

Pinna nobilis, in search for the surviving fan mussel population in Greece

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Introduction

The fan mussel, *Pinna nobilis* (Linneus 1758) is an emblematic protected species, endemic to the Mediterranean Sea and one of the largest bivalves in the world. In addition to the human stressors which have caused the decline of fan mussel populations, the cryptogenic parasite *Haplosporidium pinnae* caused a mass mortality event (MME) in the Mediterranean, which since the autumn of 2016 has led the species to the brink of extinction.

Since the first confirmed MME records in the Aegean Sea in 2018, fan mussel populations have been decimated in Greek seas. In an effort to track the progress of the MME, the present study attempted to assess the status of fan mussel populations in the Aegean and Ionian Seas by means of underwater visual surveys.

Methods

Between May and September 2022, 96 shallow (<20 m) and 7 deep (>20 m) independent underwater visual surveys which lasted 45 minutes each, were conducted in 13 marine areas across the Greek coastline (Fig.1). Dead, freshly dead (evaluated by the level of fouling on the shell) and alive *P. nobilis* individuals were counted. *P. nobilis* shell fragments and uprooted dead individuals, lying on the seabed were not counted. Each live individual's shell width was measured.

Results

Overall 2123 *P. nobilis* individuals were recorded, among which 88.5% were dead and 11.5% were alive (Fig. 1). No individuals were recorded during the deep censuses. The only surviving fan mussels were found in the semi-enclosed Gulfs of Amvrakikos in the Ionian Sea and Kalloni in the Aegean Sea.

In Amvrakikos Gulf 241 alive *P. nobilis* were recorded (Fig.2) in 36 conducted surveys, between 0.6 to 9,7 m depth and the mortality rate was estimated at 51,8%. The mean shell width of the living individuals was 9 cm. A small percentage (7,7%) of the dead individuals, were estimated to have died recently.

In Kalloni Gulf, Lesvos Island, 3 alive individuals were recorded in 2 conducted surveys between 0.5 to 2 m depth and the mortality rate was estimated at 96.6%.

Conclusions

This study documented the collapse of fan mussel populations in the majority of the areas investigated (Fig. 3), but also highlights

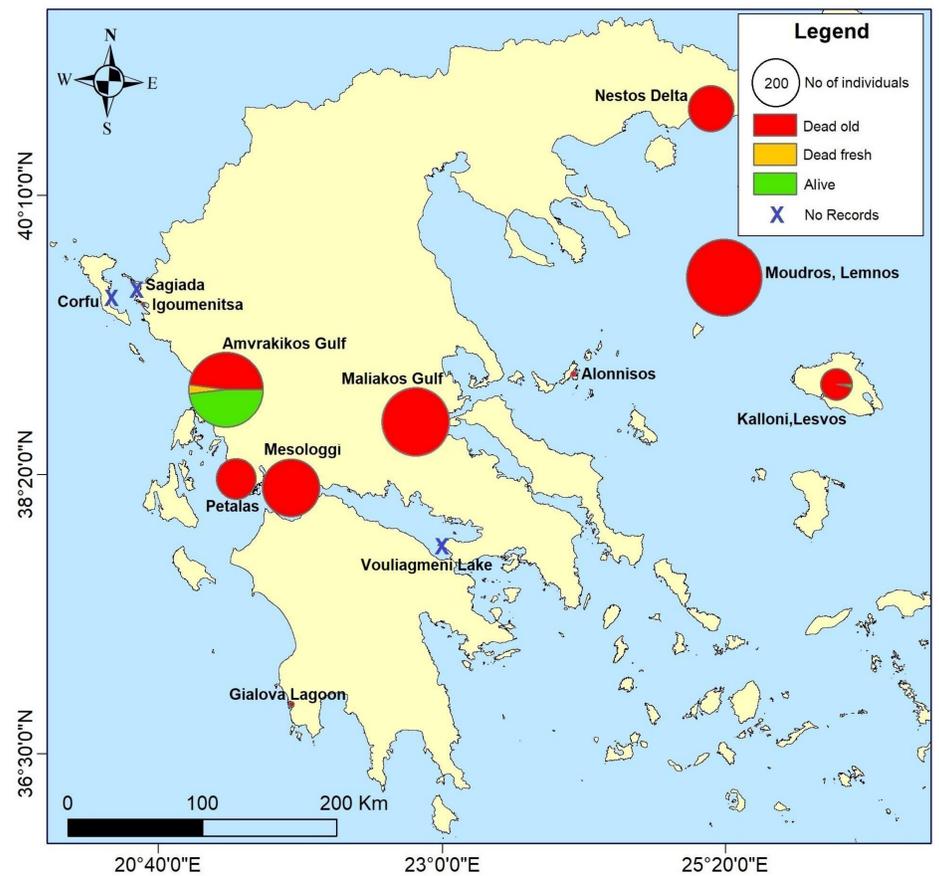


Fig. 1. Map of Greece depicting the mortality assessment of *Pinna nobilis* populations at 13 marine areas by September 2022.

the importance of the few remaining sanctuary areas which still hold surviving populations.

The presence of surviving populations in the semi-enclosed Gulfs of Amvrakikos and Kalloni, indicates that specific environmental conditions, such as extreme temperature and salinity, could limit *P. nobilis* mortality by *H. pinnae*. Systematic regular monitoring of these areas and especially the search for juveniles and recruits is highly important in order to observe a possible natural recovery and examine the methods for the fan mussel populations' protection and restoration.

The search for surviving *P. nobilis* populations or individuals, is crucial to guide conservation measures and increase the chances for the species' survival in Greek seas.

Acknowledgements

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Fig. 2. Surviving *P. nobilis* population in Amvrakikos Gulf, Ionian Sea (photo by O. Papadakis, August 2022).



Fig. 3. Dead *P. nobilis* population in Moudros Gulf, Lemnos Island (photo by O. Papadakis, June 2022).