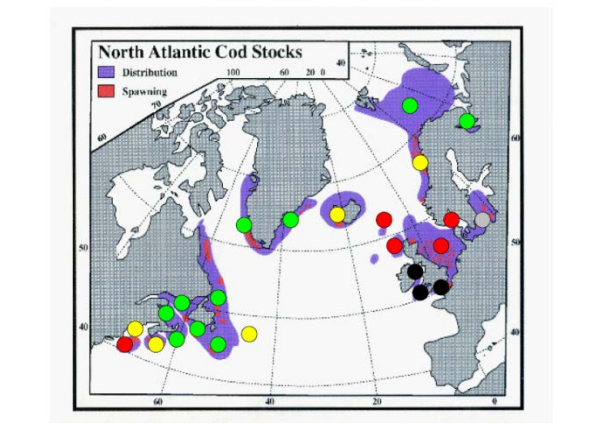


**Figure 2: (Effects of Temperature Increase on Cod Stocks)** (Courtesy of ICES Marine Journal and Kenneth Drinkwater.)

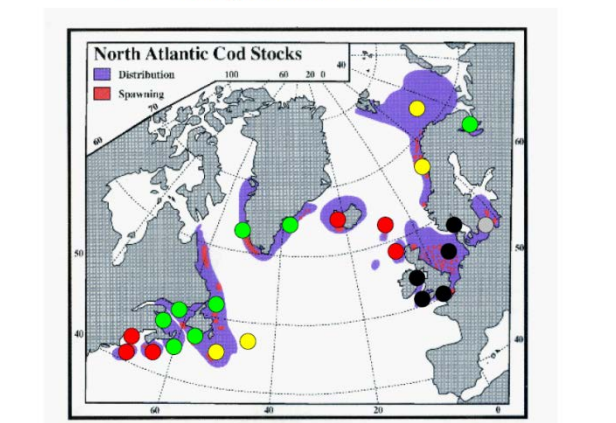
Effect on abundance of 1°C increase



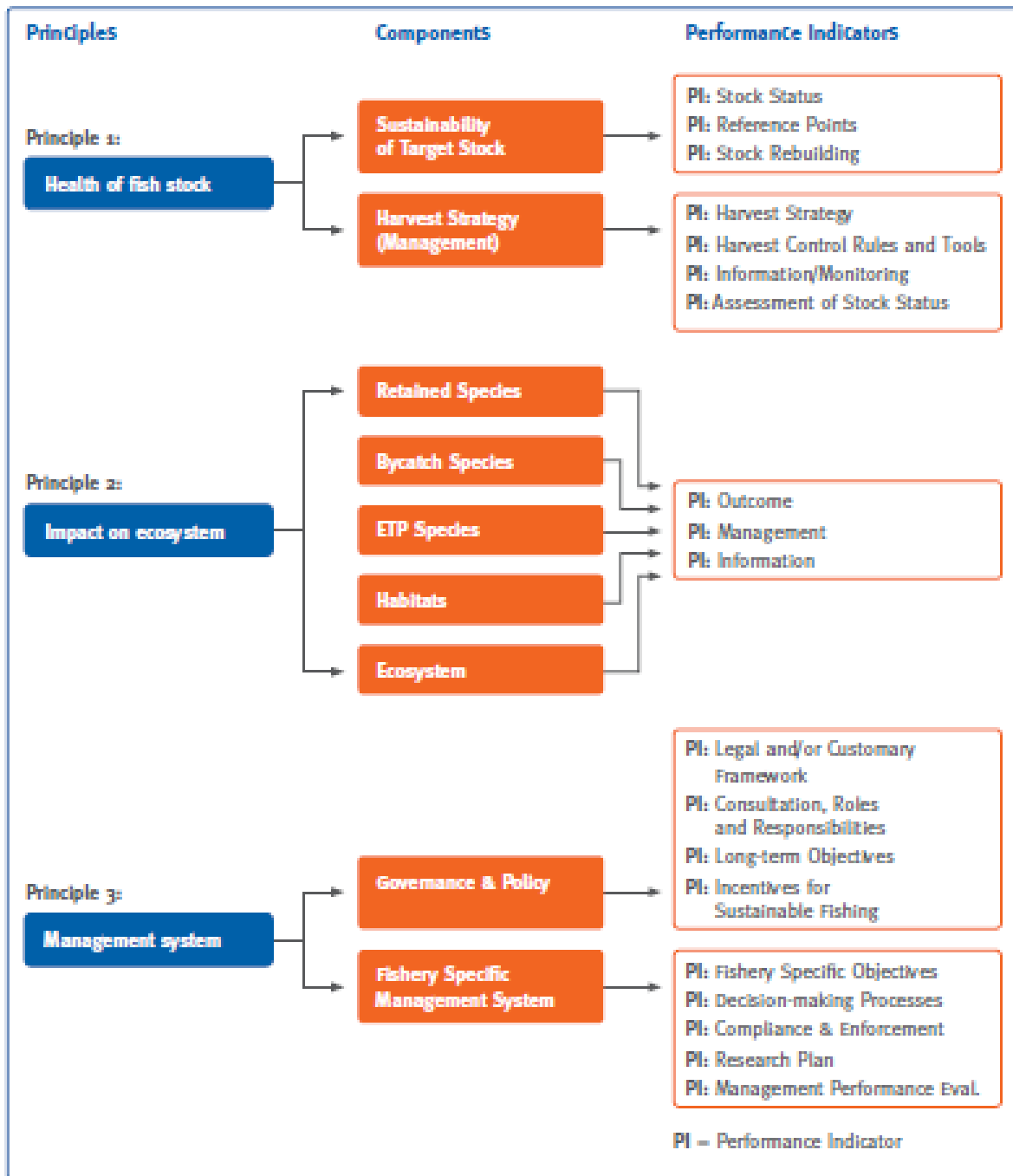
2°C Temperature Increase



3°C Temperature Increase



**Figure 3: MSC's Assessment Tree for Scoring Fisheries**



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