POPULATION DYNAMICS OF *PROCAMBARUS CLARKII* (GIRARD, 1852) (DECAPODA, ASTACIDEA, CAMBARIDAE) FROM SOUTHERN TUSCANY (ITALY)

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ABSTRACT

The presence and continuity of naturalized populations of the red swamp crayfish, *Procambarus clarkii* (Girard, 1852) (Decapoda, Astacidea, Cambaridae), were investigated in the Salica River, in the southern part of Tuscany (Italy), from where no previous information on this species was available. Seasonal samplings were conducted using baited traps. A total of 747 crayfish, including three gravid females, was caught in the framework of the investigation. Information on some population dynamic features (size-frequency distributions, sex-ratio, growth of juveniles, etc.) can now be provided.

INTRODUCTION

Crayfish have been moved outside their natural ranges through different mechanisms, either natural, such as migrations, accidental, such as escape from holding facilities, or deliberate, by humans. As a matter of fact, several species of crayfish have deliberately been introduced to alleviate the problem of reduced stocks
of native species (Barbaresi & Gherardi, 2000). The red swamp crayfish, Procambarus clarkii (Girard, 1852) (Decapoda, Astacidea, Cambaridae), is an autochthonous species in the southern and central regions of the United States, and it is now the most important commercially cultured species in the world (Ackefors, 2000). A number of life history traits makes this species suitable for commercial exploitation, including rapid growth, high fecundity, polytrophism, behavioural plasticity, resistance to extreme environmental conditions, and resistance to diseases (Huner & Lindqvist, 1995; Barbaresi & Gherardi, 2000; Hazlett et al., 2003). Therefore, it was introduced world-wide, and has become the dominant crayfish in almost all areas colonized by its naturalized populations (Gherardi, 2006). In Europe, P. clarkii was firstly introduced in Spain in 1972 (Ackefors, 2000); then, the species was successively imported into Portugal, France, Germany, and the Netherlands (Barbaresi et al., 2003). Since 1990, P. clarkii has also been found in several ponds and streams in northern and central regions of Italy (Gherardi et al., 1999).

The invasive capabilities of P. clarkii can result in both structural and biological impact. On the structural side, the activity of burrowing may result in damaging agricultural areas (e.g., rice plantations) and of rivers and lakes where they may destabilize the banks (Angeler et al., 2001; Barbaresi et al., 2004; Anástacio et al., 2006). An indirect effect of crayfish activity may be an increase in turbidity, thus reducing light penetration and plant production (Angeler et al., 2001; Rodriguez et al., 2003). Little information is available on the biological effects of the naturalization of P. clarkii. Its feeding habits, on aquatic macrophytes and on the eggs, larvae, and adults of amphibians and fishes, may lead to changes in trophic networks and even to the disappearance of some species (Barbaresi & Gherardi, 2000; Gil-Sánchez & Alba-Tercedor, 2002; Renai & Gherardi, 2004; Correia et al., 2005; Cruz et al., 2006; Gherardi & Acquistapace, 2007). In Tuscany (central Italy), P. clarkii was introduced in the framework of the establishment of a farm in Lake Massaciuccoli (to the north of Pisa). When the farm went bankrupt in 1993, the entire cultivated stock of P. clarkii was released into the lake. Therefore, it seems plausible that all the wild populations of P. clarkii now appearing in central Italy, originated from that from Lake Massaciuccoli (Barbaresi & Gherardi, 2000). Several studies on populations of red swamp crayfish were performed in Tuscany, with particular reference to the zones close to Lake Massaciuccoli and close to the urban centre of Florence (Gherardi et al., 1999; Barbaresi & Gherardi, 2000).

The present study is the first attempt to describe the biology of a naturalized population of P. clarkii in the southern part of Tuscany, from where no previous information on the presence of the red swamp crayfish was available. The presence and continuity of the population of Procambarus clarkii were investigated in the Salica River, a stream flowing close to the urban centre of Grosseto.