A comparison of fisheries management measures in Mediterranean trawling fisheries

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INTRODUCTION

Fishing mortality is normally reduced through effort reductions, which can mainly be done by decreasing the fishing power or the fishing time. The adoption of closed fishing seasons is one of the main measures used in the management of Mediterranean fisheries [1]. However, a recent surge of studies in the western Mediterranean has discussed the reduction of effort by banning fishing one more day per week (other than the week-end) instead of the seasonal closure [1], [2], [3] and [4]. First sale landings prices (also called ex-vessel prices) of the main target species, are important to consider in order to determine the economic impact of both measures.

OBJETIVE

The aim of this work is to analyse the ex-vessel price of the main target species to determine the economic impact of banning one day (the proposed alternative measure) compared to the economic impact of seasonal closure (the actual measure: normally one month). The economic loss also was analysed to verify the economic effect of both measures.

MATERIAL AND METHODS

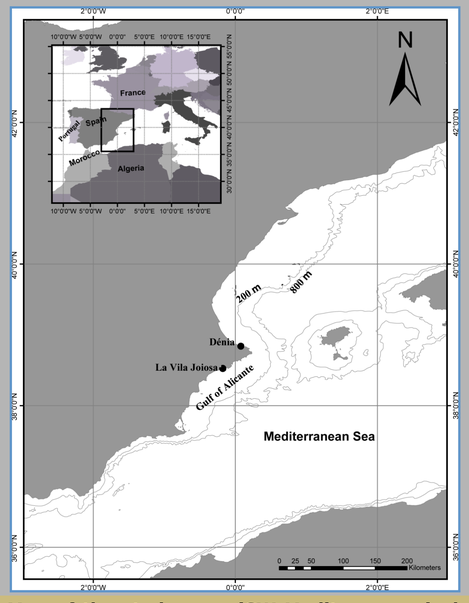


Fig. 1. Map of the study area (SW Mediterranean) showing the location of the two trawling ports studied: La Vila Joiosa and Dénia (Spain).

Data records of daily auctions were obtained from the fishing guild of both ports for 10 years (2002 to 2011). For each fishing day, data on species landing first sale value (€) were available by vessel.

ANOVA Ex-vessel (first sale) prices (euro · day^{-1}) of 4 target species.

Daily variation: Design (Balanced) consisted of 2 factors:

- ***Day*** (5 levels, fixed)
- ***Port*** (2 levels, fixed & orthogonal)

Monday — Tuesday — Wednesday — etc.

Dénia La Vila — Dénia La Vila — etc.

Home (closed) port: Design (Balanced) consisted of 3 factors:

- ***Closure*** (2 levels, fixed)
- ***Port*** (2 levels, fixed & orthogonal)
- ***Year*** (# levels, random & orthogonal)

Before — After

Dénia La Vila — Dénia La Vila

$Y_1\ Y_2\ Y_3\ Y_4\ Y_5$ $Y_1\ Y_2\ Y_3\ Y_4\ Y_5$ etc.

Neighbor (open) port: Design (Balanced) consisted of 3 factors:

- ***Closure*** (3 levels, fixed)
- ***Port*** (2 levels, fixed & orthogonal)
- ***Year*** (# levels, random & orthogonal)

Before — During — After

Dénia La Vila — Dénia La Vila — Dénia La Vila

$Y_1\ Y_2\ Y_3\ Y_4\ Y_5$ $Y_1\ Y_2\ Y_3\ Y_4\ Y_5$ etc.

Economic loss: An approximation was tested to analyse the economic loss, regardless the operating costs, produced by banning one day (based on the result obtained from the daily variation of both effort and prices) compared to economic loss produced by banning one month (the actual measure: seasonal closure) [See 4].

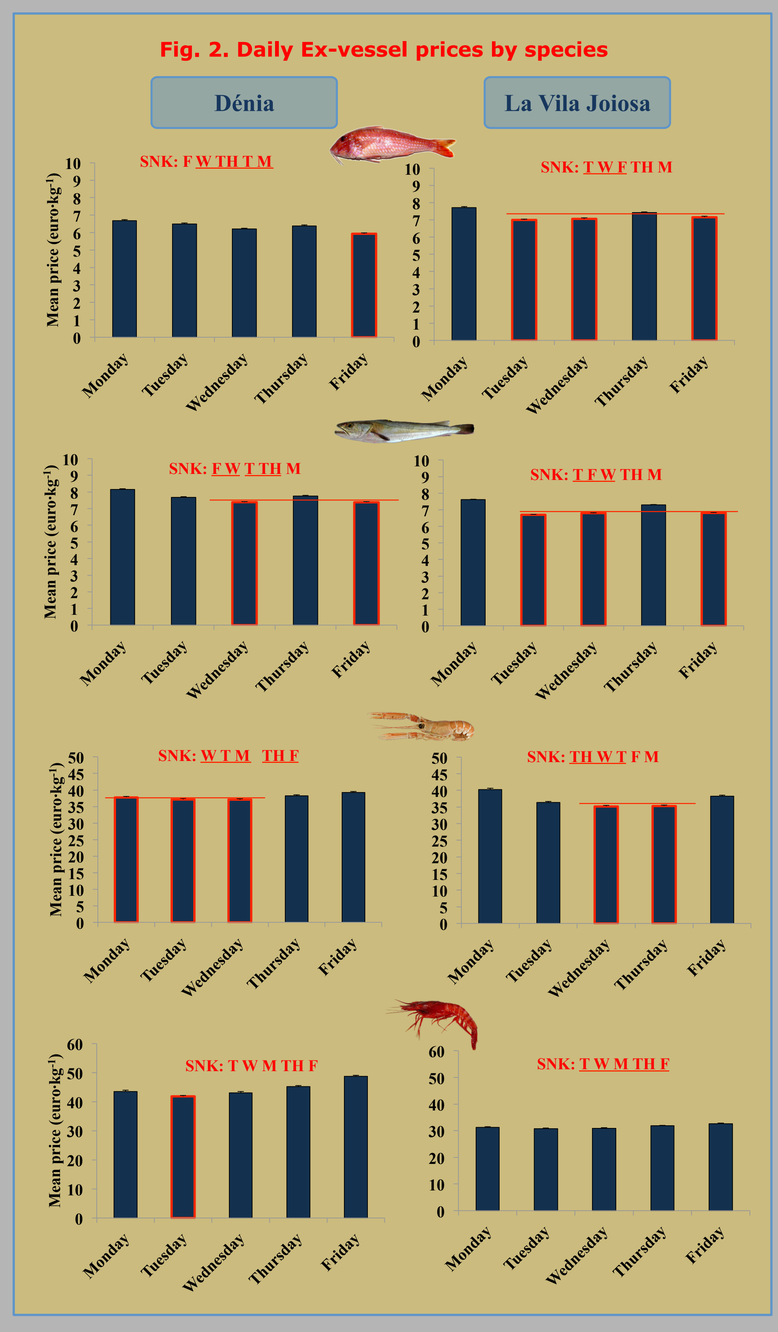
DISCUSSION AND CONCLUSIONS

- ✓ Closure leads to an unavoidable reduction in most of target species prices.
- ✓ Lowest prices were on Tuesday and Wednesday, and higher on Monday and Friday.
- ✓ Banning one day per week would reduce revenues less than a month of closure.
- ✓ Banning one day per week would reduce the double effort than a month of closure and may be applied without subsidies.

RESULTS

Fig. 2. Daily variation in the mean ex-vessel price (euro·kg^{-1}) and standard error of the main target species: *Mullus* spp., *Merluccius merluccius*, *Nephrops norvegicus* and *Aristeus antennatus* in the two ports: Dénia (left) and La Vila Joiosa (right). Student–Neuman–Keuls (SNK) pairwise comparisons among days of the week (Monday: M, Tuesday: T, Wednesday: W, Thursday: Th, and Friday: F).

Fig. 3. Mean ex-vessel price (euro·kg^{-1}) and standard error of the main target species: *Mullus* spp., *Merluccius merluccius*, *Nephrops norvegicus* and *Aristeus antennatus* in the two ports before and after the closure (left) and their mean prices at neighbour/open port before, during and after the closure (right).



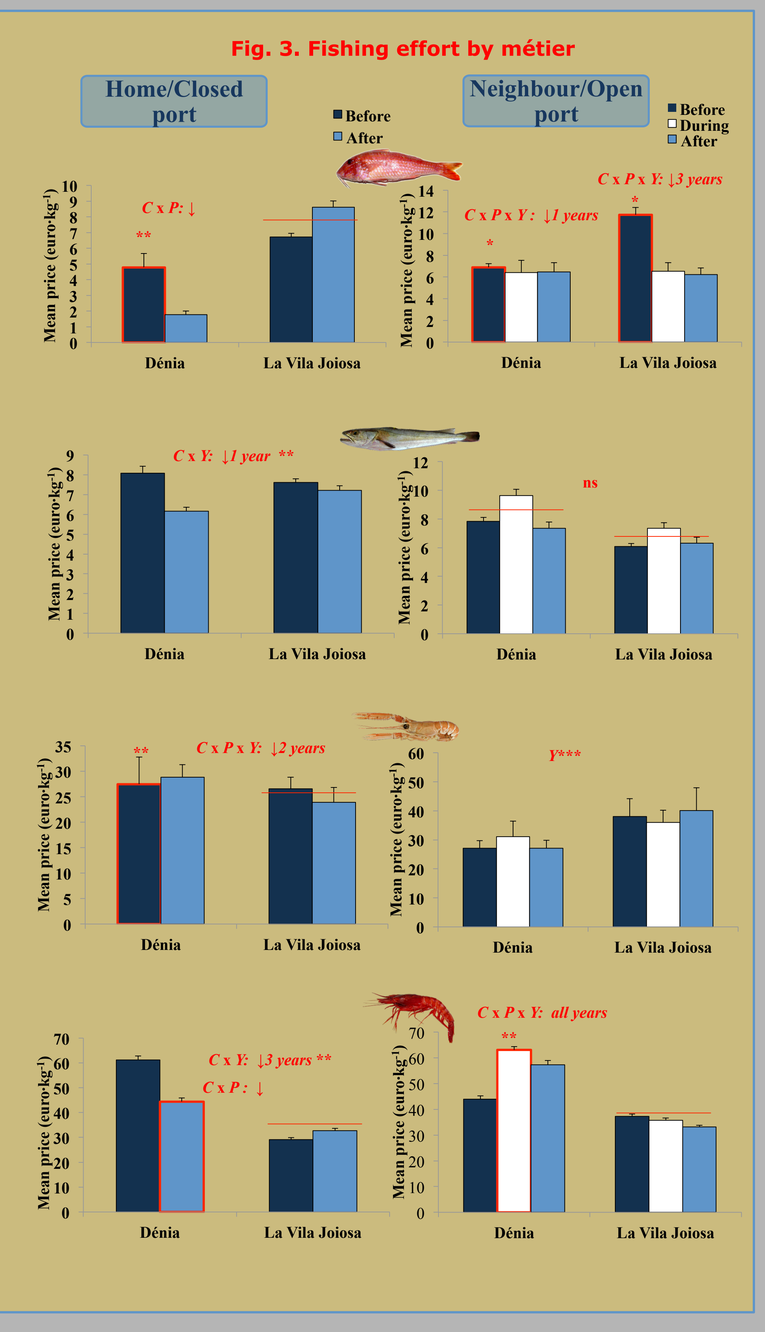


Table 1. Comparison between the economic loss produced by the seasonal closure (actual management measure) and by banning a day (Wednesday) per week (proposed alternative measure).

	Dénia				La Vila Joiosa			
	2009	2010	2011	Mean	2009	2010	2011	Mean
Mean VPUE (euro·vessel^{-1}·day^{-1})	975.20± 9.87	1064.78± 10.71	1526.72± 17.87	1188.90	1407.80± 14.32	1411.24± 14.86	1589.16± 14.82	1469.40
Multiplied by 22 days	21454.49	23425.23	33587.78	26155.84	30971.66	31047.35	34961.54	32326.85
Mean VPUE in Wednesdays (euro·vessel^{-1}·day^{-1})	985.99± 22.68	1008.26± 24.01	1482.80± 23.94	1159.02	1350.90± 30.99	1345.98± 30.55	1457.65± 25.65	1384.84
Multiplied by 22 days	21691.70	22181.78	32621.67	25498.38	29719.76	29611.50	32068.30	30466.52
Loss reduction %	-1.11%	5.31%	2.88%	2.36%	4.04%	4.62%	8.28%	5.65%
Mean VPUE (euro·vessel^{-1}·month^{-1})	13649.71± 576.36	14976.33± 683.85	25140.51± 783.52	17922.18	19608.76± 423.13	22279.89± 396.78	23466.94± 463.64	21785.20
Sum of all Wednesdays (50 days) landings value (euro·vessel^{-1}·year^{-1})	32299.56± 4199.97	29959.80± 4044.97	46201.02± 4129.26	36153.46	38162.88± 2293.56	41557.05± 2686.46	43353.33± 3161.81	41024.42
*Loss produced by the closure (euro·vessel^{-1}·month^{-1})	263.59	6407.89	1263.89	2645.12	3174.90	4744.66	920.00	2946.52

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