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Statistical standards

**CLASSIFICATION, DEFINITION AND CODIFICATION OF FISHING EFFORT
STATISTICS (GEAR, CRAFT PROPULSION AND CRAFT SIZE)**

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CLASSIFICATION, DEFINITION AND CODIFICATION OF FISHING EFFORT
STATISTICS (GEAR, CRAFT PROPULSION AND CRAFT SIZE)

1. GENERAL

- 1.1 The various effort measures used by ICES can be grouped into two classes: (i) those expressed in terms of fishing time; and (ii) those expressed in terms of fishing power. Those used by ICNAF refer only to fishing time; ICNAF does not collect or publish effort measures expressed directly in terms of fishing power, though groupings in terms of craft size (tonnage) are used. The effort measures used by ICES and ICNAF, as described in the appropriate sections of Fisheries Circulars Nos. 203 and 204, are given and defined in Appendix 'A' to this paper.
- 1.2 The development of new types of boats, and further improvements in fishing techniques and gear, indicate the necessity to define further and refine constantly these effort measures. In the case of long-distance fishing craft, it is also necessary to ensure that the catch and effort data are allocated to the day, week or month when these were made, and not to the date of the landing of these catches or of the products processed from them on board. Questions relating to searching time are arising; it would appear that in some cases an overall area decrease in the density of the fish population may be obscured if concentrations remain as abundant as before on particular grounds; if effort is confined to these spots, it might seem, in terms of fishing time, that there has been no change in abundance. These and other considerations are constantly stressing the need for a continual search for improved definitions.

2. CLASSES OF FISHING UNITS

2.1 General

Important differences in the fishing efficiency of the various types of gear and of fishing craft are apparent. Comparable and adequate fishery statistics, reflecting the relationships between effort (inputs) and catch (outputs) require, when collecting and publishing these statistics, that a distinction be made between different "classes of fishing units".

These distinctions are made in terms of (i) the gear used; (ii) the method of propulsion; and (iii) the size of the craft. Appendix 'B' presents details on the practices of both ICES and ICNAF with respect to the establishment of "classes of fishing units" in terms of (i) gear; (ii) propulsion; and (iii) craft size.

2.2 Gear classification

The gear classifications of ICES and ICNAF are almost identical, and these details are presented in Appendix 'B', while in Appendix 'C', a worldwide gear classification is also presented for comparison.

2.3 Method of propulsion

ICES, as will be noted from the material presented in Appendix 'B', uses three types of propulsion to define classes of fishing units. ICNAF has dispensed with the breakdown by propulsion methods.

2.4 Classification of craft according to size categories

Both ICES and ICNAF use gross registered tons to define the size categories to be used for identifying different classes of fishing units. These are compared in Appendix 'B'. Appendix 'D' indicates the different categories used by ICES for presenting fleet statistics. Other papers deal with the classification of fishing fleet statistics; in developing classifications of size categories for general fishing fleet statistics, it is advisable that these, either in expanded or contracted form, correspond with the size categories adopted to identify the "classes of fishing units" used in the collection and publication of effort (inputs) and catch (outputs) statistics.

APPENDIX 'A'

DEFINITIONS OF FISHING EFFORT MEASURES

FISHING TIME

ICES No. of hours or 1000 hooks fished
ICNAF

No. of hours fished: for otter trawls this is defined as "the total number of hours during which the trawl was on the bottom and fishing"; *if countries are unable to report so precisely they should give the nearest approximation with the precise definition of the approximation used.*

No. of hours fished: for dory vessels this is defined as "the number of hours the dory fleet is absent from the mother vessel times the number of dories".

Thousand of hooks fished: this is defined as "the number of hooks used in each set times the number of sets". This figure should be calculated to the nearest thousand hooks.

For other fishing gear: the number of hours the nets, seines, traps, pots, dredges, harpoons, etc. were used in the fishing operations; this is the product of the number of hours per unit times the number of units.

ICES No. of hauls, drags or sets made
ICNAF

The number of times the fishing gear has been hauled or dragged or set, whichever description is appropriate to the fishing gear or technique used.

ICES No. of days fished
ICNAF

The number of days (24-hour periods, reckoned from midnight to midnight) on which any fishing took place.

For those fisheries in which searching is a substantial part of the fishing operation, days "on grounds" in which searching but not fishing took place, should be included in the days fished data.

Taking into account the inclusion of "searching time" the definition of "number of days fished" could be further refined at the national level if possible as follows: "The number of days (24-hour periods, reckoned from midnight to midnight) on which the fishing craft was on the fishing grounds, intent on catching fish (not counting the time spent steaming to or from port and between grounds) minus the number of fishing days lost through delays from weather, breakdown or other factors".

ICES No. of days on grounds
ICNAF

This is defined as the number of days (24-hour periods, reckoned from midnight to midnight) in which the craft was on the fishing ground, and includes in addition to the days fishing and searching also all the other days while the craft was on the ground.

FISHING TIME (concluded)

ICES No. of days absent from port

The number of days absent from port on any one trip should include the day the fishing craft sailed but not the day of landing.

Where it is known that fishing took place on each day of the trip the number of "days absent from port" should include not only the day of departure but also the day of arrival back in port.

Where on any trip a fishing craft visits more than one "fishing area" (as defined for statistical purposes) an appropriate fraction of the total number of days absent from port should be allocated to each "fishing area" in proportion to the number of days spent in each, so that the total number of days absent on any trip will be the sum of the number of days allocated to all of the different "fishing areas" visited.

ICES No. of trips made

Any voyage during which fishing took place in only one "fishing area" is to be counted as one trip.

When in a single trip a craft visits more than one "fishing area" an appropriate fraction of the trip should be apportioned to each "fishing area" in proportion to the number of days spent fishing in each, so that the total number of trips for the Statistical Area as a whole will be the same as the sum of trips to each "fishing area".

FISHING POWER

ICES Average gross tonnage

Average gross tonnage is to be given in gross register tons.

The averages should be weighted. Weighted averages are required in view of the decision to reduce the reporting task of the national offices by eliminating for the time being the monthly breakdown of the annual effort measure data.

ICES Average horse power

Data should be given in "brake horse-power". For steam engines give the data instead as "indicated HP".

The HP averages should be given either as straight i.e., unweighted averages, or as weighted averages, with an indication of the type of average used. Weighting is to be calculated on the basis of "number of trips".

ICES Average length, overall

The overall length should be given; if this is not possible and if the registered length is substituted the word "overall" in this line is to be deleted and "reg" inserted. The length data should be given in metres (1 British foot = 0.3048 m.).

These length averages should be given either as straight (unweighted) averages or as weighted averages with an indication of the type of average used. Weighting is to be calculated on the basis of "number of trips".

ICES No. of fishing units operating

The number of fishing units operating should include every unit within the relevant "class of fishing units" that fished at least once in the fishing area.

In the case of "pair boat" fisheries the two craft together comprise one fishing unit.

APPENDIX 'B'

DEFINITION OF "CLASSES OF FISHING UNITS"

1. General

In the statistical reporting of catch-effort statistics for fishing areas according to classes of fishing units a distinction between these classes of fishing units is made on the basis of:

- Primarily: (a) The fishing gear (method) used;
- Secondarily: (b) the propulsion method; and
 (c) the size category.

ICES does not for the time being require countries to define classes of fishing units by standard tonnage classes. Instead of standardized tonnage class categories a rather more flexible system of reporting by "fisheries" based on an agreed craft-and-gear classification and, where necessary, other criteria (e.g. craft size groups, mesh size, "type of fishery", etc.) is used. Member countries are responsible for establishing their national breakdown into "fisheries" for this purpose.

2. Fishing gear (method)

The International Standard Statistical Classification of North Atlantic Fishing Gear is based on the classification recommended by the Expert Meeting on Fishery Statistics in the North Atlantic Area, Edinburgh, September 1959, as modified subsequently by the CWP as a guidance to national offices.

Countries might, for some of these gear categories in certain areas, find it advisable to introduce further refinements by introducing sub-categories (e.g. "bottom" or "pelagic"). Such refinements might, sometimes, be very necessary, but to avoid a too complicated international list of gear categories, these further refinements are left to the national reporting offices.

A careful utilization of this North Atlantic gear classification, suitably refined by the national offices, together with the selected craft categories, should enable the reporting offices to establish suitable classes of fishing units for each "fishing area".

2. (concluded)

This International Standard Statistical Classification of North Atlantic Fishing Gear is as given below:

<u>ICES</u>	<u>ICNAF</u>
1. Otter trawls	1. Otter trawls
1.1 Large-meshed otter trawls <u>1/ 2/</u>	1.1 Side trawlers
1.1.1 Side trawlers	1.2 Stern trawlers
1.1.2 Stern trawlers	
1.2 Small-meshed otter trawls <u>1/ 2/</u>	
1.2.1 Side trawlers	
1.2.2 Stern trawlers	
2. Pair trawls	2. Pair trawls
2.1 Large meshed pair trawls <u>1/ 2/</u>	
2.2 Small-meshed pair trawls <u>1/ 2/</u>	
3. Beam trawls	3. Beam trawls
4. Danish seines	4. Danish seines
5. Purse seines, ring nets, etc. <u>1/</u>	5. Purse seines, ring nets, etc.
6. Beach seines	6. Beach seines
7. Drift gill nets	7. Drift gill nets
8. Set gill nets	8. Set gill nets (bottom nets)
9. Fixed gear <u>1/</u>	9. Fixed gear (weirs, traps, pots, etc.)
10. Long-lines	10. Long-lines
11. Hand-lines	11. Hand-lines
12. Dory-type gear	12. Dory-type gear
13. Other lines	13. Other lines
14. Dredges <u>1/</u>	14. Dredges
15. Harpoons	15. Harpoons
16. Other gear <u>1/</u>	16. Other gear
17. Gear that cannot be specified	17. Gear that cannot be specified

3. Propulsion method

In ICES statistics a distinction is made as far as possible between the methods of propulsion given below:

1. Motor
2. Steam
3. Other (sails, oars, etc.)

1/ To be specified where necessary.
2/ "Large-meshed" refers to meshes of 70 mm. and above; "small-meshed" to meshes of less than 70 mm.

4. Size category - fishing fleets

In distinguishing between different size categories of fishing craft it is possible to use either the gross registered tonnage or the horse power. It is recommended that, where a breakdown is made on the basis of craft size, (i.e. large and small trawlers), it should be made as far as possible within the framework of the agreed international tonnage classification used by ICES and ICNAF which follows below:

<u>ICES</u>		<u>ICNAF</u>	
<u>Size Category No.</u>	<u>Description (Gross Register Tonnage)</u>	<u>Size Category No.</u>	<u>Description (Gross Register Tonnage)</u>
1.	50 GRT and less	1.	50 GRT and less
2.	51-150 GRT	2.	51-150 GRT
3.	151-500 GRT	3.	151-500 GRT
4.	501-900 GRT	4.	501-900 GRT
5.	901-1800 GRT	5.	901-1800 GRT
6.	1801-3000 GRT		
7.	3001-5000 GRT	6.	over 1800 GRT
8.	5001 GRT and above		

APPENDIX 'C' */

GEAR CLASSIFICATION

As mentioned in the preface, the gear classification published in: Modern Fishing Gear of the World, London 1959, has been used as a guide for this book.*/ This gear classification has been submitted to the First International Fishing Gear Congress of F.A.O. in 1957 and has been primarily based on European fishing gear.

Considering the whole world, however, some alterations of and additions to the classification are necessary, but no essential modifications are required. A new main group for gear, specially designed for the drive-in fishery of Asia, has been added. In contrast to the original classification the gill nets and tangle nets have been divided into two different groups. Moreover, most of the other main groups had to be enlarged.

The careful reader will see that two implements used for the harvesting of marine products are not mentioned in the classification, but in the text of the book. These are the pumps used for fishing ... and the mechanical clam dredges or shellfish harvesters... The author must admit that he could not decide whether to include these gears in the classification. The harvesters could have been combined with the dredges. The pumps, as far as they are used for catching and not removing fish already caught from a gear, could form a new main group. Let us see how this idea will develop in the future.

The basis for the classification is the principle how the fish are caught. In this way, 15 main groups have been established. The first and second sub-sections are based on facts influencing the fishing operations. These facts may include a different design or construction of the gear, but even a varying size or material of the particular model of the gear. Which fact is influencing the handling of the gear would depend on its type.

This altered classification is given in the following...

*/ Kind permission to reproduce this Appendix, taken from Fish Catching Methods of the World, by Professor A. von Brandt, has been given by the publishers, Fishing News (Books) Ltd., London, 1964.

The classification given in the original publication showed in parentheses after each gear item the number of the figures in the book, giving an example of the type of gear mentioned.

1. Without gear

- 1.1 grasping by hand
- 1.2 by diving
- 1.3 with hunting animals
 - 1.31 dogs
 - 1.32 otters
 - 1.33 cormorants
 - 1.34 sucker-fish
 - 1.35 others

2. Wounding gear

- 2.1 hand instruments
 - 2.11 spears
 - 2.12 fish plummets
 - 2.13 clamps
 - 2.14 tongs
 - 2.15 rakes
 - 2.16 combs
- 2.2 bows and arrows
- 2.3 harpoons
 - 2.31 cast by hand
 - 2.32 shot by rifles
 - 2.33 shot by guns
- 2.4 rifles
- 2.5 blow-pipes

3. Stupefying methods

- 3.1 striking gears
 - 3.11 clubs
 - 3.12 thrown missiles
- 3.2 poisons
- 3.3 electrical fishing
- 3.4 explosives
 - 3.41 fish-shooting
 - 3.42 hand-grenade
 - 3.43 dynamite

4. Lines

- 4.1 without hooks, bobbing
- 4.2 with gorges or hooks
 - 4.21 hand lines
 - 4.22 set lines
 - 4.23 troll lines
 - 4.24 drift lines
- 4.3 with rip hooks
 - 4.31 rip lines
 - 4.32 gaffs

5. Traps

- 5.1 hiding places for traps
 - 5.11 brush-traps
 - 5.12 octopus pots
 - 5.13 other hiding places
- 5.2 barriers
 - 5.21 walls (stone, wood, netting, etc.)
 - 5.22 fences
 - 5.23 gratings
- 5.3 mechanical traps
 - 5.31 gravity traps
 - 5.32 bent-rod traps
 - 5.33 torsion traps
 - 5.34 snares
- 5.4 tubular traps
 - 5.41 genuine tubular traps
 - 5.42 thorn-lined traps
- 5.5 baskets
 - 5.51 fish pots
 - 5.52 fyke nets
- 5.6 trap nets
 - 5.61 weirs
 - 5.62 pound nets

6. Aerial traps

- 6.1 box traps
- 6.2 boat traps
- 6.3 raft traps
- 6.4 veranda nets
- 6.5 scoop nets for jumping fish

7. Bag nets with fixed mouth

- 7.1 scoop nets
 - 7.11 landing nets
 - 7.12 skimming nets
 - 7.13 push nets
 - 7.14 dragged scoop nets
- 7.2 scraping nets
 - 7.21 stationed
 - 7.22 movable
- 7.3 gape nets
 - 7.31 stow nets on stakes
 - 7.32 swing nets on anchors
 - 7.33 otter-board stow nets

8. Dragged gear

- 8.1 dredges
 - 8.11 hand dredges
 - 8.12 boat dredges
- 8.2 sweep nets
 - 8.21 single walled
 - 8.22 triple walled
- 8.3 bottom trawls
 - 8.31 for broadside sailing boats
 - 8.32 two-boat trawls
 - 8.33 beam trawls
 - 8.34 otter board trawls
- 8.4 surface trawls
- 8.5 midwater trawls
 - 8.51 one-boat trawls
 - 8.52 two-boat trawls

9. Seine nets

- 9.1 double stick nets
- 9.2 genuine seines
 - 9.21 beach seines
 - 9.22 boat seines

10. Surrounding nets

- 10.1 semi-encircling nets
 - 10.11 barrier-like nets
 - 10.12 spiral nets
- 10.2 totally encircling nets
 - 10.21 lampara-like nets
 - 10.22 purse seines
 - 10.23 ring nets

11. Drive-in nets

- 11.1 stationed
- 11.2 movable

12. Lift nets

- 12.1 hand lift nets
- 12.2 level lift nets
- 12.3 gallows lift nets
- 12.4 blanket nets
- 12.5 water wheels

13. Falling nets

- 13.1 cover nets
 - 13.11 cover pots
 - 13.12 lantern nets
- 13.2 cast nets
 - 13.21 hand cast nets
 - 13.22 cast nets from gallows
 - 13.23 cast nets from boats

14. Gill nets

- 14.1 set nets
- 14.2 floating nets
- 14.3 drift nets

15. Tangle nets

- 15.1 single net walls
- 15.2 trammel nets

APPENDIX 'D'
ICES: FISHING FLEET STATISTICS

Type	Steam	Motor	Total
<u>BY SIZE-CLASSES (Tonnage groups)</u>			
* 0-25 GRT			
26-50 GRT			
51-150 GRT			
151-500 GRT			
501-900 GRT			
901-1800 GRT			
1801-3000 GRT			
3001-5000 GRT			
> 5000 GRT			
<u>BY HP GROUPS</u>			
1-30 HP			
31-100 HP			
101-200 HP			
201-500 HP			
> 500 HP			

* Countries are requested to specify the lower limit of the 0-25 GRT class in their submissions.

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APPENDIX 'E'

GEAR CLASSIFICATION
COMMENTS BY PROF. DR. A. VON BRANDT

I begin with comments on my own gear classification according to "Fish catching methods of the world, 1964" (which is not officially adopted either by FAO or ICES/ICNAF) with some explanation and compare this result with the notes for STANA 1W and 1E (sea fishery only).

1. Without gear

This means collecting, especially molluscs. Big quantities are collected in France (pêche à pied) and in many other parts of the world, especially during low tides. Diving for shells and sponges is also included.

2. Wounding gear

This means spears and harpoons, which are used for catching aquatic animals and also big fishes, e.g. on the Pacific coast of the Far East and America. Other long handled implements are also used for catching sea urchins, plants, etc.

3. Stupefying method

This includes fish poisoning, electrical fishing (till now restricted mostly to freshwater) and fishing with dynamite.

4. Lines

All forms of lines, watched (hand lines, troll lines) or not watched (set lines, drift lines); sometimes only one or a small number of hooks; sometimes thousands of hooks; principally no difference in the catching method. Also included are ripping hooks as used for Sturgeon (Black Sea) and other fishes (East and South Asia).

5. Traps

These are of different forms and sizes but are based on the same catching principle; passive gear - the fish has to come in by itself and then cannot find the way out. Big catches are in weirs or poundnets in the sea (e.g. herring, tuna, salmon); smaller traps important for crustaceans.

6. Aerial traps

Used in the sea for mullet fishery only.

7. Bag nets with fixed mouth

Big stow nets are used in the deep sea, apparently by the Koreans only, but are important in the estuaries of NW Europe.

8. Dragged gear

Although the principle of fishing is broadly the same, there should be at least 3 sub-groups:

dredges (for shellfishes)
bottom trawls (except beam trawls)
midwater trawls

This division into 3 groups is not based on the technical aspects but for the biologists' interest. Two other groups are of interest for technical reasons:

beam trawls
pair trawls

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9. Seine nets

This is also a uniform group calculated by sets (not hours as used for dragged gear); for biological reasons (and technical effort) 2 sub-groups may be created:

beach seines
boat seines

10. Surrounding nets

This means totally encircling nets only, e.g. purse seines, lampara nets and mixed forms one group only.

11. Drive-in nets

Special forms are used in the seas off SE Asia only.

12. Lift nets

Big types are used in the SE Asia (India: Chinese lift net; Philippines: basnig), smaller forms in all parts of the world for shellfish and bait fishing (inshore fishery).

13. Falling nets

In seas cast nets, mostly in tropical areas; also small types used by boats.

14. Gillnets

Single walled nets in which the fish is enmeshed; bigger fishes or also forms with hard fins and spines are also entangled; nevertheless the size of the meshes is decisive. No difference if the nets are set or drifting, but of interest for technical reasons.

15. Tangle nets

The size of the mesh is not decisive; single walled nets or trammel nets with the same catching principle.

Considering North Atlantic (East and West) only, the following types of fishing gear may be of interest (types are more specified):

A. Collecting

B. Harpooning

Only when sea mammals are included.

C. Line fishing

When number of hooks are mentioned, no further specification is necessary.

Hand lines
Long lines

D. Trapping

E. Stow netting

Only in estuaries

F. Dragging or trawling

- (a) beam trawls
- (b) dredges (shellfish)
- (c) bottom trawls (bottom fish)
- (d) midwater trawls (pelagic or semi pelagic fish)

- G. Seining
 - (a) beach seines
 - (b) boat seines
- H. Fishing with surrounding nets (pursing)
- I. Gill-netting
 - (a) set nets
 - (b) drift nets
- J. Fishing with tangle nets
- K. Other gear
A and also J may be included in this group.

Comparing this grouping with the categories of fishing gear in STANA E and W, we have the following list:

Above List	STANA 1E	STANA 1W
Collecting (Harpooning)	Harpoons	Harpoons
Hand lining	Hand-lines	Hand-lines
	Dory type gear	Dory type gear
	other lines	other lines
Longlining	Long-lines	Long-lines
Trapping	Fixed gear	Fixed gear
		(weirs, traps, pots, etc.)
(Stow netting)	-	-
Dredging	Dredges	Dredges
Beam trawling	Beam trawls	Beam trawls
Bottom trawling	Otter trawls	Otter trawls
	large and small meshed	side and stern trawlers
	side and stern trawlers	
Midwater trawling	-	-
Pair trawling	Pair trawls	Pair trawls
	large and small meshed	
Beach seining	Beach seines	Beach seines
Boat seining	Danish seines	Danish seines
Pursing	Purse seines, ring nets	Purse seines, ring nets
Gill netting with set nets	Set gill nets	Set gill nets
Gill netting with driftnets	Drift gill nets	Drift gill nets
(Fishing with tangle nets)	-	-
Other gear	Other gear	Other gear

On comparing these three lists, the following comments can be made:

- (1) In STANA, collecting fisheries are not mentioned. As far as I know the quantities of mussels collected by hand, also by professional fishermen, are not small.
- (2) Harpooning: this is necessary only when sea mammals are mentioned.
- (3) For lining in both forms, dory type gear and other lines are mentioned. If the number of hooks is mentioned, only one group may be sufficient. There are no technical or biological objections. As far as I know, dory fishermen use small long lines and hand lines which could be included in other lines if there are no traditional reasons against this.
- (4) Trapping: "Fixed gear" in STANA 1E is misleading without any explanation. A bottom line and a set gill net may be a fixed net also.

- (5) Bottom trawling: to mention large and small meshes with the 70 mm limit may be of interest for reasons of stock preservation. To mention side trawlers or stern trawlers has nothing to do with the method and is an item of fishing vessel classification.
- (6) Midwater trawling: this should be included by biological and technical reasons and not only left to the countries (204:2.22).
- (7) Pair trawling: small and large meshed gear, see above.
- (8) Beach seining and boat seining: these should be mentioned in following groups and not divided by purse seining. Danish seine for boat seining may be justified in this area by tradition.
- (9) It seems that stow netting and fishing with tangle nets could be included with other gear.

The last point to be mentioned about the gear classification is to make quite clear the meaning of the different categories, even when the names seem to leave no doubt. Therefore, my proposal is to make a STANA paper with drawings giving some explanations about what has to be grouped together as mentioned above. There should be no difficulty in preparing this paper.

On fishing fleets or vessels I have no comments except:

- (a) For some methods, no vessels are necessary, not even rowing boats, e.g. collecting, including some form of diving, also beach seining and many other types of inshore fishing with lines, gill nets, etc.
- (b) There is no doubt that two items for vessels are the most important: size (203: 2.13 and 204: 2.24) and HP.
- (c) It may be necessary to note that a new working group (Chairman Mr. de Wit, Netherlands) will try to clarify the vessel parameter important for the meeting about fishing effort prepared by ICES for 1970.

The differences between my proposal and STANA classification for fishing gear are not as important as I expected. As mentioned before, it should be quite simple to illustrate and define the different categories of fishing gear. This is necessary if my proposals are to be used.