



## REPORT ON THE SPANISH F/V TRONIO RESEARCH ACTIVITIES IN THE NORWEGIAN TERRITORIAL WATERS AROUND THE BOUVET ISLAND

The Norwegian Directorate of Fisheries, MSR Office, granted consent to the F/V Tronio by Royal Decree of 30th March 2001 No. 360 in order to conduct marine scientific research in the Norwegian territorial waters around the Bouvet Island in the period 05.03.2020-15.04.2020. It has been sent in response to the Embassy's request dated 25th February 2020, concerning marine scientific research in the Norwegian territorial waters around the Bouvet Island.

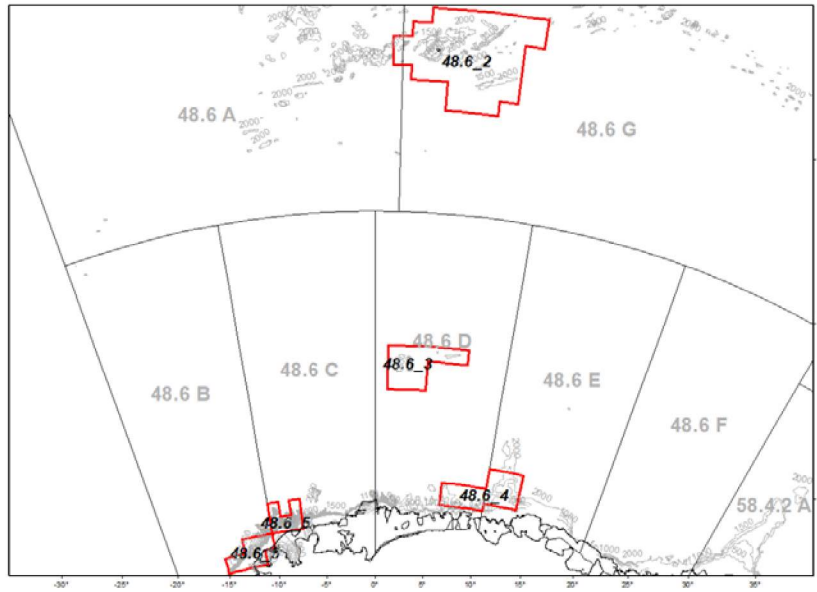
The purpose of this cruise is to complete one aspect of the research fishing commitments under Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) toothfish research fishing program.

As a Norwegian mandatory regulation, final results and conclusions from the cruise should be made available to the Directorate of Fisheries within six months after the completion of the cruise that is the aim of this report.

The Spanish F/V Tronio is working within the CCAMLR convention area since the last decade, mainly focused in the Ross sea area.

Spain joined a collaborative research program in 2019 that was being undertaken by Japan and South Africa since 2013 to enhance data collection and analysis in the CCAMLR subarea 48.6 under CM 21-02. The overriding aim of the proposal is to strengthen the basis of stock assessments for Antarctic toothfish (*Dissostichus mawsoni*) and ecosystem understanding in a data-poor area, by using traditional and new technology.

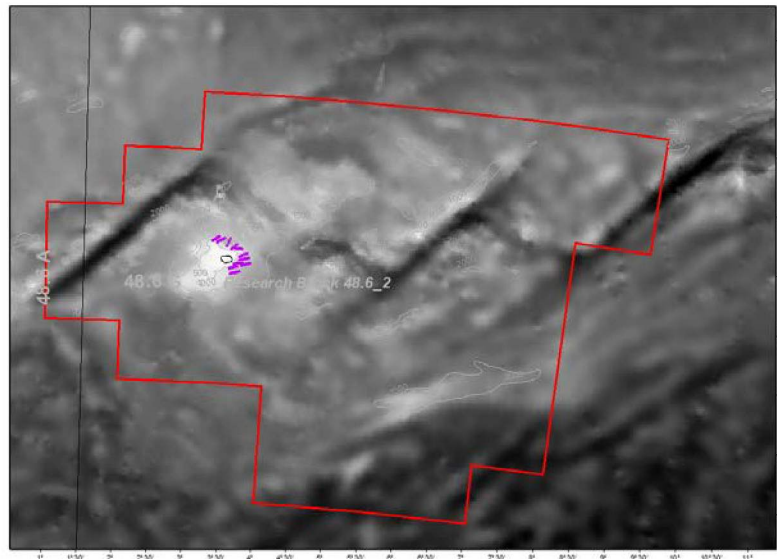
The research plan concentrates fishing effort in locations where tagged fish have been released to increase the amount of data and the number of tags available for recapture, so four research blocks (RB) were designated in Subarea 48.6 (Figure 1 below).



**Figure 1:** Research blocks designated to the collaborative research survey in the 48.6 subarea.

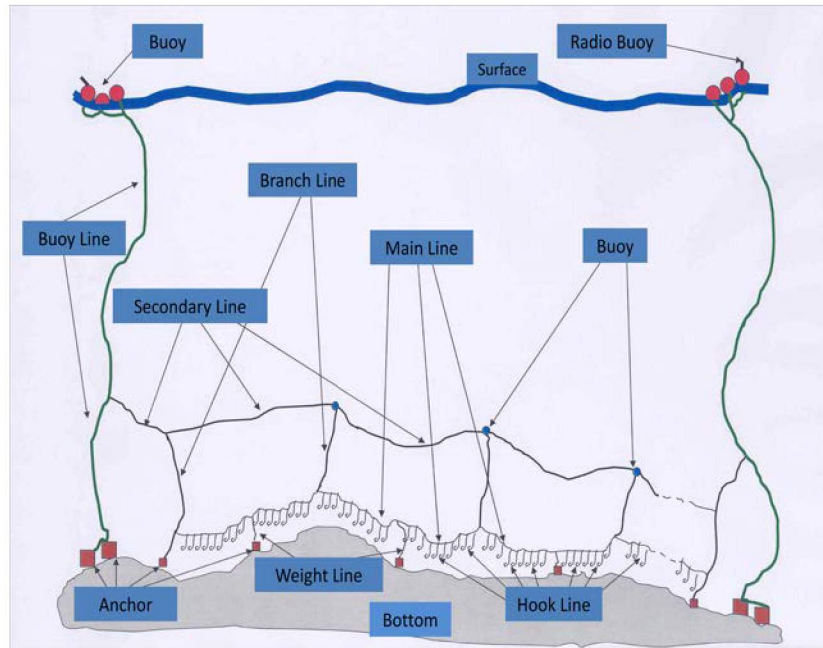
The Northern 48.6\_2 RB includes the Norwegian territorial waters around the Bouvet Island. In this RB both toothfish species, the Patagonian (*Dissostichus eleginoides*-TOP) and Antarctic toothfish (*D. mawsoni*-TOA), overlap.

The Cruise Dates (boarding to disembarkation) were from 18-11-2019 to 02-05-2020 and activities within the Bouvet vicinity were from 17<sup>th</sup> to 19<sup>th</sup> March 2020, where a total of 11 sets have been hauled (Figure 2).



**Figure 2:** Location of the 11 sets (purple) made in the vicinity of Bouvet island within the RB 48.6\_2 (in red).

The fishing gear used is the Bottom Longline - Spanish System. The double system (Spanish LL) (Fig. 3) consists of an upper line (secondary line) and a main line from which the hooks are attached by a branch line. The diameter of the upper line is 16 mm. Main line materials are made of nylon (4 mm of  $\varnothing$ ) in the first and last sections of the gear while most of the gear is monofilament rope (5 mm of  $\varnothing$ ).



**Figure 3:** The Spanish Bottom Longline system deployed on Spanish vessels.

The CCAMLR Conservation Measure 41-04 (2019) manages the limits on the exploratory fishery for *Dissostichus mawsoni* in Statistical Subarea 48.6. According to that, the total catch of *Dissostichus mawsoni* in the whole research block 48.6\_2 is 140 tonnes.

Each vessel participating in this exploratory fishery shall conduct fishery-based research in accordance with the Research Plan and Tagging Program. Toothfish shall be tagged at a rate of at least five fish per tonne green weight caught.

The by-catch in this fishery shall be regulated as set out in Conservation Measure 33-03 Any vessel catching a total of three (3) seabirds shall immediately change to night setting only (i.e. setting only during the hours of darkness between the times of nautical twilight)

Each vessel participating in the fishery shall have at least two scientific observers, one of whom shall be an observer appointed in accordance with the CCAMLR Scheme of International Scientific Observation, on board throughout all fishing activities within the fishing period.

## Catch

The total retained catch and number, number of *Dissostichus* spp species that have been tagged and released and CPUE, within the Norwegian territorial waters around the Bouvet Island are shown in the table below (Table 1)

**Table 1:** Catch retained (green weight), number, *Dissostichus* spp released with tags and CPUE (kg/1000hooks) by species.

Sp_cod	Scientific_name	Catch (k)	number	n tagged	CPUE (k/1000hooks)
TOP	<i>Dissostichus eleginoides</i>	3116	166	18	62.6
TOA	<i>Dissostichus mawsoni</i>	1476	54	1	29.7
GRV	<i>Macrourus spp</i>	198	165	0	4.0
MOY	<i>Muraenolepis microps</i>	3.4	5	0	0.1
ANT	<i>Antimora rostrata</i>	2.6	3	0	0.1

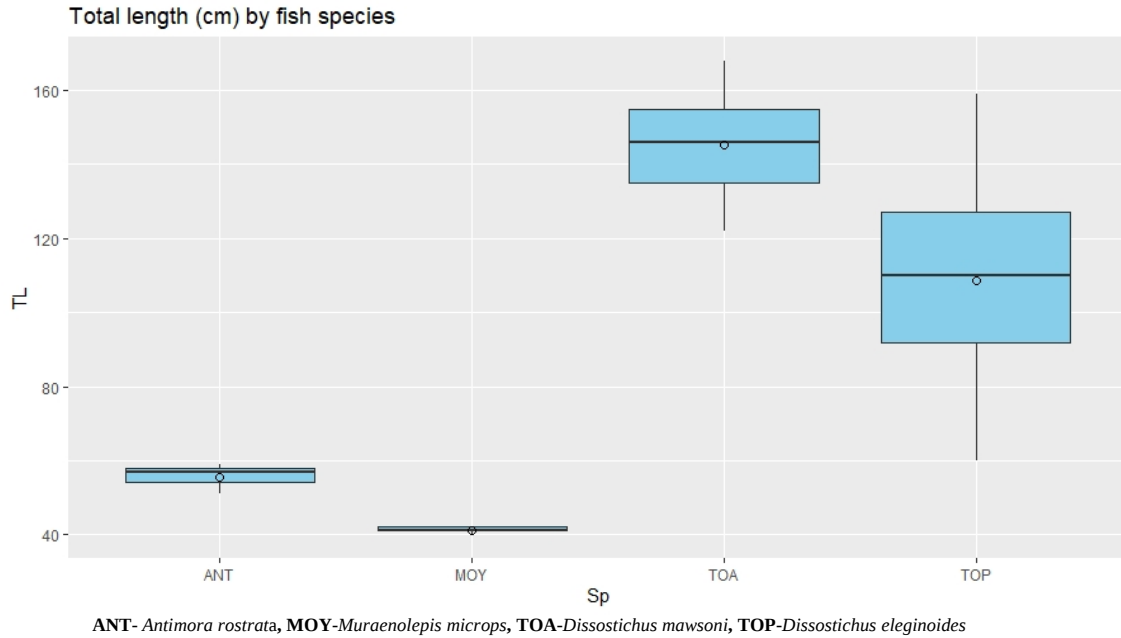
Patagonian toothfish (TOP) has been the most fished species followed by the Antarctic toothfish (TOA), which are the target species of this fishery. Toothfish catches by set are shown in Table 2 as well as the CPUE in kg/1000 hooks. Bottom depth prospected was from 672 to 1475m deep.

**Table 2:** Catch and effort data by toothfish species and set.

Set	length(m)	nhooks	day	depth(m)	Sp	weigth(k)	number_retained	number_lost	number_tagged	CPUE (k/1000hooks)
106	9125	4977	17-Mar-20	1475	TOA	123	4	0	0	24.7
106	9125	4977	17-Mar-20	1475	TOP	542	23	0	4	108.9
107	9125	4977	17-Mar-20	1290	TOA	69	2	0	0	13.9
107	9125	4977	17-Mar-20	1290	TOP	301	10	0	4	60.5
108	9125	4977	17-Mar-20	821	TOA	246	8	0	0	49.4
108	9125	4977	17-Mar-20	821	TOP	331	14	0	1	66.5
109	9125	4977	18-Mar-20	906	TOA	280	8	1	0	56.3
109	9125	4977	18-Mar-20	906	TOP	413	12	0	0	83.0
110	9125	4977	18-Mar-20	733	TOA	52	2	1	0	10.4
110	9125	4977	18-Mar-20	733	TOP	445	24	0	5	89.4
111	9125	4977	18-Mar-20	1103	TOA	268	13	0	0	53.8
111	9125	4977	18-Mar-20	1103	TOP	519	38	0	2	104.3
112	9125	4977	18-Mar-20	672	TOA	83	3	0	1	16.7
112	9125	4977	18-Mar-20	672	TOP	59	1	0	1	11.9
113	9125	4977	19-Mar-20	803	TOA	55	2	0	0	11.1
113	9125	4977	19-Mar-20	803	TOP	38	1	0	1	7.6
114	9125	4977	19-Mar-20	1289	TOA	77	2	0	0	15.5
114	9125	4977	19-Mar-20	1289	TOP	98	5	0	0	19.7
115	9125	4977	19-Mar-20	762	TOA	223	10	0	0	44.8
115	9125	4977	19-Mar-20	762	TOP	370	18	1	0	74.3

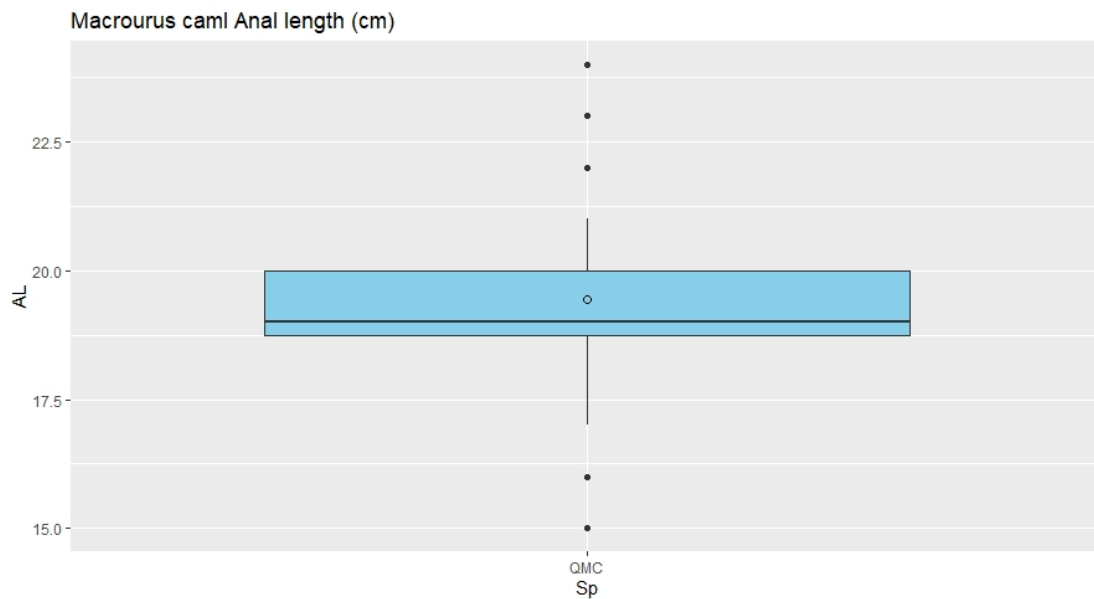
**Biological data:**

All fish species but Macrourids were measured to the Total Length to the lower cm. Data sampled by fish species is shown in a boxplot in Figure 4.



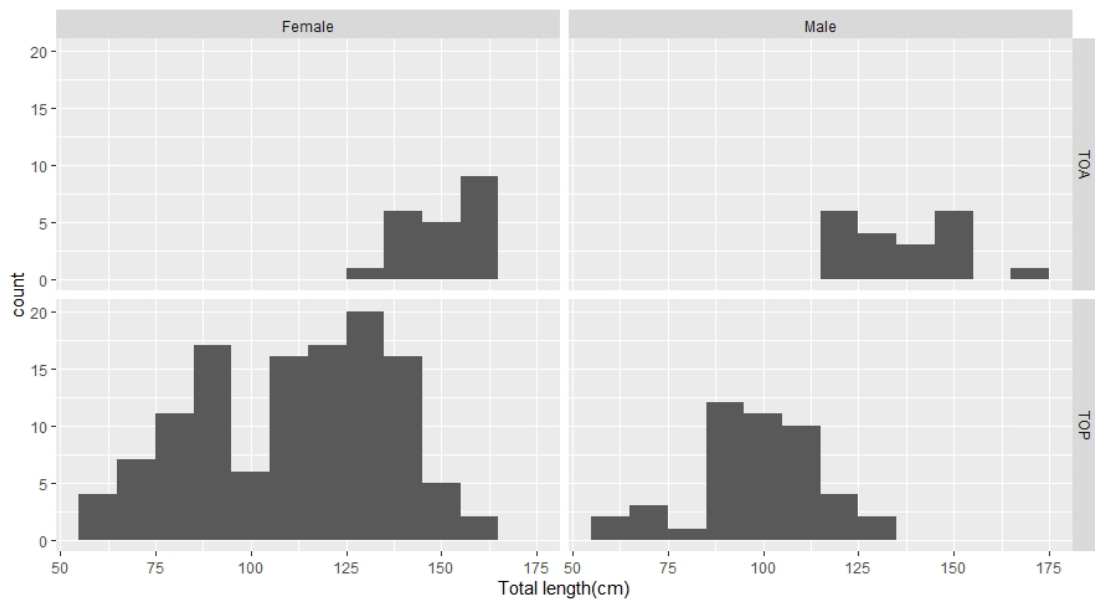
**Figure 4:** Total length (cm) by fish species. The circle on the boxplot is the mean TL value

Only one species of Macrourids (QMC-*Macrourus caml*) has been fished in the area. A boxplot with the anal length distribution (to ½ cm.) is shown in Figure 5.



**Figure 5:** Boxplot of the Anal length (½ cm) of *Macrourus caml*. The circle on the boxplot is the mean AL value.

Minimum and maximum size of Patagonian toothfish (TOP) is 60 cm (both male and female) and 129-159 for male and female respectively while Antarctic toothfish (TOA) sizes are bigger (122-135 and 135-165 for minimum-maximum and male-female size respectively)-Figure 6

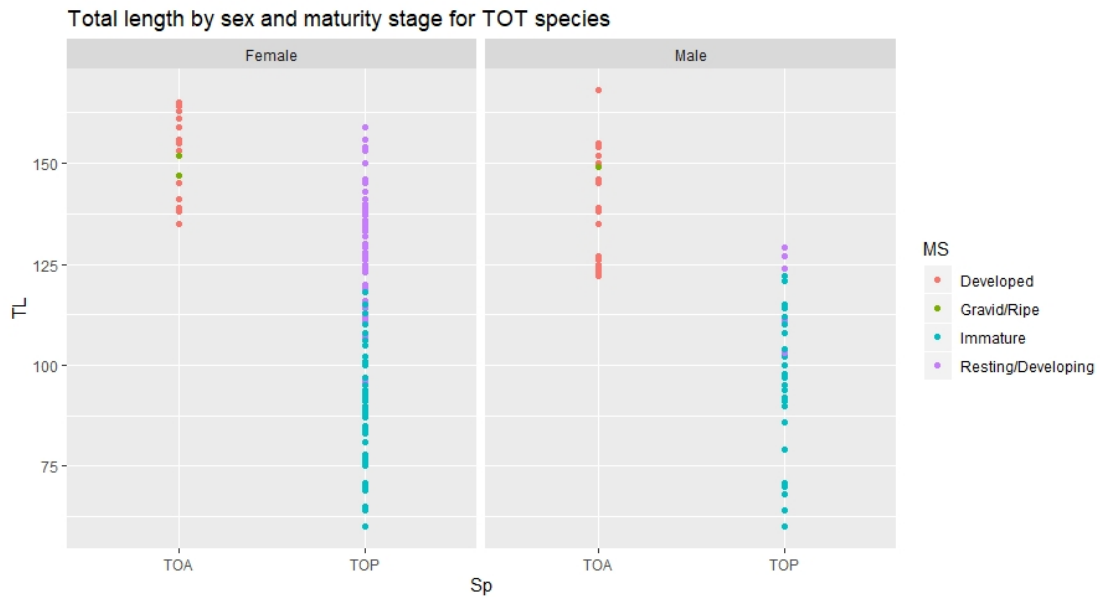


**Figure 6:** Length frequency distributions of toothfish species by sex.

To classify the maturity stages of the toothfish species, the observers have used the following macroscopic key for gonads:

<b>Stage</b>	<b>Female</b>	<b>Male</b>
1	Immature	Immature
2	Maturing virgin or resting	Developing or resting
3	Developing	Developed
4	Gravid	Ripe
5	Spent	Spent

In Figure 7 are shown the maturity stage by toothfish species and sex. While most of the TOA were in a developed maturity stage, the majority of TOPs were in immature stage.

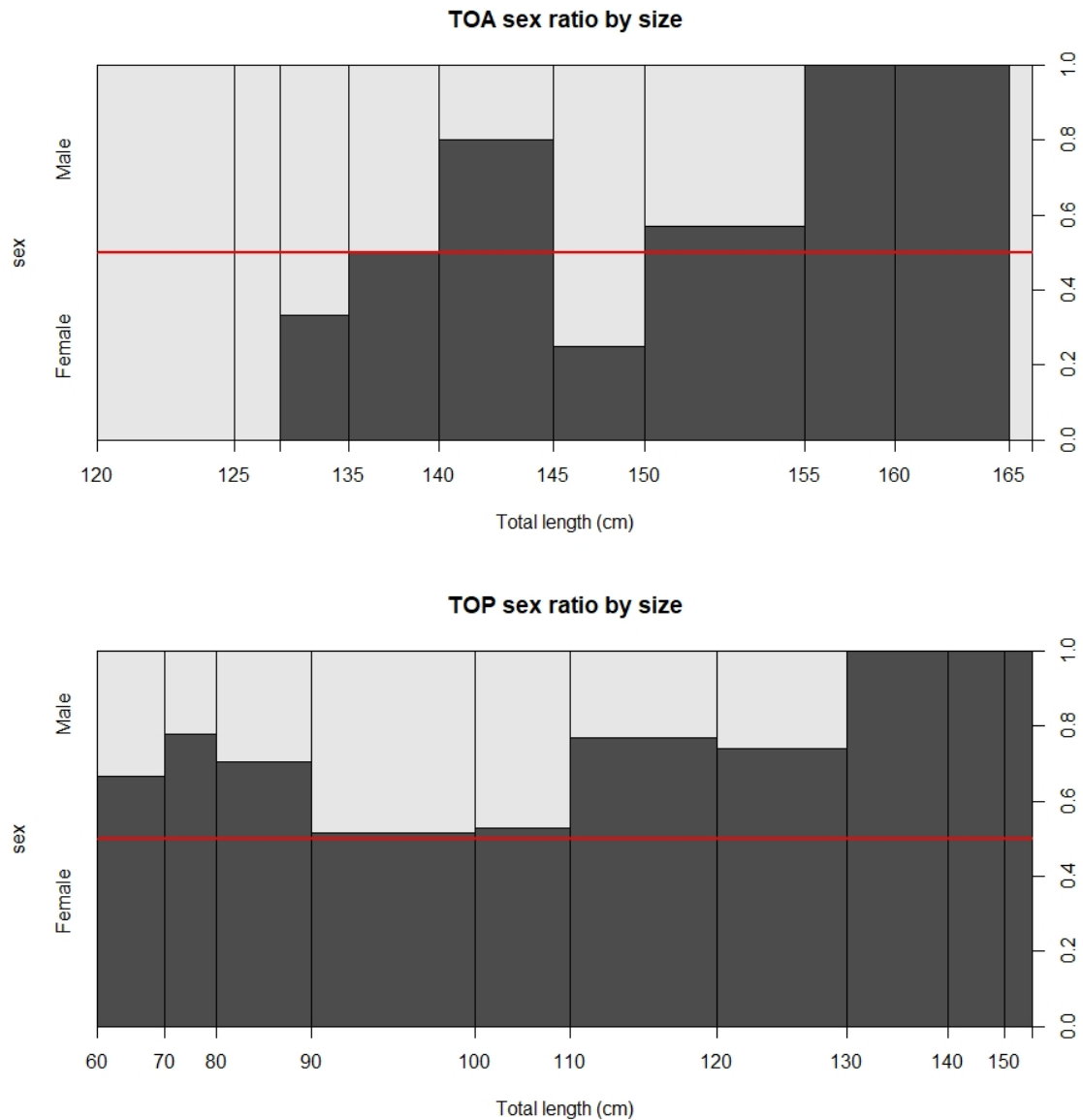


**Figure 7:** Maturity stage by toothfish species and sex

### *Sex ratio and maturity*

166 TOP and 41 TOAs have been sampled for a sex ratio analysis. Significant differences have been found between species. TOA sex ratio is 51% females while is the 73% for TOP individuals (Figure 8).

TOA			TOP		
Sex	N	proportion	Sex	n	proportion
Female	21	0.512	Female	121	0.729
Male	20	0.488	Male	45	0.271



**Figure 8:** Sex ratio of *Dissostichus mawsoni* (upper graph) and *D. eleginoides* (down) by size. The red line shows the 1:1 proportion.

**Vulnerable Marine Ecosystem (VME)**

Following the Conservation Measure 22-07 “Interim measure for bottom fishing activities subject to Conservation Measure 22-06 encountering potential vulnerable marine ecosystems in the Convention Area”:

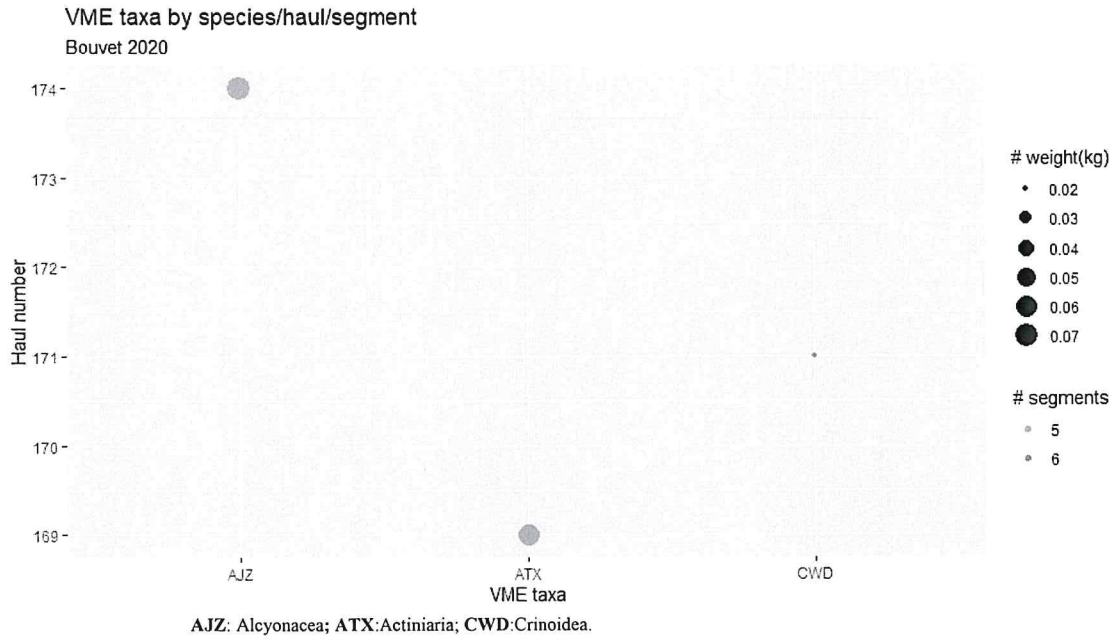
A VME indicator unit’ means either one litre of those VME indicator organisms that can be placed in a 10-litre container, or one kilogram of those VME indicator organisms that do not fit into a 10-litre container.

A line segment’ means a 1 000-hook section of line or a 1200 m section of line, whichever is the shorter

A ‘Risk Area’ means an area where 10 or more VME indicator units are recovered within a single line segment.



During the research in the Bouvet area only three VME taxa have been found at a very low level, well below the CCAMLR established threshold (10 or more indicator units in a segment). Figure 9 shows the weight (kg), haul number and segment where these taxa have been encountered.



**Figure 9:** VMEs encounters by haul and segment.

During the whole cruise there has been no incidence with sea birds or marine mammals.

Santa Cruz de Tenerife on September 1st, 2020.

Signature: Roberto Sarralde Vizuete  
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