MANAGEMENT OF THE NATIVE WHITE-CLAWED CRAYFISH (*AUSTROPOTAMOBIUS PALLIPES*) IN THE REGIONS WITHIN THE PROVINCE OF GIRONA

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BACKGROUND

The native white-clawed crayfish (*Austropotamobius pallipes*) was a species commonly found in most watercourses in the basins of the rivers Fluvià, Ter and Muga until the end of the 1970s, when the crayfish plague *Aphanomyces astaci* arrived, a water mould that led to the disappearance of almost all the populations in these river basins.
The white-clawed crayfish populations are currently found in second-order or larger seasonal rivers and fast-flowing streams where, due to some kind of natural barrier (drought in the lower reaches of the watercourse, cliffs, etc.), the fungus was unable to grow.
Moreover, during the 1990s, the red swamp crayfish (*Procambarus clarkii*) population expanded rapidly in the basin and the situation became far worse, since the North American species is both a carrier of the crayfish plague and resistant to this fungal disease. Later, the signal crayfish (*Pacifastacus leniusculus*) arrived in the Ter River and the spinycheek crayfish (*Orconectes limosus*) arrived in the Muga River Basin, both species being carriers of the pathogen *Aphanomyces astaci*.
This situation means relict populations of the white-clawed crayfish cannot expand and are forced to survive in the most inaccessible seasonal rivers and fast-flowing streams, facing the danger of a new outbreak of crayfish plague.

GEOGRAPHICAL LOCATION

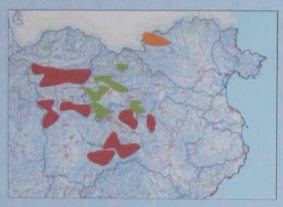
The river basins in northeast Catalonia are located in the Serralada Transversal [Catalan Transversal Range], Serra de les Salines [Les Salines Range] and the Serra Cavallera [Cavallera Range] in the northeastern sector of Catalonia.
The rugged topography of the mountain ranges in this area gives rise to numerous watercourses, which provide the ideal habitat for the white-clawed crayfish.
Downstream, in the middle and lower basin, there are numerous sections of more stagnant water, which have favoured the expansion of the red swamp crayfish and the disappearance of the native white-clawed crayfish.

Upper Fluvià River Basin (La Garrotxa Region)

River network in northeast Catalonia

EVOLUTION OF WHITE-CLAWED CRAYFISH POPULATIONS

Distribuition before 1980



Distribution according to the 2014

In 1992, the first systematic inventory of the watercourses in the La Garrotxa Region was carried out, in order to locate white-clawed crayfish populations. These populations were then monitored on five consecutive years, revealing an alarming decline in their range and numbers.
In 1998 and 2002, new censuses were carried out in order to assess the status of each population, and a significant decline in the density of most of the populations was confirmed.
After 2004, the rest of the river basins in northeast Catalonia were monitored.
Finally, in 2014 the last census was carried out.
The estimated results of the total populations (in blue) and the viable populations (in red) during the period 1992-2014 are shown in the following graph:

Female with cement glands (September 2004)

RESULTS OF THE CURRENT CENSUS (2014)

The census carried out between May and October 2014 reveals that the crayfish has a very irregular distribution in the basin, with the various populations being completed isolated from each other.
Over 80% of the watercourses considered to be the most liable to contain a crayfish population have been sampled.
In the last year of sampling, a total of 71 populations were counted, of which only 20 have been considered as being viable, since the rest have very low densities (1-10 individuals per 100-m section).

Municipi	1992	1993	1994	1995	1996	1998	2002	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Argelaguer	N>1	N>1	N>1	A	A	A	X	A	A	A	A	A	A	A	A	A	A	A
Maià de Montcal	N>1	N>1	A	A	A	A	X	A	A	A	A	A	A	A	A	A	A	A
Mieres	N>2	N>2	N>2	A	A	N>2	X	N>3	N>3	N>2	N>4	N>6	N>3	N>2	N>2	N>4	N>4	N>4
Montagut	A	A	A	A	A	A	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1
Les Planes	N>1	N>1	N>1	A	A	A	X		N>2	N>3	N>3	N>3	N>3	N>3	N>3	N>3	N>3	N>2
Riudaura	N>1	N>3	A	A	A	N>1	N>1	N>2	N>2	N>2	N>2	N>2	N>1	N>2	N>2	N>2	N>4	N>4
Sant Aniol de Finestres	N>2	N>2	A	A	A	N>2	X	N>1	N>3	N>5		N>6	N>2	N>7	N>7	N>7	N>7	N>7
Santa Pau	A	A	A	N>2	N>2	N>2	X	N>1	N>3	N>2	N>2	N>1	N>2	N>1	N>1	N>1	N>1	A
Sant Feliu de Pallerols	N>1	N>1	A	A	A	N>1	X	N>1	N>1	N>1	N>1	N>1	N>1	N>2	N>2	N>4	N>4	N>2
Sant Jaume de Llierca	N>1	N>1	A	A	A	N>1	X	N>1	A	N>1	N>1	A	A	A	A	A	A	A
Sant Joan les Fonts	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>2	N>2	N>2	N>2	N>1	N>2	N>2	N>2	N>1	N>2	N>2
Vall de Bianya	N>4	N>4	N>4	N>2	N>2	N>2	N>2	N>1	N>1	N>1	N>1	N>2	N>3	N>3	N>3	N>10	N>8	N>10
Vall d'en Bas	N>6	N>6	N>6	N>6	N>5	N>6	N>3	N>5	N>5	N>5	N>5	N>4	N>2	N>4	N>2	N>6	N>6	N>10
Canet de Adri									N>0	N>1	N>0	N>0	N>0	N>0	N>0	N>0	N>0	N>0
Figueres									N>1	N>2*	N>4	N>3	N>3	N>3	N>3	N>2	N>2	N>2
Campdevànol									N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>0	N>0	N>0
St. Joan Abadesses									N>1	N>1	N>4	N>4	N>1	N>5	N>5	N>3	N>1	N>2
Les Llosses								N>11	N>1	N>1	N>1	N>1	N>1	N>1	N>1			
Vallfogona de Ripollès									N>2	N>2	N>1	N>1	N>1	N>0	N>0	N>0	N>0	N>0
Ogassa									X	N>1*	N>0	N>0	N>0	N>1	N>1	N>1	N>1	N>1
Sant Aniol de Finestres								N>1	N>4	N>1	N>3	N>4	N>1	N>7	N>7	N>7	N>7	N>7
Les Planes d'Hostoles								N>1	N>2	N>2	N>2	N>3	N>4	N>3	N>3	N>2	N>2	N>2
Sant Feliu de Pallerols								N>1	N>1	N>1	N>1	N>1	N>1	N>2	N>4	N>3	N>2	N>2
La vall d'en Bas														N>1	N>1	N>1	N>1	N>1
Amer									N>2	N>1	N>1	N>1	N>0					
Brunyola									N>1	N>1	N>2	N>2	N>0					
Sant Hilari Sacalm									N>2	N>1	N>1	N>1	N>1	N>2	N>0	N>0	N>0	N>0
Osor									N>1	N>1	N>1	N>1	N>1	N>1	N>0	N>0	N>1	N>1
Sisqueda									N>3	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1
Canet d'Adri												N>1	N>1	N>1	N>1	N>1	N>1	N>1
Sant Esteve de Bonsana																		N>1
Meiosner									N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1
Espinelv									N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1	N>1

PROBLEMS

During the monitoring, several problems that affect the future of the populations were detected. In addition to new outbreaks of crayfish plague, the survival of the white-clawed crayfish currently depends on the following factors:

- summer droughts in sections of rivers inhabited by crayfish
- the expansion of the red swamp crayfish
- water pollution
- poaching
- repopulations of fish species

RECOVERY PLAN

At present, a recovery plan is being carried out in the Fluvià River Basin, with an action programme based on the following points:

- Preventing the basin becoming invaded by non-native species and establishing a programme to control the expansion of the red swamp crayfish
- Favouring the colonisation by the native white-clawed crayfish in potentially optimum sections
- Establishing a monitoring and control programme for each population
- Establishing lines of research applied to the management of the species
- Establishing an educational programme to raise awareness about the species and the problems it faces.