Rethinking Fisheries Management: Why Fisheries Management Fails

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Abstract: Fisheries management as we know it today is in a perpetual state of crisis because it is fatally flawed. Fisheries management will increasingly fail to prevent species decline, and even exacerbate those declines, unless it adopts new institutional priorities and methodologies based not on the prevalent "Industrial Model," which is driven primarily by economic utility, but instead based on the "Biological Model," which is primarily driven by the whole range of species' biological needs, including limits placed by interactions with other species and by the ecosystem's carrying capacity at each stage of a species's lifecycle. In other words, fisheries managers – including fisheries economists – must stop just managing fishermen and learn to manage fish ecosystems by thinking more like biologists than economists. To do this, concepts such as "efficient use" and "optimization" of the resource must now be legally redefined primarily in biological and ecosystem conservation terms, and fisheries management agencies must adopt the tools of conservation biology, including investing far more heavily in the basic biological monitoring that makes such management possible. Failure to make these changes will simply lead to more stock crashes, unnecessary and probably fatal stresses on fishing-dependent communities, and ultimately extinction of whole species.

Keywords: sustainable, fisheries, management, ecosystem, overfishing

PURPOSE OF THIS ARTICLE

Fisheries management today is in a perpetual state of crisis. Increasingly, fisheries regulators are less able to foresee, much less prevent, major stock crashes which jeopardize fishing dependent communities and can bankrupt whole fleets. In many cases, fish management failures have in fact either led to or greatly exacerbated fisheries declines. The failure of fisheries management creates untold – and largely preventable – suffering in fishing dependent communities. However, there are several little acknowledged but clear institutional failures which have led to these problems, both in the US and internationally, which badly need to be and can be addressed and corrected. This article will attempt to shed some more light on these problems, from our viewpoint as a representative of commercial fishing families and fishing dependent communities, as well as illuminate some potential solutions and show how these changes are slowly being implemented in U.S. fisheries management laws.

MANAGING FISHERMEN IS NOT MANAGING FISH

The traditional role of fisheries managers is merely managing fishermen, never fish ecosystems themselves. Fisheries management thus typically glosses over the biological reality that fish populations are supported and maintained by a highly complex and interwoven yet fragile coastal and marine ecosystem. Many of these ecosystems themselves are now threatened with widespread destruction caused by generations of habitat loss and increasing estuarine and coastal pollution. These long term habitat loss impacts usually far outweigh any possible impacts of mere fishing. For most species, all commercial and sportfishing combined usually accounts for only a very small portion of total human-induced fish mortalities, while habitat loss, oil spills and other pollution, and (particularly in the case of salmon) total blockage of many major spawning and rearing areas accounts for far more in terms of net losses and past extinctions. The trend toward increasing habitat loss is often a far more insidious and far more lasting impact than transitory overfishing.

Since fish managers traditionally have control over only one small portion of these total impacts – fishing harvests – they are legally helpless to prevent continuing declines of many commercial valuable species when the driving force behind these declines is not fishing but widespread habitat loss. A classic example is the current salmon crisis in many places along the US west coast, including Canada. In the Columbia River, for instance, all sport, commercial and Tribal fisheries combined account for only an estimated 5% of all human-induced fish mortalities within the system (less for some species), while the hydropower dams in that basin account for almost 85%. Yet the most recent version of a Columbia River salmon restoration plan still has federal fish managers attempting to squeeze yet more adult returns out of nearly nonexistent harvests but unwilling (and unable) to deal with the widespread destruction of fisheries caused by too many dams, too many water diversions, too much grazing and too many logging operations which have had far more negative impact.

In fact most commercial fished species are utterly dependent on inland and near shore habitats for at least part of their lifecycle. In addition to salmon, pollock, crab, halibut, shrimp, and menhaden are all species that are very wetlands dependent, yet coastal wetlands are disappearing rapidly everywhere. California, for instance, has lost 91% of its wetlands, Oregon 38% and Washington 31% and the remainder has been biologically compromised. Counting coast wetland losses only, these loss figures would be even greater. Coastal wetlands losses have already had a dramatic impact on salmon and many other fisheries throughout the west coast and the nation, costing tens of thousands of jobs and hundreds of millions of dollars each year in loss of productive fisheries capacity. (See for instance "Fisheries, Wetlands and Jobs," http://www.pond.net/~pcffa/wetlands.htm). Almost every coastal area is now under massive assault by agricultural, industrial and residential development as well as victimized by widespread pollution.

Fisheries management can no longer be seen as merely the management of fishermen without reference to all other biological impacts. Fisheries management MUST deal with all impacts at ALL stages of a species' lifecycle, or the species will inevitably fail because nonfishing impacts remain uncontrolled.

Unfortunately it is only when the federal Endangered Species Act (ESA) kicks in that any of the many other non-fisheries impacts can come under any form of NMFS legal scrutiny. Yet once a fish species is already so near extinction as to be listable as threatened or endangered, it is often far too late to do much good with even the most stringent regulations.

Some efforts have been made to correct this problem. For instance, in the 1996 amendments which codified what is now the Magnuson-Stevens Sustainable Fisheries Act (SFA) (16 U.S.C. 1801 et. seq.) was the new requirement, advocated primarily by PCFFA, that fisheries managers designate "essential fish habitat" (EFH). Thereafter any federal agency whose actions potentially would have impacts in EFH had to respond to any concerns federal fisheries managers raised about that project's impact on EFH. Though certainly nowhere near as strong as the mandatory consultation and mitigation requirements under Section 7 of the ESA, nevertheless this provision for the first time gave fisheries managers a real say in what goes on in fish habitat. To date NMFS has poorly implemented this provision, but this was at least a start in a positive direction in addressing lack of habitat protection authority for fisheries.

In spite of industry misgivings, the current fad concerning "marine protected areas"(MPAs) also may provide a potentially positive tool. If used properly, and if drawn up in ways that involve and make biological sense for fishermen, MPAs may also become an effective tool in sustaining our fisheries by protecting key habitat and nursery areas. The Pacific Fisheries Management Council (PFMC) is now drawing up criteria for their assessment and implementation. (See FN, Feb. '99, "Marine Protected Areas: Friend or Foe?" at: http://www.pond.net/~pcffa/fn-feb99.htm).

Another way, of course, is for fishermen themselves to use other tools to protect the fish habitat that their industry depends upon. PCFFA and other fishermen's associations are making increasing use in court of the Endangered Species Act, the Clean Water Act, the Oil Pollution Control Act and many other environmental protection statutes to protect fish habitat. Indeed, fishermen have every reason to be far more aggressive defenders of habitat than any environmental group, since it means protecting their jobs. (See FN April '99, "Greener than the Greens," http://www.pond.net/~pcffa/fn-apr99.htm).

Finally, one of the most important fields that fisheries economists need to pay real attention to are the emerging methods for quantifying and thus internalizing environmental externalities through environmental cost accounting. Environmental damage (including damage to fisheries and other public resources) is usually externalized (i.e., ignored) in most cost-benefits analyses. Obviously such an approach is totally bogus, resulting in grossly overstated benefits for proposed development projects that, considered as a whole, many be far more burden on society as a whole -- which after all must ultimately pay for these environmental damages -- than they are worth. In fact, once you ascertain the full economic value of all the many environmental amenities Nature provides, and if full environmental cost accounting were in fact used to assess the full range of social costs from the loss of these amenities, many projects such as dams and wetland conversions would no longer be economically justifiable. (One good source on this developing field for Economists is the "International Society for Ecological Economics." See:http://www.ecologicaleconomics.org/about/index.html).

DISINFECTING IN DATA COLLECTION INVITES DISASTER

A second and increasingly common source of fisheries management failure has been the distressing tendency of governments to seriously under fund basic fisheries data collection programs. These programs are not glamorous

but they are essential to proper resource management. Each year fisheries agencies everywhere have to scramble for diminishing data collection funds, often pitted against many other competing interests.
Funding is frequently inadequate to provide basic management monitoring and data.

Lack of adequate population data, perhaps more than any other single factor, leads to overfishing. On the US west coast, for instance, perpetual lack of groundfish survey money in past years led to guesswork allocations based on overly optimistic assumptions that were neither accurate nor sustainable, and which led to the fatal combination of massive groundfish allocation cutbacks combined with already serious overcapitalization. The end result is that nobody in that fishery can make a decent living anymore. Some way to retire at least 50% of the groundfish fleet has to be found or all will face ruin. As it is, rebuilding plans may take 50 years to accomplish for some species.

Fisheries management without data is nothing more than guesswork. Indeed, chronic lack of essential management data makes major and economically painful crashes inevitable, doing far more long-term harm to fishing dependent communities than any combination of proactive and rational restrictions that protect long-term sustainablity.

Fishery Management Plans are now required to specify the pertinent data which will be submitted as part of the Plan (16 U.S.C. 1853(a)(5)). The Pacific Fisheries Management Council also periodically publishes a list of types of basic fisheries data it needs for proper management, including current data gaps. Others Councils, if they don't already do so, should follow suit. However, such agency data needs assessments must not just wind up sitting on some shelf, they need to be gotten into the hands of members of Congress and of fishing industry organizations that should be lobbying Congress to make sure these data collection programs are fully funded.

Unfortunately, data collection programs based on annual Congressional appropriations battles are inherently unstable. Ultimately, what our industry needs is a research and data collection Trust Fund, funded automatically by the industry itself through poundage fees or other routine assessments, that pays for basic data collection programs in perpetuity outside the annual political budget process. Other dedicated sources of funding should also be found. For instance, if the Conservation and Reinvestment Act (CARA -- S. 2123 and H.R. 701) passes in Congress, a portion of those offshore oil production royalties could also be used for this purpose. State data collection programs also need to be funded by similar state mechanisms, such as through California's recently passed coastal and fisheries conservation funding mechanisms in Propositions 12 and 13. Data collection and observer programs are essential; without them we are sailing blind into a storm.

THE CLASH OF MODELS: REDEFINING "EFFICIENT USE"

A third major failure of fisheries management generally is the inability to make the institutional transition from the "Industrial Model" to the "Biological Model" in determining how commercial fisheries should be structured and managed. Both paradigms have real but very different and largely incompatible implications for the future direction and composition of the fishing industry. Unfortunately, even though the widespread Industrial Model of fishing has clearly failed, it is nevertheless so deeply ingrained in the management process and its institutions that it still dominates every major agency management decision.

The Magnuson-Stevens Sustainable Fisheries Act requires the efficient use of fisheries resources (see for instance 16 U.S.C. §1851(a)(5)), but nowhere is it defined in the Act what efficient use really means, nor for whom. Unfortunately, defining efficiency solely in economic terms, as was so often done in the past (particularly by fisheries economists), has in fact led to massively overcapitalized multinational factory fleets creating serious bycatch and ecosystem problems wherever they go that, when viewed from a purely biological point of view, others see as rampant and ultimately unsustainable waste.

In the older Industrial Model, driven by almost entirely by economic Utilitarianism, the driving principle of fisheries management is to optimize return on investment by optimizing profits of its participants by harvesting the "maximum sustained yield.." In this model, the ocean is seen as a gigantic factory out of which we can extract almost unlimited amounts of food for markets to our own profit. Decision making is driven almost entirely by commercially marketable species, rather than ecosystem needs as a whole, with each species managed in isolation from all others. Open fisheries are the general rule under this model, on the theory that economic forces and free trade alone will "optimize" or "rationalize" the markets and that the most economically efficient participants (usually the largest and most highly capitalized) will and should prevail.

Maximizing private profiteering from a public resource, however, eventually comes at the biological expense of the resource itself (the so-called "tragedy of the commons"),

leading inevitably to fisheries collapse. Thus moderating mechanisms such as maximum sustained yield (MSY) concept have been imposed on the Industrial Model, but only as a last resort. Efficient use of the resource, however, is always seen in this model in purely economic terms as the most cost effective delivery of the largest volumes of marketable products to market, not in biological terms.

The preferred tools of the Industrial Model people are simplistic economic modeling, including an economy of scale theory that bigger and faster is inevitably more economically efficient. This way of thinking also relies on a free market theory actually based on Social Darwinism that ultimately implies the globalization and concentration of fishing capacity in the hands of a small number of big multi-national companies. High levels of bycatch and discards of nonmarketable species are a normal and accepted practice under this model, and is not accounted as waste. Issues of community or biological sustainability are non-economic concepts which are meaningless under this model. The object of the Industrial Model is increased economic production, pure and simple, but the model is blind to where the production is done and by whom. Instead of regulation, proponents instead put their faith in the invisible hand of the market to keep things in balance.

Privatization of public resources is a favorite rallying cry for those locked into the Industrial Model. ITQ programs fit well within this model, because they will likely lead to the kind of economic centralization and concentration that proponents of this model believe is best and most efficient. The vision of the future under the Industrial Model means fewer but larger boats, more vertical integration of fishing and processing capacity, and fewer and fewer actual owners. Under the Industrial Model, most of today's commercial fishermen would essentially become either factory workers or sharecroppers.

The vast majority of fisheries economists were trained in and deeply emotionally committed to the Industrial Model, perhaps because they have no biological training. The very fact that NOAA now resides in the Department of Commerce, rather than in Interior with most other natural resource trustee agencies, or as a separate agency like the EPA, is a mark of success of the Industrial Model in fisheries management today. Judging by its past history, however, the Industrial Model itself has lead to overcapitalization, overconcentration, depopulation of traditional artesanal fishing communities and numerous fisheries disasters worldwide.

The emerging Biological Model of fisheries management is exemplified by most fisheries biologists (who also have little training in economics), and takes a very different management approach. This model starts from the premise that every fish species is part of a complex, fragile and interlocking food chain. Thus impacts on one species may impact a whole range of other marine species, both positively and negatively, often in ways that may not be foreseen. The Biological Model is therefore driven primarily by concepts from conservation biology rather than economic theory. Based on a multi-species ecosystem approach, it lends itself to 'carrying capacity' limits on fishery utilization based on ecosystem protection, including protection of genetic diversity and multi-species biodiversity.

In this world view, bycatch and discards are factors that may have major ecosystem impacts on non-target species and so these impacts have to be accounted for in biological terms. Protection of "keystone species" becomes an imperative under this model, and management drivers then become primarily ecosystem protection and community sustainability considerations, not purely economic ones.

The preferred tools of the Biological Model include new economic tools such as "equilibrium analysis," food web modeling (i.e., charting interactions among species), cumulative impacts analysis, and the other common tools of environmental impact assessment, conservation biology and conservation genetics. This model also implies a much greater degree of fisheries monitoring and data collection than the Industrial Model – when management is driven primarily by biological impacts rather than market profitability, it is far more important to know what those ecosystem impacts actually are. This model also lends itself more readily to considerations of human fishing community sustainability as well.

The vision of the ideal commercial fishing fleet under the Biological Model of management is also very different. Instead of intensive harvests by large factory boats with high bycatch rates, this model implies that fleet composition should move toward smaller, more diverse and more flexibly deployed boats whose impact is spread out more over time and space, and therefore is less biologically disruptive. A fleet of this type would in theory also allow more effective use of discards and bycatch in secondary manufacturing or value-added products sustaining a diverse on-shore fishing-dependent community with less waste. It would also be more flexible in responding to major fisheries changes. Nontransferrable Community Development Quotas (CDQ's), other nonprivatizing harvest control mechanisms and the designation of marine protected areas all fit neatly within this paradigm, as all are based on the concept of biological sustainability.

Ultimately, which management model prevails will define "efficient use" of the resource, "sustainability" and even "optimum yield" under the Magnuson-Stevens Sustainable Fisheries Act. Under the Industrial Model, efficient use means more capital intensive use in which corporations and factory fleets, and not family fishermen, will play the primary future role. Under the Biological Model, however, both ecosystem protection and diversified small and mid-sized boat fishing communities will play the primary roles. At present, we have an uneasy mix of both, as perhaps it should be. Either taken to an extreme could damage fisheries or do a disservice to those who make their lives as well as livelihoods harvesting seafood.

However, PCFFA believes that maintenance of a diversified, small and mid-sized boat fleet of family fishermen as well as a viable fishing profession is far more achievable under the Biological Model than the Industrial. We also believe that in the long run the Biological Model makes the most sense for fisheries management as a whole, as well as better supporting fishing families as communities and as a culture. Ultimately some mix of the two will probably provide us the best of both worlds and be most truly sustainable.

HOW THESE MODELS ARE SHIFTING IN THE SUSTAINABLE FISHERIES ACT

In the 1996 amendments to the U.S. Magnuson-Stevens Sustainable Fisheries Act (codified at 16 U.S.C. §1801 *et. seq.*) there were major shifts away from the Industrial Model and a move toward implementing both the biological constraints and community sustainability mandates of the Biological Model. Some of the major changes in the Act embodying this shift were:

** Explicit recognition of habitat loss as a major threat (particularly in 16 U.S.C. §1801(9)) and development of a network of Essential Fish Habitat designations and protections (16 U.S.C. §§1801 and 1853(a)(7));

** More comprehensive and more science-based fisheries management plans generally (16 U.S.C. §§1801(c)(3), 1851 and 1853);

** A multi-species ecosystem protection approach is now explicit in the Act itself (16 U.S.C. §§1801, 1851 and elsewhere);

** New bycatch monitoring and reduction requirements (16 U.S.C. §1853(a)(11));

** Demoting "economic efficiency" from an imperative to one of many considerations rather than the primary driver of management (16 U.S.C. §1851(a)(5) and elsewhere);

** A mandate for consideration and protection of long-term fishing community sustainability as a separate National Standard (16 U.S.C. §1851(a)(8));

Many of these reforms are incomplete, or have been poorly implemented by the agencies. Many of these same conservation and sustainability provisions would be strengthened under the Fisheries Recovery Act (H.R. 4046) now being proposed by Congressman Gilchrest. While we have concerns about some of the language in this bill, PCFFA and several other major commercial fishing organizations advocating for sustainable resource use strongly support its basic reform goals.

Other tools that should be used much more in fisheries management in the future are the tools of environmental protection generally, particularly in the US the National Environmental Policy Act (NEPA) requirements for a complete environmental impacts analysis and cumulative effects analysis, and also considerably more investment by NMFS and other agencies in essential monitoring and data collection. All these and additional tools are necessary to modernize fisheries management, and should be supported rather than resisted by fisheries managers and the industry itself. Similar reforms are needed in other countries as well.

CHARTING A FUTURE

Fisheries management agencies that are not driven primarily by the Biological Model, that do not attempt to get control over the whole lifecycle of impacts, including all those non-fisheries impacts that threaten spawning and rearing habitat, and which do not invest heavily in the data collection and monitoring necessary for true adaptive management, are doomed to failure.

Though economic considerations must always necessarily play a major role in fisheries management once there <u>is</u> a fishery, long gone are the days when fisheries management decisions could be made primarily on the basis of economics alone. Thanks to the still prevalent Industrial Model of fisheries management, however, most of the world's fisheries are now in a perpetual state of crisis or collapse. Oversimplified mathematical economics constructs simply no longer help. Ocean ecosystems are simply far to complex to model using simplistic economics tools. If they are going to be effective, today's fisheries

economists must learn to think more like biologists, for our most pressing problems are not economic ones, they are biological.

Frankly, with so many of the world's fish populations in such a severe state of depletion, with habitat loss and coastal pollution so rampant, priority simply has to be given to the far more fundamental biological problems of restoring and maintaining fish populations first. You just cannot meaningfully debate the fine points of international fisheries economics with an industry facing major biological collapse. For fisheries economists we have this advice: first find out from the biologists how to give us healthy fish populations, then discuss your econometric models later. Adopting the Biological Model is what fisheries regulators should and must do in today's world if they are to be effective stewards. If fisheries managers cannot put these biological priorities foremost, then both they and the fishermen they manage will soon be economically extinct.

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