

ALIEN SPECIES IN THE ADRIATIC BLUE CRAB



Working Group
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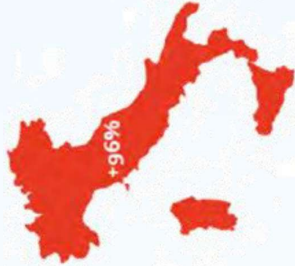
AGRI.TE.CO. Ambiente Progetto Territorio Sic.
Ministero dell'Agricoltura e delle Politiche Rurali
Fondo Sviluppo e Coesione 2014-2020
Operativa LEADER 2014-2020
Asse 1 - Sviluppo rurale
Sottoprogramma 2 - Sviluppo rurale
Intervento 2.1 - Sviluppo rurale
Attività di sviluppo rurale

ricerca research
pianificazione project
progettazione project
per lo sviluppo in
resistenza degli ambienti
territoriali, lo sviluppo
delle comunità locali

Meeting MEDAC FG
Adriatic - 9th April 2024

ALIEN SPECIES IN THE ADRIATIC

Italy
+ 3,000 alien species
+96% in the last 30 years



The main (or most famous) alien species in the Adriatic Sea



Mnemiopsis leidyi



Pomatomus saltatrix



Undaria pinnatifida



Sargassum muticum



Callinectes sapidus

BLU CRAB (CALLINECTES SAPIDUS)

Differences between green crab and blue crab

green crab



blue crab



Size ratio
about 8 a 1

Photo by Agriteco, 2024

BLUE CRAB (CALLINECTES SAPIDUS)

Scientific classification



Phylum: Arthropoda

Class: Malacostraca

Order: Decapoda

Family: Portunidae

Species: *Callinectes sapidus* (Rathbun, 1896)

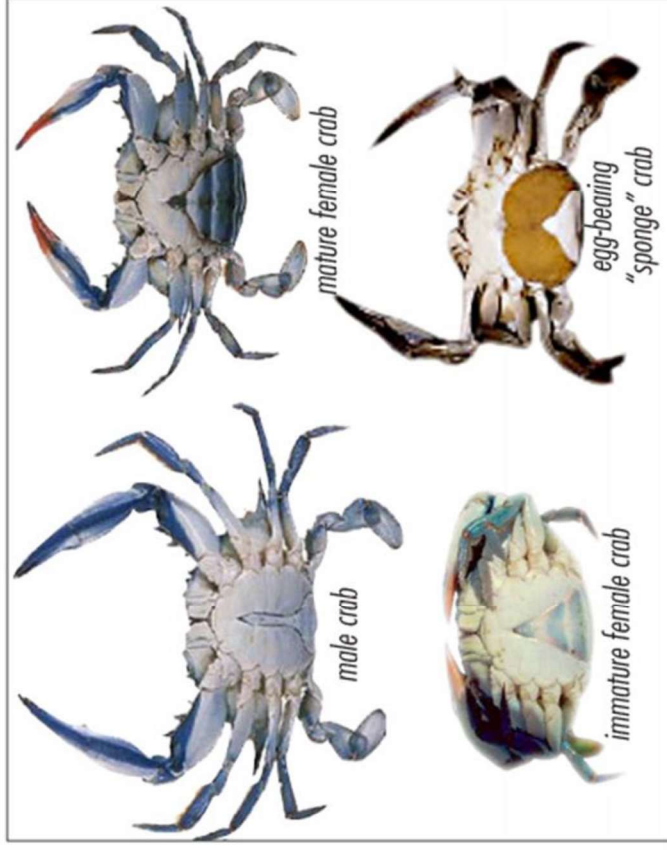
Common name: Atlantic blue crab

Main features

The granular dorsal surface, varying in colour from grey to greenish blue

The anterolateral margin of the carapace has nine teeth, the last of which are distinctly longer, acute and laterally extended, called lateral spines

The last pair of pereopods is flattened and flattened, shovel-shaped, as a functional adaptation to swimming



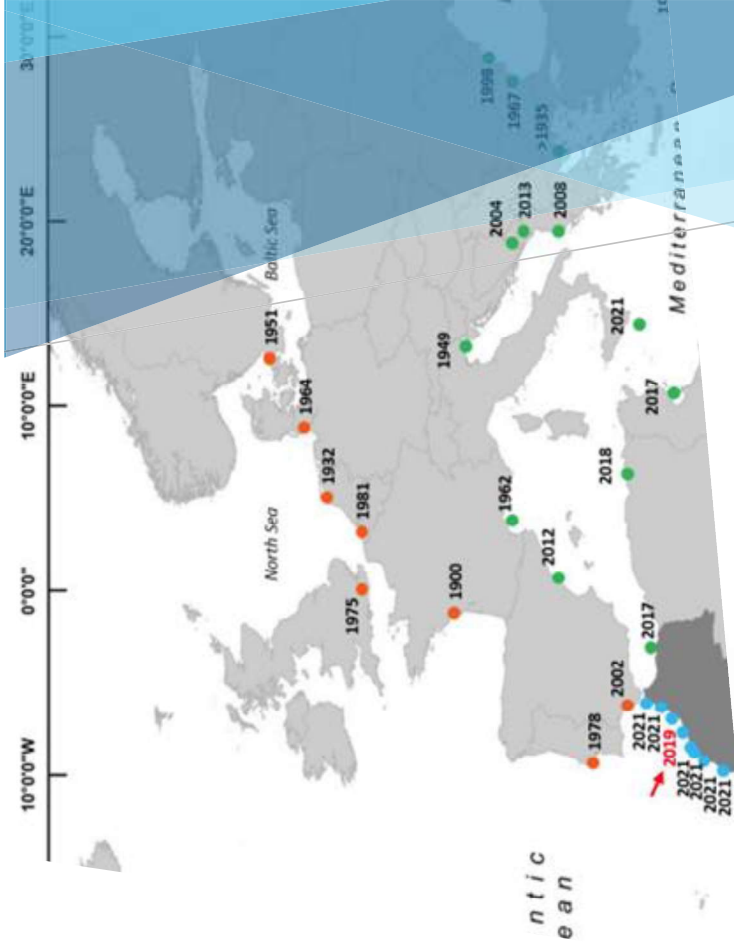
Sexual dimorphism

Claws:

- metallic blue in the male
- orange in the female

Abdomen:

- fused segments in the shape of an inverted T in the male
- triangular-shaped abdominal apron in sexually immature females
- round-shaped abdominal apron in sexually mature females



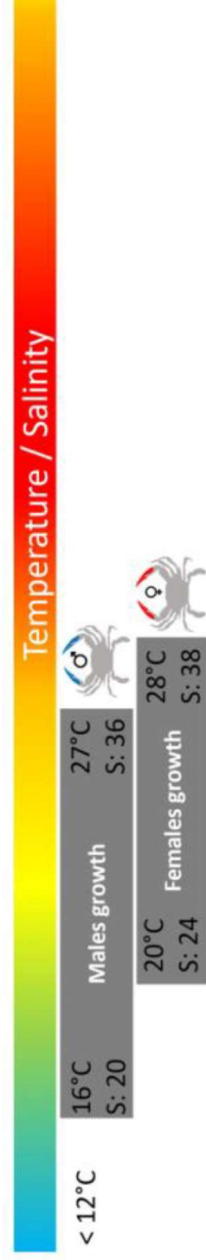
BLUE CRAB (CALLINECTES SAPIDUS)

First reports in Europe and the Adriatic Sea

BLUE CRAB (CALLINECTES SAPIDUS)

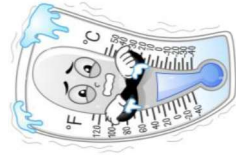
Ecological parameters

Blue crab life and the success of population stabilisation and reproduction are strongly influenced by **water temperature and salinity**



C. sapidus is a species that is highly tolerant of these two parameters in all life stages, from larva to adult crab, and **for this reason they find transitional environments their ideal habitat**

In Mediterranean waters, the optimal temperature range is between 16°C and 27°C for males and between 20°C and 28°C for females, while salinity is between 20 and 38‰



Below 12°C the blue crab shows hibernation status



BLUE CRAB (*CALLINECTES SAPIDUS*)

Life cycle

Complex cycle that is completed between open sea and transitional environments

Release and development of larvae in the open sea

Juvenile growth in late autumn

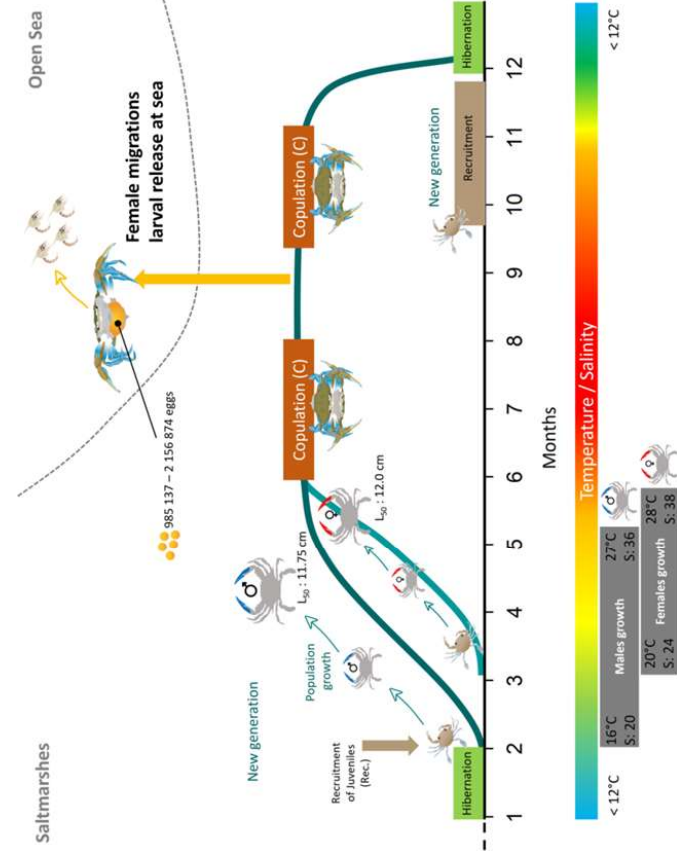
Stop activity in winter with $T^{\circ} \text{H}_2\text{O} < 12^{\circ} \text{C}$

Resumption of activity and growth in spring

Sexual maturity at L50:

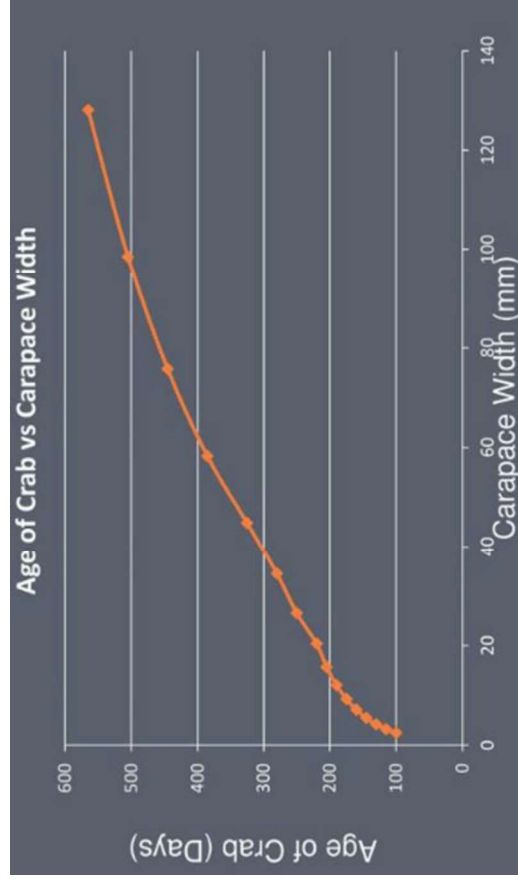
- Males 10-11 cm and 12-18 months
- Females 12 cm and 12-18 months

L100 in females at 13 cm



BLUE CRAB (CALLINECTES SAPIDUS)

Life cycle



Males continue to mutate and grow after reaching sexual maturity

females stop mutating and growing when they reach maturity and are ready to mate

Females reproduce only once in a lifetime

Size

6 cm in the first year
and 12 cm in the second year

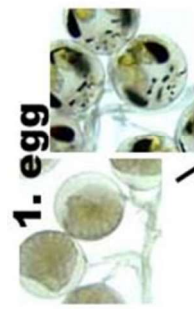
BLUE CRAB (CALLINECTES SAPIDUS)

Eating habits

The blue crab is omnivorous species and feeds on both plant and animal materials and varies its diet according to its life stage

All sizes of blue crab are opportunistic omnivores and feed along the bottom, as they are considered general scavengers, bottom carnivores, detritivores and omnivores

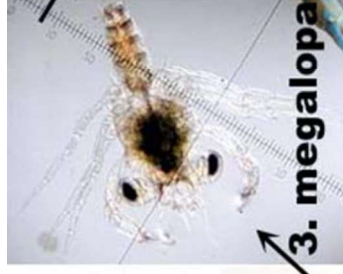
They use vision and chemical receptors to detect the scent of prey, catching it between the claws



1. egg



2. larva



3. megalopa



4. juvenile



5. adult

Larva consumes dinoflagellates and copepod nauplii

Megalopa feeds on fish larvae, small crustaceans and aquatic plants

Juveniles consume mainly small bivalves, detritus and plant material

Adults crabs feed mainly on bivalves, snails, shrimps, fish and decaying organic matter

Food preferences change by size and location

Cannibalism is common in the Blue Crabs

BLUE CRAB (*CALLINECTES SAPIDUS*)

Its expansion

Northern Adriatic environments ideal for settlement and development



Presence of marine environment, transitional areas (lagoons) and freshwater streams **without discontinuity**

No natural predators

Octopus, blue shark (blue shark), sea bass, eel are present, but they are overfished and **their effect on blue crab is minimal**

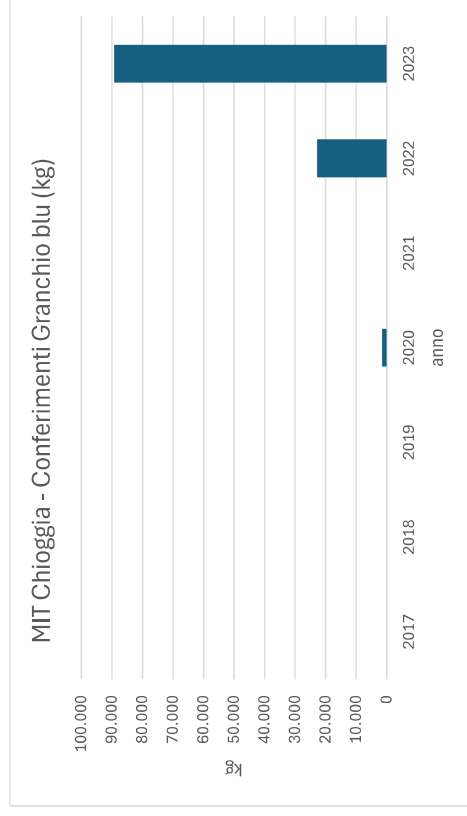
Sea turtle found in a few specimens

African Sacred Ibis also an alien species

However, most of these predators act on juveniles

BLUE CRAB (*CALLINECTES SAPIDUS*)

Current situation



The problem exploded in the summer of 2023, but the signs of its increasingly invasive presence had been present for some years



Photo by: Coop. San Marco Burano, 2019

The real sentinels were the lagoon fishermen using fixed nets

2017: a few specimens/week

2018-2019: a few specimens/week

2020-2021: tens of kilos/week

2022: tens of kg/day

2023: hundreds of kg/day

BLUE CRAB (CALLINECTES SAPIDUS)

Cuttlefish fishing at sea



Lagoon fishing



Photo by: Agriteco, 2023

BLUE CRAB (*CALLINECTES SAPIDUS*)

Delta Po shellfish farms



Photo by: ISPRA-ARPAV, 2023



Chamelea gallina fishing at sea

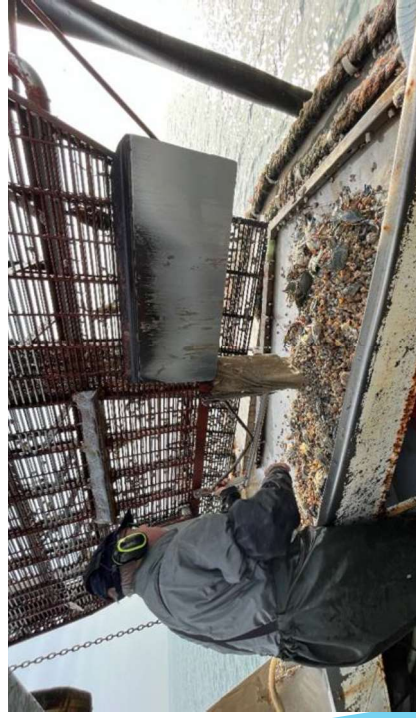


Photo by: Agriteco, 2023



BLUE CRAB (CALLINECTES SAPIDUS)

It has become a problem for local biodiversity



Photo by: Co.Ge.Vo. Chioggia, 2022



Photo by: ISPRA-ARPAV, 2023



Photo by: Agriteco, 2023



BLUE CRAB (CALLINECTES SAPIDUS)

Consequences

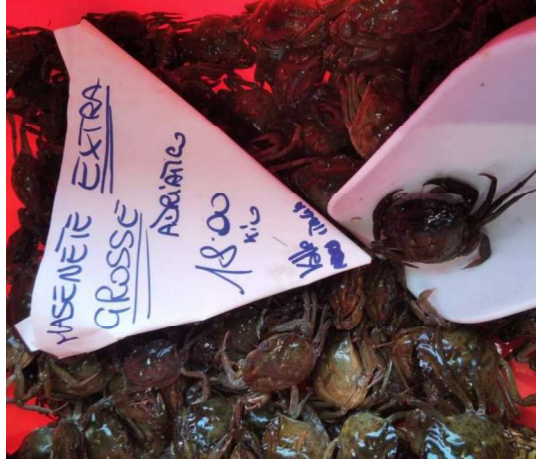


Photo by web, 2023

Out of control price increases for local products



Tapes philippinarum
> 20 €/kg

Photo by Agriteco, 2021



Damage to fishing nets

BLUE CRAB (*CALLINECTES SAPIDUS*)

Economic damage

Local fishing companies are suffering damage from the presence of the blue crab

- Decline in the resource and consequent decrease in catch and income
- Costs of repairing fishing nets
- Search for new markets
- Crab elimination expenses

At this time, the overall damage to the fishery is NOT quantifiable



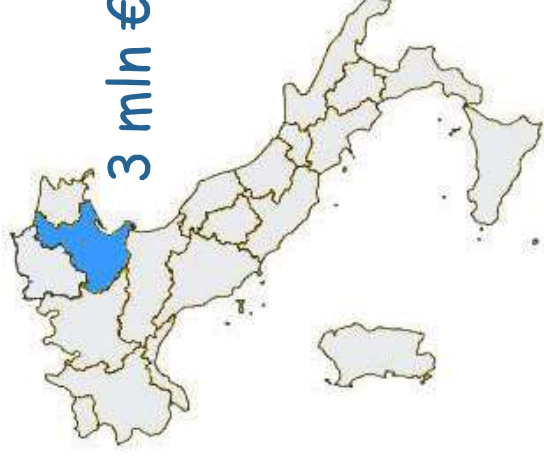
First date:

Turnover clam culture
Delta Po reduced from 50
mln to zero



First Actions for Fishing

3 mln € from Veneto Region



10 mln € from Italy

BLUE CRAB (CALLINECTES SAPIDUS)

Eradication NOT possible
in short time



Possible Solutions

Commercial way



Biological containment with
the involvement of fishermen



BLUE CRAB (CALLINECTES SAPIDUS)



Possible Solutions

Large-scale food industry



Small-scale food industry



BLUE CRAB (CALLINECTES SAPIDUS)



Possible Solutions

Repopulation actions in areas in productive distress

Investigating the possibility of inclusion in other production lines, such as those for feed, flour, cosmetics, integrators, etc., exploiting the properties of the carapace rich in Chitin, Magnesium and Calcium

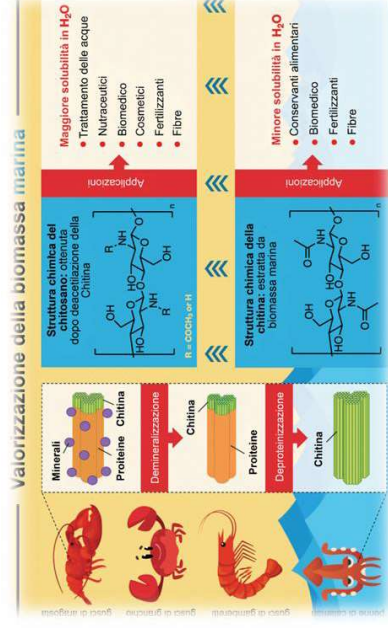
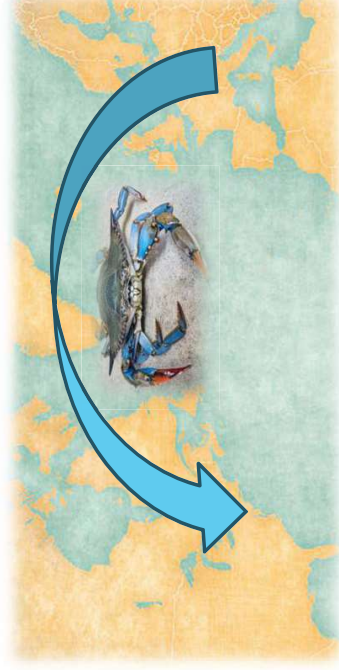
Favouring processing and transformation companies

Studying the Tunisian model

Step 1: training of operators (more than 600)

Step 2: involvement of fish-processing companies to test the potential for exploiting blue crab

Step 3: launch of companies that process and export different finished products: whole cooked crab, peeled crab, crab meat (currently 48)



Reducing the timeframe for the execution of interventions

Thank you for your
attention

