Dynamics of the Fishing Capacities Used for the Mechanized Exploitation of the Gastropod *Rapana venosa* at the Romanian Coast, during 2013 - 2017 *(Cristian Sorin Danilov, Simion Nicolaev, Eugen Anton, George Țiganov, Alexandru Dan Nicolaev, Cătălin Valentin Păun, Valodia Maximov)*	**"Cercetări Marine" Issue no. 49** **Pages 133 - 140**	**2019**

DYNAMICS OF THE FISHING CAPACITIES USED FOR THE MECHANIZED EXPLOITATION OF THE GASTROPOD *Rapana venosa* AT THE ROMANIAN COAST, DURING 2013 - 2017

Cristian Sorin Danilov, Simion Nicolaev, Eugen Anton, George Țiganov, Alexandru Dan Nicolaev, Cătălin Valentin Păun, Valodia Maximov

National Institute for Marine Research and Development "Grigore Antipa"
300, Mamaia Blvd., RO-900591, Constanta, Romania
E-mail: cdanilov@alpha.rmri.ro

ABSTRACT

The invasive species *Rapana venosa* (Valenciennes, 1846) was reported for the first time at the Romanian Black Sea coast in 1963 (Gomoiu, 1972).

Due to the excellent gourmet qualities, rapa whelk population began to be exploited since 2009. At first, during the period from 2009 to 2012 rapa harvesting was done only manually with divers.

Since the second half of 2013, with the legalization of the use of beam trawl fishing, a filter-towed gear type (Order no. 1696 of 11/07/2013, Order no. 400 of 2013), economic operators with fishing activities at the Romanian coastline have begun to focus on the acquisition of new vessels with functional technical characteristics (length, engine power) and equipment (fishing facilities) that would facilitate the industrial exploitation of the gastropod *R. venosa*.

The legalization of fishing with beam trawl allowed a significant increase in catches of *Rapana*, which led to a gradual implementation of changes in the structure of the fishing fleet, such as increasing the number of vessels with lengths over 9 m and equipping existing vessels with fishing equipment / facilities suitable for fishing combined with both stationary fishing gears (fixed nets, guide cages, long lines etc.) and towed filter nets (pelagic trawl, beam trawl etc.).

Key-Words: Black Sea, *Rapana*, beam trawl, fishing vessels, fishing facilities

AIMS AND BACKGROUND

The reduction of fish catches in the last 5 years from 280 t in 2013 to 170 t in 2017 and the emergence of a new exploitable opportunity [the gastropod *Rapana venosa*, with a representative stock that allows the exploitation of a total allowable catch (TAC) of 10,000 t per year] made a large part of the economic agents with fishing activities on the Romanian coast to direct their activity towards the mechanized exploitation of this new resource.

In order not to cause damage on the beam trawl when fishing, trawling operations are only conducted along sandy bottoms and muddy sands, specifically in the central and northern areas of the Romanian seaside. The harvesting of rapa whelk on rocky bottoms, characteristic of the southern area of the coast, is done only with divers. For these reasons, in order to perform the TAC, it is ideal for the two harvesting methods, with the divers and the trawl, to be practiced in combination.

Fishery management exploitation of this resource has a dual function: to regulate sustainable economic exploitation and use this as a tool for environmental control, maintaining rapa whelk population at a level that cannot constitute a threat to the ecosystem (Danilov *et al.*, 2018).

R. venosa is a species of high economic value on the market with varying prices from 5500-7000 USD per tonne.

Being a new resource to ensure sustainable exploitation, this molluscstock is exploited at a TAC determined annually based on the biomass recorded.

The assessments of the rapa whelk stock conducted by NIMRD specialists in recent years have estimated the stock at the Romanian coast of the Black Sea at about 17,500 tonnes (with a value of TAC of approximately 10,000 t/year) (Report of Scientific Expeditions, 2013-2015)

By the time of authorization of the beam trawl fishery, the rapa whelk was harvested manually with divers, but the yield has proven to be very weak, for example in 2012 there were harvested only 588 t, i.e. 5.9% of the TAC (annual reports - NAFA 2012).

This method has proven expensive due to high operating costs (higher costs of services provided by divers or with boats used during harvest) compared to the size of catches [modest catches due to the limited number of diving hours per day (according to legal requirements) and the hydroclimatic conditions].

In 2013, after authorization to use beam trawl for harvesting rapa whelk was granted, only the beam trawl catch taken was 2.2 times higher than that achieved manually by divers in 2012, that later, in 2017, this increase reached 15.7 times higher, respectively, representing 92% of the TAC (national legislation - NAFA, 2012-2017). These increases were made

possible by the progressive increase in the number of vessels having engaged in mechanical harvesting of rapa whelk with beam trawl (fishing logs 2012-2017; Annual Report - NAFA, 2013).

EXPERIMENTAL

Initially, the beam trawl rapana harvest (Fig. 1) started in mid-2013, and achieved only a number of 7 vessels [2 vessels oflength class 24-40 m, 4 vessels of length class 12-18 m, one vessels of length class 06-12 m], the only existing ones, at that time, with appropriate facilities for conducting operations with beam trawl fishing (Fishing Vessel Register, NAFA, 2012).

The substantial catch obtained by harvesting rapa whelk with the beam trawl in 2013 made the companies to focus their attention to the acquisition, in particular, of vessels 12 to 18 m in length (Fig. 2), 18-24 m and 24 - 40 m (Fig. 3), provided with installations suitable for mixed fishing, both with stationary gears (gillnets, long lines, cages etc.) and towed filter gears (beam trawl, pelagic trawl, dredge etc.) (Danilov *et al.*, 2017).

Generally, fishermen opted for vessels with length above 12 meters, due to fishing, of two beam trawls. This technique was preferred because it is more efficient in this embodiment, the filter surface per unit time is doubled and the catch thus more consistent (Danilov *et al*., 2018).

On the other hand, since 2014, an important place in the mechanized fishing with beam trawl began to occupy gradually vessels of 9-11 m in length (6 to 12 m class), equipped with fishing facilities appropriate to achieve rapa whelk harvesting operations, with one or two beam trawls (Fig. 4) (fishing logs 2012-2017; Annual Report - NAFA, 2013).

Fig. 1. Beam trawl *(original photo).*

Fig. 2. Vessel of class 24-40 m *(original photo).*

Fig. 3. Vessel of class 12-18m*(original photo).*

Fig. 4. Vessel of class 24-40 m (*original photo).*

The beam trawl (Fig.1) is a filtering towed gear. From the point of view of construction, it consists of a beam (metal pipe) supported at its ends by two bases, metal or the net (collection bag consisting of cover, sole and side).

The cross member and the soles represent the framework skeleton on which the mesh part is attached which in turn is fastened to the front of the sole on a resistance skeleton (rope, cable or chain) that has the role of driving and directing to the concentration area of the bag the target object (rapa whelk) (Țiganov et al., 2017).

In order to facilitate the harvesting of the existing rapa whelk population on the substrate, the beam trawl must have a position that is as tangent as possible to the bottom of the sea during operation. However, depending on hydroclimatic or improper operation of the tool, malfunction may occur in the operation ofthe gear, that will induce disturbances in benthic communities or changes in their structure.

In terms of selectivity of the fishing gear used for rapa whelk (beam trawl), it proved that it does not retain sexually immature individuals, nor brood belonging to demersal fish species such as gobies, mullet, whiting etc. Rarely, among rapa whelk catches appear sometimes juveniles of turbot, flounder and sole, which, however, are released at sea after emptying the bag.

RESULTS AND DISCUSSION

The first activities of harvesting the rapa whelk were carried out in the Mamaia Bay and Cape Midia, at depths of 20 to 29 m. However, once the migration of rapa whelk to the north of the coast in search of food (molluscs), the areas of activity were gradually moved on into northern Romanian seaside, so now (2018) these activities have come to be realized almost entirely in the Sacalin - Zatoane area, at the same depth interval.

The lower catches of fish made year by year by the economic agents determined the progressive straightening of the activities and towards the harvesting of rapa whelk, a resource with high potential and with a

constantly growing market.

This orientation has gradually led to substantial changes in the structure of the fishing fleet, the trend in recent years has been to increase the number of vessels with a length between 9-27 m, belonging to the classes of lengths in the range of 6-40 m. The greater interest was directed to the purchase of vessels belonging to the class of lengths 12 - 18 m, because they are equipped with installations, equipment and facilities corresponding to the development of complex activities, respectively with reduced maintenance costs (fishing logs 2012-2017; Annual Report - NAFA, 2013).

Figure 5 shows the dynamics of fishing capacities for total length classes, used to harvest rapa whelk with beam trawl, between 2013 and 2017, and Figure 6 shows the dynamics of fishing capacities with beam trawl, by length classes, recorded in the same period.

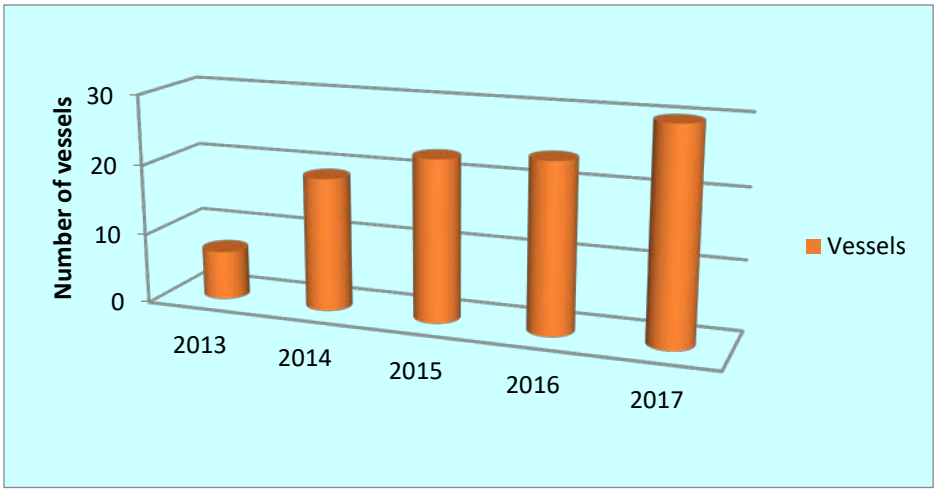

Fig. 5. Dynamics of fishing capacities for total length classes, used for trawling with beam trawl, during 2013 and 2017.

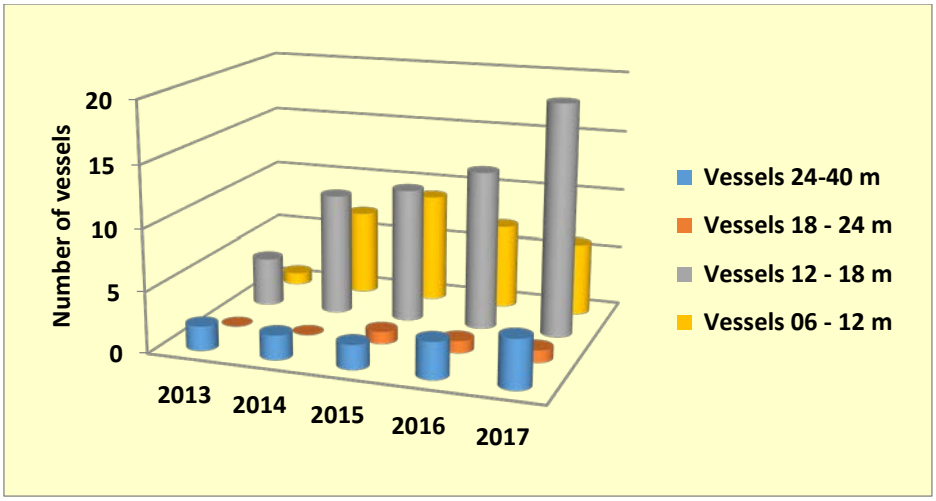

Fig. 6. The dynamics of fishing capacity for each class length used for harvesting rapa whelk with beam trawls during 2013 - 2017.

Increasing the number of vessels led implicitly to the progressive increase of catches from one year to another. The largest share of the catch were a segment throughout the vessels of 12-18 m, that is better represented in terms of numbers, and the attainment of increased explain the catch. The percentage of rapa whelk catches made by this fleet segment of the total catch made in the Romanian sector of the Black Sea has progressed from 25% (2013) to 58% (2017) (Annual reports - NAFA, 2012-2017).

The use of beam trawl fishing, while still manually harvesting with divers, led to a progressive increase in the total catch of rapa whelk, from 1,277 t in 2013-9,244 t in 2017(Fig.7). The share of catches with beam trawls, of the total catch of rapa whelk, was progressively increasing over the years, from 50% in 2013 to 80% in 2017. If in 2013 the TAC was made at the rate of 12.8%, in 2017 it reached a rate of 92 %.

The increase of the amounts of rapa whelk harvested from the total catch at the Romanian coast resulted in a decrease of the pressure on highly sensitive species, such as turbot (*Psetta maxima*) (Maximov et al., 2013), closely regulated by the European Commission by a total allowable catch (TAC).

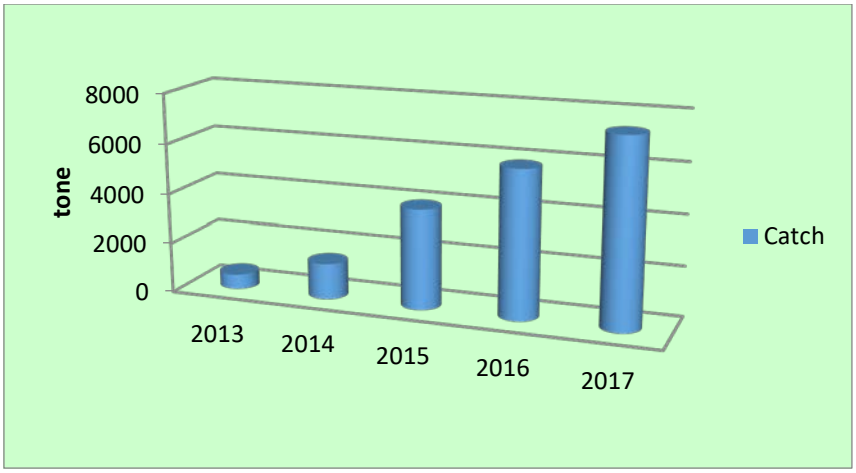

Fig. 7. The evolution of the total catch by vessels practicing beam trawl fisheries for rapa whelk during 2013 - 2017.

Figure 8 highlights the catches made by each segment of vessels practicing fishing with beam trawls, in the same period.

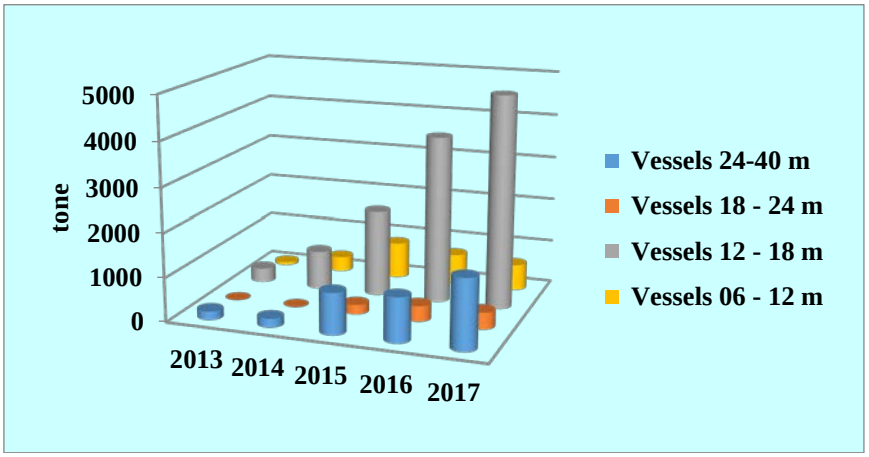

Fig. 8. Evolution of catches taken by vessels in the same length class which practiced fishing with beam trawl for rapa whelk during 2013 - 2017

CONCLUSIONS

Currently, the activities of harvesting rapa whelk with the beam trawl are carried out on depths between 20 and 29 m, with sandy or sandy-muddy substrate, in the area between Mamaia Bay and Sacalin-Zatoane.

During 2013 - 2017, the number of vessels that have carried out mechanical fishing with beam trawl increased from 7 in 2013 to 30 vessels in 2018. From 2013 to 2017 an increase in the total catch of *Rapana venosa* was recorded, the highest number of catches being in 2017.

The tendency at the present time of the companies practicing

commercial fishing activities on the Romanian coast has remained, that of focusing mainly on the activities for harvesting rapa whelk with divers and beam trawl, respectively of acquiring vessels with technical characteristics and equipments suitable for mixed fishing with beam trawl and other gearsfor certain fish with high economic value.

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