DG Fisheries and Maritime Affairs

Guidelines for an improved analysis of the balance between fishing capacity and fishing opportunities

The use of indicators for reporting according to Art. 14 of Council Regulation 2371/2002

Version 1, March 2008

1. General part

1.1. Context

Member States shall put in place measures to adjust the fishing capacity of their fleets in order to achieve a stable and enduring balance between such fishing capacity and their fishing opportunities; the exchange of information concerning efforts undertaken is organised in annual Member State reports and a Commission summary report (Art. 11 and 14 of Council Reg 2371/2002). The minimum requirements for Member States' Annual Reports are laid down in Art. 13 of Commission Regulation 1438/2003 and contain a "description of the fishing fleets in relation to fisheries".

The Committee for Fisheries and Aquaculture, the STECF and the Commission agree that the analysis in these reports of the relation between fishing fleets and their resources needs improvement. A common approach of relatively simple indicators shall be recommended that help in describing this relation, based on accessible data, in particular data that is being collected according to the Data Collection Regulations (DCR). The indicators presented here have resulted from two STECF working groups that convened in October 2007 and February 2008. The guidelines are based on these results as well as STECF conclusions and shall be reviewed from time to time based on progressing practical experience and the evolution of the DCR framework.

1.2. Recommended indicators

The indicators retained respond to the criterion of being relatively easy to calculate. Their recommendation shall not be interpreted as discouraging the application of more sophisticated methods for establishing the balance between capacity and resources, in particular bio-economic models. Member States using more sophisticated methods are invited to test the simpler indicators by comparing their results with the results of the sophisticated models.

Many indicators could be developed that are relevant for describing the balance between fishing fleets and their resources. These guidelines contain one technical indicator, three biological indicators, two economic indicators and two social indicators, thus reflecting the CFP objectives of ensuring an exploitation that provides sustainable economic, environmental and social conditions, and providing, within indicator groups, for default indicators in case of data unavailability.

The technical indicator is of primary importance as it is based on robust data and provides the only quickly calculated reference for a **fishing capacity potential in prevailing circumstances for the fishing activity**:

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Ratio between average days at sea and maximum days at sea observed in a fleet segment.

Given that the balance to be achieved shall be "stable and enduring", the biological indicator is of primary importance as well: A healthy resource base is a prerequisite for **sustainable exploitation** and thus enduring economic performance and good social conditions. Calculating and interpreting these indicators will need support from fisheries scientists. The hierarchy within the biological indicators recommended is guided by their explanatory power; second-best indicators shall be used in case of unavailability of data for better indicators:

a) Ratio between estimated current fishing mortality (F) and targeted fishing mortality of stocks exploited by the fleet segment, attributed to fleet segments and weighted according to catch composition;

b) Ratio between current catch weight of a species and the estimated biomass of the stock exploited, attributed to fleet segments according to their share of the total catch;

c) Catch per unit of effort, measured in catch weight per days at sea of a fleet segment.

The economic indicator complements the biological indicator and gives account of the **economic performance** of fleet segments without having an evident correlation with the stock developments. The hierarchy recommended is guided by the general acceptance of the indicator for economic performance measurement:

a) Return on investment per fleet segment;

b) Current revenue against break-even revenue per fleet segment.

The social indicator retained shall make good the fact that the other indicators presented do not show the **societal benefit** of the economic activity. The hierarchy recommended is guided by their accessibility to interpretation:

a) Average wage per Full-time equivalent in a fleet segment;

b) Gross value added of the activity of the fleet segment.

1.3. Application and interpretation

As a minimum, the technical indicator shall be applied to all fleet segments as a baseline. In addition, one economic indicator shall be shown and interpreted together with one biological indicator, to take account of possible conflicting information: An enduring "balance" can only be considered achieved when both economic and biological indicators compare favourably to reference points (e.g.: $F/F_{target} \leq 1$ and Return on investment ≥ 0). This could be expressed in a traffic light system of capacity balance indication:

Table: indicator combination economic/biological in form of a warning system:

Indicators' traffic light	Economic indicator	Biological indicator
Green	ROI ≥ 0	$F \le F_{target}$
Yellow	ROI ≥ 0	$F \ge F_{target}$
	ROI ≤ 0	$F \le F_{target}$
Red	ROI ≤ 0	$F \ge F_{target}$

It is also recommended to calculate the social indicator, but it should not substitute for the others.

In view of important fluctuations both in economic parameters and stock/exploitation developments, a moving average across a number of calendar years shall be established for the purpose of indicator interpretation wherever possible. It is considered that **five years shall be shown for the technical and biological indicator, and three years for the economical and social**.

Indicators are subject to interpretation, both in view of assumptions and generalisations built into the calculation and in view of "benchmarks". Any interpretation shall take account of the **reliability of data** underlying the calculation and the **homogeneity in activity patterns of the fleet segment** studied. **Reference points for interpretation** of the balance are suggested in the technical part. The indicators do not for themselves indicate a "bad" or "good" situation, but are significant concerning the appropriateness of increasing efforts to adjust capacity, which might then need more detailed analysis for being put into practice.

2. TECHNICAL PART

2.1. Technical indicator: Ratio between days at sea and maximum days at sea

2.1.1.1. Description and data sourcing

"Ratio between the average number of days at sea per vessel and the maximum number of days at sea of any vessel within the fleet segment". The maximum number of days should be established by the vessel in the fleet segment using most days at sea in any of the years in the time series, or by an average of the days at sea of the vessels that were most active in each of the time spans.

In order to take account of different vessel characteristics, e.g. the fact that vessels with larger engines using towed gear might tend to catch more than those with smaller engines, this indicator should ideally include the weighting of the individual vessel's capacity, by adding up the ratio in terms of kW-days (for active gears) and GT-days (for passive gears) for each vessel in the fleet segment.

Data (days at sea per vessel, GT and kW) is available at Member State level from data collection according to DCR.

2.1.1.2. Application and interpretation

This indicator is easy to calculate and is the only one that refers to the potential capacity as a reference point. It roughly shows by how much capacity can be reduced still using the current fishing opportunities. It is therefore to be considered the baseline indicator for each fleet segment. The margin between the calculated value and 1 indicates the technical overcapacity. For a possible "traffic light system", an indicator of more than 0,9 will only be observed in fleet segments showing a largely homogeneous activity, which could thus be considered generating a green light in practice. Continuous values of e.g. (depending on fleet homogeneity) below 0,7 shall be considered as showing a distinct structural overcapacity (red light).

2.2. Biological indicators

2.2.1. Ratio between $F_{estimated}$ and F_{target} (F/F_t)

2.2.1.1. Description and data sourcing

The calculation operates by establishing F/Ft ratios per target species, which are then added together according to the catch composition.

Step a) Festimated for a species: First, extract F estimations for stocks exploited by the fleet segment in question. Second, attribute the F to the fleet segment according to the ratio of catches by the fleet segment to total EU catches (as used in the calculation of F). Where the estimated F are based on catch data including discards, it is assumed for simplification that all fleet segments have the same discard ratio, so that the total catch including the discard add-on is being fully distributed to fleet segments.

Ftarget for a species: First, extract targets for species caught by the fleet segment from compulsory rules or scientific advice (internationally agreed long-term F targets, e.g. with Norway, then Community legislation on long-term F targets (management and recovery plans), then Fmsy as advised by scientific bodies (e.g. ICES), then Fmax as advised by scientific bodies). In cases where several targets exist for the same species due to area-specific stock assessments, Ftarget should be shown for each stock; if this is not possible, e.g. where the catch by the fleet segment cannot be reliably attributed to the different stocks, the lower value is to be taken in line with the precautionary approach. Second, attribute the Ftargets to the fleet according to the quota share that the Member State has in the stock applying relative stability, adding or subtracting habitual quota exchanges with other Member States. Even better, where the fleet segment is operating with a stable sub-quota of the total allowable catch, the attribution shall be made according to the ratio of this fleet's sub-quota.

Step b) An overall ratio for the fleet segment then needs to be derived by adding together the individual ratios of Festimated to Ftarget by species. Each individual ratio is weighted according to the share of that species in the fleet segment total catch for species which are F-assessed. An overall ratio for the species will be obtained by adding together the ratios of the fleet segments involved.

Step c) The overall ratios should be accompanied by complementary information which gives account of the landings volume of F-assessed species against the total volume of landings of that fleet segment. The higher this percentage is, the more significance the F-ratio has.

Data requirements are:

A stock subject to a full stock assessment, i.e. where current age averaged fishing mortality has been determined; a target value for that mortality must be available; and the stock must be subject to total allowable catch rules and national quotas. The indicator is only to a small extent directly based on DCR-data, i.e. for data on landings or catches by fleet segment by main species, (if landings, values are adjusted to reflect ratio of discards to landings at stock level). The total volume of catches of one species can be derived from stock assessment reports (e.g. ICES). The target-Fs can be established as described above.

2.2.1.2. Application and interpretation

Of the biological indicators considered the F/Ft ratio is regarded as the best indicator to use. A particular advantage is that the ratio accommodates differences between species in terms of sustainable exploitation rates, i.e. the optimal exploitation rate for each species has already been determined and is expressed as Ftarget. The F/Ft ratio is dimensionless and facilitates comparisons or combinations across species, thereby producing ratios that are fleet-specific (with all assumptions made) rather than showing thresholds concerning catches of individual species. The fleet-specific nature of overall F/ Ft values, however, could lead to hiding disproportionate pressure by a fleet segment on one particular species, which leads to the recommendation that interpretation of this biological indicator should also cover individual species values (step a) above).The overall values for individual fleet segments within Member States give an indication of the importance of fleet segments to the overall national catch, but also, if the overall value for a fleet segment is greater than one, it indicates whether the individual fleet segment is catching more fish than would be expected under desirable fishing mortality rates from the entire national fleet ("red light" in a traffic light system). In the case that the calculation has been made using fleet-segment quotas, a value greater than one might be given yellow colour, as the desirable exploitation rate is already fleet-specific, thereby not taking account of possible changes to quota allocations.

If several fleet segments of a Member State operate on the same species, establishing an overall ratio for the species across fleets will show whether national catches are consistent with long term stock management goals. Values above 1 indicate at least "yellow" traffic light.

An obvious limitation of this indicator is that not all species are subject to stock assessments. For this reason it is considered important to also show the proportion of the fleet segment catch that is accounted for by the species involved in calculating the indicator. Otherwise a species used to generate the indicator that constitutes a very low proportion of the total catch of a fleet segment could generate a high overall indicator value for this fleet segment when in fact absolute levels of the catch are small.

2.2.2. Ratio between current catch weight and stock biomass

2.2.2.1. Description and data sourcing

The biomass of the stock can be apportioned to fleet segments using quota shares and adding or subtracting habitual quota exchanges as for the F/Ft indicator, where quotas exist.

The catches of a fleet segment per main species are available from data collection under DCR. Ideally, the catch figure should include discards. If fleet data is for landings but scientific data provides landings and discards estimates at stock level, then fleet landings can be adjusted using the stock discards to landings ratio. The biomass estimates of the exploited stocks can be derived from any production model or from scientific survey indices.

In case where studies exist that indicate a target ratio between harvest and biomass, the indicator could be developed in much the same manner as the F/Ft indicator, including a comparison across harvest ratios for several species. If no target ratio exists, compilation of harvest ratios across species is not possible, as the value is likely to be species specific.

2.2.2.2. Application and interpretation

The indicator is "second-best", to be used when F-estimates or -targets are not available. Where harvest ratios can be compared to established harvest ratio targets, the interpretation is similar to the one for F/Ft. Otherwise, the indicator provides trends in catch/biomass ratio over time that reflect the exploitation state of a given stock. A harvest ratio seen to be steadily increasing while at the same time the measure of biomass is decreasing can be seen as indicating over-exploitation of the stock. The same trend, however, would also be seen from a developing fishery that was still harvesting at sustainable levels.

It is difficult to determine threshold values of this indicator. It might be possible on a species by species basis to determine the threshold values by considering historical abundance i.e. a period when the stock was considered in good health and stable compared to a period when stock abundance was in steady decline. If a period exists where stock abundance showed steady increase, the catch/biomass ratios from this period can also be considered.

2.2.3. Catch per unit of effort (CPUE)

2.2.3.1. Description and data sourcing

Catch per unit of effort can be calculated for each species targeted by each fleet segment. As for the other biological indicators, discards should ideally be taken into account in "catches". An effort unit can for example be expressed in days at sea.

Data is available from DCR data collection.

2.2.3.2. Application and interpretation

Catch per unit of effort estimates can be interpreted as a relative index of stock abundance. It does not indicate the level at which exploitation becomes unsustainable. Furthermore, changes in stock abundance can be due to other effects than changes in fishing pressures. In particular, this indicator would be undermined if catch per unit of effort for a given species is altered because of changes in fleet behaviour rather than species abundance. Expert knowledge on this should be taken into consideration when interpreting the indicator. Overall, it is a "third-best" biological indicator where other indicators cannot be calculated.

The indicator can only provide a trend over time. By creating a mean standardised index such that all indices values for individual species become relative to one it is possible to combine across species to produce a single time trend. However, such a combined result can be misleading if CPUE trends are different for different species. For species representing the majority of fleet catch, consideration of CPUE trends for each species is recommended.

2.3. Economic indicators

2.3.1. Return on Investment (ROI)

2.3.1.1. Description and data sourcing

"(Profit after capital stock depreciation and interest payments minus opportunity costs) divided by total investment".

Data is available under DCR data collection except for opportunity costs. "Profit after capital stock depreciation and interest payments" can be derived from "total income" minus all cost items including "capital costs". The "total investment" is "Investment(assets)" under DCR. For opportunity costs, a risk-free long-term yield (e.g. 5%) of the invested capital can be taken, given the absence of an agreed standard level of these costs.

2.3.1.2. Application and interpretation

ROI measures investment profitability, and, as applied to a fleet in total, average investment profitability. Its strength lies in the comparability with other economic sectors. Weaknesses are attributable to methodological inconsistencies concerning the calculation of "invested capital" across Member States. Results greater than zero suggest that extraordinary profits (that is profits above the opportunity costs) are being generated, a sign of economic under-capitalisation. Results below zero indicate economic over-capitalisation. However, results on a vessel-by-vessel analysis can be very variable.

2.3.2. Ratio between current revenue and break-even revenue

2.3.2.1. Description and data sourcing

The current revenue is the total income of the fleet segment. The break-even revenue is the "total income times (vessel costs plus depreciation costs plus interest payments) divided by (total income minus [fuel costs plus other running costs plus crew share])".

Data is available from data collection under DCR, whereby "vessel costs" are expressed by repair and maintenance costs plus other fixed costs, and "depreciation plus interest payments" are expressed by capital costs.

2.3.2.2. Application and interpretation

The break-even revenue shows, in a simplified calculation, the level of revenue at which all costs are covered and net profit is zero. It is a good measure of economic sustainability, although not linked to investment costs (as is ROI). When the ratio is below 1, current cash flow is not sufficient to cover current costs, so the activity is not economically sustainable. The difference between the two revenues indicates the level of economic overcapacity.

2.4. Social indicators

2.4.1. Average crew share per Full-time equivalent

2.4.1.1. Description and data sourcing

"(Crew share (in %) times value of landings) divided by number of full-time employees"

Data is available from data collection according to DCR.

2.4.1.2. Application and interpretation

The indicator is significant for determining income developments for dependent fishermen. Possible reference points are minimum wages for establishing a precarious situation and average wages for establishing a balanced situation.

2.4.2. Gross value added (GVA)

2.4.2.1. Description and data sourcing

"Depreciation costs plus interest costs plus crew share plus net profit". All items are available from data collection according to DCR (see ROI). "Depreciation costs plus interest" constitute the capital costs under DCR nomenclature.

2.4.2.2. Application and interpretation

GVA expresses the added value that the activity contributes to the national economy. The indicator may provide information on the socio-economic importance of the fishery, as economically important stocks are represented by high revenues, while the associated costs are a measure of the level of effort applied in the fishery. Setting target values for this indicator is very complicated. A value above zero means the fishery has a value for society.

Annex (English only): Calculation examples

Annex to the Guidelines on Indicators for the balance between fishing capacity and fishing opportunities, March 2008

Calculation examples

1. RATIO BETWEEN DAYS AT SEA AND MAXIMUM DAYS AT SEA

	Capacity 1)	Current effort 2)		Maximum effort 3)		Capacity utilisation 4)	
	kw	days	kWdays	days	kWdays	days	kWdays
Vessel 1	100	80	8000	200	20000	0,4	0,4
Vessel 2	100	110	11000	200	20000	0,55	0,55
Vessel 3	400	200	80000	200	80000	1	1
Average	200	130	33000	200	40000	**0,65**	**0,83**

1) The capacity should be indicated in kW for active and in GT for passive gear segments.

2) The column presents the individual vessel data.

3) The column applies the maximum level of utilisation of a vessel in the fleet to every vessel of the fleet.

4) The column results in the capacity utilisation of the fleet segments, with and without taking account of the different capacity values.

2. RATIO BETWEEN $F_{ESTIMATED}$ AND F_{TARGET} (F/F_T)

		Species 1	Species 2	Species 3	All other species and total
1	Catch in Fleet segment (100 tons)	50	35	20	30 → 135
2	Total EU catch (100 tons)	65	50	80	unknown
3	Total EU catch according to ICES stock assessment (100 tons)	80	70	100	unknown
4	Current F (stock assessment)	0.7	1.2	0.9	unknown
5	Current F applied to fleet segment (row 4 times (row 1 divided by row 3))	0.4	0.6	0.18	unknown
6	Target F (stock assessment)	0.5	0.6	0.3	unknown
7	Quota of the Member State [1)]	90 %	50 %	50 %	unknown
8	Target F split according to Member State	0.45	0.3	0.15	unknown

	quota (row 6 times row 7)				
9	F/F_t for the species in the fleet segment (row 5 divided by row 8)	0.89	2	1.2	unknown
10	Catch composition fleet segment	37% (of 78% assessed catch)	26% (of 78% assessed catch)	15% (of 78% assessed catch)	22% → 100%
11	F/F_t weighted by catch composition of assessed species (row 9 times (row 10 divided by row 13))	0.42	0.67	0.23	unknown
12	Sum of all weighted F/F_t for the fleet segment [2]	**1.32**	**1.32**	**1.32**	unknown
13	Percentage of fleet segment catch used for F/Ft calculation = significance of the value in row 12				**78%**

1) In case that the fleet segment disposes of a stabilised quota, the fleet segment's quota should be taken.

2) If several fleet segment of a Member State operate on the same species, the summation of F/Ft values for individual species across fleets will show whether national catches are consistent with long term stock management goals. A summation of the composite (cross-species) indicators will not necessarily reflect the situation for individual species.

3. RETURN ON INVESTMENT

Values for a calendar year ('000 EUR)	Fleet segment 1	Fleet segment 2
Total income (=landings times sale value)	1500	700
Production costs (crew costs, fuel costs, repair + mainte-nance, other fixed costs costs, other operational costs)	800	481
Capital costs (depreciation + interest payments)	400	175
Opportunity costs (Investment times 5%)	100	75
Profit	200	-31
Investment	2000	1500
Profit ./. investment % [1]	10%	-2%

1) The results indicate the extraordinary capital yield above the risk-free long-term investment generating 5% (= opportunity costs). With a value ≥ 0, the invested capital is at least as profitable as the risk-free long-term investment.

4. CURRENT REVENUE AGAINST BREAK-EVEN REVENUE

	Values for a calendar year ('000 EUR)	Fleet segment 1	Fleet segment 2
1	Total income (=landings times sale value)	1500	700
2	Repair + maintenance costs	64	38
3	Other fixed costs	72	43
4	Capital costs (depreciation + interest payments)	400	175
5	Fuel costs + crew costs + other operational costs	664	400
6 [1)]	Income * (repair + maintenance costs + other fixed costs + capital costs) = row 1 * (row 2 + row 3 + row 4)	804000	179200
7 [1)]	Income minus (fuel costs + crew costs + other operational costs) = row 1 minus row 5	836	300
8	Break-even income (row 6 divided by row 7)	961.7	597.3
9	Current income ./. break-even income [2)]	1.56	1.17

1) Rows 6 and 7 together build the calculation formula; the individual values are not of interest

2) Economic overcapacity would be indicated with result values < 1