Analysis of the biological sampling of Nephrops FU30 commercial catches

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INTRODUCTION: problem

During the last WGBIE, a problem with the Nephrops FU30 length frequency distributions (LFD) was detected (Vila and González-Herráiz, 2016).

This stocks is currently managed based on a qualitative assessment (trends of commercial LPUEs). In order to move to an analytical assessment, some steps have been done:

• UWTV survey (since 2015).

• SCA model to obtain Harvest Ratios (HR).

The poor quality of LFDs affected the assessment trial: bad SCA model fit.

Therefore, an improvement of NEP30 LFDs was required.

INTRODUCTION: context

The pan-European biological sampling program of commercial fish catch evolved from a **stock-based** (DCR 2002-2008) to a **métier-based** sampling scheme (DCF 2009-now). The aim of this change was to move towards an integrated management which includes ecological aspects.

However, the biological sampling of the Gulf of Cadiz trawl métier (OTB_MCD>=55_0_0) was not implemented in an appropriate manner. Due to the low catches of NEP30 stock, the concurrent sampling was applied but on trips selected for being directed to *Nephrops*.

As this design seriously affected the representativeness of the sampling, it was changed by a true **métier-based random sampling** in 2016.

INTRODUCTION: objective

Due to the WGBIE 2016 requirement, the métier-based random sampling scheme was extraordinarily strengthened in spring and summer to provide data to WKNEP:

1. Sampling a number of trips directed to Nephrops.

2. Supervising the biometric sampling on-board.

3. Analyzing the parameters obtained by both types of sampling (random and NEP-directed sampling):

    a) Sampling effort.

    b) LPUE (to provide scientific estimates).

    c) LFD (Length Frequency Distributions).

4. To propose the most appropriate sampling scheme for the future.

OTB_MCD>=55_0_0 métier: technical features

OTB_MCD>=55_0_0 (2015 data)	
Nº vessels	131
LOA (m)	19.0
Tonnage(GT)	43.9
Power (Kw)	156.8
Total trips	21782
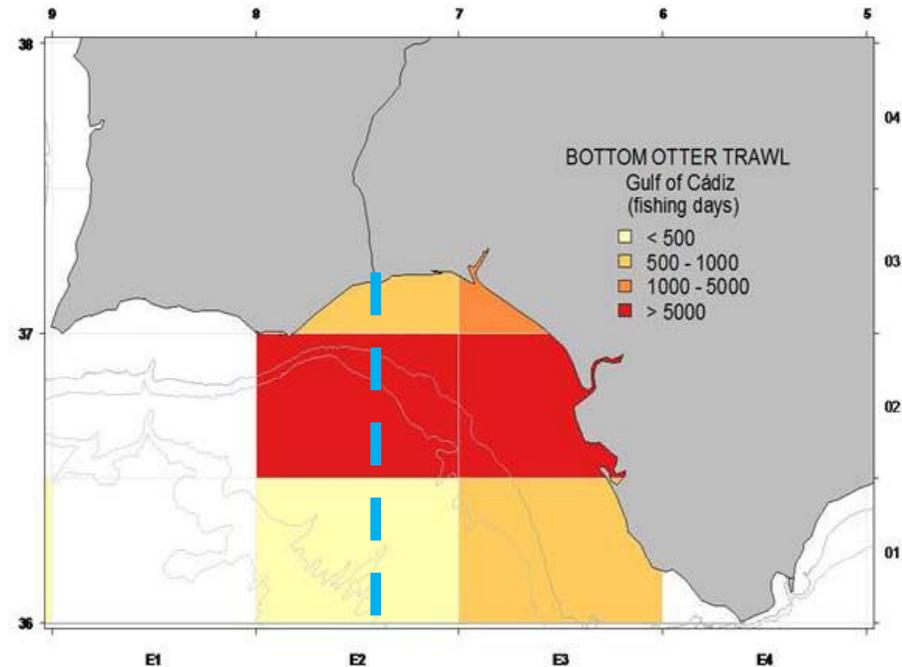
OTB_MCD>=55_0_0 métier: catch profile
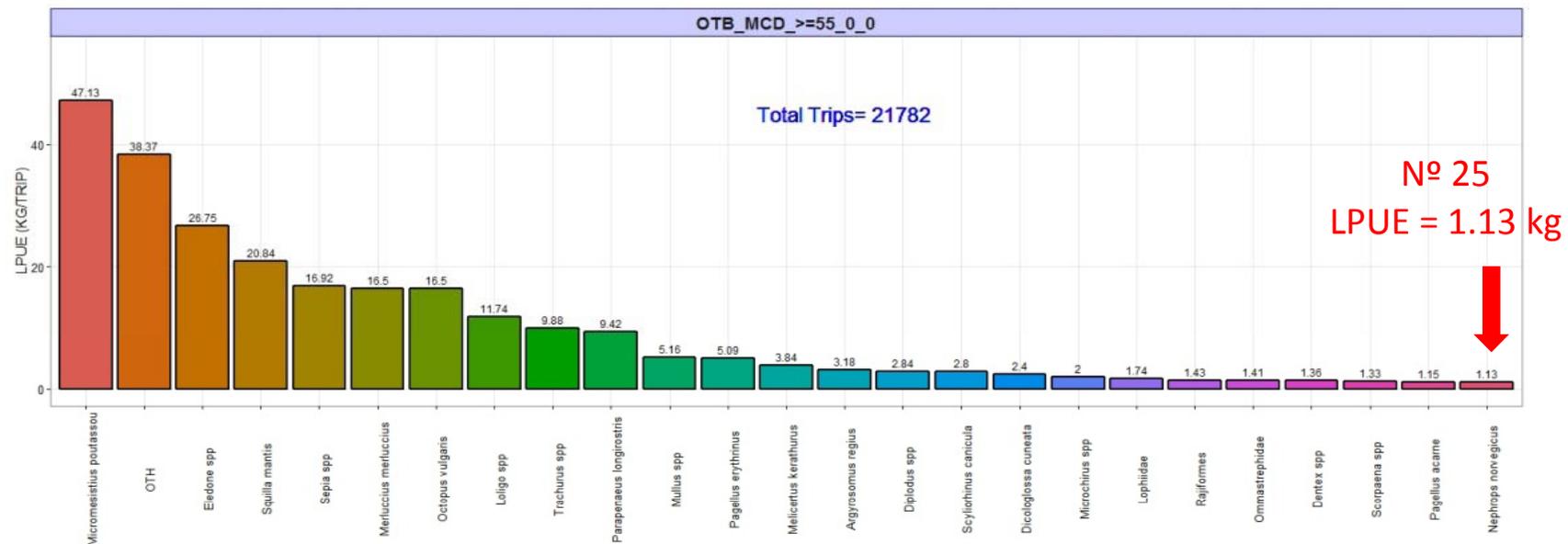
This métier is defined as bottom otter trawl targeting a variety of crustaceans, cephalopods and demersal fish using a mesh size of 55 mm.

In 2015, total catches were **5623 t** with the following rank of species: Blue whiting, Horned octopus, Spottail mantis squillid, Cuttlefish, Hake, Common octopus, Squids, Horse-mackerels, Deep-water rose shrimp, Mullets, Common pandora, Tiger shrimp, Meagres, Sargo breams, Small-spotted catshark, Wedge sole, Rays, Dentex, Scorpionfish, Axillary seabream, and **Nephrops norvegicus**.

2016 sampling design on the Gulf of Cadiz fishing activity

Sampling design: métier-stratified random sampling (3 métiers):

- OTB_MCD>=55_0_0 (Bottom otter trawl with mixed catches).

- PS_SPF_0_0_0 (Purse seine targeting anchovy and sardine).

- LHM_DWS_0_0_0 (Hand line targeting Blackspot seabream).

Bottom otter trawl sampling:

- One-stage sampling (selection of a vessel and trip).

- PSU = vessel * trip

- Sampling effort = 76.

- Selection protocol: random selection on vessel list (official census) with replacement, and recording of refusals.

Regulation: 2016 Nephrops fishing licenses

Spanish Ministry of Fisheries (Regulation 17/02/2016): Census of bottom trawl vessels authorized to fish Norway lobster in the Gulf of Cadiz during 2016, as well as the individual quota assigned to each.

1. Nº of vessels authorized to fish *Nephrops*: 139 (8 exported or under irregular situation).
2. Quota allocation: individual by vessels (or groups of vessels).
3. Total 2016 Spanish quota: 46.4 t.

Mean annual quota by vessel: 363 kg.
16 vessels with quote > 1t.

Analysis of 2016 sampling data: sampling effort

QUARTER	Random sampling				NEP-directed sampling	
	Total sampled trips	With NEP	% refusals	Nº NEP vessels	Total sampled trips	Nº NEP vessels
Q1	17	2	0.0 *	0*/4	--	--
Q2	24	6	53.3	2/4	2	0/2
Q3	13	0	52.2	1/5	4	0/2
Q4	NA	NA	NA	NA	NA	NA
TOTAL	54	8	---	--	6	--

NOTES:

* Random sampling was properly started at Q2 (during Q1 most of vessels were taken from the group of collaborator vessels).

Nº NEP vessels: refusals/total in the list of 16 vessels with >1 t of annual quote.

Analysis of 2016 sampling data: scientific landings estimates (kg/trip)

QUARTER	LPUE from random sampling	LPUE from NEP-directed sampling	LPUE from total sampling
Q1	7.9	--	7.9
Q2	21.8	147.5	31.4
Q3	0.0	120.3	28.3
Q4	NA	NA	NA
TOTAL	12.2	129.4	23.9

Biased

Estimated landings: 266 t

Estimated landings: 521 t

Analysis of 2016 sampling data: LFD

NEP30 LFD (Random sampling) — Females, Males

NEP30 LFD (NEP-directed sampling) — Females, Males

NEP30 LFD (TOTAL sampled trips) — Females, Males
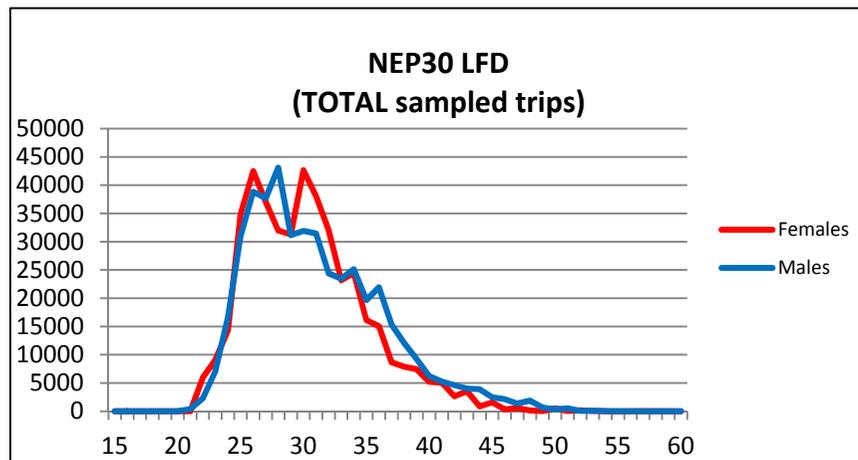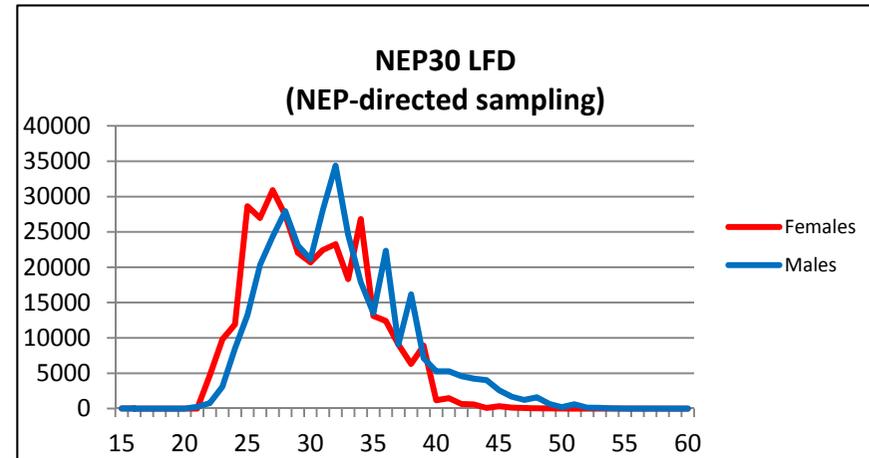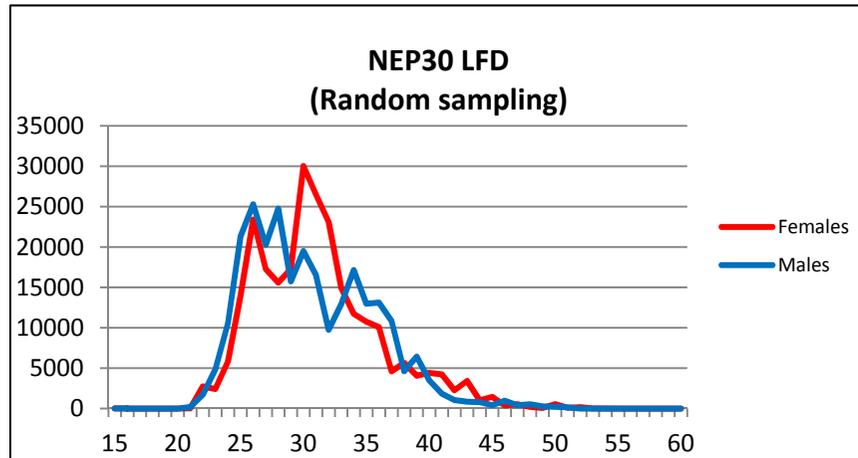
Quarter	Sex ratio (random)	Sex ratio (NEP-directed)	Sex ratio (total)
Q1	1.31	--	1.31
Q2	0.81	1.21	0.94
Q3	--	0.95	0.95
Q4	NA	NA	NA

Sex ratio = L_{male}/L_{female}

CONCLUSIONS

1. Sampling design:

   a. The NEP-directed sampling does not guarantee LFDs with the statistical quality required by analytical assessment models.

   b. The only sampling design that can provide representative parameters of the total fishing activity of the Gulf of Cadiz trawl métier must follow a random sampling scheme.

2. Estimation of parameters for stock assessment: this random sampling design can provide "real" scientific catch estimates to improve the current ICES assessment type (based on commercial LPUE).

3. EU-MAP (2017-2019 program): NEP30 will be maintained in the species list for concurrent sampling, although it does not exceed the EU-MAP threshold of 200 t.