White-clawed Crayfish (*Austropotamobius pallipes*) – Spain (ALP and ATL)

Photo: David Gerke (Wikimedia Commons)

Conservation status	IUCN Global & EU27: Endangered ES (ALP): U2 (+) ES (ATL): U2 (+)
Protection status	HD: Annex II and V Bern Convention: Appendix III
Population (2007-12)	EU27: Incomplete data ES (ALP): Not available ES (ATL): Not available
MS with genuine improvement	ES (ALP), ES (ATL)
Other MS	AT, DE, ES (MED), FR, IE, IT, PT, SI, UK

Summary: The decline of White-Clawed Crayfish in Spain started to be noticeable in the 1960s as a consequence of habitat loss and overexploitation. However, the main pressure that has caused the significant decline since the 1970s and 1980s was the introduction of Red Swamp Crayfish and Signal Crayfish, vectors of the fungus *Aphanomyces astaci* which causes the disease called Crayfish plague. Although the species was reported to have an unfavourable-bad conservation status over the 2007-2012 period in Spain, it showed genuine positive trends in the Atlantic and Alpine biogeographical regions. It was estimated that, in 2009, approximately 1,050 White-clawed Crayfish populations existed in the Iberian Peninsula (occupying between 500 and 1,000 km of river habitat), compared to approximately 850 (occupying between 400 and 800 km) in 2007. The key driver of the improvements has been the implementation of a regional-level multi-species conservation action plans, with measures that focused on captive breeding and reintroduction of individuals to suitable available locations that remain free from the alien crayfish species.

Background

Status and EU occurrence

The White-clawed Crayfish (*Austropotamobius pallipes*)[1] is widely distributed throughout Europe. Its geographical range limits are Scotland and Spain in the north and south of Europe, respectively. Its westerly geographical limit is northwestern Spain. Montenegro is the easterly limit of its distribution (Füreder *et al*, 2010).

The species occurs in the Alpine, Atlantic, Continental and Mediterranean biogeographic regions in the EU. Its conservation status in the EU-27 in 2007-2012 was assessed as unfavourable-bad in all the regions, with a deteriorating trend in the Alpine, Atlantic and Continental regions, and a stable trend in the Mediterranean region (Annex 1). The species was assessed as endangered at the global, European and EU level in 2010 (Füreder *et al*, 2010).

In Spain, the White-clawed Crayfish was historically distributed in limestone areas of the country (Alonso et al, 2000). In the Alpine biogeographical region, the species is currently found at the lowest river reaches. In the Atlantic region it is found in País Vasco and also more locally in Asturias, Cantabria, Navarra, La Rioja, as well as eastern areas of Galicia and northern Castilla y León. In the Mediterranean region it is found mostly in eastern areas of Castilla y León, Navarra, La Rioja, Aragón, Cataluña, Valencia, Castilla-La Mancha and Andalucía.

Spain assessed the White-clawed Crayfish conservation status in 2007-2012 in all three biogeographical regions as unfavourable-bad (Annex 1). The range, habitat for species and future prospects in the Mediterranean and Atlantic regions were assessed as unfavourable-inadequate, and the population component was assessed as unfavourable-bad. In the Alpine region, while the habitats component was assessed as unfavourable-inadequate, the range, population and future components of the conservation status were assessed as unfavourable-bad. Consistent with this is the species' IUCN threat assessment as 'vulnerable' at the national

[1] Natura 2000 species reporting code 1092

level in Spain in 2011 (Real Decreto 139/ 2011), whilst Andalucía, Aragón, Extremadura, Galicia, La Rioja and Navarra administrative regions have assessed it as 'threatened with extinction' (Alonso pers comm, 2018). However, the species was also reported as showing an increasing trend over the 2007-2012 period in all three biogeographical regions in Spain, and in the Alpine and Atlantic regions this was considered to be due to genuine improvements (EEA/ETC-BD, undated).

It should be noted that genetic studies have shown a possible allochthonous origin of the species in Spain (Clavero, 2013) and a recent study indicated that an introduction from Italy to Spain could have taken place in the XVI century (Clavero *et al*, 2015). However, another study has shown that the species has been present in the Iberian Penninsula at least since the late Pleistocene (Matallanas *et al*, 2016a). The scientific debate remains open (eg Matallanas *et al*, 2016b).

Ecological requirements

The White-clawed Crayfish can generally be found under submerged gravel, rocks, logs, tree roots and leaves in a variety of freshwater habitats, including streams, rivers, canals, lakes, reservoirs and water-filled quarries (Holdich 2003). It has been highlighted that the abundance of the species depends on habitat features such as the presence of vertical banks and overhanging vegetation (Naura and Robinson, 1998). In particular, while juveniles find refuge in marginal vegetation such as *Chara* sp. and debris, fine gravel and plant roots, adults can be found in stony riverbeds (Demers *et al*, 2004; Souty-Grosset *et al,* 2006). In Spain, it is mostly found in isolated headwater river locations. In addition, the species can inhabit ponds and other similar natural or semi-natural habitats such as pools and wells (Alonso pers comm, 2018).

Whilst the species is generally found in waters on calcareous rocks that are relatively hard and mineral rich (Füreder *et al*, 2010), it has been shown to be relatively tolerant to various physico-chemical conditions, particularly temperature and dissolved oxygen (Alonso pers comm, 2018). Although some authors have classified it as sensitive to pollution (Füreder *et al*, 2010) and some reports indicate that water pollution can be an important pressure (Holdich, 2003), the species cannot be reliably used as a water quality indicator (Holdich, 2003; Alonso pers comm, 2018). In Spain, the White-clawed Crayfish is found in clean waters but it is known to be able to live in waters relatively impacted by organic pollution (Alonso pers comm, 2018).

There is evidence that shows that crayfish and fish often compete for food and shelter, and that predation interactions can occur. In the Mediterranean region the White-clawed Crayfish can coexist with indigenous cyprinids (Reynolds, 2011). However, in Spain the White-clawed Crayfish is currently mostly found in waterbodies where fish are absent.

The White-clawed Crayfish normally reaches sexual maturity after three to four years (Holdich 2003), and can live for more than 10 years in captivity, although it generally lives between 6 and 8 years in Spanish waterbodies (Alonso pers comm, 2018).

Pressures and threats

The White-clawed Crayfish was commercially exploited in Spain until the 1970s and the species was also greatly affected by habitat loss until the 1980s (Alonso pers comm, 2018).

Nevertheless, the main current pressures on the conservation of the White-clawed Crayfish in Spain are all linked with the invasion of alien crayfish species, namely the Red Swamp Crayfish (*Procambarus clarkii*) and the Signal Crayfish (*Pacifastacus lenisculus*) across the country, and the Spinycheek Crayfish (*Orconectes limosus*) in Cataluña only (Alonso pers comm, 2018). These species are predators with an aggressive behaviour. They compete for food and habitat and they are known to prey on the White-clawed Crayfish (Füreder *et al,* 2010). Furthermore, although some populations of the White-clawed Crayfish are thriving, their genetic variability is low in some places (Gouin *et al,* 2006; Bertocchi *et al,* 2008; Diéguez-Uribeondo *et al,* 2008).

The most important pressure affecting the European populations of the White-clawed Crayfish is, however, the spread of the fungus *Aphanomyces astaci*, which causes a disease called crayfish plague. Both the Signal Crayfish and the Red Swamp Crayfish have been identified as disease vectors. The invasion of these two species have decimated the White-clawed Crayfish populations in Spain (Alonso pers comm, 2018).

The Red Swamp Crayfish was introduced in freshwater habitats in Spain in the 1970s and 1980s, mostly occupying low land areas that are more prone to pollution. At the time of writing, the Red Swamp Crayfish cannot be commercialised in Spain but it can be exceptionally exploited in rice fields found in Isla Mayor (Sevilla, Andalucía) in order to control and eradicate the species (El País, 2016). The Red Swamp Crayfish is very abundant

and widespread across the Iberian Peninsula, especially in the western half of the country (Alonso pers comm, 2018).

The Signal Crayfish started its spread much more recently in the country because it was never commercialised. However, this invasive crayfish species can live in habitats at higher altitudes and with lower nutrient content than the Red Swamp Crayfish. This similarity in habitat requirements between the Signal Crayfish and the White-clawed Crayfish constitutes an important threat to the remaining White-clawed Crayfish populations and a key pressure in areas where the native species could thrive (Alonso pers comm, 2018). The Signal Crayfish is currently mostly distributed in the northern third of the country but it is spreading to other Spanish areas (Alonso pers comm, 2018).

Illegal fishing activities involving live invasive alien crayfish species for commercial purposes or bait aggravates the pressure (Alonso, 2012). Fishery and aquaculture management measures in Spain have not controlled the spread of the invasive crayfish until very recently. The fishing and sale of the Red Swamp Crayfish have been permitted and only a number of lenient restrictions have applied. This is thought to have significantly facilitated the spread of this invasive alien species in the country. In contrast, the fact that the Signal Crayfish has not been exploited commercially is believed to have slowed its spread until legal fishing was allowed in open areas in 2000, providing both a convenient supply of signal crayfish and an expectation of fishing activities in places where the species was not present. In addition, although in some administrative regions all invasive alien crayfish that were captured had to be killed by law, it is known that this has rarely happened and, thus their spread has been further facilitated (Alonso pers comm, 2018).

Other pressures on the conservation of the White-clawed Crayfish are related to habitat loss, fluctuations of the water regime and pollution. Habitat loss continues to be a pressure on remaining populations in some head stream locations, although its impact is dwarfed by the devastating impact of the invasive alien crayfish species. In addition, since the species is currently generally confined to the higher reaches of a few catchments, extreme weather events, potentially linked to some extent with climate change, can have a significant negative impact on the populations. This constitutes a threat for the conservation of the species in the future. Lastly, organic pollution related to agricultural activities and the use of insecticides are other additional pressures (Alonso pers comm, 2018).

Drivers of improvements: actors, actions and their implementation approaches

Organisers, partners, supporters and other stakeholders

Measures aimed at the conservation of the White-clawed Crayfish are taken at the regional administrative level in Spain. It is known that, although most regional governments (Comunidades Autónomas) monitor the White-clawed Crayfish populations, only some have implemented conservation actions. In particular, it is known that Andalucía, Castilla-La Mancha, Cataluña, Comunidad Valenciana and Navarra have implemented a number of actions towards the conservation of the species. To the best of our knowledge, information on potential actions taken in other regions is not readily available at the time of writing despite the species being found in a total of 12 Spanish regions:

Comunidades Autónomas and number of Sites of Community Importance (SCIs) with presence of the White-clawed Crayfish *(Austropotamobius pallipes)* in Spain (Adapted from Alonso, 2012).

Regions in bold correspond to those where conservation actions are known to have been implemented. It is important to note that some White-clawed Crayfish populations are also found outside the Natura2000 network.

Region (Comunidad Autónoma)	Significant presence of the White-clawed Crayfish?	Number of SCIs
Andalucía	Yes	9
Aragón	Yes	12
	No	3
Asturias	Yes	2
Cantabria	Yes	5
Castilla-La Mancha	Yes	6
Castilla y León	Yes	16
Cataluña	Yes	17
Comunidad Valenciana	Yes	1

Region (Comunidad Autónoma)	Significant presence of the White-clawed Crayfish?	Number of SCIs
	No	3
Galicia	Yes	4
La Rioja	Yes	2
	No	1
Navarra	Yes	8
País Vasco	Yes	5
	No	1

In Andalucía, Consejería de Medio Ambiente y Ordenación del Territorio (Junta de Andalucía) has been the organiser of the conservation actions that were taken. In Castilla-La Mancha, Consejería de Agricultura, Medio Ambiente y Desarrollo Rural (Junta de Castilla-La Mancha) has been the institution in charge of the implementation of conservation measures. In Comunidad Valenciana, Conselleria de Agricultura, Medio Ambiente, Cambio Climático y Desarrollo Rural (Generalitat Valenciana) has managed the conservation of the species. In Navarra, Departamento de Medio Ambiente, which belongs to the regional government, is in charge of the implementation of conservation measures.

In Cataluña, the actions that were taken under the LIFE Potamo Fauna project (Annex 2) enabled cooperation among a number of stakeholders. The public entity Consorci de l'Estany in Banyoles and Porqueres was the organiser. The following partners were involved in the project: Consorci del Ter, which dealt with the management and administration of the study areas, The Ministry of Agriculture, Livestock, Fisheries, Food and Environment of the Generalitat of Catalonia, which provided its experience and the breeding facilities. In addition, the public company Forestal Catalana s.a., the University of Pais Vasco, as well as the NGO Amics de la Tortuga de l'Albera were involved in the project (LIFE Potamo fauna, 2017). No detailed information is available on the extent to which the partners engaged in conservation measures.

In general, fishermen and privately owned aquaculture installations have not been involved in the implementation of conservation measures in Spain. Other stakeholders would need to be engaged if serious national and regional conservation plans are to succeed. In particular, relevant laws have to be created or transposed, biosecurity protocols have to be strictly followed and extensive awareness raising campaigns have to be launched.

Contributions / relevance of strategic plans

Three administrative regions in Spain have produced an action plan for the conservation of the species: Navarra in 1996, Aragón in 2006 and La Rioja in 2000. This last action plan expired recently (Alonso, 2012). In addition, a subregional action plan ('Pla de gestió') for the species in Girona and Barcelona (Cataluña) was defined in 2016 (Diputació Barcelona, 2018). Andalucía, Castilla-La Mancha and Castilla y León are currently preparing their action plans (Alonso pers comm, 2018).

To date, although a national strategic plan has been produced, it has not yet been approved by the national government. As a consequence, no integrated national strategy has been adopted. This indicates that the actions that have been implemented so far follow regional initiatives which do not have the support from the national government. Red list assessments of the species as threatened with extinction at the regional level created political momentum to produce the regional action plans.

In addition, a national strategy on the management, control and eradication of the invasive crayfish species in Spain needs to be created by the Ministerio de Agricultura y Pesca, Alimentación y Medio Ambiente, since no national action is currently in place (MAPAMA, 2018). Although all invasive crayfish species are now in the national list of invasive exotic species (MAPAMA, 2018), the effectiveness of the measures taken at a national level remains unclear.

Measures taken and their effectiveness

Spain reported that in 2007 to 2012 the following conservation measures were taken for the White-clawed Crayfish.

Application of conservation measures for White-clawed Crayfish *(Austropotamobius pallipes)* for 2007-2012 in Spain

Measure	Type	Ranking	Inside/outside Natura 2000	Broad evaluation
6.3 - Legal protection of habitats and species	Legal Administrative Contractual	High	Both	Maintain Enhance Long-term
6.0 - Other spatial measures	Administrative	Low	Inside	Maintain
7.0 - Other species management measures	Contractual	Medium	Both	Maintain
7.3 - Regulation/ Management of fishery in marine and brackish systems	Legal	Medium	Both	Maintain
7.2 - Regulation/ Management of fishery in limnic systems	Legal Administrative Recurrent	High	Both	Enhance
3.2 - Adapt forest management	Administrative	Low	Both	Maintain
6.1 - Establish protected areas/sites	Legal Administrative	Medium	Both	Maintain
7.1 - Regulation/ Management of hunting and taking	Legal Administrative	Medium	Both	Maintain
4.0 - Other wetland-related measures	Administrative Recurrent One Off	Medium	Inside	Not Evaluated
4.1 - Restoring/improving water quality	Administrative Contractual Recurrent	High	Both	Maintain Enhance
4.2 - Restoring/improving the hydrological regime	Administrative Recurrent One Off	Medium	Both	Enhance
4.3 - Managing water abstraction	Administrative Recurrent	High	Inside	Long-term
8.1 - Urban and industrial waste management	Administrative Recurrent	Medium	Inside	Not Evaluated
7.4 - Specific single species or species group management measures	Administrative Recurrent One Off	High	Inside	Not Evaluated

Source: Spain Article 17 report 2013 at https://bd.eionet.europa.eu/article17/reports2012/

The strategy of using the Signal crayfish as a barrier between the White-clawed Crayfish and the Red Swamp Crayfish populations in some regions has proved generally ineffective. Instead, a separation between areas where invasive alien species are present (or likely to be present in the future) and areas where the White-clawed Crayfish is likely to be undisturbed, coupled with habitat improvement and/or restoration, constitutes a far better approach for the conservation of the species in the short and medium-term (Whitehouse *et al*, 2009; Manenti *et al*, 2014; Alonso pers comm, 2018). Careful selection of suitable unoccupied sites where the White-clawed Crayfish can be reintroduced should ensure the viability of the new populations.

The relocation of crayfish individuals from successful populations to new sites within the same catchment has increased the number of populations in the regions of Andalucía, País Vasco and Aragón (Alonso pers comm, 2018). For instance, in Andalucía numerous translocation operations took place following this procedure (e.g. Europapress, 2015).

Captive breeding has been an important part of the existing action plans and has been an effective measure to increase the number of populations in Spain (Alonso pers comm, 2018). For instance, it has been estimated that in Castilla-La Mancha 35% of the current populations came from one captive breeding centre (Rillo de Gallo, Guadalajara). Breeding stock from this facility has also been used for the reintroduction of the species in other regions in the past.

Administrative regions such as Andalucía, Valencia and Cataluña now have operational captive breeding facilities that play a central role in their reintroduction programmes. In Andalucía, there are two captive breeding facilities ('Centro de Conservación y Cría de Especies de Aguas Epicontinentales La Ermita' in Granada and 'Centro de Cría y Conservación de Peces Amenazados' in Córdoba) (Europapress, 2017). In Cataluña, individuals used for reinforcement programmes have been sourced from the Centre for Reproduction of native crayfish in the Garrotxa Volcanic Zone Natural Park (PNZVG) (LIFE Potamo Fauna, 2018). Furthermore, ponds and other natural or semi-natural waterbodies have been used to keep and breed White-clawed Crayfish populations that were used for reintroduction purposes (Alonso pers comm, 2018). In Comunidad Valenciana, for instance, the semi-natural breeding facilities at ´Vivero Forestal El Hontanar´ have provided crayfish individuals to the region (La Vanguardia, 2015).

The creation of infrastructure with the objective of containing the spread of invasive alien crayfish has also played an important role in some cases. For example, in Andalucía, three small dykes were built in Parque Natural Sierra de Las Nieves (Málaga) to create a buffer area and, in doing so, stop the spread of the Red Swamp Crayfish further upstream. As part of these measures the site has been intensively monitored since then and there is evidence that shows that the construction of dykes has been an effective action. Sites were monitored in the downstream direction to avoid the spread of crayfish plague (Junta de Andalucía, 2009). Experience shows that a 'do nothing' approach results in a net loss in the number of populations (Alonso pers comm, 2018).

In addition, all regions have allowed the fishing of the Red Swamp Crayfish until very recently and eight out of 12 regions have prohibited these activities in relation to the Signal Crayfish. However, the Spanish Supreme Court ruled in 2016 that the Red Swamp Crayfish was an invasive alien species and, as a consequence, it has recently been included in the Spanish list of invasive species (MAPAMA, 2018). The inclusion of this species in the list means a ban on the possession, transport, traffic and commerce of live or dead Red Swamp Crayfish individuals, including international trade.

Other measures have also targeted more intense pollution control in areas where the White-clawed Crayfish is known to be present. For example, this has been the case of Navarra, where suitable potential new sites for the reintroduction of the species have also been closely monitored. Lastly, habitat restoration and research support actions have taken place in some areas (eg Aragón).

Other measures that have been taken for the conservation of the species include monitoring activities, the reintroduction of some native crayfish populations within the network of ´Espacios Naturales Protegidos´ that includes Natura 2000 sites, all measures related to the improvement or maintenance of water quality, as well as those measures linked to general management of water abstraction.

Lastly, a number of campaigns were launched to raise public awareness, especially under the LIFE Potamo Fauna project (LIFE Potamo Fauna, 2018). As part of the LIFE project, a targeted media campaign consisted of the publication of leaflets on invasive species, the creation of signs in strategic sites, as well as intense communication with tourism companies, resorts and marinas, canoeing or kayaking clubs, and similar stakeholders (LIFE Potamo Fauna, 2018). However, the impact of this type of campaign at the national level has so far been quite limited.

Funding sources (current and long-term) and costs (one-off and ongoing)

Actions towards the conservation of the White-clawed Crayfish have mostly been funded by the Spanish regional authorities (Comunidades Autónomas) as part of their general conservation management responsibilities. These actions have included monitoring of the existing populations and surveillance, control of illegal fishing, containment measures, as well as reintroduction actions. However, in some cases actions were supported by European funds. For instance, in Castilla-La Mancha, the Rural Development Programme (RDP), funded by the European Agricultural Fund for Rural Development (EAFRD) was used to support reintroduction actions in the region.

The LIFE Potamo Fauna project was co-financed by the European Commission and the following Spanish entities: Diputación de Girona, Ayuntamientos Banvoles y Porqueres, Consociu esportiu Estany de Banyoles and Aigues de Banyoles s.a.

Future actions

The Spanish PAF for Natura 2000 in 2014-2020 does not include the White-clawed Crayfish. It is not known whether or not the national action plan for the conservation of the species will be approved in the future. It is likely that some regional conservation actions will continue to be implemented in the near future to further support the current strategies.

Research carried out as part of the LIFE Potamo Fauna project has shown that some native White-clawed Crayfish have some degree of immunity to the fungus *Aphanomyces astaci* (Benejam and Saura-Mas, 2013). If these findings are confirmed, a programme that is supported by the relative natural immunity of some White-clawed Crayfish populations could be developed.

Achievements

Impacts on the target species

In 2009, it was estimated that approximately 1,050 White-clawed Crayfish populations existed in the Iberian Peninsula (occupying between 500 and 1,000 km of habitat), compared to approximately 850 (between 400 and 800 km of occupied habitat) in 2007 (Alonso pers comm, 2018). Furthermore, some Spanish administrative regions have recently reported sharp increases in population numbers. For instance, in Andalucía there were 93 populations in 2009 compared to 35 in 2007, and in Comunidad Valenciana there were 30 populations in 2009 compared with 19 in 2007 (Alonso pers comm, 2018).

It should be born in mind, however, that there has been no agreement among Spanish regions on what actually constitutes a population. In addition, it is known that the healthiest and most extensive populations are generally in decline and that although the number of populations has increased, the number of existing individuals in the country could have in fact been reduced (Alonso pers comm, 2018).

Other impacts (e.g. other habitats and species, ecosystem services, economic and social)

Experience drawn from regional management actions indicates that the specific local areas where monitoring of the White-clawed Crayfish takes place benefit from the more intense general habitat surveillance. Potential illegal actions that could result in habitat loss or deterioration are normally prevented where the species is monitored. This is explained because habitat loss or deterioration is more readily detected when it occurs in areas that are monitored more often (Alonso pers comm, 2018).

Furthermore, it is known that the White-clawed Crayfish is a keystone species that plays an important role in freshwater ecosystems in terms of provisioning services, regulatory and support services and cultural value (Füreder *et al*, 2010).

Conclusions and lessons learnt

The key targeted conservation measures that led to the improvements

- Captive breeding and release programmes, as well as relocation operations, in a number of Spanish administrative regions has led to a significant increase in the number of native crayfish populations.
- The creation of river infrastructure (i.e. dykes) has contained the spread of invasive alien crayfish at a local level (e.g. Parque Natural Sierra de Las Nieves, Málaga).

Conservation measures that have not been sufficiently effective

- The strategy of using the Signal crayfish as a barrier between the White-clawed Crayfish and the Red Swamp Crayfish populations in some regions has proved generally ineffective.
- Biosecurity protocols with the aim of containing the spread of the crayfish plague have not been implemented at a national scale. Only regional government activities follow safe biosecurity protocols. Commercial and recreational fishing activities do not consider biosecurity aspects in their activities.
- Public awareness campaigns have been limited in scope, mostly covering specific areas in the country such as north-eastern Cataluña. A nationwide campaign would be necessary to inform all stakeholders about the pressures and threats on the species and what practical actions should be taken.

Factors that supported the conservation measures

- The assessment of the species conservation status as threatened with extinction in some Spanish administrative regions created a favourable context for the implementation of regional action plans.
- The recent ruling by the Spanish Supreme Court in 2016 on the invasive alien nature of the Red Swamp Crayfish has paved the way towards the creation of more effective management action plans.

Factors that constrained conservation measures

- The lack of a coherent national regulation framework in relation to invasive alien crayfish species. This led to suitable fishing regulations being enforced only in certain regions and with limited coordination at the national level.
- Low public awareness has resulted in poor implementation of some management measures such as the killing of any captured Red Swamp Crayfish individuals.
- The protection of the White-clawed Crayfish has encountered socio-political resistance since the Red Swamp Crayfish is commercially exploited in areas such as Isla Mayor (Sevilla, Andalucía) and the adverse effects of the invasive species on the ecosystem are not generally acknowledged.

Quick wins that could be applied elsewhere for the species

- Separation between sites where invasive alien species are present (or likely to be present in the future) and areas where the White-clawed Crayfish is likely to be undisturbed, coupled with habitat improvement measures, constitutes a strategy that could yield quick wins in the short and medium-term
- The viability of the above approach in the long-term requires not only intense monitoring and patrolling targeted at potential illegal invasive introductions, habitat loss or deterioration and pollution events, but also careful design of suitable containment measures to prevent the arrival and spread of invasive crayfish species.
- The use of controlled habitats such as ponds or similar natural/semi-natural waterbodies is recommended when breeding facilities are not available, since it has yielded positive results at a regional level.

Examples of good practice, which could be applied to other species

- In a context of low financial support, as was the case in some Spanish administrative regions, conservation action plans that have tackled several species within the same habitat have shown that these can yield positive results efficiently.
- Targeted applied research revealed some level of immunity to the effects of *Aphanomyces astaci* in some localised White-clawed Crayfish populations. This has widened the options available for future conservation actions.

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Annex 1. White-clawed Crayfish (*Austropotamobius pallipes*) conservation status at Member State and biogeographical levels

Favourable	FV	Unknown	XX	Unfavourable - inadequate	U1	Unfavourable - bad	U2

Qualifier (+) improving (-) deteriorating (=) stable (x) unknown (n/a) not reported

	2001-06	2007-12				
	Overall	Range	Population	Habitat for species	Future	Overall (with trend)
AT (ALP)	U2	FV	U2	FV	FV	U2 (+)
ES (ALP)	U2	U2	U2	U1	U2	U2 (+)
FR (ALP)	U2	U1	U2	U2	U2	U2 (-)
IT (ALP)	U1	FV	FV	FV	FV	FV
SI (ALP)	U1	FV	U1	FV	U1	U1 (=)
EU (ALP) overall	U2	U1	U2	U2	U2	U2 (-)
ES (ATL)	U2	U1	U2	U1	U1	U2 (+)
FR (ATL)	U2	U2	U2	U2	U2	U2 (-)
IE (ATL)	U1	FV	FV	FV	U2	U1 (=)
UK (ATL)	U2 (-)	U2	U2	FV	U1	U2 (-)
EU (ATL) overall	U2	U2	U2	U2	U2	U2 (-)
DE (CON)	FV	U1	U1	U1	XX	U1 (=)
FR (CON)	U2	FV	U2	U2	U2	U2 (-)
IT (CON)	U1	FV	U1	U1	U1	U1 (-)
SI (CON)	U1	FV	U1	FV	U1	U1 (-)
EU (CON) overall	U2	FV	U2	U2	U2	U2 (-)
ES (MED)	XX	U1	U2	U1	U1	U2 (+)
FR (MED)	U2	U1	U2	U2	U2	U2 (-)
IT (MED)	U1	FV	U1	U1	U1	U1 (-)
PT (MED)	U2 (-)	U2	U2	U2	U2	U2 (-)
EU (MED) overall	U2	U1	U2	U2	U2	U2 (=)

Source: Member State Article 17 reports as compiled by the ETC-BD on EIONET https://bd.eionet.europa.eu/article17/reports2012/

Annex 2. LIFE Nature projects in Spain that aimed to help conserve the White-clawed Crayfish (*Austropotamobius pallipes*)

Project Title	Project N°	MS	Type Of Beneficiary
LIFE Potamo Fauna - Conservation of river fauna of Community interest in the Natura 2000 network sites of the Ter, Fluvià and Muga river basins	LIFE12 NAT/ES/001091	ES	Public enterprise

Source: Life Programme database