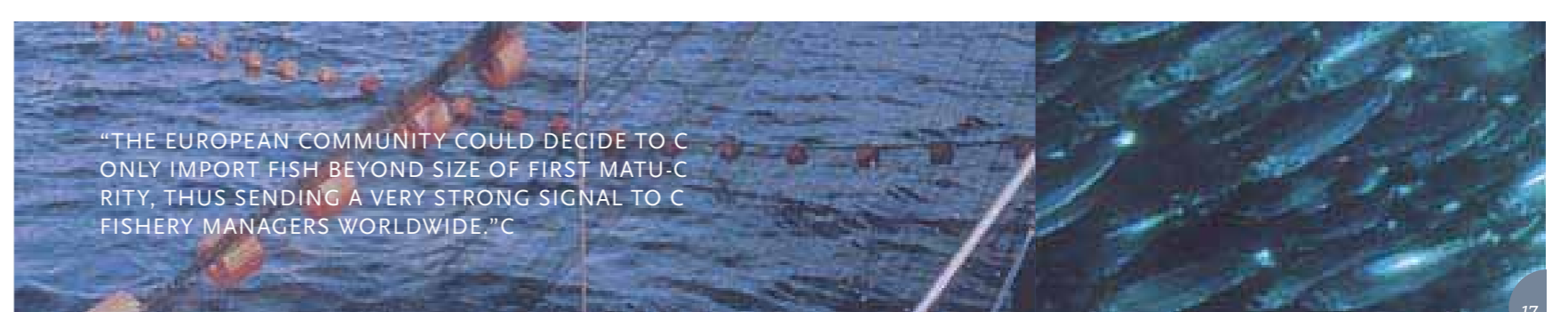




Photo by Paul Kay (www.marinewildlife.co.uk)

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



"THE EUROPEAN COMMUNITY COULD DECIDE TO C
ONLY IMPORT FISH BEYOND SIZE OF FIRST MATU-C
RITY, THUS SENDING A VERY STRONG SIGNAL TO C
FISHERY MANAGERS WORLDWIDE."C

Keep fishery management simple@

A recent article in Science¹, 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-@

By Rainer Froese

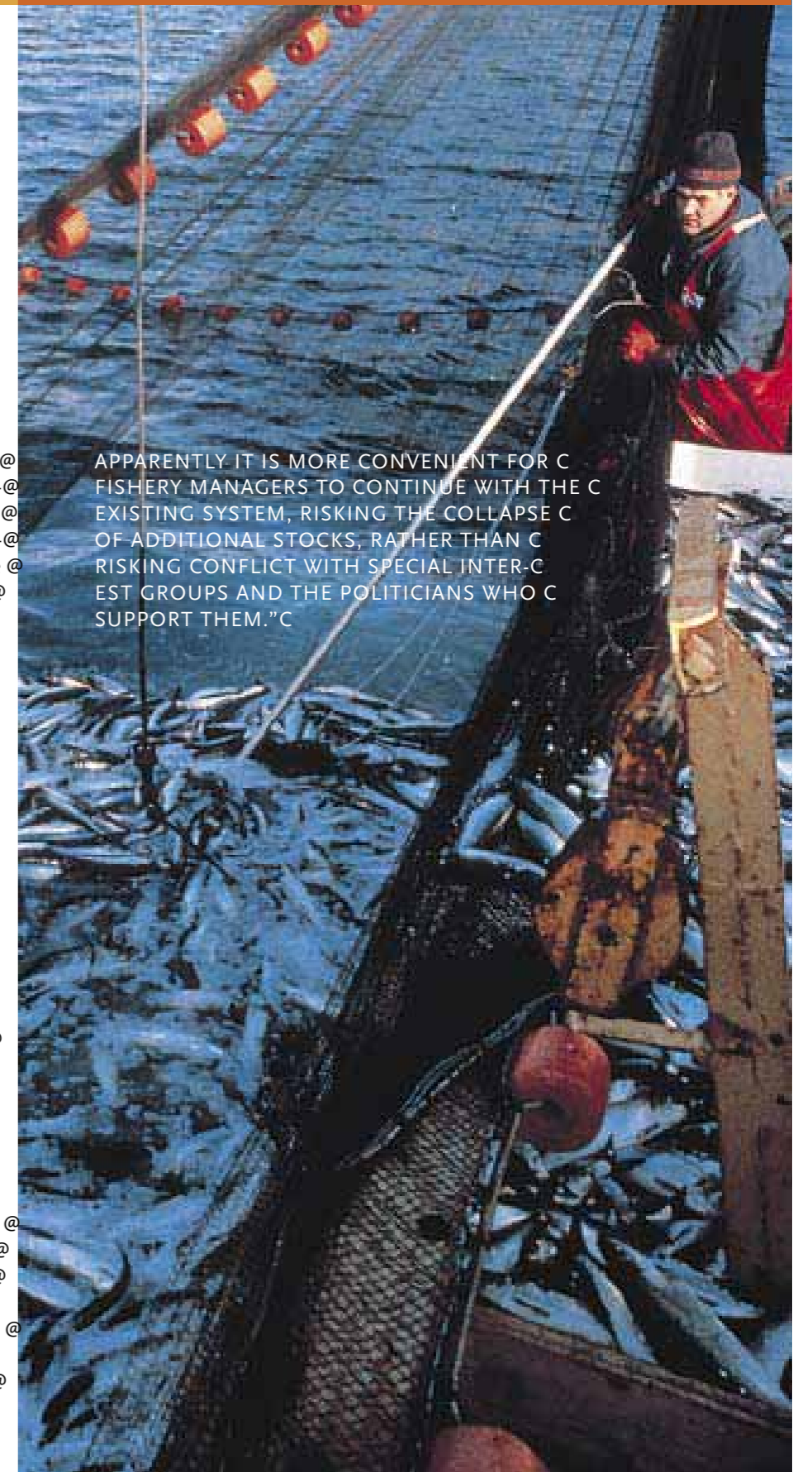
ficiently size nor species selective—they have been @
termed "weapons of mass destruction" —and would @
have to be abandoned. Instruments to minimize @
financial hardship for individual fishers do already @
exist in the European Community and elsewhere.@

3) @ Apparently it is more convenient for fishery @
managers to continue with the existing system @
risking the collapse of additional stocks, rather @
than risking conflict with special interest groups @
and the politicians who support them. I propose the @
term 'Convenience overfishing' for this situation @
which is common in the developed world, in con-@
trast to 'Malthusian overfishing' which is poverty-@
driven and predominant in developing countries. @

So where is the good news? Crises offer the opportunity @
for drastic changes in direction. While I welcome Ecosys-@
tem-Based Fishery Management I do not see it as a huge @
change, rather as a logical next step in applying state-of-@
the-art science to fisheries. However, it is not the science @
that has failed but the institutions that were supposed @
to apply scientific advice in real-world circumstances. @

I suggest Common Sense Fishery Management as @
explained above as a drastic change in direction with @
the potential to recover healthy stocks and fisheries. @
As the first and most important measure I suggest @
making sizes at first maturity widely known, e.g. in @
form of posters showing fish at the respective length. @
These posters can be placed in fishing boats, ports, @
super markets, restaurants, schools, billboards, Inter-@
net, and meeting rooms. Fishers, traders, supermarket @
managers, chefs, gourmets, children, consumers and @
politicians could all then easily determine whether a @
fish in front of them had been given a chance to repro-@
duce, and thus actively participate in fishery manage-@
ment. The European Community could decide to only @
import fish beyond size of first maturity, thus sending @
a very strong signal to fishery managers worldwide.@

And there is already precedence: The Convention on @
International Trade in Endangered Species (CITES) is @
about to adopt a minimum size limit of 10 cm for the @
trade in seahorses, which is beyond the size of first @
maturity for most of these species. Minimum size limits @
for species groups have also successfully been tested in @
the management of the Great Barrier Reef to deal more @
effectively with multi-species fisheries. The National @
Oceanic and Atmospheric Administration (NOAA) of the @
United States stresses that 'it is now more important @
than ever to protect small [Atlantic] swordfish in order @
to rebuild the population.' Senegal has adopted size at @



APPARENTLY IT IS MORE CONVENIENT FOR C
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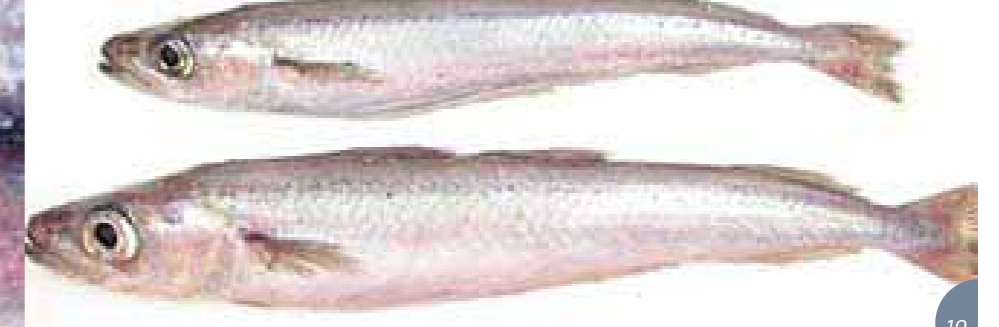
¹ Ecosystem-based fishery management. *Science* 305:346-347

"ONE DOES NOT HAVE TO BE A SCIENTIST TO C
REALIZE THAT THIS IS A RECIPE FOR DESTROYING C
STOCKS."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. @

For more information please contact the author:

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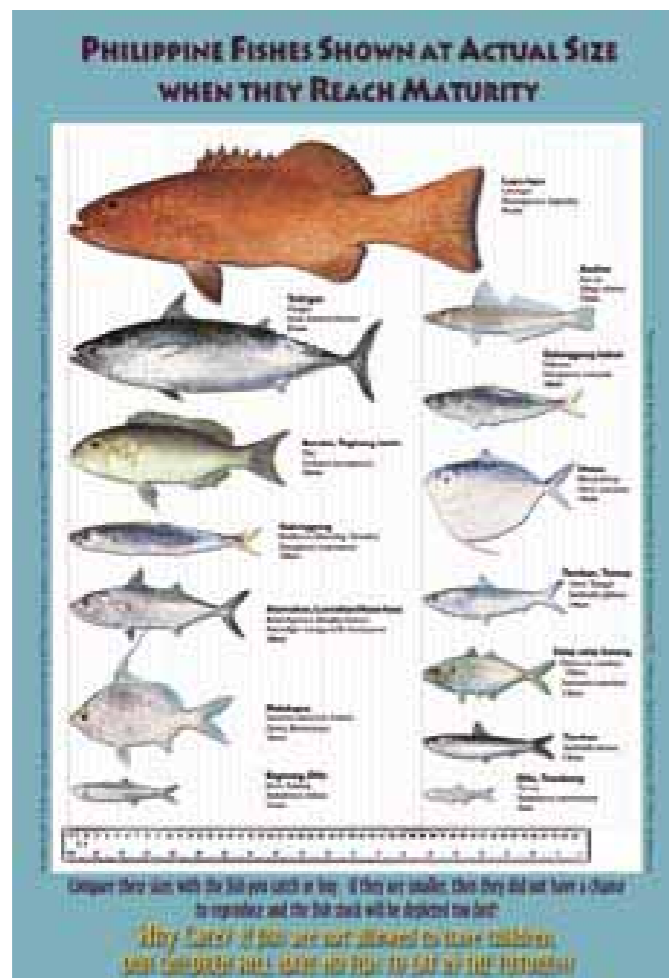
Or see:@

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 EVENTUALLY
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).@