Photo by Paul Kay (www.marinewildlife.co.uk)

"IT IS THE REMOTENESS AND C OBSCURITY OF CURRENT FISHERY C MANAGEMENT PRACTICE THAT C HAS ALLOWED FISH RESOURCES C TO BE DEVASTATED "C

Keep fishery management simple@

By Rainer Froese

A recent article in Science[1], authored by leading fisher-@ ies scientists, called for a shift from management of @ single fish stocks to broader Ecosystem-Based Fishery @ Management (EBFM). While nobody will argue against @ the need to 'sustain healthy marine ecosystems and @ the fisheries they support' I fear that complicated 'new @ analytical models and management tools [that] will @ be needed' in this context will further remove fisher-@ ies management from fish consumers, who as citizens @ own the fish in their national waters and as consum-@ ers and taxpayers finance fishing and management. @

"MOST FISH THAT YOU HAVE EATEN WERE CHILDREN."C

Here I argue that it is the remoteness and obscurity @ of current fishery management practice that has @ allowed fish resources to be devastated; on land, in @ contrast, the sleeping giant of public pressure has dras-@ tically reduced terrestrial pollution, thus halting the @ demise of our forests and reviving our dying rivers. @

Eating too many young fish@

It is now common knowledge that most fish stocks @ are overfished because too many fishers are hunting @ too few fish. It is less known that most fish that you @ have eaten were children. This is because fishing @ removes large fish first and foremost, and typical @ fishery management does not only allow more fish @ to be caught than has been recommended by scien-@ tific advisory bodies, it also sets the minimum size @ for landings well below the size of first reproduction, @ well below the size where maximum benefit from fish @ growth would be obtained, and well below the size @ where maximum number of eggs would be produced. @ One does not have to be a scientist to realize that @ this is a recipe for destroying stocks. To remedy this @ situation I propose Common Sense Fishery Manage-@ ment (CSFM) consisting of three simple measures:@

1) Let them spawn! @
All fish are allowed to reproduce at least once before @ being caught. It is obvious that if every fish is allowed @ to produce at least one replacement spawner it is impos-@ sible to overfish the stock; because the size at which @ fish are at first maturity —and so able to spawn for the @ first time—is known for all commercial fish stocks, this @ measure can be put into practice by raising the existing @ minimum size limits above this size.@

2) Let them grow! @
Fish are only caught around a target size where @ maximum biomass per year-class (the fish hatched @ or born in a given year) can be obtained. This size @ is known for all commercial fish stocks and is typi-@ cally a bit larger than size at first maturity. Catch-@ ing fish at this size makes biological and economic @ sense and thus 'pays for itself' in the mid-term. @

Financial incentives—such as distributing exist-@ ing subsidies according to the percentage of fish @ caught at +/- 10% of the target size—could be used @ to ease the hardship for fishers during the transi-@ tion period to this way of fishing the stock.@

3) Let the mega-spawners live!@
Old, large, successfully surviving fish typically produce @ many more eggs of a better quality, with higher sur-@ vival chances and possibly better genetic make-up than @ first-time spawners. A certain percentage of each year @ class is therefore allowed to survive to old age, thus @ acting as 'spreader of good genes' and as insurance @ against natural recruitment failures in cases where @ unfavourable environmental conditions can cause the @ loss of an entire year-class. This percentage will typi-@ cally be 50% or more of first-time spawners, depending @ on the productivity of the species and on other man-@ agement goals such as those derived from the Ecosys-@ tem-Based Fishery Management mentioned above.@

If fishery management can be so easy, why is it @ not done that way? The answer is complex; but @ I want to highlight three components here:@ @
1) In healthy fish stocks there are normally more than @ enough spawning fish for the stock to be able to cope @ with the removal of a surplus by fishers. But when the @ stock falls to a low level—as is the case with many of the @ world's fish stocks—the pressure is on and the number @ of new offspring becomes more strongly dependent on @ the number of spawning fish that remain. It is at this @ point that the size of the fish and whether they have @ had a chance to spawn or not becomes critical. Unfor-@ tunately much traditional management focuses on @ reducing effort to stop stocks reaching this point and @ has not responded so well to the current situation.@

2) Catching fish only around a certain target size is @ possible but requires substantial changes in market @ demand, equipment, regulations, and fishing strategy. @ For example, long-lines, purse-seines, and traps are @ already size-selective with little by-catch of unwanted @ species. If deployed at the right time and place they @ can catch mostly the target species at the target size. In @ contrast, the widely used large trawls are neither suf-@

[1] *Ecosystem-based fishery management. Science 305:346-347*

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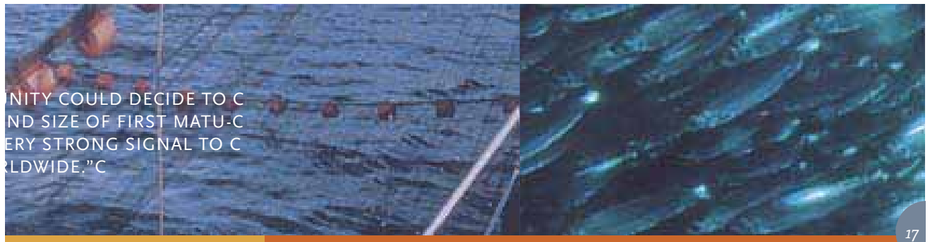


"THE EUROPEAN C ONLY IMPORT FISH RITY, THUS SENDIN FISHERY MANAGER

"NITY COULD DECIDE TO C ND SIZE OF FIRST MATU-C ERY STRONG SIGNAL TO C LDWIDE."C

ficiently size nor spec termed "weapons of r have to be abandoned financial hardship fo exist in the European

3) @Apparently it is m managers to continue risking the collapse o than risking conflict and the politicians wh term 'Convenience ov which is common in t trast to 'Malthusian o driven and predomin

So where is the good r for drastic changes in tem-Based Fishery Ma change, rather as a log the-art science to fish that has failed but the to apply scientific adv

I suggest Common Se explained above as a the potential to recov As the first and most making sizes at first m form of posters showi These posters can be p super markets, restau net, and meeting roo managers, chefs, gou politicians could all t fish in front of them h duce, and thus activel ment. The European C import fish beyond si a very strong signal t

And there is already p International Trade in about to adopt a mini trade in seahorses, wh maturity for most of t for species groups hav the management of th effectively with mult Oceanic and Atmosph United States stresses than ever to protect s to rebuild the populat

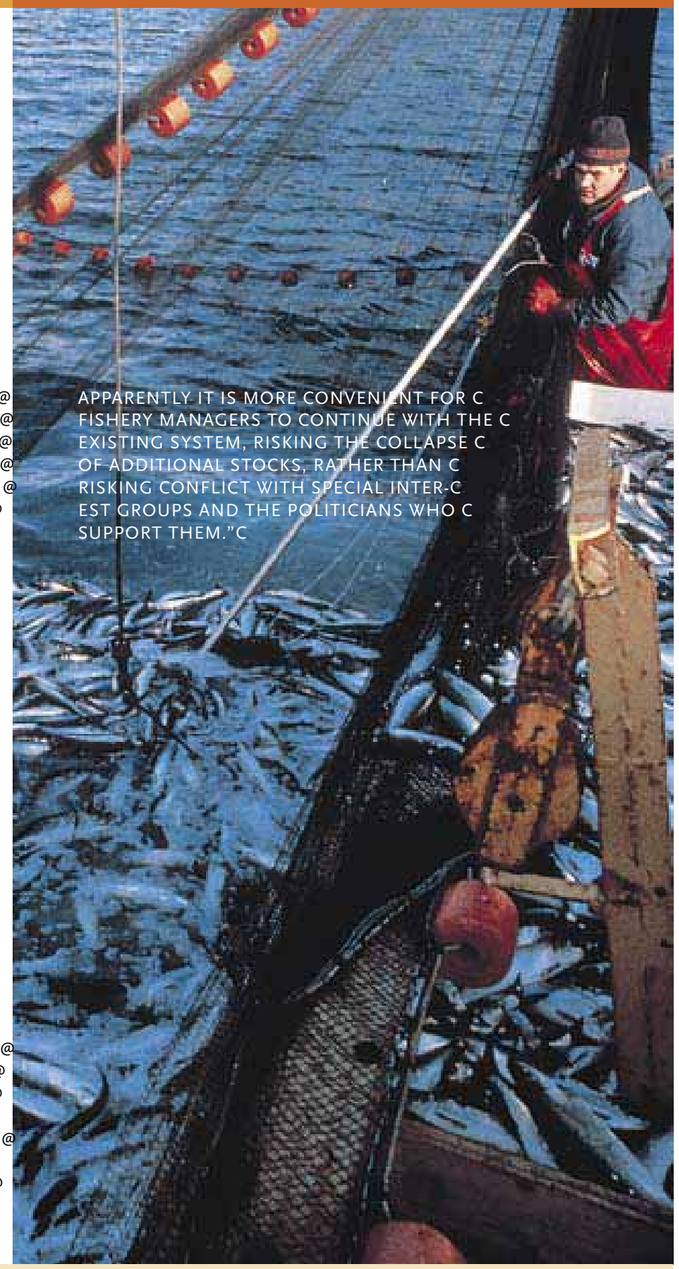
ective—they have been @ estruction" —and would @ uments to minimize @ idual fishers do already @ unity and elsewhere.@

nvenient for fishery @ the existing system @ ional stocks, rather @ pecial interest groups @ port them. I propose the @ ing' for this situation @ veloped world, in con-@ hing' which is poverty-@ developing countries. @

Crises offer the opportunity @ ion. While I welcome Ecosys-@ nent I do not see it as a huge @ ext step in applying state-of-@ However, it is not the science @ tutions that were supposed @ real-world circumstances. @

hery Management as @ change in direction with @ lthy stocks and fisheries. @ tant measure I suggest @ ty widely known, e.g. in @ h at the respective length. @ in fishing boats, ports, @ schools, billboards, Inter-@ hers, traders, supermarket @ children, consumers and @ sily determine whether a @ en given a chance to repro-@ icipate in fishery manage-@ unity could decide to only @ irst maturity, thus sending @ ry managers worldwide.@

ence: The Convention on @ ngered Species (CITES) is @ size limit of 10 cm for the @ beyond the size of first @ pecies. Minimum size limits @ successfully been tested in @ at Barrier Reef to deal more @ es fisheries. The National @ dministration (NOAA) of the @ it is now more important @ Atlantic] swordfish in order @ enegal has adopted size at @



APPARENTLY IT IS MORE CONVENIENT FOR C FISHERY MANAGERS TO CONTINUE WITH THE C EXISTING SYSTEM, RISKING THE COLLAPSE C OF ADDITIONAL STOCKS, RATHER THAN C RISKING CONFLICT WITH SPECIAL INTER-C EST GROUPS AND THE POLITICIANS WHO C SUPPORT THEM."C

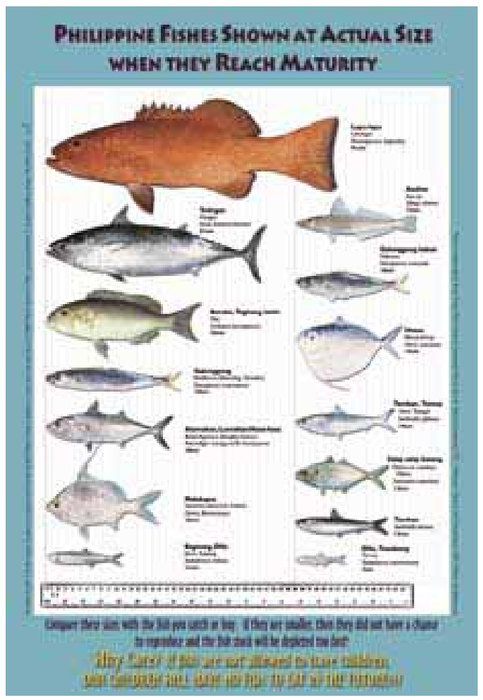
Photo courtesy of Norwegian Seafood Export Council

"IN 2003, CATCHES OF BLUE WHITING C REACHED A RECORD HIGH OF 2.3 MILLION C TONNES WHEREAS THE ADVICE FROM C ICES WAS NOT TO EXCEED 600 THOUSAND C TONNES." C

Blue whiting: playing a big game with small fish@

By Mikko Heino

first maturity as minimum landing size for most com-@ mercial species. Hawaii has done the same and is con-@ templating additional maximum size limits for certain @ species to protect mega-spawners. Florida applies @ minimum size limits to imported reef fishes. And the @ Bureau of Fisheries and Aquaculture Research in the @ Philippines, distributes a 'fish ruler' and encourages @ consumers 'to assess how mature/immature the fish @ being sold are'—thus, the process of bringing common @ sense to fishery management has already begun.@



Note that Common Sense Fishery Management is @ not meant as a replacement for Ecosystem-Based @ Fishery Management or for additional measures @ such as marine protected areas. The latter will be @ crucial in protecting juveniles or mega-spawners and @ spawning habitats as well as the many non-com-@ mercial species affected by fishing. Also note that @ 'let all fish spawn' will not work for species such as @ eels and salmon which die shortly after spawning; @ these species need dedicated management plans. @

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Froese, R. 2004. Keep it simple: three indicators to @ deal with overfishing. Fish and Fisheries 5:86-91.@

Pikitch, E. K, C. Pikitch, E.K, C. *et al.* 2004@ 2004. Ecosystem-based fishery man-@ agement. Science 305:346-347.@

Myers, R. A. and Mertz, G. 1998. The limits @ of exploitation: a precautionary approach. @ Ecological Applications 8:165-169.@

FishBase (www.fishbase.org) contains size @ at first maturity and size with maximum @ biomass for all commercial fishes.@

Often, managers do not follow scientific advice @ exactly, but seldom has the gap between the advice @ and the actual catches been so yawning as for blue @ whiting over the last few years. In 2003, catches of @ blue whiting reached a record high of 2.3 million @ tonnes—making the blue whiting fishery the @ biggest one in the Atlantic—whereas the advice @ from ICES was not to exceed 600 thousand tonnes. @

As attempts to reach an international agreement on @ exploitation have failed, and despite the warnings by @ the scientists that a collapse may be imminent unless @ fishing pressure is decreased, the gap between the @ advice and the actual catch has only been widening. Yet @ the stock appears to have sustained the heavy exploita-@ tion and is estimated to be at a historically high level.@

"THE RESULT IS EVER-INCREASING C EXPLOITATION THAT WILL EVENTUALLYC RUIN THE RESOURCE."C

Why have the managers chosen to neglect the scien-@ tific advice? How is this possible during the era of the @ precautionary approach? Have the scientific advice @ and the underlying stock estimates been faulty? And @ finally, how can blue whiting show such remarkable @ resilience? These are simple questions, but there are @ no simple answers. However, it is important to appre-@ ciate three basic aspects of blue whiting fisheries.@

1. Blue whiting is a straddling stock@

Blue whiting has a very wide distribution area cover-@ ing the EEZs (Exclusive Economic Zones) of several @ coastal states as well as international waters (see @ the information box). There are no obvious stock @ units within the main distribution area, and blue @ whiting need to visit several EEZs to complete their @ life cycle; spawning areas are mostly in the EC and @ international waters, spawning migrations bring @ them through the Faroese waters twice a year, and @ feeding areas cover most of the northeast Atlantic. @

As for any straddling stock, rational management of @ blue whiting calls for international co-operation, and, @ in particular, an agreement on how the total catch is @ to be divided among the players. Because this agree-@ ment is lacking, we witness instead the "tragedy of @ the commons": individually, each player gains by @ exploiting the common resource harder, whereas @ the resulting cost is shared by everybody. The result @ is ever-increasing exploitation that will eventu-@ ally ruin the resource. However, the situation is not @ unique to blue whiting and cannot alone explain why @ attempts to reach a political agreement have failed.@

2. Blue whiting boom?@

The most likely reason for the resilience of blue @ whiting to ever-increasing catch levels is very good @ recruitment of young fish to the stock in the recent @ years. In fact, all year classes during the period @ 1995–2001 have been either strong or extremely @ strong in comparison to those that were born in the @ period 1981–1994 (prior estimates do not exist). @

Although part of this increase may only be appar-@ ent and may be caused by geographical changes in @ fishing exploitation and reporting of catches, it appears @ that the recruitment dynamics of blue whiting have @ changed in a positive way. The cause of this change @ is one of the main questions for us to solve. Further-@ more, will the unprecedented recruitment continue?@

3. Difficulties in assessing the stock@

Blue whiting is a challenging stock to give advice on. @ One reason is that stock assessment of a widely distrib-@ uted species with poorly known population structure @ is inherently difficult. Fishery-independent survey @ estimates are hard to come by, although international @ co-operation on the spawning grounds shows promise. @

Another aspect is that the blue whiting fishery is @ increasingly dependent on recruiting year classes. In practice it has been impossible to satisfactorily estimate the number of new fish joining the stock until after a year class has recruited to the fishery.

Yet the advice is based on population estimates pro-@ jected into the future and relies heavily on estimates @ of current recruitment (which is highly uncertain) and @ on assumptions on future recruitment (which appears @ to have changed in comparison to the earlier years).@

Photos courtesy of Thomas Wenneck (www.imr.no)