# Second Report

# of the implementation of the FIP

## Spanish crayfish, *Procambarus clarkii*, with fyke nets & traps in Andalusia and Extremadura

### Orellana La Vieja – Extremadura

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# Contents

# 1   Executive Summary

FIP activities in Extremadura started in May 2022, with field work and data collection carried out in the Guadiana basin using traps, a typical gear used in the Guadiana lakes. The two months delay in the start of the 2022 FIP was due to the lack of rain, water and the heat wave felt, delaying the crayfish life cycle and fishing to occur. No sampling in Andalusia of fyke nets targeting Spanish crayfish was carried out since the fishery has yet to start (expected to start in September). Field work was carried out in June and July at Orellana la Vieja, Guadiana Lakes in Extremadura. Results shows a slightly higher number of females in the traps catch sample, and a normal distribution of crayfish length frequencies. Total catch data in weight were provided from Alfocan and South Ocean and were analysed. However, the companies did not provided length measurements which did not allow for a comparison with the data collected, and also between regions. From this preliminary assessment there are several points that can be highlighted, namely the low proportion of bycatch of pumpkinseed juveniles at Guadiana Lake. In order to fully assess the Spanish crayfish fishery, further work and additional data needs to be collected and provided, and a more effective stakeholder engagement, namely with administration and fishers.

## 2    Introduction

The following document represents the second report of the Spanish crayfish (*Procambarus clarkia)* FIP. In the first report (December 2021) a description of the fishery, its socio-economic importance, but also biological and ecological aspects of crayfish were presented. The report also included a summary of the current legislation in Andalusia and Extremadura regions. The present report focus on the fishing activities carried out in Extremadura region. Note that the fishing season in Andalusia has yet to start. Two site visits were planned and conducted in Extremadura for the first time since the beginning of FIP.

### 2.1    Crayfish fishery in Extremadura region.

The crayfish fishery in Extremadura is regulated and managed by Resolution of 25 of October 2016[1] on the control plan for this region and supplies 25% of the national crayfish production. There are no fisher's association or other business organizations associated to the crayfish fishery, and the exact number of fishers operating in the area is still unknown.

Fishing activity in Extremadura is characterized by the use of traps (Fig. 1) that are set in Guadiana's Lake at Orellana La Vieja during a 24 hours period (Fig. 2).



**Fig. 1** – Trap used to catch crayfish at Guadiana Lake in Extremadura region.

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[1] http://doe.juntaex.es/pdfs/doe/2016/2200o/16061720.pdf, downloaded 20/10/2021
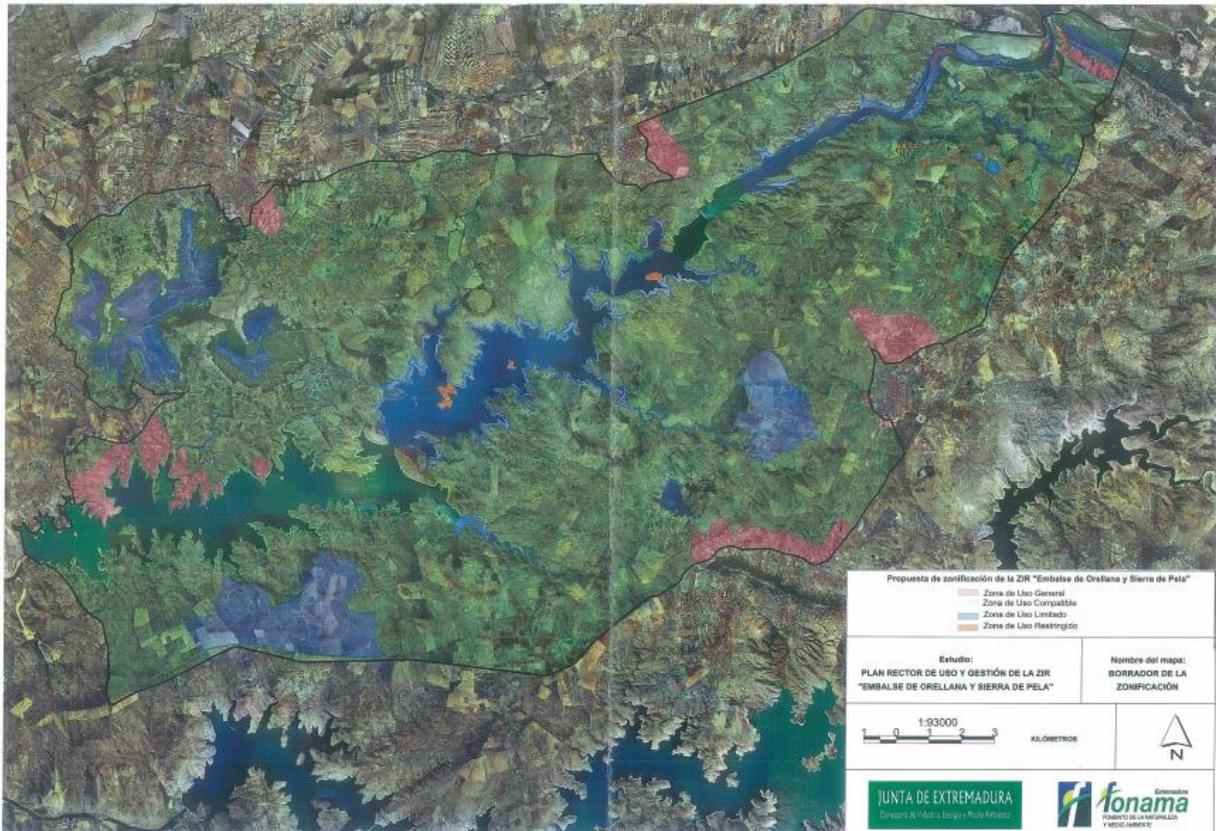
**Fig. 2** – Fishing area in Guadiana's Lake at Orellana La Vieja, Extremadura region.

## 3   Work plan

The 2022 FIP activities started in May, with a 2 months delay of what was initially planned (March), mainly due to the lack of rain and water, and the consequence delay in the beginning of the fishing season. The following planned FIP tasks were carried out:

**Experimental planning (Started May 2022 – July 2022)**
-   Defining sampling areas and methodology (first visit), adapt methods (second visit)
-   Preparing sampling material

**Data collection *in situ* (Started June 2022 – July 2022)**
-   Collecting biological data (size, total weight, sex, behavior, habitat, geographic position) from crayfish and bycatch

**Data analyses (Started June 2022 – December 2022)**

- Biological data compilation and analysis
- Review of sampling planning
- Bycatch identification and characterization.

**Stakeholder mapping and engagement (Started May 2022 – December 2022)**

- Fishers' engagement and participation in data collection.

**Reporting and project management (Started May 2022 – December 2022)**

- Drafting report
- Managing activities
- FIP reporting (August, January)

## 4. Results

Two site visits to collect data were conducted in Extremadura, the first one on the 1st of June, and the second on 20th of July, where traps catch data were collected by accompanying two fishers, side-by-side in another vessel, during their fishing activities. The following data were collected for each trap: crayfish size, sex, number of individuals, existence of bycatch and GPS position.

### 4.1. Fisheries characterization *in situ*

The experimental design drafted included the collection of data from sets of traps of different fishers in order to have catch composition in the different fishing locations. However, it was only possible to follow one fisher at the time. Fishers collected between 150 to 200 traps pre fishing day, but it was only possible to sample around 10% of traps in each site visit due to the time required to measure each crayfish, while trying not minimise interference in the fisher normal activity.

### 4.1.1. First Site Visit – 01/06

During the first visit one fisher was accompanied, and 21 of the 200 traps collected were sampled, corresponding to a total of 844 individuals measured. This particular fisher works in partnership with another fisher and together they collected 375kg of crayfish in the 400 traps displayed in the fishing area.

*i)      Sex Ratio*

Overall the number of crayfish female sampled are slightly higher than the number of males, with a total of 57.2% of female sampled (483 individuals) and 42.8% males (361 individuals). When analysing each trap in detail, the proportion of females were higher in 15 traps, and in some cases the ratio grew to more than 65% difference, with exception for traps number 2, 5, 7, 9, 14 and 21, where the number of males were higher than the females, although always under 60% ratio (Fig. 3).
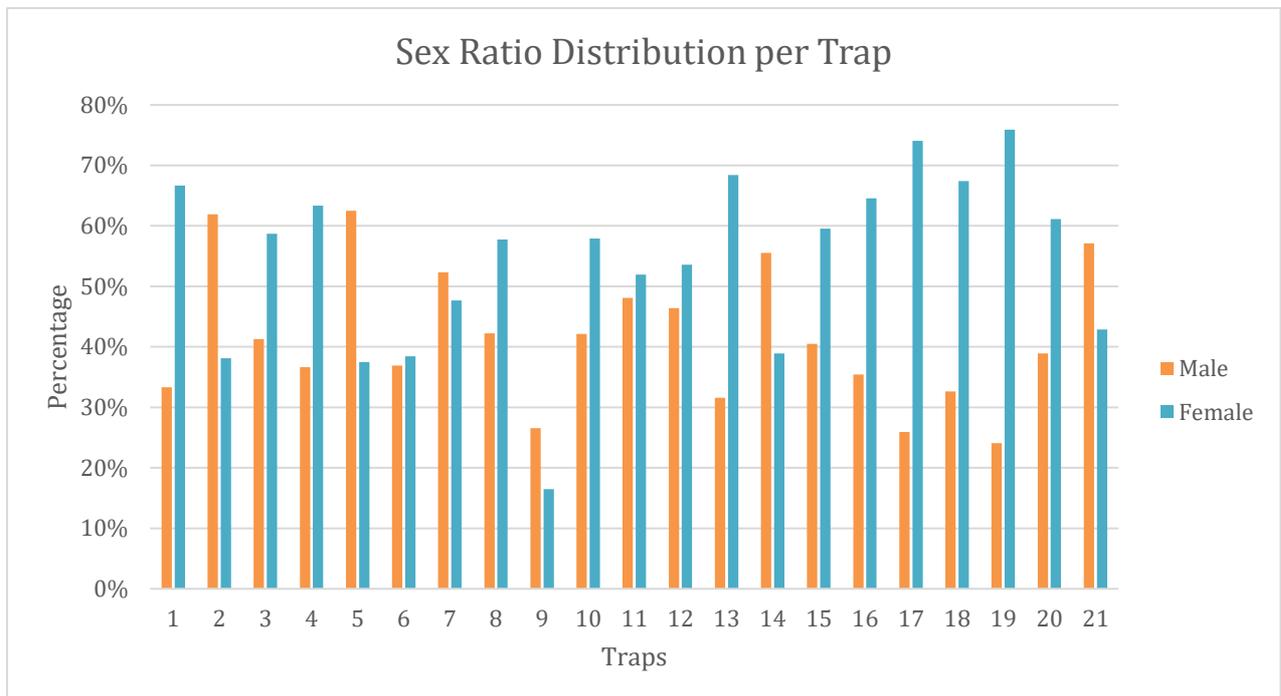


Fig. 3 – Sex ratio for each trap sampled.

*ii)      Catch per Unit of Effort – CPUE*

The catch at each traps shows that there is a predominance of traps with approximately 40 individuals (Fig.4). Furthermore, knowing the number of fishers or traps operating in the area it is possible to estimate total crayfish catch for the Extremadura region.

*a)  CPUE in number*

$$CPUE(number) = \frac{total\ number\ of\ individuals}{total\ number\ of\ traps}$$

*Total number of individuals sampled = 845*

*Total number of traps sampled = 21*          *CPUE = 40.2*
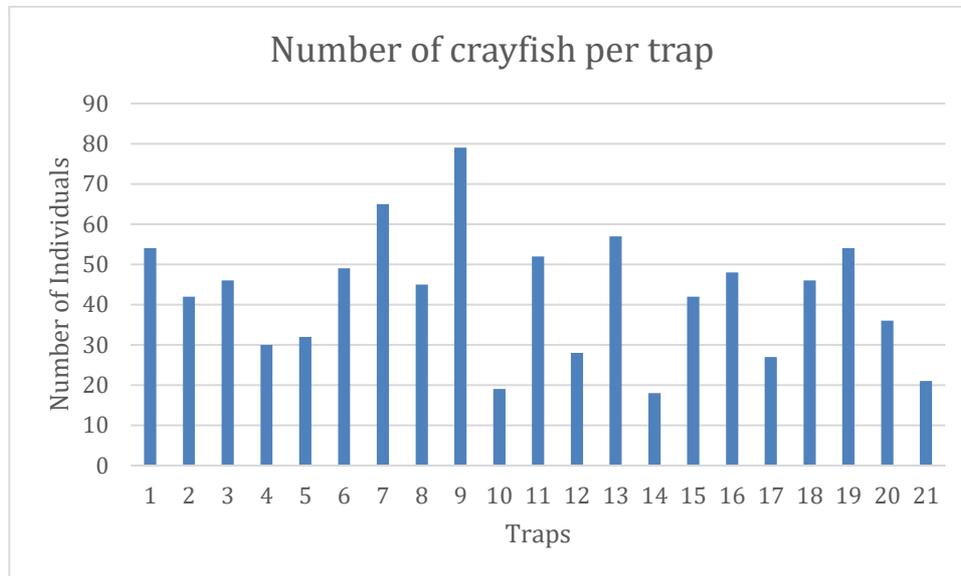


Fig. 4 – Number of individuals per trap.

Results shows that each trap harvest in average 40 individuals during the 24 hours fishing at the lake, with a peak in trap number 9 with almost 80 individuals caught.

*b) CPUE in kg*

$$CPUE(Kg) = \frac{Catches\ weight}{Number\ of\ Traps}$$

*Catches weight = 375 kg* → *2 fishers and 400 traps*

*CPUE (Kg) = 375 / 400*

*CPUE (Kg) = 0,9375 Kg*

Results shows that each fisher catch approximately 1 kg of crayfish per trap operating 24 hours.

*iii)      Length frequency*

Catches were distributed between 22 and 52 mm, with the majority of the individuals around 30 and 40 mm, indicating that the catch was mainly composed of adult individuals, aged above 300 days.
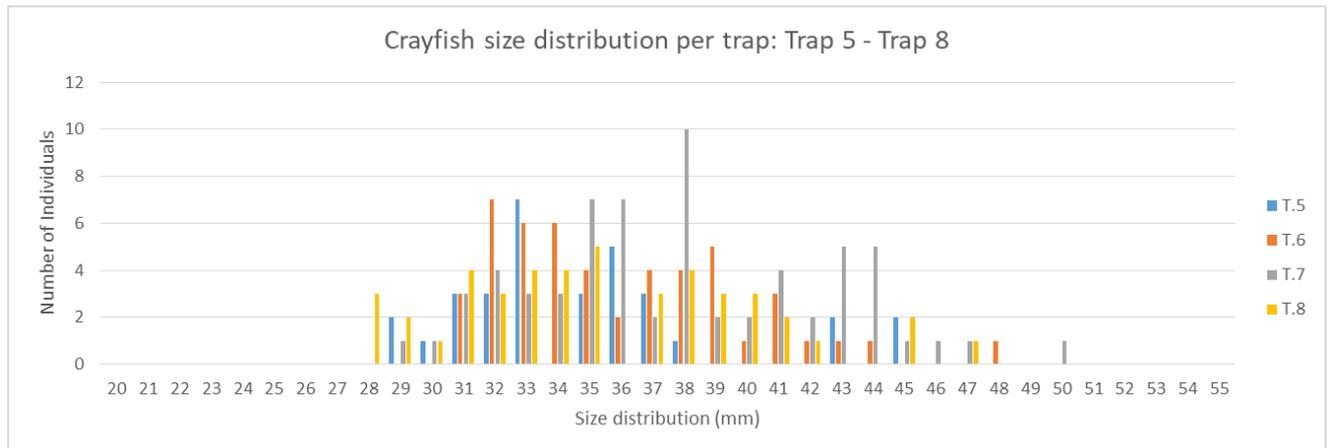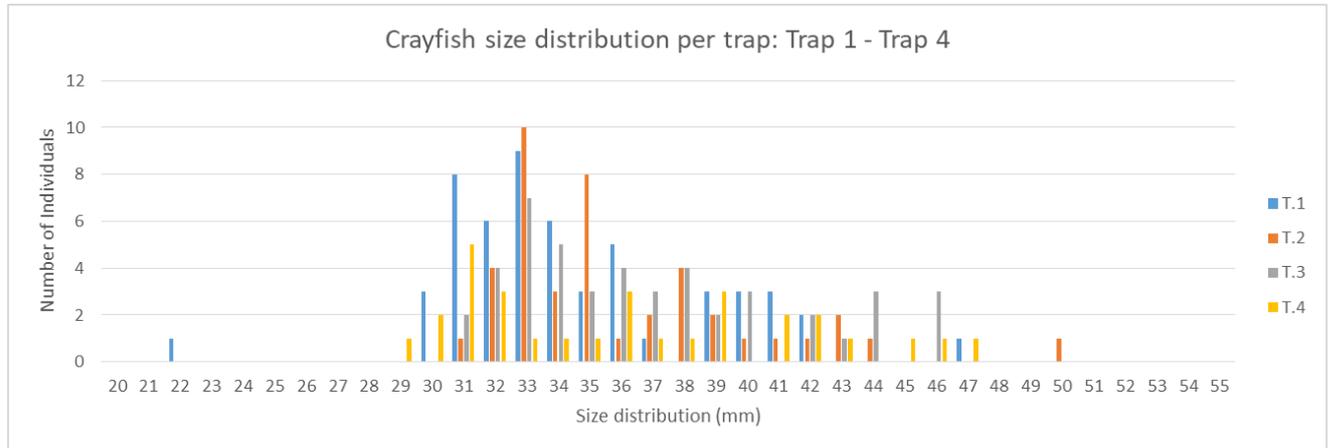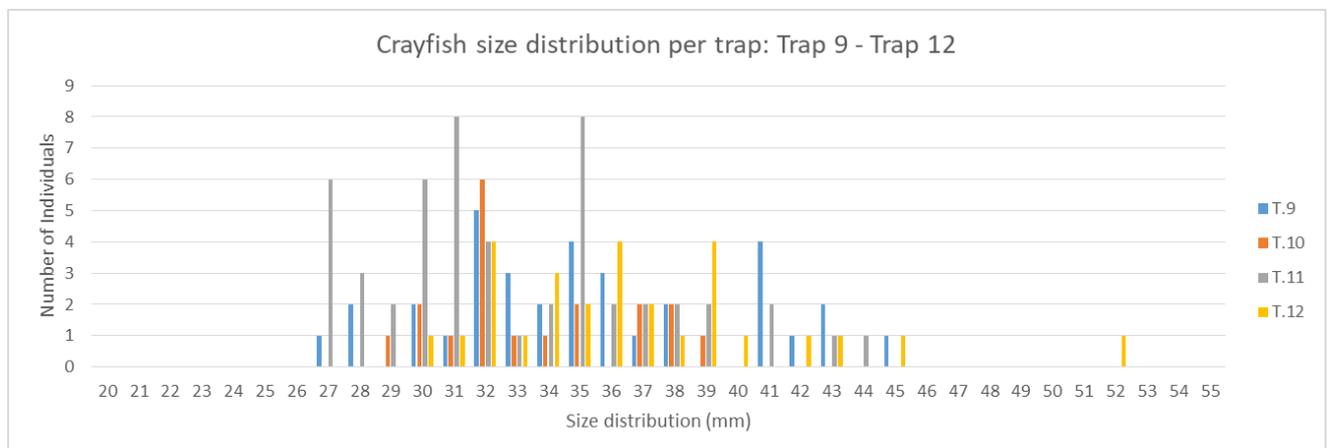




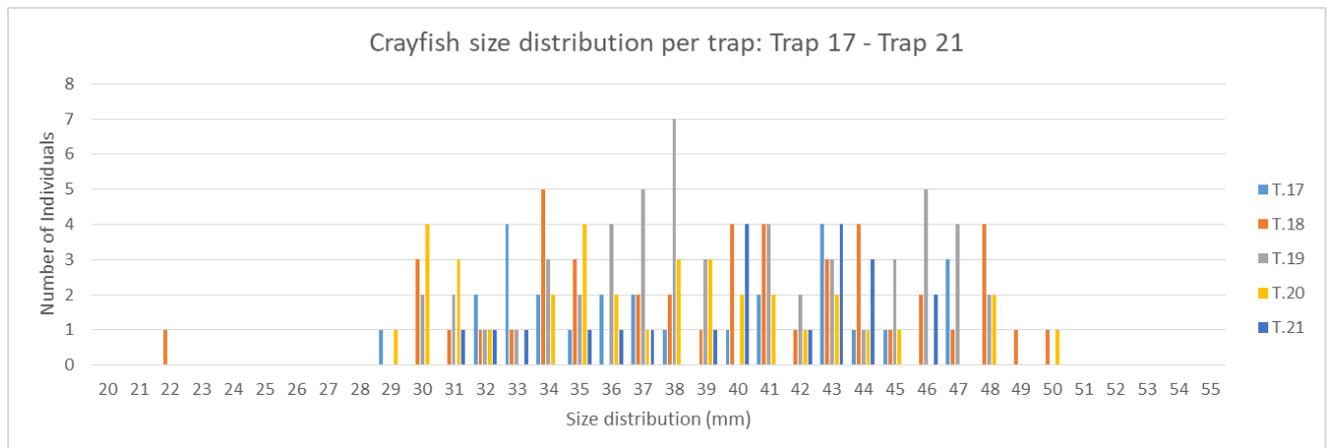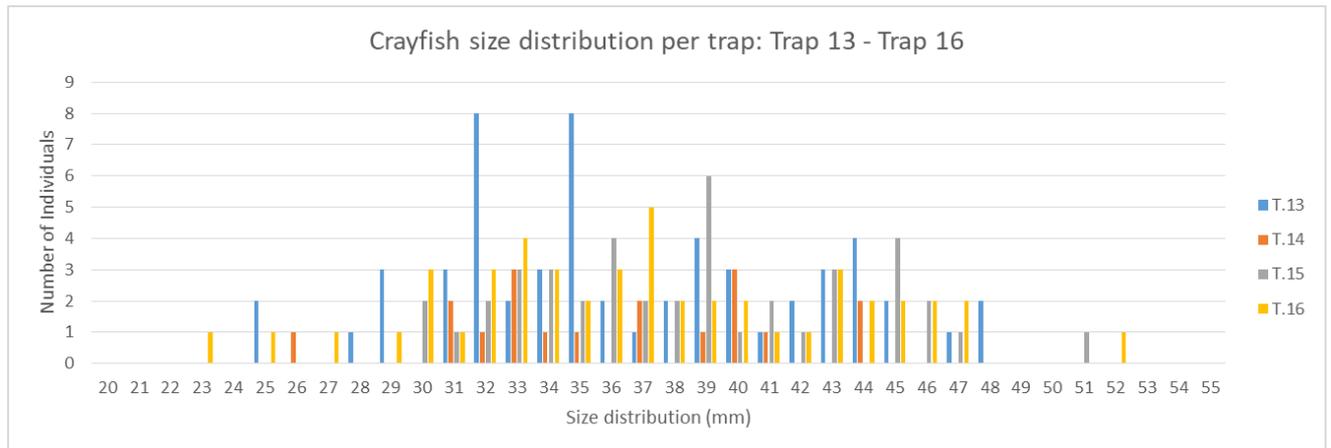Fig. 5 a) Crayfish length distribution per trap: Trap 1 – 8.

Fig. 5 b) Crayfish length distribution per trap: Trap 9 – 21.

### 4.1.2. Second Site Visit – 20/07

During the second visit one fisher was accompanied and 14 of the 150 traps collected were sampled, corresponding to a total 579 individuals measured. This fisher collected a total of 2 bags of crayfish in that day, which corresponds to a total of 60kg approximately. Contrary to what happened in the first visit, it was not possible to know the exact total catch weight of the day.

*i)* *Sex Ratio*

Overall the number of crayfish females sampled are slightly higher than the number of males, with a total of 53.4% of female sampled (309 individuals) and 46.6% males (270 individuals).

When analysing each trap in detail, the proportion of females were higher in 9 traps, and in some cases the ratio grew to almost 70% difference, with exception for traps number 5, 6 where the number of males were significantly higher than the females, with almost 70% ratio (Fig. 6).
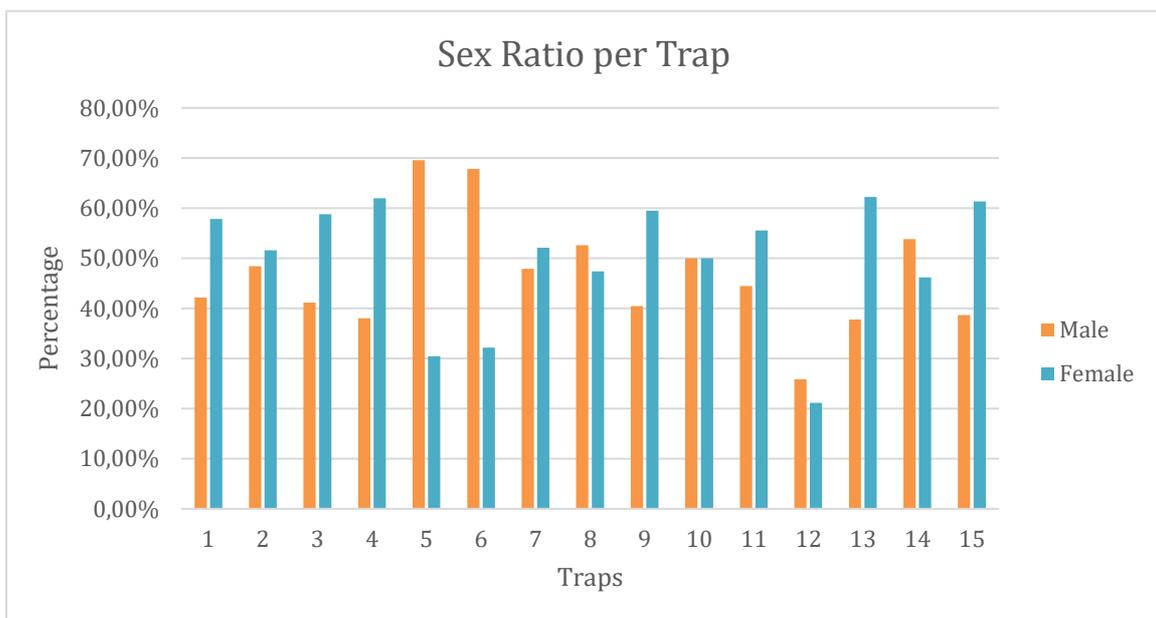


Fig. 6 – Sex ratio for each trap sampled.

*ii)     Catch per Unit of Effort – CPUE*

The catch at each traps shows that there is a predominance of traps with approximately 40 individuals (Fig.7).

*a) CPUE in number*

$$CPUE(number) = \frac{total\ number\ of\ individuals}{total\ number\ of\ traps}$$

*Total number of individuals sampled = 579*

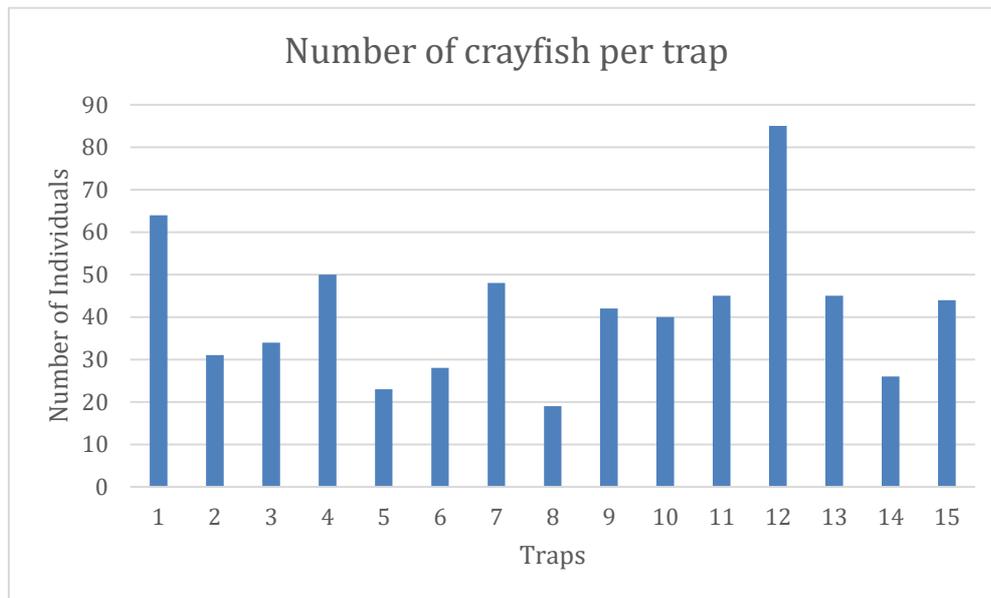*Total number of traps sampled = 15          CPUE = 38.6*

Fig. 7 – Number of individuals per trap.

Results shows that each trap harvest in average 40 individuals during the 24 hours fishing at the lake, with a peak in trap number 12 with 85 individuals caught.

b) *CPUE kgs*

$$CPUE(Kg) = \frac{Catches\ weight}{Number\ of\ Traps}$$

*Catches weight = 60 kg → 1 fisherman and 150 traps*

*CPUE (Kg) = 60 / 150*

*CPUE (Kg) = 0.40 Kg*

Results shows that this fisherman catch approximately 0.4 kg of crayfish per trap operating 24 hours.

iii)    *Length frequency*

Catches were distributed between 21 and 41 mm, with the majority of individuals with sizes between 25 and 35 mm, indicating that the catch was mainly composed of young adult individuals, aged under 250 days.
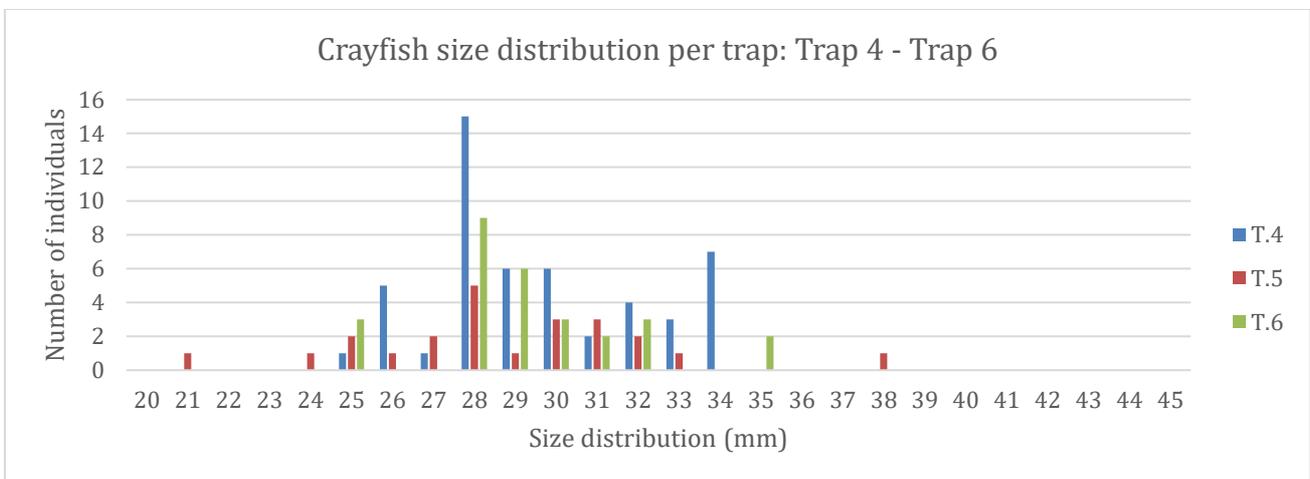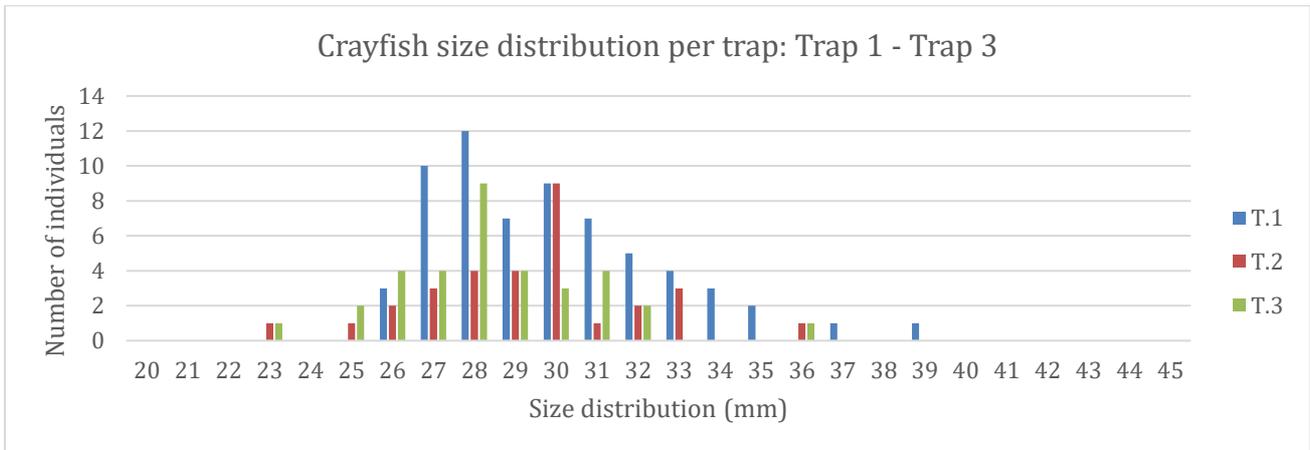
Fig. 8 a) Crayfish length distribution per trap: Trap 1 – 6.
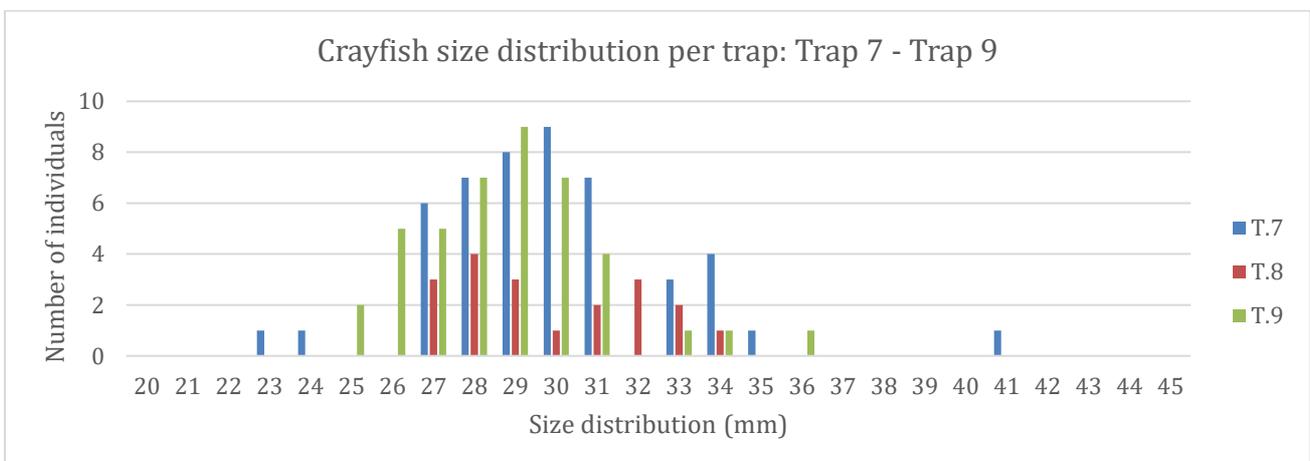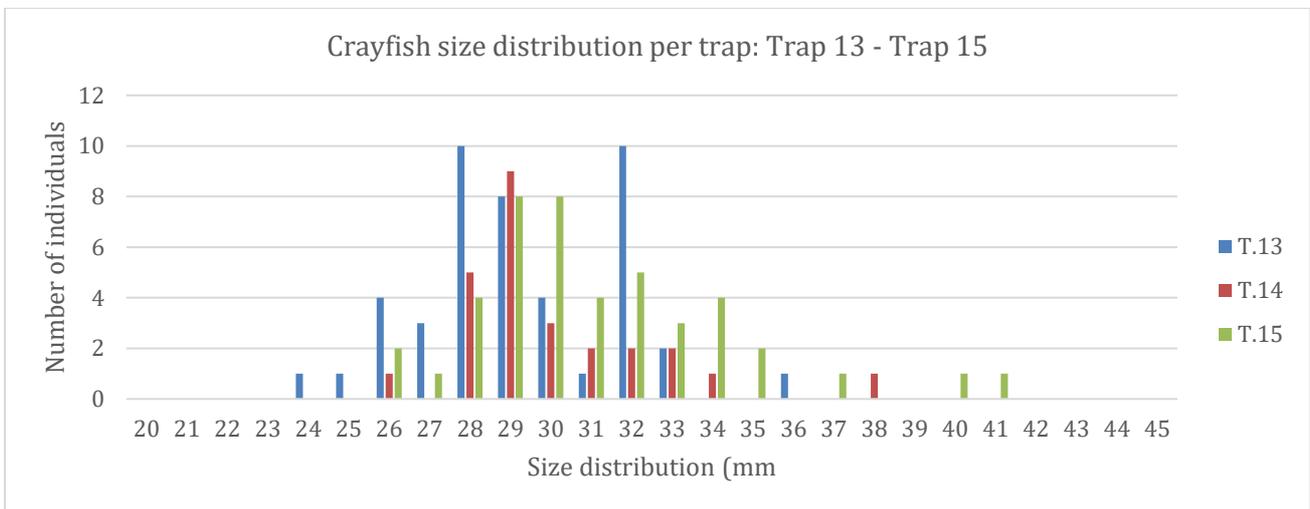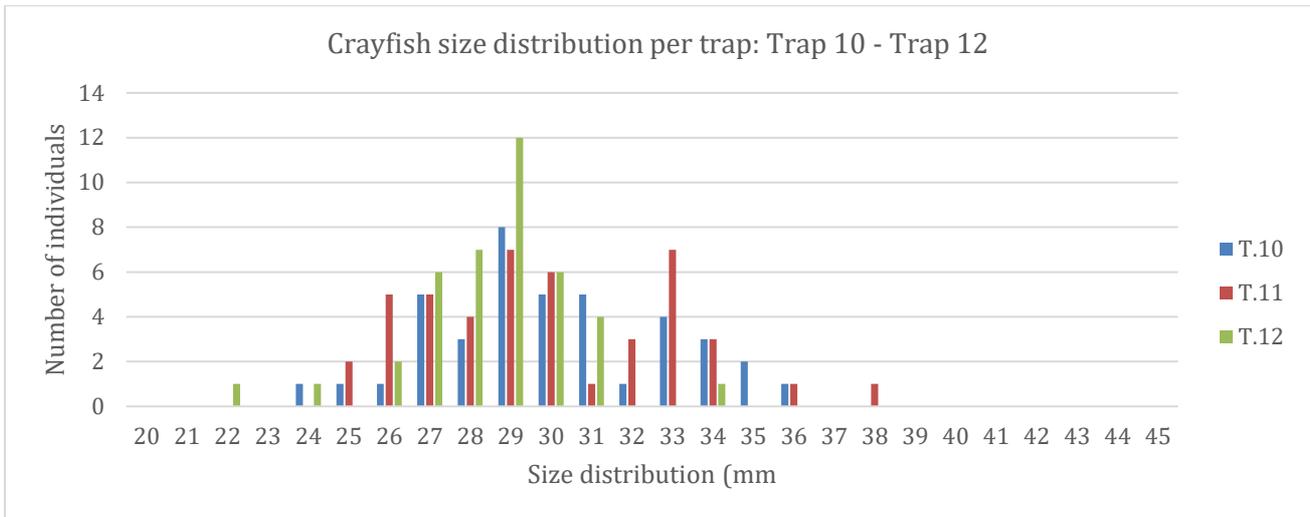
Fig. 8 b) Crayfish length distribution per trap: Trap 7 – 15.

### 4.1.3. Bycatch characterization

Bycatch was identified and measured from 3 out of the 36 total traps observed in both visits. Only juveniles of pumpkinseed (*Lepomis gibbosus*) (Fig. 10), which is also an invasive species, were found. Bycatch was very low, with the majority of the traps only having the targeted species.

Fig. 10 – Pumpkinseed (*Lepomis gibbosus*).[2]

A total of 5 pumpkinseed individuals were measured in both visits, and sacrificed according to the procedures for invasive species. In the first visit only one individual were caught within 21 traps sampled, with 9.7cm of total length. The remaining 4 individuals were caught during the second visit and were found in two traps out of 15 traps, two fishes in each, with the following lengths: 11; 10.5; 8.5 and 9.5, respectively. Therefore, bycatch for this type of fishing gear in this area is low with 5 pumpkinseeds collect in a total of 36 traps sampled.

## 4.2.    Production characterization

Total catch data was made available by two producers, Alfocan and South Ocean, for the beginning of the 2022 season. Both producers only provided total weight data for each week. Since the length measurements data were not available, the results presented shows only the weight distribution per week for both producers.

*i)        Alfocan data analysis*

Results shows that the highest weights were registered between the weeks 23 and 26 (June).

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[2] https://www.flickr.com/photos/valter/5984861480, accessed 20/07/2022
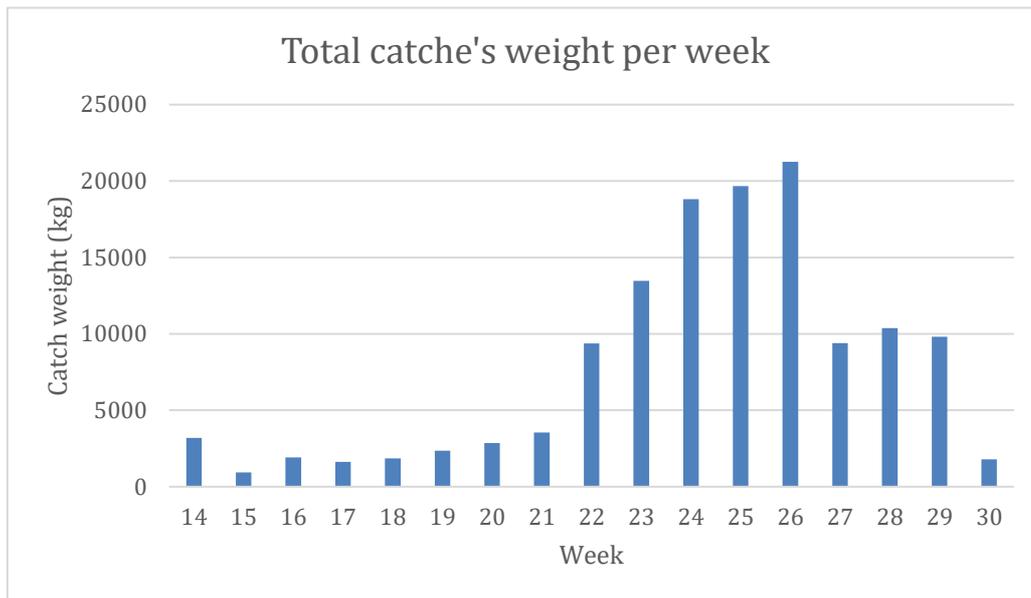
Fig. 11 – Weight distribution per sampling day per week

*ii)        South Ocean data analysis*

Results from South Ocean data are consistence with the results from Alfocan, showing higher weights during May (18-22 weeks) with a clear peak in the week 22.
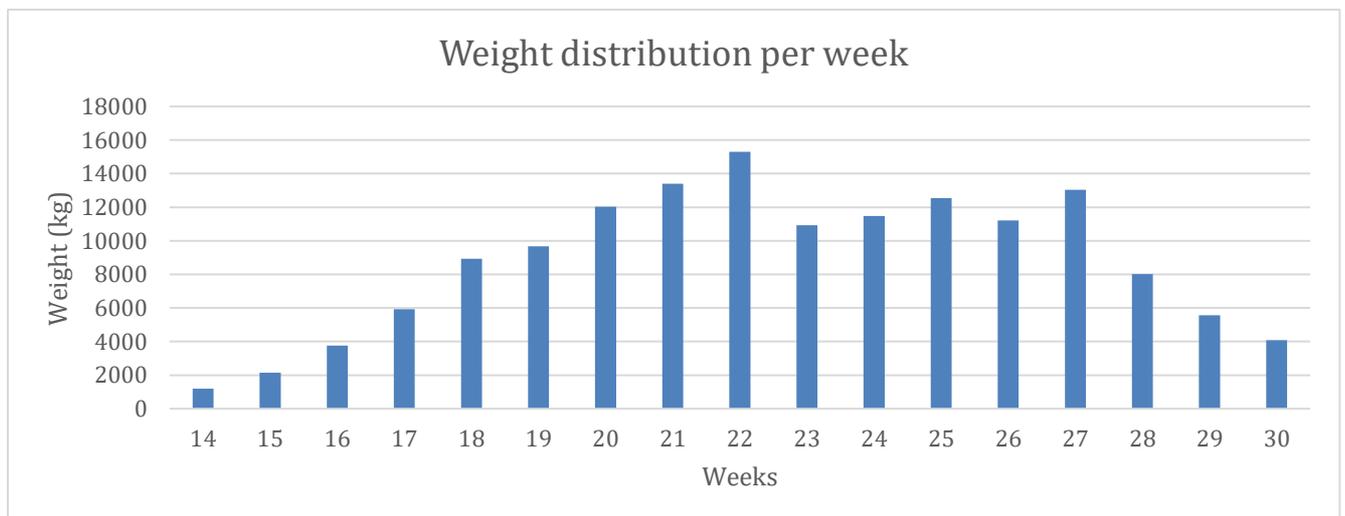


Fig. 12 – Weight distribution per sampling day per week

## 5. Discussion

2022 FIP activities started with a two months delay due to the lack of rain and water, and also due to the heat wave felt earlier in the year. The fyke net fishery targeting Spanish crayfish has not started, since this type of gear is used at rice fields in the Guadalquivir basin and the rice season has yet to start, , with expectation to start in September. Field work and data collection was only possible at Extremadura's lakes fisheries with the use of traps in the Guadiana basin. Nevertheless, sufficient data was collected to do a preliminary analysis of catch composition and bycatch characterization for the fishery in Extremadura.

Fishers from Extremadura reported that the 2022 catches' were the lowest they remember and the catches have been dwelling for the last few years, especially in the dry years, due to the lack of rain and water.

On the 1st of June a first visit to the lakes where fishing activities occur was made, as well as to the crayfish reception and weighing facilities before being sent to the producers, to acquire knowledge of the processing lines and control measures. Through the data collection carried out following two fishers during their normal daily activity allowed the estimation of a first CPUE (catch per unit of effort) of the fishery, by number and weight. For the first fisher followed, CPUE by numbers shows that each trap caught around 40 individuals of crayfish during the 24 hours operating. The CPUE in weight was estimated to be 0.94, which means that each fisher caught approximately 1 kg of crayfish per trap, i.e. in 24 hours.

CPUE estimated for each trap of the second fisher were slightly lower than the CPUE assessed in the first visit, 38.8. Regarding CPUE by weight they were considerably lower than on the first visit, with a CPUE of 0.4, which means that this fisher caught approximately 0.4 kg of crayfish per trap. This represents a decrease of almost 60% compared with the first visit in early June, which represents a decrease in the number of individuals available for fishing and the end of the fishing season in Extremadura for this year. Also the individuals were smaller (average between 25 and 30 cm) than the ones caught in June (average between 30 and 40 cm).

Overall, results shows that the CPUE was higher in the first visit with exception of some traps caught in the second visit. Nevertheless, in the second visit there less traps set than in the first

visit, and also the number of crayfish were lower showing that the fishing season was nearly in the end.

Regarding the sex ratio of the crayfish sampled, the proportion of females were slightly higher than the males for both visits, but the size distribution were similar, showing that the population were mainly composed by adult individuals approximately 1 year of age.

Bycatch was assessed from 36traps hauled during the two visits and it is very low. Only 5 individuals of pumpkinseed, a prolific invasive species in the region, were found caught in the traps, which indicates high selectivity of the gear used.

The data provided by both companies Alfocan and South Ocean, included only total weight from the beginning of the operations until this date. Data provided for the Guadalquivir fishery, and used in the first report, included individual measurements. Despite being measured differently between producers, these data would be useful in order to compare the data collected from the catches in situ with the samplings made at the factories, and also to assess differences between regions. It is recommended that measurements data from Extremadura fishery be provided to be used in future reports, following what was already suggested in the first FIP report "it is recommended that both companies align their measurement and choose either PRBT or POCL, although we recommend for comparison with international studies that POCL is chosen". Nevertheless, comparing the total catch data provided from both companies, it is possible to observe that May represented, so far, the month were highest volumes of crayfish were registered.

Finally, regarding data transmission, we suggest that future data should be transmitted already in editable format, and include the individuals' measurements for a better understanding and comparison of the data collected.

## 6. Conclusions and Recommendations

From this preliminary assessment fewer conclusions can be taken regarding stock status and the characterization of the fishery, particularly regarding fishing effort and species abundance.

Nevertheless, there are some preliminary points that can be highlighted, namely the lower proportion of bycatch. In order to fully assess the Spanish crayfish fishery, the following recommendations ought to be considered:

1. More data regarding fishers and fishing areas are required;

2. More measurements need to be taken during the season for calibration purposes;

3. A common reference measurement needs to be agreed between the companies and also with the Spanish administration;

4. Sampling effort should be refocused on different measurement procedures instead of daily frequency;

5. Data should be transmitted in electronic format in editable format (word, excel);

6. Data collection from Andalusia region should be ensured;

7. The engagement of fishers should be promoted to allow for fishery data to be collected.