

Conservation challenges posed by the invasive blue crab Callinectes sapidus in Sicilian coastal wetlands: insights from the Stagnone di Marsala lagoon and the Trapani and Paceco salt pans.

Marsiglia N. 1,2*, Giacoletti A. 2,3, Russi M. 2,3, Bosch-Belmar M. 1,2,3 and Sarà G 2,3.

¹ CoNISMa, Consorzio Nazionale Interuniversitario per le Scienze del Mare, ²Laboratory of Ecology, DiSTeM, University of Palermo, Palermo, Italy; ³NBFC, National Biodiversity Future Center, Palermo, Italy

Introduction

Mediterranean coastal wetlands are biodiversity hotspots providing key ecosystem services¹ such as:

- nursery habitats;
- b) nutrient cycling;
- water purification;
- d) shoreline protection.

These fragile ecosystems are increasingly threatened by climate change, pollution, habitat alteration, and biological invasions^{2,3}. The Atlantic blue crab (Callinectes sapidus), native to the western Atlantic, has rapidly colonized Mediterranean coastal areas⁴. In western Sicily, stable populations have been established in protected lagoons and saltmarshes, threatening local biodiversity and artisanal fisheries⁵.

Objectives:



assess blue crab establishment and reproduction;



analyze habitat preference;



evaluate impacts on biodiversity and ecosystem functioning;



explore and propose mitigation and management strategies.

*email: nicoletta.marsiglia@unipa.it **Materials and Methods** Study areas San Teodoro Kitesurf Punta Palermo Figure 1: Monitoring areas: a) Stagnone di Marsala (TP, Sicily); b) Saline di Trapani e Paceco (TP, Sicily). Sampling design Monitoring sites: 5 (Stagnone di Marsala) and 3 (Saline di Trapani) Traps for site: 3 **Soaking time**: 24 hours **Sampling frequency**: monthly. Response variable: abundance, biomass, biometric measurement, Figure 2: a) Traditional crab trap with bait; b) measured traits. sex ratio, gonadosomatic index. **Habitat characterization** Photo-sampling: visual Crab traps: presence and survey of benthic species with abundance of crabs. 20x20 cm frame. **Sensors**: temperature and **Sediment sampling:** salinity dataloggers. substrate cores. **Solution Sampling**: stable isotope analysis.

Results

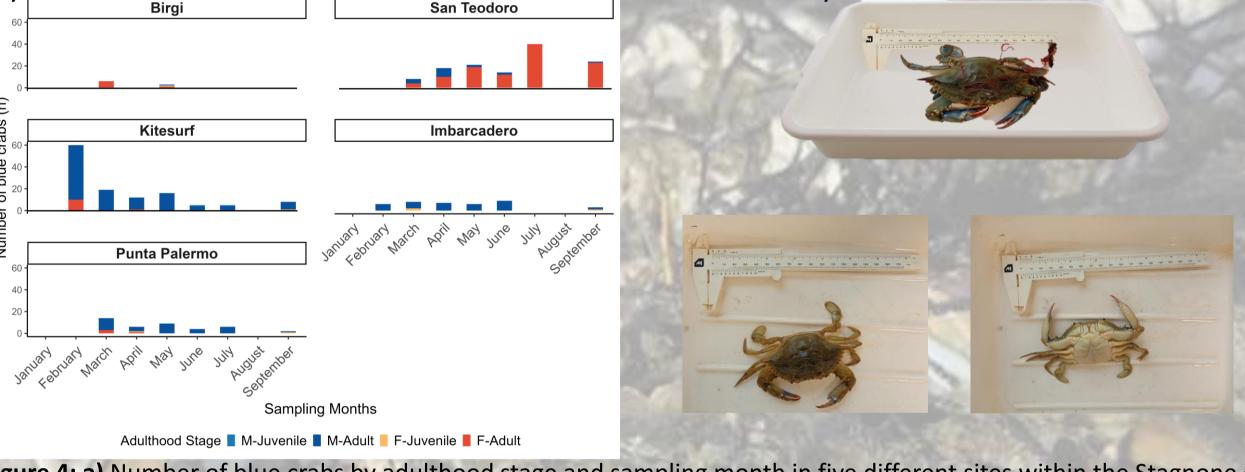
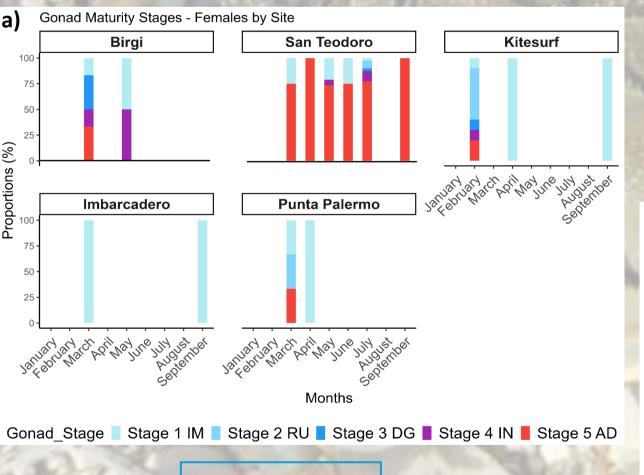
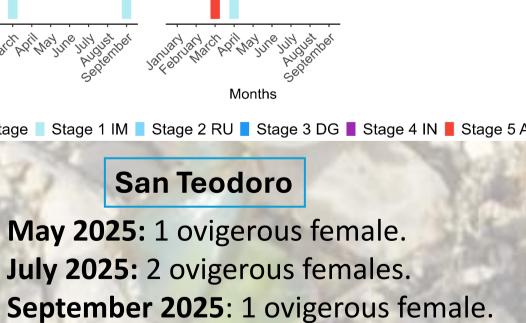
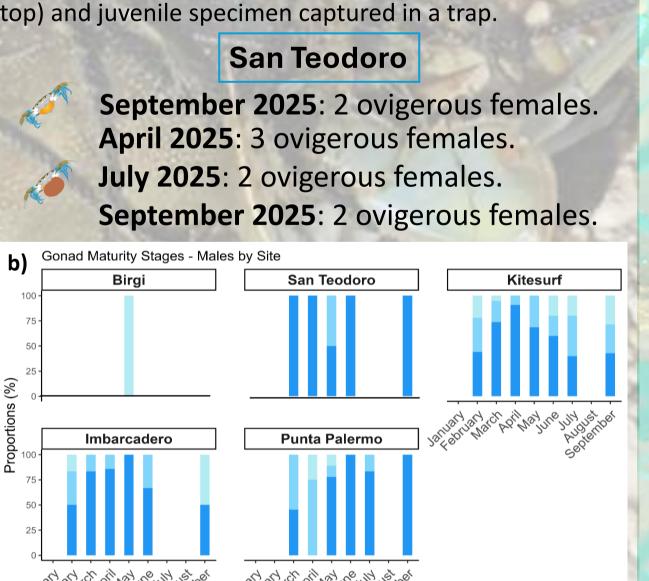


Figure 4: a) Number of blue crabs by adulthood stage and sampling month in five different sites within the Stagnone di Marsala lagoon (M = male, F= female); b) adult (top) and juvenile specimen captured in a trap.

Figure 5: a) Monthly evolution of sexual maturity stages of females; b) males crabs in different sites within the







Channel

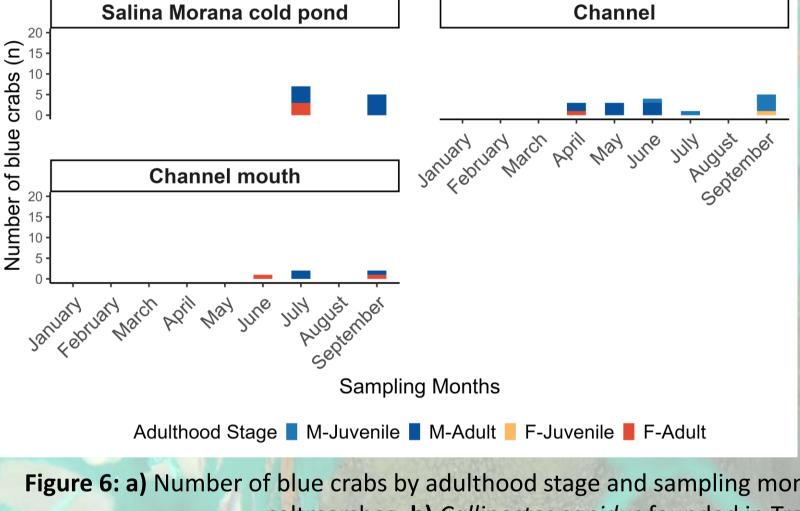


Figure 6: a) Number of blue crabs by adulthood stage and sampling month in three different sites within Trapani saltmarshes; b) Callinectes sapidus founded in Trapani saltmarshes. a) Gonad Maturity Stages - Females by Site **Channel mouth** Salina Morana cold pond **Channel mouth**

Figure 3: Habitat and instrument layout in the field.

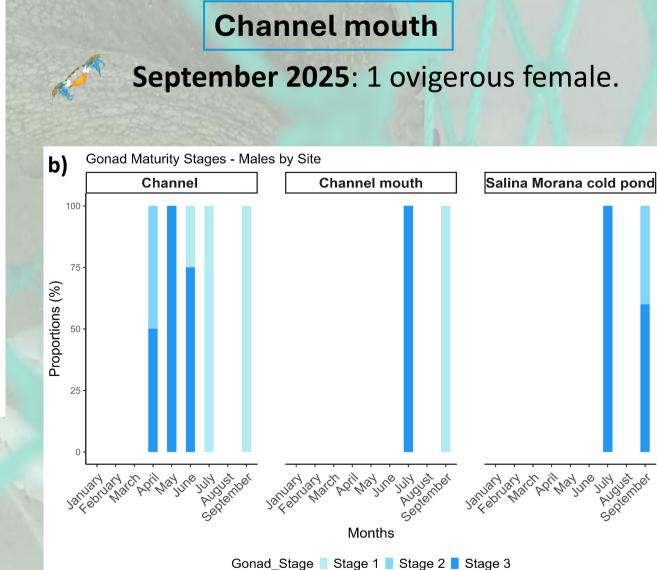


Figure 7: a) Monthly evolution of sexual maturity stages of females; b) males crabs in different sites within the Trapani saltmarshes.

Stagnone di Marsala lagoon. Take home messages



The blue crab C. sapidus is firmly established in Stagnone di Marsala lagoon and Trapani salt pans.

Different gonad maturation stages observed in both sexes: evidence of local reproductive activity overall in San Teodoro (Stagnone di Marsala).

Variation in maturation stages between Stagnone di Marsala lagoon and Trapani salt pans and sexes suggests environmental or behavioral influences.

Actions: align invasive species control with conservation goals is essential to preserve the resilience of Mediterranean coastal wetlands.

¹Liquete C., Piroddi C., Drakou EG., Gurney L., Katsanevakis S., Charef A., Egoh B. (2017). Current status and future prospects for the assessment of marine and coastal ecosystem services: a systematic review. PLoS ONE 8(7): e67737. ²Katsanevakis, S., Wallentinus, I., Zenetos, A., Leppäkoski, E., Çinar, M. E., Oztürk, B., Grabowski, M., Golani, D. & Cardoso, A. C. (2014). Impacts of invasive alien marine species on ecosystem services and biodiversity: a pan-European review. Aquatic Invasions, 9(4), 391–423. ³ Coll, M., Piroddi C., Albouy C., Lasram F.B.R., Cheung W.W.L., Christenden V., Karpouzu V.S., Guilhaumon F., Mouillot D., Paleczny M., Palomares M. L., Steenbeek J., Trujillo P., Watson R., and Pauly D. (2010). The Mediterranean Sea under siege: spatial overlap between marine biodiversity, cumulative threats and marine reserves. Global Ecology and Biogeography 19(5): 755–768 ⁴ Mancinelli, G., Chainho, P., Cilenti, L., Falco, S., Kapiris K., Katselis G., Ripeiro F. (2017). The Atlantic blue crab Callinectes sapidus in southern European coastal waters: distribution, impact and prospective invasion management strategies. Marine Pollution Bulletin, 119(1), 5–11.











⁵ Gavioli A., Castaldelli G., Eggleston D.B., Christian R.R. (2025). From ecological to anthropogenic factors: unraveling the drivers of blue crab Callinectes sapidus occurrence along the Mediterranean coasts. Frontiers in Marine Science, 11:1515098.







