

Knepp Wildland Project 2016: Molluscan Survey

(December 2016)



Fig. 1 Site 4 – a newly created shallow-water scrape

Dr. M. J. Willing

A Report commissioned by The Knepp Castle Estate

Project Officer: Penny Green

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1. SUMMARY

- This project was established to undertake molluscan surveys along a length of River Adur, adjacent wetlands and newly created scrapes and pools on the Knepp Castle Estate to replicate baseline surveys completed in October 2005.
- A total of 24 live aquatic species were recorded during the survey, 14 in the River Adur and 10 restricted to floodplain ditches and scrapes.
- Eight aquatic species found in the Adur in 2005 were not recorded there in 2016 although seven of these were present living in floodplain scrapes and pools. The river channel works undertaken between 2011 and 2013 may have contributed to these losses, but other environmental factors may also partially or completely be the cause. Only one species recorded in 2005 (*Bathyomphalus contortus*) was not re-found in 2016.
- Three aquatic taxa were recorded live for the first time in 2016; *Lymnea stagnalis* in scrape pools, *Galba truncatula* in one floodplain ditch and the non-native *Potamopyrgus antipodarum* at two adjacent sites in the Adur channel. This latter species maybe a recent colonist due to its limited distribution.
- All of the aquatic species recorded are common and widespread both in West Sussex and throughout southern England; none are of 'conservation concern'.
- Only three terrestrial species (all common and widespread) were recorded from wetland sites on the Adur floodplain; a further four species found in 2005 were not recorded. Reasons for the apparent losses are considered and may be associated with the restoration works of 2011 – 2013 or periods of flooding or drought.
- A small number of aquatic species (all also present in the Adur or adjacent pools and scrapes) were found in Kneppmill Pond.
- A small number of aquatic and one terrestrial species were found in a fen sample collected at the head of the pond; a number of species recorded there in 2005 were not

found but this is thought to be due to high water levels restricting fen access on the survey day.

2. OBJECTIVES

This survey was commissioned by Knepp Castle Estate to undertake a molluscan survey of a section of River Adur and adjacent floodplain to repeat a baseline survey undertaken there in October 2005 and then provide comparative analysis.

3. METHODS

Field surveys: These were undertaken on 7th December 2016. Survey locations are shown on Figs. 2 and brief site descriptions are given in Table 3 (Appendix 8.2).

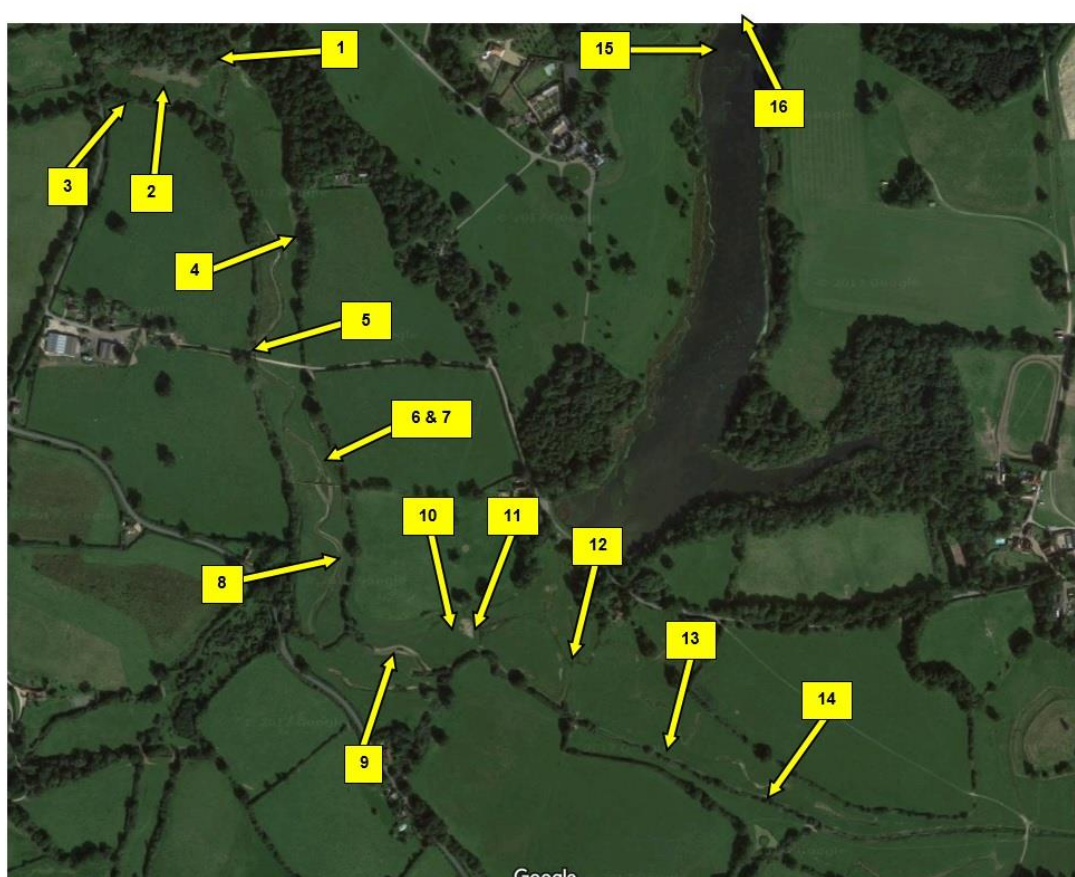


Fig. 2: Approximate survey site locations in the River Adur corridor (1 – 14) and Kneppmill Pond (15 – 16), Knepp Castle Estate

3.1 Terrestrial surveys: Terrestrial surveys were undertaken thus:

In order to collect the small species, which can easily be under-recorded or missed in the field (e.g. *Vertigo* spp.), bulk samples were taken for later laboratory processing. At each of the terrestrial survey locations this involved collecting low-growing ground vegetation, plant (e.g. *Juncus* spp, *Carex* spp) litter, moss and ground surface scrapings over an area of about 1.5 – 2m². Locations judged most likely to harbour Mollusca were preferentially selected;

these included damp hollows, shaded locations at the edge of, or beneath, clumps of vegetation such as grass-tussocks. The bulk sample material removed was then air dried in muslin bags to assist final sieving (again through a 2 mm/0.5 mm sieve nest). The larger < 2mm residue was examined with a X4 magnifier, whilst the < 0.5mm fractions were examined in small batches using a X 7 – X 60 binocular microscope.

In addition to bulk sampling, field examination (in the immediate vicinity of the sampling stations) of mud/soil surfaces and vegetation. This extra searching is especially useful to locate larger species that may occur in low numbers (e.g. *Cepaea* spp) and may therefore be under-represented or absent in bulk samples.

Survey for the possible presence of some *Vertigo* spp, which climb on marsh and grassland vegetation, was carried out by the well-established technique of beating herbaceous vegetation onto a gridded white plastic tray in dry conditions (it is extremely difficult to undertake the 'beating technique' in wet vegetation). Material on the tray was carefully examined with a magnifier for presence of the snails.

3.2 Aquatic Surveys: River and scrape pool sites were sampled using an Environment Agency approved long-handled professional sampling net with a 0.5mm nylon mesh. This was used to collect sediment samples at each site (little aquatic (macrophytic) vegetation was seen at any sample site). Several 'net sweeps' were made at each location; the material recovered being combined into a single sample for that site. In order to recover all small species and juveniles, these sediment samples were removed for later laboratory sieve processing. This involved washing material to retain all molluscan remains > 0.5mm. Residues were then examined on gridded white trays with smaller fractions inspected microscopically with a x7 – x45 binocular microscope.

Species recovered from samples have been recorded in abundance classes thus:

R = *rare* (1 - 2 specimens recovered)

F = *frequent* (3 - 30 specimens recovered)

A = *abundant* (> 30 specimens recovered)

X = dead shell only found

At all survey sites 12 figure NG locations of survey stations were recorded using a Garmin GPS, and most sites were also digitally photographed. Preserved specimens of *Lymnaea palustris* agg were sent to Lymnaeidae specialist Ron Carr for dissection to confirm identification¹.

¹ *Lymnaea palustris* agg has recently been shown to be the two species *L. palustris* seg and *L. fusca*. Separation is not possible from external features, but requires dissection of reproductive structures. R. Carr, an authority on this separation examined Knepp Castle Estate specimens. (Carr & Killeen 2003).

4. RESULTS

Survey results are displayed in Appendix 8.1 tables 1 and 2 and site descriptions and locations in table 3. Survey site images and selected specimen images are displayed in Appendix 8.4. Species naming follows Anderson (2005). A total of 27 species were recorded (3 terrestrial and 24 freshwater) all being common and widespread in south-east England. Eight aquatic species recorded in the Adur in 2005 were not found there in 2016 although seven of these were nevertheless living in floodplain scrapes and pools. Only one aquatic species, *Bathyomphalus contortus* present in 2005, was not found at any aquatic site in 2016. Three aquatic species were found in 2016 that had not been recorded living in 2005 (*Lymnaea stagnalis*, *Galba truncatula* and *Potamopyrgus antipodarum*). Only three common terrestrial species were recorded on the river floodplain in 2016 a further four present in 2005 were not re-located. Kneppmill Pond produced a small number of species also present elsewhere in either the Adur or adjacent scrapes. Only one terrestrial Mollusc was recorded from a fen-litter sample collected at the head of the pond.

5. DISCUSSION

The 2016 survey of the Adur river corridor (and brief sampling of Kneppmill Pond) produced 24 aquatic and 3 terrestrial molluscan species. All of these species are common and widespread in both West Sussex and south-east England (Kerney 1999, Conchological data base as accessed on NBN). None of the species have any conservation 'designation' (e.g. listing on EUHSD annexes or as English 'Species of Principal Importance' [NERC Act 2006]). In the latest red-list IUCN-based status review of non-marine Mollusca for Great Britain (Seddon *et al.* 2014) all of the 25 native (aquatic and terrestrial) species are categorised as of 'least concern'. The two non-native aquatics (*Physella acuta* and *Potamopyrgus antipodarum*) appear as 'Not Applicable'.

Aquatic species: Of the 24 aquatic species found, 14 were recorded live in the River Adur with the remaining 10 only present in scrapes, pools and ditches on the river floodplain. The 2005 molluscan survey (Willing in Greenaway 2005) by contrast produced 19 from river sites. Species present in 2005 but absent from the river in 2016 include *Valvata cristata*, *Bithynia tentaculata*, *Lymnaea fusca*, *Planorbis carinatus*, *Hippeutis complanata*, *Bathyomphalus contortus*, *Planorbis corneus* and *Pisidium milium*. Except for *B. contortus*, all of these species were nevertheless present in one or more of 2016 pool and scrape sites. Species newly recorded in 2016 include *Lymnaea stagnalis*, found in two scrape sites (the species was only recorded as dead shells in 2005), *Galba truncatula* in one floodplain rush-filled ditch and the non-native *Potamopyrgus antipodarum*. This snail is often found in huge numbers; once present at a site it frequently becomes the most numerous species. *P. antipodarum* was only recorded in the two adjacent river sites (S.8 & 9) which may suggest a recent introduction (possibly brought in on visiting waterfowl); the species is likely to spread throughout the river channel with colonisation of the scrapes also likely. The other non-native *Physella acuta*, which was also recorded in 2005, was one of the most frequent species recorded in 2016 (both in the river and floodplain scrapes). The

disappearance of 8 species from the river suggests that it may have suffered from one or more negative impacts since 2005. The most obvious significant impact to both sections of the river channel and adjacent floodplain was the river restoration works undertaken by the Environment Agency Operations Team between 2011 and 2013. This work created numerous scrapes on the floodplain as well as re-meandering operations on about 1.75 km of river channel. With an 11 year survey hiatus since the previous survey it is not possible to identify any particular cause, but other events that may also have had an effect. These include diffuse pollution (agricultural fertilisers, sewage, pesticides) and prolonged periods of either low or spate water flow.

Terrestrial species: Only low numbers of three common species, also recorded in 2005, were recovered from floodplain sites (rush-filled drains, hollows and rush dominated areas around scrapes and pools). The earlier survey also found a further four species; the common marsh species *Zonitoides nitidus*, the grassland *Vertigo pygmaea* and two generalists *Monacha cantiana* and *Deroceras reticulatum*. As with the aquatic surveys the apparent losses may be due to a variety of possible causes including the floodplain restoration / channel re-creation works between 2011 and 2013, a prolonged period of flooding or drought. The scrapes at the eastern end of the survey corridor were completely dry at the time of site survey (Fig. 15)

Kneppmill Pond: A single aquatic sample (S.15) produced a low-diversity assemblage of species that were also recorded in either the River Adur or adjacent scrape pools. One wetland sample taken from fen/carr area at the head of the pond only produced 4 aquatic species. A sample collected near to this area in 2005 produced a more diverse fauna including a further seven fen wetland taxa including the local *Vertigo antivertigo*. At the time of survey the pond water levels were high preventing safe access to fen areas nearer to the 2005 survey point.

6. REFERENCES

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7. ACKNOWLEDGEMENTS

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8. APPENDICES

8.1 Results:

Table 1 Survey Results

	Sites							
	1	2	3	4	5	6	7	8
Freshwater species								
<i>Potamopyrgus antipodarum</i>	-	-	-	-	-	-	-	F
<i>Valvata cristata</i>	R	-	-	-	-	-	-	-
<i>Valvata piscinalis</i>	F	F	-	-	R	-	-	-
<i>Bithynia tentaculata</i>	F	-	X	-	-	R	-	-
<i>Physella</i> cf <i>acuta</i>	A	F	-	F	X	-	-	F
<i>Galba truncatula</i>	-	-	-	-	-	-	-	-
<i>Lymnaea fusca</i>	-	-	-	-	-	F	R	-
<i>Lymnaea stagnalis</i>	-	-	-	-	-	F	F	-
<i>Radix balthica</i>	F	-	-	R	R	F	-	R
<i>Planorbis carinatus</i>	-	-	-	R	-	-	-	-
<i>Planorbis planorbis</i>	-	R	-	-	-	A	-	-
<i>Anisus vortex</i>	F	-	F	-	-	-	-	-
<i>Gyraulus albus</i>	-	F	F	R	R	-	-	-
<i>Hippeutis complanatus</i>	R	-	-	-	-	-	-	-
<i>Planorbarius corneus</i>	-	-	-	R	-	F	-	-
<i>Acroloxus lacustris</i>	-	-	R	-	-	-	-	-
<i>Musculium lacustre</i>	-	R	R	F	-	-	-	-
<i>Sphaerium corneum</i>	F	-	R	-	-	-	-	R
<i>Pisidium casertanum</i>	-	F	F	-	R?	-	-	-
<i>Pisidium obtusale</i>	R	-	-	-	-	-	-	-
<i>Pisidium milium</i>	F	-	-	-	-	-	-	-
<i>Pisidium subtruncatum</i>	F	R	R?	-	F	-	-	R
<i>Pisidium nitidum</i>	F	F	-	-	F	-	-	-
<i>Pisidium henslowanum</i>	-	F	R	-	F	-	-	F
<i>Pisidium</i> spp	-	-	-	R	F	-	-	R
Terrestrial species								
<i>Carychium minimum</i>	-	-	-	-	-	-	R	-
<i>Succinea putris</i>	-	-	-	-	-	-	F	-
<i>Nesovitrea hammonis</i>	-	-	-	-	-	-	R	-

Table 2 Survey Results

	Sites							
	9	10	11	12	13	14	15	16
Freshwater species								
<i>Potamopyrgus antipodarum</i>	A	-	-	-	-	-	-	-
<i>Valvata cristata</i>	-	-	-	-	-	-	F	-
<i>Valvata piscinalis</i>	R	-	-	-	-	-	-	-
<i>Bithynia tentaculata</i>	-	-	-	-	-	-	A	-
<i>Physella</i> cf <i>acuta</i>	-	X	R	-	-	R	X	-
<i>Galba truncatula</i>	-	R	-	-	-	-	-	R
<i>Lymnaea fusca</i>	-	R	R	-	-	-	-	-
<i>Lymnaea stagnalis</i>	-	-	-	-	-	-	-	-
<i>Radix balthica</i>	-	-	R	X	-	-	R	-
<i>Planorbis carinatus</i>	-	-	-	-	-	-	-	-
<i>Planorbis planorbis</i>	R	-	F	-	R	-	-	-
<i>Anisus vortex</i>	F	-	-	-	-	-	-	X
<i>Gyraulus albus</i>	-	-	-	-	-	-	-	-
<i>Hippeutis complanatus</i>	-	-	-	-	-	-	R	-
<i>Planorbarius corneus</i>	-	-	R	-	-	-	-	-
<i>Acroloxus lacustris</i>	-	-	-	-	-	-	R	-
<i>Musculium lacustre</i>	R	-	-	-	-	-	-	-
<i>Sphaerium corneum</i>	-	-	-	-	-	-	-	-
<i>Pisidium casertanum</i>	-	-	-	-	R	-	-	F
<i>Pisidium obtusale</i>	-	-	R	-	-	-	-	F
<i>Pisidium milium</i>	-	-	-	-	-	-	F(juv?)	-
<i>Pisidium subtruncatum</i>	-	-	-	-	-	-	-	-
<i>Pisidium nitidum</i>	-	-	-	-	-	R(juv)	-	-
<i>Pisidium henslowanum</i>	R	-	-	-	F	-	-	-
<i>Pisidium</i> spp	-	-	-	-	-	-	-	-
Terrestrial species								
<i>Carychium minimum</i>	-	R	-	-	-	-	-	-
<i>Succinea putris</i>	-	X	-	-	-	-	-	R
<i>Nesovitrea hammonis</i>	-	-	-	-	-	-	-	-

8.2: Site details

Table 3: Summary site locations and descriptions

Site & Grid Ref. (all with prefix 'TQ')	Brief site details	Figures
1 15103 21842	An artificial pool fed by inflow ditch. Little aquatic vegetation including <i>Callitriche</i> sp., <i>Rorippa nasturtium-aquaticum</i> , with <i>Sparganium</i> & <i>Juncus</i> spp on margins	3
2 15016 21812	An extension of site 1; shallow, clay bottomed pool with occasional <i>Callitriche</i> sp.	4
3 14956 21805	River Adur channel at upstream limit of survey zone. Very slow flowing with occasional <i>Callitriche</i> sp; bottom sediments blanketed with dead leaves; site partially over-shaded by oak, alder, ash.	5
4 15198 21615	Shallow scrape much as site 2.	1
5 15144 21442	River Adur channel; very slow flowing clay-bottomed river channel with occasional <i>Callitriche</i> sp. with <i>Sparganium</i> , <i>Juncus</i> spp, <i>Phalaris</i> and <i>Iris</i> on margins. Flood debris caught in over-hanging bushes at 1m+ above water provides evidence of flood flow.	6
6 15251 21280	Shallow <i>Carex</i> spp, <i>Juncus</i> spp un-shaded fringed pool.	7
7 As site 6	<i>Juncus</i> & <i>Carex</i> litter collected on fringes of Site 6 pool.	7
8 15276 21087	River Adur channel; fast-flowing shallow (0.5m), clay-bottomed channel. Occasional <i>Glyceria fluitans</i> .	8
9 15381 20998	River Adur channel; slow to moderate flow in sunken gully. Occasional <i>Callitriche</i> sp. with <i>Sparganium</i> , <i>Typha</i> on margins	9
10 15441 21013	<i>Juncus</i> spp tussock filled field ditch	10
11 15485 21016	Shallow clay-bottomed scrape with occasional <i>Callitriche</i> , <i>Glyceria fluitans</i> ; margins with <i>Sparganium</i> and <i>Phalaris</i> ,	11
12 15602 20985	Shallow scrape and <i>Juncus</i> spp dominated meadow beyond	12
13 15740 20871	River Adur channel; slow/moderate flow-flowing with emergent <i>Typha latifolia</i> , <i>Sparganium</i> and <i>Schoenoplectus lacustris</i> ; marginal <i>Phalaris</i>	13
14 15895 20796	River Adur channel; similar to S.13	14
15 15803 21938	Millpond. Open water beyond marginal <i>Carex</i> spp & <i>Typha latifolia</i>	16
16 15934 22160	Unshaded <i>Carex</i> spp, <i>Iris</i> fen on edge of sallow carr at head of Mill Pond	17

8.3: Molluscan Scientific / English Names (taxa recorded in 2016)

Aquatic species	Common English name:
<i>Valvata cristata</i>	Flat Valve Snail
<i>Valvata piscinalis</i>	Common Valve Snail
<i>Potamopyrgus antipodarum</i>	Jenkin's Spire Snail
<i>Bithynia tentaculata</i>	Common Bithynia
<i>Physella acuta</i>	An invasive 'bladder snail'
<i>Lymnaea fusca</i>	Marsh Pond Snail
<i>Galba truncatula</i>	Dwarf Pond Snail
<i>Radix balthica</i> (= <i>Lymnaea peregra</i>)	Common Pond Snail
<i>Planorbis planorbis</i>	Marginated Ram's-horn Snail
<i>Planorbis carinatus</i>	Keeled Ram's-horn
<i>Anisus vortex</i>	Whirlpool Ram's-horn Snail
<i>Bathyomphalus contortus</i>	Twisted Ram's-horn Snail
<i>Gyraulus albus</i>	White Ram's-horn Snail
<i>Hippeutis complanatus</i>	Flat Ram's-horn
<i>Planorbarius corneus</i>	Great Ram's-horn
<i>Acroloxus lacustris</i>	Lake limpet
<i>Sphaerium corneum</i>	Horny Orb Mussel
<i>Musculium lacustre</i>	Lake Orb Mussel
<i>Pisidium casertanum</i>	Caserta Pea Mussel
<i>Pisidium obtusale</i>	Porous-shelled Pea Mussel
<i>Pisidium milium</i>	Rosy Pea Mussel
<i>Pisidium subtruncatum</i>	Short Ended Pea Mussel
<i>Pisidium henslowanum</i>	Henslow's Pea Mussel
<i>Pisidium nitidum</i>	Shining Pea Mussel
Terrestrial Species	
<i>Succinea putris</i>	Large Amber Snail
<i>Carychium minimum</i>	Short-toothed Herald Snail
<i>Nesovitrea hammonis</i>	Rayed Glass Snail

8.4: Survey sites images



Fig. 3: Survey site 1 - pool on Adur floodplain



Fig. 4: Survey site 2 - pool on Adur floodplain



Fig. 5: Survey site 3 – River Adur Channel



Fig. 6: Survey site 5 – River Adur Channel



Fig. 7: Survey site 6 & 7 – Pool and surrounding wetland on Adur floodplain



Fig. 8: Survey site 8 – River Adur Channel



Fig. 9: Survey site 9 – River Adur Channel



Fig. 10: Survey site 10 – *Juncus*-filled ditch on Adur floodplain



Fig. 11: Survey site 11 - pool on Adur floodplain



Fig. 12: Survey site 12 - pool on Adur floodplain



Fig. 13: Survey site 13 – River Adur Channel



Fig. 14: Survey site 14 – River Adur Channel



Fig. 15: Dried scrapes on Adur floodplain near Site 14



Fig. 16: Site 15 - Kneppmill Pond



Fig. 17: Site 16 - Fen at head of Kneppmill Pond

END of REPORT