

## While it's called fishery management, it's not even close

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***“At the global scale, probably the one thing currently having the most impact (on the oceans) is overfishing and destructive fishing gear.”*** (former National Oceanic and Atmospheric Administration head Jane Lubchenco in an interview on the website Takepart.com on April 7, 2010.) The Deepwater Horizon oil spill catastrophe began on April 20, less than two weeks later.

Each year in the U.S. hundreds of millions of tax dollars are spent on what is called fishery management. It's called fisheries management in the Magnuson-Stevens Fishery Conservation and **Management** Act. The federal administrative entities which implement the mandates of the Magnuson-Stevens Act are designated in the Act as Regional Fishery **Management** Councils, and the bureaucrats and scientists who are involved in those mandated activities are referred to as fishery **managers**.

But all things considered, can what the Magnuson-Stevens Act mandates, what the Regional Councils are charged with and what the managers do be considered fishery management?

Let's consider what management of either naturally occurring or cultured living organisms (other than fish and shellfish) actually entails. The most obvious requirement of managing them is the provision of something between an adequate and an optimum environment, including both the living and the non-living components of that environment, for the species/species complexes being managed. This is regardless of whether the management process is aimed at optimizing the production of one (or a few) species or at maintaining an area in a so-called "natural" state (though how close any area can be to natural, considering humankind's pervasive impacts on virtually the entire biosphere, is open to argument).

Whether it's a herd of dairy cattle, a field of poppies, a national park or an entire watershed, the involved individual or collective managers are charged with maintaining an appropriate environment for the organisms/systems being managed.

How does "fisheries" management fit in with this? Quite obviously and not so surprisingly, not all that well.

When we are considering maintaining (or ideally, increasing, though in the U.S., Canada and the EC in particular we're far from ready for the "giant step" of increasing the harvest) capture fisheries in natural systems, there is a host of both natural and anthropogenic factors that play a significant role in determining the population levels of particular species. Among them are:

- Water quality
- Water temperature
- Wind direction/duration
- Upwelling
- Food availability
- Predation
- Essential habitat availability
- Fishing
- Entrainment/impingement
- Disease/parasites
- Parasitism
- Turbidity
- Competition
- Cannibalism
- Reproductive success

And there are undoubtedly others.

So what do the people in the ENGOs who, with a bunch of help from their foundation keepers, have become so adept at manipulating the press, the polls and the public do when there aren't enough fish? They demand that the managers reduce (or eliminate) fishing. This is regardless of the effect of any other factor on the particular fish stock or the effectiveness of reducing or limiting fishing in rebuilding the stock in question (and "rebuilding" the stock almost always means returning it to maximum population levels).

And the managers for the most part go along because they have to do something to justify their positions, and thanks to federal legislation controlling (or eliminating) fishermen is a lot easier than controlling just about anything else. It's easier politically, it's easier scientifically, it's easier economically and it's easier technologically. So what if it isn't effective? Thanks to the extensive efforts of anti-fishing activists over the last two decades (see *Pew and the media* at <http://www.fishtruth.net/PDF/PewMedia.pdf>), cutting back or eliminating fishing is just about a guarantee of positive media coverage, and there are few politicians, reporters or members of the public who have enough of a grasp of the involved complexities to know the difference. Besides which there will be enough tilapia and swai and cultured shrimp produced overseas to keep the consumers fed - if not in culinary nirvana.

This has cost and is costing the domestic fish and seafood industry untold millions of dollars every year in uncaught fish that could be sustainably harvested. It is denying U.S. consumers the health benefits and the undeniable pleasures of dining on ocean-fresh, locally produced seafood and it is costing our coastal communities tens of thousands of jobs every year.

With what seems a monomaniacal fixation on the effects of fishing, a fixation which has been successfully – and tragically – spread virtually everywhere in this country, many other factors of equal or greater potential to temporarily or permanently interfere with vital ocean processes or the health of our fish stocks have been largely or completely ignored.

### **At the time it sounded good, at least to the un- or ill-informed**

I started this FishNet with a quote from Jane Lubchenco from less than two weeks before the Deepwater Horizon catastrophe began to unwind in the Gulf of Mexico. At the time she was the newly appointed head of NOAA, the agency in the US Department of Commerce that is in charge of about everything non-military in the US Exclusive Economic Zone. Her academic background was as a tide pool biologist. She was a Pew Ocean Fellow and a member of the Pew Oceans Commission and in keeping with the Pew spin on the oceans and their misuse, appeared to believe that she and her ideas could save the world's fisheries - from the fishermen.

As the quotation demonstrates, she was so concerned with the supposed evils of fishing that she assumed that everything was more than fine with our federal policies regarding the safety of our offshore energy systems. I won't rehash it here but I'd strongly recommend that you go over the FishNet on this issue I did while the Deepwater Horizon well was still gushing an eventual 5 million barrels of oil into the Gulf of Mexico, *Fish and Oil: NOAA's Attitude Gap*, at <http://www.fishnet-usa.com/FishAndOil.pdf>. (and delayed Exxon Valdez impacts were still being revealed by researchers in the agency she now headed – see [http://www.nwfsc.noaa.gov/news/features/delayed\\_effects\\_oilspill/index.cfm](http://www.nwfsc.noaa.gov/news/features/delayed_effects_oilspill/index.cfm).) Perhaps if Dr. Lubchenco and the people she brought with her from the ENGO world weren't so myopically focused on over-fishing, offshore oil wells would have received some of the governmental scrutiny that was, and still is, so illogically directed at commercial fishermen. What are the chances that doing so would have saved the U.S. taxpayers a few bucks and spared the Gulf of Mexico – and the businesses that are dependent on its ecological integrity – the possibly irreversible damages caused by the huge oil spill?

The situation vis-a-vis on-board observers is the most dramatic indication of how skewed perceptions have become regarding ocean/fishery protections. In just about all federally regulated fisheries there are requirements for on-board federal observers, who are increasingly being paid for by the vessel owners/operators. These observed trips range in frequency from 100% coverage of all of the vessels in a fleet to vessels being assigned to carry an observer on a trip once a month or so, and with charges - often to the vessel – approaching a thousand dollars per day at sea. In fisheries in which landings are severely limited, observer costs can force vessels into bankruptcy.

These observers are there to track the catch and bycatch of the vessel to insure that quotas are not exceeded and that the take of protected species are accurately accounted for. There are also requirements for at-sea and at-the-dock reporting, so the catch of a vessel may be reported three separate times.

Surprisingly, or perhaps not so surprisingly considering the attitude of federal policy-level folks like Dr. Lubchenco, there are no requirement for any official observers on oil tankers, drilling rigs or other offshore vessels or structures that could have a negative environmental impact in our EEZ. As we have seen in a history of maritime accidents extending back for at least a half a century, these disasters can cause hundreds of millions of dollars or more in damages.

The following table is from The International Tanker Owners Pollution Federation Limited website (cached by The Wayback Machine at <http://tinyurl.com/osw5slv>). These were only spills from tankers, not drilling rigs or pipelines. Note that

the Exxon Valdez spill, while included, ranked only number 35 in spill size. Note also that the authors assumed that off-shore spills “caused little or no environmental damage.” The cached version of the website was from 2007/08.

The table below gives a brief summary of 20 major oil spills since 1967. A number of these incidents, despite their large size, caused little or no environmental damage as the oil did not impact coastlines, which is why some of the names will be unfamiliar to the general public. The Exxon Valdez is included because it is so well known although it is not the twentieth largest spill but rather the 35th.

Position	Shipname	Year	Location	Size (in tonnes)
1	Atlantic Empress	1979	Off Tobago, West Indies	287,000
2	ABT Sumner	1991	700 nautical miles off Angola	260,000
3	Castillo de Bellever	1983	Off Saldanha Bay, South Africa	252,000
4	Amoco Cadiz	1978	Off Brittany, France	223,000
5	Haven	1991	Genoa, Italy	144,000
6	Odyssey	1988	700 nautical miles off Nova Scotia	132,000
7	Torrey Canyon	1967	Scilly Isles, UK	119,000
8	Sea Star	1972	Gulf of Oman	115,000
9	Irenes Serenade	1980	Navarino Bay, Greece	100,000
10	Urquiola	1976	La Coruna, Spain	100,000
11	Hawaiian Patriot	1977	300 nautical miles off Honolulu	95,000
12	Independenta	1979	Bosphorus, Turkey	95,000
13	Jakob Maersk	1975	Oporto, Portugal	88,000
14	Btaer	1993	Shetland Islands, UK	85,000
15	Khark 5	1989	120 nautical miles off of Morocco	80,000
16	Aegean Sea	1992	La Coruna, Spain	74,000
17	Sea Empress	1996	Milford Haven, UK	72,000
18	Katina P	1992	Off Maputo, Mozambique	72,000
19	Nova	1985	Off Kharg Island, Gulf of Iran	70,000
20	Prestige	2002	Off Galicia, Spain	63,000
35	Exxon Valdez	1989	Prince William Sound, Alaska	37,000

As we saw in the Deepwater Horizon episode, effective federal oversight was sorely lacking, and I’ve yet to see much progress there other than some bureaucratic rearranging and changing the name of the agency in charge. Human nature is human nature, whether the human is on an oil tanker, an offshore drilling rig or a commercial fishing vessel. But the potential for damages with the tanker or the drilling rig can range into the many billions of dollars while a fishing boat might kill a couple of thousand dollars’ worth of over-quota fish. And the income earned by a drilling rig or tanker every year is many orders of magnitude greater than the fishing vessel. Yet we don’t have a federal observer on the bridge of every tanker or on board every rig in the Gulf.

(It’s important to note here that the Pew Charitable Trusts, which has been directly responsible for much of the anti-fishing efforts over the last two decades, is largely controlled by heirs of Joseph Pew, the founder of Sun Oil/Sunoco.)

### Gulf of Maine cod – again it’s not just fishing, and again it’s Jane Lubchenco

*“We need a rapid transition to sectors and catch shares. Catch shares are a powerful tool to getting to sustainable fisheries and profitability. I challenge you to deliver on this in Amendment 16, to include measures to end overfishing. I will commit the resources to my staff to do their part to ensure Amendment 16 is passed in June. We are shining a light on your efforts and we will track your progress. There is too much at stake to allow delay and self-interest to prevent sectors and ultimately catch shares from being implemented. We are shining a light on your efforts and we will track your progress. There is too much at stake to allow delay and self-interest to prevent sectors and ultimately catch shares from being implemented.”* (Ms. Lubchenco on April 8, 2010 while telling the New England Fisheries Management Council how her policies were going to fix the New England groundfish fishery – by Julie Wormser on the Environmental Defense blog EDFish/.)

What she said the day after her less than prophetic statement that fishing was the biggest threat to the world’s oceans was yet another demonstration of Ms. Lubchenco’s commitment to the naïve idea that just about any problem with the world’s oceans could be solved by adequately controlling fishing.

Six and a half years after her “catch shares revolution” that she kicked off by inflicting it on the New England groundfish fishery, the fishery is in a shambles and New England has lost much of its fishing infrastructure. This has all happened as fishing effort has been reduced so many times that far too many fishermen can no longer afford to fish for their own quota or to buy or lease quota from other fishermen in similar straits. So what was wrong with Ms. Lubcheco’s foresight this time?

The recent media mini-frenzy brought about by the release of a study relating the decline of codfish in New England to increasing ocean temperatures will give you some idea. The study was titled “*Slow adaptation in the face of rapid warming leads to collapse of the Gulf of Maine (GOM) cod fishery.*” Not incidentally, it was funded by the Lenfest Foundation, the fisheries-related grants of which are “managed” by the Pew Trusts.

For an idea of the misdirected zeal with which the people at Lenfest pursue their “scientific” objectives, in their report on **Subsidies to U.S. Fisheries**, Lenfest researchers R. Sharp and U.R. Sumaila (who was also a Pew Oceans Scholar) list “*Fuel Subsidies*” as the largest category. They describe these as “*exemptions from federal and state fuel taxes and some state fuel sales taxes.*” In reality they are refunds of federal and state highway use taxes available to fishermen or any other commercial/industrial users who are “exempt” from the tax. This is because they do not use the federal/state highway systems (<http://tinyurl.com/RoadUseTax>). Sharp and Sumaila also include “*sales tax exemptions,*” which also aren’t fishing-specific subsidies but exemptions from sales taxes which are provided to any businesses for qualified purchases. The authors apparently believe that having fishermen pay taxes that the federal and state governments don’t intend them to pay would eliminate a “*harmful subsidy*” and “*could improve the health of fisheries in the U.S.*”

The following quotes were taken directly from the paper (my emphasis added):

- *Recovery of this fishery (GOM cod) depends on sound management, but **the size of the stock depends on future temperature conditions.***
- *Based on this analysis, the Gulf of Maine experienced **decadal warming that few marine ecosystems have encountered.***
- *The Gulf of Maine cod stock has been chronically overfished, prompting progressively stronger management, including the implementation of a quota-based management system in 2010. **Despite these efforts, including a 73% cut in quotas in 2013, spawning stock biomass (SSB) continued to decline.***
- *The Gulf of Maine is near the southern limit of cod, and previous studies have suggested that **warming will lead to lower recruitment, suboptimal growth conditions, and reduced fishery productivity in the future.***
- *Gulf of Maine cod spawn in the winter and spring, so the link with summer temperatures **suggests a decrease in the survival of late-stage larvae and settling juveniles.** Although the relationship with temperature is statistically robust, the exact mechanism for this is **uncertain but may include changes in prey availability and/or predator risk.** For example, the abundance of some zooplankton taxa that are prey for larval cod has declined in the Gulf of Maine cod habitat. **Warmer temperatures could cause juvenile cod to move away from their preferred shallow habitat into deeper water where risks of predation are higher.***
- *The average weight-at-age of cod in the Gulf of Maine region has been below the long-term mean since 2002, and **these poorly conditioned fish will have a lower probability of survival.***
- ***Temperature may directly influence mortality in younger fish through metabolic processes described above; however, we hypothesize that predation mortality may also be higher during warm years.** Many important cod predators migrate into the Gulf of Maine or have feeding behaviors that are strongly seasonal. During a warm year, spring-like conditions occur earlier in the year, and fall-like conditions occur later. During the 2012 heat wave, the spring warming occurred 21 days ahead of schedule, and fall cooling was delayed by a comparable amount. **This change in phenology could result in an increase in natural mortality of 44% on its own, without any increase in predator biomass.***

An article in the Boston Globe about the study reported that “*the authors... say the warmer water coursing into the Gulf of Maine has reduced the number of new cod and led to fewer fish surviving into adulthood. Cod prefer cold water, which is why they have thrived for centuries off New England. The precise causes for the reduced spawning are unclear, the researchers said, but they’re likely to include a decline in the availability of food for young cod, increased stress, and more hospitable conditions for predators. Cod larvae are eaten by many species, including dogfish and herring; larger cod are preyed upon by seals, whose numbers have increased markedly in the region.*” (***Climate change hurting N.E. cod population, study says***, David Abel, October 29, 2015.)

While Mr. Abel neglected to mention it, post-larval cod up to maximum size are also consumed by adult spiny dogfish, as are the fish and shellfish that cod feed on. From Bigelow's and Schroeder's classic *Fishes of the Gulf of Maine*, "voracious almost beyond belief, the dogfish entirely deserves its bad reputation. Not only does it harry and drive off mackerel, herring, and even fish as large as cod and haddock, but it destroys vast numbers of them.... At one time or another they prey on practically all species of Gulf of Maine fish smaller than themselves...."

The authors of the report recognized a number of temperature-related factors which might have been contributing to the GOM cod decline and went so far as to state that the earlier warming in GOM surface waters in 2012 "could result in an increase in natural mortality of 44% on its own, without any increase in predator biomass."

So a group of researchers published a paper in *Science* that showed that it wasn't just fishing that was responsible for decreasing populations of cod in the GOM. That's a good thing, right?

But then, according to an article in *The Plate*, National Geographic's food blog, the study predicted that "if fishing mortality is completely eliminated (that is, a complete closure of the cod fishery, such as took place in Newfoundland), Gulf of Maine cod could rebound in 11 years. If some fishing is allowed, recovery would take longer: from 14 to 19 years, depending on how fast the water warms."

Hard as it is to credit, in spite of all of the indications of the severity of the effects of warming on the GOM cod that the authors identified, the paper that they published in what is supposed to be one of the most important scientific journals in the world couldn't get past the "it's got to be fishing" creed as espoused by Ms. Lubchenco and others that has turned managing fishermen into the only "effective\*" tool in the fishery managers' toolbox. Not only has fishing, according to them, reduced this stock to its current depleted status, reducing fishing even further or eliminating it appears in their collective estimation to be the only way to fix it.

I have to get into some fisheries management basics here before proceeding farther. First off, the goal of fisheries management is to have enough fish in a stock after fishing to be able to sustain itself (most simply, removals from the stock = additions to the stock). This amount of fish is represented as  $B_{msy}$ , the biomass (B) that is required to produce the maximum sustainable yield (msy).

If we are dealing with a static environment  $B_{msy}$  will remain constant. But when the environment changes – as when the temperature changes – with fish that are approaching either end of their comfort range  $B_{msy}$  will change as well (the authors of the paper provided us with a number of factors related to water temperature which I reproduced in the bullet list above that would explain at least some of these changes). Thus, as the water temperature in the Gulf of Maine (GOM) increased, the cod  $B_{msy}$  decreased. In plain English, the GOM is capable of producing fewer cod today than it was ten years ago.

For another fishery management basic, all of those factors that account for mortality in a fishery are considered either natural and indicated by **M**, or due to fishing, indicated by **F**. For convenience (meaning the scientists don't have a clue and it's too much trouble to figure it out what it really is) **M** is usually assumed to be constant.

*"However, in most cases, a single value—usually 0.2—for natural mortality is assumed for stock assessments, despite evidence to the contrary (Pope 1979, Quinn and Deriso 1999, Jennings et al. 2001)."* From **A Review for Estimating Natural Mortality in Fish Populations**, Kate. I. Siegfried & Bruno Sansó

*"The traditional assumption of a constant M may be appropriate when only mature fish are of explicit interest in the assessment."* From **Estimating Natural Mortality in Stock Assessment Applications**, edited by Jon Brodzick, Jim Ianelli, Kai Lorenzen and Richard D. Methot Jr., NOAA Technical Memorandum NMFS-F/SPO-119, June 2011. (I have to point out that in a GOM that's getting hotter a constant M isn't even appropriate when "only mature fish are of explicit interest in the assessment." - NES).

Because, according to management dogma or due to management convenience, natural mortality remains constant by definition regardless of what it actually is, when a stock decreases it must be due to fishing. Accordingly, in spite of the authors having provided at least seven reasons why natural mortality for GOM cod is increasing as GOM temperatures are increasing, and in the face of the inarguable fact that the amount of cod fishing and the cod fishing mortality have plummeted at the same time, the authors conclude that reducing fishing for cod even further than it has been or eliminating it will "fix" the cod stocks.

Predation has and will continue to increase as the water temperature rises. The condition of the cod has declined and will continue to decline as the water temperature rises. Spawning success ditto. Also the survival of late-stage larvae and settling juveniles. And prey availability. And predation on the cod will increase. An example that the authors note is that seals, which are apparently quite fond of a diet rich in cod “*have increased markedly in the region.*” (For the significance of seal predation on cod stocks, see *Seals threaten Scottish cod stock recovery* at <http://tinyurl.com/SealPredation-Cod>.) Yet cutting back on fishing effort again and again and again is still the *modus operandi* of choice for recovering the GOM cod stocks, regardless of its impact on New England’s fishermen, fishing communities and fishing traditions and regardless of its lack of impact on the recovery.

That’s about all that needs to be said about the efficacy of fisheries management as espoused by the anti-fishing clique and as embraced by our modern fisheries management regime.

This definitely doesn’t bode well for fishing in any waters that are or will be warming, and that supposedly is or is going to be all of them, but it’s fishing-centric management at the most painfully obvious.

In how many fisheries being “managed” is that the case today? More importantly, in how many of fisheries in which natural mortality has increased due to ocean temperature increase has the permitted fishing mortality been correspondingly adjusted downward? As ocean temperatures continue to increase, how long will it take the fisheries management establishment – at least that part of it that doesn’t depend on foundation funding for hundreds of millions of dollars of “*lets keep on beating the overfishing drums*” funding, many of them provided by Pew - to admit that the whole idea of “overfishing” and its actual causes needs to be reconsidered.

\* “Effective” from the managers’ perspective because it’s all they are allowed to do to manage fisheries.

**When the commercial fishing industry didn’t agree with NOAA/NMFS on the status of the monkfish stocks**  
(Part of the ongoing controversy with New England/Gulf of Maine cod is centered on the difference in opinion between members of the fishing industry and the management establishment about the health of the stocks. I thought it might be instructive to review how a similar disagreement, only this time dealing with monkfish, was resolved fifteen years ago.)  
In Framework Adjustment #1 to the Goosefish (monkfish) Fishery Management Plan published in 2001 it was announced that the directed monkfish fishery off the Northeast states would be permanently closed in 2002 due to the low number of fish that were being captured in the annual Northeast Science Center’s bottom trawl surveys (<http://www.nefmc.org/library/framework-1-2>). The participants in the directed fishery disagreed with the survey results and objected strenuously to the proposed closure, reporting that there were plenty of fish available, and for whatever reason(s) the NOAA R/V Albatross was not capable of catching them. Participants in the fishery – primarily in the Mid-Atlantic – formed the Monkfish Defense Fund (MDF) which convinced NMFS leadership that the fish were there but were not being taken by the researchers. A collaborative industry/NMFS pilot survey validated the industry’s claims that the stock was more plentiful. As a result, Congress provided funding for a collaborative, comprehensive NOAA/NMFS/MDF monkfish survey, again using commercial vessels with a history of successful participation in the monkfish trawl fishery and using their experienced captains and crews and their own gear to conduct the survey. On board the commercial vessels would also be NMFS and state personnel and academic researchers.  
The first large scale cooperative monkfish survey took place in early 2001 with two modern trawlers, *F/V Drake* (out of Portland, ME) and *F/V Mary K* (out of New Bedford, MA). The commercial vessels did catch the monkfish that the Albatross couldn’t and provided a more accurate biomass estimate. The difference in the monkfish catch between the commercial vessels and the NOAA/NMFS vessel was significant enough that the managers reversed their decision to permanently close the directed fishery. Subsequent cooperative monkfish surveys on commercial vessels were held in 2004 and 2009. The series stopped after the 2009 survey because NOAA/NMFS personnel decided that their new survey vessel, *R/V Bigelow*, would adequately sample the monkfish stock.

### And for an update on spiny dogfish....

(If you missed it, in *Dolphins and seals and dolphin, oh my!* from this past January I wrote about the almost totally ignored impacts of predation on commercial and recreational fish stocks in New England and the Mid-Atlantic (<http://www.fishnet-usa.com/Dogfish%20and%20seals%20and%20dolphin.pdf>). Since then the Mid-Atlantic Fishery Management Council has recommended that the spiny dogfish Total Allowable Catch be reduced significantly, based on the results of an assessment update which evidently couldn’t find a whole bunch of these highly efficient predators that were there until a few years back (for a discussion of how efficient they are follow the previous link). Last July Dr. James Sulikowski’s research group at the University of New England in Biddeford, Maine published *The Use of Satellite Tags to Redefine Movement Patterns of Spiny Dogfish (Squalus acanthias) along the U.S. East Coast: Implications for Fisheries Management* which reported the results of their work to more accurately describe the spiny dogfish stock(s) of the Northeast U.S. (<http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0103384>),

But before getting into their research I'm going to take a slight detour to discuss the Northeast Fisheries Science Center's two annual bottom trawl surveys, the primary data source for the assessments of commercially and recreationally important fish species from Cape Hatteras to Maine. These surveys are so influential in assessments because they collectively comprise a time series going back to the early 1960s. In that time NOAA vessels have made approximately the same number of tows of approximately the same nets of approximately the same duration over approximately the same pieces of bottom on approximately the same dates every year. The annual variations in the numbers/weights of the various species being sampled are assumed to be an (approximate) indication of the variations of the total populations of those species. The nets that are used fish on the bottom and don't sample the entire water column.

The total area sampled is identical from year to year, and the area sampled does not necessarily represent the full range of the species (or stock) being sampled.

The assumption is that the catch of particular species each year is going to be proportional to the total population of that species. Hence, if the trawl survey took 5,000 pounds of scup, for example, in one year and 3,000 pounds of scup the following year, in year two the biomass of scup would be estimated to be 60% of what it was the previous year (the weight used is often the average of several recent years – as specified in the FMP).

This seems to be reasonable if the distribution of the species (or stock) doesn't change significantly from year to year. But what if it does? What if, for example, the population shifts to the north and to the east, which would be one of the expected reactions to warming ocean temperatures? It seems obvious that the part of the population sampled by the trawl survey(s) will no longer be representative of the total population as it is today, only as it was. And considering that not all of the species sampled are restricted to living in close association with the bottom but at times might move up and down in the water column, it might well be that with a changing temperature regime some species will not be equally susceptible to capture by the bottom tending gear utilized in the trawl surveys.

Getting back to the University of New England spiny dogfish work, from the abstract of the report, "*vertical utilization also suggests distinct diel patterns and that this species may not utilize the benthos as previously thought, potentially decreasing availability to benthic (bottom tending gear as used in the NMFS bottom trawl surveys) gear.*" In Conclusions the authors write "*the results suggest that the estimated spiny dogfish movement patterns calculated from satellite tag data are possibly spatiotemporally asynchronous with the NEFSC bottom-trawl surveys, thus a potentially large percentage (horizontal and vertical "availability") of these sharks may be unaccounted for in this survey.*"

What would be a consequence of underestimating the total biomass of spiny dogfish off the Mid-Atlantic and Northeast states? Obviously one would be underestimating what they were eating, which includes both codfish and the species that codfish eat. But as fishing management is accomplished today, spiny dogfish predation is irrelevant, because even if it were known, nothing could be done about it. The spiny dogfish fishery must be managed like all of our other fisheries, with a harvest limited to what would yield MSY every year. This is in spite of the fact that spiny dogfish are worth pennies a pound to the fishermen while the other commercial species like cod whose populations spiny dogfish are significantly impacting are worth at least an order of magnitude more.

While the Magnuson-Stevens Act, the federal legislation that controls fishing in the U.S. Exclusive Economic Zone, pays lip service to the Optimum Yield in a fishery, something which should allow fisheries to be fished to below the MSY level if that is economically or socially warranted, the Act actually precludes that. As I wrote in 2009:

*"One of the requirements of the Magnuson Stevens Act, the federal legislation that controls fishing in the US Exclusive Economic Zone, or more accurately one of the implied requirements of the Act, is that all fisheries be at the level that will produce MSY.*

*The first of the 10 National Standards that are applied to Fishery Management Plans put in place through the provisions of the Act is "conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the OY (Optimal Yield) from each fishery for the U.S. fishing industry."*

*From the Act (16 U.S.C. 1802, MSA § 3): 104-297*

(33) The term "optimum", with respect to the yield from a fishery, means the amount of fish which—

(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;

(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and

(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.

(34) The terms "overfishing" and "overfished" mean a rate or level of fishing mortality that jeopardizes the capacity of a fishery to produce the maximum sustainable yield on a continuing basis.

The definition of OY supposedly allows for departures from the MSY. However, as even the casual consideration of the above section of Magnuson indicates, that is not the case, or more accurately, that is only the case when a stock isn't at the MSY level. In that case the stock is considered to be overfished, and if it is considered to be overfished, it must be "rebuilt" to the MSY level by having the harvest level reduced.

But will having every stock of fish in the U.S. Exclusive Economic Zone being managed at the MSY level be economically, socially or ecologically "optimum?" Will it automatically provide "the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities?" Economically and socially, emphatically no. Is it even possible? Ecologically a not so emphatic "maybe." Considering all of the good intentions, all of the effort, all of the pain and suffering and all of the money – both from the public and the private sectors – that is being expended in efforts to reach what are perhaps undesirable and unattainable goals, the results of being tied to the Magnuson concept of OY can be and in demonstrable instances are far from optimum. (from **MSY and effective fisheries management**, [http://www.fishnet-usa.com/maximum\\_sustainable\\_yield.htm](http://www.fishnet-usa.com/maximum_sustainable_yield.htm)).

One of the demonstrable instances in which the results are far from optimum is having spiny dogfish at the MSY level in waters off the Mid-Atlantic and New England.

### **So why is it important to call it fishing management or fishermen management or something similar?**

Because no one has much of a clue of the effects of water quality or water temperature or wind direction/duration or upwelling or food availability or of much of anything else on fish stocks. As a matter of fact they lump all forms of non-fishing mortality together, call it Natural Mortality – as opposed to Fishing Mortality – and assume that it is a constant. Natural Mortality plus Fishing Mortality is by definition equal to total mortality. So obviously the authors at the Gulf of Maine Research Institute can report that fishing mortality is what's driving the Gulf of Maine cod population, because that's what fisheries science and their models demand. It doesn't matter how many codfish the burgeoning stocks of spiny dogfish eat nor does it matter how much of the prey species that codfish depend on is left after the dogfish get done with them, because codfish mortality that isn't due to fishing doesn't vary. All that varies is fishing, and the only way to have more fish is by reducing fishing. And if it can't be reduced enough, then stop it.

The only way real fishery management has a chance of working will be by identifying and quantifying all of the major forms of mortality on each fish stock being managed, and by either controlling at least or at least allowing for all of those other sources of mortality – which in no way in the natural world can add up to a constant year after year.

Once we're at that point we'll never have to look at a fishery that continues to decline, regardless of how much we cut back on fishing mortality, and force the fishermen to continue to pay the price for other factors that we either can't or that we feel that it's too inconvenient to control.

As I concluded in **MSY and effective fisheries management** six years ago (cited above):

*"The so-called conservationists involved in fisheries would have us believe that there's some sort of "natural balance" possible in our inshore and offshore waters and that, if fishing is reduced adequately across the board, this mythical balance can be reestablished. That is far from the case.*

*In their Rousseau-inspired misconception of what the oceans should be, they look at anthropogenic effects as categorically bad, with fishing in general and not harvesting every stock at the MSY level in particular among the worst. This is not necessarily the case. Fishing can be an effective management tool. In the case of species like herring, menhaden and dogfish, allowing – or encouraging – harvest levels above what would be considered "sustainable," and then maintaining the populations at lower than maximum levels by carefully regulating harvest might be all that is necessary to return "overfished" stocks of much more valuable species back to their OY levels.*



*Take, for example, the current situation regarding the New England groundfish complex. Fishermen have been hit with a seemingly interminable series of harvesting reductions extending back well over a decade. These cutbacks have been so severe that, if the most recent “management” proposal by NMFS is instituted, boats will be allowed to fish only 20 days a year.*

*This is due to the fact that several of the groundfish stocks haven’t been recovering as they were expected to (at least by the managers) following previous drastic reductions in fishing effort. At the same time, as we’ve seen above, the stock of spiny dogfish, notoriously voracious predators on groundfish and their prey species, have been allowed to increase unrestrictedly. And the even larger Atlantic herring stock could be impeding the groundfish recovery as well.*

*Reduce the number of spiny dogfish? Of course not. The Magnuson Act won’t permit it. Reduce the number of herring? Ditto, but for political rather than biological reasons.*

*But what if we could? Using such an approach, the economy will benefit, the ecosystem will benefit (through increased biodiversity), and the fishing communities that are dependent on “balanced” fisheries will benefit as well.*

*And there are other fisheries that are facing ever more stringent harvesting restrictions each year because they aren’t performing as the fishing-centric computer models predict that they should. The summer flounder fishery in the mid-Atlantic is one. What’s the impact of spiny dogfish on the summer flounder stock?*

*An EEZ that is being managed to provide the optimal harvest from a complex of interacting species would seem to be preferable to what we have today. The way we’re doing it today, our most valuable fisheries are increasingly subject to the depredations of other, less valuable species that enjoy the protection of a management regime that is totally stacked against rational management. If fewer spiny dogfish, fewer Atlantic herring or fewer menhaden will mean an increase in more valuable, more desirable or more threatened species, then why shouldn’t the people responsible for fisheries management be provided with the administrative wherewithal to allow this? Legislation mandating that they can’t isn’t benefitting anyone beyond the few anti-fishing activists who have built careers on saving fish stocks that clearly don’t need saving, and it’s certainly not benefitting the ecosystem. So why do we have it?”*