

## Mediterranean Forum For Applied Ecosystem-Based Management

### Fisheries' activities for Kneiss Islands region (Mahres- Zaboussa- Skhira) Data series analysis report from 2005-2020



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### **Background**

The MED4EBM Project aims at enhancing capacities of various stakeholders and institutional actors involved in the management of coastal and marine areas, and at establishing a cooperation and coordination platform for them to effectively implement Ecosystem-Based Integrated Coastal Zone Management (EB-ICZM). MED4EBM proposes the use of innovative tools to address the main issues that often limit the effective application of Ecosystem Management integrated in coastal-marine areas (EB-ICZM).

This innovative tool developed by PROGES and called Integrated Spatial Planning (PROGES-ISP), is based on specific analytical methods and software, which make EB-ICZM much easier for the professional team, interested parties and institutional decision makers involved. PROGES-ISP involves the use of specific software and a series of methodological, procedural and organizational tools, to plan, implement and monitor the dynamics of Ecosystem Management through a participatory and evidence-based approach supported by objective data. It allows the real-time analysis of a large amount of spatial and tabular data and the redaction of advanced reports, through an interface that facilitates the visualisation and the management of large amounts of data, that they could differ from each other by type, time scale and geographical extension. The methods and procedural and organizational tools proposed make it possible to manage analytical processes with a multi-stakeholder approach to Integrated Ecosystem Management of coastal areas, through a step-by step procedures based on deterministic methods, ecological analyses and socio-economic assessments. This approach allows project managers and stakeholders to quantitatively assess the relationships between ecosystem components, functions and services, along with associated human activities.

**Objectives:** This report aims to analyse in details ISP data series for fisheries in order to

- help in cause/ effect analysis document
- come out with practical recommendations and conclusions which will help in the elaboration of governmental protocols

## A-Socio-economic sectors

### I-Fisheries (Component)



[Fisheries

(Id=116)]

| Indicators attached to component: Fisheries (Id=116) |  |  |                 |       |
|--|--|--|-----------------|-------|
| Name   | Description                            | DataSource                               | UpdateFrequency | Notes |
| Sanctions  | Number and Type of pecuniary sanctions | CRDA<br>Marine Guard<br>Fishery District | Monthly         |       |
| Catch by species                                     |  |  |                 |       |
| Catch by group                                       |  |  |                 |       |

#### 1.Catch by species

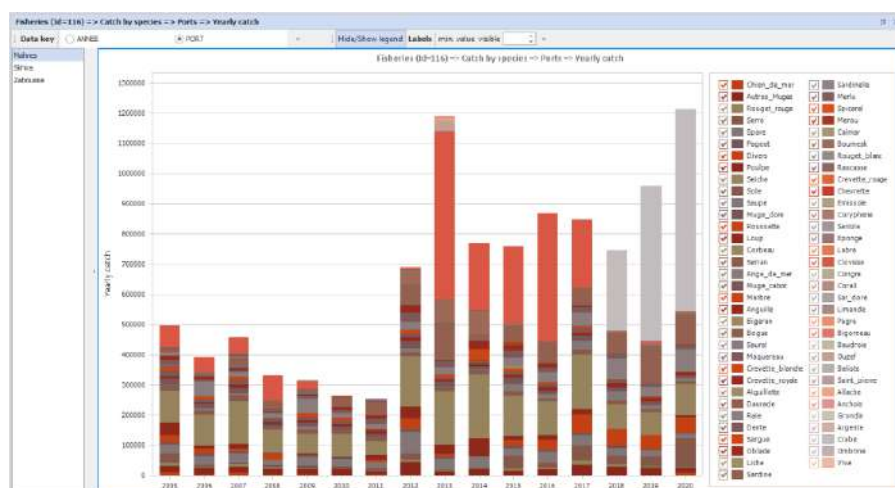
Name

All catch species

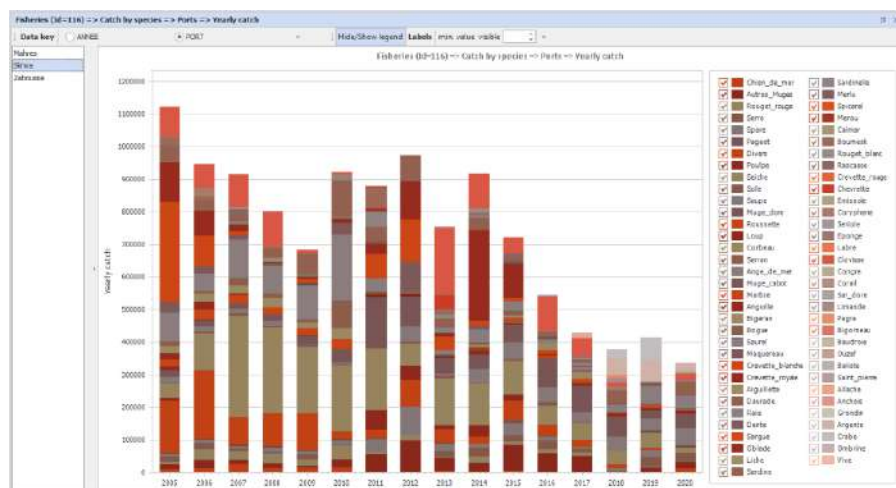
Target species

#### 1.1-All catch species

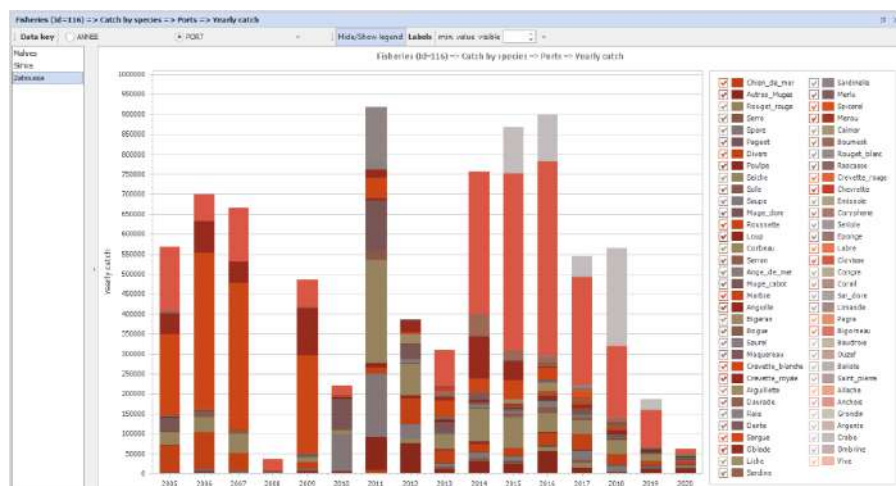
##### a- Mahres



##### b- Skhira



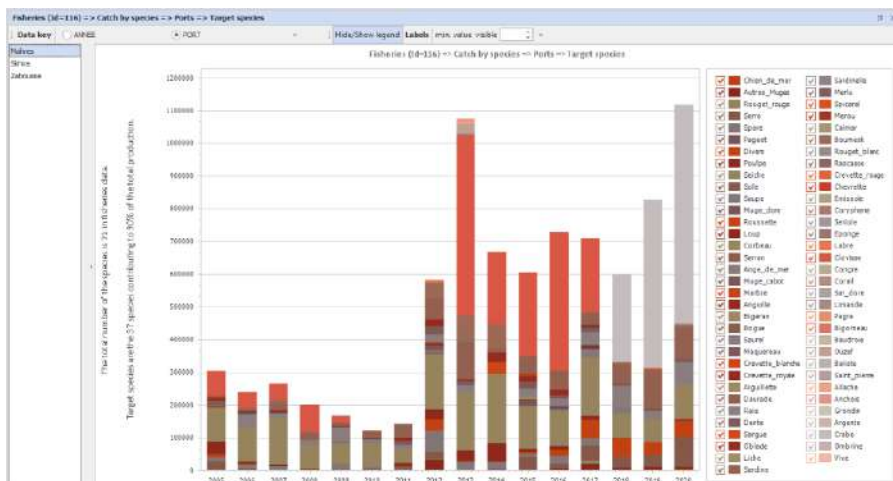
### c- Zaboussa



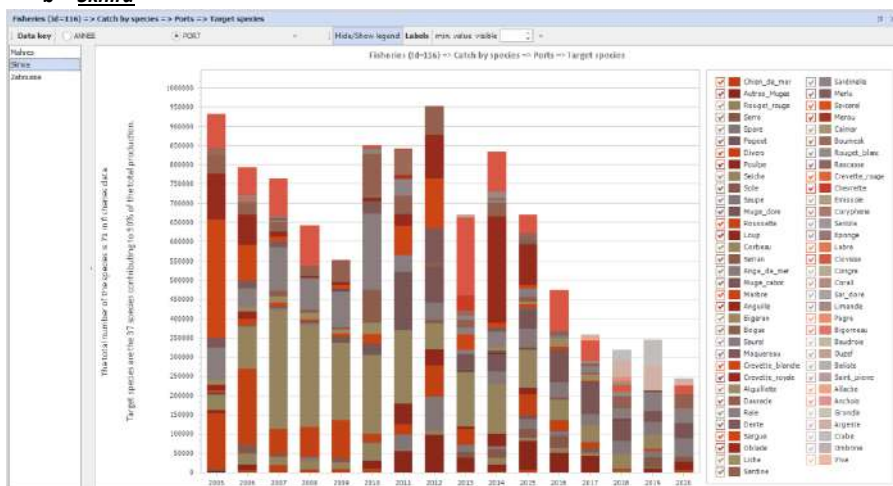
### 1.2- Catch by target species

Target species are defined as those which contribute to 90% of the total production. The choice of adding this indicator was made in order to reduce the list of the species from 66 to 37 species having the highest economic importance. This procedure is followed in order to make the data more comprehensible and readable for the stakeholders.

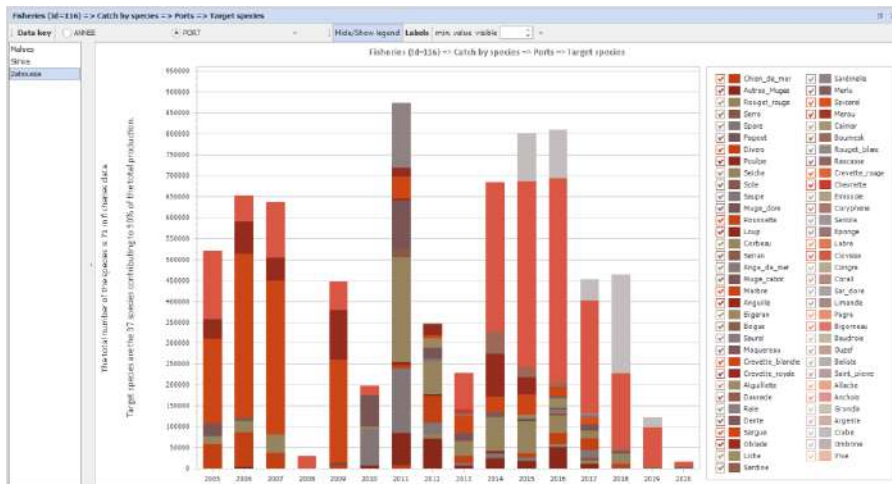
### a- Mahres



b- Skhira



c- **Zaboussa**



## 2.Catch by group

= Cephalopoda by species

= Coquillage by species

= crustacea by species

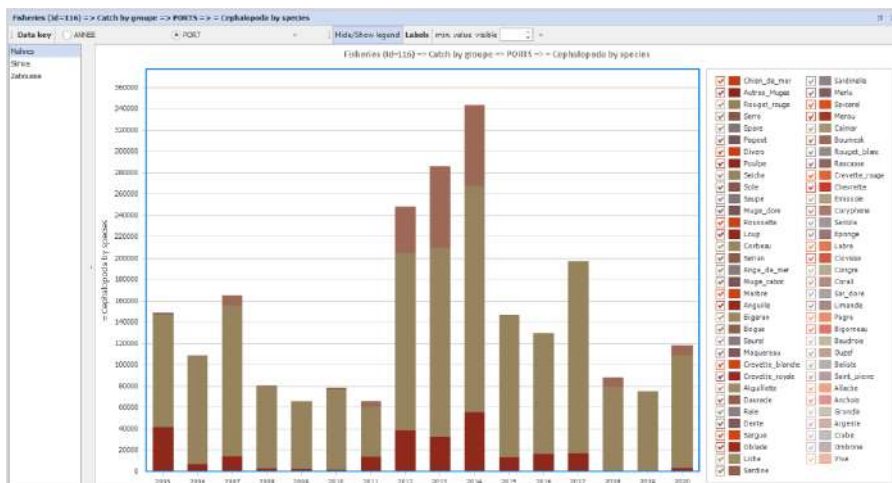
= poisson blanc by species

= poisson pelagique by species

### **2.1-Cephalopoda**

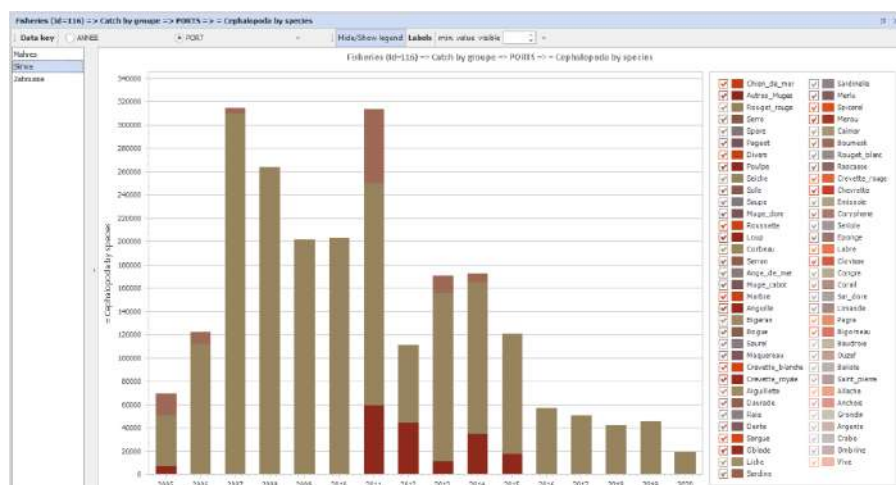
a- Mahres

This group is made of three main species: Seiche, Boumesk and Poulpe. Seiche contributes the most to the total production.



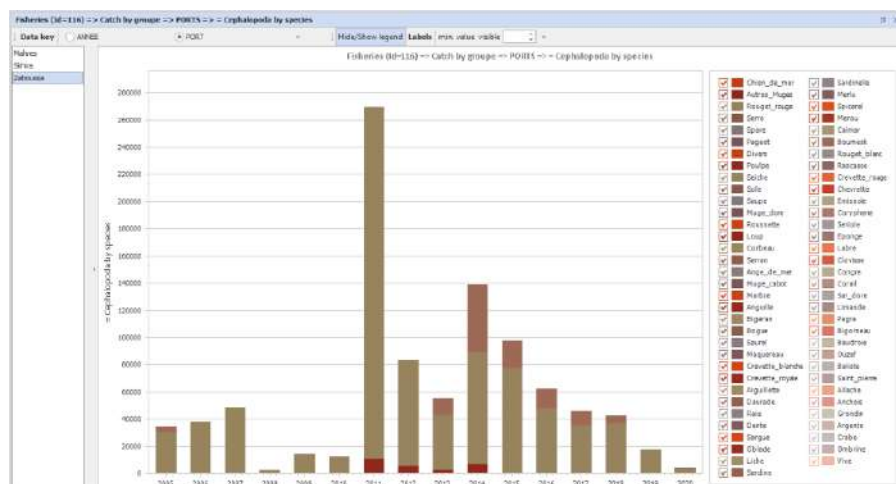
### b- Skhira

This group is made of three main species: Seiche, Boumesk and Poulpe. Seiche contributes the most to the total production.



### c- Zaboussa

This group is made of three main species: Seiche, Boumesk and Poulpe. Seiche contributes the most to the total production.



## 2.2-Coquillage

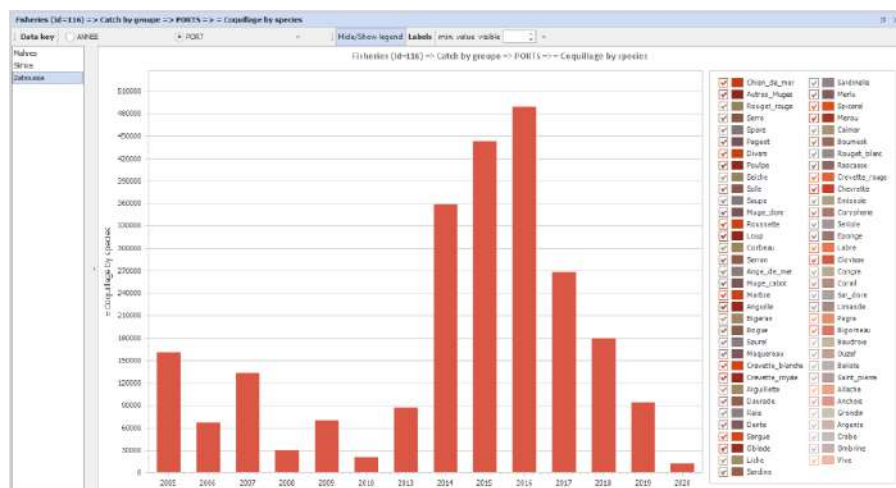
This part is detailed more in the section below (see *II-Coquillage (subcomponent)*).

### a- Mahres



[illegible]

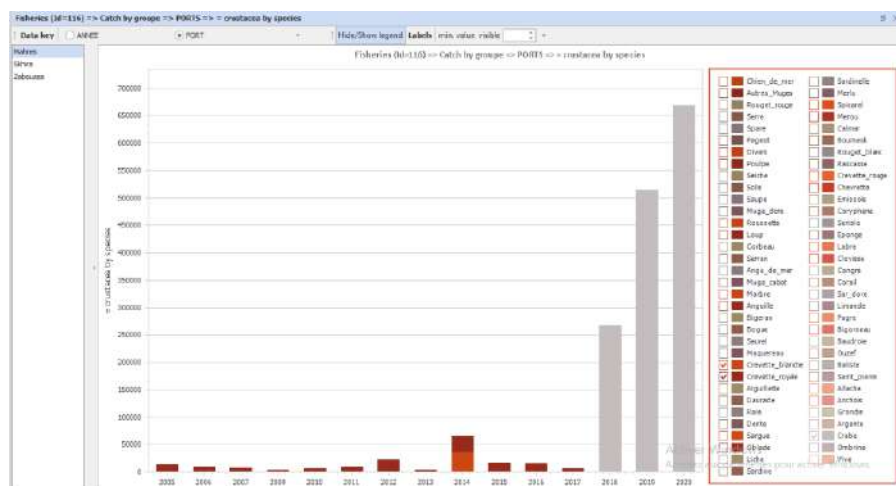
## 7



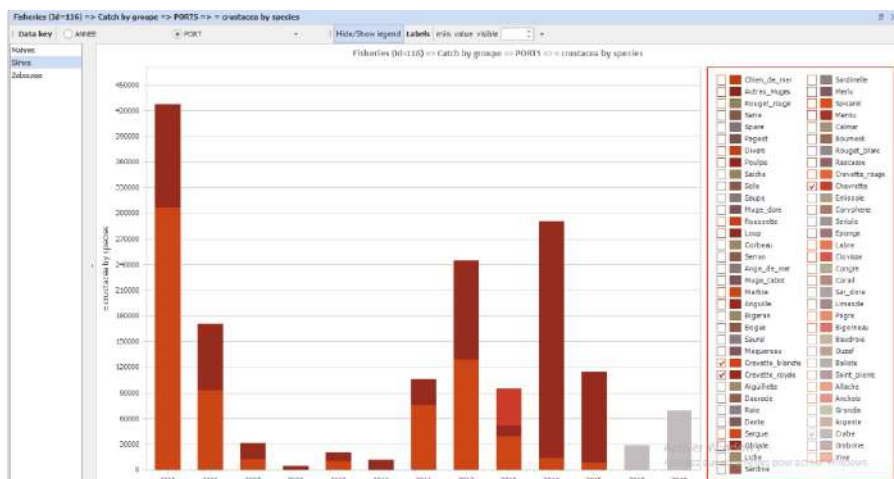
### 2.3-Crustacea

The main species that composed this group were: Crevette\_blanche, Crevette\_royale and crabs. The latter dominated the production since its appearance in when all the species disappeared in Mahres and Skhira. Data on chevrette existed only in Skhira in 2013 and Zaboussa in 2013. The production in Skhira registered no records in 2016 and 2017 and in Zaboussa in 2010.

#### a- Mahres



#### b- Skhira



#### c- Zaboussa

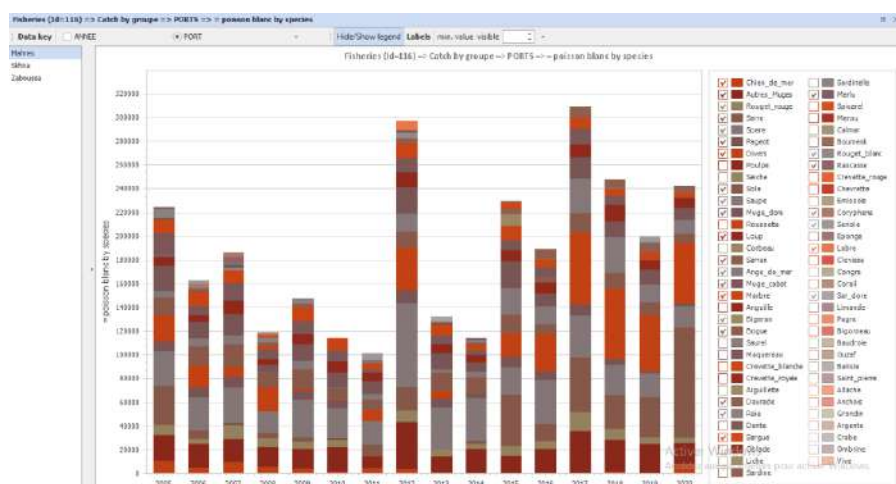


### 2.4-Poisson blanc

#### a- Mahres

The present species that compose this group are: Chien\_de\_mer, Autres\_muges, Rouget\_rouge, Serre, Spare, Pageot, Divers, Sole, Saupe, Muges\_dore, Loup, Serran, Ange\_de\_mer, Muge\_cabot, Marbre, Bigeran, Bogue, Daurade, Raie, Sargue, Merlu, Rouget\_blanc, Merlu, Rouget\_blanc, Rascasse, Coryphene, Seriole, Labre and Sar\_dore.

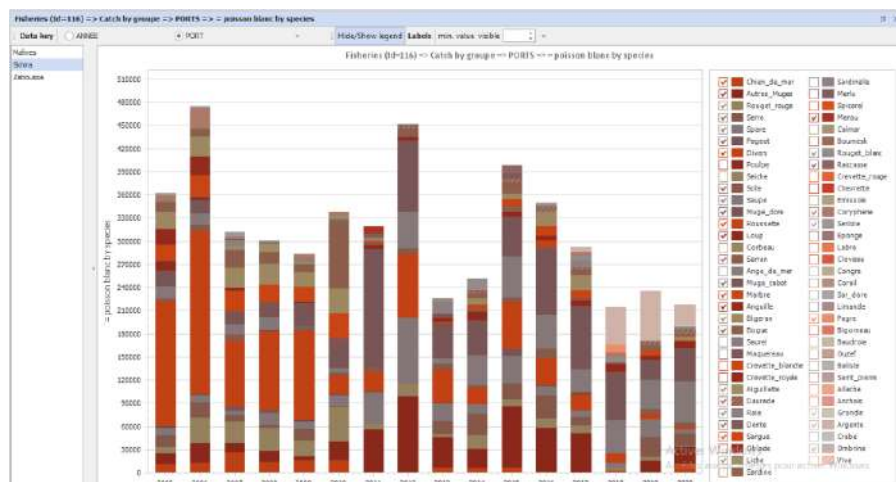
The species which contribute the most to the total production are: Spare, Divers and Autres\_muges.



#### b- Skhira

The present species that compose this group are: Chien\_de\_mer, Autres\_muges, Rouget\_rouge, Serre, Spare, Pageot, Divers, Sole, Saupé, Muges\_dore, Roussette, Loup, Serran, Muge\_cabot, Marbre, Anguille, Bigeran, Bogue, Aiguillette, Daurade, Raie, Dente, Sargue, Liche, Merlu, Rouget\_blanc, Merlu, Rouget\_blanc, Rascasse, Coryphene, Seriole, Labre and Sar\_dore.

The species that contribute the most to the total production are: Divers, Muge\_dore, Autres\_muges and , Chien\_de\_mer.



#### c- Zaboussa

The species that compose this group are: Chien\_de\_mer, Autres\_muges, Rouget\_rouge, Serre, Spare, Pageot, Divers, Sole, Saupé, Muges\_dore, Roussette, Loup, Muge\_cabot, Marbre, Bigeran, Bogue, Aiguillette, Daurade, Raie, Dente, Sargue, Oblade, Liche, Merlu, Spicarel, Merou, Rouget\_blanc, Coryphene, Seriole, Labre, Pagre, Grondin, Argente, and Ombrine.

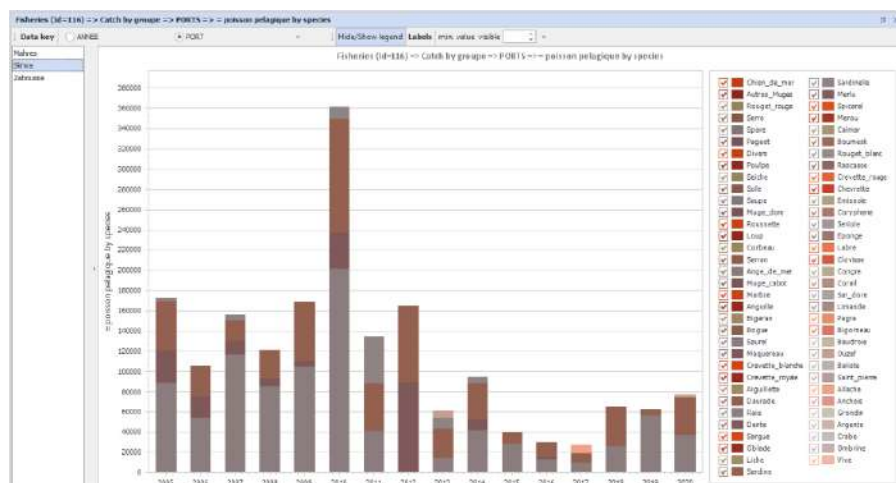


a- Mahres

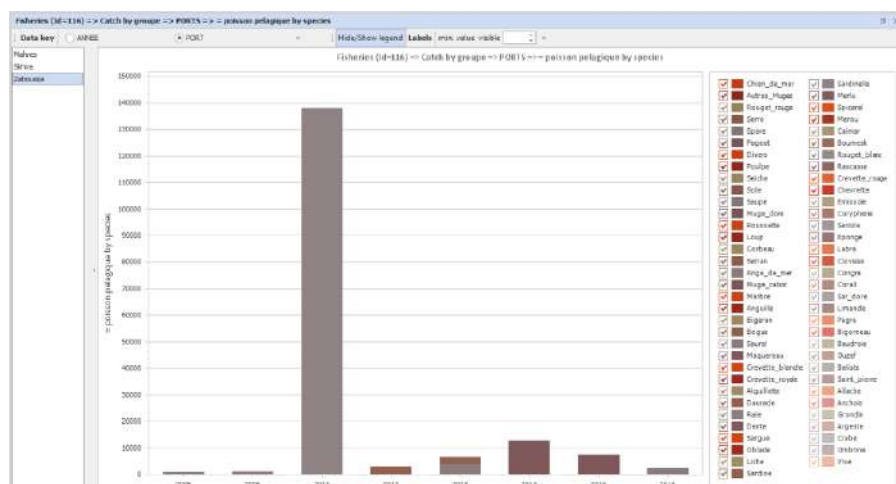
The species that compose this group are: Sardine, Saurel, Maquereau, Sardinelle, Anchois, Ouzef, Allache.

The species that contribute the most to the total production are: Sardine, sardinelle and Maquereau.





c- **Zaboussa**



## II-Coquillage (subcomponent)

shore fishing (Clam and Annelids harvesting)

[Shore fishing (Clam and Annelids harvesting) (Id=118)]

Indicators attached to component: Shore fishing (Clam and Annelids harvesting) (Id=118)

| Name    | Description | DataSource | UpdateFrequency | Notes |
|---------|-------------|------------|-----------------|-------|
| Catches |             | DGPA       | Annual          |       |

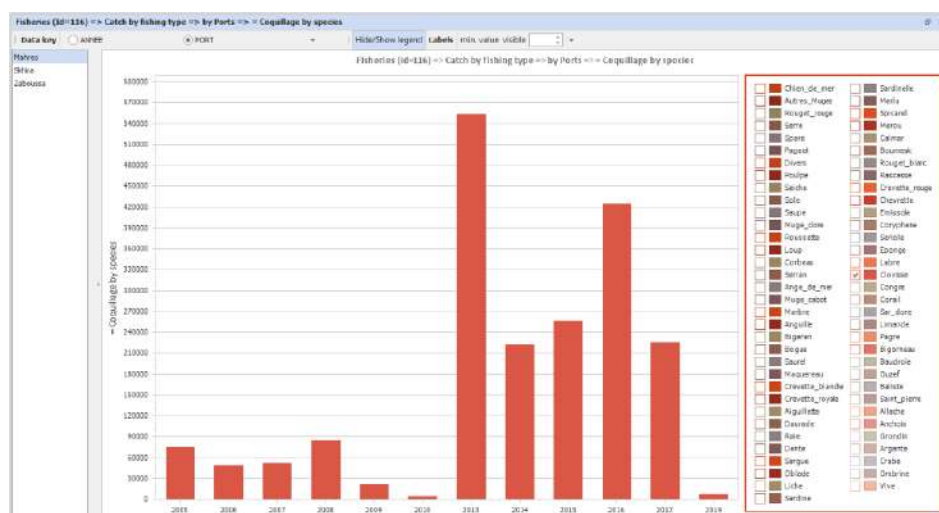
The only species caught in Mahres, Skhira and Zaboussa are clams (French: *Clovisse*), particularly *Ruditapes decussatus*).



Fig 1: External face (b) and internal face (a) of the shell of *Ruditapes decussatus*

#### a- Mahres

From 2005 until 2010, the clam productivity in Mahres was very low. **No statistics were registered in the years 2011 and 2012.** The maximum value was registered in 2013 (553627 kg). The production dropped significantly in 2019. No data were registered in 2018 and 2020.



#### b- Skhira







->INSTM is a service provider for the phytotoxic monitoring network (DGSVT) in the shellfish collection areas in the Gulf of Gabes. Monitoring data cannot always explain the null values recorded above because the closures of shellfish collection areas could be due to other factors such as the fecal bacteriological quality (REMI: microbiological control network) and viral quality (-REVI: virological monitoring network for shellfish). Hence, it is needed to integrate the data from these networks into the ISP.

### III-Coastal fishing (subcomponent)

Coastal fishing

(Id=117)]

#### Indicators attached to component: Coastal fishing

(Id=117)

| Name             | Description   | DataSource   | UpdateFrequency | Notes |
|------------------|---|--|-----------------|-------|
| Number of boats  | N° of small boat wit and without engine.  | CRDA   | Yearly          |       |
| Catches          | <del>Amount</del> Amount and/or group of species caught according to the different type of fishing gears. | CRDA<br>DGPA   | Annual          |       |
| Subsidies        | Amount of money for <del>maintainance</del> maintenance of boats, engine, fuel and nets.                  | CRDA<br>Local Administration Fisheries (related to CRDA) | Annual          |       |
| Workforce        |   | DGPA   |                 |       |
| Catch per harbor |   | DGPA   | Monthly         |       |
| CPUE             | Catch per unit effort is the catch divided by the number of active boats in each harbor.                  | DGPA   | Yearly          |       |

#### 1.Catches: Catch coastal production by species

The type of fisheries is defined as 'coastal' since it is practiced in the areas accessible to small-scale fisheries. (Préciser les limites géospatiales selon la réglementation tunisienne: Hanem)

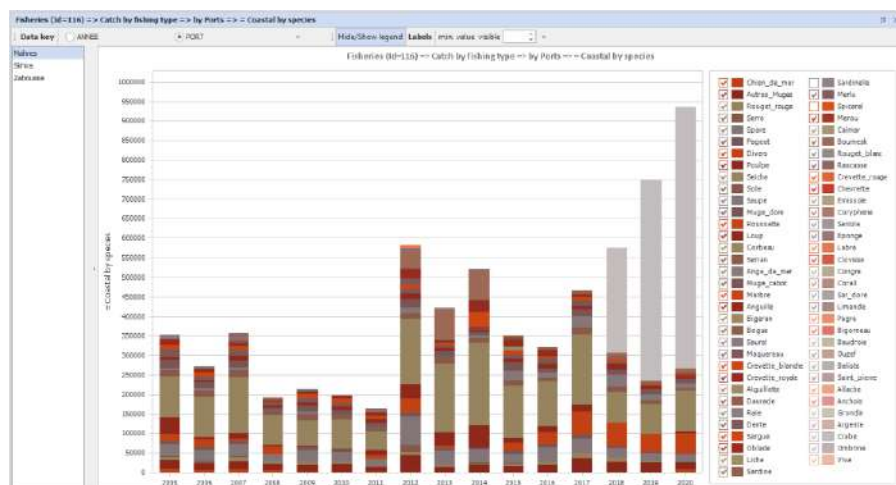
##### a- Mahres

Most of the 66 species of the total catch were captured by this fishing type.

After 2017, mMost of the production was ensured by is related with the Blue crab species- (Crabe) since its appearance.

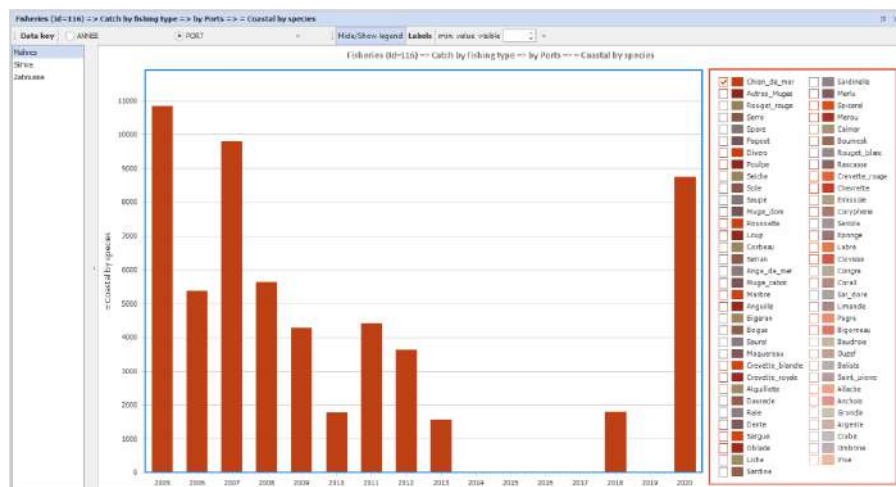
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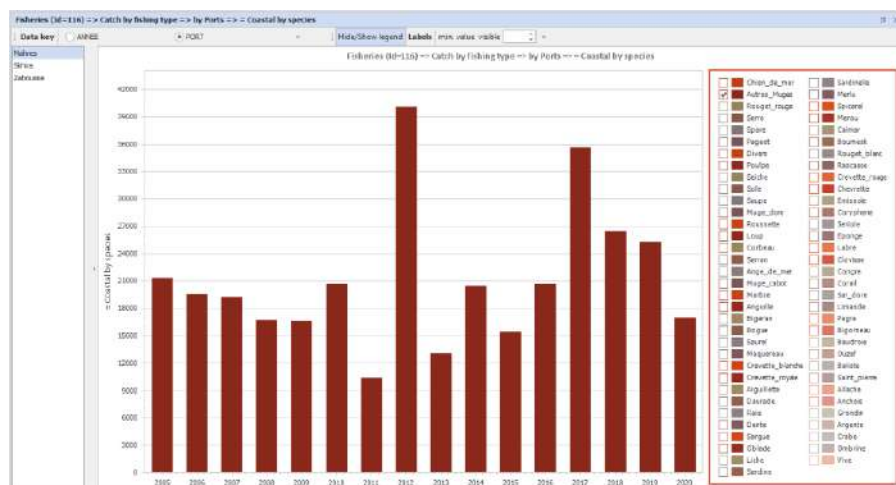
## /Chien\_de\_mer

The production diminished gradually from 2005 until 2013 and it registered no values from 2014 until 2017 and also in 2019.



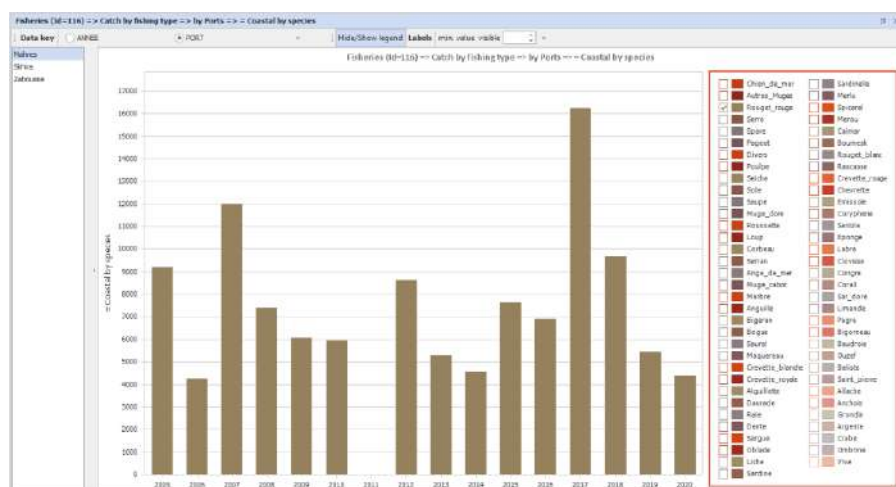
## /Autres\_muges

The production was relatively constant with two visible peaks in 2012 and 2017.



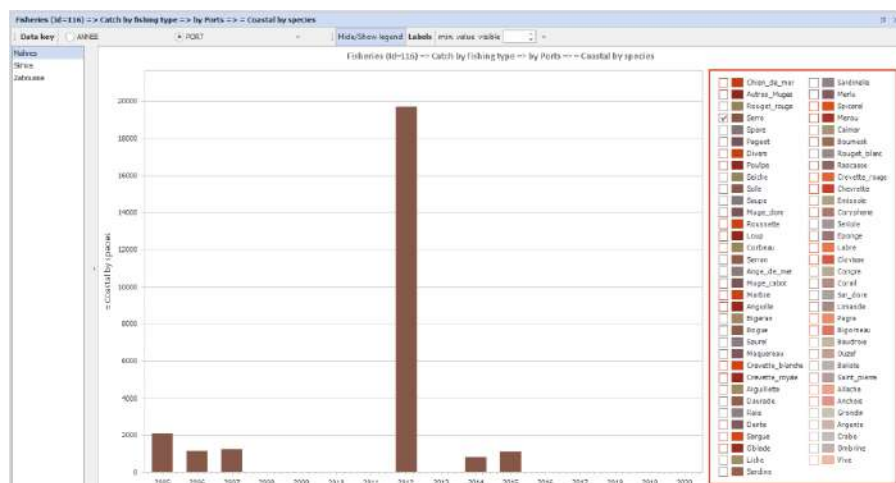
#### /Rouget\_rouge

The production didn't register any value in 2011.



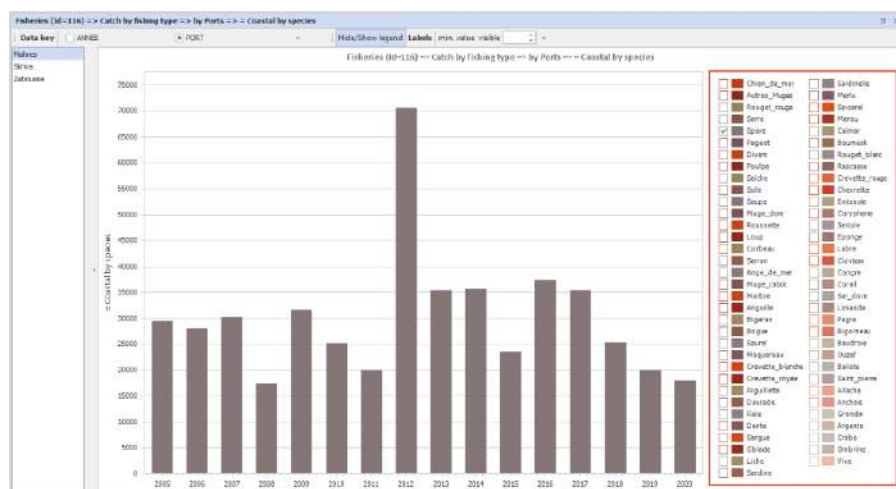
#### /Serre

The production was low and with no records in most of the years.



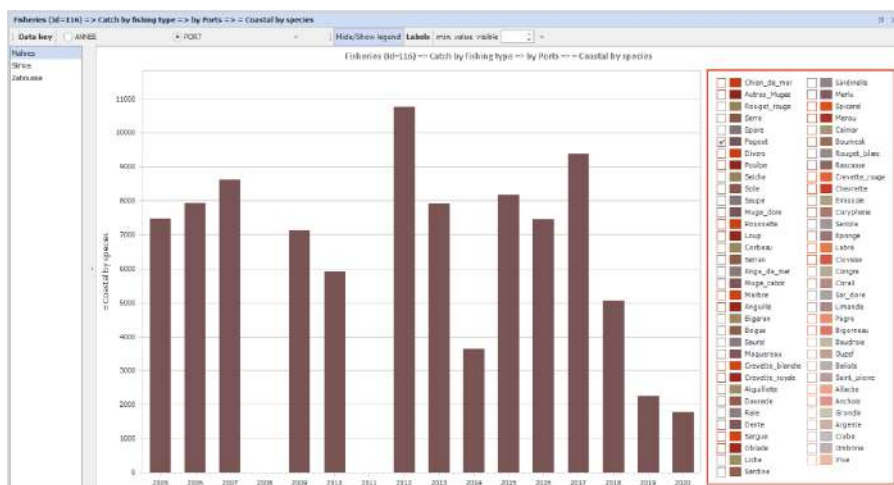
/Spare

The production was relatively constant with a peak in 2012.



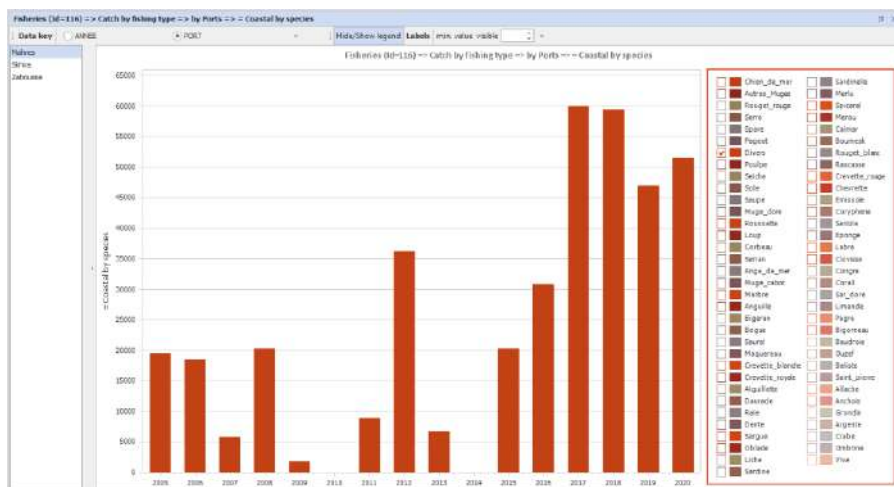
/Pageot

The minimal values were registered in 2019 and 2020 with no values in 2008 and 2011.



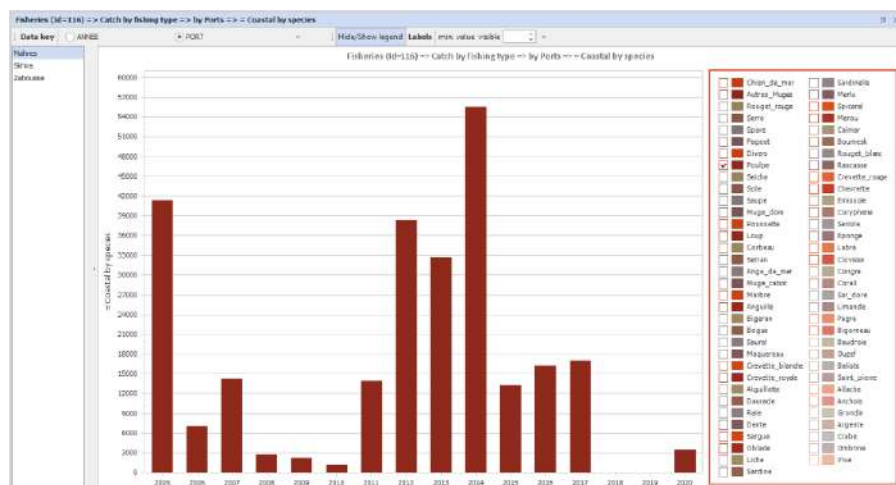
## /Divers

The identification of many species that participated considerably in the production of the catch was being more and more difficult.



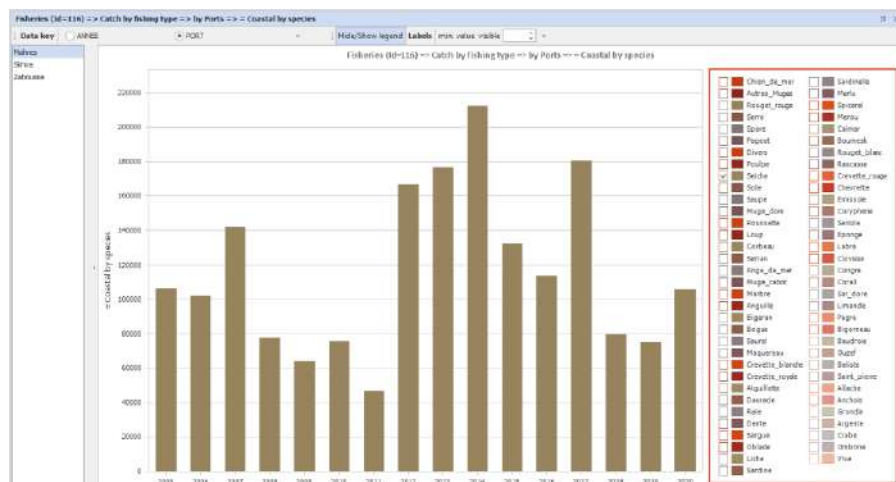
## /Poulpe

The production got better and reached the peak in 2014 than diminished suddenly and was didn't register any data in 2018 and 2019.



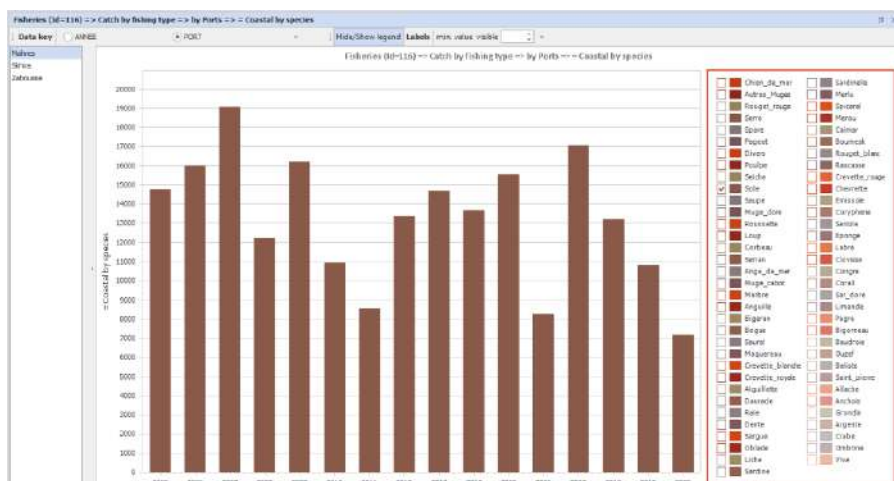
## /Seiche

The production dropped from 2005 to 2011 and recovered considerably in 2012 with a peak in 2014 then diminished gradually.



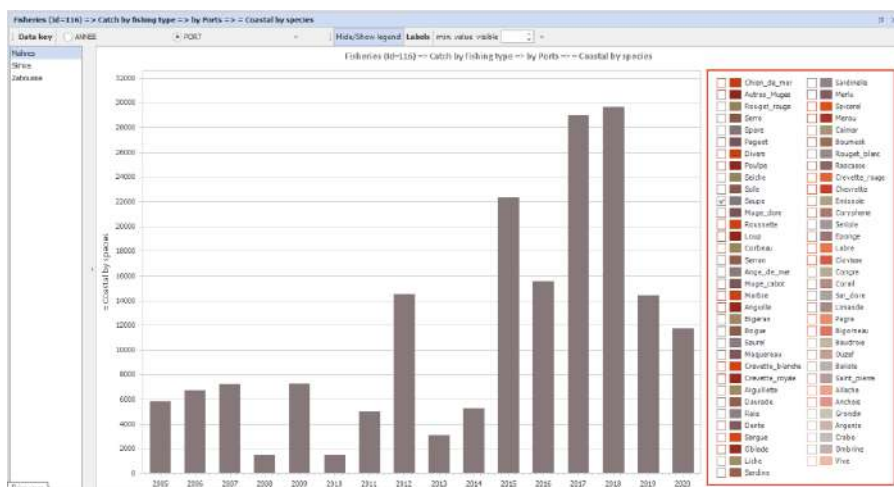
## /Sole

The production was relatively constant. The minimal values were registered in 2011, 2014 and 2020.



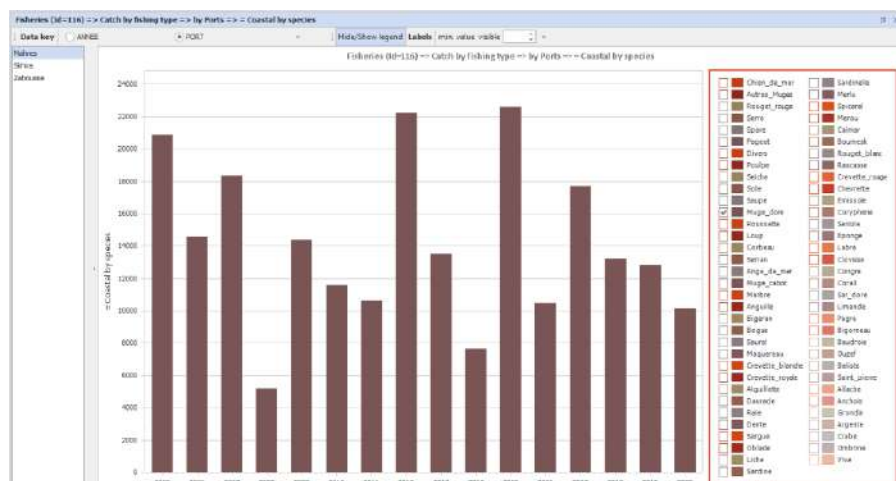
## /Saupe

The production stayed low from 2005 until 2014, then, recovered from 2015 and dropped in 2019 and 2020.



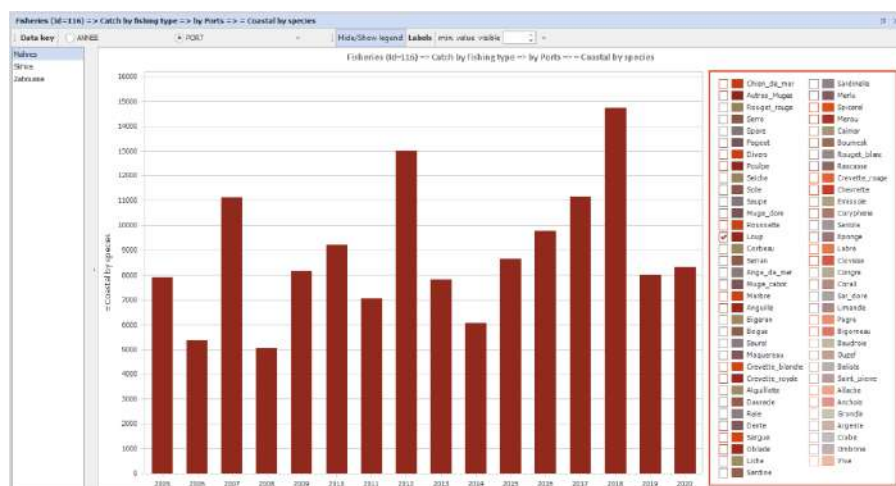
## /Muge\_dore

The minimal values were in 2004 and 2014.



/Loup

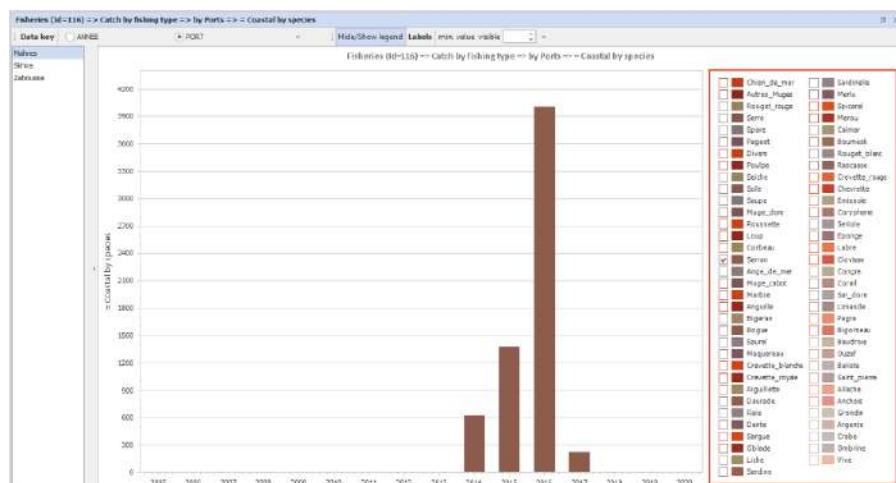
The production was relatively regular and constant.



/Serran

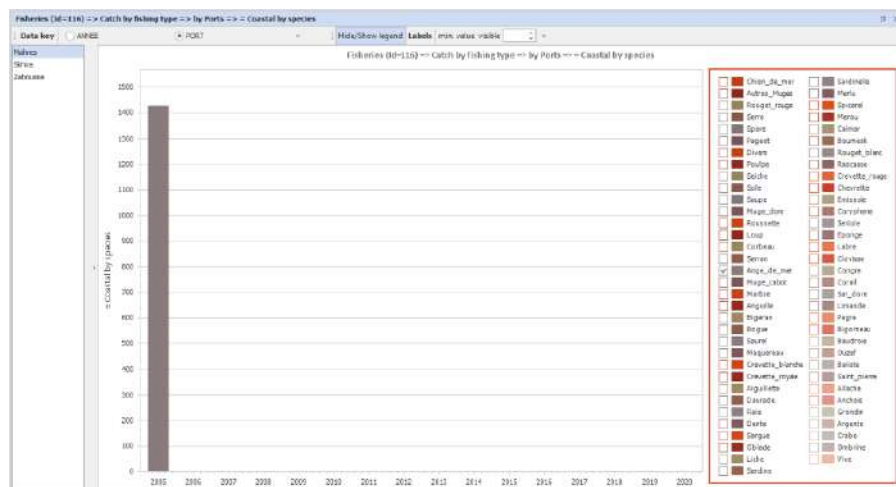
This species barely registered few records.





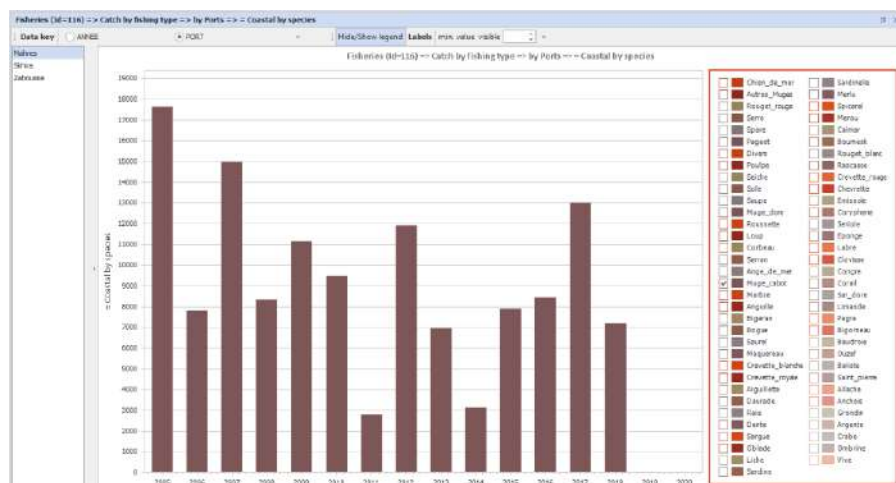
/Ange\_de\_mer

It only spotted in 2005.



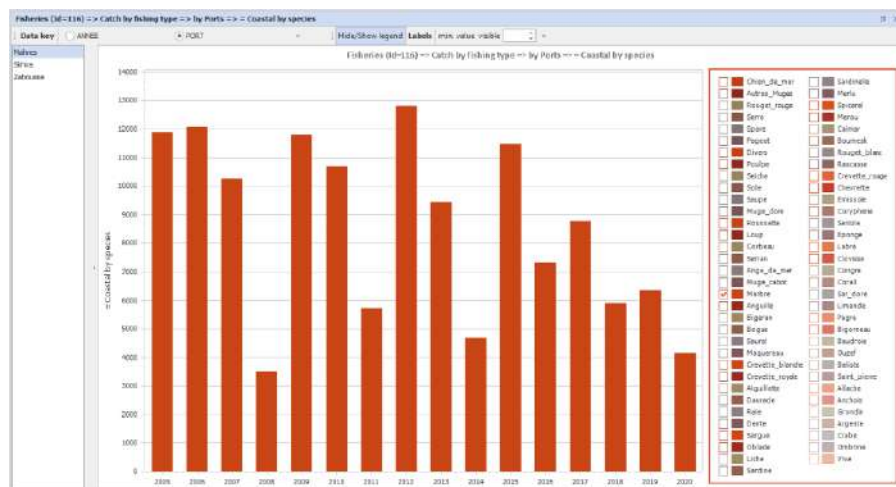
/Muge\_cabot

There are no data for 2019 and 2020.



/Marbre

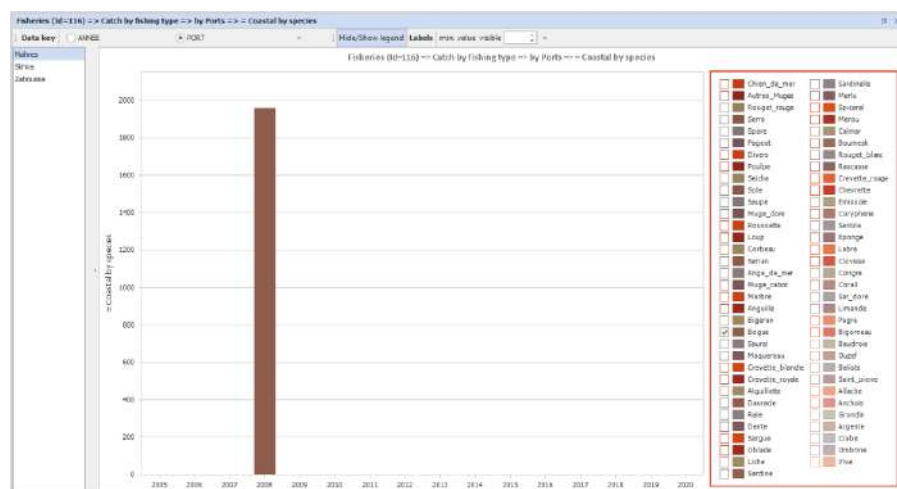
It diminished from 2015.



/Anguille

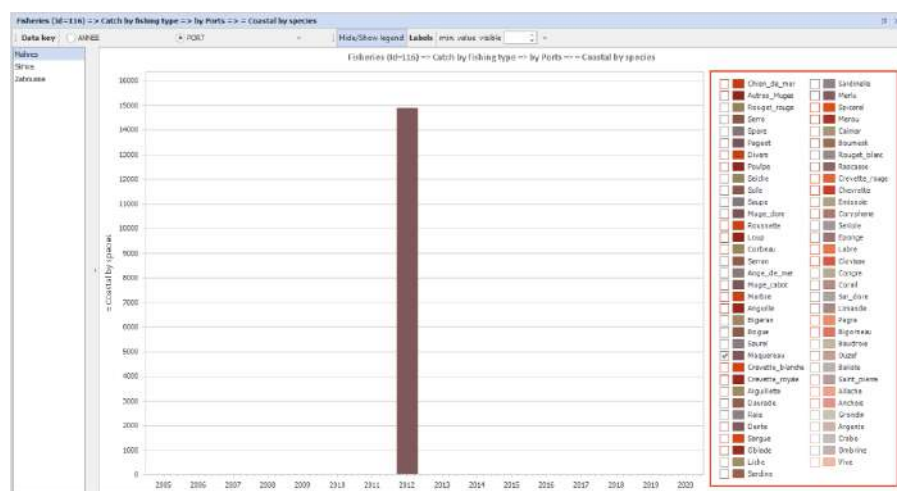
It registered few records.

It's spotted only in 2008.

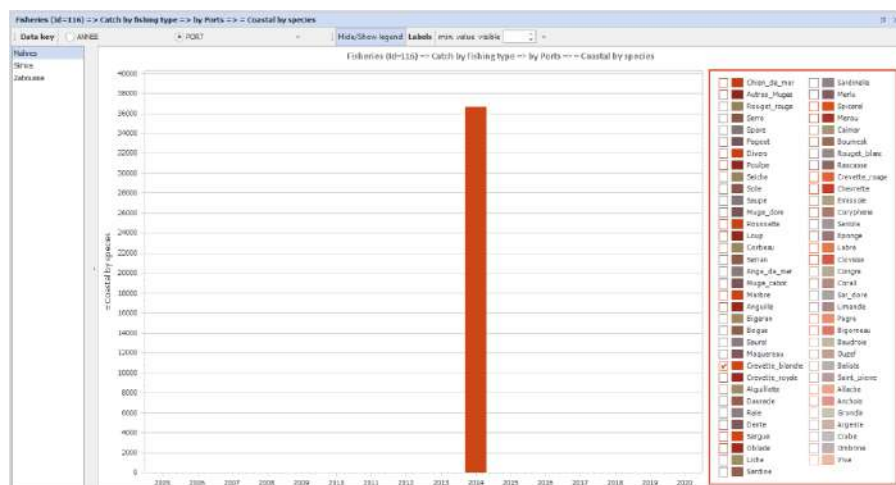


It was reported only in this type in 2007.

It was reported only in this type in 2012.

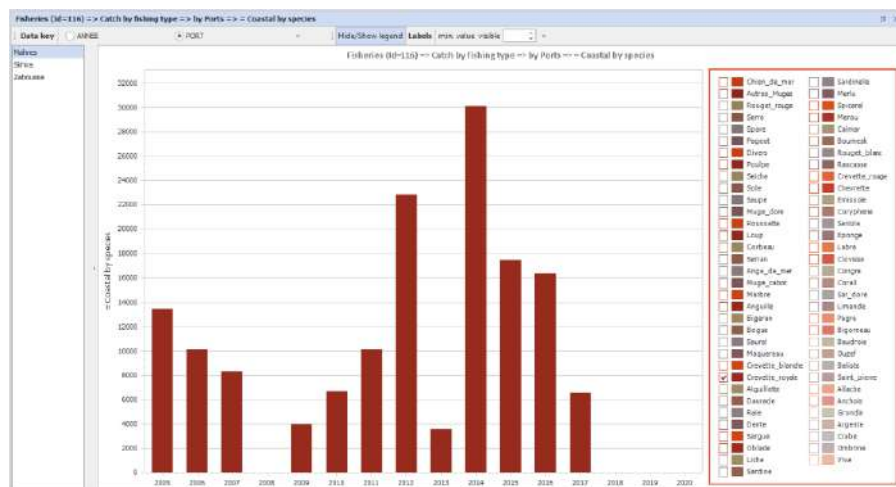


One record was reported only in this type in 2014.



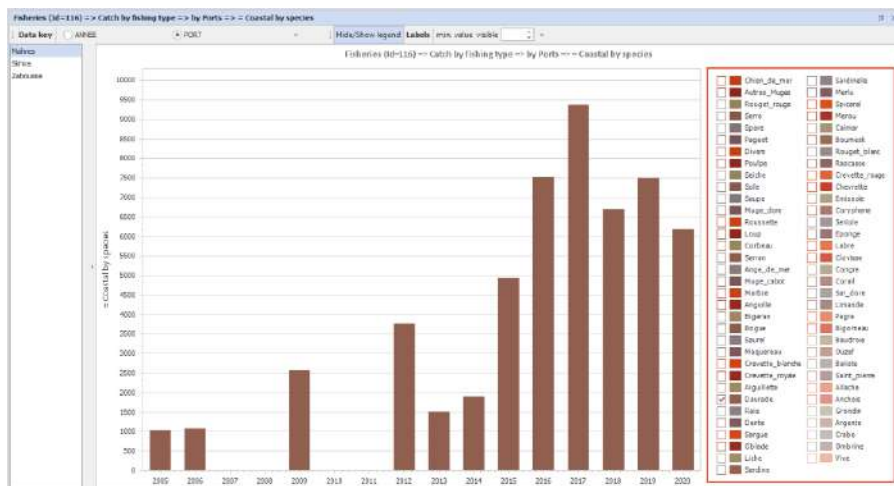
#### /Crevette\_royale

The production was low from 2005 until 2011 with no value 2008. It dropped from 2014 until 2017 and it recorded no values in 2018, 2019 and 2020.



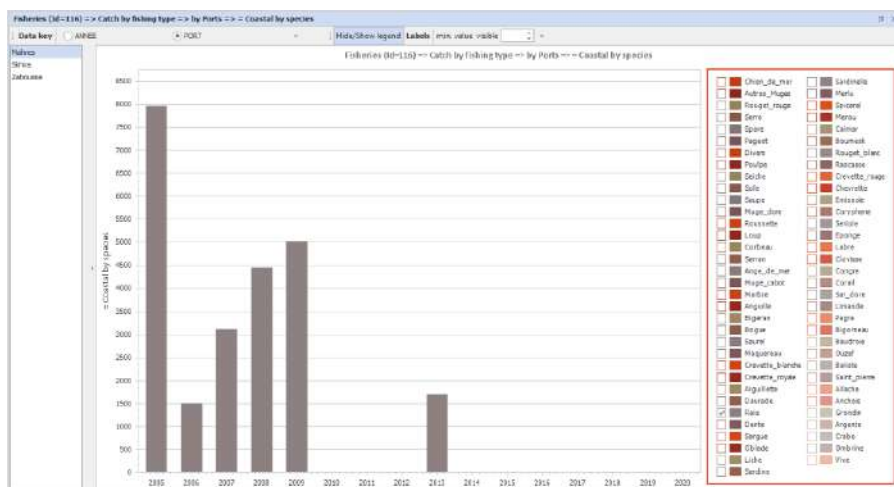
#### /Daurade

The production was very low from 2005 until 2014 with low values in 2007, 2008, 2010 and 2011, then, it recovered from 2012.



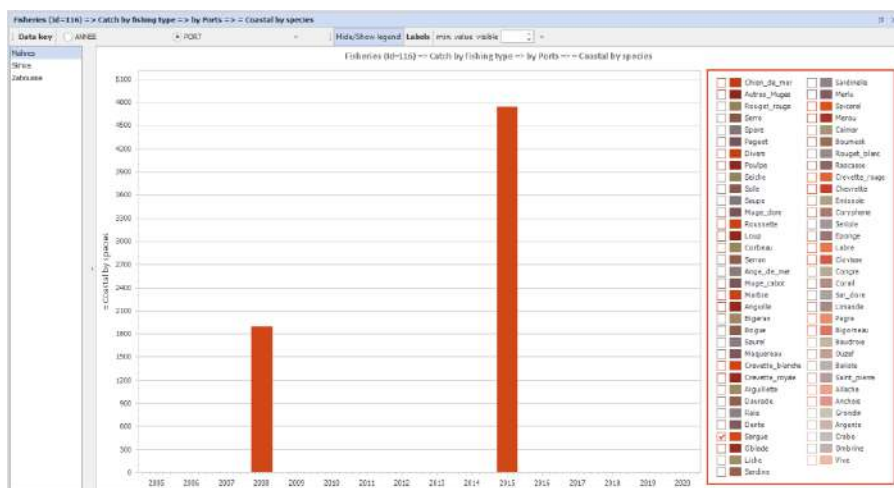
## /Raie

The production didn't register any values in 2010, 2011 and 2012 and from 2014 until 2020.



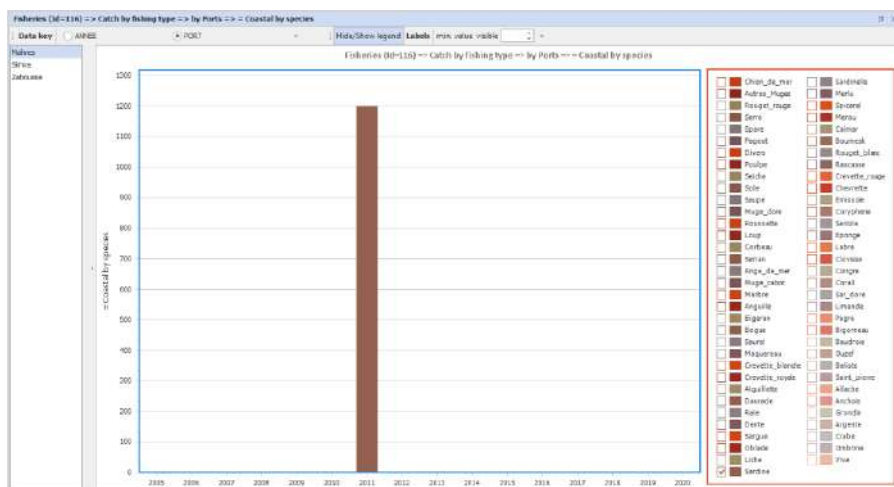
## /Sargue

It was only recorded in 2008 and 2015.



#### /Sardine

It was spotted only in 2011.

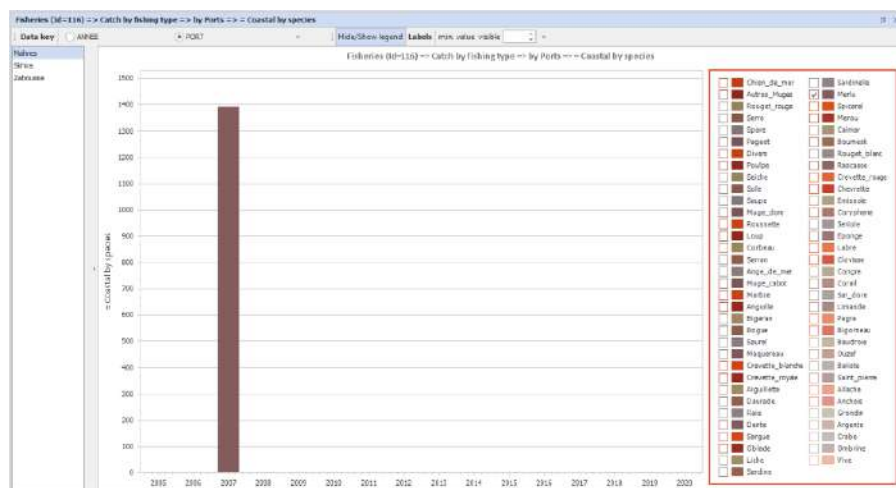


#### /Sardinella

It is the same species as Allache but in the field work sheets of DGPA the two names are found. So, it depends on the agent to choose the species: Allache or Sardinella.

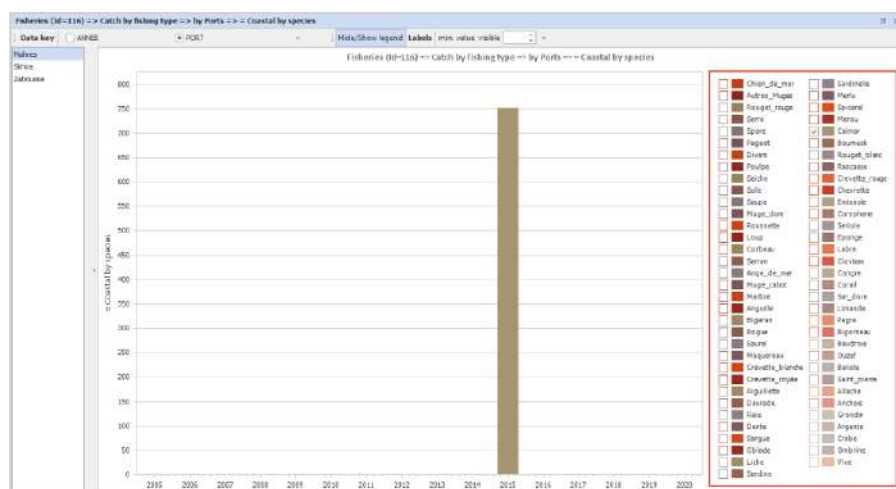
#### /Merlu

It was only registered in 2007. It is a benthic species caught by trawls. **This can be a wrong value.**



## /Calmar

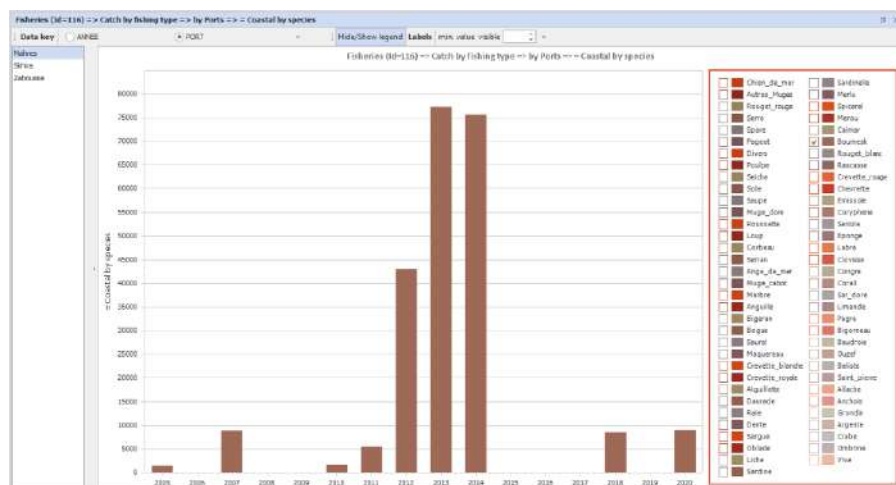
It was only registered in 2015.



## /Boumesk

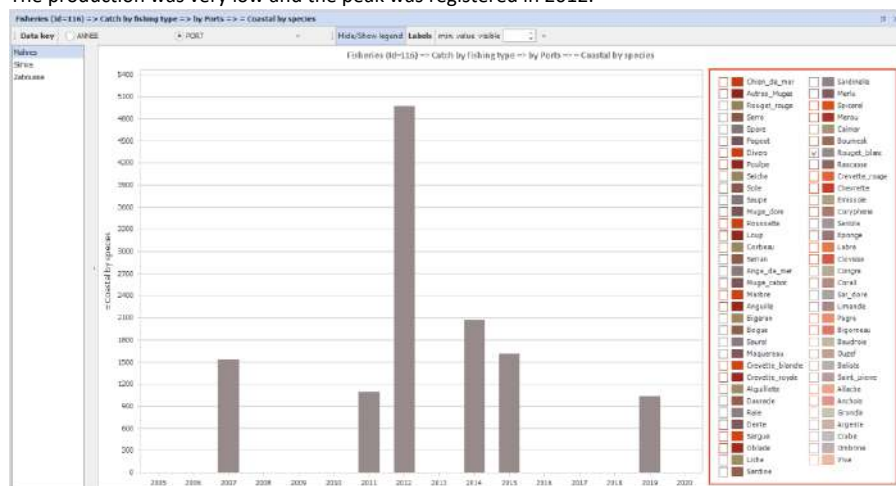
The production registered its best values in 2012, 2013 and 2014. Outside this period, it was very low with lots of no data.





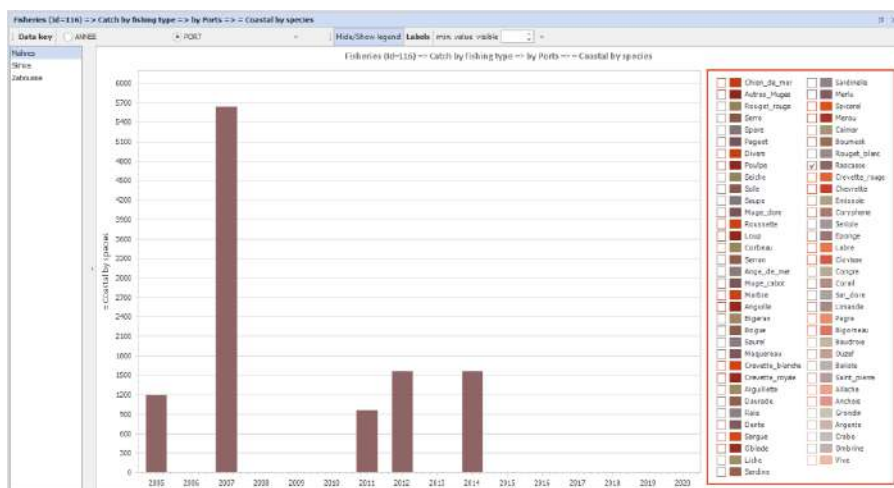
## /Rouget\_blanc

The production was very low and the peak was registered in 2012.



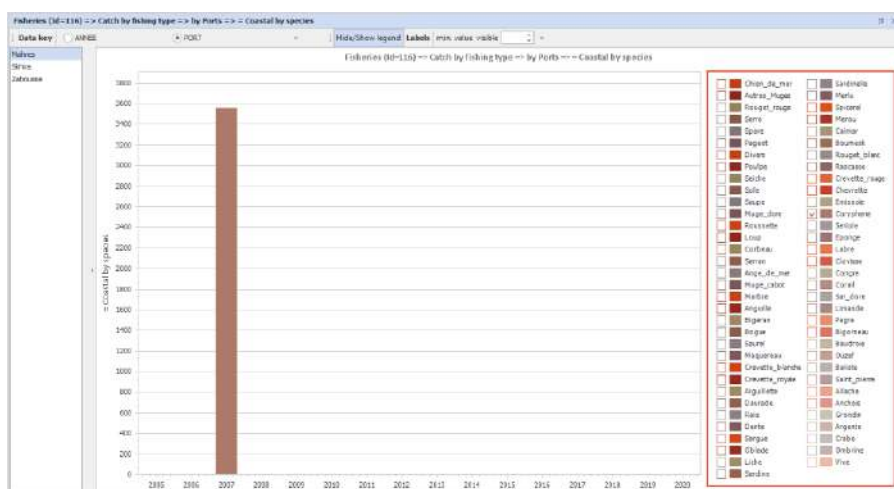
## /Rascasse

Lots of no data were registered.



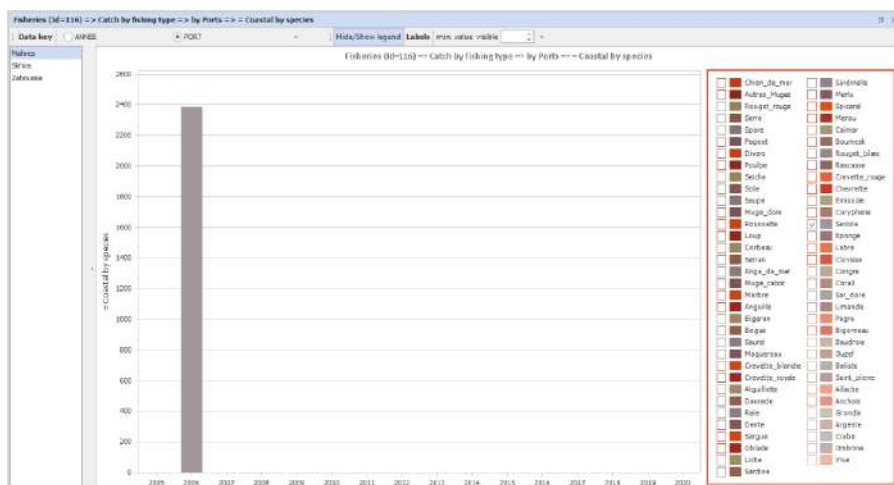
## /Coryphæne

It was only reported in 2007.



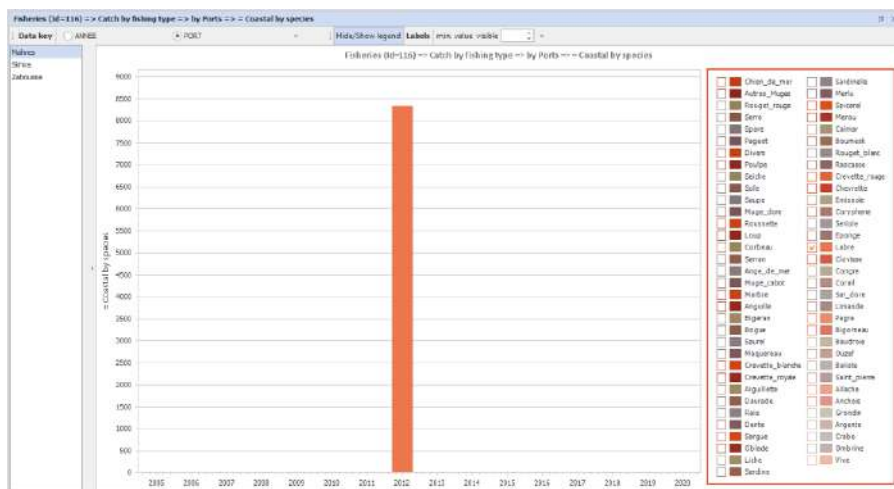
## /Seriole

It was only registered in 2006.



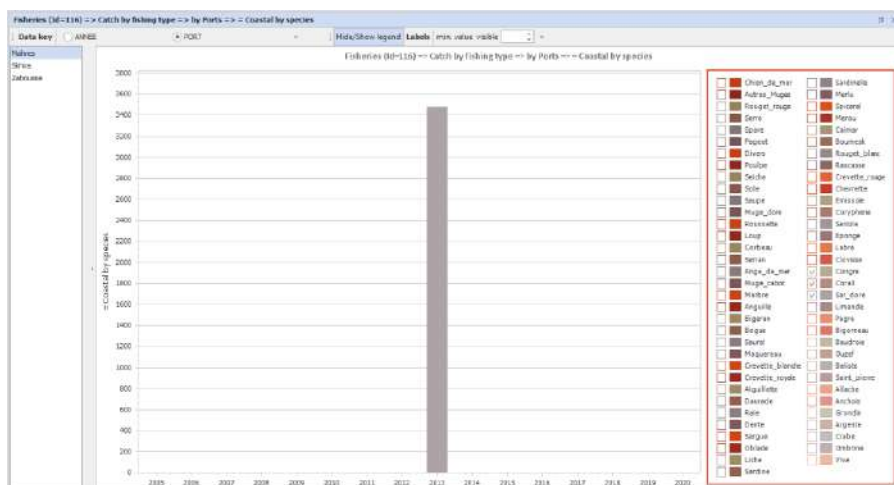
/Labre

It was only spotted in 2012.



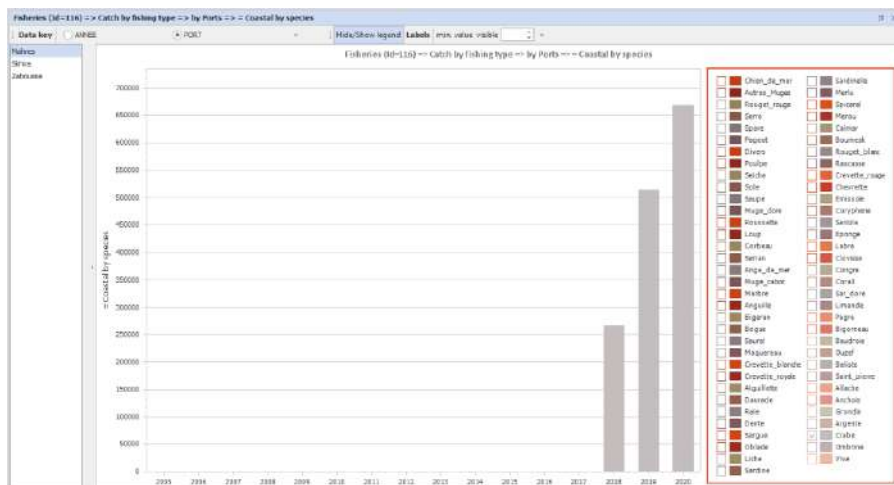
/Sar\_dore

It was only reported in 2013.



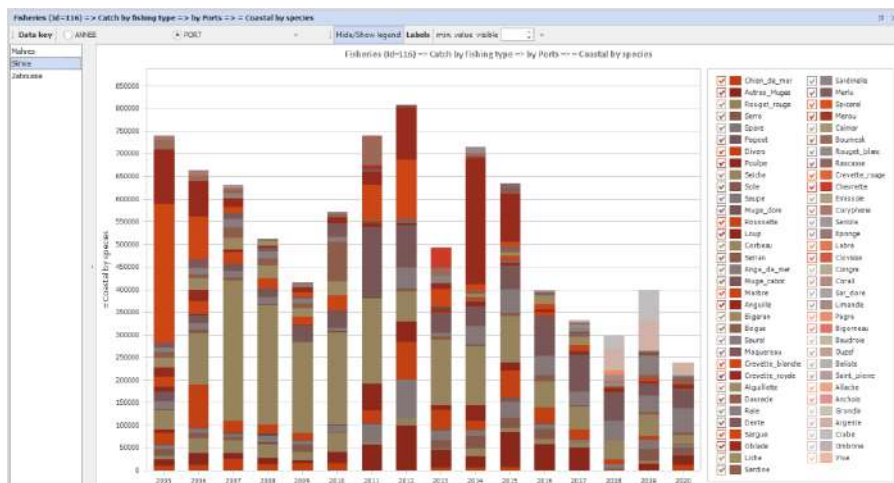
## /Crabe

The fishery of crabe in Mahres has begun in 2018 using traps. The encouragement of fishermen to use this gear was in the beginning to reduce the impact of the species. It appeared from 2018 with an important productivity and was growing ever since. It contributed enormously to the total catch production.



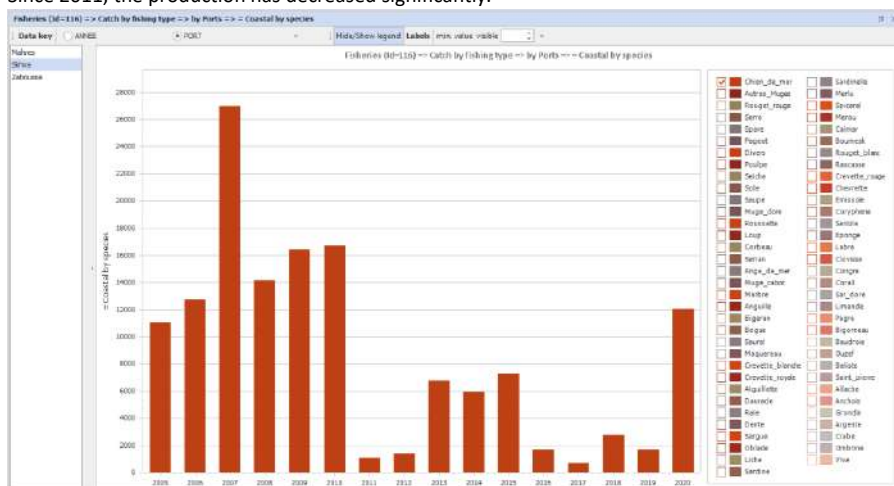
## b- Skhira

The species which contributed the most in the production were: Crevette\_blanche, Seiche, Crevette\_royale, Divers, Autre\_muge and Muge\_dore, Bigeran, Serre and Crabe in 2018 and 2019.



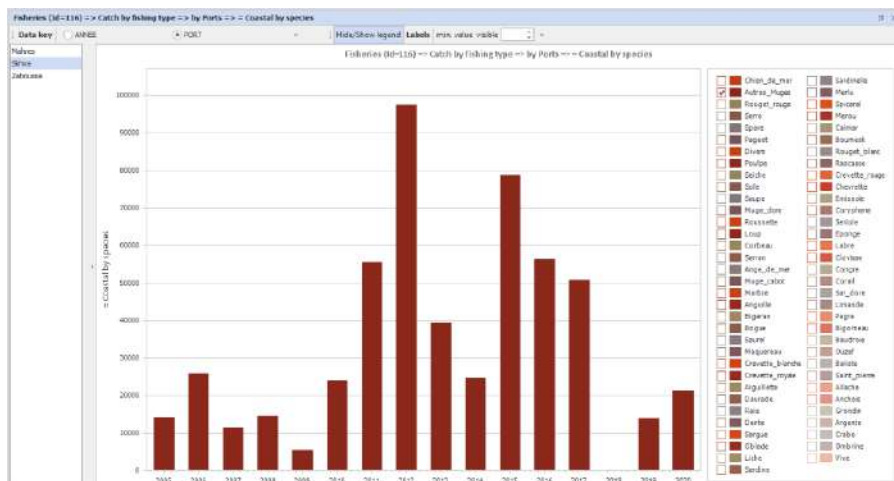
## /Chien\_de\_mer

Since 2011, the production has decreased significantly.



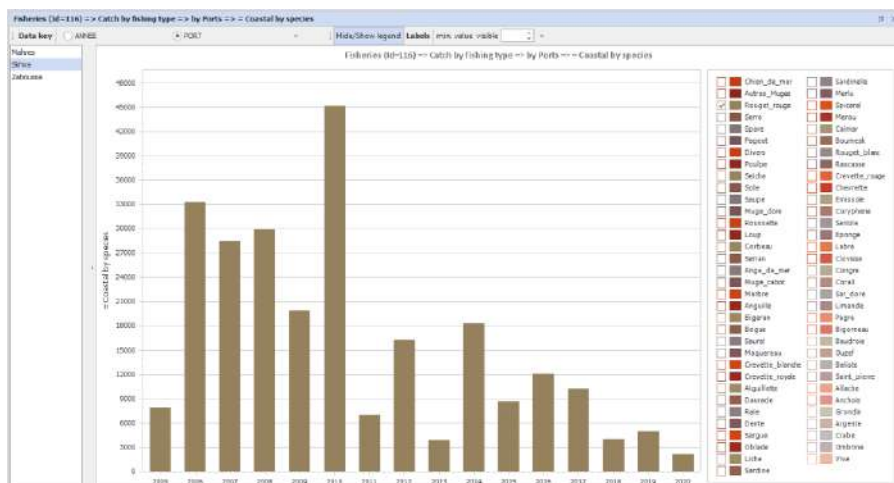
## /Autres\_muges

Between 2005 and 2009, the production was low, then, it started to grow from 2010 with peaks in 2012 and 2015. No data was recorded in 2018. Low values were registered in 2019 and 2020.



#### /Rouget\_rouge

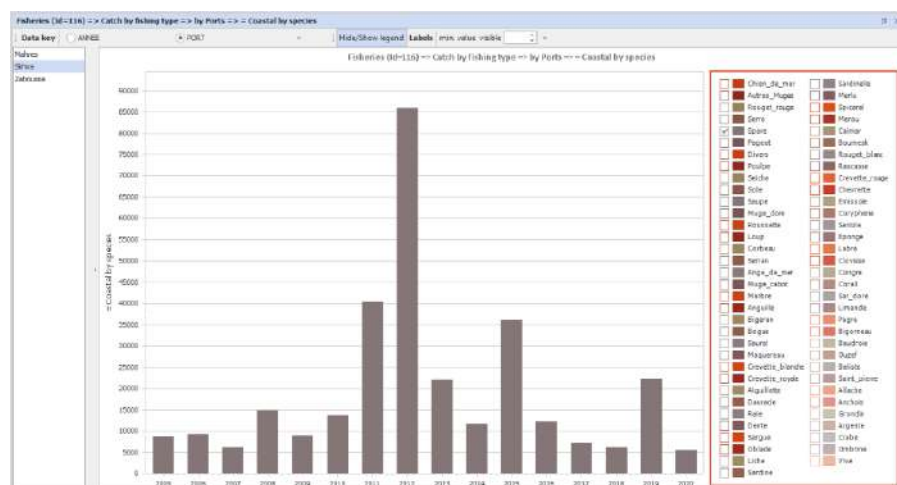
The best production values were registered from 2006 until 2010. Outside this period the values were low.



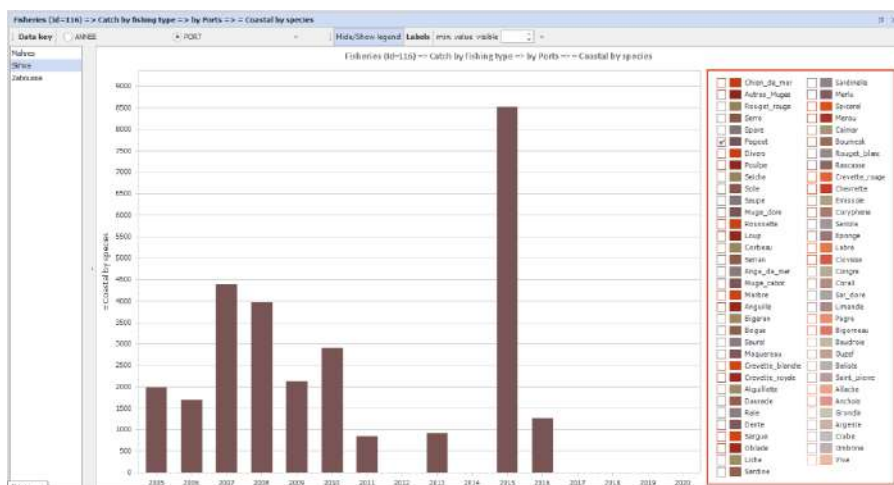
#### /Serre

The catches were null in 2010, 2011, 2012, 2017 and 2018. Outside it is about 14 tons.

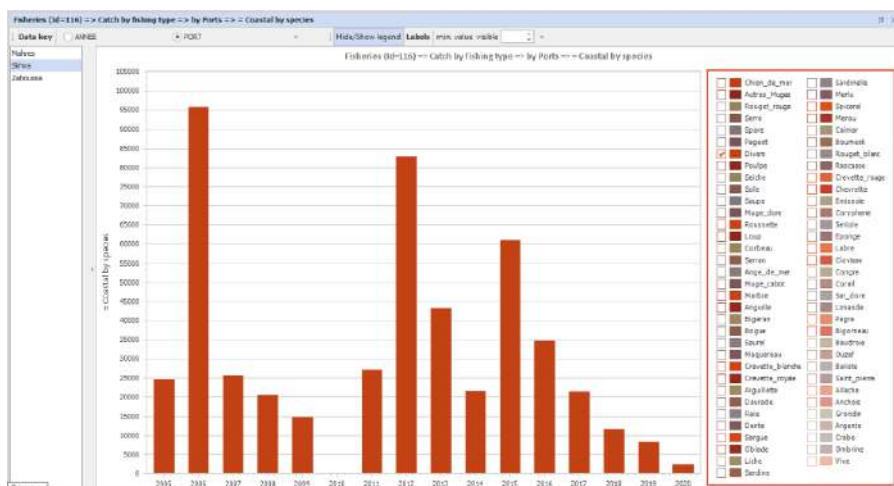
The production exceeded 5000 kg in all the years with a remarkable peak in 2012 (85959,7 kg).



A peak of the production in 2015. No values in 2012, 2014 and from 2017 to 2020 were observed.



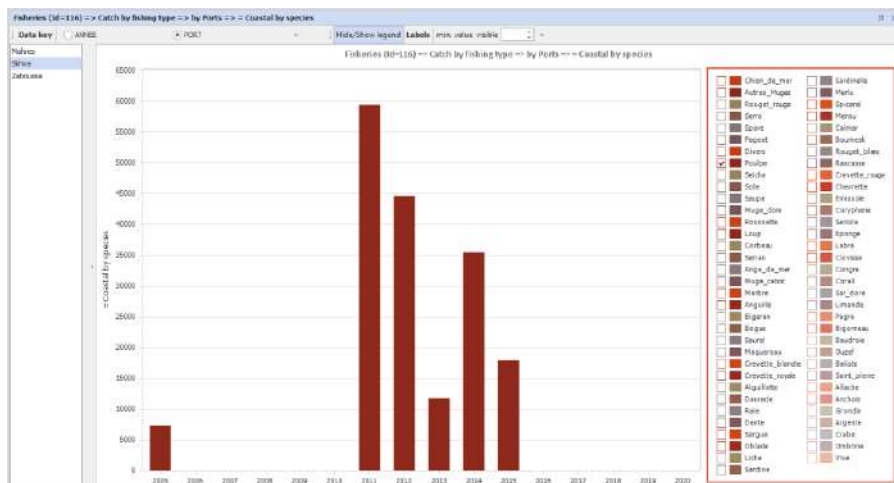
## /Divers



## /Poulpe

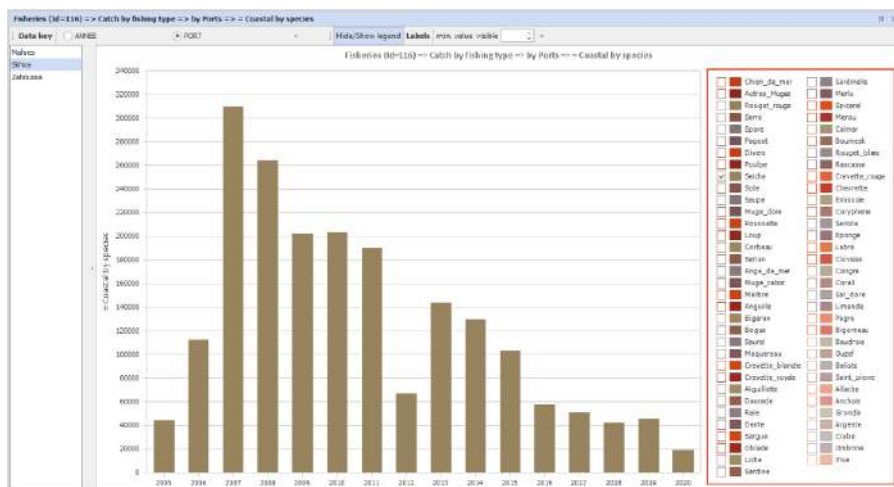
Values of the production were registered in 2005 and from 2011 until 2015 with a maximum in 2012.





## /Seiche

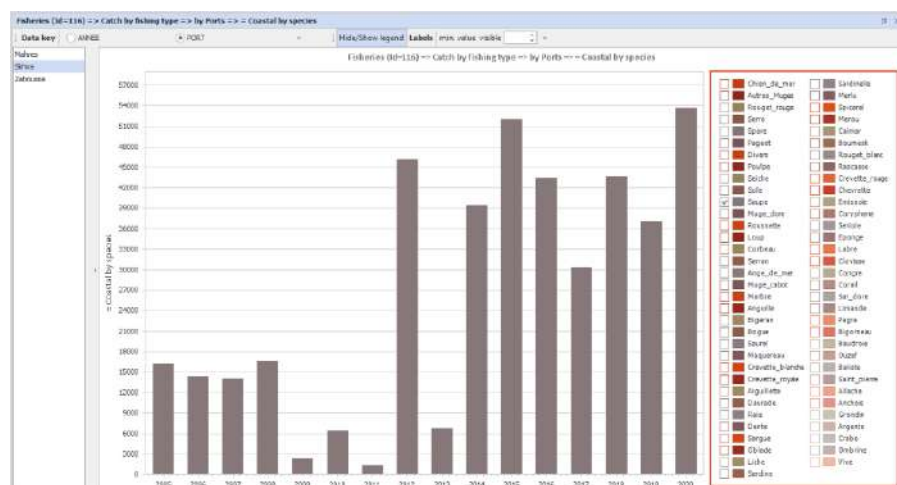
The production dropped gradually from 2007.



## /Sole

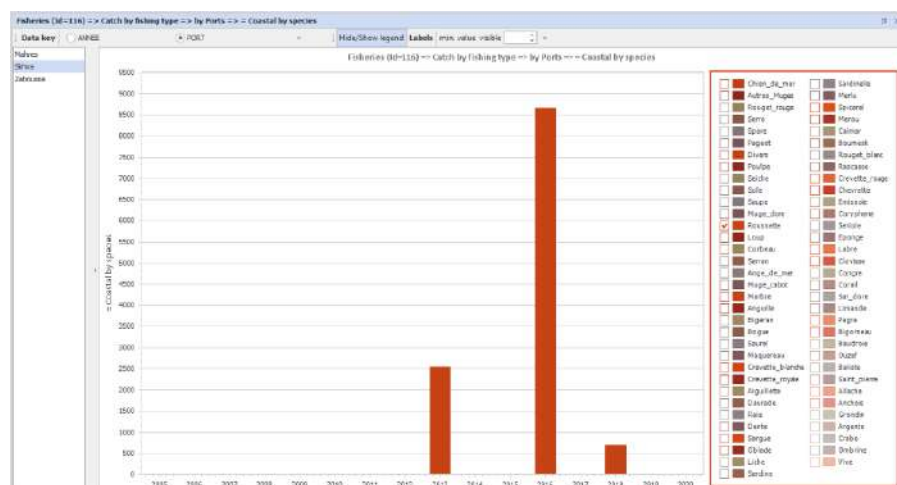
A peak in 2016 and a no value in 2018 was registered.

The production recovered from 2012. The maximal value was recorded in 2020.

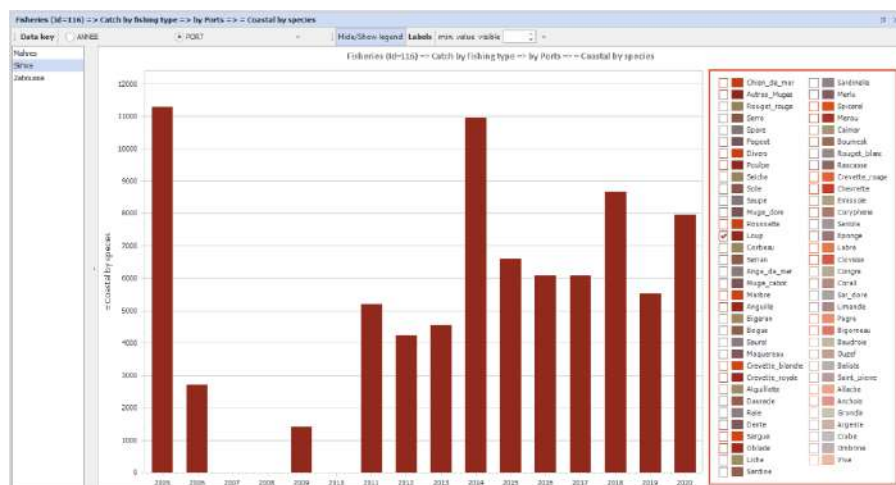


The peak was observed in 2011. The production diminished from 2016.

The only values were registered in 2011, 2016 and 2018.

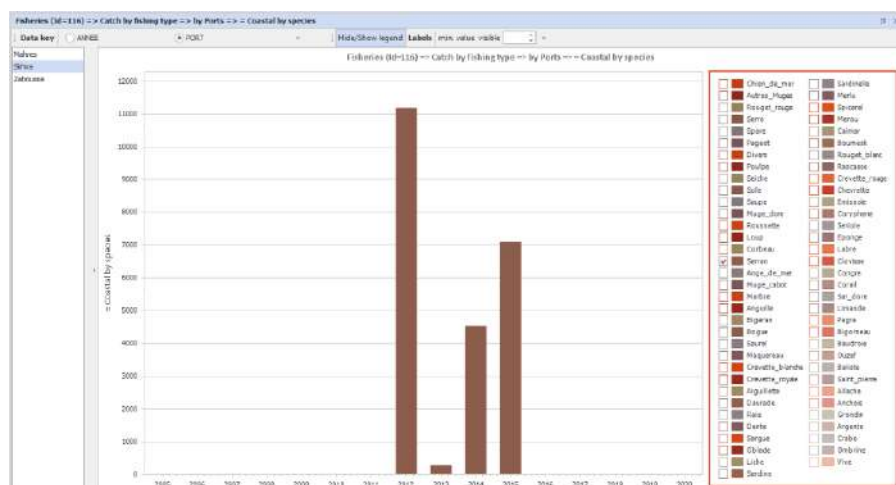


The production didn't register any values in 2007, 2008 and 2010.



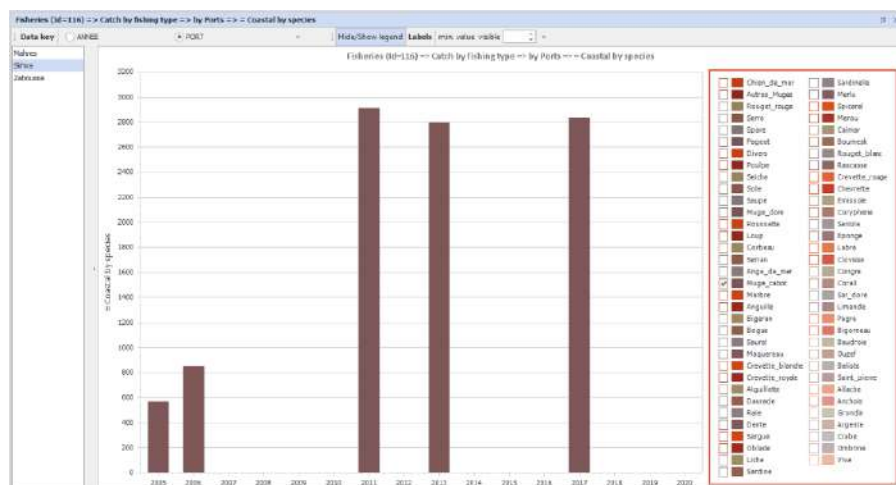
/Serran

The only values were registered from 2012 until 2015.



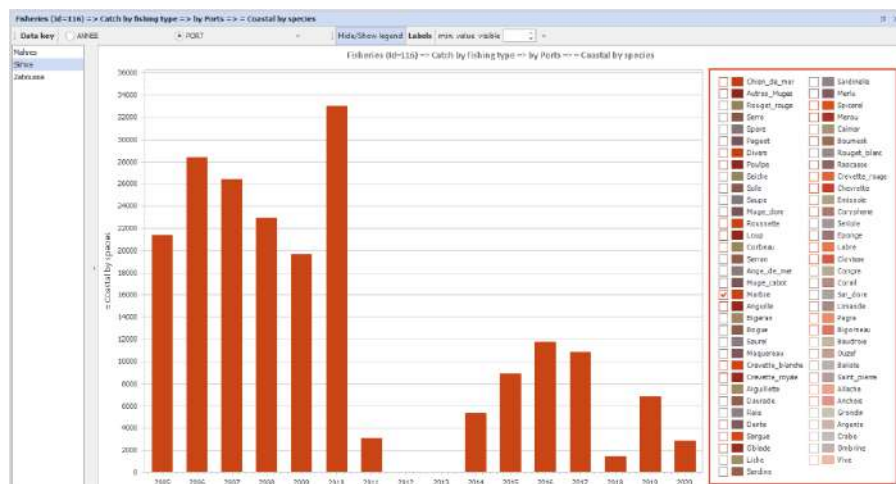
/Muge\_cabot

The production was very irregular and mostly with absent data.



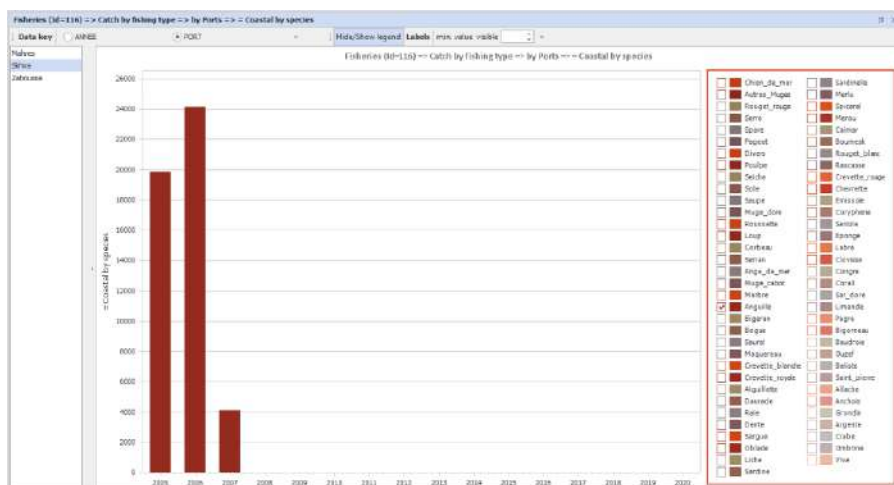
## /Marbre

The peak was observed in 2010 then the production dropped suddenly in 2011 with no values in 2012 and 2013 and then it stayed very low.



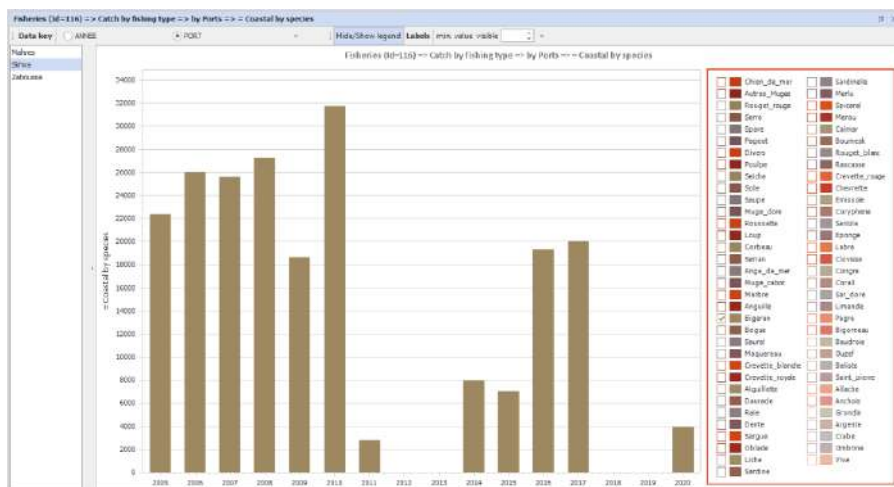
## /Anguille

It was only observed from 2005 to 2007.



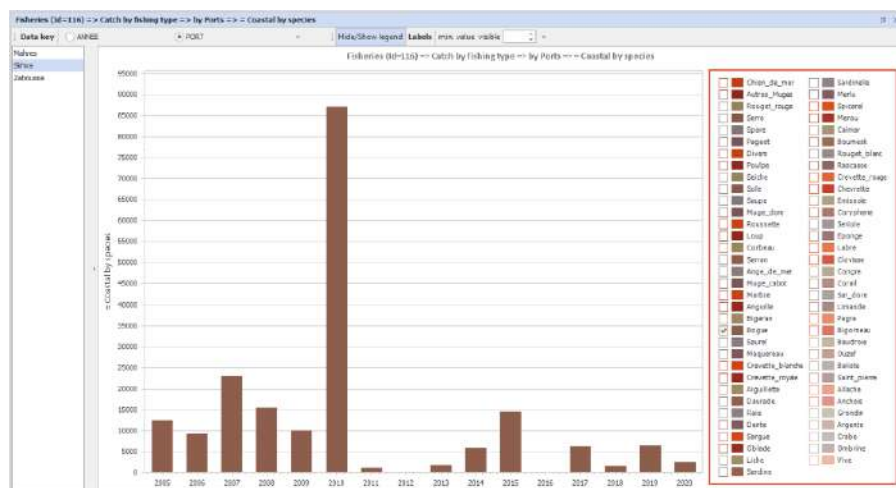
#### /Bigeran

The peak was recorded in 2010, then, the production dropped suddenly in 2011 and registered no values in 2012 and 2013. Then, it recovered and registered again no values in 2018 and 2019.



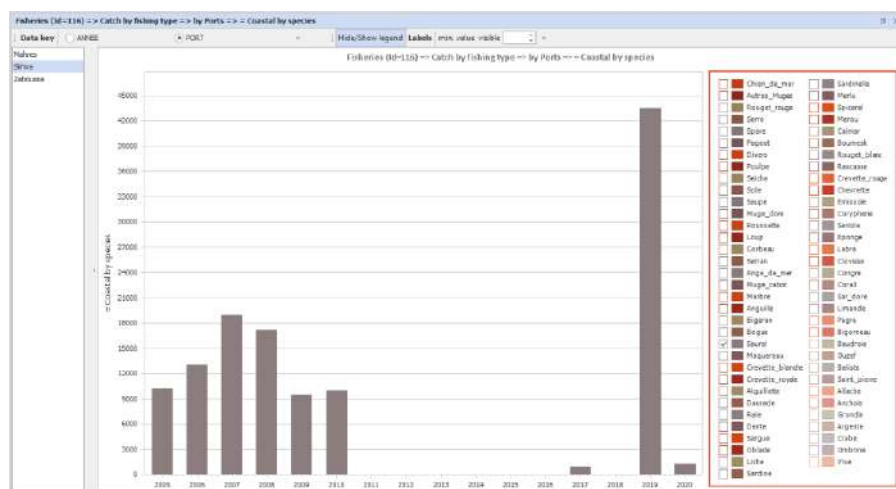
#### /Bogue

A high value in 2010 and no values in both 2012 and 2016 were recorded.



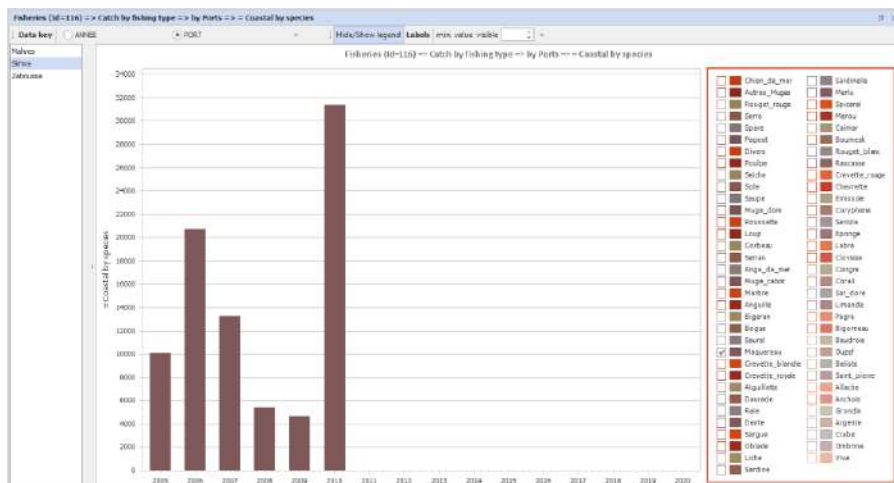
#### /Saurel

No values from 2011 to 2016 and in 2018 were observed. The peak was recorded in 2019, then, the production declined again considerably.



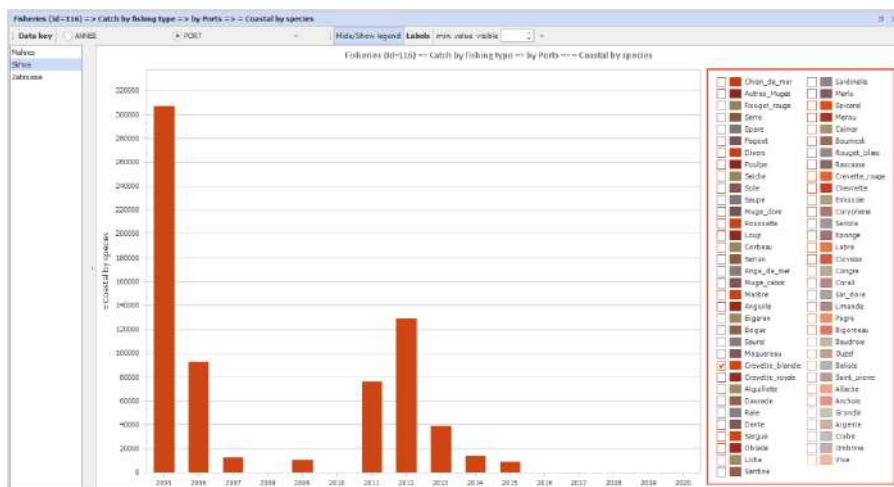
#### /Maquereau

It was only registered from 2005 till 2010.



#### /Crevette\_blanche

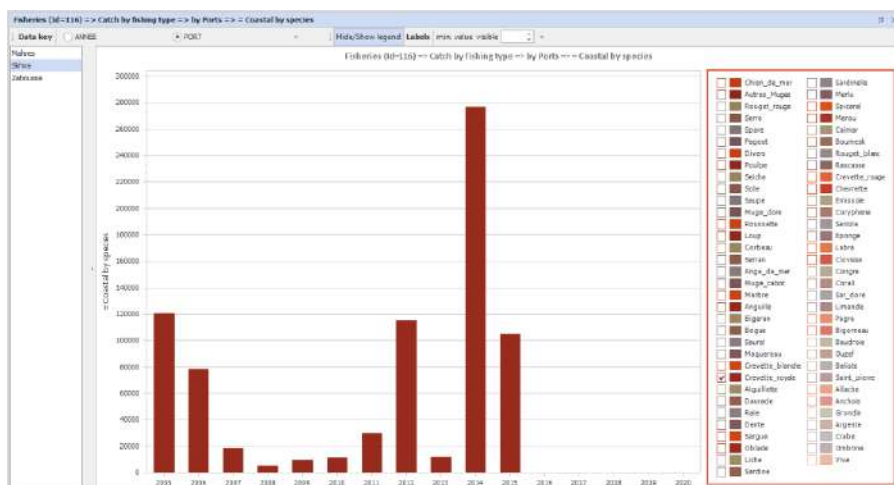
The peak was observed in 2005. No values in 2008, 2010 and from 2014 to 2020 were recorded.



#### /Crevette\_royale

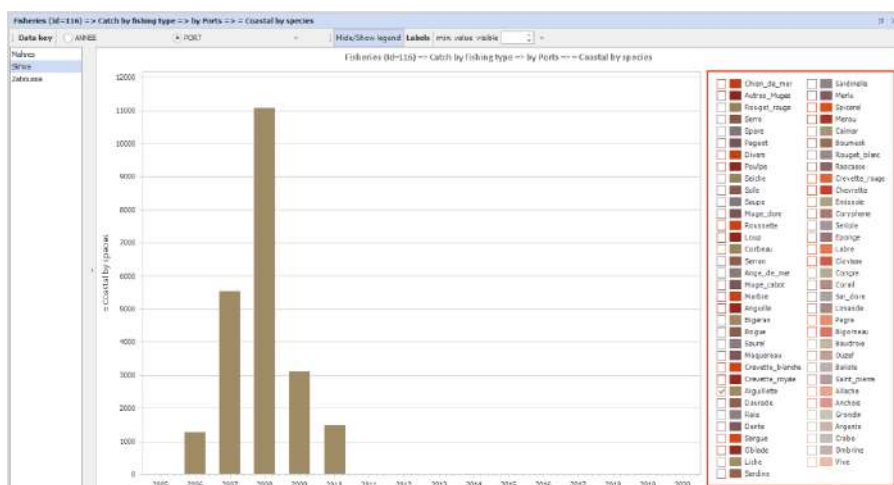
The peak was recorded in 2014. No values were observed starting from 2016.





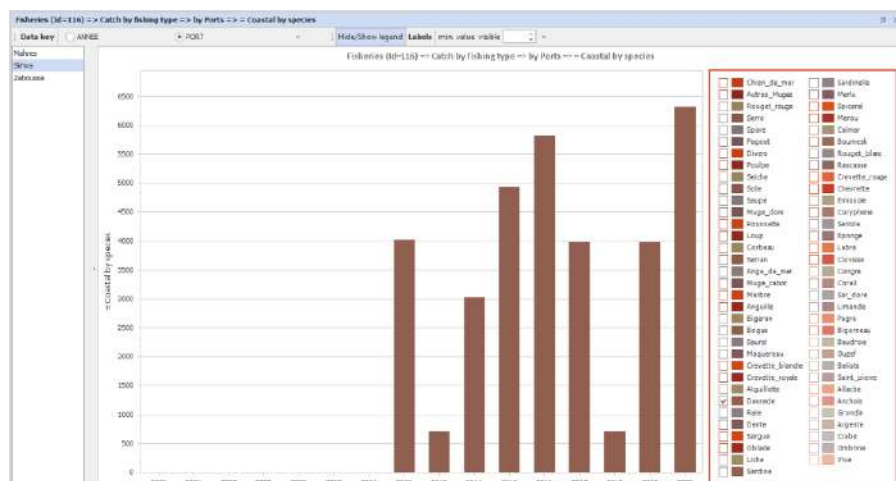
## /Aiguillette

It had values only from 2006 to 2010.



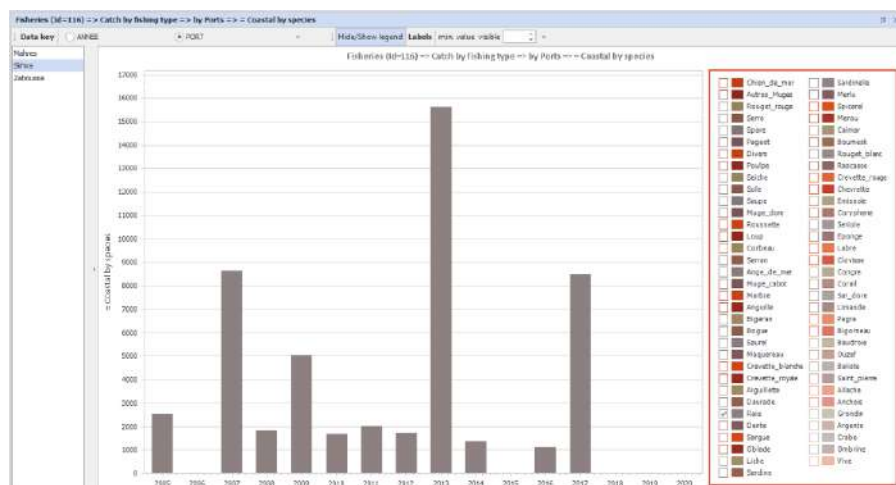
## /Daurade

Values started to be registered starting from 2012 with a peak in 2020.



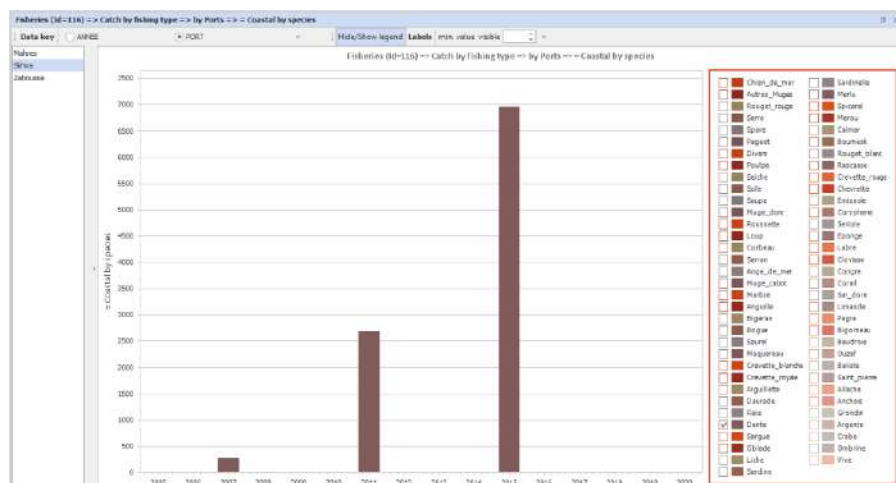
## /Raie

Irregular values were registered with a high peak in 2013. The production didn't record any data starting from 2018.



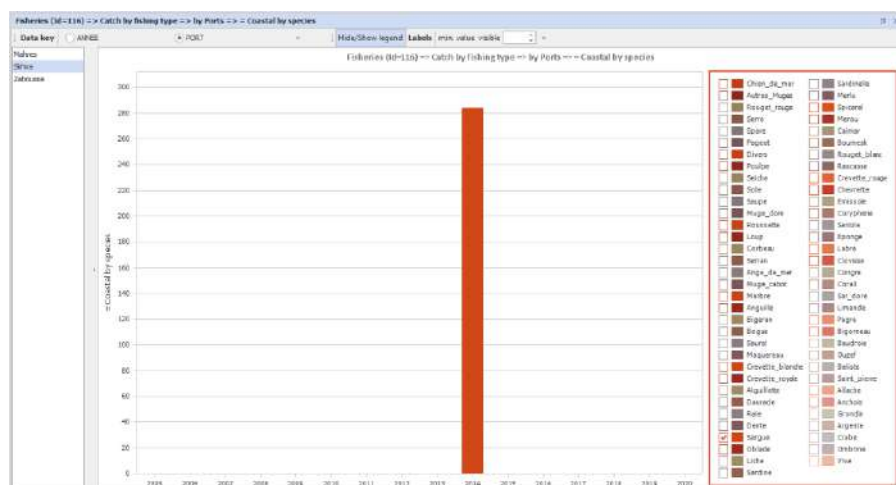
## /Dente

The species was reported only in 2002, 2011 and 2015.



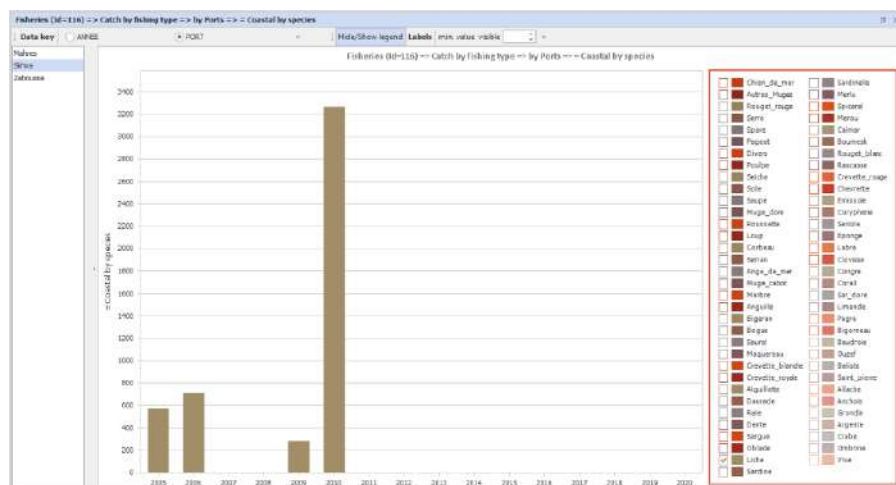
/Sargue

Only one value was registered in 2014.



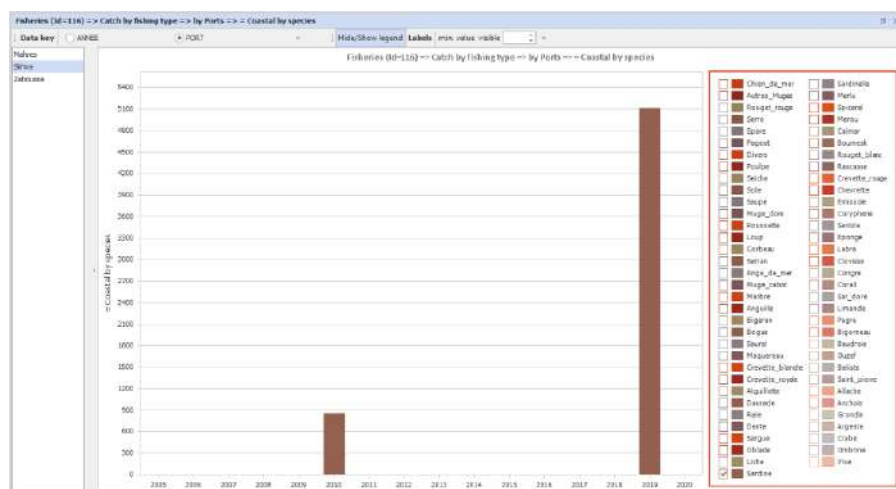
/Liche

It only existed in 2005 2006 and 2009 with very weak values and with a peak in 2010.



#### /Sardine

It was spotted only with a low value in 2010 and a peak in 2019.



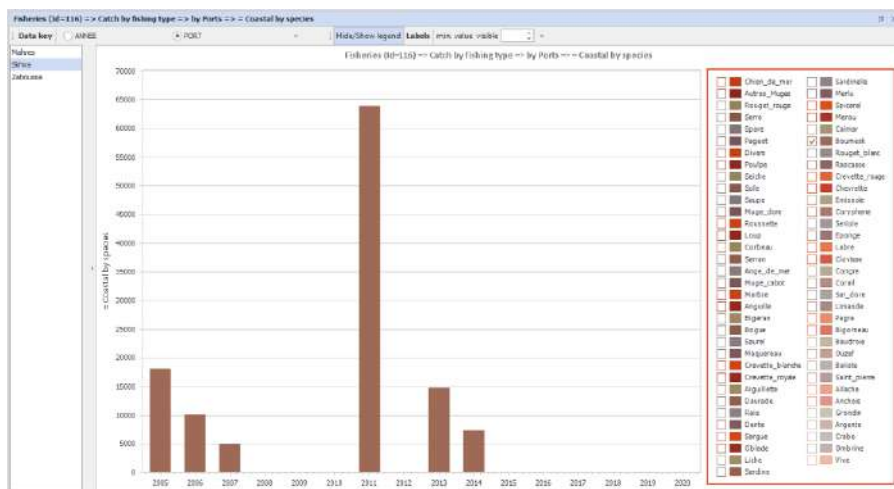
#### /Merou

Only one important value was recorded in 2011.



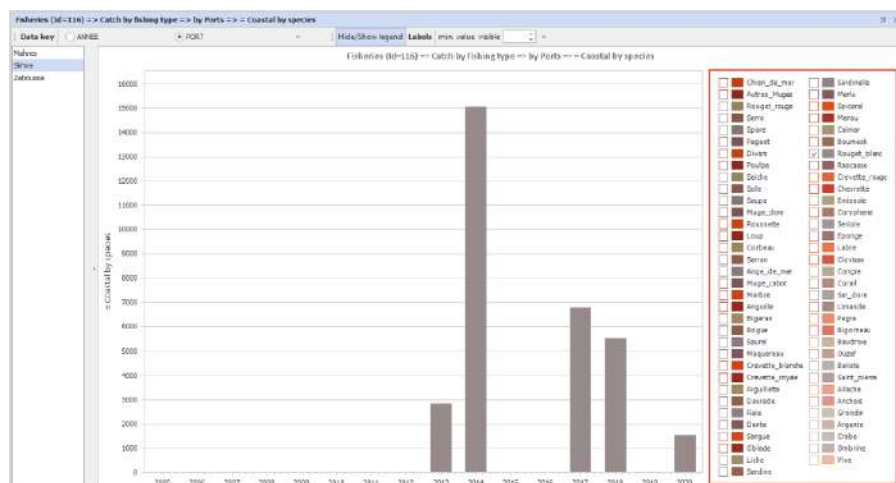
#### /Boumesk

The production is irregular and with no values in most of the years. A high value was registered in 2011.



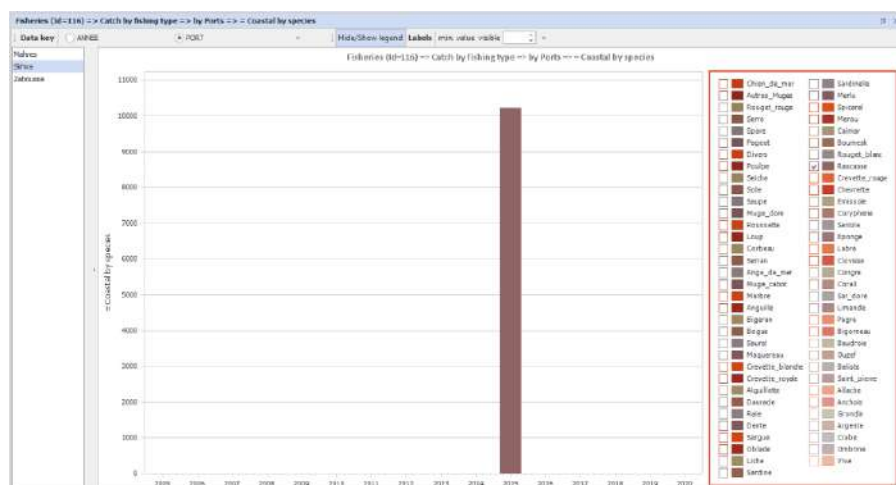
#### /Rouget\_blanc

The species started to appear in 2013 and it registered a peak in 2011.



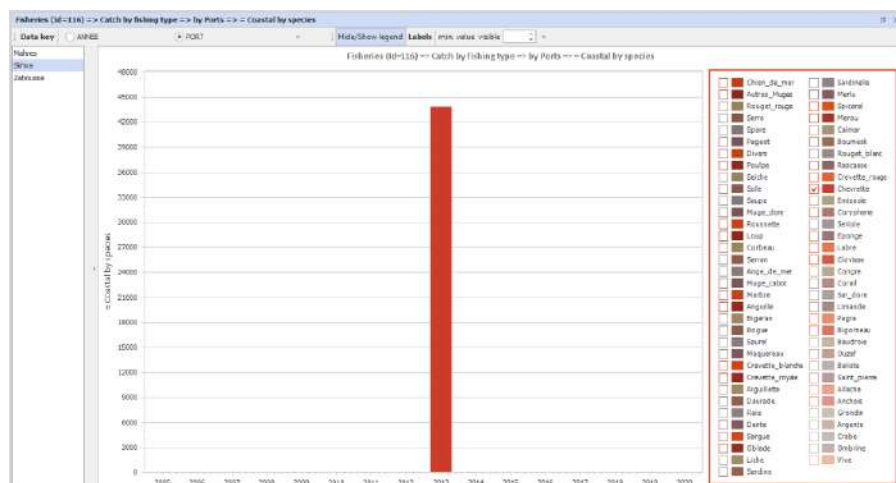
/Rascasse

Only one value was recorded in 2015.



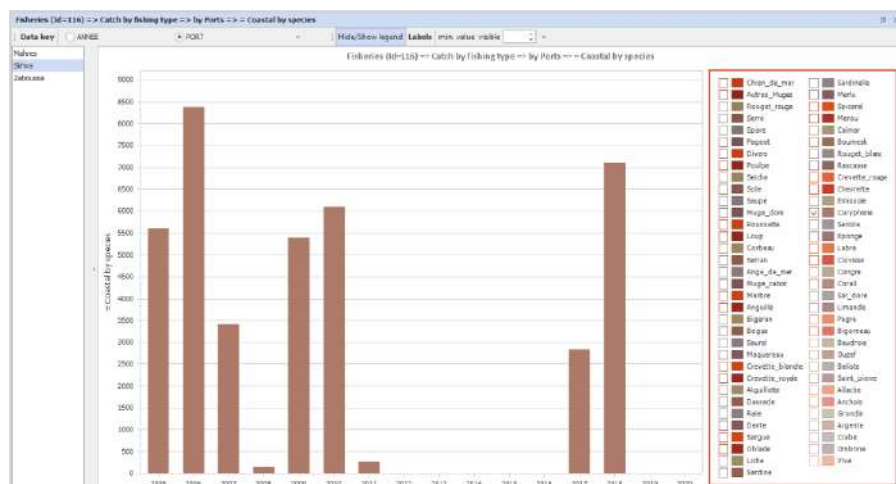
/Chevrette

Only one value was recorded in 2013.



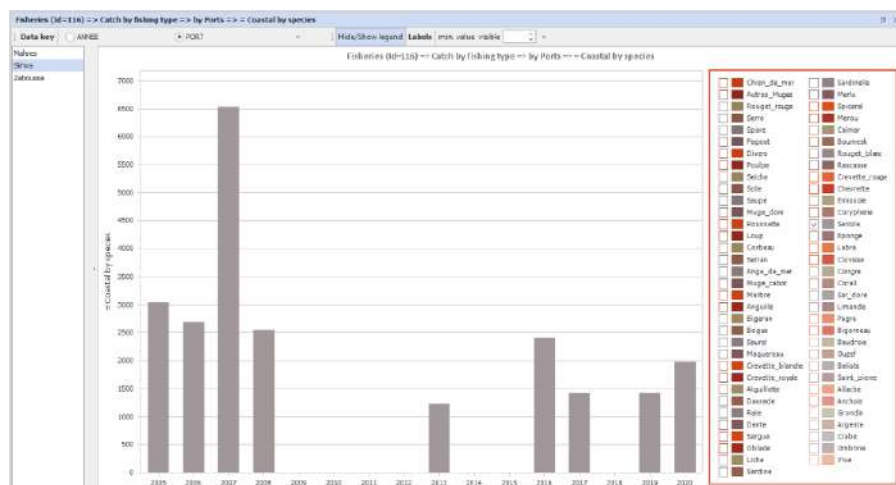
## /Coryphene

The production registered relevant fluctuations, with two peaks in 2006 and 2018. No values were recorded between 2012 and 2016 and again in 2019 and 2020.



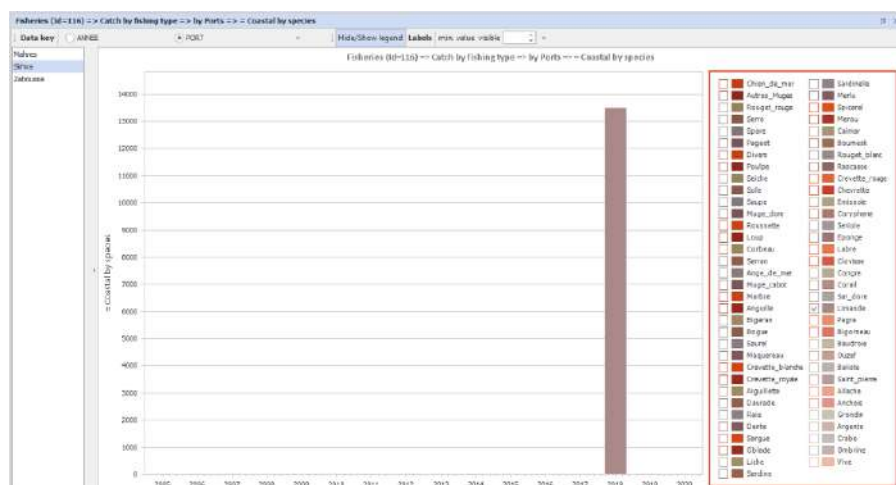
## /Seriole

The production is irregular with many absent values.



/Limande

Only one value was registered in 2018.

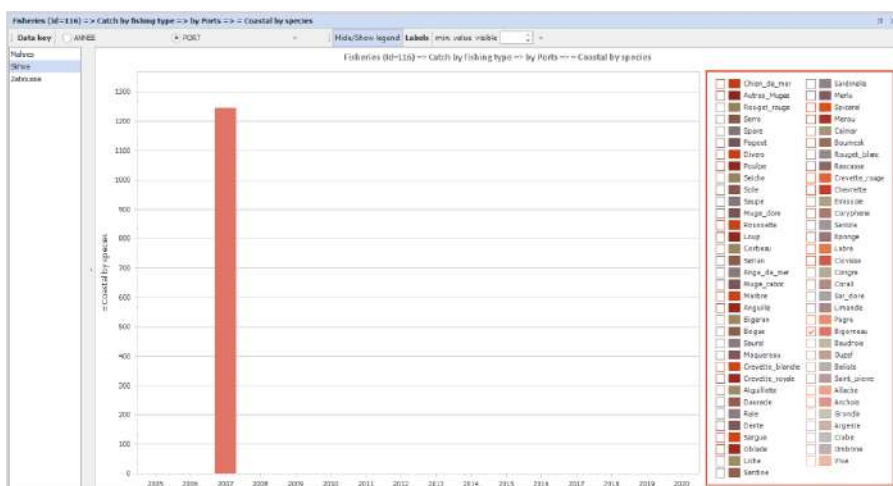


/Pagre

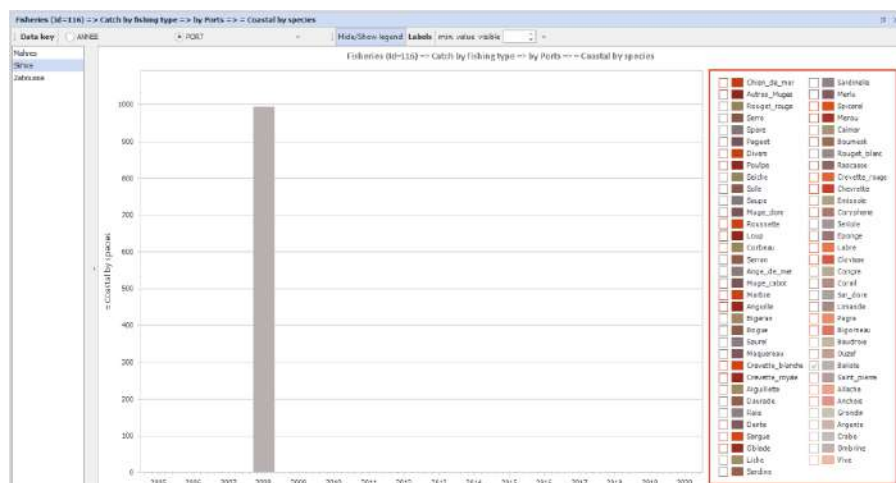
Only a weak value was registered in 2013 and an important one was recorded in 2018.



Only one value was registered in 2007.



Only one value was registered in 2008.



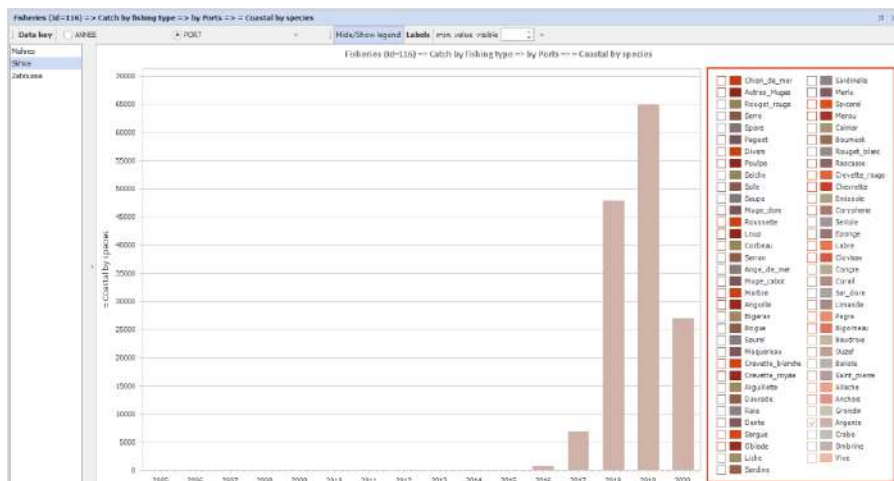
## /Grondin

Only one value was recorded in 2020.



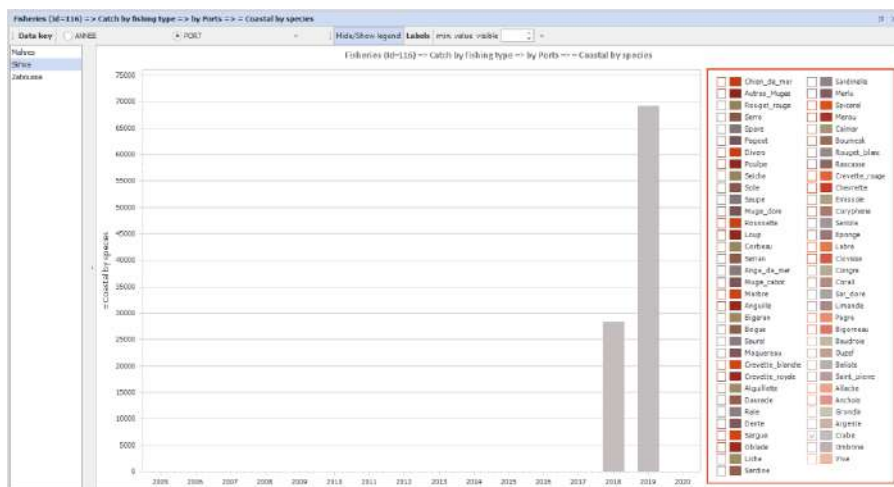
## /Argente

The species started to appear from 2016 and reached a high value in 2019, then, it dropped in 2020.



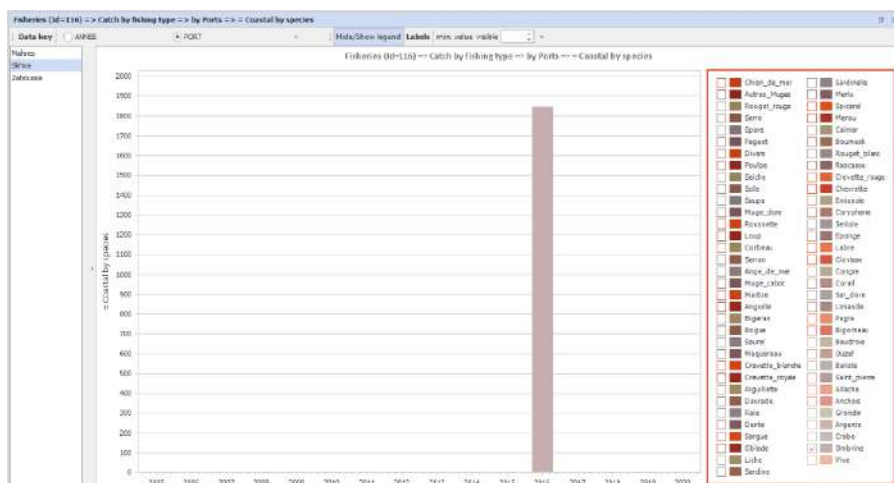
## /Crabe

Very high values were registered in 2018 and 2019 and then there was no record in 2020.



## /Ombrine

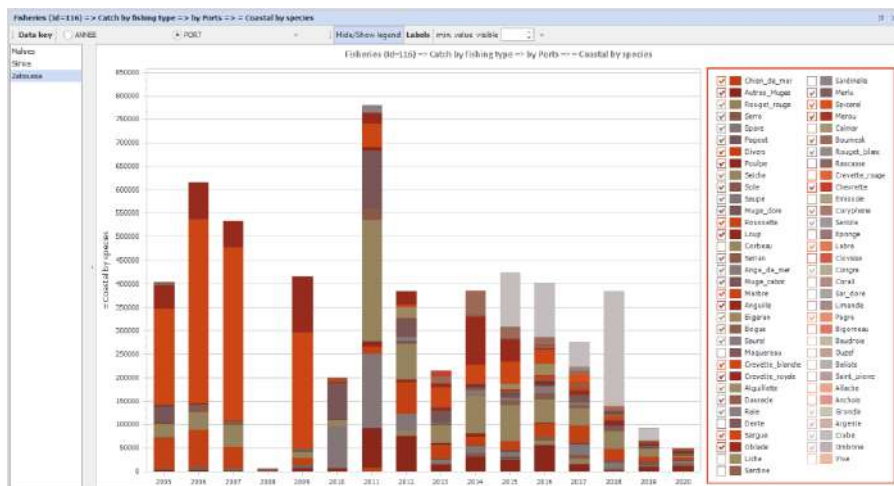
Only one value was recorded in 2016.



### c- Zaboussa

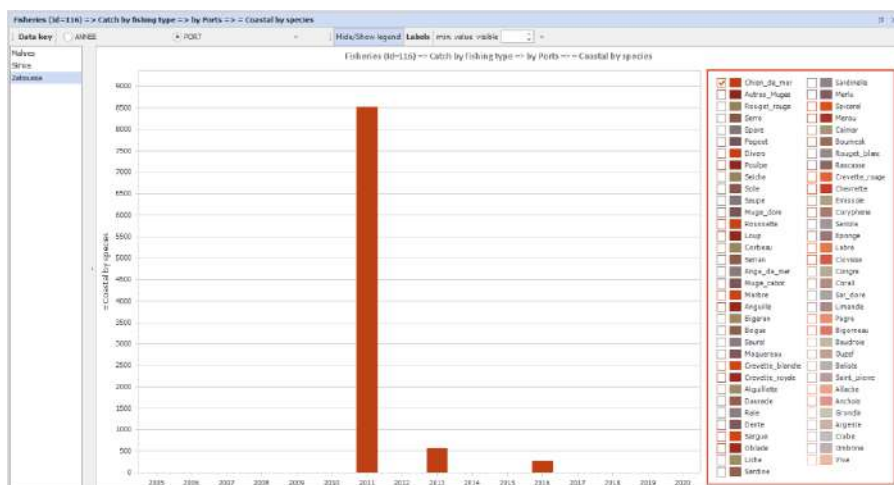
The present species were: Chien\_de\_mer (English: Barracuda; Family: Sphyraenidae; Genus: *Sphyraena* sp.), Autre\_muge, Rouget\_rouge, Serre,Spare, Pageot, Divers, Poulpe, Seiche, Sole, Saupe, Muge\_dore, Roussette, Loup, Serran, Ange\_de\_mer, Muge\_cabot, Anguille, Bigeran, Bogue, Saurel, Crevette\_blanche, Crevette\_royale, Aiguillette, Daurade, Raie, Sargue, Oblade, Merlu, Spicarel, Merlu, Chevrette, Coryphene, Seriole, Congre, Pagne, Grondin, Argente, Crabe, Ombrine.

The species which contributed the most to the production were: Crevette\_blanche, Seiche, Crevette\_royale, Autre\_muge and muge dore, spare, Divers and Crabe. The latter had contributed the most in the production since it appeared from 2015 until 2019.



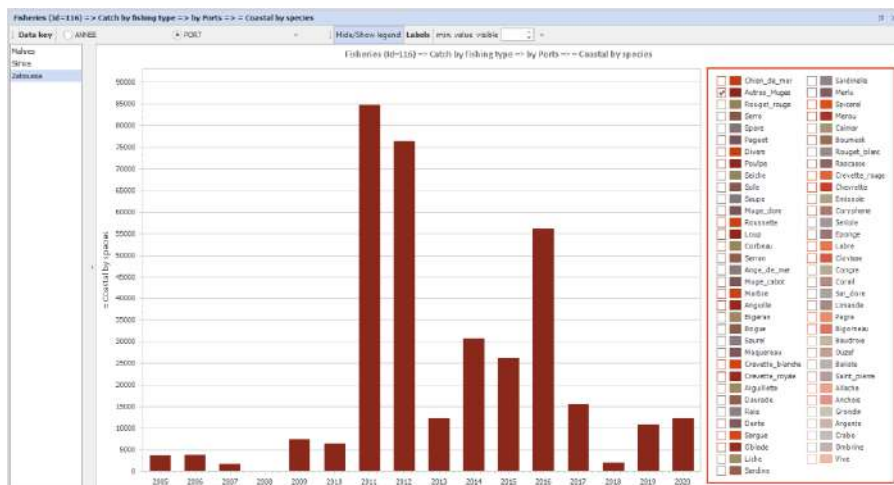
### /Chien\_de\_mer

The production registered a peak in 2011 and it was very low in the rest of the two years 2013 and 2016.



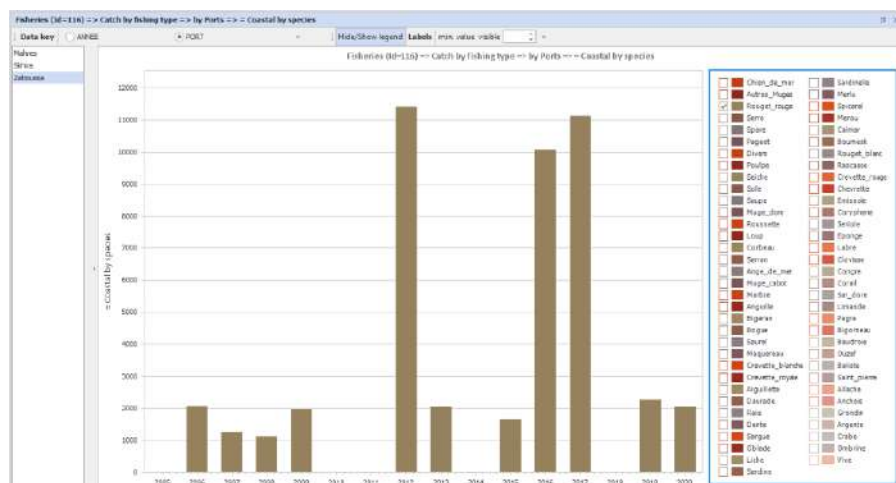
#### /Autre\_muges

The production was weak in the first years from 2005 till 2010 and was null in 2008. Then, it improved from 2011 with a peak in this year and in 2012. After these years and especially after 2016, the production dropped.



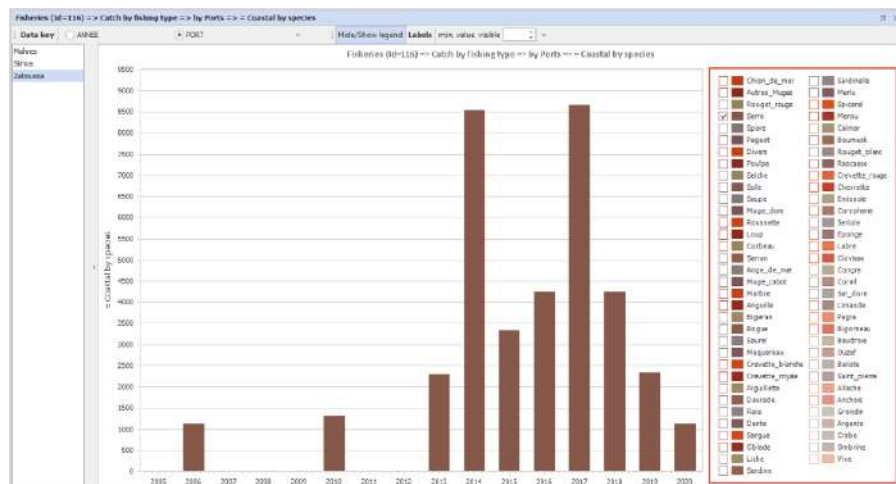
#### /Rouget\_rouge

The production was weak and no data were recorded in 2010, 2011 and 2018. The only years where it was maximal was in 2012, 2016 and 2017.



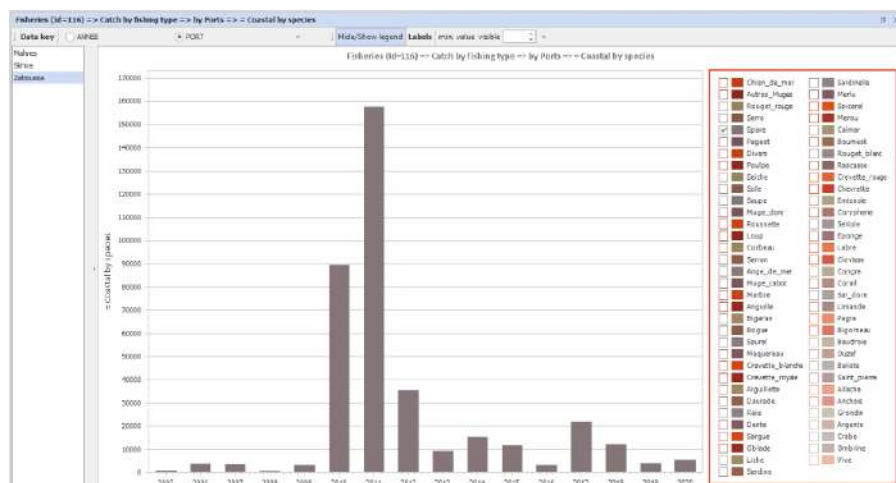
## /Serre

The peaks of the production were registered in 2014 and 2017, then, it diminished considerably. In the first years from 2005 until 2012, it was very low with many absent values.



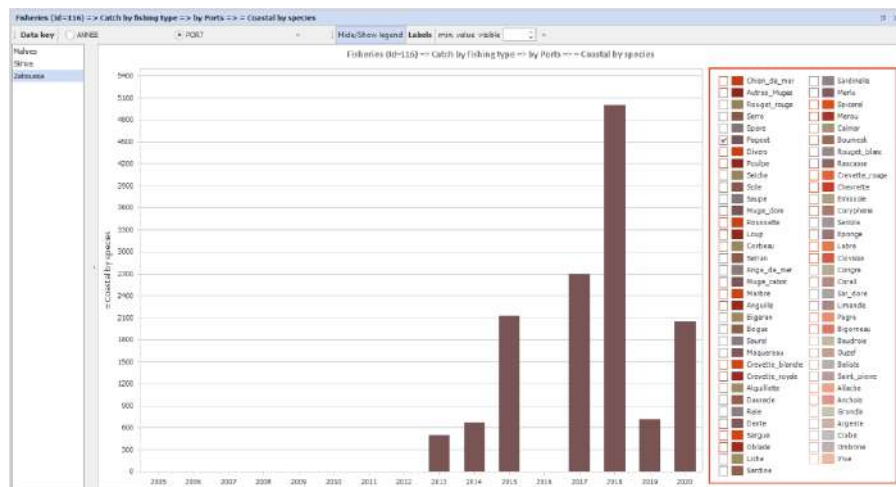
## /Spare

The production was very important in 2010 and 2011.



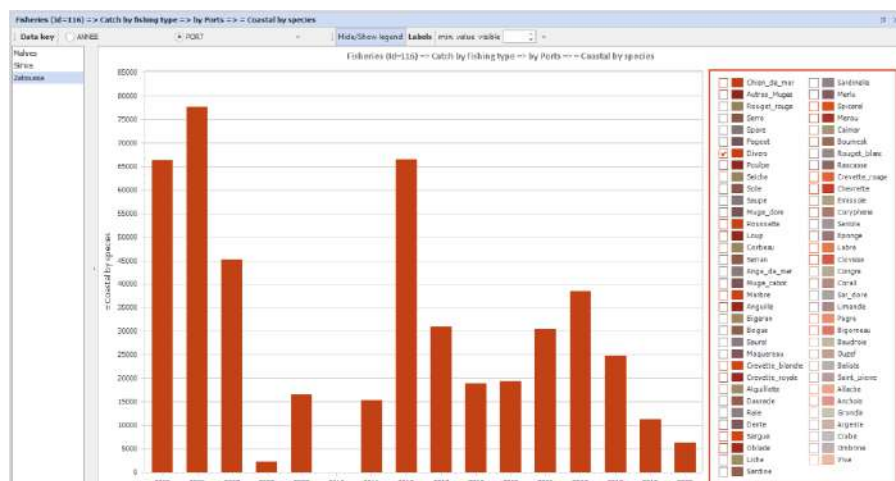
## /Pageot

The production didn't record any values from 2005 until 2012 and in 2016. It started to record some values in 2013 and reached a peak in 2016, then, it declined again.



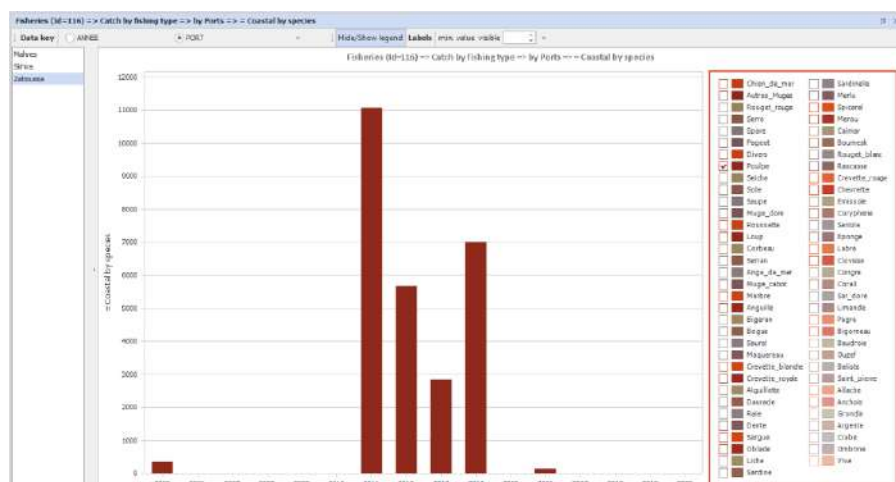
## /Divers

Many species that contributed considerably in the production were unidentifiable in the first years. After 2017, the identification improved. Thus, the values of the production ensured by this group diminished.



#### /Poulpe

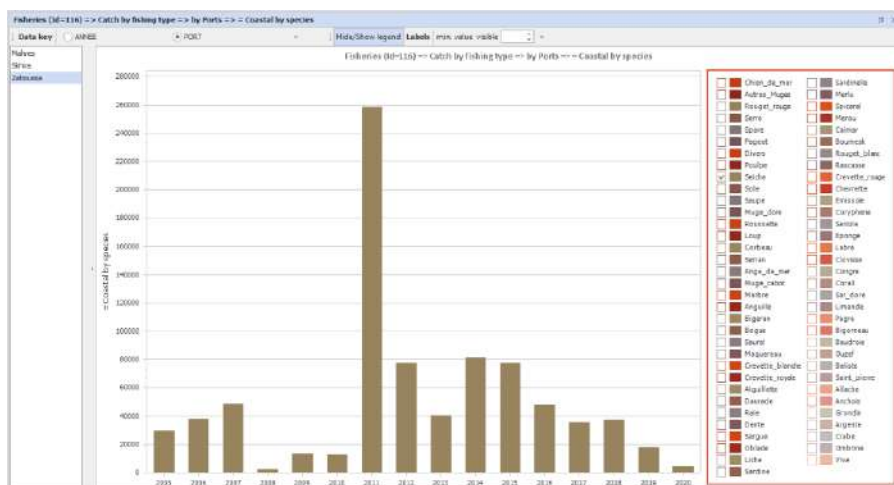
This species was absent most of the years. It appeared especially from 2011 until 2014.



#### / Seiche

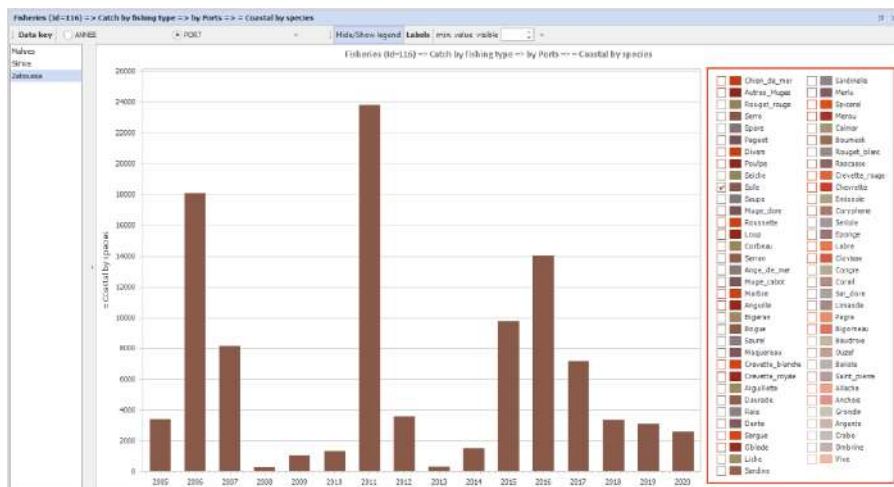
This species registered a peak in the production in 2011, then, it diminished.





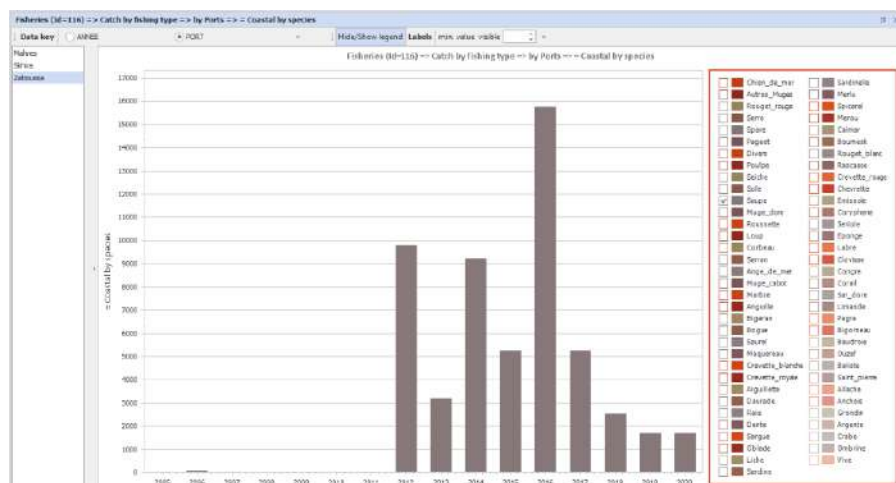
#### /Sole

The production was very weak in 2008, then, it registered an important peak in 2011 and it dropped again especially in 2013. Then, it registered another less important peak in 2016 and it diminished gradually ever since.



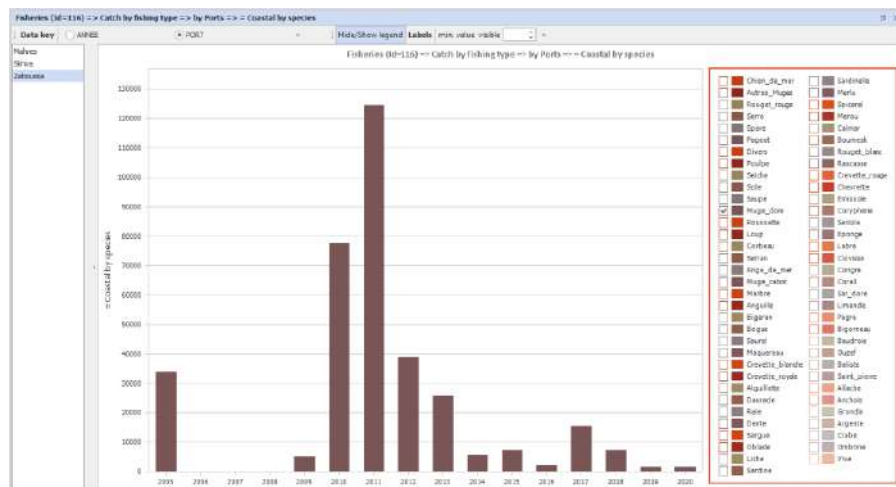
#### /Saupe

The production registered some values in 2006 and starting from 2012. The peak of the production was recorded in 2015 the production diminished gradually.



## /Muge\_dore

After the absence of values in 2006, 2007 and 2008 the production registered an important peak in 2011, then, it diminished again.



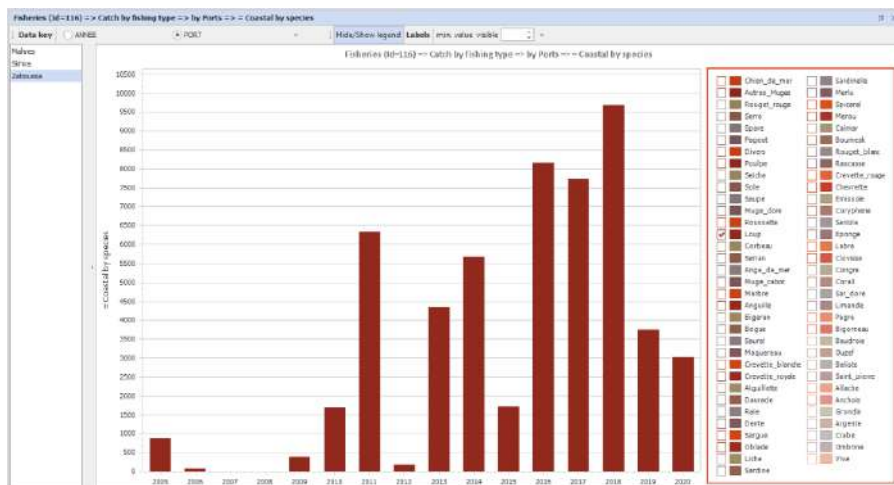
## /Roussette

This species was only spotted in 2013 and 2017.

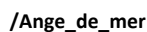


## /Loup

After the absence of values in 2006 and 2007, the production registered a first peak in 2011, and then, it dropped considerably in 2012. It improved, especially, in 2017, 2018 and 2018 where it reached the maximal values. After that, it decreased again in 2019 and 2020.



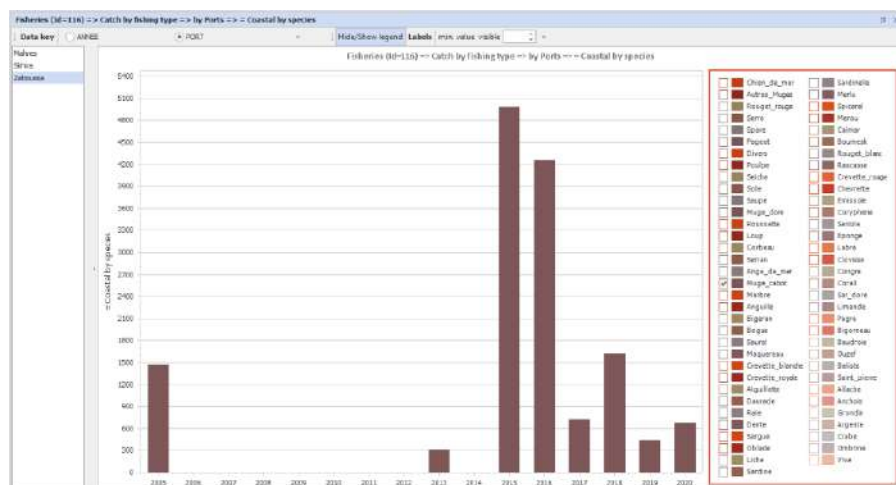
## /Serran



The only value was registered in 2020.

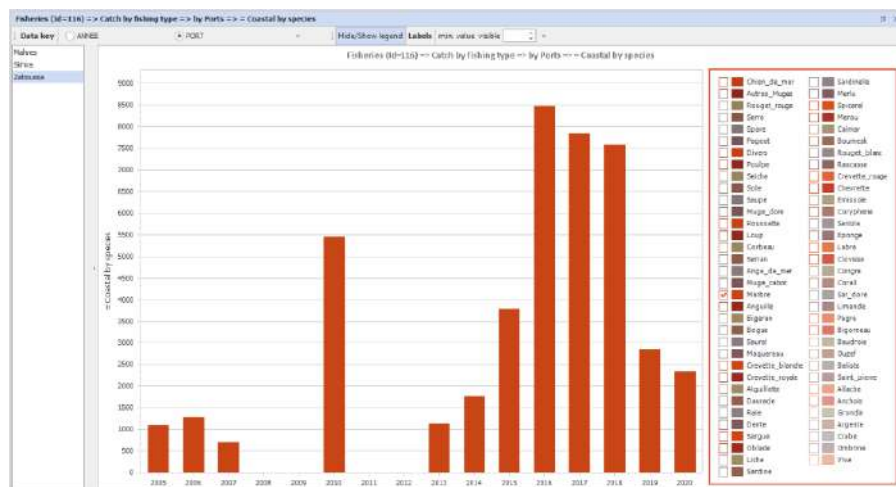


Many no data were registered from 2006 until 2012 and in 2014. The peaks were observed in 2015 and 2016, then, the production dropped again.



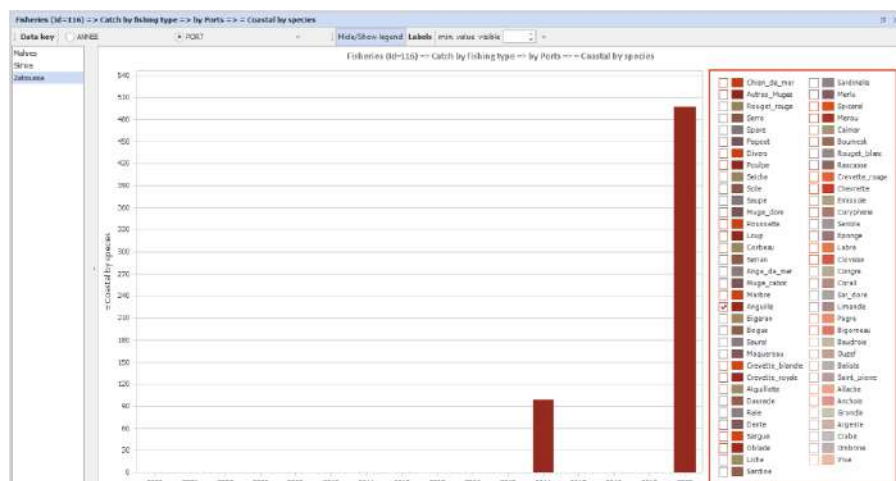
### /Marbre

No values were recorded in 2009, 2010, 2011 and 2012. Starting from 2013, the production grew and reached its maximal values in 2016, 2017 and 2018, then, it dropped.



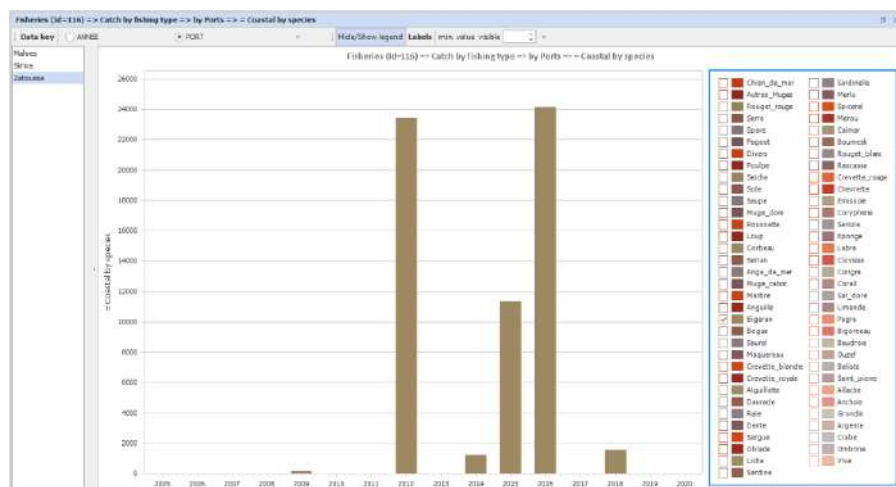
### /Anguille

It was observed only in 2016 and 2020 with low values.



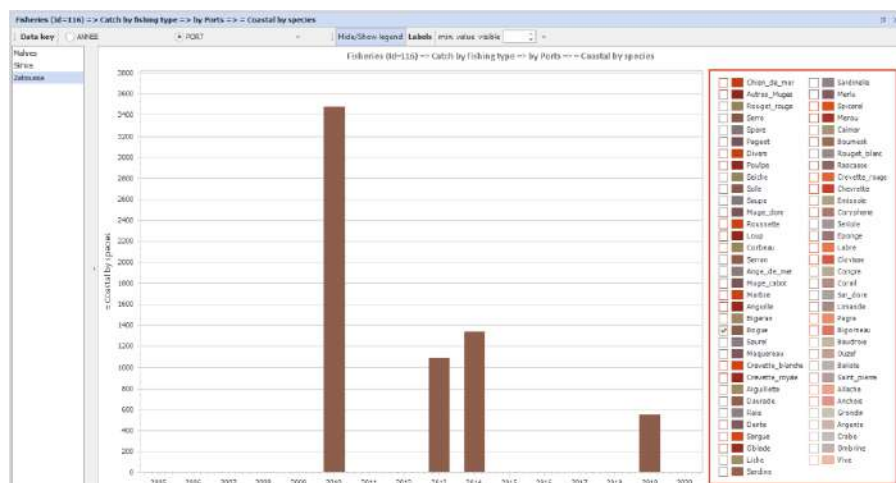
#### /Biggeran

It registered a first peak in 2012 after many absent values, then, three more values between 2014 and 2016 (second peak) and another low value in 2018.



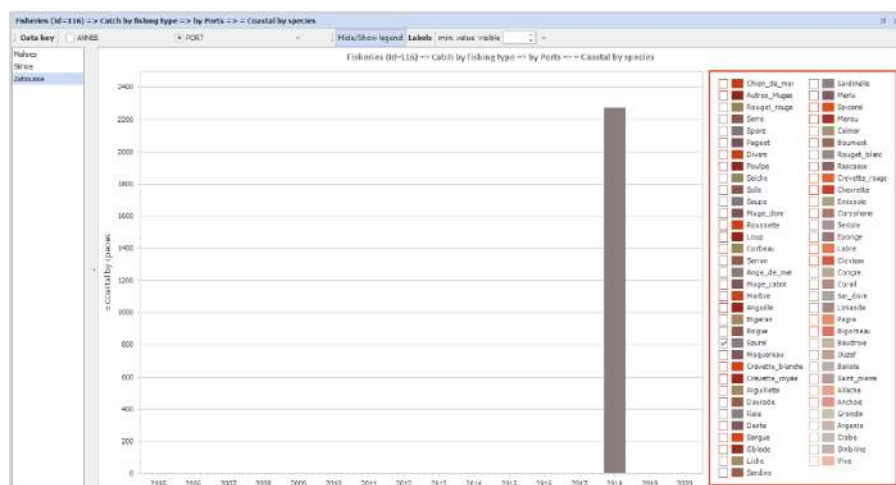
#### /Bogue

Only four values were registered from 2005 till 2020.



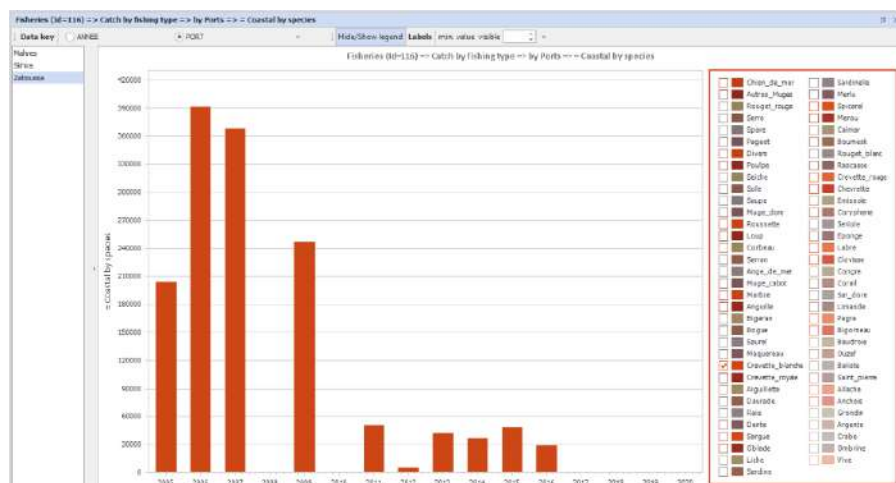
/Saurel

Only one value was registered in 2018.



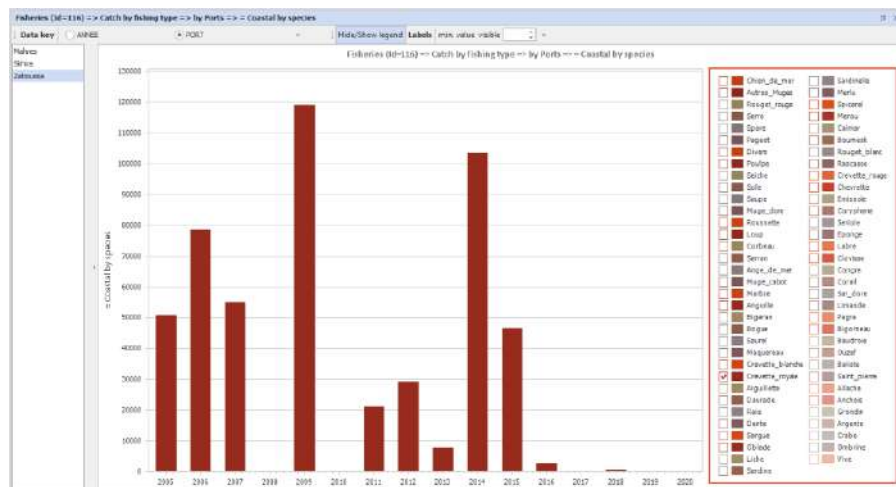
/Crevette\_blanche

The best values were registered between 2005 and 2007 and in 2009. The other values were recorded between 2011 and 2016.



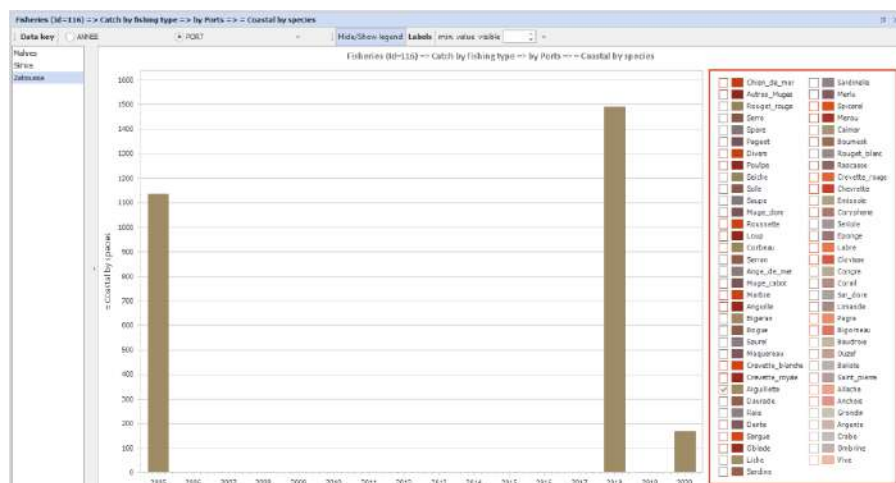
## /Crevette\_royale

Significant values of production were registered between 2005 and 2007 with an important peak in 2009. Then, it appeared again starting from 2011 until 2016 and in 2018 with a second peak in 2014.



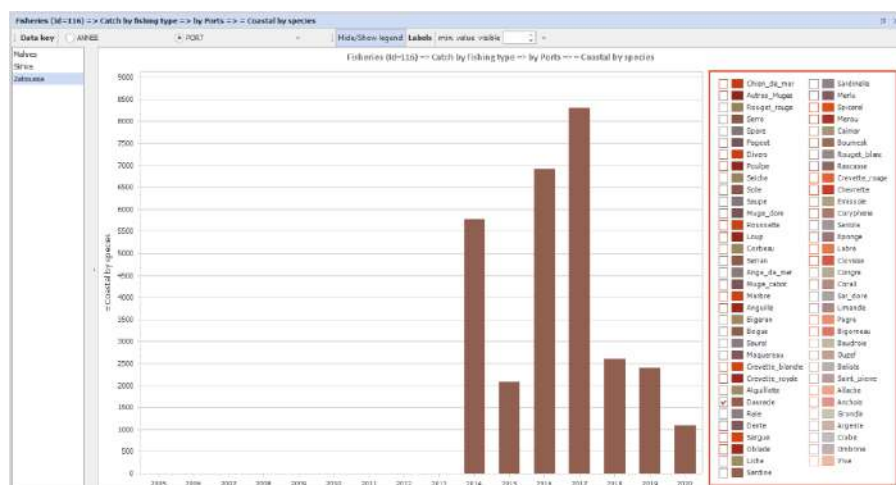
## /Aiguiellette





#### /Daurade

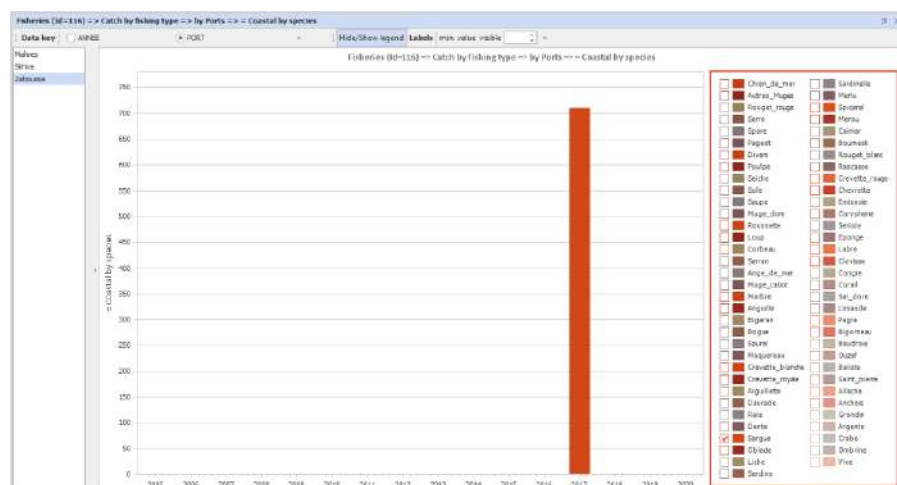
The production started from 2014. No records were registered before.



#### /Raie

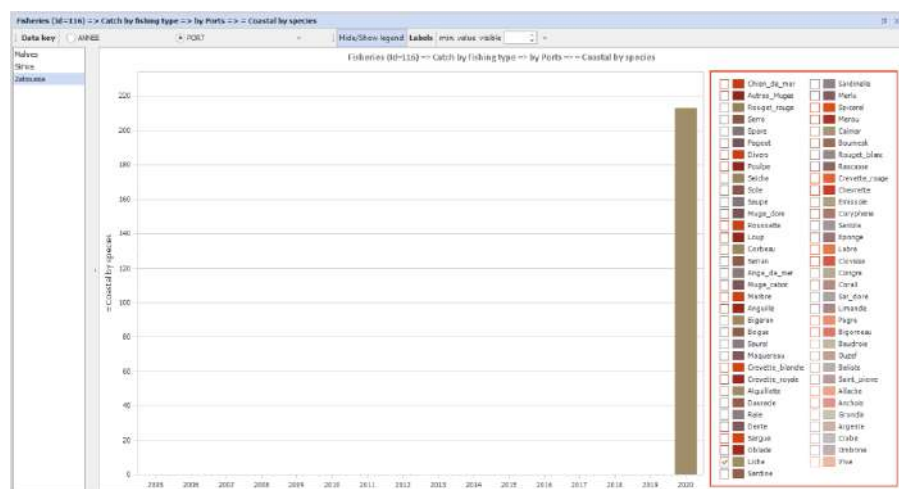
Important value was caught in 2011.

It was spotted only in 2017.



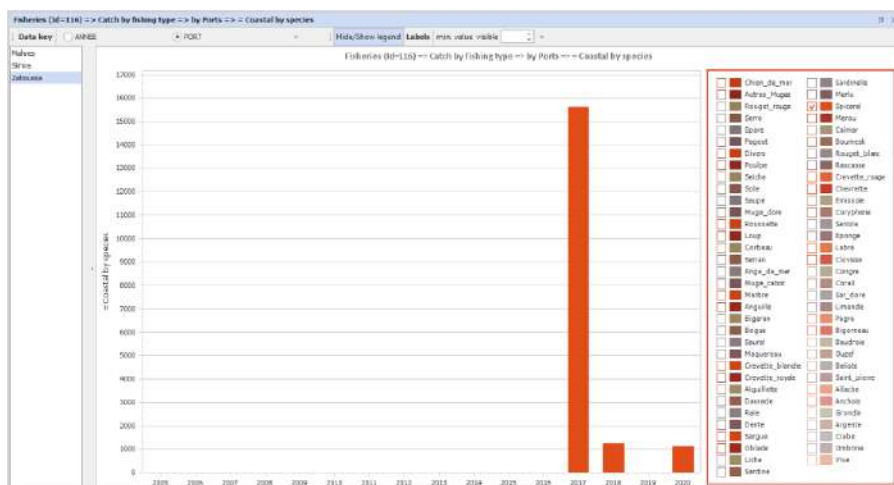
It was registered starting from 2018.

Only one value was recorded in 2020.

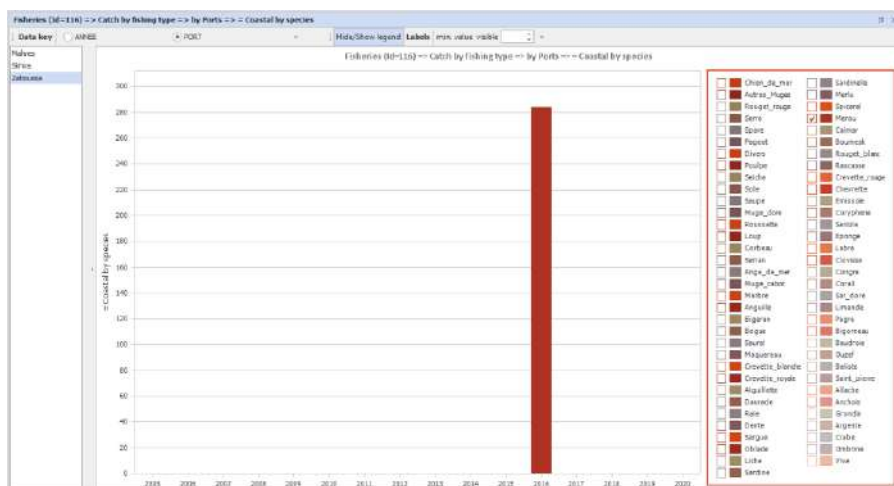


It was reported only in 2017.

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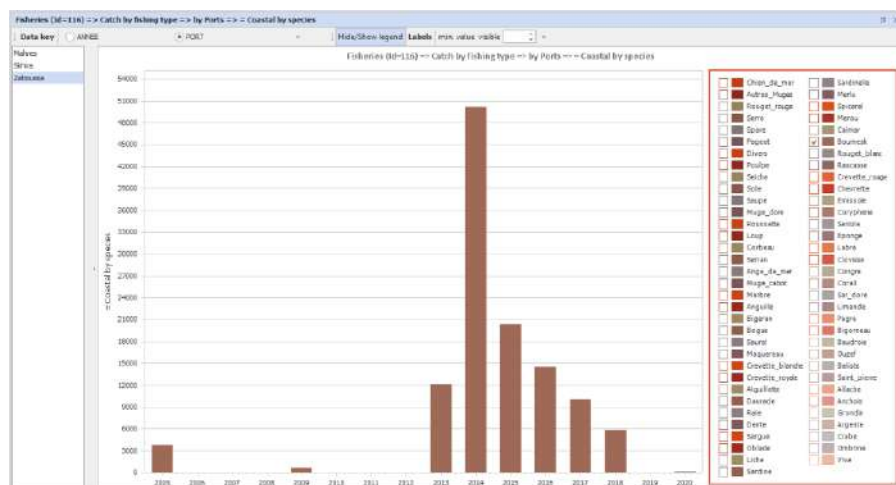


## /Merou



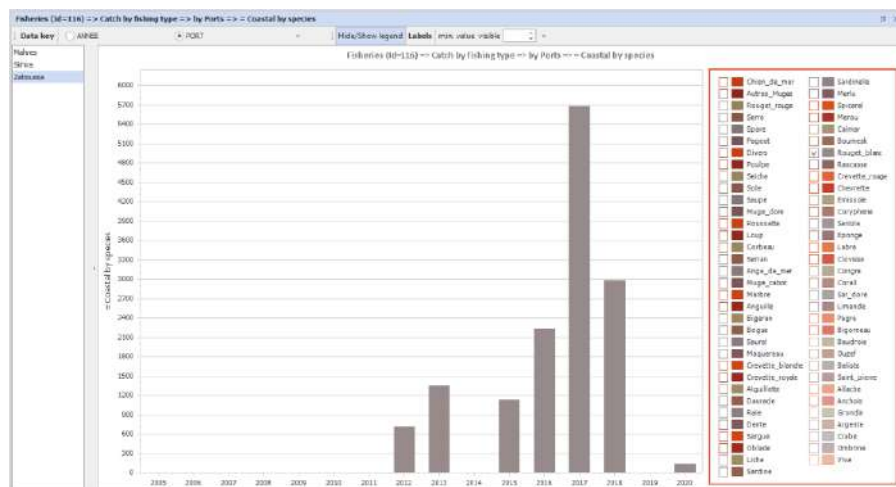
## /Boumesk

The production was registered every year between 2013 and 2018 with an important peak in 2014. Outside this interval, the production is almost with absent values in most of the years. Otherwise, it was very weak.



#### /Rouget blanc

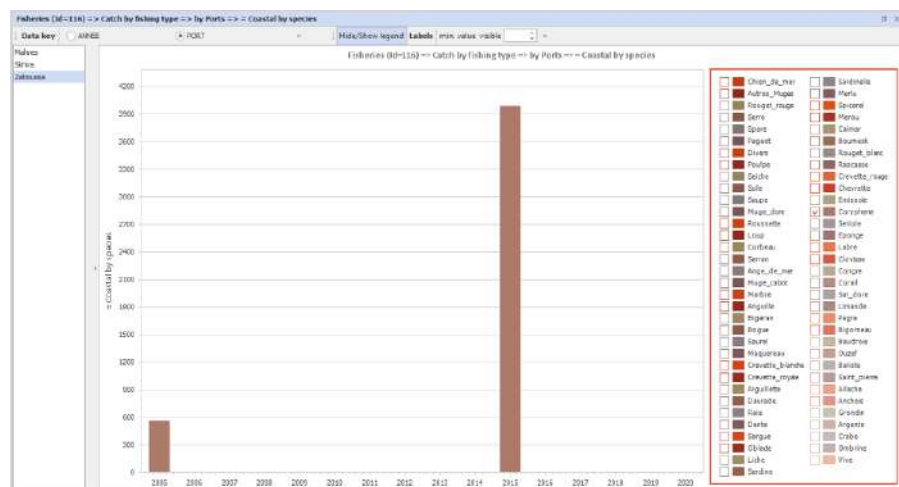
The values of the production started to be registered from 2012 with no values in 2014 and 2019 and a peak in 2017.



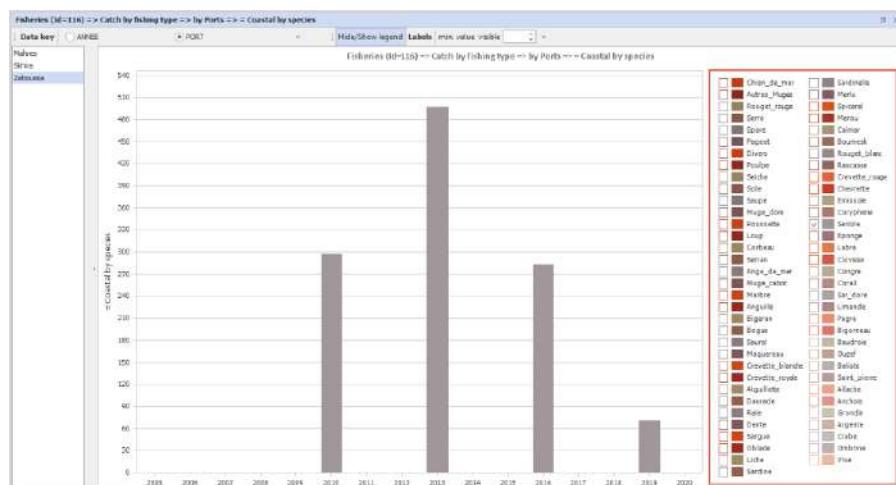
#### /Chevette

Only one value was recorded in 2013.

This species was spotted only in 2005 and 2015.

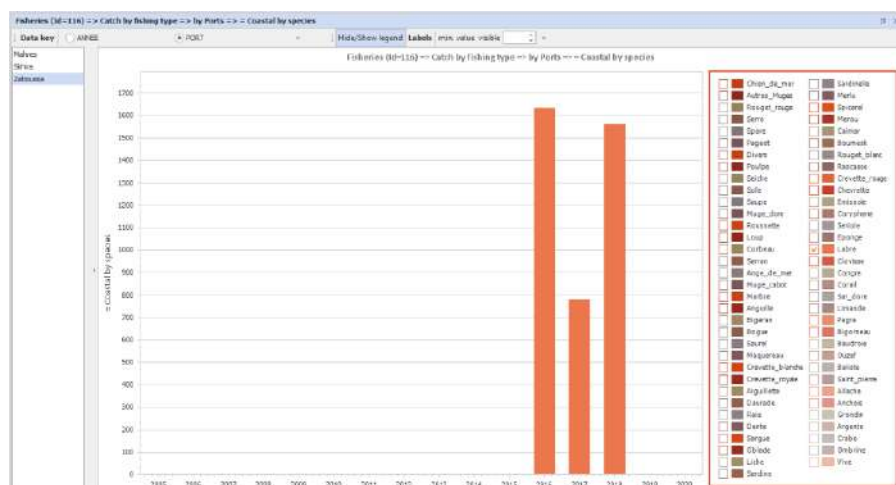


The production was very low and irregular.



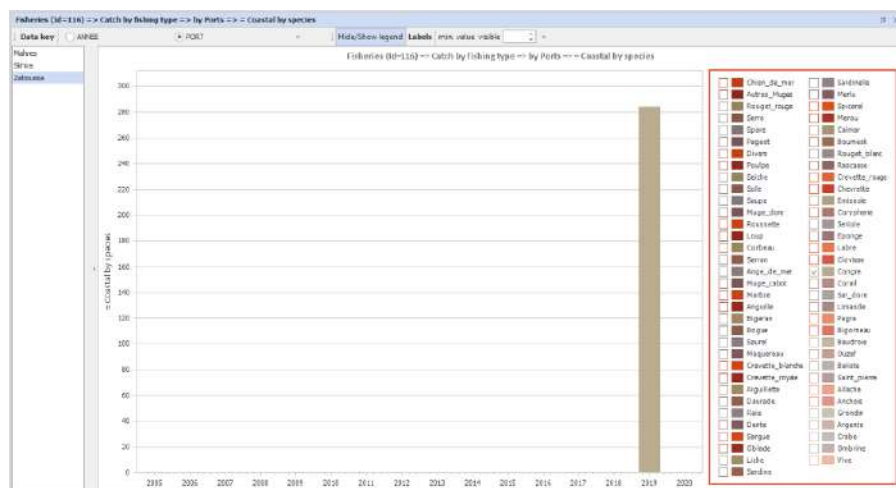
/Labre

It was registered between 2016 until 2018.



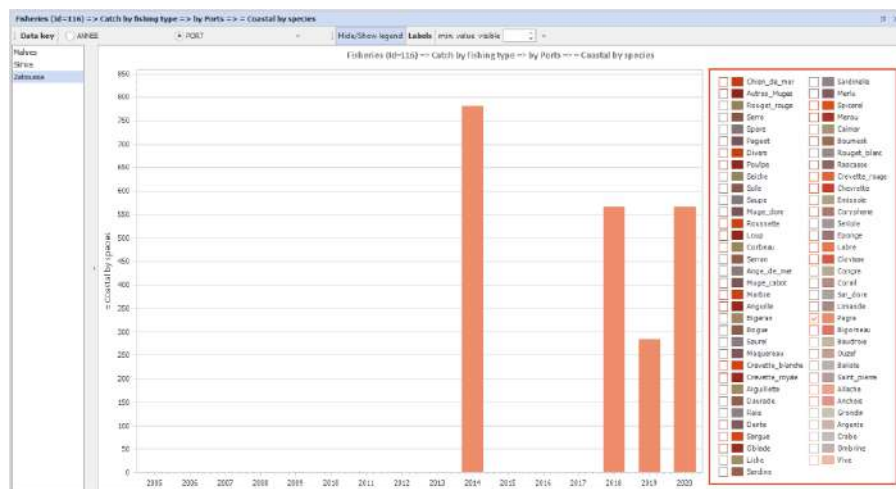
/Congre

Only one value was registered in 2019.



## /Page

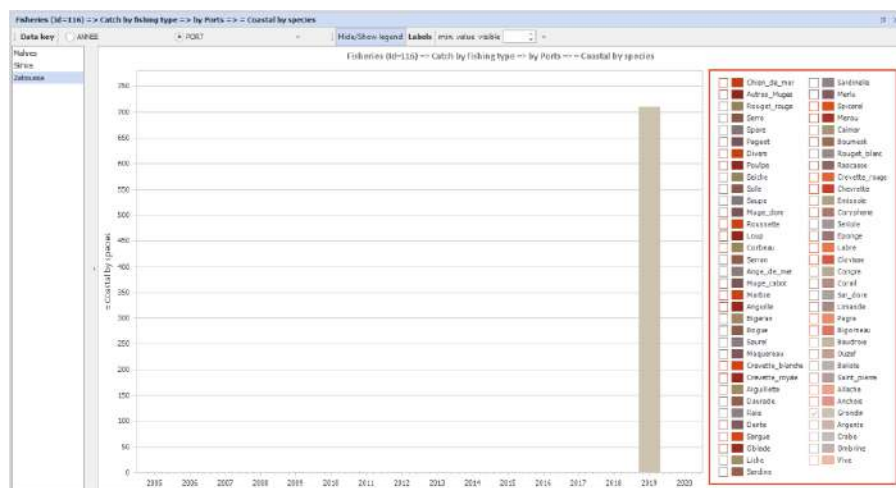
The species appeared for the first time in this harbor in 2014. Then, it disappeared for three consecutive years. It reappeared again starting from 2018.



## /Grondin

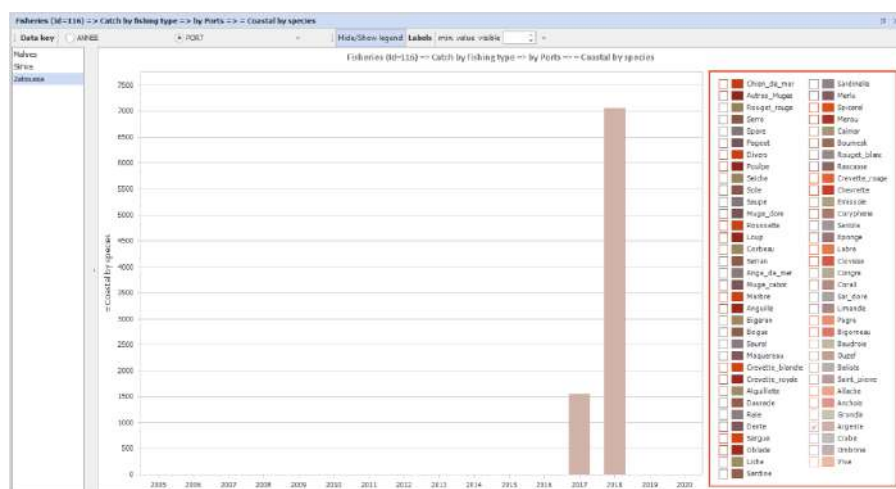
Only one value was registered in 2019.





## /Argente

Only two values were recorded in 2017 and 2018.



## /Crabe

It recorded important values of production between 2015 and 2019 with an important peak in 2018.



Only one value was registered in 2019.



->The fish coastal production was effected by the appearance of the invasive blue crab. Efficient strategies and action plans for the exploitation of this species are being well elaborated (see outcomes of crab day in supplementary material).

->Crabe was spotted in Divers and starting from 2018 the ID= "Crabe bleu" was attributed by the DGPA to this species in the national database (Check Sihem Khazri).

-> Coryphæna was reported in Skhira and Mahres only in 2006 and 2008. There might be no stock for this species or the fishermen don't target it since it is fished by a specific fishing technique

using palm leaves. Also, the national statistics of this species should be verified since it should be fished with purse seine instead of coastal fishing.

-> Muges\_cabot wasn't reported in 2019 and 2020. This can be due to a possible confusion with Autres\_muges.

-> Bigeran wasn't reported in 2015 and 2018. There might be a possible confusion of this species with Muge\_dore.

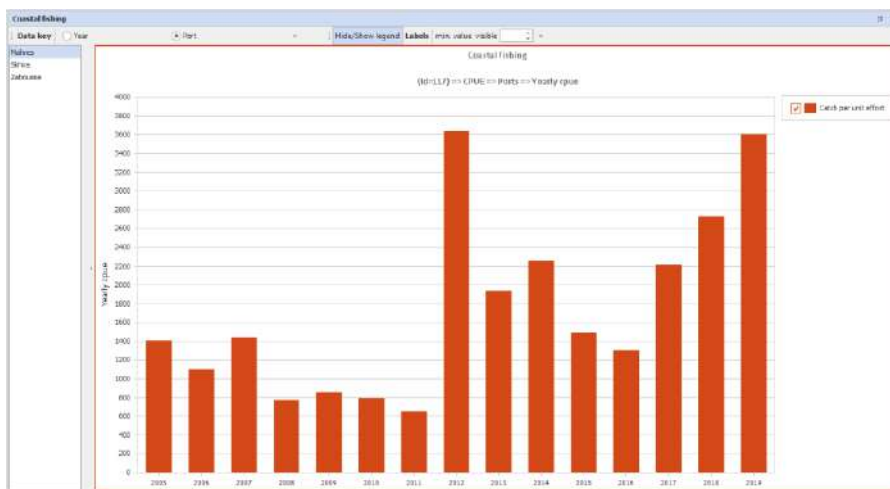
-> The production of the species Daurade recovered since 2014 with the escalating climate change conditions.

## 2.CPUE

This indicator is chosen in order to describe the production linked to the fishing effort. It's a product of the production divided by the fishing effort. If the CPUE is high, the fishing effort is low or/ and the production is high and vice versa.

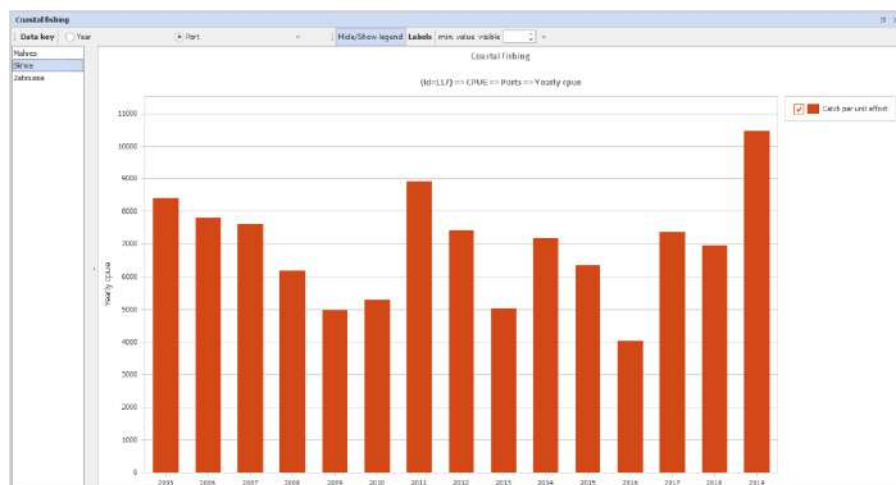
### a- Mahres

The CPUE in Mahres for the coastal fishing was low from 2005 until 2011 then it grew to reach its maximum in 2012 and 2020. This means that the fishing effort might be high compared to the production, then, the situation got reversed.



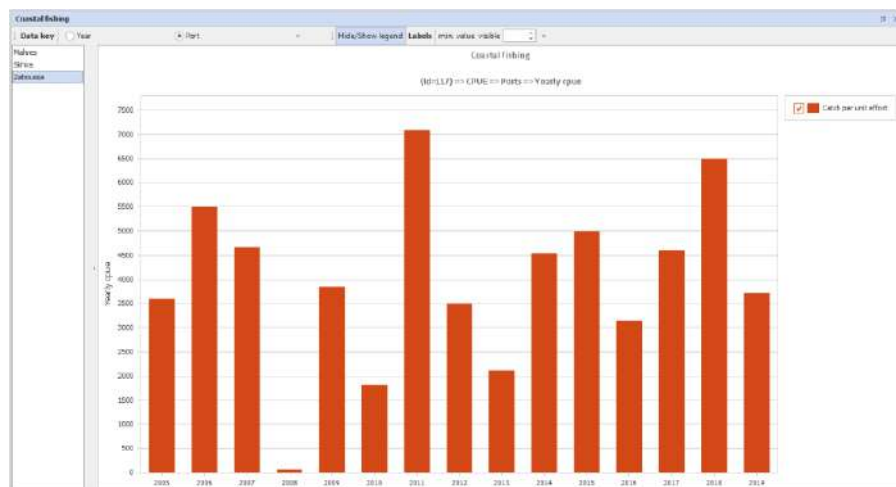
### b- Skhira

The CPUE in Skhira for the coastal fishing is relatively stable.



#### c- Zaboussa

The CPUE in Zaboussa is irregular. In 2008, it dropped suddenly and almost became null. There's no production since there might be no fishing effort in that year.



#### IV-Purse seine fishing (subcomponent)



[Purse seine fishing (Id=120)]

Indicators attached to component: Purse seine fishing (Id=120)

| Name | Description | DataSource | UpdateFrequency | Notes |
|------|-------------|------------|-----------------|-------|
|------|-------------|------------|-----------------|-------|

|                 |  |      |  |  |
|-----------------|--|------|--|--|
| Catches         |  | DGPA |  |  |
| Number of boats |  | DGPA |  |  |
| Subsidies       |  | CRDA |  |  |
| Workforce       |  | DGPA |  |  |
| CPUE            |  |      |  |  |

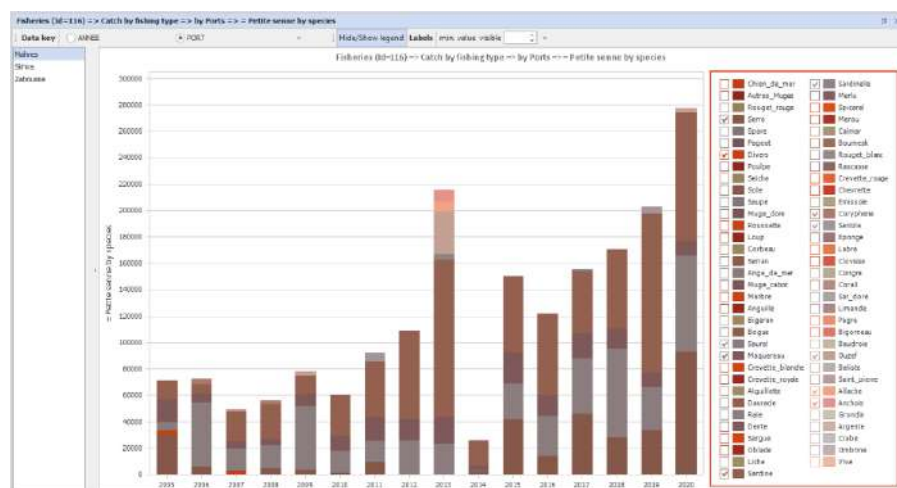
### 1. Catches: Catch purse seine by species

It is a fishing technique using encircling nets and light to attract fish. This is why it is known as “Lamparo” (light fishing).

#### a- Mahres

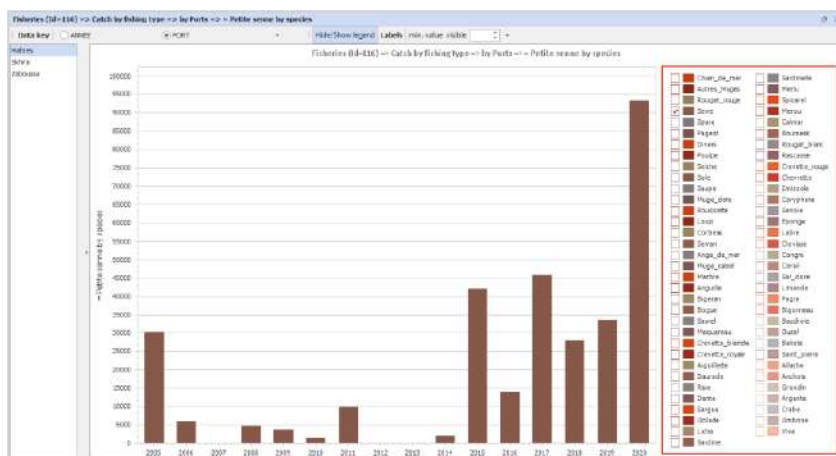
The species that were captured by purse seine were: Serre, Divers, Saurel, Maquereau, Sardine, Sardinelle, Coryphene, Seriole, Ouzef, Allache, Anchois.

Most of the production was ensured by the species Sardine, Saurel, followed by Maquereau.



#### /Serre

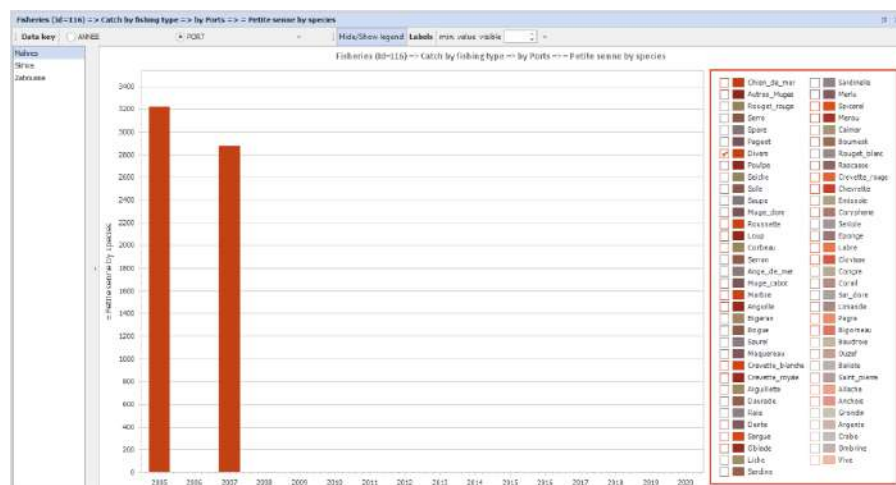
There are no records for the years 2007, 2012 and 2013. The production started to recover from 2015 with a maximum value in 2020.



## /divers

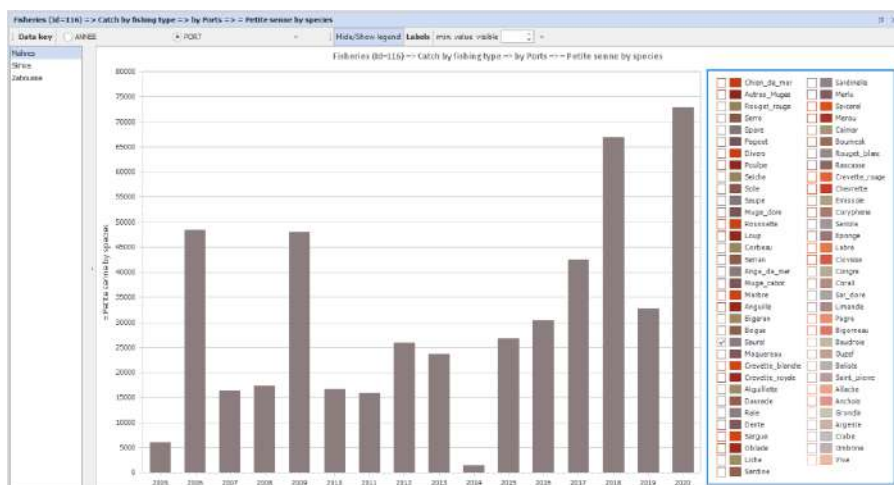
This group is composed of all the fishes that weren't identified.

This group of species was detected only in 2005 and 2007. These records might be due to errors in entering the data.



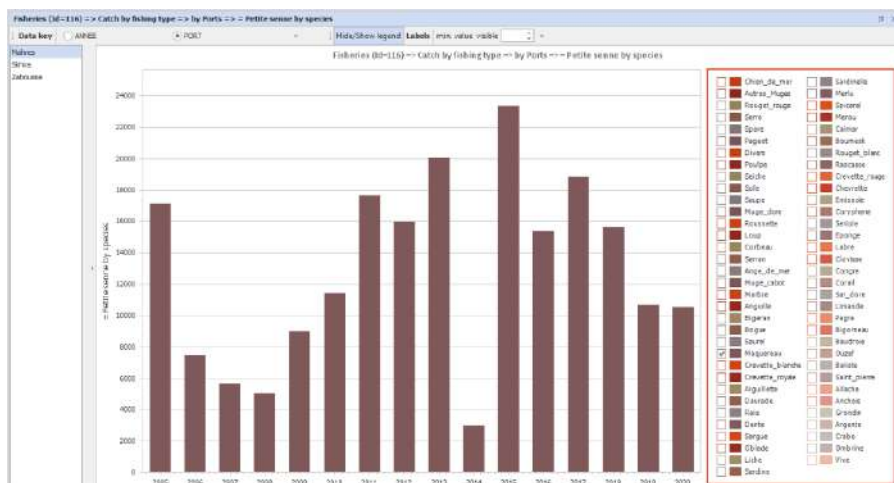
## /Saurel

The minimum value was registered in 2014 and the highest values were recorded in 2018 and 2020.



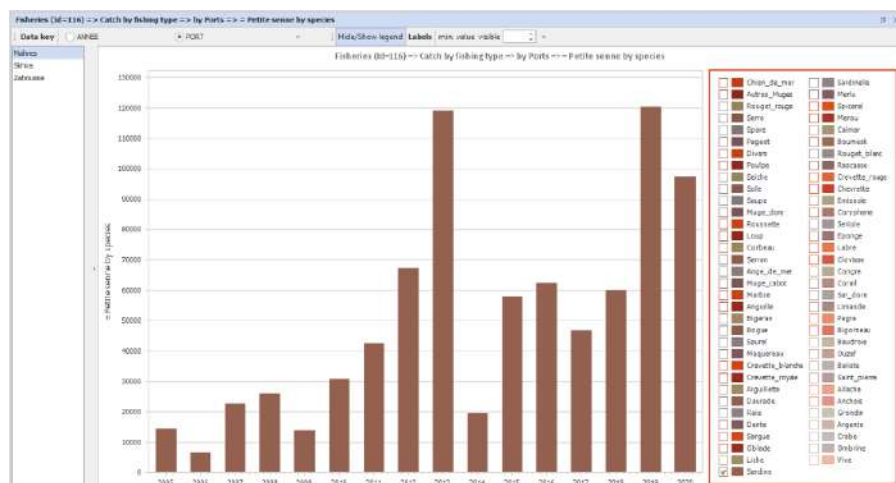
#### /Maquereau

The maximum values were in 2013 and 2015. The minimum value was in 2014 (a sudden drop).



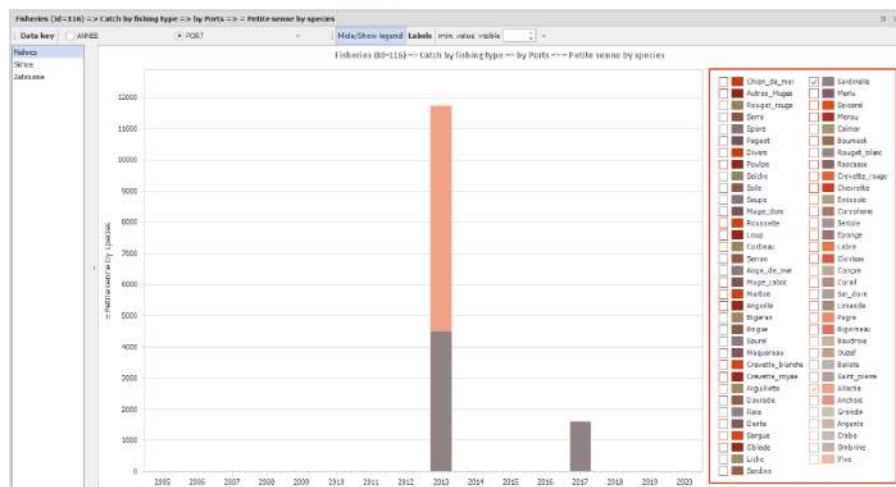
#### /Sardine

The production was very low from 2005 to 2009, then, started to recover from 2010 to 2013, suddenly, it dropped in 2014. From 2015 to 2018, it was constant, then, reached its maximum in 2019.



### /Sardinelle (Allache)

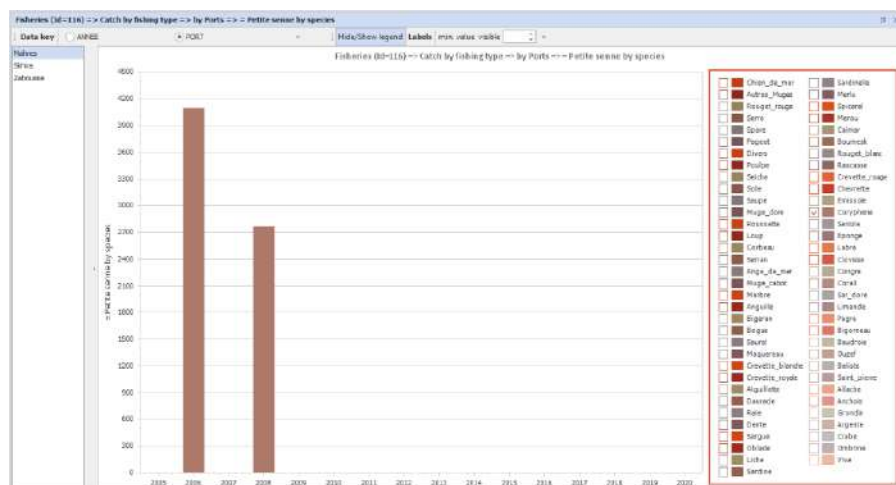
These two species are the same. They were only registered in 2013 and 2017.



### /Coryphene

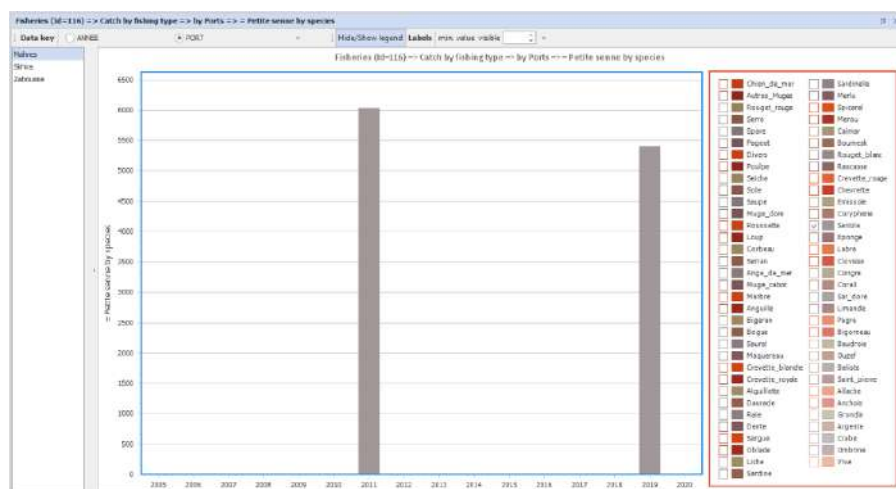
This species was only registered in 2006 and 2008.





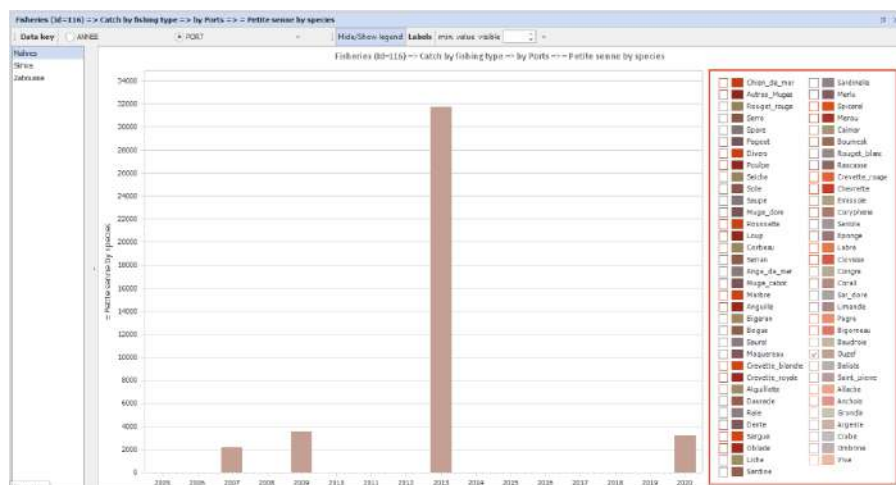
## /Seriole

It was only reported in 2011 and 2019.



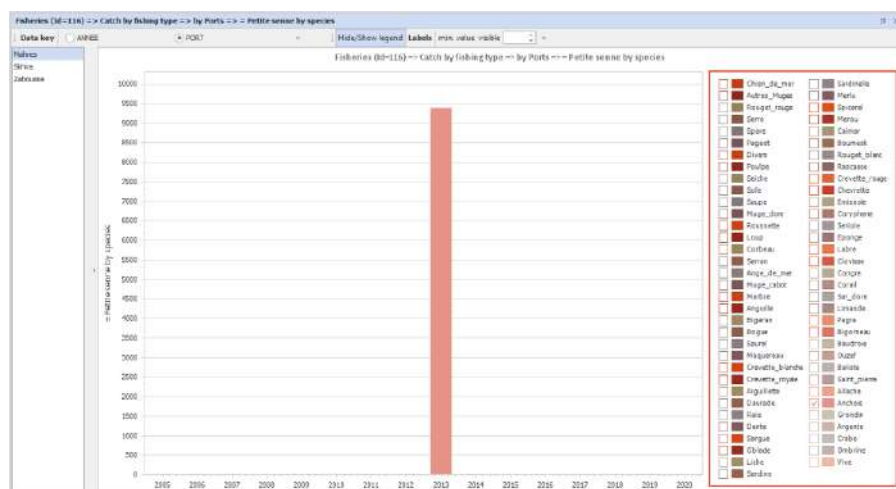
## /Ouzef

In 2013, it reached the highest value. The remaining values of the production were very low and were recorded in 2007, 2009 and 2020.



## /Anchois

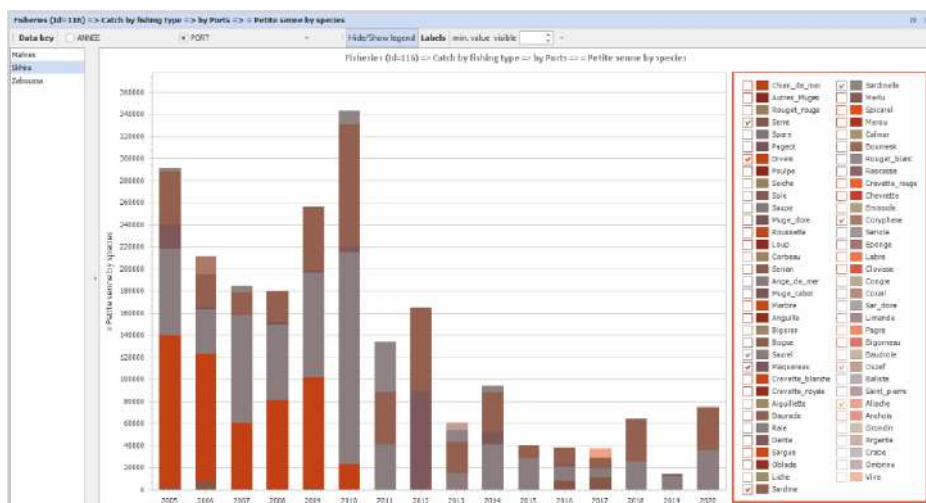
The only value was reported in 2013.



## b- Skhira

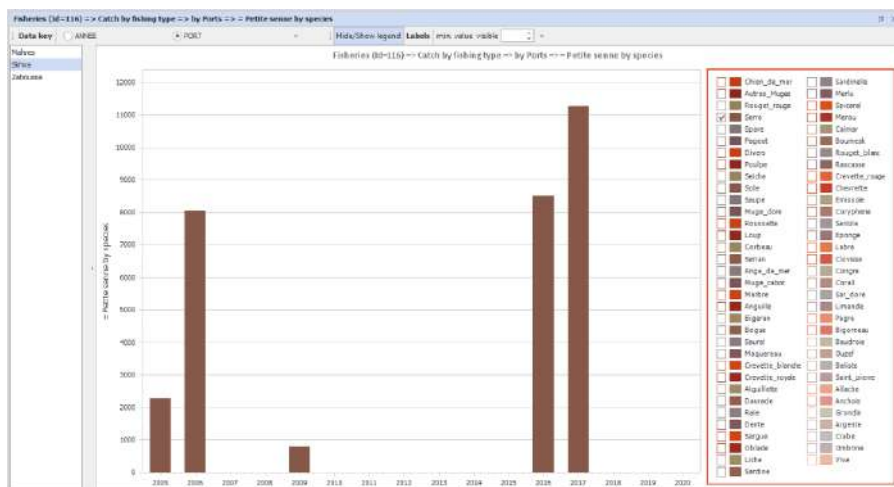
The species caught and recorded were the following: Serre, Divers, Saurel, Maquereau, Sardine, Sardinelle, Coryphene, Ouzef, Allache. Anchois records were absent.

Most of the production was ensured by Saurel and Sardine.



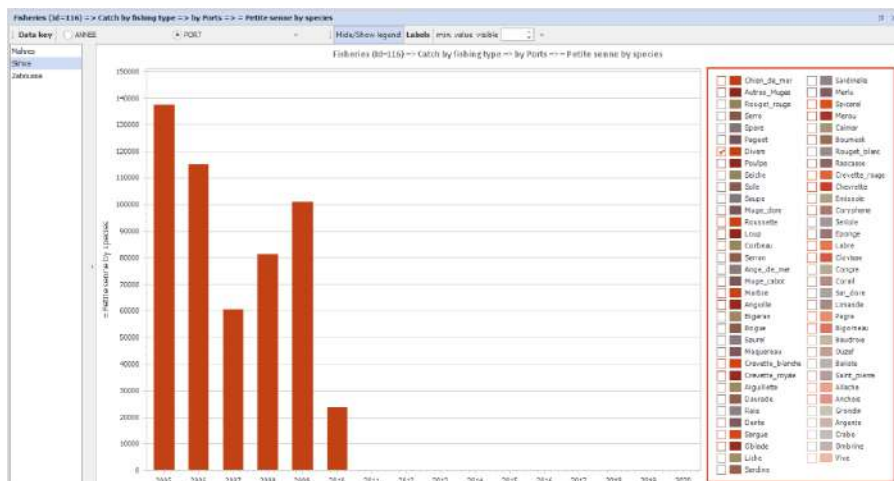
## /Serre

The only years where we had records of this species are: 2005, 2006, 2009 (min value), 2016 and 2017 (max value).



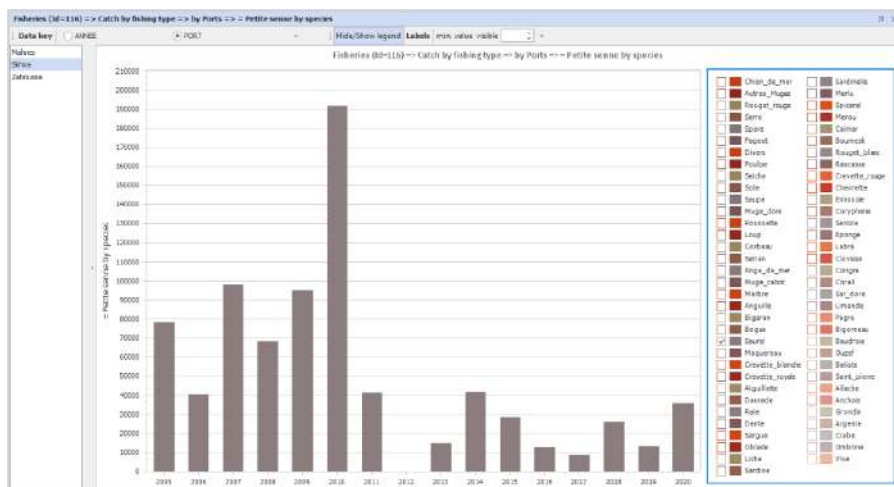
## /Divers

It was recorded only in the first years like in Mahres and then never reappeared again. The hypothesis which can be made is that this can be due to identification difficulties for some species in these years.



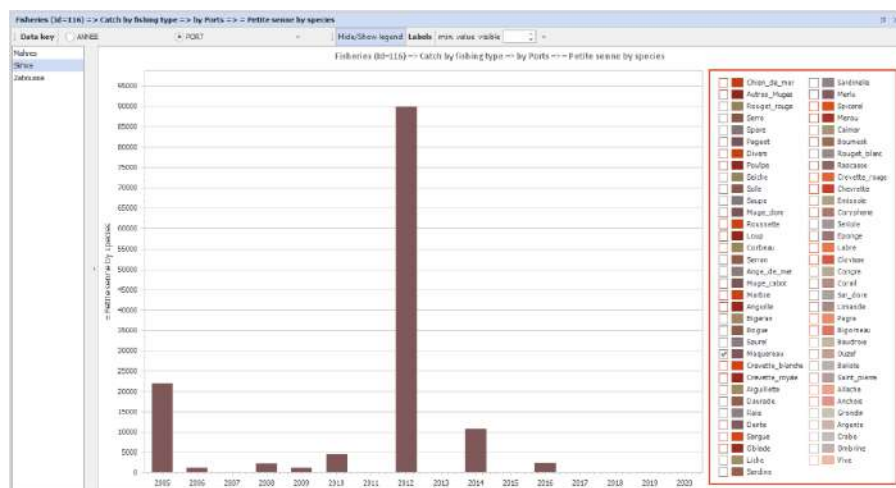
/Saurel

The production was at its minimum values after the peak in 2012 with a no value in 2012.



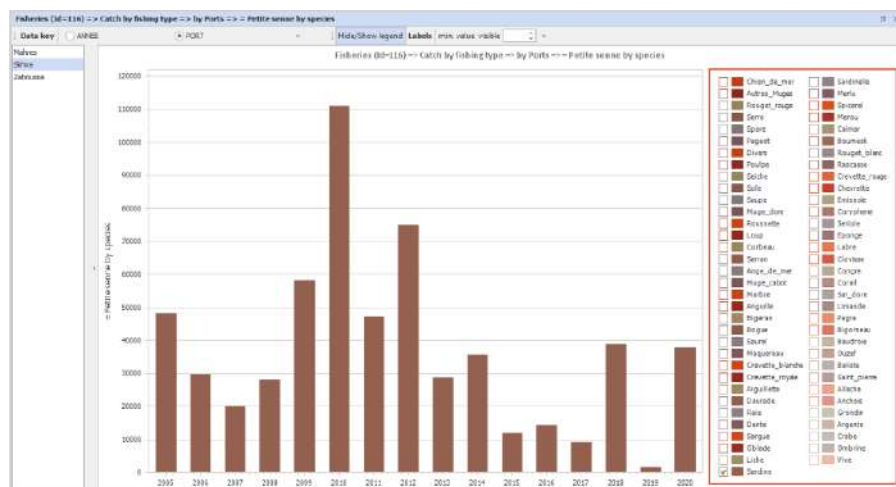
/Maquereau

The peak of the production was recorded in 2012. All the other values were very low with no values in 2007, 2011, 2013, 2015, 2017 until 2020.



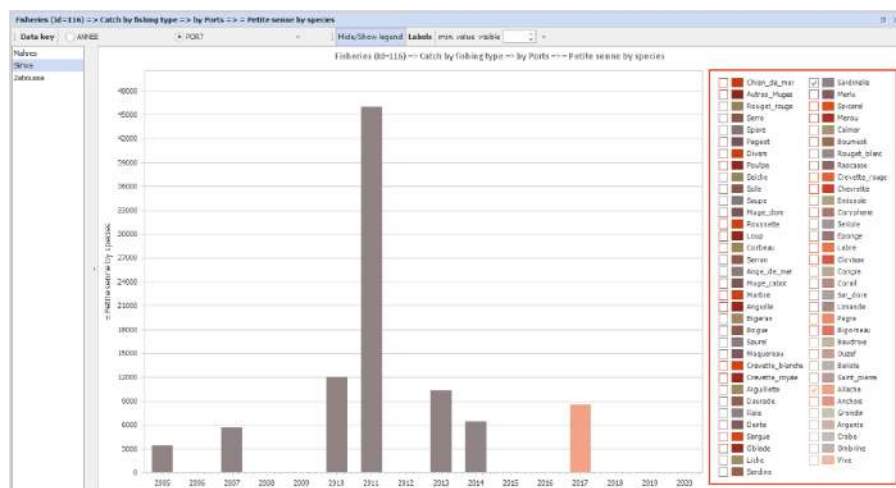
#### /Sardine

The maximum values were in 2010 and 2012 and the minimum value was in 2019.



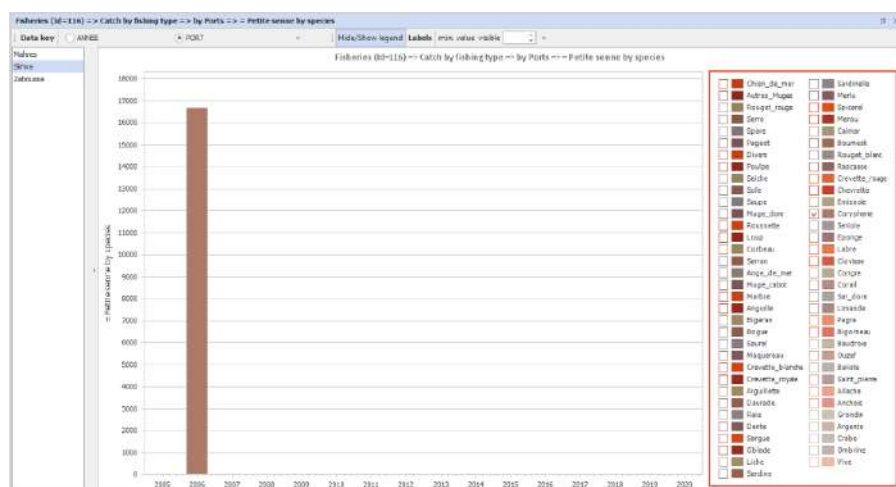
#### /Sardine (Allache)

The maximum value was in 2011. The other values were very low in 2005, 2007, 2010, 2013, 2014 and 2017. The rest of the years the species records were absent.



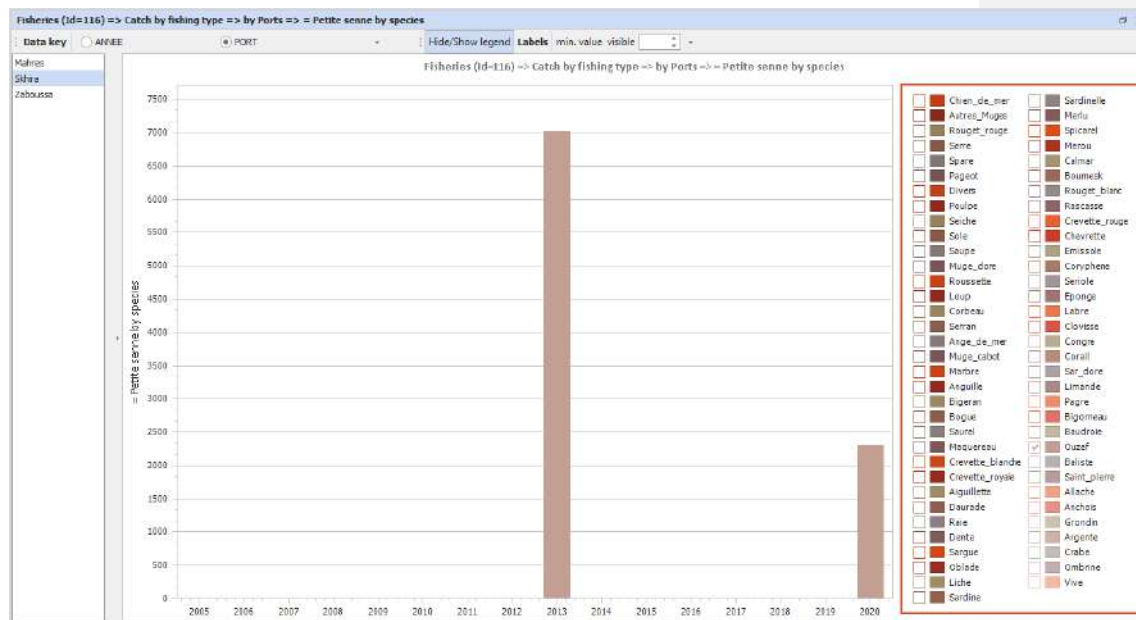
## /Coryphene

It was spotted only in 2006.



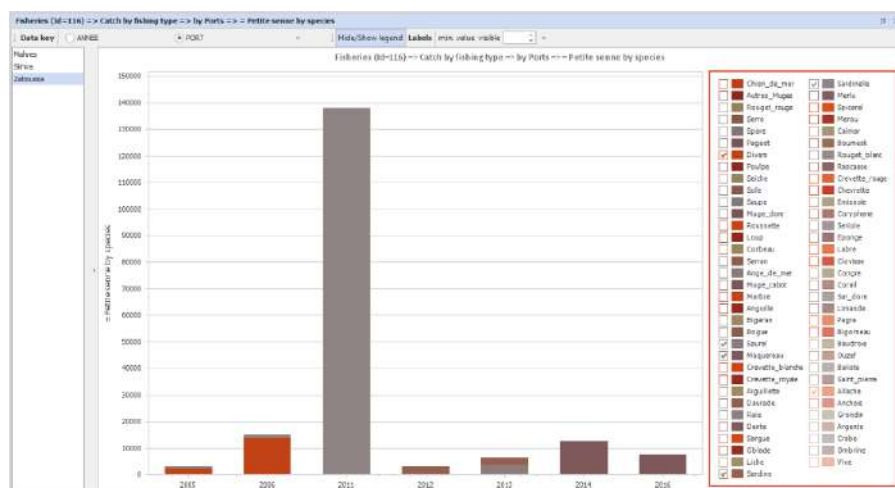
## /Ouzef

It registered only two values in 2013 and 2020.



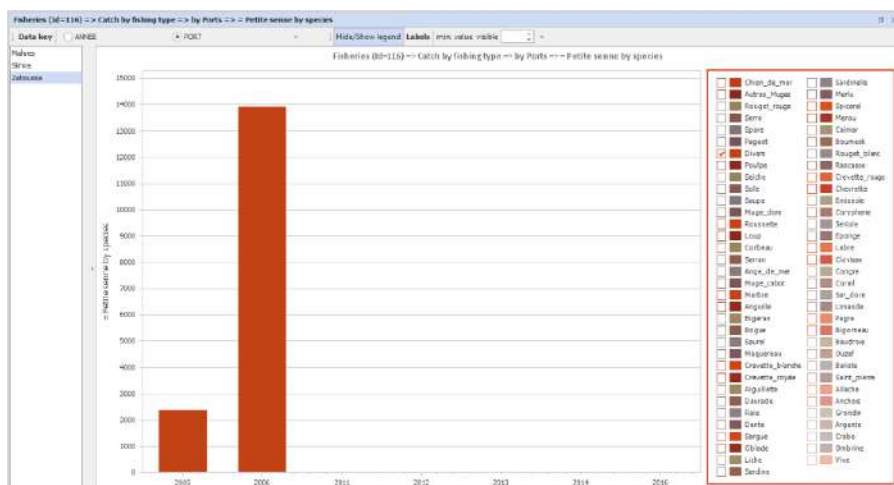
### c- Zaboussa

The present species in this port fished by purse seine were: Divers, Saurel, Maquereau, Sardine, Sardinelle (Allache).



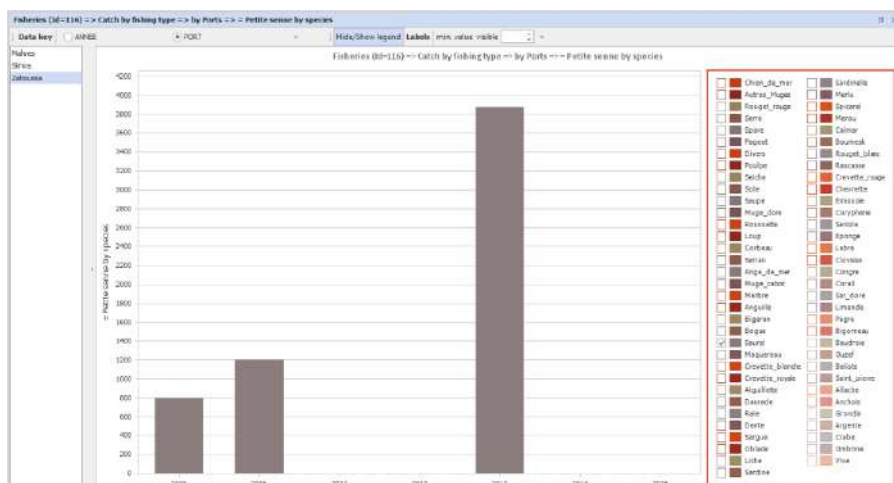
### /Divers

Similar to Mahres and Skhira, this group of species was only registered in the first years and was never signalled again, confirming the hypothesis that it can be due to inability of identifying the species at the beginning.



## /Saurel

It was only recorded in 2005, 2004 and 2013(max value).

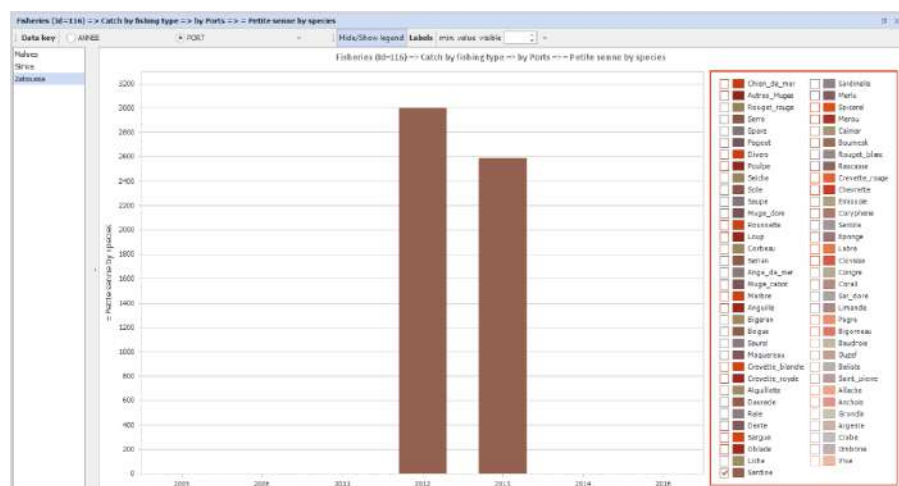


## /Maquereau

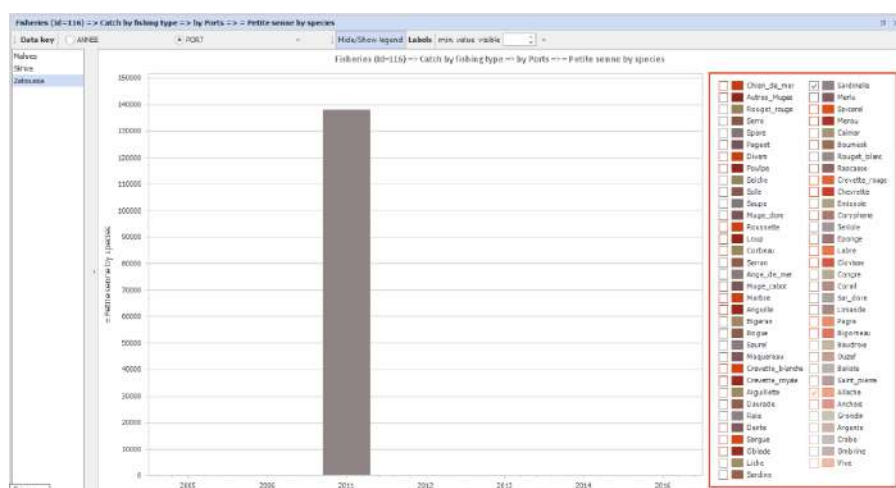
It was only reported in 2014 and 2016.



It was only spotted in 2012 and 2013.



Only one value was registered in 2011.



## Conclusion

-> Most of the production in purse seine fishing was ensured by Sardine, Saurel and Maquereau. These species were the ones targeted by the fisherman and have more commercial value in the market.

-> In Mahres, the production of the species Sardine, Saurel and Maquereau was getting recovered and stabilized, but, in Skhira it was diminishing in the recent years and in Zaboussa only few records were spotted. The minimal values of these species were registered in 2014 in Mahres.

-> Sardinelle and Allache are the same species. It is highly recommended to correct this confusion in the national fisheries' statistics.

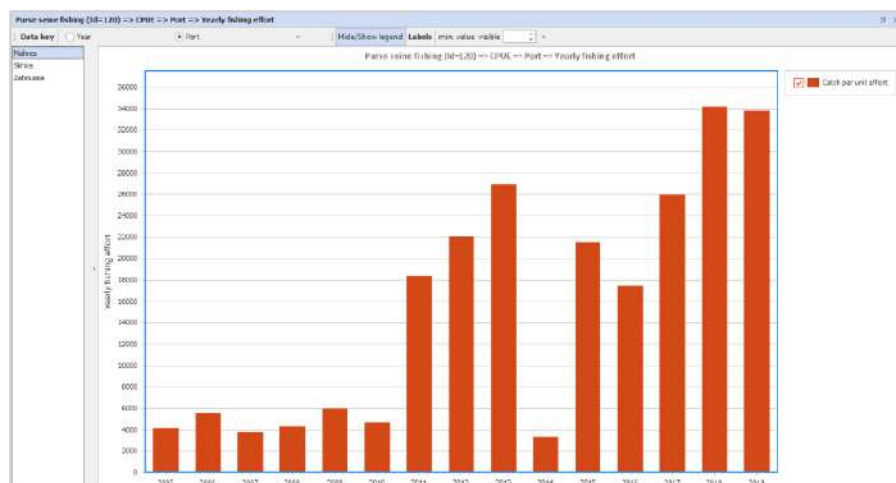
-> Rouget\_rouge in January 2012 in Mahres wasn't fished by purse seine. It is recommended to correct this by deleting it from this fishing type and replacing it in coastal fishing.

-> Coryphene is a species of high priority for management in the Mediterranean area. The production of this species in Sfax represents maximum 2% of the national production.

## 2.CPUE

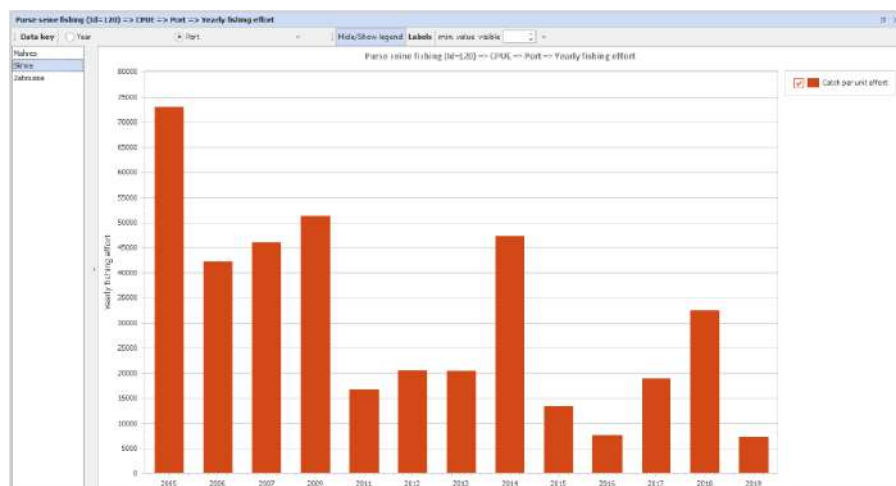
### a- Mahres

The CPUE was weak from 2005 until 2010. This means that the fishing resources weren't exploited enough because of the low values of the fishing effort. Then, it grew from 2011 until 2020, except for 2014 where it recorded a minimal value. From 2011, the authorizations to practice the fishing activity as well as the gasoil for navigation were given to encourage the exploitation of the marine resources in this sector. In 2014, an event happened and led to the big decrease of the CPUE. The fishing effort of 2013 might be a cause of stress that was applied unconsciously on the stock not allowing it to regenerate normally. These hypotheses have to be verified.



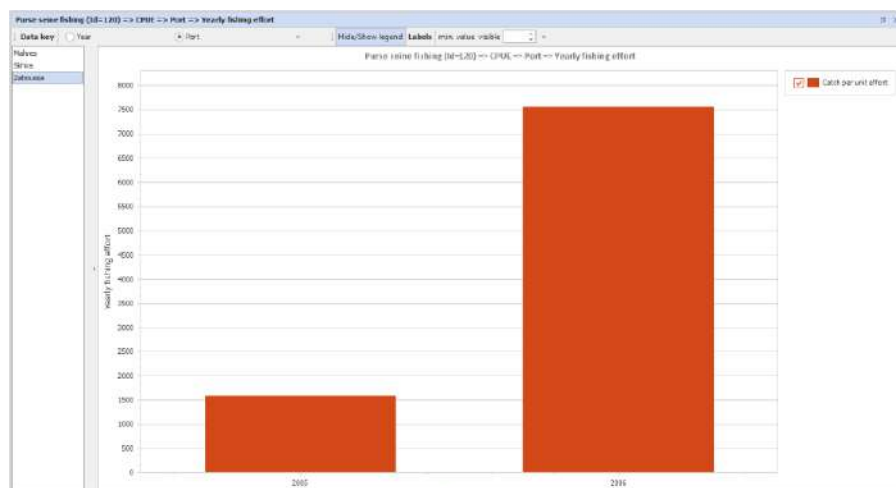
**Skhira**

The CPUE in this fishing area was important in 2005, 2006, 2007 and 2009. Between these years, the CPUE didn't register any values. Then, it was irregular and mostly weak.



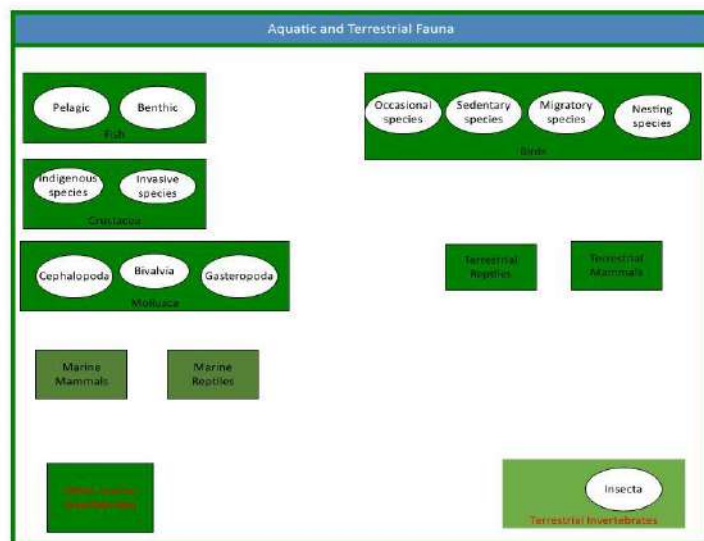
**Zaboussa**

The CPUE recorded only two values in 2005 and 2006.



## **B-Aquatic and Terrestrial Fauna**

Number of species is the indicator that we used to describe the components and the subcomponents of this box. It is also the most used in biodiversity monitoring.

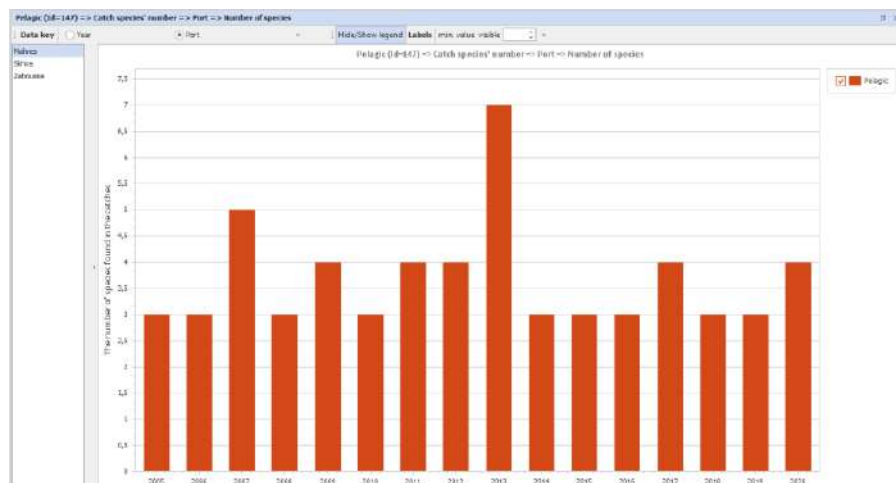


### **1.Fish**

#### **1.1-Pelagic**

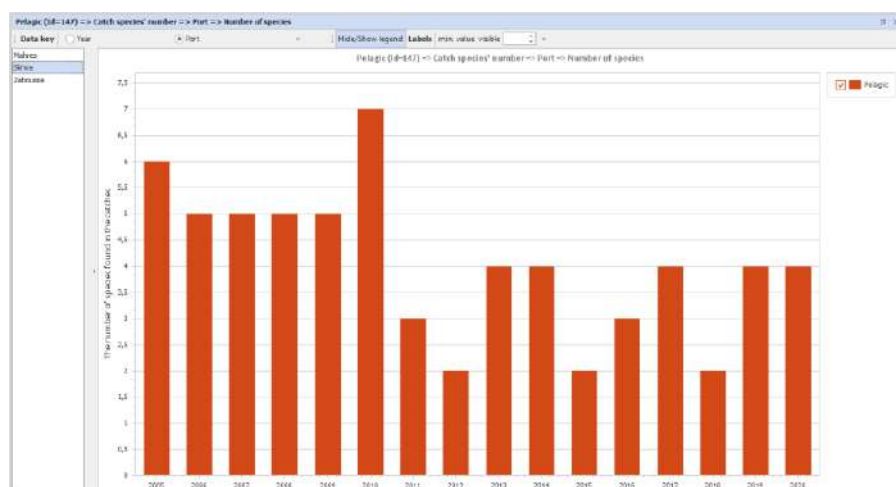
##### **a- Mahres**

The specific richness for pelagic fish is mostly equal to 3 for all the years. It scored its highest value in 2013 where we 7 species were found.



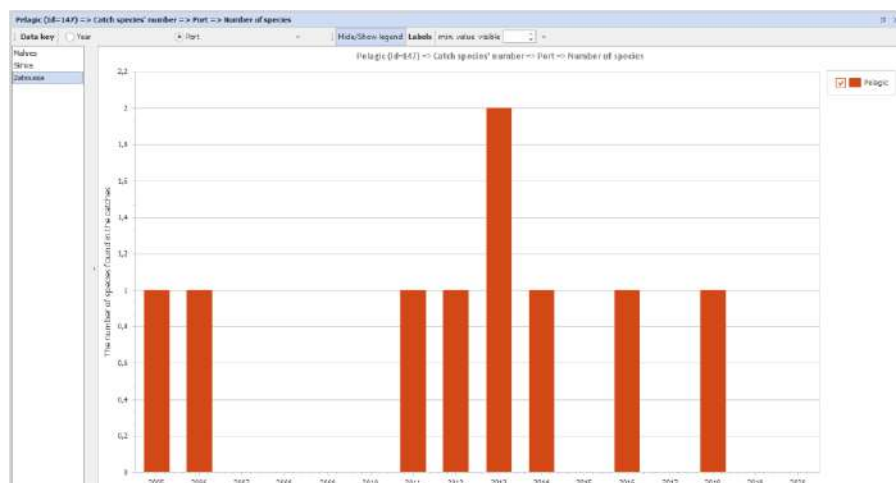
#### b- Skhira

The specific richness was regular and high until 2011.



#### c- Zaboussa

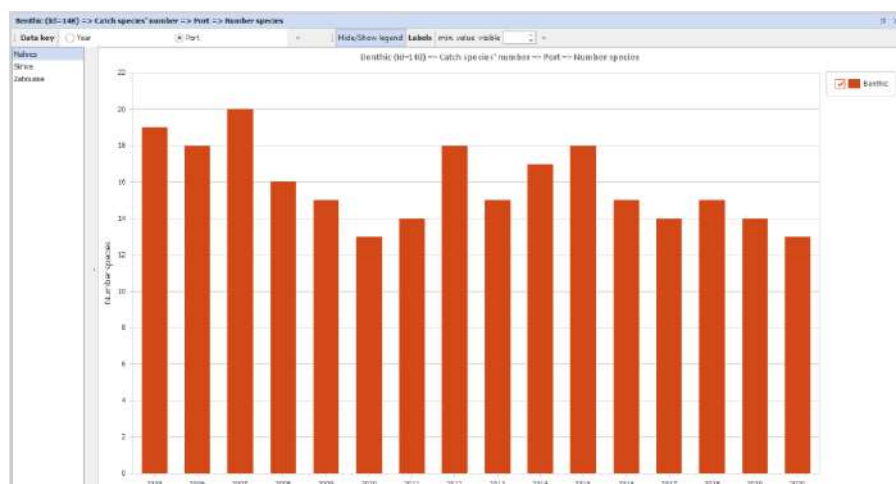
In this harbor, the number of species is irregular and most of the time with no values.



### 1.2-Benthic

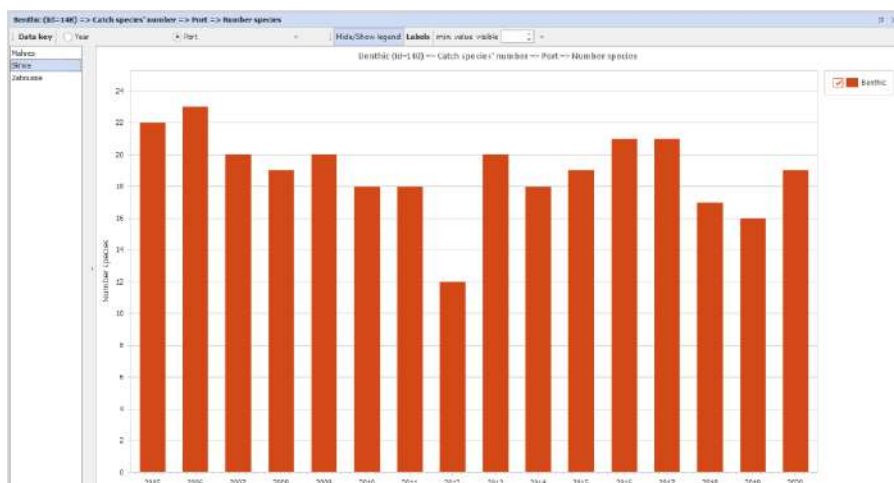
#### a- Mahres

The specific richness is regular and high fluctuating between 13 and 20.



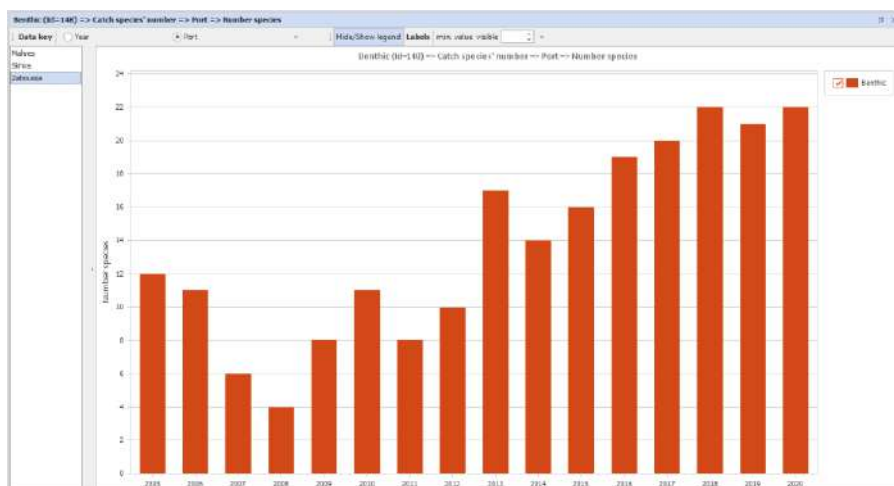
#### b- Skhira

The specific richness is regular and high fluctuating between 12 and 23.



**c- Zaboussa**

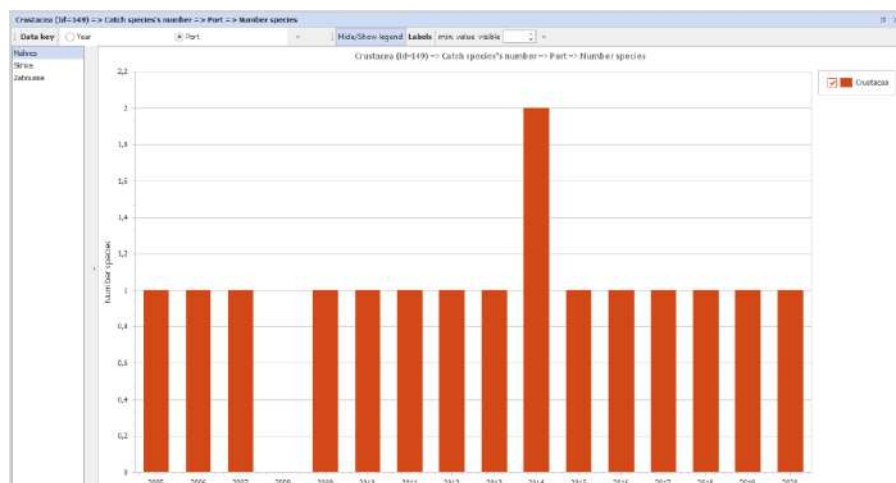
The specific richness was irregular from 2005 until 2012 varying between 4 and 12. From 2013, it decreased and scored values varying from 14 to 22.



**2. Crustacea**

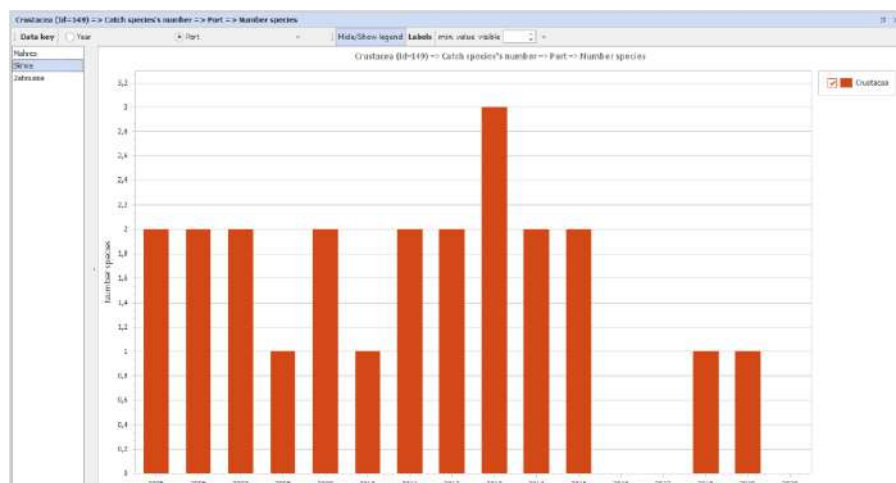
**a- Mahres**

The number of species was equal to 1 in most of the years and 2 (just in 2014). In 2008, it was didn't register any values.



**b- Skhira**

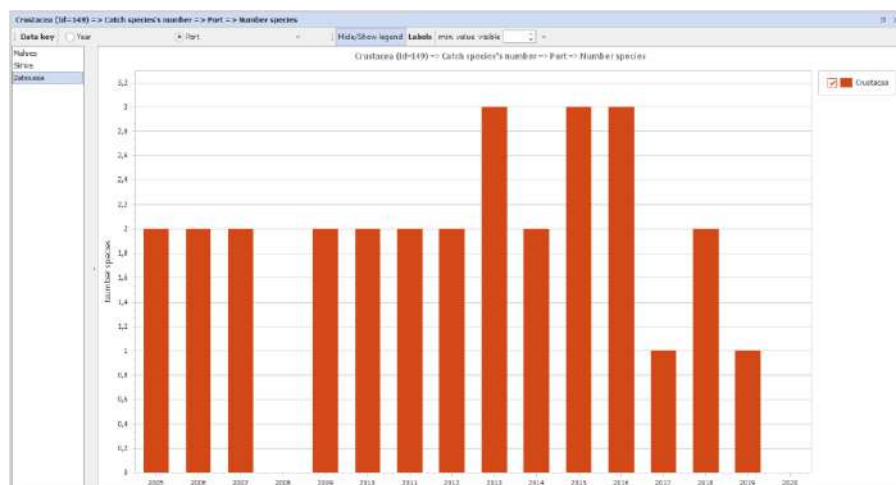
The specific richness varied from 1 to 3 and it didn't register any values in 2016 and 2017.



**c- Zaboussa**

The number of species varied between 1 and 3 with no value in 2008.





### 3. Mollusca

#### 3.1-Cephalopoda

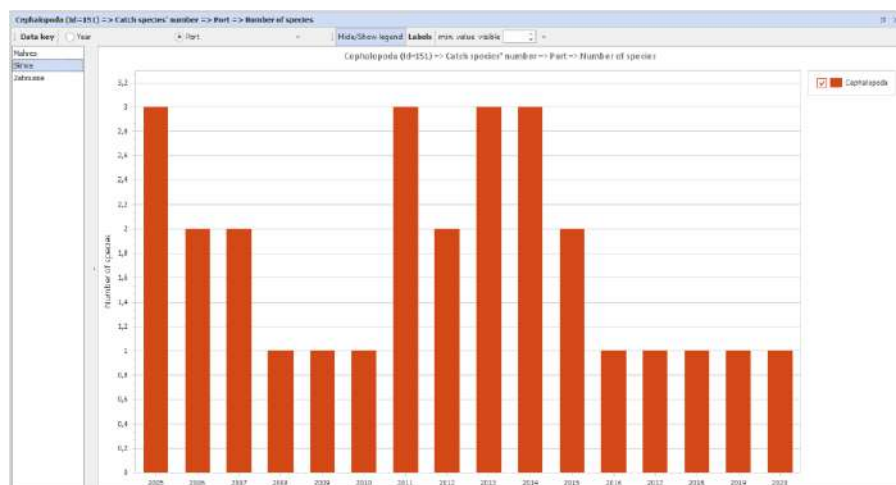
##### a- Mahres

It varied from 1 to 3.



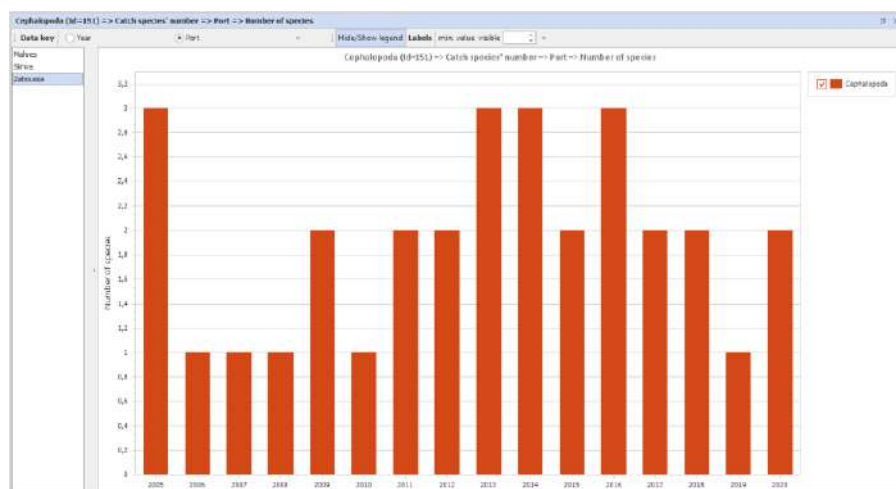
##### b- Skhira

It varied from 1 to 3.



**c- Zaboussa**

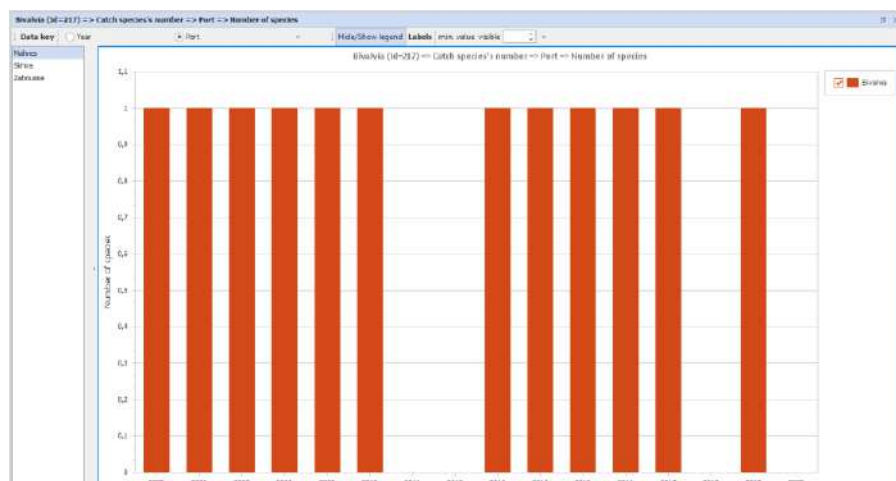
It varied from 1 to 3.



**3.2-Bivalvia**

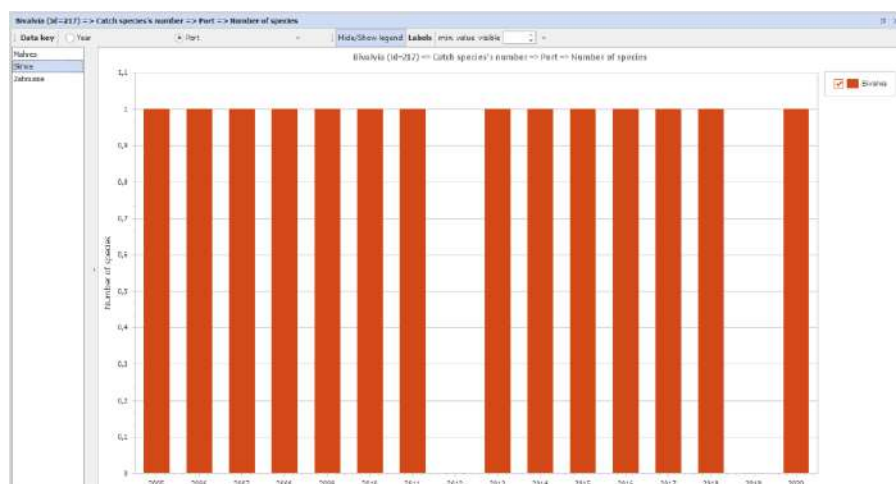
**a- Mahres**

It was equal to 1 in most of the years with no data in 2011, 2012 and 2018.



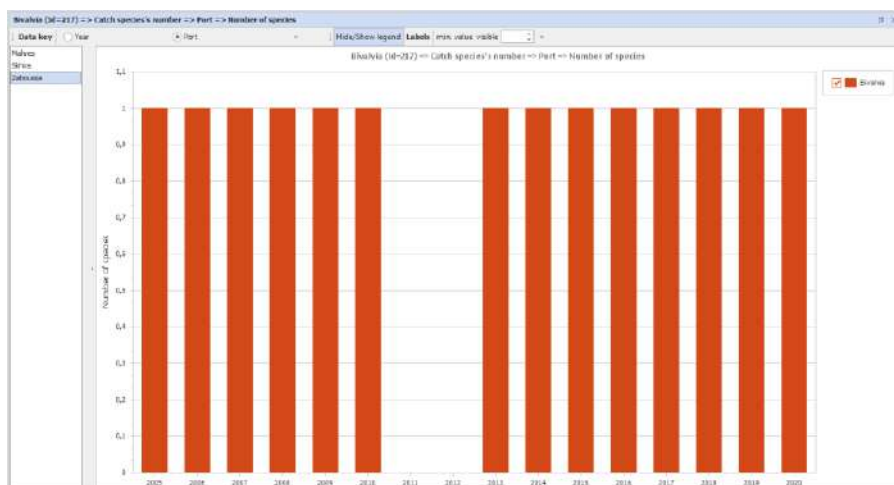
**Skhira**

It was equal to 1 in most of the years with no values in 2012 and 2018.



**Zaboussa**

It was equal to 1 in most of the years with no records in 2011 and 2012.



## Supplementary material

### Species'scientific name

The species in this document are named in the same way used in the database and ISP. It corresponds to the common name used in the fisheries' statistics department of DGPA.

Table of all species' common names and its corresponding scientific name found in the original fisheries'doc given by Hanem (need to be completed below)

| Species common name | Species scientific name                |
|---------------------|--|
| Clovisse            | <u><i>R. decussatus</i></u>            |
| Muge doré           | <u><i>Liza aurata</i></u>              |
| Muge cabot          | <u><i>Mugil cephalus</i></u>           |
| Autres Muges        | <u><i>lisa saliens</i></u>             |
| Poulpe              | <u><i>O. vulgaris</i></u>              |
| Seiche              | <u><i>S. officinalis</i></u>           |
| Sardine             | <u><i>Sardina pilchardus</i></u>       |
| Crevette royale     | <u><i>P. kerathurus</i></u>            |
| Boumesk             | <u><i>E. moschata</i></u>              |
| Ouzef               | <u><i>Atherina boyeri</i></u>          |
| Sardinelle          | <u><i>Sardinella aurita</i></u>        |
| Allache             | <u><i>Sardinella aurita</i></u>        |
| Crevette blanche    | <u><i>Metapenaeus monoceros</i></u>    |
| Crabe               | <u><i>Portunus segnis</i></u>          |
| Calmar              | <u><i>L. vulgaris</i></u>              |
| Chevrette           | <u><i>Parapenaeus longirostris</i></u> |
| Crevette rouge      | <u><i>Aristeus antennatus</i></u>      |

All species:

| Species common name | Species scientific name |
|---------------------|-------------------------|
| Chien_de_mer        |                         |
| Raie                |                         |
| Merlu               |                         |
| Rouget_blanc        |                         |
| Rouget_rouge        |                         |
| Rascasse            |                         |
| Merou               |                         |
| Sole                |                         |
| Marbre              |                         |
| Spare               |                         |
| Pageot              |                         |
| Saupe               |                         |
| Muge_dore           |                         |
| Muge_cabot          |                         |
| Autres_Muges        |                         |
| Roussette           |                         |
| Loup                |                         |
| Daurade             |                         |

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| Liche            |  |
| Labre            |  |
| Bogue            |  |
| Dente            |  |
| Pagre            |  |
| Sar_dore         |  |
| Serran           |  |
| Brochet_de_mer   |  |
| Limande          |  |
| Corbeau          |  |
| Ange_de_mer      |  |
| Sargue           |  |
| Aiguillette      |  |
| Oblade           |  |
| Emissole         |  |
| Congre           |  |
| Baudroie         |  |
| Baliste          |  |
| Saint_pierre     |  |
| Grondin          |  |
| Argente          |  |
| Anguille         |  |
| Bigeran          |  |
| Spicarel         |  |
| Sardine          |  |
| Sardinelle       |  |
| Allache          |  |
| Anchois          |  |
| Ouzef            |  |
| Coryphene        |  |
| Seriole          |  |
| Serre            |  |
| Saurel           |  |
| Maquereau        |  |
| Poulpe           |  |
| Seiche           |  |
| Boumesk          |  |
| Calmar           |  |
| Crevette_royale  |  |
| Crevette_rouge   |  |
| Crevette_blanche |  |
| Chevrette        |  |
| Langouste        |  |
| Crabe            |  |
| Clovisse         |  |
| Bigorneau        |  |
| Ombrine          |  |
| Divers           |  |

### Closure of clam harvesting campaigns due to phytoplankton blooms

|         | January | February | March | April | 1 - 15<br>May | 16 - 31<br>May | June | July | August | September | October | November | December |
|---------|---------|----------|-------|-------|---------------|----------------|------|------|--------|-----------|---------|----------|----------|
| 2009    |         |          |       |       |               |                |      |      |        |           |         |          |          |
| 2010    |         |          |       |       |               |                |      | *    |        |           |         |          |          |
| 2011    |         |          |       | *     |               |                |      |      |        |           |         |          |          |
| S3 2012 |         |          |       | *     | *             |                |      |      |        |           |         |          |          |
| 2009    |         |          |       |       |               |                |      |      |        | *         |         |          |          |
| 2010    |         | **       | **    |       |               |                | *    |      | **     | *         |         | *        |          |
| 2011    |         |          |       |       | *             |                |      |      |        |           |         |          |          |
| 2012    |         |          |       |       |               |                |      |      |        | **        | **      | *        |          |
| 2019    | *       |          |       |       |               |                |      |      |        | *         | ***     | *        |          |
| S5 2020 |         | *        | **    |       |               | *              |      | *    |        | *         | **      | *        |          |
| 2009    |         |          |       |       |               |                |      |      |        | ***       |         | *        |          |
| 2010    |         |          | *     |       |               |                |      | *    |        | *         | *       |          | *        |
| 2011    |         | ****     | ***   | **    | *             |                |      |      |        |           |         |          |          |
| 2012    |         |          | *     |       | *             |                |      |      |        | ***       | ***     |          |          |
| S6 2019 | *       |          |       |       |               |                |      |      |        |           | **      | *        | *        |

\* Closed station  
 Closed campaign

S3: Mahres

S5:Zaboussa

S6:Skhira



🚦 Crab day Skhira

Outcomes, reports, photos, summary on strategies or protocols...

**Commented [FP3]:** Still to add?



