

Towards rationality in fisheries management

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The amount of wild fish captured globally has barely changed in the past two decades. The ceiling, of about 90m tonnes a year, seems to have been reached at the end of the 1980s. Overfishing is one reason, as is the limited room for productivity growth, particularly if consumers want high quality. (The price of fish – different scales, The Economist, August 10, 2013)

Bearing in mind that each edition of The Economist has a print circulation of about 1.5 million, its website attracts about 8 million visitors each month, and that the people who read it are among the world's most influential, consider the "take home" message that anyone with little or no knowledge of fisheries – maybe 99% of the readers – is being given; that stability of production in a fishery is an indication of overfishing, and even more importantly, that overfishing is unacceptable because it limits production.

Now we all know that sustainability is the managers' goal in our fisheries. In fact, this goal is part of the legal underpinnings of each of the fisheries management plans in effect in – and sometimes beyond – the US Exclusive Economic Zone.

According to the legislation controlling fisheries management in US federal waters, the first National Standard for Fishery Conservation and Management is that "*conservation and management measures shall prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.*" This is fine up to a point. The optimum yield from a fishery is defined in the Act as "(A) *the amount of fish which 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.*" No problems so far, the law recognizes that the optimum harvest from a fishery is not necessarily the maximum sustainable harvest. But then we have "(C) *in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield (MSY) in such fishery.*"

Adding their interpretation to this, the people at NOAA/NMFS, with the enthusiastic support of the various and sundry anti-fishing activists who pull way too many of the strings in Washington, have added as an administrative guideline that "*the most important limitation on the specification of OY (optimum yield) is that the choice of OY and the conservation and management measures proposed to achieve it must prevent overfishing.*"

So while OY from each fishery, determined with consideration given to relevant economic, social, or ecological factors, seems to be the goal of federal fisheries management, that is just window dressing. The real requirement is for each and every fishery to be at MSY.

From an administrative perspective, a perspective that has far more to do with the influence that the aforementioned activists had and continue to have than on the real-world needs of commercial and recreational fishermen and the communities and businesses that they support, this probably makes a certain amount of sense. After all, who could possibly argue about every fishery faithfully producing at maximum levels year after year? As the people at The Economist, at the ENGOS whose bank accounts are bloated with mega-foundation cash, and in the offices of Members of Congress who don't have – or who don't value – working fishermen as constituents want to convince us all, overfishing is something akin to the eighth deadly sin.

But is it?

From a real world perspective, a perspective that is shared by an increasing number of people who are knowledgeable about the oceans and their fisheries and who value the traditions and the communities that have grown up around them as well as the economic activity that fisheries are capable of producing, this proscription against "overfishing" is an ongoing train wreck.

And at this point, because it's The Law, nothing can be done about it.

A hypothetical situation:

Suppose there was an important fishery that was the basis of a large part of the coastal economy as well as the cultural cement that held coastal communities together. Then suppose that fishery started to decline. If you were a fishery manager and you were in charge, what would you do?

Though not in what should be the real world, that's a simple question with an even more simple answer in today's world of federal fisheries management. Regardless of any other factors you would cut back on fishing effort.

Suppose that didn't work, suppose that the fishery continued to decline. What would you do then? Because you have no other realistic options you'd cut back on fishing effort even more.

And suppose even that didn't work. If there were still any fishermen fishing, you'd cut back their fishing effort yet again. And again and again and again until you had gotten rid of them all, in spite of whether the cutbacks had any noticeable effects on the fish or not.

As we saw above, this would all be based on a so-called fishery management "plan" that was created under the strict requirements of a surprisingly short and what has become an even more surprisingly short sighted bit of federal legislation and the administrative interpretation of that legislation. The Magnuson-Stevens Fisheries Conservation and Management Act (MSFCMA) – which was written initially with good intentions towards US fishermen and signed into law in 1976 – has been purposefully distorted by outside groups and individuals with no legitimate ties to or empathy with the businesses and people dependent on fishing but with huge budgets provided by mega-foundations which themselves are provided with a convenient government-supplied coordinating mechanism (See <http://www.fishnet-usa.com/All%20Stolpe%20Columns.htm#CGBD>).

Why is it a "so-called" management plan? Back a few more years than I'd like to acknowledge I spent some time in the graduate planning department at Rutgers University, concentrating on environmental planning. Not too surprisingly, one of the topics that came up repeatedly was rational planning; what it is and how to do it. Putting together a bunch of definitions and some foggy recollections, in creating a rational plan you 1) define a problem or a goal, 2) design alternative actions to solve the problem/achieve the goal, 3) evaluate each alternative action, 4) chose and implement the "best" alternative action, and 5) monitor/evaluate the outcome and adjust if necessary.

This seems pretty simple and straightforward. How does it apply to fisheries management plans? If the problem with the New England groundfish fishery is that there are people making a living based on harvesting groundfish and if the goal is to stop them from doing that, then the managers and the management plan are right on target. But I suspect that most involved individuals/organizations aren't purposely planning to solve that problem/achieve that goal.

So why, after a seemingly endless series of *less groundfish can only be fixed by less groundfish fishing* iterations, are the groundfish fishermen – those who are still working – and the communities that depend on them just barely hanging on with fewer fish to catch following each cutback in fishing effort?

While this idea is going to be ridiculed by all of those anti-fishing activists whose careers are predicated on blaming just about every ocean ill on overfishing, perhaps it's because overfishing isn't the problem that they've built multi-million dollar empires on by convincing the world – and the U.S. Congress – that it is.

But for the moment let's pretend that we don't have a fisheries management system that has been torqued into something worse than ineffectuality by their lobbying clout. Let's pretend that the people responsible for creating fisheries management plans in general and the groundfish plan – actually the multispecies plan – in particular were trying to do some rational planning. Where would they go from here?

What about competition between species?

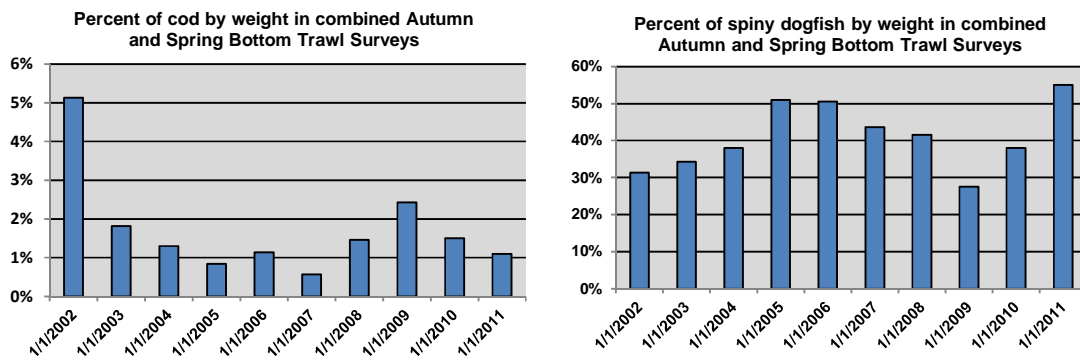
Obviously, having lived with the effectiveness – or the lack thereof – of continuously cutting back on groundfish fishing, they'd look for an alternative or two (and no, opening parts of several previously closed areas of the EEZ while demanding full-time, industry paid observer on every vessel that fishes in them isn't anything approaching a reasonable alternative). It's hard to imagine that early on they wouldn't consider the idea that other, competing species might be in part responsible for declining stocks. That's the way the natural world has worked, is working and will continue to work.

1953 – Spiny dogfish biomass unknown - *"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. Again and again fishermen have described packs of dogs dashing among schools of mackerel, and even attacking them within the seines, biting through the net, and releasing such of the catch as escapes them. At one time or another they prey on practically all species of Gulf of Maine fish smaller than themselves, and squid are also a regular article of diet whenever they are found."* (**Fishes of the Gulf of Maine**, Bigelow, H.B. and W.C. Schroeder)

About ten years ago fishermen started complaining about the impact that the huge numbers of spiny dogfish off our coast were having on other much more valuable fisheries. As a result I organized a workshop on spiny dogfish/fisheries interactions in September of 2008 (see A Plague of Dogfish at <http://www.fishnet-usa.com/dogforum1.htm>) and have attempted to keep informed of spiny dogfish biology since then. One of the ways that I do this is by keeping an eye on things like landings and survey data, which NOAA/NMFS makes readily available via various web pages.

Among the most interesting data sets I have found are the reports of the bottom trawl surveys which have been carried out by Northeast Fisheries Science Center vessels every year for over half a century (to access the recent reports go to <http://www.nefsc.noaa.gov/femad/ecosurvey/mainpage/> and click on "Cruise Results" in the menu on the left). The assumed reliability and reproducibility of these surveys is such that they are one of the primary data sources in the stock assessments for many of our important fisheries. In recent years spiny dogfish at times have comprised upwards of 50% by weight of all of the fish taken in these surveys.

Looking for another way of addressing the spiny dogfish situation, I put together a spreadsheet of the percentage (by weight) of spiny dogfish and Atlantic cod caught in the Spring and Autumn bottom trawl surveys for the last ten years and graphed the results (because the annual Winter survey was discontinued half way through this time period, I omitted it).



I was surprised to see how well the high abundance levels of spiny dogfish coincided with the low abundance levels of Atlantic cod – the primary groundfish species – and vice versa. (Note that this relationship wasn't apparent in prior years.)

It seems in-your-face obvious that in recent years there been something going on between spiny dogfish and Atlantic cod abundance (I looked at the trawl survey results for a number of other species relative to spiny dogfish and none of them exhibited such a dramatic apparent relationship).

Of course this could be an example of *post hoc ergo propter hoc* (basically correlation doesn't equal causation). But then again, it could not as well.

1992 – Spiny dogfish biomass estimated at 735 thousand metric tons: "*given the current high abundance of skates and dogfish, it may not be possible to increase gadoid (cod and haddock) and flounder abundance without 'extracting' some of the current standing stock.*" (Murawski and Idoine, **Multi species size composition: A conservative property of exploited fishery systems** in **Journal of Northwest Atlantic Fishery Science**, Volume 14: 79-85)

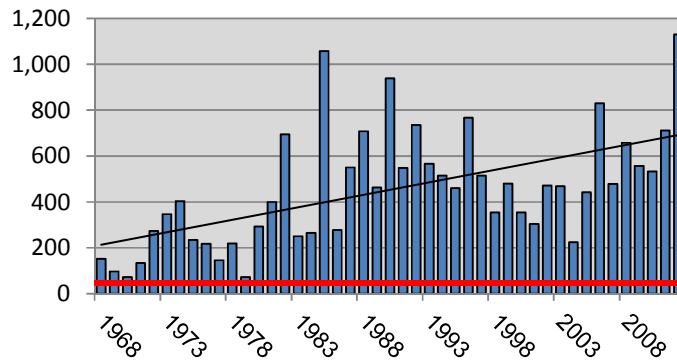
James Sulikowski at the University of New England in Biddeford, Maine has been intensively involved in shark and ray research for twenty years. He is currently focusing on spiny dogfish and along with population and distribution work has begun to look at prey and predation. According to Dr. Sulikowski "*preliminary analysis of stomach content data suggest a high degree of dietary overlap between dogfish and Atlantic cod as Atlantic herring, Clupea harengus, was found to be the primary prey item of both species. In addition, preliminary stable isotope data suggests evidence of niche overlap between cod and dogfish, although the extent of overlap may change seasonally. Collectively, the stomach content and stable isotope data suggests dogfish and cod are in competition for resources within this ecosystem.*"

How does this apply to the current Northeast Multispecies (groundfish) Fisheries Management Plan? In fact, it doesn't apply at all. The multispecies plan is based on the assumption that fishing is the only thing influencing the groundfish stocks – including Atlantic cod. Considering that fishing is the only thing that federal legislation permits the New England Fishery Management Council to manage, its members have become quite adept at managing it. The fact that an extensive and still ongoing series of fishing cutbacks hasn't stopped the decline of the primary groundfish species – led by Atlantic cod – seems to be irrelevant to them doing that.

1994 – Spiny dogfish biomass estimated as 514 thousand metric tons: "*...preliminary calculations indicated that the biomass of commercially important species consumed by spiny dogfish was comparable to the amount harvested by man. Accordingly, the impact of spiny dogfish consumption on other species should be considered in establishing harvesting policies for this species.*" (**18th Stock Assessment Workshop**, Northeast Fisheries Science Center)

The graph below shows the spiny dogfish total biomass estimates from the Northeastern Fisheries Science Center's spring bottom trawl surveys. The highest estimated biomass, 1.131 million metric tons (or about 2.5 billion pounds), was in 2012 (from data in in Table 7 of *Update on the Status of Spiny Dogfish in 2012 and Initial Evaluation of Harvest at the Fmsy Proxy* by Rago and Southesby and MAFMC staff and identified as not representing "*any final agency determination or policy*"). For reference, the total allowed catch (TAC) of spiny dogfish will be under 20,000 metric tons (the solid red line) a year for the next three years

**Spiny Dogfish Total Biomass (metric tons x 1,000)
estimated from Spring Survey**



2008 – Spiny dogfish biomass estimated at 657 thousand metric tons: “All told, 87% of the stomach contents from these particular Gulf of Maine caught dogfish (401 adult dogfish collected by University of New England researcher James Sulikowski and his students) consisted of bony fish – with cod, herring, and sand lance being the top three species.” (J. Plante, **Dogfish in the Gulf of Maine eat cod, herring**, Commercial Fisheries News, May 2008)

The two graphs below – from the Northeast Fisheries Science Center’s web page *Status of Fishery Resources off the Northeastern US - Atlantic cod* (<http://www.nefsc.noaa.gov/sos/spsyn/pg/cod/>) show the decline of cod abundance calculated from both the Spring and Autumn bottom trawl surveys in the Gulf of Maine and on Georges Bank. Note that as the calculated spiny dogfish biomass (above) is increasing the biomass indices for Atlantic cod in both the Gulf of Maine and on Georges Bank are decreasing correspondingly.

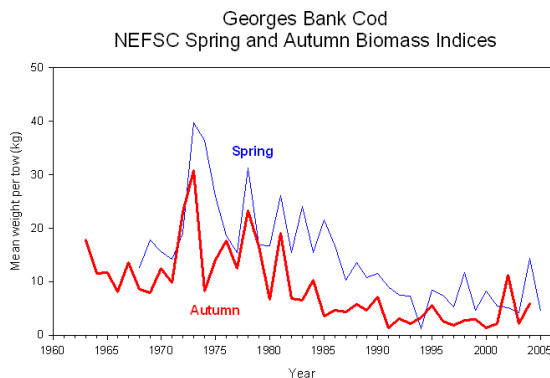


Fig 1.13. Biomass indices (stratified mean weight per tow) of Georges Bank Atlantic cod from NEFSC spring and autumn research vessel bottom trawl surveys, 1963-2005.

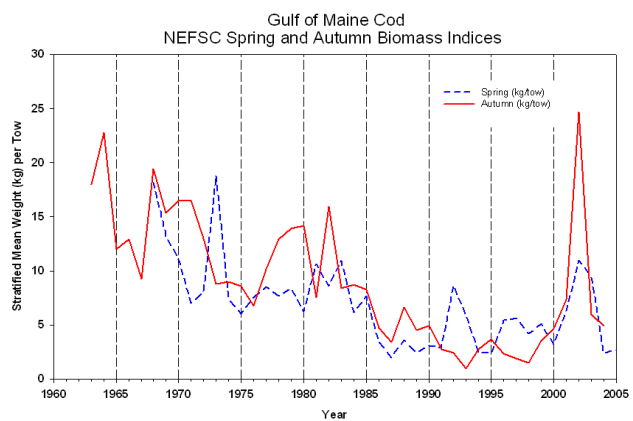


Figure 1.4. Biomass indices (stratified mean weight per tow) for Gulf of Maine cod from NEFSC spring and autumn research vessel surveys.

It has been reported that spiny dogfish consume 1.5% of their weight per day. That translates to them eating about 17000 metric tons of anything slower/smaller/less voracious than they are every day.

2009 – Spiny dogfish biomass estimated at 557 thousand metric tons: “our reason for contacting you is to draw your attention to a severe and growing problem that we are all facing because of the supposed constraints imposed on the federal fisheries management system by the most recent amendments to the Magnuson Act. Because of the supposed necessity of having all stocks being managed at OY/MSY, all of our fisheries are and have been

suffering from a plague of spiny dogfish (Squalus acanthias).” (Fishermen Organized for Rational Dogfish Management letter to NOAA head Jane Lubchenco)

Since 1950 the annual Atlantic cod landings in all US ports exceeded 50,000 metric tons only in 1980, '82 and '83. In 2011 they were 7,900 mt.

If there was one rational step that could be taken to try to return the Atlantic cod stocks off our Northeastern coast to former levels, it's hard to imagine anything with more of a likelihood of success than significantly cutting back the population of spiny dogfish. But this isn't possible because if the spiny dogfish stock is not at a level that could produce the maximum sustainable yield it would be overfished – and thanks to the successful lobbying of the anti-fishing clique managed fish stocks can't be overfished.

In the face of all of this it's kind of hard to think that the federal fisheries management system has as a goal anything but the elimination of New England's codfish fishermen. Otherwise, how could an alternative to further futile decreases in fishing for cod not be an increase in fishing for spiny dogfish? That would seem to be a rational action, wouldn't it (and rest assured that spiny dogfish impact many more species than Atlantic cod).

But it's not, and with the MSFCMA written and interpreted the way it is it can't be.

But the spiny dogfish plague isn't the only fly in the “blame it all on overfishing” ointment. There's an explosion in the population of seals in New England coastal waters as well. With the ability – or more accurately, with the need – to consume 6% of their body weight per day, the almost 16,000 gray seals off Cape Cod are consuming far more fish than Cape Cod's recreational and commercial fishermen could ever hope to catch. If they aren't competing directly with the fishermen for cod and striped bass and flounder they are competing indirectly by eating the prey species that the fishermen's targeted species eat. For a succinct and fairly balanced examination of the developing Cape Cod seal crisis see *Thriving in Cape Cod's Waters, Gray Seals Draw Fans and Foes* by Bess Bidgood in the NY Times on August 17th. And there are burgeoning populations of other marine mammals as well as cormorants, birds that are protected by the federal Migratory Bird Treaty Act. They are all highly efficient predators on smaller fish.

The Act will be reauthorized this year. In the reauthorization, unless the managers are once again given the ability to use their judgment we won't be able to most effectively manage our federal fisheries to maximize the benefit we can derive from them. The Magnuson management process was designed to benefit from the knowledge that people in the fishing industry and marine scientists have gained through uncounted years of on-the-water experience in dealing with an environment that is as strange to the rest of us as outer space and a lot more complex. The benefits of that knowledge have been lost to the process because of legislated changes by people who and organizations that are sorely lacking in that hands-on experience and think that there is one answer to every fishery-related problem - to cut back on fishing. Without that changing, without discretion being returned to the managers, our fisheries will increasingly follow the trajectory that the New England groundfish fishery is on. None of us – except perhaps for the ENGOs and the foundations that support them – either want or can afford that. Magnuson must be amended. Flexibility, with adequate safeguards, to deal with situations like the current dogfish plague must be restored to the management process. Rationality demands it.