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Fisheries management proposals regarding *Nephrops norvegicus* in the northern GSA 6

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The fishing opportunities proposal for 2026 in the Western Mediterranean published by the European Commission (COM(2025)509 final) is centered around the Norway lobster (*Nephrops norvegicus*) in the GSA 6 being the most vulnerable stock in the EMU 1. We here propose some alternative fisheries management measures that could be applied as an alternative to a proportional reduction of fishing effort in days.

1. Norway lobster along the Spanish Mediterranean coast

The fishing opportunities proposal for 2026 in the Western Mediterranean adapts the compensation scheme in order to improve the status of this stock in the GSA 6. However, aside from STECF's reservations to directly and proportionally link fishing effort to fishing mortality (STECF EWG 2511), in the case of this particular stock there is information directly linking sea water temperature increase to a decrease of its abundance (Figure 1, Mingote et al., in prep.).

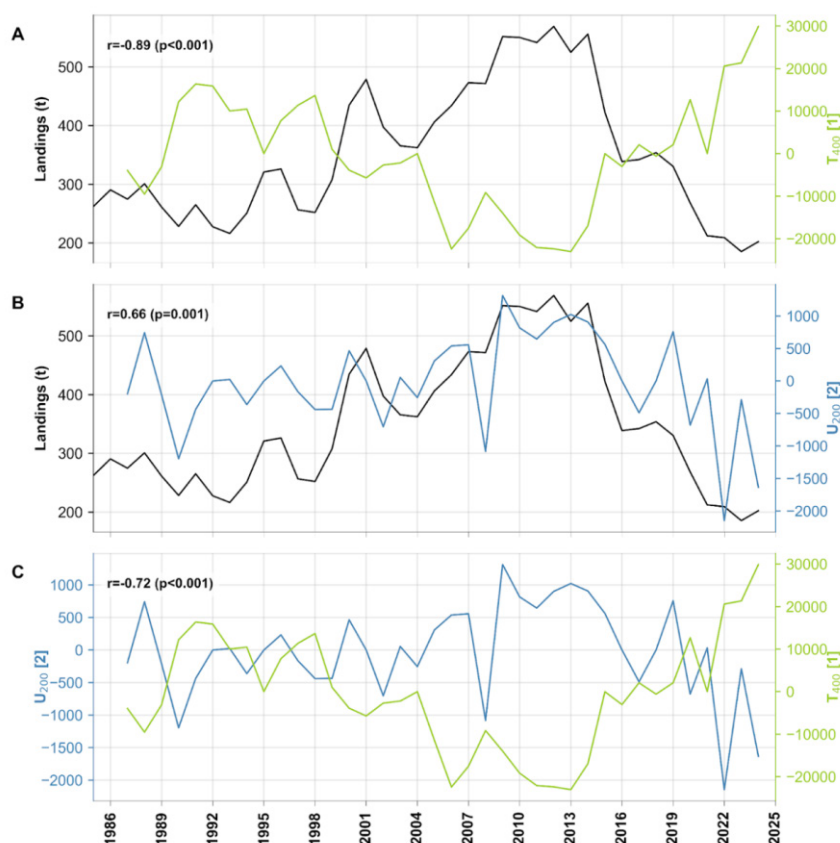


Figure 1. Time series of total yearly landings (t) of the Norway lobster (solid black line, t) from 1986 to 2024, and the temporal pattern of the selected modes of environmental variables from 1987 to 2024. A) Comparison between landings and $T_{400} [1]$, that corresponds to the mode 1 score values for temperature at 400 m depth (solid green line); B) Comparison between landings and $U_{200} [2]$ that corresponds to the mode 2 score values for alongshore velocity at 200 m depth (solid blue line); C) Comparison between $U_{200} [2]$ and $T_{400} [1]$. Values presented in the yaxis for the environmental variables correspond to the score value obtained from the EOFs calculations. The Pearson correlation coefficients (r) and p values between the curves in each plot are shown. Source: Mingote et al., in prep.

In fact, the distribution of Norway lobster landings per unit effort (LPUE) along the Spanish Mediterranean coast indicates that the species is most present in the northern part of the GSA 6, with landings concentrating north of the Ebre Delta (Figure 2), where waters remain cooler (e.g. Pisano et al. 2020).

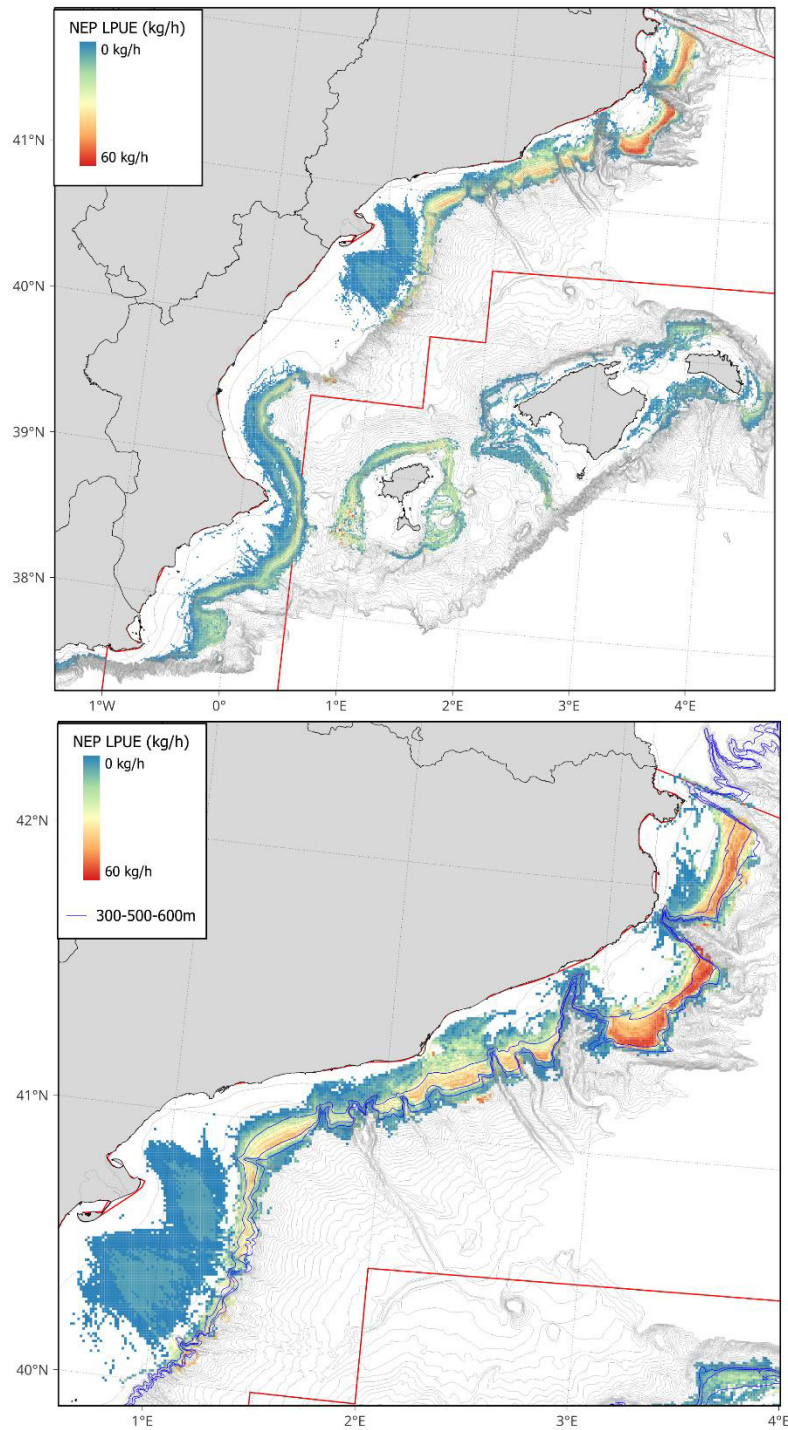


Figure 2. Spatial distribution of *Nephrops norvegicus* landings per unit effort (LPUE, in kg/h) along the Spanish Mediterranean coast (top) and along the Catalan coast (bottom). Blue lines indicate bathymetry at 300, 500 and 600 m.

This species was exploited along the entire Spanish Mediterranean coast (GSAs 12, 5, and 6), but landings and LPUE have decreased over the last two decades in all areas except the north of the GSA 6 (Figure 3), to the point that exploitation is either not relevant anymore (GSAs 12) or the state of the stock could not be assessed (GSA 5, STECF 2509).

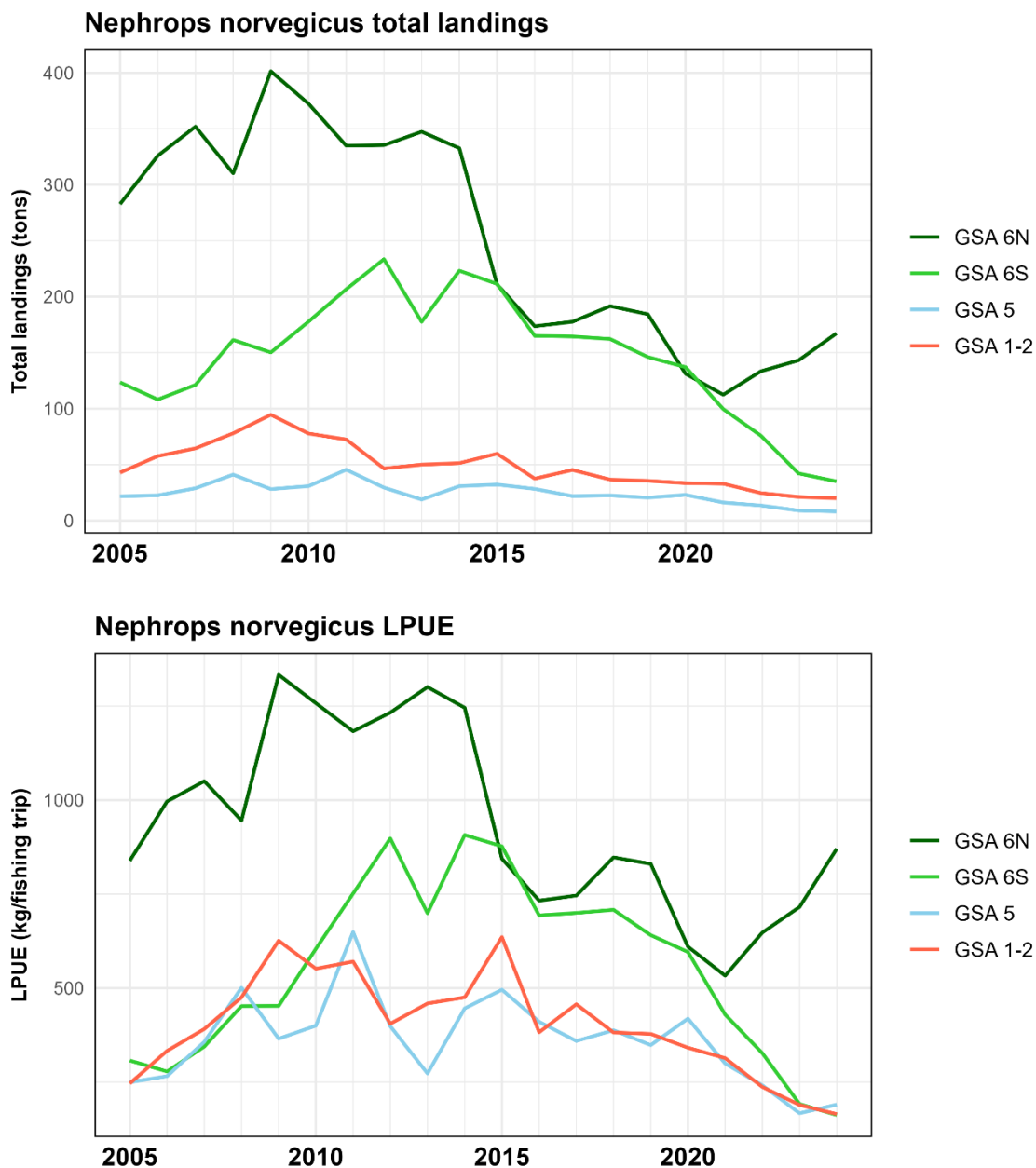


Figure 3. Total annual Norway lobster catch per vessel (in tons) (top) and Landings per Unit Effort (LPUE, in kg per fishing day per vessel) (bottom) for Norway lobster in GSAs 12, 5, and 6, between 2005 and 2024. GSA 6N: Catalonia; GSA 6S: Comunidad Valenciana and Región de Murcia.



In its current state, the proposal fails to acknowledge that fishing effort may not be the main driver of this species stock status, and that a sharp reduction in fishing days is unlikely to produce a proportional recovery of the stock. On the other hand, the stock in GSA 6 being the most vulnerable seems to be more related to the fact that there still is one, and it is being assessed, rather than it being in poorer shape than in other areas. Additionally, if the proposal tries to compensate the areas where there is no relevant Norway lobster stock (albeit not only related to a difference in fishing effort), then the southern areas of the GSA 6 (Comunitat Valenciana and Región de Murcia) clearly need to be recognized as areas where this species is not notably present, and should not face the same consequences as the northern part. While we are aware of the challenges of spatially tailoring fisheries management measures, in this case the consequences of not doing so are both not the most beneficial to the stock and detrimental to the socioeconomic aspects of the fishery. The “most vulnerable stock” limitation tied to effort reduction in days has entailed a proposal that promotes inequality and that has room for improvement in addressing the stock status.

It is also worth noting that the Norway lobster is acting as a “choke species” for an entire multispecies fishery when, in the northern GSA 6, its landings only represented 2.6% in weight of the total bottom trawl landings in 2024 (an average of 1.98% during the period 2021-2023), and 0.09% of the total landings of the Catalan fleet in 2024 (an average of 0.71% during the period 2021-2023) (ICATMAR 2504).

2. Fisheries management proposals regarding the Norway lobster stock in the northern GSA 6

In view of the lack of linear relationship between fishing effort and fishing mortality (STECF 2509), and the clear relationship of Norway lobster abundance and environmental factors, it seems all the more relevant to consider management measures that can be applied as an alternative to a reduction of fishing days that is proportional to the estimated fishing mortality reduction. Matching the estimated fishing mortality reduction value to a reduction of effort in days is unlikely to be the only way to contribute to the recovery of this stock, let alone the one with more balanced socioeconomic consequences for the fishing sector.

2.1. Increase of permanent closure areas

Permanent closure areas are already in place in the northern GSA 6, and are reportedly effective in the recovery of habitats and populations, particularly in the case of Norway lobster (Vigo et al. 2023). The closure areas that are currently being implemented in the N GSA 6 amount to 5.7% of the total 100500 m area (Figure 4).

In addition, we present two proposals regarding the area of maximum distribution of Norway lobster in our area, i.e., 300 to 500 m (Figure 5), where 65% of LPUE for the species are concentrated (Annex I: LPUE Analysis by Depth Strata). In this sense, it is worth noting that data points beyond 500 m are likely due to the standard methodology for landings data and VMS combination, where

the totality of landings of a day must be equally distributed among the VMS pings of that day. As a result, fishing days starting in deepsea grounds and ending over shallower grounds, where Norway lobster is caught, may be reflecting Norway lobster presence in bottoms deeper than its actual habitat. Onboard monitoring data, where information is available by haul, show a low presence of individuals beyond 500 m (ICATMAR 2505).

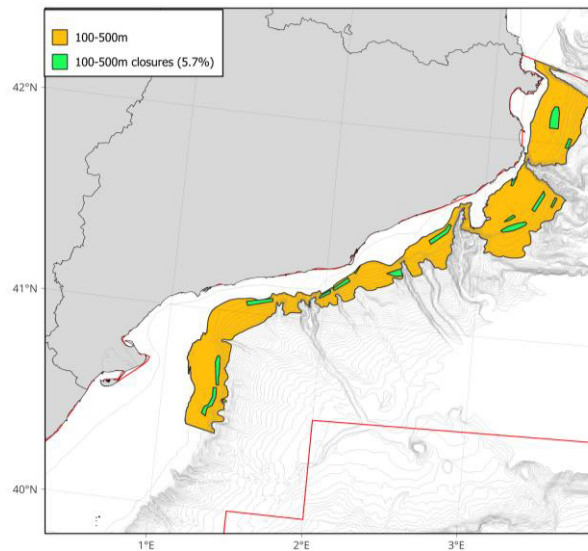


Figure 4. Implemented closure areas between 100 and 500 m depth. Yellow polygon represents the 100500 m area along the Catalan coast. Green polygons represent the closure areas that are currently in force, amounting to 5.7% in surface of the 100500 m area.

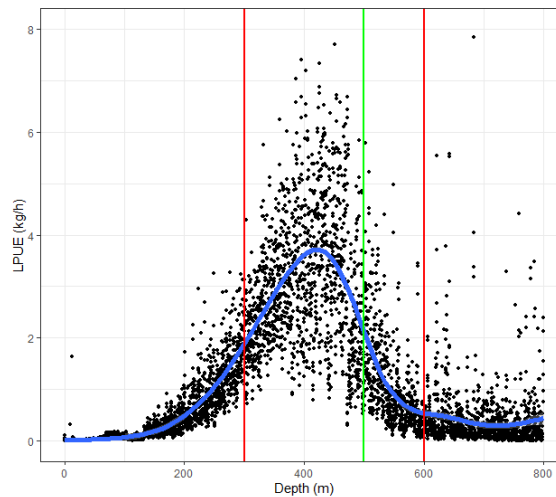


Figure 5. Landings per Unit Effort (LPUE) distribution by depth for Norway lobster. Red lines correspond to the depth limitations in the EU Commission proposal (300600 m), green line marks 500 m as a limit for our proposed maximum LPUE range for the species (300500 m). Data from 2019 to 2024. Data points beyond 500 m are likely due to standard methodology for landings data and VMS combination, where the totality of landings of a day must be equally distributed among the VMS pings of that day. As a result, fishing days starting in deepsea grounds and ending over shallower grounds, where Norway lobster is caught, may be reflecting Norway lobster presence in bottoms deeper than its actual habitat. Onboard monitoring data, where information is available by haul, show a low presence of individuals beyond 500 m (ICATMAR 2505).

The first proposal is to increase the surface of closure areas to 5% of the 300500 m polygon (Figure 6, top), and the second one is to reach 10% of the polygon (Figure 6, bottom). In both proposals, areas are equally distributed along the coast and have taken into account the relevant areas for different life stages of

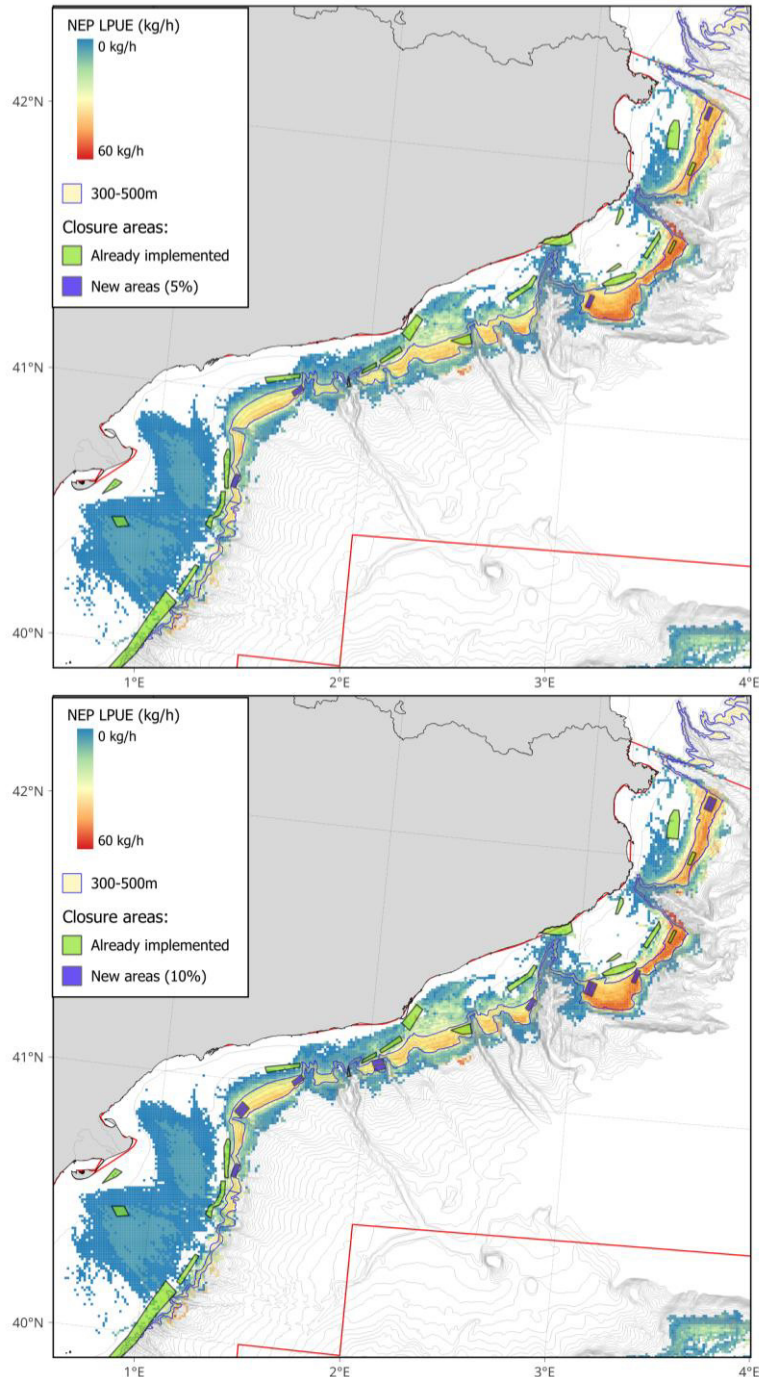


Figure 6. Proposals to increase the permanent closure areas within the main distribution range of the Norway lobster in the northern GSA 6 (300500 m). New closure areas proposed are indicated by blue polygons. Norway lobster LPUE values for 2024 are represented for reference. Top: increase protected surface to 5% to the 300500 m area. Bottom: increase protected surface to 10% to the 300500 m area.



2.2. Release of berried females

In the N GSA 6, berried females are present in the catch from August to February, with a peak between September and November (Figure 7, top). In the case of Norway lobster, individual survival after release is reportedly successful, with individuals having been recaptured up to 150 days after tagging and release (Vigo et al. 2021). The release of berried females would allow for the recovery of the spawning potential that is lost to fishing pressure. It is a measure that could be easily controlled in the fishing auction, and that is likely to have a low economic impact on the fleet, while largely benefitting the stock (berried females represent between 2.3 and 5% of total caught individuals of the species; Figure 7, bottom).

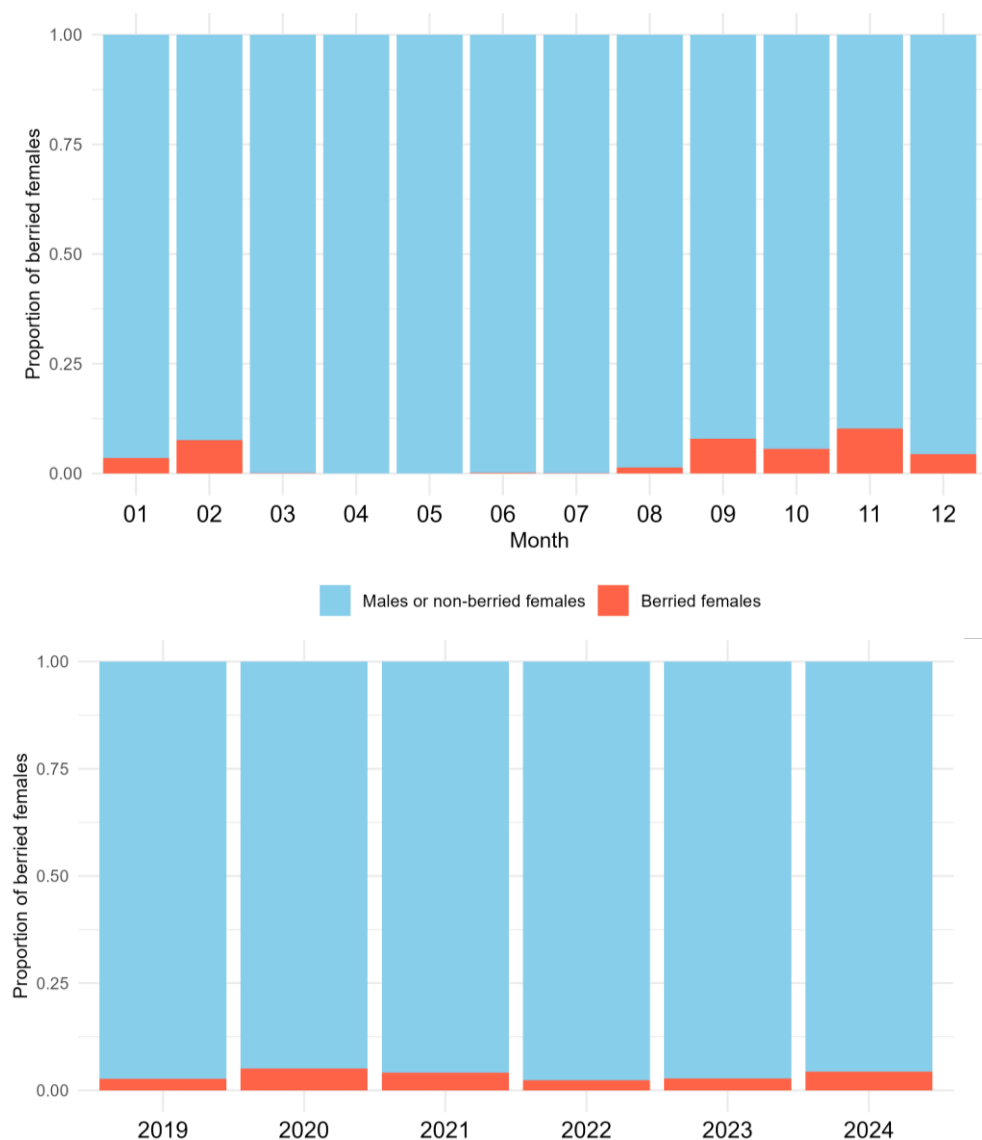


Figure 7. Porportion of Norway lobster berried females (in individuals) in relation to the total individuals caught of the species. Top: by month (data from 2019 to 2024 combined and averaged by haul); Bottom: by year (data averaged by haul).



3. Final remarks

- Norway lobster abundance is inversely correlated with sea water temperature increase, and the species distribution and fisheries trends along the GSA 6 are particularly unequal. In addition, the Norway lobster species only represents around 2% of the total landings of the bottom trawl fleet in a multispecies fishery. To have this species determine the reduction of fishing effort in days will lead to impractical and unbalanced consequences along the territory. The constraints of a “choke species” embedded in the WestMed MAP must be reconsidered.
- Fishing effort is not always linearly correlated with fishing mortality, and so a sharp reduction in fishing effort in days cannot be presented as the only way to recover a stock. Alternative measures must be considered, prioritizing those that significantly contribute to the recovery of the stock without jeopardizing the continuity of fishing activity. We present two proposals tailored to the improvement of the state of the Norway lobster stock in the N GSA 6: the increase of the closure areas surface in the species main distribution range, and the release of berried females.
- Finally, the continuity of the catch limit on the blue and red shrimp is likely to keep causing a displacement of the fishing effort onto coastal areas, as it has in 2025 (ICATMAR 2507). This measure contributes to the increase in fishing effort on stocks such as the European hake of the Norway lobster, and should therefore be reconsidered.

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Annex I: LPUE Analysis by Depth Strata

Nephrops norvegicus

Executive Summary

This annex presents the analysis of Landing Per Unit Effort (LPUE, in kg/h) for *Nephrops norvegicus* across three different depth stratification schemes for the years 2019-2024.

The three stratification schemes analyzed are:

- Division 1 (300600): 0300m, 300600m, 600800m
- Division 2 (300500): 0300m, 300500m, 500800m
- Division 3 (500600): 0500m, 500600m, 600800m

Division 1 (300600)

Year 2019

Stratum	LPUE Total	% of Total
0300m	159.89	14.99%
300600m	829.18	77.75%
600800m	77.45	7.26%

Stratum	LPUE Total	% of Total
0300m	124.84	15.80%
300600m	578.45	73.23%
600800m	86.66	10.97%



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Stratum	LPUE Total	% of Total
0300m	94.76	14.39%
300600m	519.84	78.92%
600800m	44.13	6.70%

Year 2022

Stratum	LPUE Total	% of Total
0300m	109.80	12.65%
300600m	684.44	78.88%
600800m	73.49	8.47%

Year 2023

Stratum	LPUE Total	% of Total
0300m	135.21	13.47%
300600m	775.11	77.23%
600800m	93.34	9.30%

Year 2024

Stratum	LPUE Total	% of Total
0300m	186.93	15.83%
300600m	885.92	75.02%
600800m	107.99	9.15%

Division 2 (300500)

Year 2019

Stratum	LPUE Total	% of Total
0300m	159.89	14.99%
300500m	708.22	66.40%
500800m	198.40	18.60%

Year 2020

Stratum	LPUE Total	% of Total
0300m	124.84	15.80%
300500m	501.27	63.46%
500800m	163.84	20.74%

Year 2021

Stratum	LPUE Total	% of Total
0300m	94.76	14.39%
300500m	452.43	68.68%
500800m	111.53	16.93%

Year 2022

Stratum	LPUE Total	% of Total
0300m	109.80	12.65%
300500m	571.51	65.86%
500800m	186.42	21.48%



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Year 2023

Stratum	LPUE Total	% of Total
0300m	135.21	13.47%
300500m	646.22	64.39%
500800m	222.24	22.14%

Year 2024

Stratum	LPUE Total	% of Total
0300m	186.93	15.83%
300500m	761.17	64.46%
500800m	232.75	19.71%

Division 3 (500600)

Year 2019

Stratum	LPUE Total	% of Total
0500m	868.11	81.40%
500600m	120.96	11.34%
600800m	77.45	7.26%
TOTAL	1066.52	100.00%

Year 2020

Stratum	LPUE Total	% of Total
0500m	626.11	79.26%
500600m	77.18	9.77%
600800m	86.66	10.97%
TOTAL	789.95	100.00%

Year 2021

Stratum	LPUE Total	% of Total
0500m	547.19	83.07%
500600m	67.40	10.23%
600800m	44.13	6.70%
TOTAL	658.72	100.00%

Year 2022

Stratum	LPUE Total	% of Total
0500m	681.31	78.52%
500600m	112.93	13.01%
600800m	73.49	8.47%
TOTAL	867.73	100.00%



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Year 2023

Stratum	LPUE Total	% of Total
0500m	781.42	77.86%
500600m	128.90	12.84%
600800m	93.34	9.30%
TOTAL	1003.66	100.00%

Year 2024

Stratum	LPUE Total	% of Total
0500m	948.10	80.29%
500600m	124.76	10.57%
600800m	107.99	9.15%
TOTAL	1180.85	100.00%