Monitoring and control activities of the American crayfish *Procambarus clarkii* in Tuscany, Italy (LIFE + SOS TUSCAN WETLANDS)

Elena Tricarico[1*], Laura Aquiloni[1], Gianni Bettini[2], Elena Cecchinelli[1], Caterina Macciò[1], Alberto Francesco Inghilesi[1]

[1]Department of Biology, University of Florence, via Romana 17, 50125 Florence (Italy), *elena.tricarico@unifi.it
[2] Studio Biosfera, via Ferrara 5/e, 59100 Prato (Italy)

Intro. The project LIFE11NAT/IT/000094 SOS Tuscan Wetlands (2013-2017; http://www.life-sostuscanwetlands.eu/en/home) aims at decreasing the biodiversity loss in the wetlands of Northern Tuscany (Fig. 1) through habitat restoration and control of the alien invasive species established in the area. Among them, the red swamp crayfish *Procambarus clarkii* (Fig. 2) caused severe impacts on native species and ecosystems. Here, we report the first results of the monitoring and control activities conducted on the species during May-August 2014.


Fig. 2


Fig. 1

Methods. The activities were carried out in Sibolla lake (Fig. 3) and Ramone marsh (Fig. 4) (both included in Sites of Community Importance). For 10 consecutive days per month, baited traps (monitoring: 73 traps for Sibolla, 36 for Ramone; control: 118 traps for Sibolla, 62 for Ramone) were placed along banks (Fig. 5). Traps were checked daily; number, sex and size of trapped individuals were annotated. C.P.U.E. index (Catch per Unit Effort, as total number of crayfish per trap) was used to estimate population abundance.


Fig. 3


Fig. 4


Fig. 5

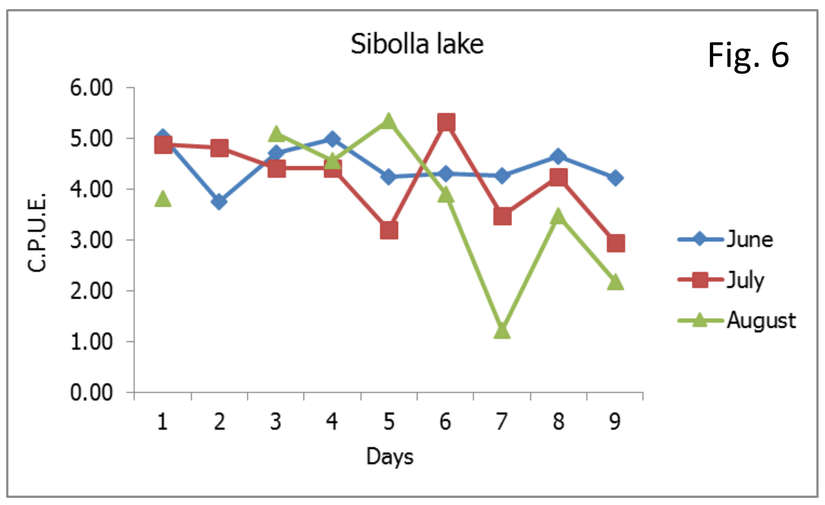

Fig. 6

Results. The species resulted to be widespread in both areas, with higher values of C.P.U.E. for Ramone marsh in both monitoring and control activities (Ramone: 18.48, 22.13 *vs* Sibolla: 3.66, 4.14, respectively) (Figs. 6,7). The control activities led to a significant decrease in the C.P.U.E. through time in both areas (comparisons among months for number of trapped crayfish by G-test: Sibolla: G=233.60, df=2, P<0.001; Ramone: G=1592.01, df=2, P<0.001). Sex-ratio was almost biased to males (due to the reproductive status of females) and more than 80% of trapped individuals were adult large individuals (cephalothorax length> 35 mm).

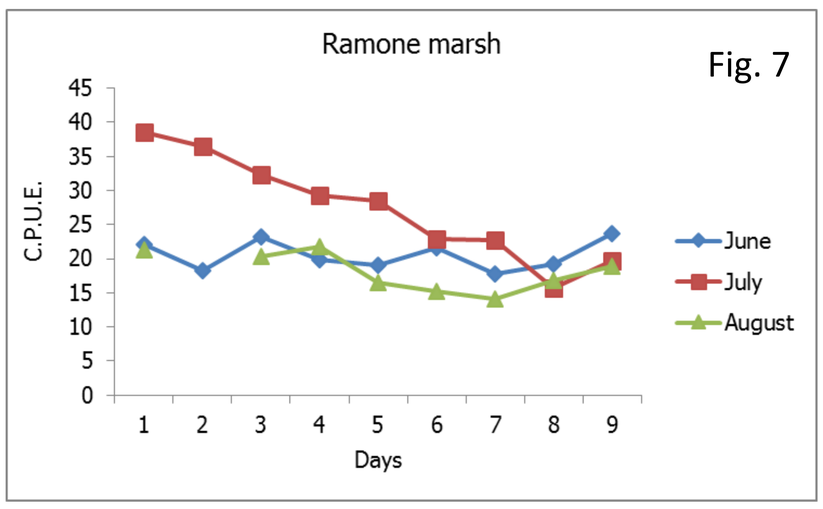

Fig. 7


Fig. 8


Fig. 9

Conclusion. Sibolla lake is a wider (2 km^2 *vs* less than 1 km^2) and deeper area (2 m *vs* max 1 m) than Ramone marsh, and it is inhabited by several indigenous predators of crayfish (birds as *Egretta garzetta*, Fig. 8, and fishes, as eels and pikes) exerting a natural control on it. Biodiversity rate is indeed greater in Sibolla lake than Ramone marsh that can be considered a hotspot of allodiversity for the several alien species found there (e.g. the coypu *Myocastor coypus* and the red-eared turtle *Trachemys scripta* spp., Fig. 9). Intensive trapping seems to be promising for managing both populations but it should be possibly coupled to other innovative control techniques (e.g. SMRT, pheromones, or hormones) and bank restoration/area limitation to obtain long-lasting results.

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