6. Fish population

Research unit
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Title
Evolution of fish populations of the Ridge of S. Croce in relation to the submerged reefs.

Introduction
The reefs are submerged structures built by means of accumulating elements of various nature and typology (blocks of rocks, concrete elements, wrecks and metal scraps, etc.) in order to protect flat sea bottom areas from trawling fishing activities and at the same time constitute a protection and reproduction area for benthonic organisms which might find holes and refuges.
This function is also known as the "tigmotropic effect", and it is particularly clear in areas lacking hard substrates; this can be noticed in the inclination of organisms to guiding, approaching, settling or keeping in contact with such fixed structures.
The attraction function that the submarine structures, capable of offering shelter to organisms and to their breed, have on the fish population has always been well known by fishermen. Already, in fact, in ancient times, the fisherman tried to keep secret the areas where he had found the presence of wrecks or particular morphologies of the sea bottom (banks, ridges, '*trezze*', etc.), which enabled them to find abundant catches.
This type of self-collocation was possible as long as the capability to trace exactly such areas was connected merely to the ability of orientation and navigation of the fisherman himself, for example through the use of triangulation with reference points taken on the mainland.
With the advent of ever more advanced technological systems and independent on the operator's ability, such as today's echo-sounding and GPS, the number of fishermen and other categories like aquiculture, sports fishermen, scuba divers,

pleasure boaters etc, able to use the submerged reefs has grown greatly, determining an impoverishment and a deterioration of the areas in question.

Programme Objective

Verify, by means of experimental hauls, increase of fish biomass following the settlement and maturation of the submerged structures in relation to the fishing catch done in nearby soft bottoms areas.

Methodological notes

This study was carried out through monthly fishing catch by using three types of nets and also through observations in immersion.

Experimental fishing

The nets used correspond to three types commonly used in the Gulf of Trieste, 'passelere', 'bombina's' and 'barracuda's'.

The 'passelere' are trammel nets/triple stitched generally used by local fishermen of the winter fishing of flounder (*Platichthys f. italicus*) and the spring fishing of cuttlefish (*Sepia officinalis*).

Even the 'bombina's' are trammel nets whose great height enables though to fish in a broader submerging layer, enabling the fishing of commercial species such as sea bass (*Dicentrarcus labrax*) and striped bream (*Lithognathus mormyrus*), etc.

The 'barracuda's', instead, are one-mesh nets made of nylon and used for the fishing of mainly white fish; they differ from the 'bombina's' for their least visibility in the water and therefore considered more productive for fishing than the first one.

For the fishing operations two 'scotti' were used, each made up of 5 nets with a 35mm mesh, 20 metres long, and 1 m high (called 'passelere' in jargon), a net with a 35 mm mesh 30 metres long, 1.5 metre high (called 'bombina's' in jargon) and 2 nets with a 35 mm mesh 50 metres long, 1.5 metre high (called 'barracuda' in jargon) for a total of 230 metres of net for each 'scotto'.

The creeks were made in two stations, one placed inside the submarine oasis of the Ridge of Santa Croce (ca. three miles South-West compared to the ex Marine Biology Laboratory) where inside the artificial reefs are located, the other near a controlling site located a mile from the oasis, North-West, at the same bathimetry.

12 catches were carried out monthly between June 2003 – May 2004 and August 2004 – July 2005. In order to have a more complete view of the situation in the two sites under consideration, some fishing catches with the 'barracuda' type net were deployed. The creeks were made in days of good weather conditions, therefore

sometimes between one immersion and another one month or less than one month would go by (see documentation enclosed).
Nevertheless, the fishing catches as a whole represented a significative sample of the seasonality of the catches in the Gulf of Trieste.
The nets were immerged in the afternoon, before sunset and collected the following morning, lying in the sea for a total of about twelve hours (D'Anna e Badalamenti, 2000).
The samples caught were taken to the laboratory, where the planned analyses were carried out, or frozen in a freezer at - 20°C and subsequently defrosted to simply execute the planned analyses: Of each sample it was recorded its:
Total length (L tot), standard length (L st) and length to the fork (L fork) for the fish; (for the crustaceans, the length of the shells was measured and for the cephalopods the length of the coat) – the measurements were expressed in ;
Weight of the sample (W) in grams, by means of an electronic scales;
Sex determination (for the fish);
The gathered data from the experimental measurements were eventually used to determine, through statistical elaborations, the following aspects:
abundance and frequency of zoological groups;
seasonal composition of halieutics fauna;
division of catches with 'passelere', 'bombina's' and 'barracuda's';
calculation of the fishing yield (g/100m) referred to 100m trammel net during the different months of sampling for 'bombine', 'passelere' and 'barracuda';
calculation of the fishing yield (g/100m) referred to 100m trammel net with no distinction between 'bombine' and 'passelere'.

The preliminary operations for the deployment of fishing nets were distinguished in 5 main stages :
1) net assembling
2) plumbing
3) choosing the surface signals
4) initial trial immersions (net bathing)
5) preliminary on-the-site investigations in immersion

Net assembling

Net assembling was effected by joining 5 pieces of nets named "passelera' (20m each) with the piece of net known as 'bombina' (30m) and 100m of 'barracuda'; this constituted one piece only called 'scotto'.
For the assembling some supplementary single-thread was used.

Plumbing

The plumbing at the extremes enabled the 'scotto' to be fixed to the substrate otherwise easily dragged by the currents or the surface signals.

The choice of the rope length was suggested by the average depth (Bussani, 1987) on which we operated, ranging between 12 and 16m. An excess of rope resulted indispensable considering marine phenomena such as the marine excursion or the probable season bad weather.

Choice of superficial signals

The choice of superficial signals was particularly considered especially for the 'scotto' reserved to the catches on the control site.

The entire area in front of the Ridge of Santa Croce was constantly subject to trawling fishing, consequently, on the bases of the used method by local fishermen (Bussani, 1987), the choice of the fishing signals was directed on "little flags" particularly visible, so as to be avoided by boats that trawl fish.

Test castings

Some test castings represented an important phase; the net used, being new, needed a preliminary permanence in the water before being considered fully functional (operation called "net bathing").

Preliminary on-site investigations in immersion

Some preliminary on-site investigations were executed in the oasis under water, in order to verify the real collocation of the submerged structures.

Once found the collocation for the cubes, the two wrecks, the semi-floating experimental structures for the mussels cultures MIM and the concrete material, following the methodologies suggested, (D'Anna et al., 1998) the trajectory on which to execute the experimental immersions was establishe

Observations in immersion

Besides the catches, in the months starting from June 2003 to July 2005 on a monthly basis, some "*visual census*" investigation methods were carried out at an operative depth ranging from 10 to 16m.

It was noticed in fact, from the previous surveys, that the bottom fishing could give an incomplete image of the situation, especially as far as the most movable fauna is concerned and not strictly linked to the substrate such as *Dicentrarcus labrax*, *Mugil auratus*, *Lithognathus mormyrus, Sparus aurata*, *Boops boops*, *Sciaena umbra* ecc.

Results

Experimental catches and observations in immersion

As for the halieutics fauna composition, yielded through experimental catches, the prevailing species both in the Ridge of Santa Croce and in the control site was *Squilla mantis.*

After effecting all the foreseen measurements on the fishing catch, a general view relating the count of samples, the number of species and the biomass concerning the sampling months were subsequently carried out (June 2003 – May 2004 and August 2004 – July 2005) (Figs. 6.1).

It is clear that the 2004/2005 catches with the 'bombina' and 'passelera' types of nets were definitely lower than those carried out in 2004/2005, fact that however reflected the general trend of the bottom catch in the Gulf of Trieste.

Furthermore, it was highlighted that the above mentioned types of nets "fish" clearly better than the control site compared to the Ridge of Santa Croce. This was to connect to the different sea bottom morphology and to the major intensity of the currents.

As a matter of fact in the collecting operations of the nets, the differences in which the nets were found at the moment of collection were remarkable; the 'scotto' positioned in the control site never presented significative quantity of benthonic material, non commercial, called "dirty" by local fishermen. This, instead, happened on the Ridge where we were often found to collect nets completely full of such material.

Its presence may be justified by the fact that the Ridge area (as protected area) is not subject to trawling actions: this might have made the growth and accumulation of organic debris easy which would otherwise have been subject to a continuous fragmentation and mixing up.

Moreover, if the effect of the currents present in the Ridge is considered, which physically undergo an acceleration due to the reduction of depth, it is possible to suppose that they determine a dragging effect of the nets on the bottom (observation made while immerging). This could have influenced considerably on the quantity of species and specimens sampled during the months in the area of the Ridge of Santa Croce.

The site presented then some characteristics more suitable compared to the Ridge of Santa Croce to execute the fishing with trammel mesh nets.

The results obtained from the 'barracuda' nets were instead different which evidently resulted more suitable to the fishing on the Ridge of Santa Croce. This type of net was able to "fish" much more in the underwater oasis compared to the control site reflecting much better the situation observed in the immersions.

Generally the data obtained pointed out a maximum in the number of specimens caught in the late-summer and autumn months and a minimum in the late winter and spring months. This trend was mainly due to the recruiting occurred for the majority of species in the late summer and autumn (Relini *et al*., 1995). Result which indeed confirmed the general trend of the catches in the Gulf of Trieste.
This situation was not however, confirmed by the observations in immersion according to which the maximum number of species and specimens was recorded in summer.
Considering that in summer both specimens investigated preferably stationed at a certain distance from the bottom and that in autumn the visibility conditions did not allow accurate observations on the Ridge of Santa Croce, we can conclude that in both seasons a high presence of species and individuals was recorded. From the observations made near the submerged structures of the Ridge of Santa Croce, it was recorded that the summer period gave with no doubt the highest number of species (17); on the contrary, the winter months touched the least number of species found (5). The periods of spring and autumn presented, in broad outlines, the same number of species observed despite the visibility conditions often not allowing to verify accurately.
The finding and the seasonal evolution of the species observed in immersion near the Ridge of Santa Croce are herewith reported.

Summer period
In June, July and August it was noticed the presence of a net thermocline with colder water in the water column and tendentially more torbid on the bottom and warmer and clearer water towards the surfaces. (Fig. 1.10).
An abundant presence of fish species was observed in the surroundings of the submerged structures which rose from the bottom so as to overtake the thermocline.
The main species observed in free water, around the submerged structures, were numerous specimens such as brass (*Dicentrarcus labrax*), branchi di bobe (*Boops boops*), blotched picarels (*Maena maena*), saddled bream (*Oblada melanura*), mullet (*Mugil* sp.), sheepshead bream (*Puntazzo puntazzo*), two-banded bream (*Diplodus vulgaris*), gilthead (*Sparus aurata*), some shoal of salpa (*Boops salpa*), numerous shoals of horse mackerel (*Trachurus trachurus*) and some specimens of black umbra were found (*Sciena umbra*).
Species observed also far from the submerged structures are shoals of anchovies (*Engraulis encrasicholus*) and sardines (*Sardina pilchardus*).
As for the non-migratory species numerous specimens of thrush (*Labrus sp*.) and conger eel (*Conger conger*) were found.

Among the molluscs specimens of cuttlefish (*Sepia officinalis*) and sparrow-hawk (*Ozaena moscata*) were found.

Autumn period

In the months from September to December a gradual uniformity of the water column was observed; this broadly presented the same conditions both in surface and near the depth.

Often the water tobidity is very high with relevant visibility variations in the course of the same day. Much less were the species observed , most probably due to the connection of the water tobidity.

Specimens of sea brass (*Dicentrarcus labrax*) were found abundantly near the bottom and around the submerged structures.

In November the presence of these specimens is mostly numerous near the submerged structures (probably spawning).

Other species are shoals of ox-eye bream (*Boops boops*), blotched picarel (*Maena maena*), horse mackerel (*Trachuru trachurus*) and specimens of pandora (*Pagellus erythrinus*).

Generally non-migratory specimens found such as thrush (*Crenilabrus pavo*) or conger eel (*Conger conger*) resulted constant in concomitance, however, to sufficient visibility.

Winter period

In the months from the end of December to the end of March, the conditions on the Ridge of Santa Croce affected our results considerably.

In more immersions, it was possible to find the presence of very cold water (4-5°C), generally torbid and with less salinity in the first superficial layer 40-50cm (Figs. 1.10; 1.11). Most probably these conditions were influenced by the Isonzo river spring nearby.

In the remaining water column the conditions were more homogeneous, tendentially with the water fairly torbid.

The species observed decreased sharply. The species considered non-migratory were represented by a number of individuals significantly lower; the specimens encountered gathered mainly around the structured located at higher depth (sunk boats "*Giuliana*" and "*Quieto*"). The presence of specimens of sea brass (*Dicentrarcus labrax*) were seen around the two wrecks.

Spring period

In the months from the end of March to the end of May a gradual trend to the stratification of the water column was recorded.

Near the surface the water was warmer compared to the layers underneath; and it is indeed here that the majority of specimens of sea brass (*Dicentrarcus labrax*), horse mackerel (*Trachurus trachurus*), shoals of ox-eye beam (*Boops boops*) striped beam (*Lithognathus mormyrus*) and mullet (*Mugil auratus*) were seen.
Nearby the sea bottom and the submerged structures the presence of species considered non-migratory increased compared to winter
No significant fish species were ever found during the immersions made in the control site, this was mainly due to the nature of the sea bottom and to the poor visibility.

SUPPLEMENTRY DOCUMENT
Report of the single immersion period 2003/2004

June immersion
The first sampling was carried out In June.
As agreed with the Harbour Office of Trieste every immersion was planned very much ahead of time. Prior notice in advance in writing was given to the competent body.
The first immersion was supposed to be for 27 and 28 June; due to hostile weather conditions, caused by a storm and North/East wind, the immersion was postponed to 30 and 31 June.
Once positioned the nets on the Ridge and lowered them on the control site, 45°41' 02" North 13°37'16" East, the boat returned to the little harbour of S. Croce.
The morning of 31 June the nets were raised. On the 'scotto' lowered to the Ridge in the 'bombina' piece a specimen of *Squilla mantis* and *Sepia officinalis* were found caught.
No fish species were found caught in the remaining 100m of the net destined to the 'passelera', but only, as the whole 'scotto', a significant quantity of debris material, non commercial, "dirty" as the local fishermen call it.
In the second 'scotto' two specimens of *Squilla mantis* (in the 100m of 'passelera') and five specimens of *Squilla mantis,* one *Merlangus merlangus* and two *Solea vulgaris* in the 'bombina' piece were found caught.
The whole 'scotto', differently from the first, did not show any debris material. The fact that in the Ridge only the 'bombina' recorded a catch, even of a species usually benthonic and that the nets were full of dirt, suggested immediately the influence of the currents in the fishing catch; under their action the nets laid on the bottom of the sea and could not perform their activity. This effect was particularly felt by the 'bombine', their height, as a matter of fact, surely influenced this effect.

Immersion in July
Sampling operations set for 30 and 31 July.
Weather conditions favourable, calm wind and partially rough sea. Two 'scotti' were lowered in the late afternoon, three crew members were present.
A specimen of *Pagellus erythrinus* and *Mullus surmuletus* were found caught in the 'passelera' pieces, while in the 'bombina' part no fish species was present; the entire 'scotto' showed a significant quantity of organic material caught.

In the control site a specimen of *Squilla mantis* was recorded caught in the 'bombina' part and a specimen of *Solea vulgaris* in the 'passelera' part.
The whole 'scotto' did not have any debris or "dirty" material.

August immersion
Sampling operations planned for 27 and 28 August.
Weather conditions favourable. Two 'scotti' were lowered in the late afternoon of 27 August, and the collecting of the nets took place in the early morning of 28 August.
Two specimens of *Engraulis encrasicholus* and one *Squilla mantis* were found on the Ridge (in the 'passelera' pieces); the 'bombina' piece did not present any caught specimen.
A significant quantity of "dirty" material was found inside the 'scotto'.
Once the cleaning operations of the net ended the 'scotto' positioned in the control site, where a specimen of *Engraulis encrasicholus* and one of *Trachurus trachurus* were found, while in the 'bombina' piece a specimen of *Trigla hirundo*, one of *Engraulis encrasicholus* and one of *Squilla mantis* were found.
The whole 'scotto' did not present any "dirt".

September immersion
Planned sampling operation fixed for 20 and 21 September.
Favourable weather conditions with weak wind from the South quadrants. The two 'scotti' were lowered in the late afternoon both on the Ridge and on the control site.
The two 'scotti' were then brought to the surface in the early morning of the 21 Semptember starting from the Ridge.
Two specimens of *Engraulis encrasicholus* and one *Ozaena moscata* were caught (in the 'bombina' piece), while in the 'passelera' part, two specimens of *Ozaea moscata*, two *Squilla mantis* and one *Solea vulgaris* and one *Engraulis encrasicholus* and *Pagellus erythrinus* were present. On the 'bombina' pice it's present a discreet quantity of "dirt".
In the control site four specimens of *Squilla mantis* and one *Sardina pilchardus* were found caught (in the 'bombina' part), in the 'passelera' pieces we found thirteen specimens of *Squilla mantis*, eight *Engraulis encrasicholus,* three *Sardina pilchardus*, three *Solea vulgaris*, two *Ozaena moscata* and one *Mugil auratus.*
No "dirty" was found.

October immersion
Sampling operations fixed for 10 and 11 October.
Good weather conditions; two 'scotti' were lowered and collected in the early morning of the 11 October, complete crew. The collecting operations started from the 'scotto' positioned on the Ridge with two specimens of *Umbrina cirrosa* and one of *Pagellus erythrinus* and *Mullus surmuletus* (in the 'passelera' pieces) and one specimen of *Dicentrarchus labrax* in the 'bombina' piece.
Once the cleaning of the nets from the usual "dirt" ended we continued with the collection of the second 'scotto'.
One specimen of *Sardina pilchardus*, *Lithognathus mormyrus*, *Squilla mantis*, *Solea vulgaris* was found in the 'passelera' pieces while in the 'bombina' piece one of each specimen of *Ozaena moscata*, *Sepia officinalis, Solea vulgaris*, *Sparus auratus, Trigla lucerna* was found caught.
No "dirty" was found.

November immersion
Sampling operations fixed for 10 and 11 November.
Due to hostile weather conditions with *bora* winds, the immersion was postponed to the 15 and 16 November. Good weather conditions, regular immersion and collecting.
The collecting started with the 'scotto' positioned on the Ridge with (in the 'bombina' piece) one specimen of *Crenilabrus pavo* and one specimen of *Ozaena moscata*.
In the 'passelera' pieces two specimens of *Ozaena moscata* were recorded. A remarkable quantity of "dirt" was found on the whole 'scotto', especially in the 'bombina' piece.
Once the cleaning operations of the nets are over, the second 'scotto' was investigated where starting from the 'bombina' piece one specimen of *Dicentrarcus labrax* was found while in the 'passelera' pieces three specimens of *Merlangus merlangus,* one of *Squilla mantis* and *Trigla hirundo*.
No significant "dirt" was found in the nets.

December immersion
Sampling operations fixed for 17 and 18 December.
Good weather conditions; the two 'scotti' were lowered in the first afternoon, the following morning were collected.
We started with the first rising of the 'scotto' positioned on the Ridge catching a specimen of *Squilla mantis* and one of *Boops boops* bothe caught in the 'passelera' pieces. No species was found in the 'bombina' piece.
A relevant quantity of organogenous material was found caught, especially in the 'bombina' piece.
In the control site, in the 'passelera' pieces, three specimens of *Merlangus merlangus* were found, while, in the 'bombina' piece, one specimen of *Squilla mantis*, *Merlangus merlangus, Platichtys flesus italicus*.
Quantity of "dirt".

January immersion
Sampling operations fixed for 12 and 13 January.
Good weather conditions. Both 'scotti' were lowered in the afternoon of 12 January and collected the trammel nets in the morning of the following day. No species was found caught.
Confirming the trend of the other immersions (in the pieces positioned on the Ridge) a certain quantity of "dirt" is found on the contrary of what happened in the control site.

February immersion
Sampling operations fixed for 16 and 17 February.
Good weather conditions. The two 'scotti' were lowered in the afternoon of 16 February with the complete crew present and collected in the morning of the following day.
One only specimen of *Loligo vulgare* was found in the 'bombina' piece on the control site. There was no species on the remaining trammel net.
The trend of the previous immersions was confirmed regarding the caught benthonic material.

March immersion
Sampling operations fixed for 18 and 19 March.
Good weather conditions. The two 'scotti' were lowered on 18 March and collected in the early morning of the following day.
The collection started with the 'scotto' positioned on the Ridge where a specimen of *Solea vulgaris* (in the 'passelera' piece) was found.
We then collected the 'scotto' positioned on the control site where *Merlangus merlangus* was counted in the 'passelera' piece.
The "dirt" took place just like in the previous samplings.

April immersion
Sampling operations fixed for 22 and 23 April.
Good weather condtions. The two 'scotti' were lowered in the afternoon of 22 April and collected them the following morning.
The collecting started with the 'scotto' positioned on the Ridge with a specimen of *Squilla mantis* found in the 'bombina' piece, nine *Squilla mantis* and one *Sepia officinalis* were found in the 'passelere' piece.
In the 'scotto' five specimens of *Squilla mantis* were counted in the 'bombina' pieces, fifteen specimens of *Squilla mantis* and one *Clupea finta* in the 'passelera' piece.
The sampling trend concerning the "dirt" was confirmed.

May immersion
Sampling operations fixed for 10 and 11 May.
Due to uncertain weather conditions with form South Western quadrants, the sampling was postponed to 12 and 13 May.
Weather conditions were good. Immersion in the afternoon of 12 May and collected the following day in the 'scotto' positioned in the Ridge where in the 'bombina' piece two specimens of *Squilla mantis* and one of *Crenilabrus pavo* Condizioni found whereas in the 'passelere' piece two specimens of *Squilla mantis were* recorded.
The second 'scotto' counted three specimens of *Squilla mantis* in the 'bombina' piece, one *Engraulis encrasicholus* and *Merlangus merlangus*. The passelre piece counted seven specimens of *Squilla mantis*, one of *Merlangus merlangus* and two of *Solea vulgaris*.
Even in the May immersion the trend observed in the other samplings regarding the remarkable quantity of "dirt" is confirmed.

Single immersion report 2004/2005

August immersion (28/08-29/08)
Good weather conditions.
Once positioned the nets on the Ridge and lowered in the control site, 45°41'02" North 13°37'16" East, the boat returned to the little port of Santa Croce.
The following morning the nets were raised. On the 'scotto' lowered on the Ridge, on the 'barracuda' piece, a specimen of *Mugil auratus*, one of *Diplorus anularis* and one of *Squalus fernandus* were caught.

The remaining 130m of net did present caught fish species, but only, as for the whole 'scotto', a quantitative debris material was found, non commercial, called "dirt" by the local fishermen.
In the second 'scotto' a specimen *Squalus fernandus* and one of *Serranus hepatus* (in the 100m of 'passelera') were found.
The whole 'scotto', on the contraty from the first, did not show any debris material.

Semptember immersion (11/09-12/09)
Favourable weather conditions with weak wind from the South quadrants.
The 'scotti' were lowered in the late afternoon both on the Ridge and on the site control.
The collection of the two 'scotti' took place in the early morning starting from the Ridge. One specimens of *Pagellus erythrinus*, one of *Ombrina cirrosa* and one of *Squalus fernandus* were caught (in the 'barracuda' piece), while in the 'passelera' part, one specimen of *Pagellus erythrinus* was recorded.
A discreet quantity of "dirt" collected was found particularly in the 'bombina' piece.
In the control site in the 'bombina' piece a specimen of *Squilla mantis* was found caught; equally in the 'passelera' and 'barracuda' piece.
No "dirt" was found.

October immersion (25/10-26/10)
Good weather conditions.
The raising operations started from the 'scotto' positioned on the Ridge with a speciemen of *Boops boops* and two of *Pagellus erythrinus* (in the 'passelera' part) and a specimen of *Dicentrarchus labrax*, one of *Squilla mantis*, one of *Pagellus erythrinus* and one of *Clupea finta* in the 'barracuda' piece.
Once the cleaning of nets from the usual quantity of "dirt", then the collection of the 'scotto' started.
Three specimens were recorded: *Engraulis encrasichus, Squilla mantis* and *Solea vulgaris* in the 'passelera' pieces.
In the 'bombina' piece there was a specimen of *Ozaena moscata* and one of *Squilla mantis*.
No "dirt" was found.

November immersion (24/11-25/11)
Hostile weather conditions with winds of bora, delaying the collection of the nets in the first afternoon.
The collection started with the 'scotto' positioned on the Ridge with three samples of *Dicentrarcus labrax*, one of *Sciena umbra, Solea vulgaris*, *Boops boops, Maena maena* and *Crenilabrus pavo*.
In the 'passelera' pieces one specimen of *Scorpena porcus* and one of *Trigla hirundo* were found.
A remarkable quantity of "dirt" was found on the whole 'scotto', especially in the 'bombina' piece.
Once the cleaning operations of the nets finished the second 'scotto' was then investigated starting from the 'bombina' piece where one specimen of *Squilla mantis* was found, while in the 'barracuda' piece one specimen of *Merlangus merlangus* and one of *Solea vulgaris* were caught.
Cleaning the nets a significant "dirt" was found.

December immersion (15/12-16/12)
Good weather conditions; the two 'scotti' were lowered in the first afternoon, and then collected in the morning of the following day.
It all started with the collection of the 'scotto' positioned on the Ridge with a specimen of *Scorpena porcus* in the 'passelera' pieces and a specimen of *Merlangus merlangus* in the 'barracuda' piece.
A remarkable quantity of organogenous material was found, especially in the 'bombina' piece.
In the control site we found three specimens of *Squilla mantis* in the 'barracuda' piece and respectively one of *Squilla mantis* in the 'bombina' and 'passelera' piece.

January immersion (5/1-6/1)
Good weather conditions.
Both 'scotti' were lowered on 5 January in the afternoon and collected the trammels in the morning of the following day.
One specimen of *Merlangus merlangus* in the 'barracuda' pieces was found on the Ridge and one specimen of *Crenilabrus pavo* in the 'passelera' piece.
A specimen of *Squilla mantis* was found in the control site in the 'barracuda' piece.
A certain quantity of "dirt" was found, confirming the trend of the other immersions (in the pieces positioned on the Ridge) contrary to what happened in the control site.

February immersion (27/2-28/2)
No species was caught.
A certain quantity of "dirt" was found, confirming the trend of the other immersions (in the pieces positioned on the Ridge) contrary to what happened in the control site.

March immersion (25/3-26/3)
Good weather conditions.
The collection started with the 'scotto' positioned on the Ridge where a specimen of *Solea vulgaris* was found (in the 'passelera' part) and a specimen of *Sepia officinalis* in the 'bombina' piece.
The 'scotto' positioned on the control site was then collected where no fish species was caught.
We confirmed what occurred in the previous samplings regarding the "dirt".
April immersion (21/4-22/4)
Good weather conditions.
The two 'scotti' were lowered in the afternoon of 21 April and collected the following morning.
The 'scotto' positioned on the Ridge was collected with a specimen of *Squilla mantis* in the 'bombina' piece, as well as a specimen of *Sepia officinalis* in the 'passelera' piece.
In the second 'scotto' a specimen of *Squilla mantis* and one of *Sepia officinalis* were counted in the 'passelera' piece.
The trend of the samplings in relations to the "dirt" was confirmed.

May immersion (12/5-13/5)
Good weather conditions.
Lowered in the afternoon of 12 May and then collected the following day in the 'scotto' positioned in the Ridge where in the 'passelera' piece two specimens of *Squilla mantis* were found while in the 'barracuda' pieces one specimen of *Squilla mantis* was counted.
The second 'scotto' counted in the passerela piece two specimens of *Squilla mantis* and two of *Sepia officinalis*.
Also in the May immersion we confirmed the trend observed in the other samples for what concerns the remarkable quantity of "dirt.

June immersion (29/6-30/6)
Favourable weather conditions, calm wind and sea partially rough.
The two 'scotti' were lowered in the late afternoon; all crew members were present.
A specimen of *Pagellus erythrinus* and a specimen of *Mullus surmuletus* were found on the Ridge in the 'barracuda' pieces; the whole 'scotto' presented a remarkable quantity of orgagenous material caught.
In the control site instead, a specimen of *Squilla mantis* was recorded in the 'bombina' piece, and a specimen of *Solea vulgaris* in the 'passelera' pieces.
The whole 'scotto' did not show debris material or "dirt" caught.

July immersion (22/7-23/7)
On the Ridge, in the 'barracuda' pieces, a specimen of *Diplorus anularis* and one of *Boops boops* were caught.
A relevant quantity of "dirty" material inside the 'scotto' was observed.
All the 'scotto' did not present any "dirt".