

**WILDLIFE AND COUNTRYSIDE ACT 1981 – SECTION 53 PROPOSAL TO
ADD A BYWAY OPEN TO ALL TRAFFIC AT THE OLD FORD CROSSING
ADJACENT TO PINKNEY BRIDGE, PINKNEY, SHERSTON**

ECOLOGICAL APPRAISAL

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SECTION 1: INTRODUCTION

A Modification Order has been made by Wiltshire County Council under Section 53 of the Wildlife and Countryside Act (1981) to add a Byway Open to All Traffic (BOAT) to the definitive Rights of Way Map. The proposed BOAT is located at the Old Ford Crossing, adjacent to Pinkney Bridge, Pinkney, Sherston (NGR ST 866 868) (see Figure 1). Numerous objections to the Order have been received and consequently, the Modification Order will be sent to the Secretary of State for determination in due course. A Public Inquiry will be held and the decision whether to confirm the Order or not will be made by an independent Inspector appointed on behalf of the Secretary of State.

The majority of the objections to the Modification Order concern environmental issues and in particular, the potential damage to ecological resources resulting from addition of the BOAT to the definitive Rights of Way Map. Under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way [CROW] 2000), the Inspector at the Inquiry is not able to take into consideration any environmental issues. His/her remit is to decide, on the balance of probability, whether or not the highway rights exist. The desirability of the new BOAT in environmental terms is not a matter he/ she can consider.

Nevertheless, Wiltshire County Council are committed to ensuring that, if the Modification Order is confirmed by the Secretary of State, measures are put in place to limit, as far as possible, any environmental damage. It is intended to achieve this through the use of a Road Traffic Regulation Order under Section 22 of the Road Traffic Regulation Act (1981) to prohibit, at certain times of the year, pedestrian and equestrian access. An application will be made to the Magistrates Court, pursuant to Section 116 of the Highways Act (1980) to stop up the vehicular rights entirely.

Consequently, Wiltshire County Council have undertaken an ecological survey and appraisal of the River Avon in the vicinity of the Old Ford Crossing. The results and conclusions of this ecological survey and appraisal are presented in this report. The ecological appraisal is aimed at identifying the ecological value of the Old Ford Crossing, the potential impacts to habitats and species that may arise from the proposed BOAT and the mitigation required to reduce any impacts to an acceptable minimum. The ecological survey was initially limited to a crayfish survey, as requested by the Environment Agency. However, given the potential presence of a number of other important species, this report has been extended to consider the overall ecological value of the habitat and species present in the vicinity of the Old Ford Crossing.

Section Two of this report outlines the methodology utilised for the survey. Section Three of the report presents the results of the survey whilst Section Four summarises the conclusions that can be drawn from the survey. Finally, Section Five of the report provides recommendations on the mitigation that should be undertaken should the Modification Order be confirmed.

SECTION TWO: METHODOLOGY

The surveys were undertaken by Jenny Ford, employed as the ecologist for Wiltshire County Council. Jenny Ford holds an English Nature licence to handle native white-clawed crayfish (licence numbers 20031183 and 20041346).

The initial crayfish surveys were undertaken on 5th May 2004. During the survey, it was noted that the water levels in the river were high; consequently, it was not possible to survey for

crayfish upstream of the Old Ford Crossing due to the turbidity and depth of the water. Consequently, a further survey was undertaken on 16th June 2004.

The crayfish survey was undertaken by overturning all stones on the river bed within 1 m² quadrats. The surveyor moved in an upstream direction to minimise disturbance of silt. All exposed crayfish were placed in a bucket containing aquatic plant material to provide cover for the crayfish. A standard pond-net was placed downstream of the quadrat to catch crayfish that escaped or were picked up by the current. Within each of the quadrats, the aquatic vegetation was removed, placed in the pond-net and searched for young crayfish. For each crayfish caught, the following information was recorded: species, sex, carapace length, claw absence/regeneration, stage of moult, breeding condition and disease incidence.

Three sampling sites along the river for crayfish survey were selected: Site 1 approximately 30m upstream of the Old Ford Crossing, Site 2 on the route of the Old Ford Crossing and Site 3 approximately 15m downstream of the Old Ford Crossing (see Figure 1). Each site comprised a stretch of river approximately 20m in length. Quadrat sites were located by selecting habitat patches that appeared to be of good quality for crayfish using the recommendations in Peay, 2003. The habitat was described in the vicinity of each selected sampling site using the standard forms recommended by Peay (2003).

The presence of bullhead was also recorded in each sampling site. In addition, a sweep of the marginal vegetation along both sides of each sampling site was undertaken to detect the presence of bullhead. The potential of the habitat to support other species of interest, including brown trout, brook lamprey and water vole, was also assessed.

SECTION THREE: RESULTS

3.1 Desk Study

Information from the Wiltshire and Swindon Biological Records Centre indicate that the Bristol Avon, including the Sherston branch, is designated as County Wildlife Site due to its high nature conservation value and value as a semi-natural wildlife corridor. Water voles are known to be present on the Sherston Avon (Mark Satinet, *pers. com.*), including the stretch of river in the vicinity of Pinkney Bridge.

Spink and Frayling (2000) indicate that the white-clawed crayfish population on the Sherston and Tetbury Avon was wiped out by crayfish plague in the early 1980s. Previous to that, the population was considered to be thriving and had been for at least 40 years. Following this mass extinction, the Environment Agency carried out reintroductions of white-clawed crayfish in the late 1980s and early 1990s on the Sherston and Tetbury Avon and the existing population has been derived from these reintroductions.

Langford *et al* (2001) state that Wessex Water have undertaken extensive river restoration on the upper reaches of the Bristol Avon in the early 1990s. This restoration comprised substrate augmentation on the Sherston Avon ie the introduction of gravel to enhance fish spawning beds. Wessex Water have indicated that this restoration work included creation of a riffle approximately 20 metres upstream of Pinkney Bridge by importing gravel. The intention of the restoration was to create spawning habitat for brown trout.

Information from the Environment Agency (Melissa Clarkson, *pers. com.*) indicates that the water quality of the Sherston Avon is high. The nearest sampling stretch (from the confluence with the Luckington Brook to Sherston STW) was recorded as Class A for Biology (very good quality) in 2002 and Class B for Chemistry (good quality). The water quality is therefore adequate to support white-clawed crayfish in addition to a wide range of fish fauna (including salmonids).

The Environment Agency holds the following data from a fisheries survey undertaken in 1999 for sites in close proximity to Pinkney Bridge (Melissa Clarkson, *pers. com.*):

Table 1. Environment Agency Fisheries Data for the Sherston Avon in the vicinity of Pinkney Bridge

Survey Site	Location	Species	Number
Easton Town Bridge	ST 861 859 (1.2 km u/s of Pinkney Bridge)	Brown trout	24
		Brook lamprey	11
		Bullhead	100s
		Stoneloach	100s
		Minnow	100s
Pinkney Mill	ST 871 870 (400m d/s of Pinkney Bridge)	Brown trout	19
		Bullhead	100s
		Stoneloach	100s
		Minnow	100s
		White-clawed crayfish	100s

The results above indicate the presence of a diverse fish fauna. The high water quality of the Sherston Avon is confirmed by the presence of white-clawed crayfish and brown trout.

3.2 Site One

3.2.1 Habitat Description

The detailed survey forms are attached as Appendix 1. Photographs of the site are provided in Plates 1 to 3. The river formed a glide at this location and the channel was approximately 10 to 12m wide. Overhanging trees provided 60 to 90% shading of the channel. Both sides of the channel were lined with retaining walls. In the east of the site, the retaining walls were replaced by a bank with a slight overhang on the northern side and dense stands of riparian vegetation on the southern side. Riparian vegetation within the east of the site comprised predominantly reed canary-grass (*Phalaris arundinacea*), great willowherb (*Epilobium hirsutum*) and bur-reed (*Sparganium erectum*). In addition, small amounts of filamentous algae were present in the channel. Adjacent land uses comprised a garden and mature woodland on the southern bank and a garden and horse paddock on the northern bank.

There were a large number of refuges present in the channel in the form of boulders and cobbles. The substrate beneath the refuges comprised bedrock, cobbles and gravels. The water depth was approximately 50 cm when surveyed in June and the water was clear with good visibility to the bed; however, when the site was visited in May, the water depth was 70 cm to 1 metre and clarity of the water was poor with a high degree of suspended solids.

3.2.2 Crayfish

The habitat appeared to be of excellent quality for crayfish: there were numerous refuges available for crayfish in the form of boulders on the river bed and crevices in the retaining walls. Two quadrats were searched for crayfish within Site 1 (one from the centre of the channel and one from the margin) and the results are presented in Table 2 below.

Table 2. Crayfish Records from Site 1 on 16/6/04

Species	Quadrat no	Sex	Carapace length (mm)	Damage	Disease incidence	Evidence of breeding	Evidence of Molt
White-clawed crayfish (<i>Austropotamobius pallipes</i>)	1	F	40	AL	-	Carrying young	-
	1	M	33.5	-	-	-	-
	1	F	40.5	AL	-	Carrying young	-
	1	M	34	-	-	-	-
	1	F	34	-	-	Carrying young	-
	1	M	24	-	-	-	-
	1	M	30.5	-	-	-	-
	1	M	14	RR	-	-	-
	2	F	36	-	-	Carrying young	-
	2	F	34	-	-	-	-
	2	M	27	-	-	-	-
	2	M	49	RL	-	-	-
	2	M	45.5	OM (L)	-	-	-
	2	X	A				
	2	X	J				

Notes

F: Female
 M: Male
 X: Escaped crayfish, not identified
 A: Adult, estimated carapace >25 mm
 J: Juvenile, estimated carapace <25 mm

AL: Antenna damaged/ missing left side
 RR: Regenerating right cheliped
 RL: Regenerating left cheliped

The results above indicate the presence of a healthy white-clawed crayfish population at Site 1. The abundance of crayfish per quadrat was greater than 5: using the suggested grading for qualitative assessment of relative abundance from Peay (2003), the abundance of crayfish at Site 1 is assessed as "very high". 80% of the females were carrying young and therefore the population is breeding. The successful breeding status of the population is also confirmed by the range of carapace sizes recorded, including three juveniles with a carapace length of less than 25 mm.

3.2.3 Other species

Two bullhead were recorded from the net during the survey. The large boulders present within Site One are likely to provide good breeding habitat for bullhead. The substrate of the site was predominantly boulders and cobbles: therefore the site did not provide suitable spawning habitat for brown trout or brook lamprey. The majority of the site did not provide suitable habitat for

water voles due to the retaining wall. However, in the east of the site, dense riparian vegetation on the southern bank and the northern bank did provide good quality habitat for water voles (although no evidence of water voles was observed).

3.3 Site Two

3.3.1 Habitat Description

The detailed survey forms are attached as Appendix 1. Photographs of the site are provided in Plates 4 to 7. The river formed a run just upstream of the bridge at this location and the channel was approximately 10m wide. On the route of the proposed BOAT, the banks shelved gently and dense stands of emergent vegetation were located on both banks (no emergent vegetation was located within the channel). Emergent and riparian vegetation comprised reed canary-grass, water-cress (*Rorippa nasturtium-aquaticum*), yellow flag (*Iris pseudacorus*), nettle (*Urtica dioica*), great willow-herb, water mint (*Mentha aquatica*) and comfrey (*Symphytum officinale*).

Within the western part of the site (west of the proposed BOAT), dense stands of riparian and emergent vegetation were present on the southern bank and the northern bank had a slight overhang with a narrow strip of riparian vegetation. A small area of trees and scrub was located on the north bank immediately to the west of the crossing and provided approximately 10% shading of the site. In addition, small amounts of filamentous algae and submerged reed canary-grass were present in the channel. Adjacent land uses comprised a garden to the north and a lawn to the south.

The substrate present in the channel predominantly comprised gravel, pebbles and small cobbles with a few large cobbles. However, the substrate was predominantly silt adjacent to the stands of emergent vegetation. The depth of the water was approximately 10 cm when surveyed in June and the water was clear with moderate visibility to the bed.

3.3.2 Crayfish

Two quadrats were surveyed within Site Two on 16/6/04 but no crayfish were recorded. Site Two was considered to provide poor habitat for crayfish due to the lack of available refuges within the channel. In addition, the bank provided poor habitat for crayfish on the route of the proposed BOAT as there were no banks suitable for burrowing or with overhangs and no suitable refuges provided by tree roots. Some potential crayfish habitat was provided on the crossing by the stands of marginal vegetation; however, no crayfish were found when sweeping the vegetation with a pond net.

To the west of the proposed crossing, the bank with a slight overhang provided some potential for crayfish; however, no crayfish were found when sweeping beneath the overhang with a pond net.

3.3.3 Other species

Site Two was considered to provide a suitable substrate for spawning brown trout and the Environment Agency have recorded the crossing as a trout redd.

When sweeping the pond net through the emergent vegetation, over 10 bullheads were recorded. There was a lack of large stones on the route of the proposed crossing (the preferred type of substrate for males to create nests when breeding) and therefore, bullheads are unlikely to utilise the route of the crossing for spawning. However, adult bullheads are probably using the emergent vegetation on the crossing as cover and refuge, particularly during daylight hours.

Site Two was considered to provide a suitable substrate for spawning brook lamprey. Brook lampreys utilise areas of small stones and gravel in flowing water for spawning (where the current is present but not too strong). Brook lamprey have been recorded along this stretch of the Sherston Avon (see Section 3.1 above). Maitland (2003) states that preferences of spawning brook lamprey are likely to be similar to that of spawning brown trout. In addition, the silt beds located adjacent to the stands of riparian vegetation may form nursery beds for brook lamprey larvae: Maitland (2003) states that larval nursery beds are often found at the edges of rivers and streams.

The dense stands of riparian vegetation within Site Two provide suitable foraging habitat for water vole. In addition, the northern bank with an overhang in the west of Site Two may provide suitable habitat for water vole burrows. However, no evidence of water vole was observed during the surveys.

3.3 Site Three

3.3.1 Habitat Description

The detailed survey forms are attached as Appendix 1. Photographs of the site are provided in Plates 8 to 10. The river formed a glide, entering a short run and then an extensive riffle just downstream of the bridge at this location and the channel was approximately 15m wide. The banks were generally gently shelving although some sections of bank were undercut. Immediately downstream of the surveyed section, a limestone retaining wall formed the northern bank. A short stretch of retaining wall was also located on the northern bank immediately adjacent to the bridge.

Both banks supported narrow strips of emergent and riparian vegetation characterised by reed canary-grass, nettle, great willowherb and water-cress. A small stand of Japanese knotweed (*Fallopia japonica*) was located on the northern bank adjacent to the bridge. A semi-mature ash tree was located on the southern bank and resulted in 20% shading of the site. A small island was located in the centre of the site with dense water-cress and reed canary-grass. More extensive stands of emergent vegetation (water-cress and reed canary-grass) were located downstream in the riffle. Site Three also supported small amounts of filamentous algae.

The adjacent land use on both banks was gardens: the lawns extended to the narrow strip of riparian vegetation. The substrate comprised cobbles, pebbles, gravels and sand with some larger cobbles and boulders, particularly closer to the bridge. The water depth varied from 10 cm to 60cm on 5/5/04 and the water was clear with good visibility to the bed.

3.3.2 Crayfish

The habitat appeared to be of reasonable quality for crayfish: there were refuges available for crayfish in the form of a few boulders on the river bed, crevices in the retaining walls, roots of the ash tree and water-cress beds. The limiting factor for crayfish at this location could be the lack of many large boulders and the velocity of the water in the riffle: crayfish prefer slower-flowing habitats such as pools and glides where available (Peay, 2003). Five quadrats were searched for crayfish within Site 3 (one from marginal dead water adjacent to the northern bank, three from the centre of the channel and one from the margin adjacent to the ash tree on the southern bank) and the results are presented in Table 3 below.

Table 3. Crayfish Records from Site 3 on 5/5/04

Species	Quadrat no	Sex	Carapace length (mm)	Damage	Disease incidence	Evidence of breeding	Evidence of Moults
White-clawed crayfish (<i>Austropotamobius pallipes</i>)	1	F	33	RL, AR, AL	-	Berried female carrying eggs	-
	1	F	12	AR	-	-	-
	3	F	12	AL	-	-	-
	4	M	30	-	-	-	Mid-moult
	4	M	21	-	-	-	Mid-moult
	4	M	14	AL	-	-	-
	5	M	32	-	-	-	-
	5	F	17	RR, ML	-	-	Mid-moult
	5	N	9	ML	-	-	-
	5	M	12	AR	-	-	-

Notes

F: Female
M: Male
N: juvenile, not distinguishable

RL: Regenerating left cheliped
AR: Antenna damaged/ missing right side
AL: Antenna damaged/ missing left side
RR: Regenerating right cheliped
ML: Missing left cheliped

The results above indicate the presence of a fairly healthy white-clawed crayfish population at Site 3. The average abundance of crayfish per quadrat was 2: using the suggested grading for qualitative assessment of relative abundance from Peay (2003), the abundance of crayfish at Site 3 is assessed as "high". Evidence of breeding was also recorded in the form of a berried female carrying eggs. However, an unusually high number of juveniles were recorded (approximately 70%) and there was a relatively low number of adults with a carapace length of 30mm+. This could mean that the habitat in Site 3 is in the process of being colonised by crayfish from further upstream. Alternatively, the habitat in Site 3 could be sub-optimal for adult crayfish (because of the low availability of refuges such as boulders) but provides good quality habitat for juvenile crayfish (because of the refuges provided by water-cress beds and filamentous algae). Further monitoring in subsequent years is required at this site related to the size distribution of the population before firm conclusions can be drawn.

3.3.3 Other Species

The run and riffle within and downstream of Site 3 was considered to provide a suitable substrate for spawning brown trout (ie a mixture of gravel, pebbles and small cobbles). The Environment Agency believe that brown trout are spawning within this stretch (Steve Thomas, *pers. com*).

Five bullhead were found during the surveys within Site 3. It is considered that Site 3 is likely to provide a spawning site for bullhead: the boulders and large cobbles present would provide good nest sites.

Although the velocity of water through Site 3 was high, particularly in the riffle section, it is possible that brook lamprey are utilising the site for spawning. Brook lamprey use similar substrates to brown trout for spawning and are found along this stretch of river (see Section 3.2.3 above).

Site 3 was considered to have the potential to support water voles in the gently shelving or undercut banks. However, the stretch was considered sub-optimal for water voles given the intensive management of adjacent land and the resulting narrow strips of riparian vegetation. In addition, no evidence of water voles was found during the survey.

SECTION FOUR: CONCLUSIONS

4.1 Status of species present

The following provides a summary of the status and legal protection received by the species present along this stretch of the river. It should be noted that none of the species below are listed on Annex IV of the Habitats Directive (as transposed by Schedule 2 of the Habitats Regulations) and therefore, none of the species below

4.1.1 *White-clawed crayfish*

The white-clawed crayfish is listed under annexes II and V of the EU Habitats Directive and Appendix II of the Bern Convention. This international level of protection requires the designation of Special Areas of Conservation that support populations of white-clawed crayfish and also requires the control of exploitation of the species from the wild. The white-clawed crayfish is also protected from being taken from the wild or sale under Schedule 5 of the Wildlife and Countryside Act (1981) (as amended).

The white-clawed crayfish is declining throughout its range and many populations in the UK have been eliminated by crayfish plague. Nevertheless, the populations in the British Isles represent the greatest concentration of the species in Europe. As such, the white-clawed crayfish is a priority species under the UK Biodiversity Action Plan and a Species Action Plan has been prepared to encourage measures for its survival.

4.1.2 *Brown Trout*

Brown trout require high levels of dissolved oxygen and cannot tolerate excessive levels of suspended solids in the water. Although relatively common, the presence of brown trout is therefore a good indicator of a healthy aquatic environment. Breeding, immature and spawning trout and spawning beds receive protection under Section 2 of the Salmon and Freshwater Fisheries Act 1975. This means it is illegal to kill, injure or take any breeding, unclean (ie about to spawn or recently spawned and not yet recovered) or immature fish. It is also illegal to willfully disturb any spawn or spawning fish or any bed, bank or shallow where any spawn or spawning fish may be found.

The Bristol Avon is also protected by the Rod and Fisheries Byelaws for the South West Region: no fishing is permitted between the dates of 16th October to 31st March inclusive.

4.1.3 *Brook Lamprey*

The brook lamprey has declined in several parts of Europe. As a result, it is listed in Annexes II and V of the Habitats Directive and Appendix III of the Bern Convention. This international level of protection requires the designation of Special Areas of Conservation that support populations of brook lamprey and also requires the control of exploitation of the species from the wild. The brook lamprey is the most common of the British lampreys, however, it is considered to be Vulnerable (in terms of the IUCN criteria for the Red List of threatened species). The brook lamprey is also included in the UK Biodiversity Action Plan as a "Long List" species ie a species

of conservation concern but not of adequate concern to make the short list of Priority BAP species and species that require Species Action Plans.

Brook lamprey receive similar protection to brown trout under the Salmon and Freshwater Fisheries Act (1975).

4.1.4 Bullhead

The bullhead is common throughout England and Wales. It is listed in Annex II of the Habitats Directive, probably due to a decline in Europe. This international level of protection requires the designation of Special Areas of Conservation that support populations of bullhead.

Bullhead receive similar protection to brown trout under the Salmon and Freshwater Fisheries Act (1975).

4.1.5 Water vole

Water vole populations in Britain have suffered a long-term decline due to habitat degradation and loss resulting in fragmentation and isolation of populations and increased vulnerability to predation pressure from American Mink. As a result of this steep decline in population numbers, the water vole has received legal protection since 1998 as a result of its inclusion on Schedule 5 of the Wildlife and Countryside Act (1981) (as amended). Water voles are protected by Section 9 (4) of the Act which protects the water vole's places of shelter or protection but does not protect the voles themselves. Under the Act, it is an offence to intentionally or recklessly:

- damage or destroy or obstruct access to any structure or place which water voles use for shelter or protection
- disturb water voles while they are using such a place.

4.2 Assessment of Ecological Value of the Pinkney stretch of the Sherston Avon

This initial appraisal of the ecological value of the river does not comprise a detailed assessment based on the results of detailed baseline surveys such as River Corridor Survey or invertebrate survey. In addition, the only species subject to a detailed assessment of population status within this appraisal is white-clawed crayfish. Nevertheless, this stretch of the Sherston Avon is assessed as being of national or possibly international importance, in accordance with the draft Institute of Ecology and Environmental Management [IEEM] Guidelines for Ecological Evaluation and Assessment (criteria presented in Appendix 2), for the following reasons:

- The presence of a thriving population of white-clawed crayfish. Given the decline in status of white-clawed crayfish across the country and coupled with mass extinctions in the region, the presence of a healthy population is significant (Holdich *et al*, 2004).
- The presence of an assemblage of species listed on Annex II of the Habitats Directive, including white-clawed crayfish, bullhead and brook lamprey. Member States are required to designate a network of sites (Special Areas of Conservation) that provide habitat for Annex II species. Sufficient sites must be designated in order for each species to be maintained at favourable conservation status in their natural range. The Sherston Avon therefore supports an assemblage of internationally important species, however, the status and health of the populations cannot be assessed on existing data to determine whether SSSI selection criteria or criteria in Annex III of the Habitats Directive are met.

4.3 Value of Old Ford Crossing

The Old Ford Crossing adjacent to Pinkney Bridge is considered to be of low value for white-clawed crayfish due to the lack of suitable refuges on the bed and within the banks. No crayfish were recorded from quadrats on the crossing itself. However, the habitat immediately up and downstream of the crossing was considered to be of high to very high value for crayfish.

The Old Ford Crossing is considered to be of value for spawning fish, including brown trout and brook lamprey due to the nature of the substrate (gravels, pebbles and small cobbles) and adjacent stands of emergent vegetation. Furthermore, this site has been the subject of river restoration work to enhance its value as spawning habitat for brown trout. However, this type of spawning habitat is not considered to be uncommon in the river; the Environment Agency have stated that they believe brown trout to be spawning in the majority of similar substrate types in the river, including the riffle downstream of the bridge.

The emergent vegetation stands along the Old Ford Crossing are likely to provide refuge and cover for adult bullhead, particularly during daylight hours. However, the Old Ford Crossing is considered to be of low value as bullhead spawning territory due to the lack of large stones which are utilised as nest sites.

The Old Ford Crossing is considered to be of low value for brook lamprey larvae or ammocoetes (the larvae require well-aerated silts where they live until they metamorphose into adults). The banks of the crossing were gently shelving with extensive stands of emergent vegetation and there were no suitable silt beds adjacent or within the vegetation. However, suitable silt beds were located immediately upstream adjacent to both banks.

The Old Ford Crossing is considered to be of low value for water voles, given the lack of suitable banks in which to make burrows. However, this stretch of river is considered to have good potential to support water voles (despite the lack of evidence found during the surveys) and they have been recorded on the Sherston Avon (see Section 3.1 above). Water voles may therefore be using riparian vegetation on the route of the crossing for foraging and shelter but there are unlikely to be water vole burrows on the crossing itself.

4.4 Potential impacts due to upgrading the definitive ROW map

Potential impacts to crayfish due to use of the proposed BOAT are therefore limited to indirect effects. Such indirect effects would comprise disturbance of silt and sediment on the bed and it being washed downstream to affect the population downstream of the bridge: the delicate gills of crayfish are easily clogged by sediment and this may cause physico-pathological changes in the long-term (Holdich, 2003). However, the crayfish population is able to cope with events where turbidity of the water is high (eg during flood events). Therefore, the level and significance of this impact would depend on the degree of use of the BOAT ie on the frequency of sediment disturbance and the volume displaced on each occasion.

It should be noted that fish, particularly brown trout, may also be susceptible to clogging of gills due to increased siltation of the water and also siltation of spawning gravels downstream. However, the main potential impacts to fish, including brown trout and brook lamprey, comprise disturbance and damage to spawning beds and fish, resulting in a reduced breeding success rate. Again, the significance of this impact would depend on the frequency and intensity of use of the BOAT. However, it is important to note that this impact comprises an illegal activity under the

Salmon and Freshwater Fisheries Act (1975). It is also important to note that even low-scale use by pedestrians (or wading anglers) can cause significant damage to the success of spawning fish (Carty and Payne, 1998).

Potential impacts to water voles, bullhead spawning habitat and brook lamprey ammocoete beds due to use of the BOAT are considered to be negligible due to lack of suitable habitat on the crossing.

SECTION FIVE: RECOMMENDATIONS

Given the potential impacts to the species outlined above due to upgrade of the definitive Rights of Way map, I would recommend the following mitigation measures to reduce impacts to an acceptable minimum:

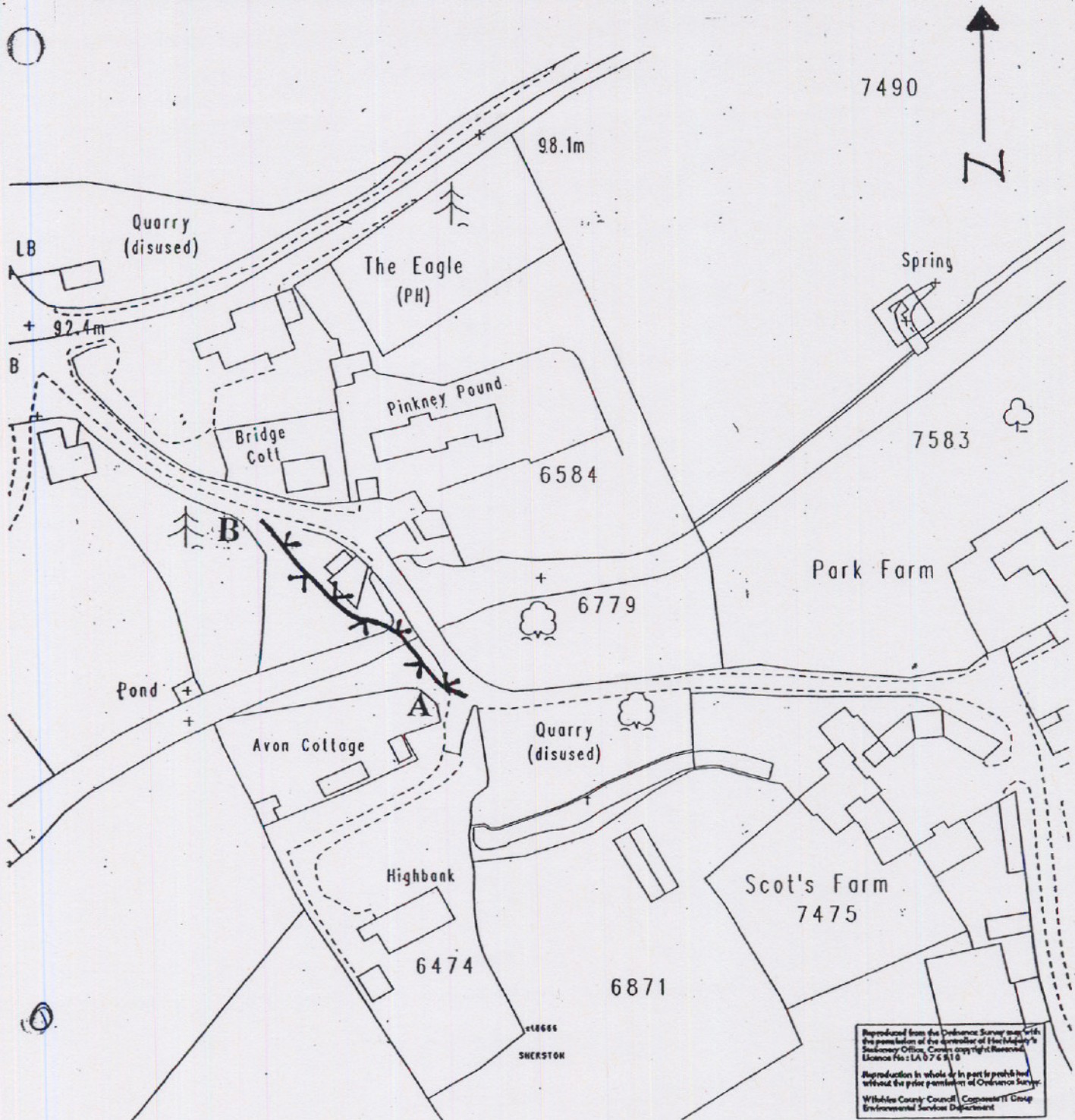
1. Total ban of vehicular use of the crossing.
2. Ban of pedestrian and equestrian use of the crossing during the brown trout spawning season. Brown trout commence spawning in October and the eggs lie in the gravels until March/ April (depending on the weather) when the alevins emerge. Consequently, the ban for pedestrians and equestrians should cover the period October to April.
3. Ban of pedestrian and equestrian use of the crossing during the brook lamprey spawning season. Brook lamprey commence spawning when the water temperature reaches 10 to 11 °C, typically in March to April. The larvae then hatch after a period of 15 to 30 days, dependant on water temperature. Consequently, the ban for pedestrians and equestrians should cover the period March to May to protect brook lampreys during the spawning season.
4. Monitor the use of the crossing and also the crayfish population downstream of the bridge. If there appears to be misuse of the crossing (eg horses trampling up and down the river, use outside the closed season or unauthorised modification to the bed or banks) or if the status of the crayfish population changes significantly, I would recommend a total ban of all use of the crossing.

Note that to comply with the requirements of the Salmon and Freshwater Fisheries Act (1975), the only alternative to the above is to place concrete along the route of the crossing. This would remove the fish spawning bed and thus avoid any conflict with the legislation. However, this would require land drainage consent from the Environment Agency who would have to decide whether the benefits of keeping the crossing open outweigh the environmental impacts/ damage resulting from loss of habitat at this point. This option would also be expensive in terms of protecting the river from pollution during construction. This option would also be in conflict with strategic river habitat restoration that has been undertaken on the river, including the stretch immediately upstream of Pinkney Bridge.

SECTION SIX: REFERENCES

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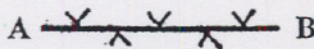
Figure 1. Location of the Proposed BOAT on the Old Ford Crossing, Pinkney



**THE PROPOSED ADDITION OF SHERSTON BYWAY 45
(PINKNEY)**

Key

Length Byway to be added



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George Batten BSc(Hons), C.Eng, FICE FIHT, Director of Environmental Services, Wiltshire County Council
Prepared by AH Date 20th November 2003 Scale 1:1250 Grid Ref. ST 8662-2680



Wiltshire
COUNTY COUNCIL

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PLATES

Plate 1: Site 1.



Plate 2. Site 1



Plate 3. Site 1

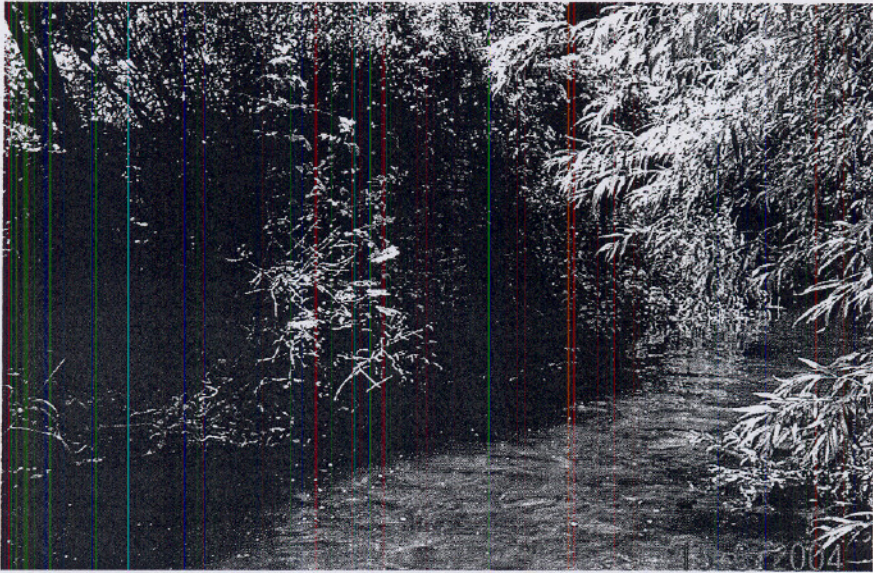


Plate 4. Site 2

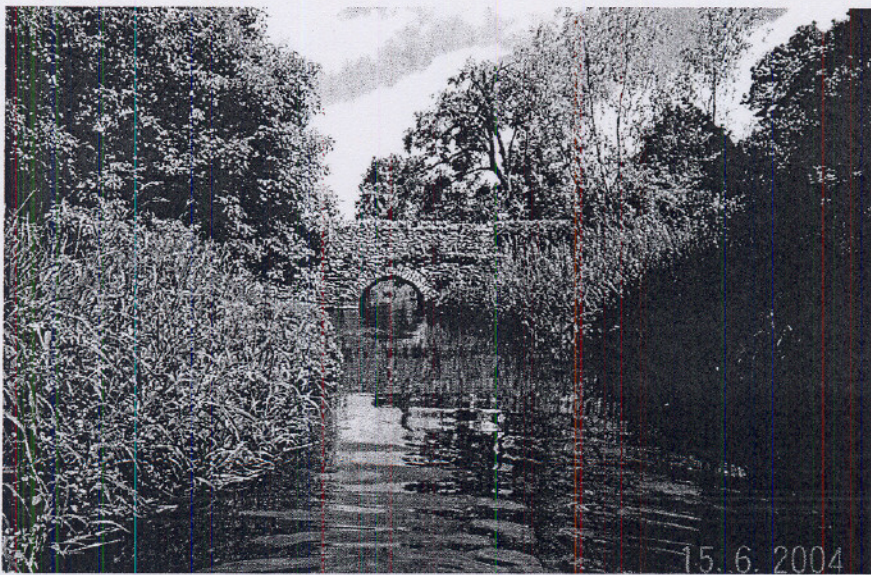


Plate 5. Site 2



Plate 6. Site 2.



Plate 7. Site 2

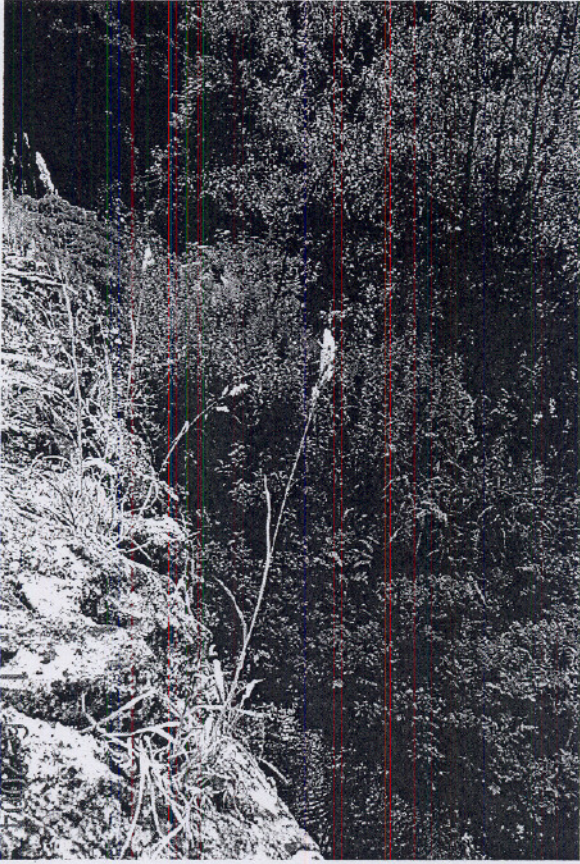


Plate 8. Site 3



Plate 9. Site 3.

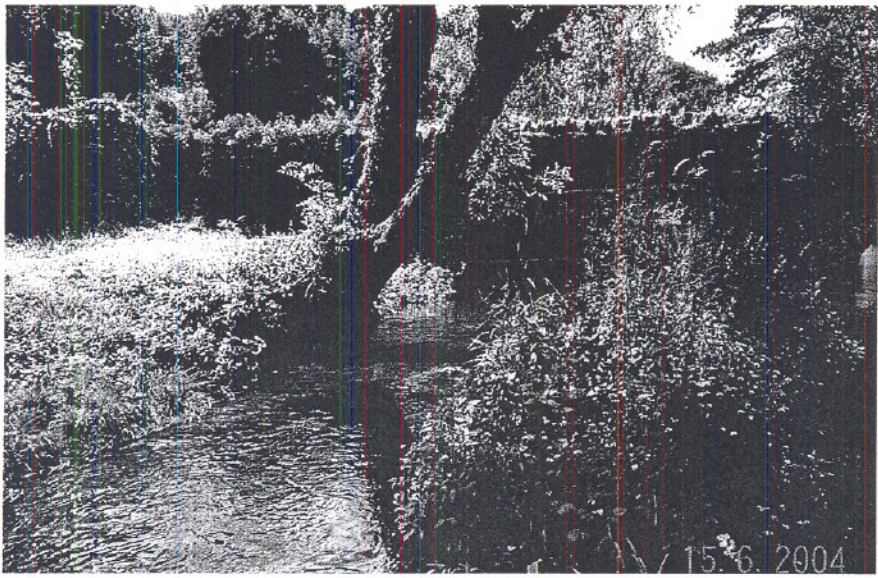
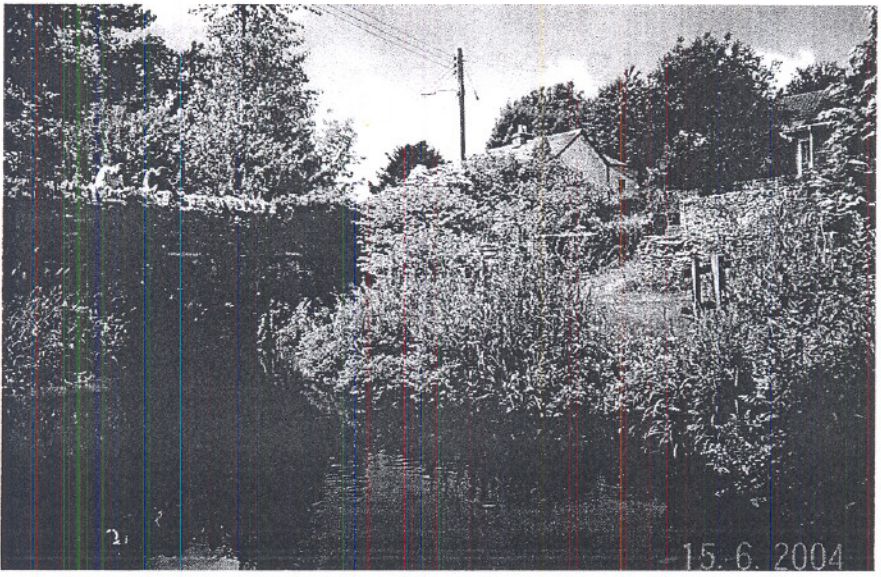


Plate 10, Site 3.



APPENDIX ONE. DETAILED HABITAT SURVEY FORMS

Crayfish Survey and Habitat Record

Catchment	Bristol Avon	River	Sherston Avon	Site (no. name)	Pinkney - Site 1
Date (dd/mm/yy)	16/6/04	Surveyors	J. Ford, D. Moxom, G King	Grid ref. (d/s end)	ST 866 867
Weather: good 1, mod 2, poor 3	1	Flow no. m: 1, low 2, fall 3, rise 4	1	Water temp. °C	-
Clarity: good 1, mod 2, poor 3	1	Start and finish time	11:00	13:00	
Photo ref. & Location	Plates 1 to 3				
Site length (m)	20	Descript (channel features, landuse)	River formed a glide. Banks in west of site lined with retaining walls; west of site by dense emergent veg (Pars, Ehir, Sere). Adjacent landuse = gardens, horse paddock. Large refuges in channel (boulders).		
Width channel (m)	10-12				
	sample patch 1	sample patch 2	sample patch 3	sample patch 4	sample patch 5
Survey method: std 1, quad 2, net/kick 3, trap 4, view 5	2	2			
Details (if not standard)					
Extent (l x w patch)	1 x 1 m ²	1 x 1 m ²			
Channel (1 margins, 2 mid, 3 both, other specify)	1	2			
Depth (metres)	30 cm	50 cm			
Feature (1 marg, d'water, 2 pool, 3 glide, 4 run, 5 riffle)	3	3			
Refuges in channel	tick all present in patch, ring main type(s) searched				
cobble (6.5-15cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
cobble (15-25.6cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
boulder (25.6-40cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
boulder (>40cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
rubble (give size)	<input checked="" type="checkbox"/>				
woody debris	<input checked="" type="checkbox"/>				
other urban debris					
tree roots, fine					
moss		<input checked="" type="checkbox"/>			
filamentous algae		<input checked="" type="checkbox"/>			
other submerged veg.					
emergents	<input checked="" type="checkbox"/>				
Main substrate beneath					
bedrock		<input checked="" type="checkbox"/>			
cobble (6.5-15cm)		<input checked="" type="checkbox"/>			
pebble (<6.5cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
gravel (<1.6cm)		<input checked="" type="checkbox"/>			
sand (<2mm)		<input checked="" type="checkbox"/>			
clay					
silt					
Siltation					
none	<input checked="" type="checkbox"/>				
low		<input checked="" type="checkbox"/>			
moderate					
high	<input checked="" type="checkbox"/>				
Refuges in bank none					
cobble/boulder					
tree roots, large					
vertical or undercut bank					
dry stone wall		<input checked="" type="checkbox"/>			
other reinforced					
crayfish burrows					
Shading above	90%	70%			
Crayfish/10 refuges, or per unit (depending on method)	8	5			
Search time					
Bullhead present?		<input checked="" type="checkbox"/>			
Evaluation crayfish habitat for whole site (0 none, 1 pres., 2 freq., 3 abund.)	Score	Notes (survey conditions, patches etc.):			
in margins	3				
in mid channel	3				
in banks	3				
surveyability	3				
Problems pollution 1, erosion 2, (E if >33% affected), aliens 3					
Total crayfish (by 1 method, note total(s) by other methods in notes if applicable)	13				

Crayfish Survey and Habitat Record

Catchment	Bristol Avon	River	Sherston Avon	Site (no. name)	Pinkney - S site 2
Date (dd/mm/yy)	16/6/04	Surveyors	J Ford, D. Moxom, G King	Grid ref. (ds end)	ST 866 868
Weather, good 1, mod 2, poor 3	1	Flow norm 1, low 2, fall 3, rise 4	1	Water temp -0C	-
Clarity, good 1, mod 2, poor 3	1	Start and finish time	13:30	15:00	
Photo ref. & Location	Plates 4 to 7.				
Site length (m)	20	Descript (channel features, landuse)	River formed a run. In eastern part of site, banks shelved gently, dense emergent veg. (Paru, Rnas, Ipse, Udio, Ehir, Maqu, Soff). In western part of site, banks had slight overha shading approx 10%. Adjacent landuse: gard. Small amounts filamentous algae.		
Width channel (m)	10				
	sample patch 1	sample patch 2	sample patch 3	sample patch 4	sample patch 5
Survey method, std 1, quad 2, net/kick 3, trap 4, view 5	2	2			
Details (if not standard)	1x1m ²				
Extent (l x w patch)		1x1m ²			
Channel (1 margins, 2 mid, 3 both, other specify)	2	1			
Depth (metres)	10 cm	10 cm			
Feature (1 marg, d'water, 2 pool, 3 glide, 4 run, 5 riffle)	4	4			
Refuges in channel	tick all present in patch, ring main type (if searched)				
cobble (6.5-15cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
cobble (15-25.6cm)					
boulder (25.6-40cm)					
boulder (>40cm)					
rubble (give size)					
woody debris					
other urban debris					
tree roots, fine					
moss					
filamentous algae	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
other submerged veg.					
emergents					
Main substrate beneath					
bedrock	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
cobble (6.5-15cm)					
pebble (<6.5cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
gravel (<1.6cm)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
sand (<2mm)					
clay					
silt					
Siltation					
none					
low	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
moderate	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
high	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Refuges in bank					
none	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
cobble/boulder					
tree roots, large					
vertical or undercut bank					
dry stone wall					
other reinforced					
crayfish burrows					
Shading above	0	30% ¹⁰			
Crayfish/10 refuges, or per unit (depending on method)	0	0			
Search time	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Bullhead present?					
Evaluation crayfish habitat for whole site (0 none, 1 pres., 2 freq., 3 abund.)					
Score	0				
in margins	0				
in mid channel	0				
in banks	0				
surveyability	1				
Problems pollution 1, erosion 2, (E if >33% affected), aliens 3					
Total crayfish (by 1 method, note total(s) by other methods in notes if applicable)	0				

Crayfish Survey and Habitat Record

Calchment	Bristol Avon	River	Sherston Avon	Site (no. name)	Pinkney. Site 3
Date (dd/mm/yy)	5/5/04	Surveyors	J. Ford, P. Moxom	Grid ref. (d/s end)	ST 867 868
Weather, good 1, mod 2, poor 3	2	Flow norm 1, low 2, fast 3, rise 4	4	Water temp. °C	-
		Clarity, good 1, mod 2, poor 3		2	Start and finish time
					12:30 15:00
Photo ref. & Location	Plates 8 to 10				
Site length (m)	20m	River forms a glide entering a short run then a riffle. Gently shelving banks though some undercut. Adjacent land use: gardens. Narrow strips of emergent veg. (Paru, Ekin, Rnas). Island in centre of channel. Extensive Paru, Rnas in channel. Fexe on southern bank			
Width channel (m)	15m				
		Describe (channel features, and use)			
	sample patch 1	sample patch 2	sample patch 3	sample patch 4	sample patch 5
Survey method, std 1, quad 2, net/kick 3, trap 4, view 5	2	2	2	2	2
Details (if not standard)					
Extent (l x w patch)	1x1m ²	1x1m ²	1x1m ²	1x1m ²	1x1m ²
Channel (1 margins, 2 mid, 3 both, other specify)	2	1	2	2	1
Depth (metres)	50cm	10cm	20cm	10cm	60cm
Feature (1 marg, d water, 2 pool, 3 glide, 4 run, 5 riffle)	3	1	3	4	1-3
Refuges in channel	tick all present in patch, ring main type(s) searched				
cobble (6.5-15cm)	✓	✓	✓	✓	✓
cobble (15-25.6cm)	✓	✓	✓	✓	✓
boulder (25.6-40cm)				✓	✓
boulder (>40cm)					
rubble (give size)				✓	
woody debris					
other urban debris					
tree roots, fine					
moss	✓	✓	✓	✓	✓
filamentous algae	✓	✓	✓	✓	✓
other submerged veg.					
emergents				✓ Rnas	
Main substrate beneath					
bedrock	✓			✓	
cobble (6.5-15cm)	✓	✓	✓	✓	✓
pebble (<6.5cm)	✓	✓	✓	✓	✓
gravel (<1.6cm)	✓	✓	✓	✓	✓
sand (<2mm)		✓	✓	✓	
clay		✓	✓	✓	
silt		✓	✓	✓	✓
Siltation					
none	✓		✓	✓	✓
low	✓	✓	✓	✓	✓
moderate		✓	✓	✓	✓
high	✓	✓	✓	✓	✓
Refuges in bank	✓	✓	✓	✓	
none					
cobble/boulder					✓
tree roots, large					✓
vertical or undercut bank					✓ (fexe)
dry stone wall					
other reinforced					
crayfish burrows					
Shading above	0	0	0	0	80%10
Crayfish/10 refuges, or per unit. (depending on method)	2	0	1	3	4
Search time	✓		✓	✓	✓
Billhead present?			✓	✓	✓
Evaluation crayfish habitat for whole site (0 none, 1 pres., 2 freq., 3 abund.)		Notes (survey conditions, patches etc.):			
in margins	1				
in mid channel	1				
in banks	2				
surveyability	2				
Problems pollution 1, erosion 2, (E if >33% affected), aliens 3.					
Total crayfish (by 1 method, note total(s) by other methods in notes if applicable)	10				

Box 9 Valuation of Ecological Receptors	
Level of value	Examples
Inter-national	<p>An internationally designated site or candidate site (SPA, pSPA, SAC, cSAC, pSAC and/or Ramsar site)</p> <p>A sustainable area of a habitat listed in Annex I of the Habitats Directive, or smaller areas of such habitat which are essential to maintain the viability of a larger whole</p> <p>A sustainable population of an internationally important species. I.e a UK Red Data Book species or species listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP) which is listed in Annex IV of the Habitats Directive, or as being of unfavourable conservation status in Europe, of uncertain conservation status or of global conservation concern in the UK BAP. Also sites supporting a breeding population of such a species or supplying a critical element of their habitat requirements.</p>
National	<p>A nationally designated site (SSSI, ASSI, NNR, Marine Nature Reserve) or a discrete area which meets the selection criteria for national designation (eg SSSI selection guidelines)</p> <p>A sustainable area of a priority habitat identified in the UK BAP, or of smaller areas of such habitat which are essential to maintain the viability of a larger whole</p> <p>A population of a nationally important species or a site supporting such a species. I.e a species listed on Schedules 5 & 8 of the 1981 W&CA (as amended), a UK Red Data Book species (excluding scarce species) that is not listed as being of unfavourable conservation status in Europe, of uncertain conservation status or of global conservation concern in the UK BAP or a non-Red Data Book species that is listed as occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in the UK BAP). Also sites supporting a breeding population of such a species or supplying a critical element of their habitat requirements.</p>
Regional	<p>Sites which exceed the County-level designations but fall short of SSSI selection guidelines, where these occur</p> <p>Sustainable areas of key habitat identified in the Regional BAP or smaller areas of such habitat which are essential to maintain the viability of a larger whole</p> <p>Sustainable areas of key habitat identified as being of Regional value in the appropriate Natural Area profile</p> <p>A population of a species listed as being nationally scarce which occurs in 16-100 10km squares in the UK or in a Regional BAP or relevant Natural Area on account of its regional rarity or localisation. Sites supporting a breeding population of such a species or supplying a critical element of their habitat requirements.</p>
County / Metropolitan	<p>Semi-natural ancient woodland greater than 0.25 ha</p> <p>County/Metropolitan sites or a site which meets the selection criteria for these sites</p> <p>A viable area of habitat identified in County BAP</p> <p>A population of a species which is listed in a County/Metropolitan "red data book" or BAP on account of its regional rarity or localisation. Also sites supporting a breeding population of such a species or supplying a critical element of their habitat requirements.</p>
District / Borough	<p>Semi-natural ancient woodland smaller than 0.25 ha.</p> <p>Viable areas of habitat identified in a sub-County (District/Borough) BAP or in the relevant Natural Area profile</p> <p>Sites/features that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource.</p> <p>A diverse and/ or ecologically valuable hedgerow network</p> <p>A population of a species that is listed in a District/Borough BAP because of its rarity in the locality or in the relevant Natural Area profile because of its regional rarity or localisation. Also sites supporting a breeding population of such a species or supplying a critical element of their requirements.</p>
Parish / Neighbourhood	<p>Areas of habitat considered to appreciably enrich the habitat resource within the context of the Parish or neighbourhood. Eg moderately species-rich hedgerows</p>

N.B Where species or habitats occur in more than one category above, the highest value is applicable.