Testimony of Ray Hilborn to U.S. Senate subcommittee.

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Qualifications

I am an ecologist working in fisheries management for over 45 years. I have published over 300 peer reviewed articles and several books, including a text book on fisheries stock assessment and management, and "overfishing, what everyone needs to know." I have received the Volvo Environmental Prize, the American Fisheries Societies Award of Excellence, The Ecological Society of America's Sustainability Science Award, and the International Fisheries Science Prize. I am a Fellow of the Royal Society of Canada, the American Academy of Arts and Sciences, the American Fisheries Society and the Washington State Academy of Sciences. I have helped lead international study teams examining the status of fish stocks and the relationship between management and outcomes, the impact of bottom trawling on benthic biota, and the impact of fishing forage fish on their predators.

Funding

My research program receives substantial funding from a range of sources including U.S. Philanthropic Foundations (Walton Family Foundation, David and Lucile Packard Foundation, Gordon and Betty Moore Foundation, Pew Institute of Ocean Sciences), fishing industry groups in the U.S. and overseas, environmental NGOs (Environmental Defense, The Nature Conservancy), U. S. government agencies (NOAA and NSF), and the Food and Agriculture Organization of the United Nations.

Testimony

US federal fisheries policy has led to rebuilding of fish stocks and some of the most successful fisheries in the world. The number of fish in the sea is rising in all regions of the US and the proportion of stocks at low abundance is consistently decreasing (See Figures 1 and 2).

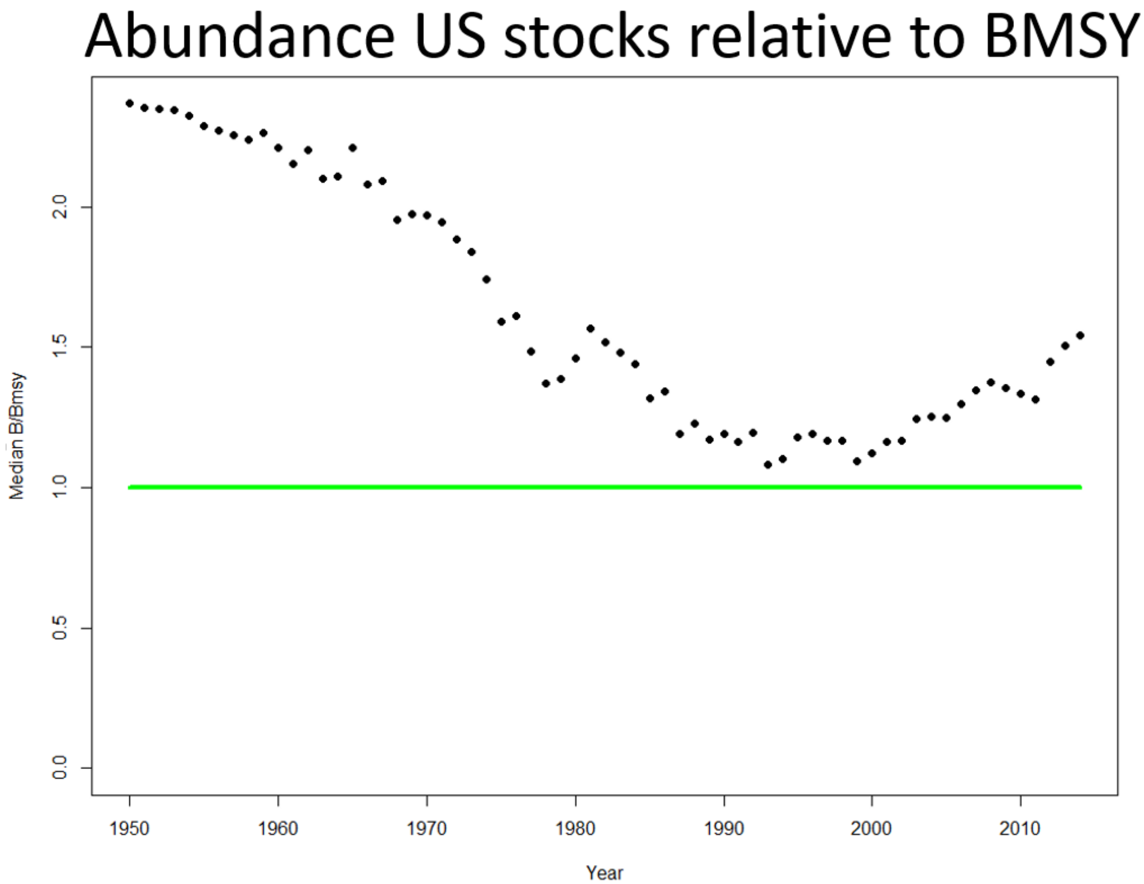


Figure 1. Trend in U.S. average stock biomass in relation to the level that would produce long term maximum sustainable yield. The green line is the stock biomass that would produce maximum sustainable yield. All data from NOAA assessments.

This success has been achieved by funding of NOAA, regionalizing fisheries management decisions, stopping the race-to-fish through various forms of rationalization, engaging in a consultative process and most of all requiring managers to follow science advice regarding allowable levels of harvest.

In many cases, but certainly not all, moving away from effort limits to hard “total allowable catch” has made a big difference in reducing fishing pressure where it was too high. The rebuilding of stocks can be directly attributed to the reduction in fishing pressure that began in the 1990s and the science advice has been guided by the objective of stopping overfishing.

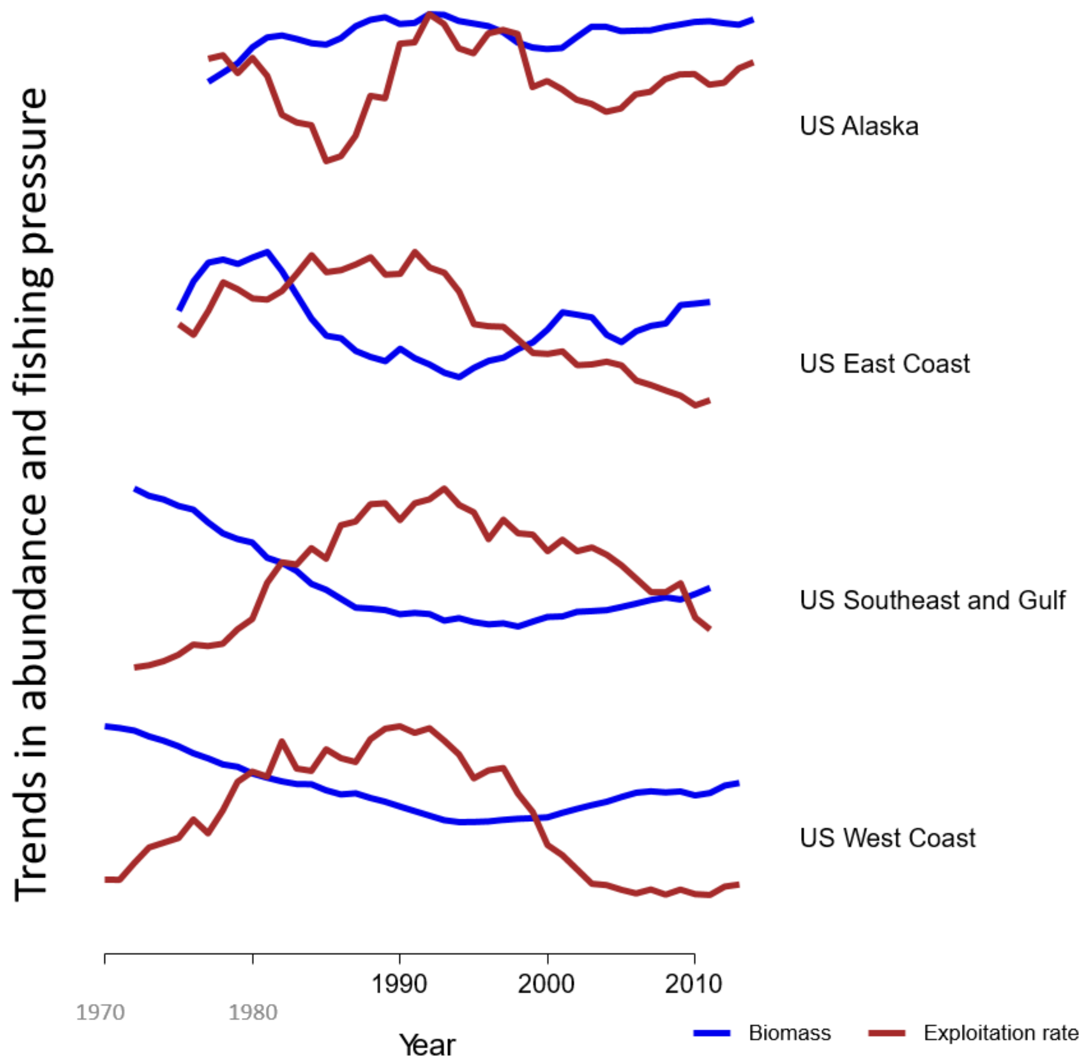


Figure 2. Trend in average abundance of fish stocks (blue line) in individual regions of the U.S. and fishing mortality rate (red line).

The major threats to U.S. fish stock and marine ecosystem biodiversity are now ocean acidification, warming temperatures, degraded coastal habitats, exotic species, land based run off, and pollution. Overfishing remains a concern for a limited number of stocks but should not continue to be the most important concern for US federal fisheries policy. If Congress were to decide what the relative importance of various objective of fisheries management should be (profit, jobs, yield, environmental protection) the science community could give guidance on the recommended harvest.

The social and economic record of US fisheries is much more mixed than the biological success. Where we have found ways to stop the race-to-fish, profitability has almost always increased, fisheries are safer, and fishing seasons have grown longer while total fishing effort and cost has been reduced. However many of the methods used to stop the race-to-fish have led to declines in owner operated small boat fleets and concentration of ownership, and we have not found any methods to allocate fishing opportunity that are considered fair by all stakeholders.

The overall approach of reference points, TAC's for each species and rebuilding plans works well for individually targeted, large scale industrial fisheries, but is totally inappropriate for recreational, small scale, and highly mixed fisheries where dozens or even hundreds of species may be caught together and the science is not affordable assess and measure catch of each species.

There is potential to increase U.S. fisheries yield, jobs and economic value, but this potential may be limited by the ability to manage stocks individually, concerns about environmental protection, profitability of fishing, and markets for stocks that are lightly fished (Figure 3).

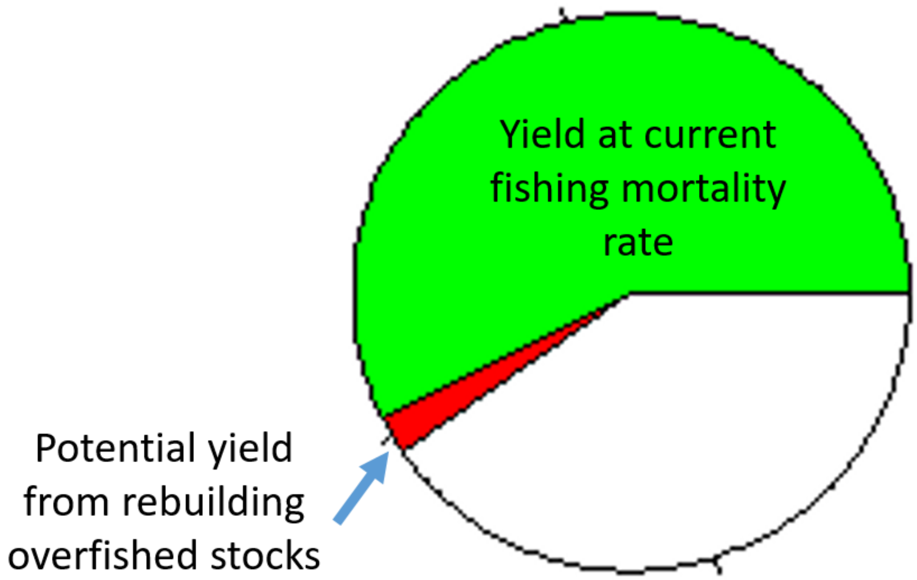
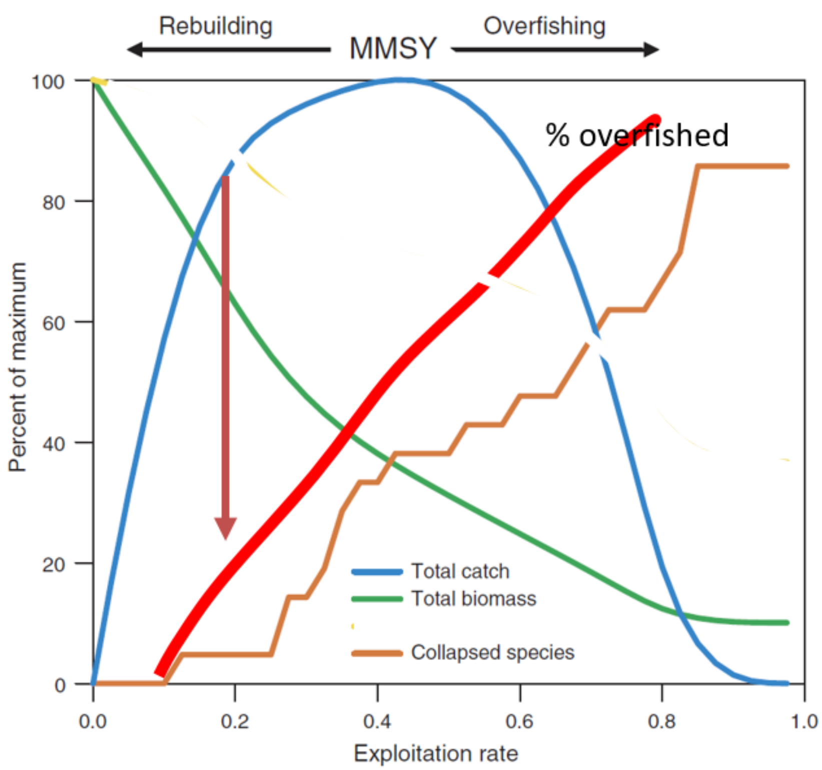


Figure 3. Graph showing how much yield will be achieved at current levels of fishing pressure (green), how much yield can be increased by rebuilding overexploited stocks (red), and the remaining area is a theoretical gain that could be achieved if we were able to and wanted to manage each stock to its MSY.

Fuller use has three aspects.

First and of the most importance, is fuller utilization of the TACs being set. In many US fisheries, particularly the mixed bottom fisheries of the east coast, west coast, and Gulf of Alaska, we catch much less than the TACs which themselves are set conservatively to prevent overfishing. In the West coast, the potential landed value of all TACs in 2015 was $168 M, the landed catch as worth $65 M, thus we only actually caught 38% of the potential value. In the Gulf of Alaska we left 1/3 of the economic value uncaught. In the East Coast groundfish fishery the percent used is somewhere below 50%. In the Bering Sea the catch may be less than ½ the catch level science says could be achieved. It is impossible to have all species in a mixed stock fishery produce MSY at the same time, and if we want to have no species overfished or collapsed we have to forgo most of the potential catch. Maximizing yield from mixed fisheries will generally involve some stocks above BMSY and some stocks below BMSY. (See Figure 4.)

Why are we catching such a small fraction of the TAC -- primarily because these mixed fisheries are heavily constrained markets and by-catch of choke species, most commonly stocks under rebuilding plans. Commonly the fishing fleet cannot catch valuable species because there are strong catch limits on other species that are caught at the same time. Markets are also very important.   Fishing is a highly competitive business, and the volatility in the actual catch due both to natural fluctuations and fisheries regulations has meant it is difficult to develop or even maintain markets for some of our fish. Many of the highest value markets for our fish are overseas and government trade policies strongly affect these markets.



From Worm et al. 2009 “Rebuilding global fisheries”

Figure 4. The relationship between catch (blue) and total exploitation rate for mixed fisheries. Redrawn from Worm et al. 2009.   The total abundance of fish is shown in green and declines as fishing pressure increases. In gold is the number of species that

would be collapsed, and in red the number overfished. We can reduce the number of overfished and collapsed stocks by reducing fishing pressure lower than would maximize yield (the downward arrow), but if we want to have no overfished stocks, we must give up most of the potential catch.

These mixed fisheries have seen dramatic reductions in fishing pressure, and rebuilding of stocks, but they have not seen increases in catch. As a policy to provide more catch to the fishing fleets our current approach for mixed stock fisheries has largely failed.

The second potential for increasing U.S. food from fish, jobs and economic benefits come from increased harvest of our underexploited fish resources. According to a recent analysis (Costello et al. 2016; Hilborn and Costello 2017) U.S. total yield could potentially increase by 50% if we could obtain the maximum sustainable yield of all species. We cannot actually achieve MSY for each species, and we may not want to maximize sustainable yield, but there is potential for more food, jobs and economic value. If scientists were directed to calculate quotas that would maximize long term catch, or jobs or profit, the science recommendations would be different from current science advice built around stopping overfishing.

Third, we can increase our fish production by using more of the fish we catch. This has happened in many fisheries where stopping the race-to-fish has placed incentives on getting more value from the fish one is allowed to catch rather than rushing to catch a bigger share of the total catch.

I know that there is considerable interest in adding flexibility to the law. I support the conclusions of the National Academy of Sciences 2013 NRC (2013) report on rebuilding plans and their conclusion

> *"Rebuilding plans that focus more on meeting selected fishing mortality targets than on exact schedules for attaining biomass targets may be more robust to assessment uncertainties, natural variability and ecosystem considerations, and have lower social and economic impact."*

I emphasize that we should not move away from science based management and the existing Council process. The current rebuilding system is designed to achieve the management objective of stopping overfishing – regardless of the cost to total catch, markets and communities. If the science community was directed to maximize economic value of U.S. fisheries or yield, the rebuilding plans would be quite different.

I would like to address the importance of recreational fishing and small scale fisheries. I serve on the Science and Statistics Committee of the Western Pacific Regional Fisheries Management Council where we evaluate the small scale commercial and recreational fisheries of the Hawaiian Islands, American Samoa, Guam, and the Northern Mariana Islands. The National Standards are appropriate for the major industrial tuna fisheries of the region but totally inappropriate for the small scale reef fisheries where we have hundreds of species with poor catch and abundance data. Trying to estimate ABC and status relative to reference points for even a dozen of them is simply not possible. If our SSC (and other SSCs) were directed to provide advice on how best to achieve specific objectives for these types of fisheries with the budgets and tools available, we could do so, but it not involve hard TACs, and almost certainly be some form of effort and spatial management.

As an example of threats to our major fisheries that are unrelated to fishing, I would like to mention the proposed Pebble Mine in Bristol Bay Alaska. For 20 years I have spent much of each summer studying this ecosystem and the fishery. Over the last 50 years sockeye salmon has been the second most valuable species caught in the US and Bristol Bay has been the major production region for sockeye salmon. The idea that highly toxic chemicals can be stored forever behind earthen dams in an ecosystem that is highly permeable, and subject to volcanic and seismic activity is laughable. The Pebble Mine poses a serious threat to one of America’s premier fisheries.

In summary I wish to emphasize that US fisheries management has succeeded by relying on science advice. This should not change. However, there certainly is the potential to change US fisheries management to try to achieve more benefits from the ocean. This can be achieved by directing the science community to design fisheries management policies that achieve our societal objectives.

References

Costello, C., Ovando, D., Clavelle, T., Strauss, C. K., Hilborn, R., Melnychuk, M. C., Branch, T. A., et al. 2016. Global fishery prospects under contrasting management regimes. Proceedings of the National Academy of Sciences, 113: 5125-5129.

Hilborn, R., and Costello, C. 2017. The potential for blue growth in marine fish yield, profit and abundance of fish in the ocean. Marine Policy. (available online).

National Research Council. 2013. Evaluating the Effectiveness of Fish Stock Rebuilding Plans in the United States, National Academies Press.