ROBERTO GENNAIO [1], GIUSEPPE SCORDELLA [2], MICHELE PASTORE [3]

[1]ARPA Puglia – Dipartimento di Lecce, Via Miglietta, 1, 73100 Lecce (ITALY)
[2] Cooperativa HYDRA, Via Coppola, 1/D, 73100 Lecce (ITALY)
[3] I.A.M.C. – C.N.R., Sezione di Taranto, Talassografico "A. Cerruti", Via Roma, 3, 74100 Taranto (ITALY) correspondence email: roberto.gennaio@ libero.it - tel. +39 328 4784086

OCCURRENCE OF BLUE CRAB *CALLINECTES SAPIDUS* (RATHBUN, 1896 CRUSTACEA, BRACHYURA), IN THE UGENTO PONDS AREA (LECCE, ITALY)

RIASSUNTO

La presente nota conferma la presenza della specie alloctona *Callinectes sapidus* (granchio blu) nel circuito dei Bacini di Ugento (Lecce, Italia).

Il litorale di Ugento localizzato a Sud Ovest del versante jonico della Penisola Salentina, a circa 60 Km da Lecce (Italia), conserva in parte una serie di habitat caratterizzati da una buona naturalità: litorali sabbiosi con *Ammophila*, dune a ginepri (*Juniperus oxicedrus* subsp. *macrocarpa*) con vegetazione di sclerofille tipiche della macchia mediterranea, steppe salate mediterranee, zone umide caratterizzate in gran parte da canneti, bassure umide e da un complesso di invasi artificiali (i bacini di Ugento) collegati tra di loro e il mare da una serie di canali a marea.

Proprio per la presenza di specie e di habitat naturali meritevoli di conservazione e tutela il biotopo è stato individuato e inserito nell'elenco dei Siti di Importanza Comunitaria (SIC) della Rete Natura 2000 ai sensi della Direttiva "Habitat" 92/43 CEE, come Litorale di Ugento IT9150009. Il biotopo è Area Naturale Protetta della Regione Puglia.

C. sapidus è una specie tipica delle coste atlantiche degli USA ed è sia pescato che allevato negli USA e nel Messico. È una specie ad ampia valenza ecologica, eurialina ed euriterma, sopportando ampie variazioni di salinità e temperatura; tollera valori di ossigeno disciolto inferiori a 0,08 mg/l. È efficiente predatrice di molluschi e crostacei, non disdegnando tuttavia anche animali morti e talune macrofite".

La prima segnalazione della specie nell'area salentina risale all'estate del 2001 quando fu registrata la cattura di un esemplare di maschio adulto che fece scalpore tra i pescatori del luogo, per le notevoli dimensioni del crostaceo (GENNAIO, 2001).

Negli anni successivi, su una serie di segnalazioni e di catture che risultavano

sempre più frequenti si è potuto constatare un aumento della popolazione presente e la sua acclimatazione con segnalazione di femmine mature con uova fecondate. L'incremento delle osservazioni attira l'attenzione di pescatori e ristoratori, per le dimensioni dell'animale, ed acquariofili locali, per i colori del granchio e l'abilità dell'animale di rompere con le chele i gusci delle vongole per cibarsi del mollusco.

Questo granchio presenta dimensioni maggiori degli altri crostacei tradizionalmente presenti nei bacini. La lunghezza del carapace varia fra 8,5 e 11,0 cm mentre il peso corporeo fra 257 e 568 g.

La presenza di maschi e femmine maturi lascia intendere l'insediamento di questo granchio nell'area di riferimento, sebbene non siano stati rinvenuti stadi postlarvali o giovanili.

La maggiore ricorrenza di individui maschi nelle catture, suggerisce una migrazione delle femmine fecondate verso il mare aperto, per il rilascio delle uova.

Per il limitato numero di esemplari adulti catturati, oltre che per la documentata bassa sopravvivenza degli stadi larvali, è plausibile considerare che la classe di età 0+ sia molto ridotta, ma comunque sufficiente a chiudere il ciclo biologico della specie ed a garantire l'approvvigionamento di novellame al sistema di bacini.

Ulteriori ricerche dovranno studiare gli effetti ecologici della presenza di questa specie sui sistemi naturali e valutare una eventuale fruizione della risorsa, come già effettuato in altri Paesi.

INTRODUCTION

The loss of biodiversity and the radical changes in abundance and ecological status of native species, caused by biotic invasions, attract increasing attention (CARLTON, 1989). Mediterranean Sea is susceptible to biological invasions principally due to the Suez Canal, aquaculture introduction and shipping. Alien algae, molluscs, crustaceans and fishes are found in many coastal habitats of the Mediterranean. Invasive species competing or replacing native ones and are sometimes considered pests or cause of nuisance.

Many allochthonous species are recently reported in the Italian coastal areas: Venice Lagoon (MIZZAN, 1999) and Lesina Lagoon (SCORDELLA *et al.*, 2003). In particular for Decapod crustaceans, the following species were reported in the Italy: *Marsupenaeus japonicus* (Lesina Lagoon), *Scyllarus caparti* (Ancona), *Dromia spinirostris* (Taranto Gulf), *Calappa pelii* (Taranto Gulf), *Callinectes danae* (Venice Lagoon), *Thalamita gloriensis* (Genova Gulf and South Sardinia), *Dyspanopeus sayi* (Venice Lagoon and Marano Lagoon), *Rhitropanopeus harrisii* (Venice Lagoon and Marano Lagoon), *Heteropanope laevis* (Tirrenian Sea), *Percnon gibbesi* (Linosa Isle and Sicily), *Callinectes sapidus* (Taranto Gulf).

Callinectes sapidus is an allochthonous crab in the Ugento Ponds Area. The first record in the basins go back to the 2001, when an adult male specimen was accidentally caught (GENNAIO, 2001), amazing the local fishermen.

In the following years, many others catches report a gradual increase of population and its probable fitting to the new brackishwater environment.

The paper confirm the presence of *C. sapidus* in the Ugento Ponds Area.

MATERIALS AND METHODS

Environmental features of the Ugento Ponds Area

The Ugento coastal area is sited in the Salento peninsula (Lecce, Italy; Fig. 1). It is characterized by many habitats (sandy littorals with *Ammophila sp.*, coastal down with *Juniperus oxicedrus* subsp. *macrocarpa* and typical Mediterranean bush, salty steppe), wetlands and low lands and a complex system of artificial ponds (connected with the sea), called "Ugento Ponds" (*Bacini di Ugento*).

The biotope was considered Community Important Site by Natura 2000 Net, according to the EU Directives "Habitat" 92/43 CEE, as Ugento Littoral (IT9150009). Besides, the Faunal Hunting Plan of the Province of Lecce established the area as "Ugento Ponds Protection Oasis" for the safeguard of the migrant and sedentary birdlife. The biotope is also Natural Protected Area of Apulia Region.

The characteristics of the seven Ugento Ponds and their geographic relationships in NW-SE direction are the following (as showed in Fig. 1): *Suddenna* Pond (1.7 ha; connected with sea in Torre S. Giovanni Town), *Bianca* Pond (1.8 ha), *Ulmo* Pond (1.5 ha), *Rottacapozza Nord* Pond (3.7 ha), *Rottacapozza Sud* Pond (11.8 ha), *Spunderati Nord* Pond (6.1 ha; connected with sea in Torre Mozza Town) and *Spunderati Sud* Pond (14.5 ha; connected with sea in Punta Macolone Mouth). There is also an eighth basin separated by the others, but connected with sea by two channels, named *Pali* Pond (2.7 ha).

The pond system is connected with sea by channels. The connection with sea or the distance from the communication channel, determine the ecological and physical-chemical peculiarities of each pond. Salinity is influenced by sea water inflow, fresh water rising by the water table and by rains. The internal basins have low average salinity (Bianca ~1.9 g/l Cl^-; Ulmo ~1.1 g/l; Rottacapozza Nord ~1.0 g/l; Rottacapozza Sud ~0.9 g/l). Ponds closer to sea channels (Suddenna ~14.2 g/l Cl^-; Spunderati Nord and Spunderati Sud ~19.4 g/l) have salinity values like seawater (~23 g/l Cl^-). Dissolved oxygen concentrations are among 4.5 and 7 mg/l with lower values at the water-sediment interface.

During late spring and summer, high temperatures (generally 30 °C air, 27 °C

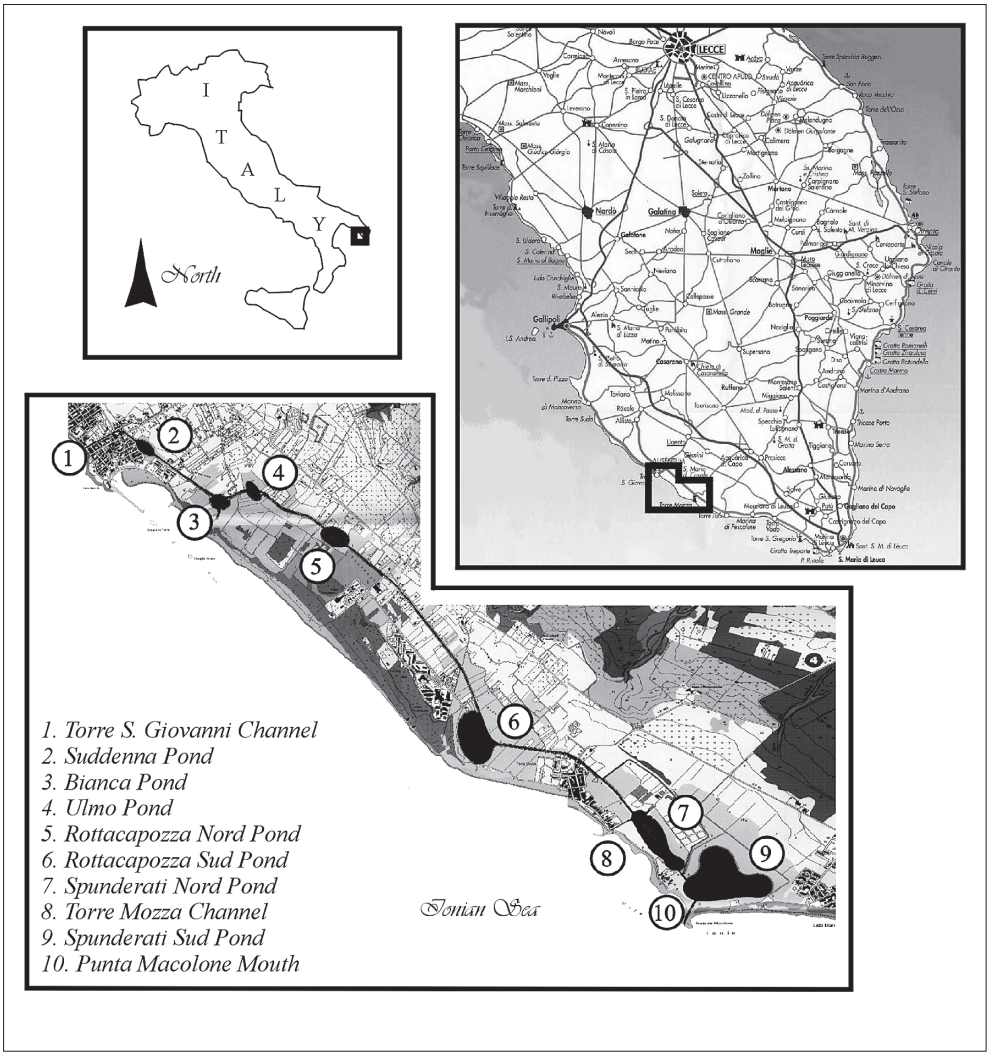

Fig. 1 - Geographic location of the *Salento* peninsula and ponds succession in the Ugento Coastal Area.

water), coinciding with low hydro-dynamisms and the increasing of nutrient concentrations, prime algal blooms regularly. In particular, benthic macroalgae (as *Cladophora sp.*, *Chaetomorpha sp*. and *Ulva sp.*) show a significant increase of biomass, both in surface and bottom, causing anoxic situation and fish mortalities. These aspects were well studied in the last years (BASSET *et al*., 2003).

Ugento Ponds are considered nursery sites because involved in periodic fry ascent and high biodiversity.

Fish populations, traditionally present in the ponds area, are mainly composed by *Mugil cephalus, Liza* sp., *Dicentrarchus labrax, Sparus aurata, Mullus barbatus, Anguilla anguilla, Aphanius fasciatus, Gambusia affinis* and *Atherina boyeri*. Autochthonous shellfish are crustaceans, *Carcinus maenas* and *C. mediterraneus, Pachygrapsus marmoratus, Palaemon serratus*, and molluscs, *Dosinia lupinus, Tapes decussatus, Venurupis rhomboides, Cardium edule* and *Mytilus galloprovincialis* (GENNAIO, 2001).

The Blue Crab

Callinectes sapidus (Blue Crab) is a typical species of the Northern Atlantic Coasts, well caught and farmed in USA and Mexico (FAO, 2004). In USA, during the 1987-2001, at least 980 Mt of Blue Crab had marketed for a value of USD 142,5 millions.

The species has a broad carapace and granulate dorsal surface, front with two prominent triangular teeth and antero-lateral margin with nine teeth (hindmost tooth longest, directed outward, acute). Chelipeds are stout, longer than walking legs; merus with three stout spines on inner margin, and one subdistal-external spine. Walking legs are compressed, fifth walking leg with distal segments paddle-like. Male abdomen has 3-5 segments fused and narrow T inverted shape (HOLTHUIS, 1980).

The occurrence of *C. sapidus* in Europe was first reported along the French coasts (BOUVIER, 1901) and afterwards along the Dutch (HARTOG and HOLTHUIS, 1951) and Danish ones (WOLFF, 1954). Crossing in the Mediterranean Sea was reported on the 1955, in Israel (HOLTHUIS and GOTTLIEB, 1955) even if this species was already caught in the 1949 in Grado, Northern Adriatic Sea (GIORDANI SOIKA, 1951). The occurrence of Blue Crab was also reported in Lebanon (SHIBER, 1981), Aegean Sea (HOLTHUIS, 1964), Egypt (ABDEL-RAZEC, 1987) and Black Sea (MONIN, 1984).

In Italy, the Blue Crab was reported in the Genova Gulf (TORTONESE, 1965), in Sicily (CAVALIERE and BERDAR, 1975) and in the Venice Lagoon (MIZZAN, 1993).

C. sapidus has a wide ecological valence, it is a good predator of fishes, molluscs and crustaceans, even if it is also necrophagous and cannibal. It feed also on algae (*Ulva sp.* and *Spartina sp.*) and it had a strong impact on the natural populations (HINES *et al.*, 1987). The species tolerates high salinity and temperature ranges (up to 45 °C and up to 117 ‰; POWERS, 1977) and it can survive at low dissolved oxygen concentrations (below 0.08 mg/l; WILLIAMS, 1974).

The species compete with other crustaceans as: *Callinectes similis, C. ornatus, Panopeus herbstii, Menippe mercenaria* and *Carcinus maenas.*

The Blue Crab has a complex life history in which it utilizes both oceanic and estuarine habitats (MILLIKIN and WILLIAMS, 1984). Mating generally occurs in the lower salinity regions of estuaries from spring to fall. After mating, females migrate down-estuary to higher salinity regions (TURNER *et al*., 2003). They generally carry the eggs, as a mass, under their abdomens for a ~2 weeks development period (MILLIKIN and WILLIAMS, 1984). Larvae are transported offshore by tides (EPIFANIO *et al.*, 1984; NATUNEWICZ *et al.*, 2001); larval phase is long from 30 to 70 days (HOLTHUIS and GOTTLIEB, 1955).

For its biology, this species is suitable to colonize new habitats (even if no acclimatizing was reported before in any Italian region) also because of the long larval phase (WILLIAMS, 1974), that facilitates the transport of the crab in the ballast waters of ships, and its strong swimming capability (>1m/s; SPIRITO, 1972).

Crab records

An important support was gave by the local fishermen operating on the basins, which referred to the authors the fishery of the Blue Crab, the sampling location and permitted the specimens observations (Figg. 2-6).

In the last months many catches were referred by fishermen which gave the crab for local aquarium collection.

On few specimens were possible to determine the biometric traits and to take some pictures. All the measured animals were viable and intact.

Morphometric traits were measured by a centesimal calipers and a decimeter.

The biometric parameters considered were Carapace Length (CL; as the distance between the center of the anterior interorbital margin and the center of the posterior margin) and Carapace Width (CW; as the widest point behind the posterior anterolateral spines). The body weight (WT) was determined on the individuals by a portable digital balance.

RESULTS AND DISCUSSIONS

Morphometric and sampling results are reported in Tab. 1.

Crab sizes were significantly bigger than the other crustacean species traditionally present in the Ugento Ponds. Carapace Length varied among 8.5 and 11.0 cm whereas Carapace Width ranged between 15.5 and 21.0 cm. Body weight was from 257 to 568 g.

Mating of crabs was confirmed by an *in verbis* report of female with dark extrudes fertilized eggs attached to her abdomen.

No larval-postlarval stage or small crab were observed.

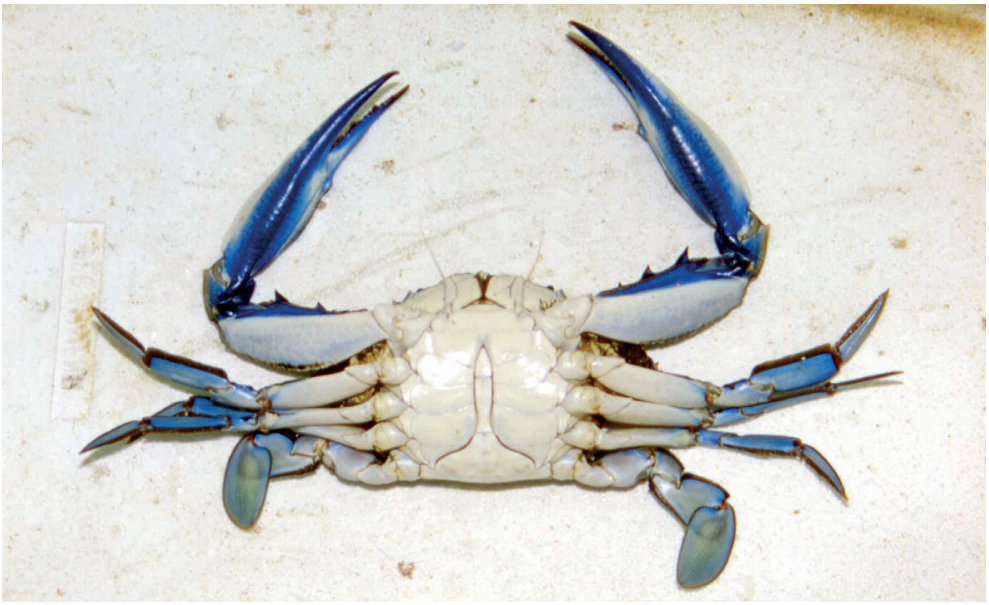

Fig. 2 - Ventral view of a *Callinectes sapidus* adult male.

Fig. 3 - Dorsal view of a *Callinectes sapidus* adult male.

Fig. 4 - Ventral view of a *Callinectes sapidus* adult female.

Fig. 5 - Specimen of *Callinectes sapidus.*

Date	Sex	Maturity	Carrying eggs	CL (cm)	CW (cm)	WT (g)	Note
28th Jul 2004	Female	Yes	No	8.5	15.5	257	Actually in aquarium (Restaurant Morfeo, 73059 Ugento, LE – Italy)
18th Aug 2004	Male	Yes	-	8.5	17.0	350	Actually in aquarium (Hotel Veliero, 73059 Ugento, LE – Italy)
23rd Aug 2004	Male	Yes	-	8.5	17.5	474	Caught in the connection channel between *Suddenna-Bianca* Ponds.
15th Oct 2004	Male	Yes	-	9.0	18.5	510	Caught in the sea channel of *Suddenna* Pond..
28th Oct 2004	Male	Yes	-	11.0	21.0	568	Caught in the *Rottacapozza Sud* Pond. Actually in aquarium (Restaurant Morfeo, 73059 Ugento, LE – Italy)

Tab. 1 - Results of the biometric measurements on the available *Callinectes sapidus* specimens caught in the Ugento Ponds. (CL, Carapace length, is the distance between the center of the anterior interorbital margin and the center of the posterior margin; CW, Carapace width, is the widest point behind the posterior anterolateral spine; WT, Body weight).

Callinectes sapidus records in the Ugento Ponds Area were increased significantly in the last year (2004) and it is attracting the interest of many stakeholders. *C. sapidus* were also appreciated as food. The presence of mature male and females also in the remote areas, far from sea channels (*Rottacapozza Sud* Pond), validates the establishment of the crab in the Ugento Ponds Area, even if no postlarval or juvenile stages was never reported.

The higher frequency of male specimens caught suggests a migration of egg-carrying females toward the sea, for spawning activity. The average number of eggs, generally carried by a female, is about two million eggs, but may change from 0,7 to 8 million eggs, depending on the size of the crab. Anyway, on the average, only one out of every million eggs survives to become a mature adult (ORNER, 2004).

For the low number of adults, probably present, and the low survival of larval stages, it is plausible to consider that +0 age class is small but enough to close the biological cycle of *C. sapidus*, supplying the Pond system with new hatched crabs.

Anyway, because of the low numbers of records referred, it was not possible to conduct a population dynamic study on the site. Further accurate researches must to be conducted to study the ecological effect of the presence of this species on the ecosystem (competition), to confirm its fitting to evaluate the exploitation of the resource (fishery or aquaculture). Genetic studies could be also carry out to mark the actual population/s and monitoring any additional supplying of other new Atlantic specimens (probably transported in ballast).

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