

## Some basic characteristics of Croatian marine fisheries and its legal regulation

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*Any rather competent discussion of the biodiversity and management of marine living resources of the Adriatic Sea requires, at least, basic information on the basic characteristics of Croatian marine fisheries. This paper presents the types and quantities of fishing gear and equipment used in Croatia, and the legal provisions regulating their use.*

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**Key words:** Fisheries, fishing gear, Croatia

### INTRODUCTION

It is well known that the Adriatic, as a semi-closed and oligotrophic fishing area, belongs to low production seas. The abundance of individual fish species does not make it a rich sea. However, it is very rich in the number of species and subspecies, of which about 407 (JARDAS, 1996) have been identified so far.

A large number of gear types and methods of operation have been developed due to such a diversity of species. Some fishing gear types have even been named after the species of fish and other organisms they are used for.

Of fishing gear used world-wide, with respect to the method of fishing, 14 groups may be distinguished: grappling and wounding, hooks and lines, traps, filter nets, trawls, surrounding nets, liftnets, falling gear, gill nets, entangling nets, gill nets and entangling nets, barrier gear, seine nets and harvesting machines. All of them are in usage in Croatian fishing. Of all the mentioned groups, 55 types and subtypes of nets and other gear types are nowadays used in the Croatian part of the Adriatic Sea (CETINIĆ *et al.*, 1999).

### SPECIFICATION OF FISHING GEAR

Having in mind the commercial importance of the Adriatic fishing, distribution, spreading and structure of its renewable stocks, position and methods of fishing, along with fishing vessels and gear, the distinction has been made between bottom, pelagic and coastal fishing.

Bottom fishing includes exploitation of benthic and demersal species of fish and marine organisms at greater depths and flat substrates. This means that exploited biocoenoses are either the sea bottom ones or depend on it for their life. Pelagic fishing includes the exploitation of pelagic species, particularly small and big pelagic fish. Coastal fishing includes the catch of fish and other marine organisms within the belt of one Nm off the mainland coast or island coasts and in shoals (reefs). Of 55 net types and subtypes and other fishing gear, all are in use in coastal fishing, except tuna purse seines, pelagic trawls, floating long-lines, trolls for fishing tuna and relatives used in pelagic fishing, open sea bottom trawls and dredge of rampon type for fishing of *Pecten jacobaeus*.

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According to the Law of Marine Fisheries of the Republic of Croatia (Narodne novine, 46/97), commercial, small-scale and fishing for sports and recreation may be distinguished.

Commercial fishing is a profit-making activity, which means that it is conducted on a professional basis. So far, about 2200 licenses have been issued to professional fishermen. In accordance with the regulations in force (Narodne novine, 46/96, 63/97, 118/97), commercial fishing is allowed to use the following types and quantity of fishing gear:

#### 1. TRAWLS

- one (1) bottom trawl
- one (1) pelagic trawl
- one (1) small coastal trawl
- one (1) dredge (for clam fishing)
- two (2) dredges (rampon)

#### 2. HARVESTING MACHINES

- one (1) hydraulic dredge ("vongolara") for shellfish catch with catch rinsing system

#### 3. SURROUNDING NETS (PURSE SEINES)

- one (1) purse seine for small pelagic fish fishing
- one (1) purse seine for big pelagic fish (tuna seines)
- one (1) purse seine for gray mullet fishing
- one (1) purse seine for garfish fishing
- one (1) purse seine for big-scale sand smelt fishing

#### 4. SEINE NETS

- one (1) summer sardine seine
- one (1) winter seine for pickarel fishing
- one (1) beach seine "migavica"
- one (1) garfish seine
- one (1) tuna seine "šabakun"
- one (1) big-scale sand smelt seine
- one (1) seine "kogol"
- one (1) seine "strašin"

#### 5. GILLNETS

- gillnet for fishing of big-scale sand smelt ; total length up to 200 m

- gillnet for fishing of mediterranean sand smelt, total length 500 m
- gillnet for fishing of picarel (*Spicara smaris*), total length up to 1000 m
- gillnet for fishing of bogue, total length up to 2000 m
- gillnet for fishing of different fishes, total length up to 2000 m
- gillnet for fishing of atlantic bonito, total length up to 1000 m
- gillnet for fishing of lobster, total length up to 1000 m
- gillnet for fishing of crab, total length up to 2500 m
- gillnet for fishing of cartilaginous fish, total length up to 2000 m
- gillnet for fishing of angelshark, total length up to 2000 m
- gillnet for fishing of sardine, unlimited length
- gillnet for fishing of picarel (*Spicara flexuosa*), total length up to 500 m
- gillnet for fishing of blotched picarel (*Spicara maena*), total length up to 800 m

#### 6. THREE LAYER TRAMMEL NETS

- trammel nets for all fishes, total length up to 800 m
- trammel nets for fishing of common cuttlefish, total length up to 800 m
- trammel nets for fishing of salema, total length up to 800 m
- trammel nets for fishing of flatfishes, total length up to 3500 m

#### 7. TRAPS

- loft, in total up to five (5) pieces
- fishtraps, in total up to fifty (50) pieces
- lobster traps, in total up to one hundred (100) pieces
- traps for Norway lobster, in total up to two hundred and fifty (250) pieces
- fyke net with one wing for smelt fishing, one (1)
- fyke net "trata", one (1)
- fyke net "fagunet", a total of up to five (5) pieces

## 8. HOOKS AND LINES

- in total up to ten (10) pieces of different hand lines and trolling lines
- in total up to 100 pieces of floating lines
- in total up to 200 pieces of hand lines with ripping hooks for fishing of Cephalopods -
- in total up to 5000 pieces of hooks of bottom long lines
- in total up to 500 hooks of pelagic long-lines

## 9. GRAPPLING AND WOUNDING GEAR

- in total up to five tridents
- in total up to five rakes
- in total up to five tongs

## 10. FISHING USING ROPES ("tramata" fishing)

- one (1) "ludar"
- one (1) "zagonica"
- one (1) "fružata"

## 11. COLLECTION OF CORALS, SHELL-FISH, SPONGES, SEA CUCUMBERS, SEA-URCHINS AND MARINE PLANTS

- in total up to two (2) axes for coral cutting
- in total up to three (3) rakes for shellfish collection

## 12. CATCH OF EUNICE SP.

- in total up to twenty (20) pieces of gadgets for the catch of *Eunice* sp.

## 13. CRAB CATCH

- in total up to five (5) gadgets for crab catch

The small scale fishing is performed for ones own needs and catch by the small-scale gear must not be traded (Narodne novine, 46/97). It is not a professional activity, and therefore the types and quantity of gear are limited. So far, about 8500 licenses have been issued to small-scale fishermen. The following gear and quantities of gear are allowed to be used in small-scale fishing (Narodne novine, 89/96, 30/97, 78/98):

## 1. GILLNETS AND TRAMMEL NETS

- gillnet for fishing of big-scale sand smelt; total length up to 50 m
- gillnet for fishing of mediterranean sand smelt, total length 60 m
- gillnet for fishing of picarel (*Spicara maris*), total length up to 120 m
- gillnet for fishing of picarel (*Spicara flexuosa*), total length up to 120 m
- gillnet for fishing of bogue, total length up to 100 m
- gillnet for fishing of different fishes, total length up to 200 m
- trammel nets for all fishes, total length up to 150 m

## 2. TRAPS

- fishtraps, in total up to five (5) pieces

## 3. TRIDENTS WITH OR WITHOUT LIGHT

- in total up to three tridents

## 4. HOOKS AND LINES

- five (5) pieces of different hand lines and trolling lines
- five (5) handlines with rigging hooks for catch of Cephalopods
- fifteen (15) floating lines
- a longline with up to 300 hooks
- three (3) gadgets (traps) for catch of *Eunice* sp.

## 5. SEINE NETS

- one (1) seine "kogol"
- one (1) seine "strašin"

## 6. COLLECTION OF SHELLFISH

- one rake and one tong for shellfish collection

In small-scale fishing with gillnets, at most 250 m of total length of all kinds of nets are allowed to be operated per fishing vessel.

## DISCUSSION

### Fishing legislation applied in Croatian fisheries

A large number of legal issues applied world-wide are applied in Croatia, as well, proposed by the Croatian Law of Marine Fisheries in force.

So, after the provisions of the Law the following has been banned:

- catch and trade of juvenile fish and other marine organisms
- catch of fish and other marine organisms during closed season and their trade in fresh condition.

For rational management and protection of commercially important fish species under the provisions of The Law of Marine Fisheries and its sublegal regulations, it has been decided on:

- what is meant by the juvenile fish and other marine organisms
- minimum size limit of commercially important fish species and marine organisms, below which they cannot be caught, collected or traded
- laws governing closed season for the taking and trading of individual species of fish and other marine organisms
- catch banned in some fishing zones and areas
- number and size of fishing vessels, engine power, type and quantity of fishing gear and equipment allowed to be used in some fishing zones and areas
- the limits of time of fishing in some fishing zones and areas
- allowable quantity of catch and collection in some fishing areas and zones, that is allowable catch quantity per a single license
- number of licenses that may be issued in a single fishing zone and area
- construction-technical features, method of operation and purpose of individual fishing gear types and fishing equipment
- special habitats of fish and other marine organisms, which are the parts of fishing grounds where fishing has been banned

Croatian Law of Marine Fisheries in force includes also the legal provisions for the monitoring program of the state of populations of fish and other marine organisms of importance for marine fisheries all over the fishing zones or their parts as well as the monitoring of the quality of marine areas where rearing activities are conducted.

Measures of protection of living resources of the sea, proposed by the Law of Marine Fisheries, are quite good and, for the most part, conform with the protection measures well known and applied in European and partly world fisheries.

### Age at first recruitment

Protection of age at first recruitment is carried out by regulating the minimum size of commercially important species of fish and other marine organisms, below which they must not be caught, collected or traded (Narodne novine, 145/98) and the smallest mesh sizes and hook sizes.

Even though the minimum size of commercially important species of fish and other marine organisms below which they must not be caught, collected or traded should correspond to those at their first maturity, those provided by our regulations in force are considerably smaller. Therefore their direct importance as protective sizes below which they must not be caught, collected and traded is practically very small (CETINIĆ *et al.*, 1998). The number of fish and other organisms, protected by this measure, is also very small, and no fish or other marine organism caught by trawls is covered by this measure. Even though fish and other marine organisms, caught by bottom trawls are returned back to the sea, rarely survive due to damages or death. This measure should encompass two most important species of our trawl fishing (hake, *Merluccius merluccius* and Norway lobster, *Nephrops norvegicus*) to make fishermen avoid those grounds when juvenile specimens of these species occur in trawl catches. This particularly refers to the Norway lobster, which after having been caught is, in most cases, alive

and undamaged so that the chances of its survival after returning it to the sea, are great. This means that fishermen should stop fishing if on a fishing ground the trawl catch per haul comprises more than 20% of immature Norway lobsters or hake in relation to total catch, or if the catch consists of more than 20% of Norway lobster females with exterior eggs. At the same time each Norway lobster female with exterior eggs should be returned back to the sea.

The minimum size limit of fish and other marine organisms below which they must not be caught or traded is of considerable importance when combined with the minimum mesh size or hook size of gear (SOLDÓ *et al.*, 1999) due to the peculiarities of the Adriatic Sea (characterized by a large number of fish species and large number of fishing gear types of which some are even named after fish they catch). This particularly applies to the protection of species in coastal fishing which change sex and therefore both sexes should be protected. The minimum size limit of fish and other marine organisms, below which they must not be caught or traded, should be much better covered by our legislation as a measure of protection of living marine resources, in particular commercially important species.

Our sublegal provision regulates the minimum mesh size for almost all fishing gear, but since these measures are mostly not based on any research results, but on fishing practice itself, the catches comprise considerable percentages of immature specimens, which for a lot of gear types exceed the 20% limit. Therefore, a lot of gear types are held to be harmful.

### **Fishing effort as a measure of fishing regulation in Croatian marine fisheries**

Even though Croatian legislation does not explicitly mention fishing effort as a measure of fishing regulation, a lot of regulations provided by the Law, which aim at proper management of living resources of the sea, are in the function of regulating and monitoring fishing effort.

Croatian Law on Marine Fisheries proposes the following protection measures that are in function of fishing effort regulation:

- number and size of fishing vessels, engine power, type and quantity of fishing gear and equipment allowed to be used in some fishing zones and areas
- construction-technical features, method of operation and purpose of individual fishing gear types and fishing equipment
- allowable quantity of catch and collection in some fishing areas and zones, that is allowed catch quantity per single license
- number of licenses that may be issued in a fishing zone and area.

Of the provisions of the Law only some have been worked out in detail by sublegal regulations:

- engine power limit on trawlers conducting fishing by bottom trawls in the interior sea, the power not to exceed 184 kW (250 HP)
- restriction of the types and quantities of fishing gear and time of fishing in some fishing areas and zones
- ceasing of new license issuing for some kinds of fishing such as fishing of Norway lobsters with traps, bottom trawls in the interior sea, dredges for catch of *Pecten jacobaeus*, "trama" fishing, trammel nets, tuna seines and floating long-lines
- some construction-technical characteristics, method of operation and purpose of fishing gear.

Although these measures limit any further increase of fishing effort, they are not sufficient enough for fishing effort reduction. Namely, it is believed that present fishing effort is too high, particularly in trawl catch of benthic species. Therefore a more efficient measure of protection of living marine resources would be to limit maximum annual catch, which is establishing maximum sustainable yield in individual areas and zones. It is particularly related to bottom species caught by trawls within the interior sea, with special attention to channels along the mainland coast. Since it would be very difficult and unpopular to limit the number of licenses for defined fishing methods in a defined area, to

enforce this measure, it would be simpler, more practical and more efficient to determine maximum sustainable yield per single license.

One of the protection measures that controls better the fishing effort, is lay down of fishing ban and closed seasons in some areas. We believe that with establishing of special habitats of fish and other marine organisms and having all fishing and some fishing gear types forbidden permanently or for certain period during the year, would make far more efficient measure.

Since present legal provisions regulate some construction-technical characteristic of individual gear types, such as mesh size and gear size, it would be necessary to regulate construction-technical characteristics of the rest of gear, which adversely affect the state of exploited species of fish and other marine organisms. Apart from the mentioned characteristics this refers to the hanging ratio and webbing cut, thread thickness and some other particulars in the construction and method of making some fishing gear types.

### Closed seasons

Sublegal regulations govern closed seasons only for three crab species, common spiny lobster, European lobster and spider crab, not for a single fish. With respect to the importance of closed seasons for recovery of species, it should be extended to all commercially important species, since no other way of protection can replace undisturbed spawning, which is not only the prerequisite for the survival of any population, but also for the successful fishing. Closed season regulation will protect spawning species in their hatcheries, considering that protected species must neither be caught nor traded. Since spawning species are heavy and slowly moving and are gathered in schools, they are easily accessible to catch. Thus, the closed season is held to be one of the significant protective easures and it should be applied to some commercially important fish species for better protection and management of fishes in the eastern Adriatic.

### REFERENCES

- CETINIĆ, P., J. DULČIĆ and A. SOLDI. 1998. Zaštita živih bogatstava mora reguliranjem ribolova. Pomorski zbornik, 36(1): 161-175.
- CETINIĆ, P., I. JARDAS, J. DULČIĆ, A. SOLDI and A. PALLAORO. 1999. Diversity of fishing gear in coastal area of the eastern Adriatic and its influence on coastal fish communities. Proceedings of International Symposium on responsible fisheries and fishing techniques Insko-Poland, 165-176.
- JARDAS, I. 1996. Jadranska ihtiofauna. Zagreb, Školska knjiga, 536. pp.
- SOLDI, A., P. CETINIĆ and J. DULČIĆ. 1999. Catch of Norway lobster, *Nephrops norvegicus* (L.), with lobster pot of different mesh size in the eastern Adriatic. Proceedings of International Symposium on responsible fisheries and fishing techniques Insko-Poland, 281-287.
- NARODNE NOVINE. 46/96, 63/97, 118/97. Naredba o vrsti i količini alata i opreme koja se smije obavljati u gospodarskom ribolovu na moru.
- NARODNE NOVINE. 145/98. Naredba o zaštiti riba i drugih morskih organizama.
- NARODNE NOVINE. 89/96, 30/97, 78/98. Pravilnik o ribolovnim alatima i opremi za mali ribolov.
- NARODNE NOVINE. 46/7. Zakon o morskom ribarstvu.

## **Osnovne značajke i zakonsko reguliranje hrvatskog morskog ribarstva**

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### **SAŽETAK**

Bilo kakva kompetentnija rasprava o biodiverzitetu i raspolaganju morskim resursima Jadranskog mora zahtijeva informacije o osnovnim značajkama hrvatskog morskog ribarstva. U radu se navode vrste i količine ribarskih alata i opreme dozvoljenih u ribolovu, te zakonsko reguliranje njihove upotrebe.

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