Improvement Programme for England's Natura 2000 Sites (IPENS) – Planning for the Future IPENS058

White-clawed Crayfish *Austropotamobius pallipes* Survey of the River Dove between Hollinsclough and Beresford Dale, Peak District National Park

Peak District Dales Special Area of Conservation (SAC)

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This project is part of the IPENS programme (LIFE11NAT/UK/000384IPENS) which is financially supported by LIFE, a financial instrument of the European Community'.

Foreword

The **Improvement Programme for England's Natura 2000 sites (IPENS)**, supported by European Union LIFE+ funding, is a new strategic approach to managing England's Natura 2000 sites. It is enabling Natural England, the Environment Agency, and other key partners to plan what, how, where and when they will target their efforts on Natura 2000 sites and areas surrounding them.

As part of the IPENS programme, we are identifying gaps in our knowledge, and where possible, we are addressing these through a range of evidence projects. Results from these projects will feed into Theme Plans and Site Improvement Plans. This project forms one of these studies.

A crayfish survey on the upper River Dove, which falls within the Peak District Dales Special Area of Conservation (SAC), was commissioned in order to confirm presence of white-clawed crayfish, a notified feature of the SAC, following crayfish plague outbreaks in 2005 and 2008, which were believed to be 100% fatal. This survey was recorded as an Action within the Peak District Dales Site Improvement Plan.

The survey reported that positive signs of white-clawed crayfish were identified, with a single adult female recorded during a torching survey. No evidence of the non-native American signal crayfish or any other non-native crayfish species was recorded during the survey. A habitat assessment of the upper River Dove indicated that the habitat was good to excellent quality for this species. Some negative impacts to water and habitat quality were noted, including high levels of silt smothering much of the channel substrate; a lack of in-channel woody debris, and the presence of the non-native Japanese Knotweed.

The report goes on to make management recommendations for the conservation of white-clawed crayfish, the upper River Dove and its corridor habitats. Recommendations include highlighting and implementing biosecurity measures; further surveys of sections of the river; habitat work to introduce woody debris; and control and monitoring of Japanese Knotweed.

The key audience for this work is the staff within Natural England and should be used to inform future monitoring and management requirements for white-clawed crayfish within the site.

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Title:	**'White-clawed Crayfish *Austropotamobius pallipes* Survey of the River Dove between Hollinsclough and Beresford Dale, Peak District National Park. July-September 2014'**

AQUASCIENCE **Consultancy Limited**

THE wildlife TRUSTS STAFFORDSHIRE

Summary

- A crayfish survey was carried out by Staffordshire Wildlife Trust [SWT] (White- clawed crayfish class NE licence Reference: Nick Mott – **2014-3545-CLS-CLS**) and three surveyors from Aquascience Consultancy between 13th July and 26th September 2014 on the upper River Dove between Hollinsclough and Beresford Dale-Upper Wolfscote Dale.

- Background: until 2005 the upper Dove and Manifold rivers were considered to be two of the great population strongholds for the white-clawed crayfish in England. Plague outbreaks were recorded on the River Dove at Milldale in 2005 and on the River Manifold at Wettonmill in 2008. Follow up surveys failed to find any surviving evidence of white-claws across this entire area. The plague outbreaks were considered to have been 100% fatal.

- It was therefore a big surprise when, in June 2014, a white-clawed crayfish was photographed at the Dove Valley Centre (Upper Whitle Farm) during a river dipping day. Unconfirmed sightings of crayfish have also been reported by anglers at Beresford Dale over the past two years (C.Horsford, Pers. Comm.).

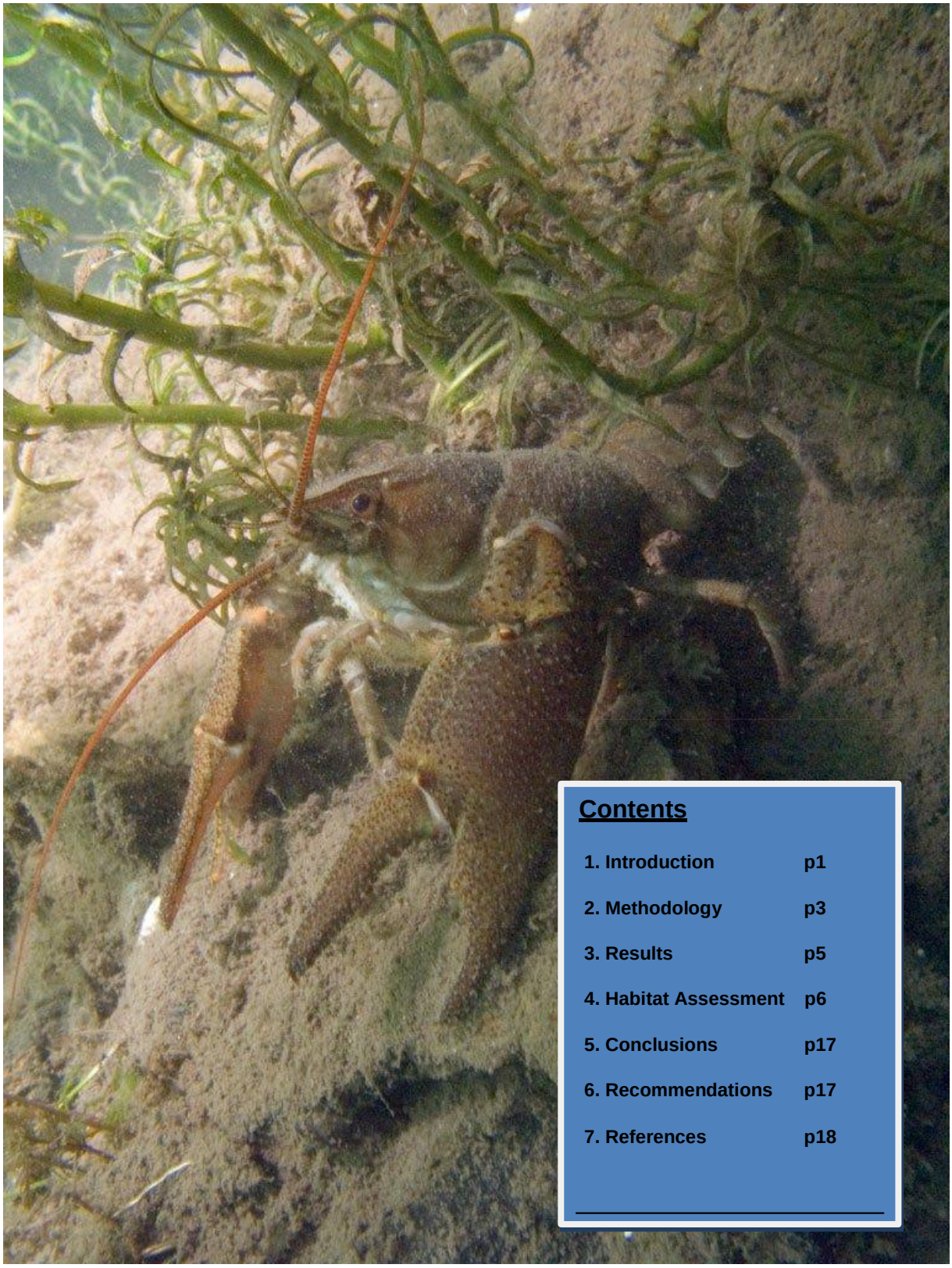
- This crayfish survey was carried out on behalf of the Aquascience Consultancy Ltd. as part of a wider assessment for Natural England.

- National survey methodologies were adopted (Peay, 2003). 50-250 potential refuges were assessed at each of the river survey sections and sub-sites.

- Conditions for the survey were entirely favourable.

- Positive signs of white-clawed crayfish were identified and good-excellent habitat conditions for this species were identified throughout the length of the study area.

- Initial management recommendations for the conservation of white-clawed crayfish, the upper River Dove and its corridor habitats are included in Section 6.



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*The White-clawed crayfish **Austropotamobius pallipes** © Andy Kirkland*

IPENS

The Improvement Programme for England's Natura 200 Sites (IPENS), supported by EU LIFE+, is a new strategic approach to managing England's Natura 2000 sites. It will enable Natural England, the Environment Agency, and other partners to plan what, how, where and when they will target efforts on NATURA 2000 sites and areas surrounding them.

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For more information: www.naturalengland.org.uk/ipens2000

White-clawed Crayfish Survey

1. Introduction

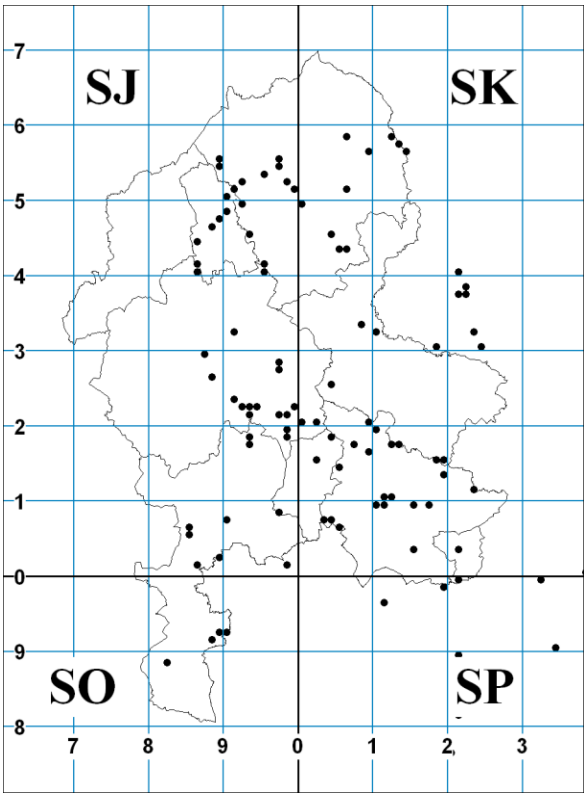
The white-clawed crayfish (*Austropotamobius pallipes)* is Britain's only native species of crayfish. *A pallipes* inhabits small streams, rivers, canals, lakes, reservoirs and quarry pools. It usually prefers clear, well-oxygenated water and can be abundant at sites that meet its habitat requirements. It is nocturnal and is omnivorous, feeding on a wide range of vegetable and animal matter, as well as detritus. It is eaten by a number of different predators including fish (trout, chub, perch, pike, and eel), birds, otters, mink and rats. Young crayfish are also eaten by carnivorous insect larvae such as diving beetles and dragonflies. As with most crayfish species it is cannibalistic, particularly on recently moulted individuals.

Breeding usually occurs in the autumn and is triggered by falling water temperatures (thus altitude and latitude are important factors). The female produces her eggs (approximately 50-100), which become attached in a cluster to the underside of her abdomen. During this time she is known to be "berried". She over-winters with her brood and in the late spring to early summer the eggs hatch into relatively immobile miniature crayfish without a tailfan, which cling to her abdomen. They then moult to form a second stage with a rounded, hairy tailfan. This stage becomes more and more active, and they eventually leave the mother in early summer to become independent. At the next moult they develop a typical crayfish form with an outspread tailfan. Juveniles may undergo several moults during their first year, but by the time they are fully mature, at about three to four years, they may moult only once a year. Average lifespan is estimated to be between seven and twelve years (Holdich, 2003). Adults can reach approximately twelve centimetres from the tip of the rostrum (snout) to the end of the telson (tail).

A juvenile white-clawed crayfish and,… an adult White-clawed crayfish

Due to the long breeding season, surveys for crayfish are necessarily squeezed into a tight 'window of opportunity'. Hand searching, kick sampling and trapping should be restricted to July to mid-October. All torching surveys should be completed by the end of October (Natural England).

Although this species remains widely distributed in England and Wales, only a tiny proportion of the pre-1970s population survives. Much of this catastrophic decline has been attributed to the introduction and spread of non-native American signal crayfish (*Pacifastacus leniusculus*) and the crayfish plague (*Aphanomyces astaci*) that it often carries. Additional threats include modifications to watercourses (including engineering, dredging and culverting), siltation, pollution, and increased urbanisation.



*All records for the White-clawed crayfish **Austropotamobius pallipes** in Staffordshire (Courtesy of, and ©, Staffordshire Ecological Record). Routine monitoring by the Environment Agency and targeted surveys carried out by Staffordshire Wildlife Trust and other organisations from 2003-14 has confirmed a major reduction in the number of native crayfish populations.*

Staffordshire mirrors the national trend. Many watercourses and previously occupied sites, which appear to retain appropriate habitat, no longer support evidence of this species. Populations of American Signal Crayfish *Pacifastacus leniusculus* are now well established in the Staffordshire / Upper Trent Catchment area with records of range expansions and new illegal introductions being received on an alarmingly regular basis.

*The American Signal Crayfish **Pacifastacus leniusculus***

Legal protection

Austropotamobius pallipes, the white-clawed crayfish, is listed on Schedule 5 of the Wildlife & Countryside Act 1981, which makes it illegal either to take it from the wild or to sell it without a licence from the appropriate nature conservation agency.

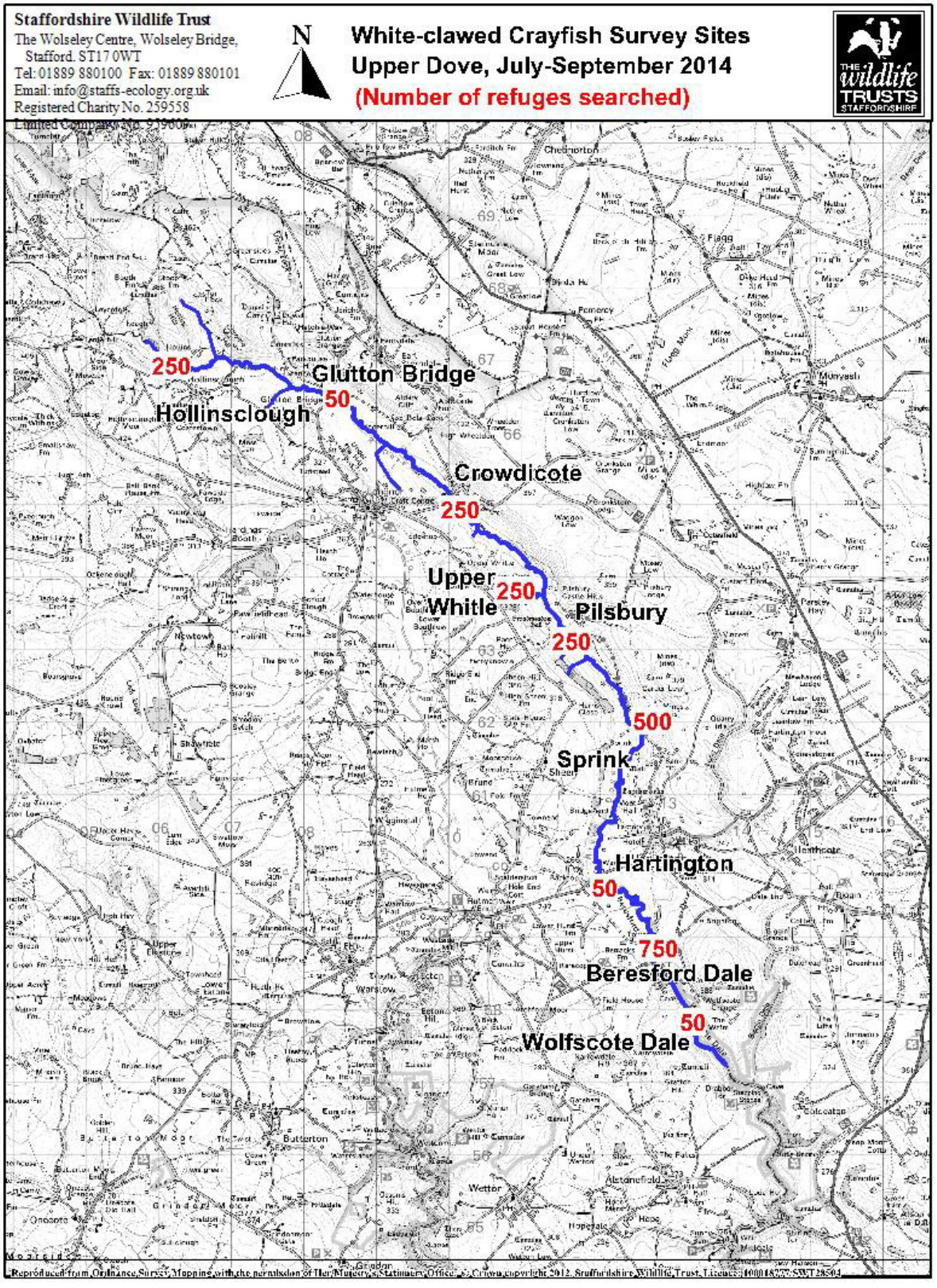
It is also included in the IUCN Red Data List (listed as 'Globally Endangered'), Appendix III of the Bern Convention and Annexes II and V of the European Habitats Directive. The Directive requires the designation of protected areas (Special Areas of Conservation) for species in Annex II.

2. Methodology

The survey was undertaken during visits carried out between the 13th July, 25th September and the 26th September 2014 using a modified national standard methodology (Peay, 2003). Conditions for the survey -in terms of weather and water levels- were ideal. Hand-searching was carried out in the shallow water (<40cm depth). An aquaviewer was used for the pools (40-80 cms depth). Night torching was carried out on the evening of the 25th September at the Upper Whitle Farm site with three surveyors from Aquascience Consultancy and SWT.

Site selection (see map below)

Nine river survey sections were selected for the survey. 50-250 stones or other 'refuges' were investigated at each of the survey sections and sub-sites.



Survey Sections 1-9 for the upper River Dove between Hollinsclough and Beresford Dale in July-September 2014

Manual searching

Surveys were undertaken from upstream to downstream at each survey section. Potential 'refuges' for crayfish were searched by hand. Refuges included individual boulders, cobbles, in channel vegetation, root systems of bankside trees, burrows in the bank, hollow logs or coarse woody debris (CWD) (i.e. partially embedded in the bank or bed of the stream and individual pieces of submerged wood in pools). Riffles were assessed by placing a hand net downstream and irritating the sediments, CWD and cobbles immediately upstream (similar to a form of kick sampling, but using hands). Hand nets were also used to search amongst submerged tree roots, accumulations of leaf litter and twigs, marginal vegetation, overhanging branches or undercut banks.

Stones, cobbles and other potential refuges were always replaced after searching.

Biosecurity / Disinfection routines

Prior to commencing the surveys all equipment and footwear was thoroughly disinfected using the Environment Agency-approved disinfectant 'Virkon Aquatic' to safeguard against crayfish plague (and fish disease) transmission. All survey work was carried out from the upstream working downstream to avoid the likelihood of carrying plague spores past barriers such as culverts, weirs, sluices and natural falls. The disinfection routine was repeated at the end of the survey section reach. All equipment was also allowed to dry after disinfection.

3. Crayfish Survey Results

A single adult female White-clawed crayfish was recorded during the torching survey carried out at the Upper Whitle site on the 25th September 2014 (SK 11026 64257).

No evidence of the American signal crayfish (*Pacifastacus leniusculus*), or any other non-native crayfish species, was recorded during the survey. However, nearby populations of signal crayfish are known from the River Hamps, the Bentley-Bradbourne Brook and the Lower Dove at Rocester.

Images from the night-torching survey on the R.Dove at Upper Whitle Farm on 25th September 2014.

4. Habitat assessment for crayfish

Austropotamobius pallipes needs year-round access to refuges from its many predators in order to establish a successful breeding population. Crevices in rocks, gaps between and underneath stones, in-channel coarse woody debris, in-channel vegetation (seasonal), submerged tree roots, overhanging branches and undercut banks are important to its survival. Generally watercourses with active geomorphological processes (natural erosion and deposition) help provide suitable niche habitats for this species. Thus streams with naturally eroding cliffs, sequences of riffles and pools, backwaters, mid-channel bars, vegetated side bars and a good variety and abundance of macrophytes (wetland plant communities) are good places to assess for the presence of crayfish. Where there are suitable conditions -i.e. areas with earth or clay banks- *A pallipes* will excavate and occupy burrows. Extensive examples are referred to as 'galleries'.

The upper River Dove

In terms of crayfish habitat, the upper River Dove can be considered to be good-excellent quality. The study area is approximately 13 km in length and maintains a good flow even during times of drought. It has a steady gradient that helps to generate exposed riverine sediments, scour pools, riffles, backwaters and undercut banks. The majority of the river corridor runs through deciduous woodland, scrub, improved, semi-improved and unimproved limestone grassland. Due to the predominantly limestone geology of the area, there is only one significant tributary along this section of the River Dove, the Swallow Brook near Hollinsclough. However, there are a large number of springs, side channel feeds and seepages

which provide additional good quality habitat and refuges for crayfish. A good example is the watercourse that emerges from the limestone near Sprink (see below).

An underground stream emerging from the limestone to join the Dove near Sprink. These features provide additional high-quality habitat for white-claws as well as refuges from spates and pollution incidents. The area in the photograph was examined as a sub-site (an additional 250 refuges were searched).

Site / Section	**Hollinsclough, Section 1**
Watercourse	**R.Dove-Swallow Brook confluence**
Date	**25/09/2014**
Grid Ref (Cent.)	**SK 06550 66890**
# refuges	**250**
Depth	**0.10m-0.65m**
Flow	**Fast**
Substrate	**Bedrock 30%, Boulders 10%, Cobbles 55%, Gravels 1%, Sand/Mud/Silt 4%**
Riparian Zone	**Exposed Riverine Sediments (ERS), Ruderal vegetation, Deciduous Woodland, Mixed Woodland, Scrub**
Comments	**1 Stone Loach *Barbatula barbatula* was caught and >15 Bullhead *Cottus gobio*. Brown trout *Salmo trutta*, dipper and otter spraint (no crayfish remains) also observed.**
A.pallipes	**High potential suitability**
Result	**Negative**
Survey methods	**Hand net, Aquaviewer**

Site / Section	**Glutton Bridge, Section 2**
Watercourse	**R.Dove**
Date	**25/09/2014**
Depth	**0.10m-0.50m**
Grid Ref (Cent.)	**SK 08500 66500**
# refuges	**250**
Flow	**Fast**
Substrate	**Bedrock 10%, Boulders 15%, Cobbles 70%, Gravels 0%, Sand/Mud/Silt 5%**
Riparian Zone	**Exposed Riverine Sediments (ERS), Ruderal vegetation, Deciduous Woodland, Scrub, Marshy grassland**
Comments	**2 Stone Loach *Barbatula barbatula* were caught and 13 Bullhead *Cottus gobio*. Brown trout and dipper also observed. A stand of Japanese Knotweed was also observed on the right bank at approximately SK 08538 66308. Some areas with livestock poaching.**
A.pallipes	**High potential suitability**
Result	**Negative.**
Survey methods	**Hand net, Aquaviewer**

Site / Section	**Crowdicote, Section 3**
Watercourse	**R.Dove**
Date	**13/07/2014**
Grid ref (Cent.)	**SK 10300 64710**
# Refuges	**50**
Depth	**0.10m-0.35m**
Flow	**Slow**
Substrate	**Bedrock 10%, Boulders 20%, Cobbles 65%, Gravels 0%, Clay 2%, Sand/Mud/Silt 3%**
Riparian Zone	**Exposed Riverine Sediments (ERS), Deciduous Woodland, Scrub,**
Comments	**9 Bullhead *Cottus gobio*. Major pathway for fine sediment run off (see photo below)**
A.pallipes	**High potential suitability**
Result	**Negative.**
Survey methods	**Hand net**

Site / Section	**Upper Whitle, Section 4**
Watercourse	**R.Dove**
Date	**13/07/2014 & 25/07/2014**
Grid ref (Cent.)	**SK 10934 64336**
# Refuges	**250**
Depth	**0.10m-1.5m**
Flow	**Slow**
Substrate	**Bedrock 30%, Boulders 5%, Cobbles 55%, Gravels 5%, Mud/Silt 5%**
Riparian Zone	**Exposed Riverine Sediments (ERS), Deciduous Woodland, Scrub, SI grassland**
Comments	**Previous positive: June 2014. Bullhead *Cottus gobio*. Brown Trout *Salmo trutta*. Tawny owl. Daubenton's bat.**
A.pallipes	**High potential suitability**
Result	**Positive on 25/07/2014 (Torching). 1 adult female (carapace length approximately 38-40mm) at SK 11026 64257.**
Survey methods	**Hand net, Torching**

Site / Section	**Pilsbury, Section 5**
Watercourse	**Upper Leek Brook trib.**
Grid ref (Cent.)	**SK 11603 63263**
# Refuges	**250**
Date	**25/07/2014**
Depth	**0.10m-0.80m**
Flow	**Slow-Fast**
Substrate	**Bedrock 30%, Boulders 15%, Cobbles 45%, Gravels 2%, Sand/Mud/Silt 8%**
Riparian Zone	**Exposed Riverine Sediments (ERS), Ruderal vegetation, Deciduous Woodland, Scrub, Marshy grassland**
Comments	**1 Stone Loach *Barbatula barbatula* were caught and >10 Bullhead *Cottus gobio*. 2 dippers, Otter spraint (no crayfish remains).**
A.pallipes	**High potential suitability**
Result	**Negative.**
Survey methods	**Hand net, Aquaviewer**

Site / Section	**Sprink, Section 6**
Watercourse	**R.Dove**
Date	**25/09/2014**
Depth	**0.10m-0.65m**
Grid ref (Cent.)	**SK 12380 62416**
# Refuges	**500 (2 sub-sites)**
Flow	**Sluggish-Fast**
Substrate	**Bedrock 15%, Boulders 5%, Cobbles 40%, Gravels 10%, Mud/Silt 30%**
Riparian Zone	**Limestone grassland, Marshy grassland, Ruderal vegetation, Scrub, Seepages**
Comments	**>20 Bullhead *Cottus gobio*. Grey wagtail.**
A.pallipes	**High potential suitability**
Result	**Negative.**
Survey methods	**Hand net, Aquaviewer**

Site / Section	**Hartington Bridge, Section 7**
Watercourse	**R.Dove**
Date	**26/09/2014**
Grid ref (Cent.)	**SK 12081 59795**
# Refuges	**50**
Depth	**0.10m-0.80m**
Flow	**Slow-Fast**
Substrate	**Boulders 15%, Cobbles 35%, Gravels 35%, Sand/Mud/Silt 15%**
Riparian Zone	**Exposed Riverine Sediments (ERS), Ruderal vegetation, Deciduous Woodland, Scrub**
Comments	**A pollution incident was reported to the Environment Agency (EA incident Ref # 01281585) involving a cracked, leaking soakaway from a private residence. Otter spraint (recent & old- no crayfish remains observed).**
A.pallipes	**Good potential suitability**
Result	**Negative.**
Survey methods	**Hand net, Aquaviewer**

Site / Section	**Beresford Dale, Section 8**
Watercourse	**R.Dove**
Date	**26/09/2014**
Grid ref (Cent.)	**SK 12813 58954**
# Refuges	**750 (3 sub-sites)**
Depth	**0.10m-1.25m**
Flow	**Sluggish-Fast**
Substrate	**Bedrock 20%, Boulders 15%, Cobbles 55%, Gravels 5%, Sand/Mud/Silt 5%**
Riparian Zone	**Exposed Riverine Sediments, Deciduous Woodland, Scrub, Limestone grassland, Marshy grassland / rush pasture.**
Comments	**>20 Bullhead *Cottus gobio*. . >10 Brown Trout *Salmo trutta*. Dipper. Kingfisher**
A.pallipes	**High potential suitability. (Anecdotal reports of crayfish from anglers 2012-14)**
Result	**Negative.**
Survey methods	**Hand net, Aquaviewer**

Site / Section	**Beresford-Upper Wolfscote Dale, Section 9**
Watercourse	**R.Dove**
Date	**26/09/2014**
Grid ref (Cent.)	**SK 13299 57986**
# Refuges	**50**
Depth	**0.10m-0.95m**
Flow	**Sluggish-Fast**
Substrate	**Bedrock 8%, Boulders 15%, Cobbles 75%, Gravels 0%, Sand/Mud/Silt 2%**
Riparian Zone	**Exposed Riverine Sediments, Deciduous Woodland, Scrub, Limestone grassland, Marshy grassland**
Comments	**>10 Bullhead *Cottus gobio*. Brown Trout *Salmo trutta***
A.pallipes	**High potential suitability**
Result	**Negative.**
Survey methods	**Hand net, Aquaviewer**

5. Conclusions

- Although only very limited evidence of white-clawed crayfish was identified during the survey, highly suitable habitat for this species was observed throughout the study area.

- Some negative impacts to water and habitat quality were observed. These include a high silt burden smothering much of the channel substrate, a very high number of weirs affecting natural geomorphological processes including sediment transport, habitat connectivity and habitat complexity, an overall lack of key pieces of in- channel woody debris, the presence of the non-native plant Japanese Knotweed, and pollution.

6. Recommendations

- **Biosecurity.** This is the most important issue to address in order to protect the small, surviving native crayfish population at Upper Whitle. Raised awareness and disinfection routines need to be promoted to anglers and other visitors to the river. The priority are angling clubs that have beats on other watercourses within known areas for American signal crayfish (e.gs. the Leek & District Fly Fishing Association who fish 'signal crayfish' sections of the River Hamps, the Bentley Brook and the River Churnet and who also fish the Dove at Dovedale). The Check, Clean, Dry campaign is a good introduction to this subject http://www.nonnativespecies.org/checkcleandry/biosecurity-for-anglers.cfm, but is recommended that more direct biosecurity measures are discussed directly with these clubs including talks and advice via site visits. Biosecurity measures can also be written in as conditions to the fishing tenancy agreements. Updated 'management accords' with clubs and landowners should also be investigated.

- **Further surveys.** It is recommended that a re-survey of the Upper Whitle Farm site reach be carried out in 2015 (July-September).

- **Habitat work.** The torching survey at the Upper Whitle Farm demonstrated that the river channel at night is dominated by predatory brown trout and that native crayfish would need to restrict their foraging movements to the cover of submerged roots and in-channel woody debris. Unfortunately, a lack of woody debris was observed throughout the upper Dove. In order to bolster the surviving white-claw population, it is recommended that significant amounts of woody debris are introduced to the channel. Techniques include the 'chopping & dropping' sycamores and multi- stemmed alders, hinging appropriate stems into channel, introducing root plates (from a biosecure source) as key pieces and 'wood traps'. These techniques are also beneficial to brook lampreys and a number of Red Data Book invertebrates. Benefits should also be afforded for natural sediment trapping and processing, the sorting of gravels, Natural Flood Management (through increased 'roughness' which slows flows to increase the overall 'journey time' of water), cooler water and overall water quality. Further information about these techniques and benefits can be found here:

  http://www.staffs-wildlife.org.uk/sites/default/files/files/Managing%20Woody%20Debris.pdf

  http://www.staffs-wildlife.org.uk/sites/default/files/files/River%20Rehabilitation%20and%20Large%20Woody%20Debris.pdf

- **Control Japanese Knotweed.** It is recommended that the stand of Japanese Knotweed at Glutton Bridge be treated and monitored to ensure against future regrowth.

7. References

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Acknowledgements

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