Wild Warwickshire

Feasibility study for the reintroduction of the Water Vole (Arvicola amphibus) to the Warwick Avon.

December 2010

M. C. Smith

Wild Warwickshire

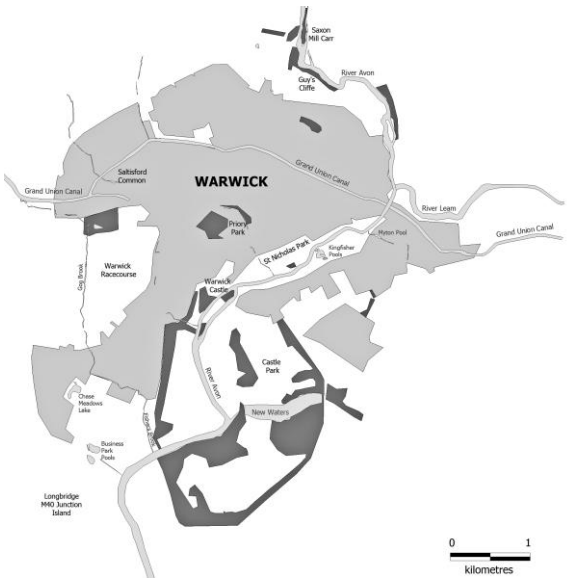
FEASIBILITY STUDY FOR THE REINTRODUCTION OF THE WATER VOLE (ARVICOLA AMPHIBUS) TO THE WARWICK AVON.

SUMMARY

There are currently two Water Vole enrichment and reintroduction programmes active in Warwickshire. It is this papers aim to suggest a third, based on the River Avon in Warwick. With Mink numbers falling and an increase in the suitability of habitat along the watercourse the area is becoming increasingly acceptable for this highly vulnerable species. An assessment of habitat quality in the area reveals 3 core sites upon which a phased reintroduction of up to 100-200 Water Voles could create a viable metapopulation in this region.

1.1 INTRODUCTION

Since the release of the North American Mink (*Mustela vison*) the Water Vole has been in serious decline. Aggressive predation by this species and heavily polluted waterways contributed to an unsustainable pressure on populations throughout the United Kingdom (Maclean, 2010). In Warwick the last records of Water Vole were from the 1960's since that time the quality of the Avon has improved to such an extent that it is suitable once more for Vole habitation and with mink numbers on the decline nationally now is perhaps a suitable time to reintroduce this species to the area.



Warwick is a small market town built beside the River Avon with a range of different aquatic habitats including pools, canals, brooks, reed beds and rivers.

1.2 THE WATER VOLE

The Water Vole is the largest of Britain's voles and despite being termed a 'Water Vole' was once widespread and common in grasslands (Harris and Yalden, 2008). It is not well adapted to aquatic life but use the water as a means of escape and as foraging habitat.

The vole can be found across Europe and Britain and exists as three separate genetic populations across this range. In Warwickshire current numbers are extremely low with significant numbers last found in Warwick in 1966.

The Water Vole is territorial by nature with females holding smaller territories than males who will defend them. Whilst omnivorous, Water Voles rely mostly on aquatic vegetation for food.

This is perhaps one of the most important habitat requirements alongside suitable banks for burrows and low predation pressures.

The main characteristics of Water Vole ecology can be broken down into a series of core species metrics that can be used to quantify their needs; these are shown in figure 1. They cover fecundity, mortality, population density and spatial home range details. All of these metrics need consideration when planning any reintroductions.

Figure 1. Species Metrics

Metric	Data	Source
Fecundity		
Number of litters per season	2-5	(Strachan and Moorhouse, 2006)
Litter Size	5-8 (Mean 6.1)	(Harris and Yalden, 2008), (Strachan and Moorhouse, 2006)
Sex Ratio	1:1	(Harris and Yalden, 2008)
Mortality		
Overwinter Mortality	~ 70 %	(Bright and Carter, 2000), (Strachan and Moorhouse, 2006)
Monthly Survival	60-90 %	(Harris and Yalden, 2008)
Density		
Density in Wet Carr/Reed bed per ha	25-50	(Strachan and Moorhouse, 2006)
Mean density per 2 km of Canal	56.7	(Moorhouse, 2004)
Mean density of all linear features	5-280	(Harris and Yalden, 2008), (Strachan and Moorhouse, 2006)
Minimum Viable Population per 1.5-2km	30-50	(Strachan and Moorhouse, 2006)
Home-range		
Male Home-range (m)	60-300	(Strachan and Moorhouse, 2006)
Female Home-range (m)	30-150	(Strachan and Moorhouse, 2006)
Core Unit	Female	(Strachan and Moorhouse, 2006)

1.3 Potential Sites

The project area sits on the River Avon, a slow moving river that rises in Northamptonshire and flows south westerly to join the River Severn at Tewkesbury. The river is well vegetated and has abundant fish stocks. The Avon is joined by the River Leam in Warwick and is further fed by several small tributary brooks and streams. For much of the rivers length in the survey area the bank sides are undeveloped with mixtures of amenity grassland, woodland and wet grassland. The Avon is prone to annual flooding mostly in the winter although heavy rain in the late spring can cause some flooding. The Grand Union Canal bisects the town and crosses the river via an

aqueduct at St Nicholas Park. A number of bodies of open water exist in the project area the most predominant of which is New Waters.

To identify sites suitable for reintroduction in the project area a very simple assessment of a number of core requirements was used. These core requirements are based on species parameters such as refuge habitat, banks suitable for burrows, flood risk and the availability of suitable food plants as well as factors such as disturbance and predation risks. Details of the vegetation for each site is listed in the Appendix.

As an example, the Grand Union Canal is essentially low quality habitat. The canal is almost completely canalised with few suitable burrow sites. Where the banks have vegetation or are not canalised might make medium quality but disturbance from walkers and barges mean that generally the whole length of the network in Warwick is unsuitable for Water Voles. Much of the river in contrast is of higher quality especially in areas away from the general public as a consequence however predation pressures from Herons or Foxes maybe higher. The vegetation tends to be more natural (semi-natural) and its structure offers greater refuge from predators.

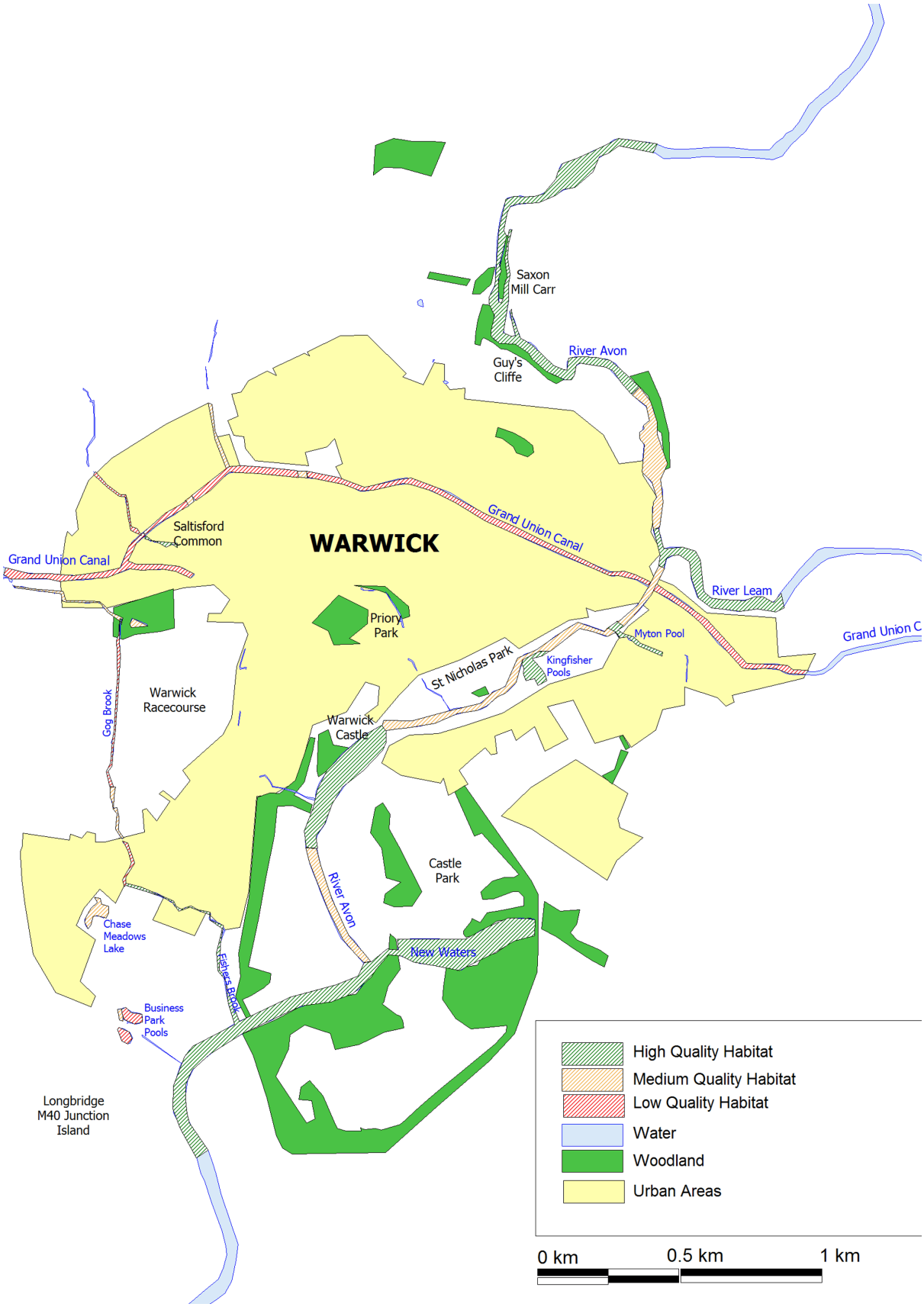
The core requirements were assessed and translated into a simple scale of poor, medium and high quality habitats. From these high quality sites a number of possible sites were identified – New Waters, Warwick Castle, Saxon Mill and Kingfisher Pools including Myton Pool. The details of these site s are outlined in Figure 2.

As an example, the Grand Union Canal is essentially low quality habitat. The canal is almost completely canalised with few suitable burrow sites. Where the banks have vegetation or they might make medium quality but disturbance from walkers and barges mean that generally the whole length of the network in Warwick is unsuitable. Much of the river in contrast is of higher quality especially in areas away from the general public as a consequence however predation pressures from Herons or Foxes maybe higher.

Figure 2. Habitat Sizes

	Open Water (ha)	Carr/ Wet Woodland (ha)	Reed bed (Ha)	Wet Grassland (ha)	Linear Water Features (km)	Total Area (ha)
New Waters	5.13	1.61	6.5	-	1	13.24
Warwick Castle	1.47	1.21	-	-	1.87	1.68
Saxon Mill	1.50	0.97	1.57	12.21	2.9	16.25
Kingfisher Pools inc. Myton Pool	0.73	-	1.29	5.6	0.85	8.47
Total	**8.83**	**3.79**	**9.36**	**17.81**	**6.62**	**39.74**

Figure 3. Habitat Quality Map



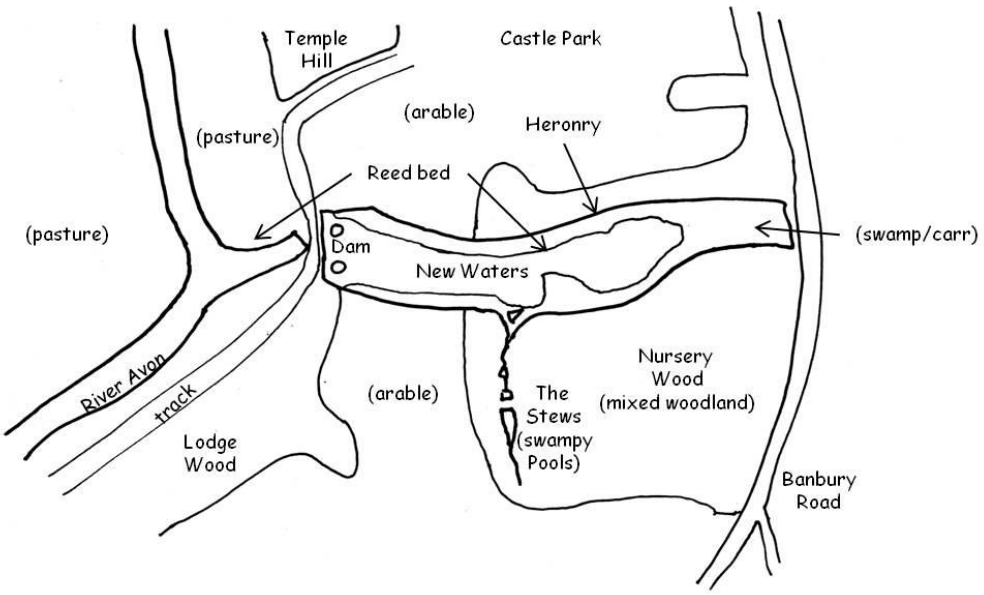
NEW WATERS

New Waters, part of Warwick Castle Park is privately owned parkland comprising woodland, open water, farmland and reed-bed; the site has the largest reed bed in South Warwickshire.

New Waters is registered by the County Ecology Unit as Eco-Site 120/126. They describe it as reed swamp with Reed mace, Greater Pond Sedge and Lesser Pond Sedge.

Water Vole have been previously recorded on the site in 1966. The reed bed and swamp carr provide excellent refuge habitat for the species. The site has records of both Mink and Otter but it is unclear the extent to which either species utilise the area. An important factor is the presence of a heronry on the site, one of the largest in the south of the county; this could present a potential predation pressure on any introduced population, although the reed bed offers excellent refuge habitat.

With current changes to the ownership of Warwick Castle Park it is unclear of the ongoing suitability of the site.

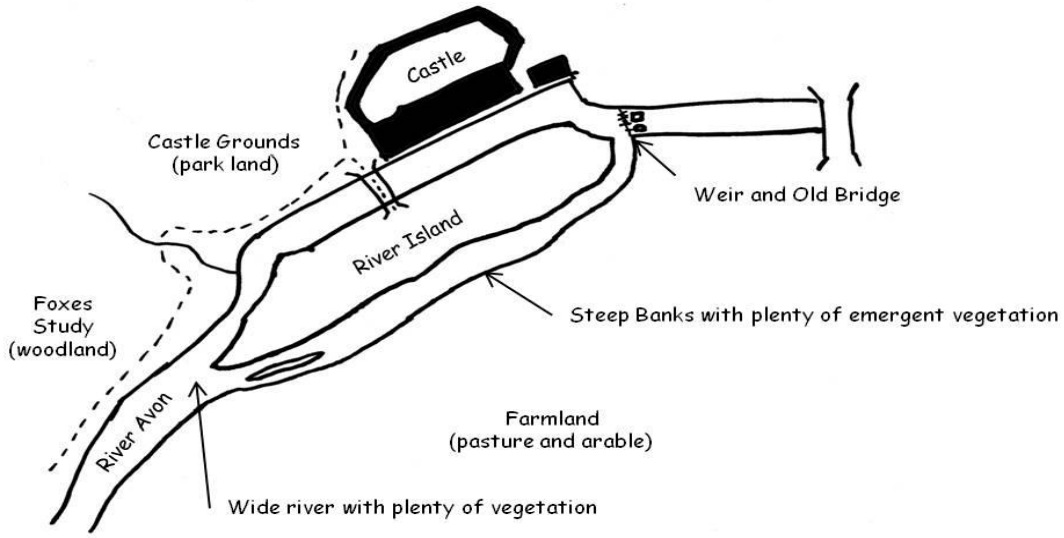


WARWICK CASTLE

Warwick Castle is a world famous visitor attraction with substantial riverside grounds. There is abundant aquatic vegetation throughout the site and despite the large numbers of visitors has several areas of quiet seclusion.

Importantly the site has steep sandy banks on the river island that already provide nesting burrows for Kingfishers.

This site offers the bonus of possibly encouraging outside investment from the Castle itself who may like to associate themselves with a programme of re-introduction and make it a feature of the castle.

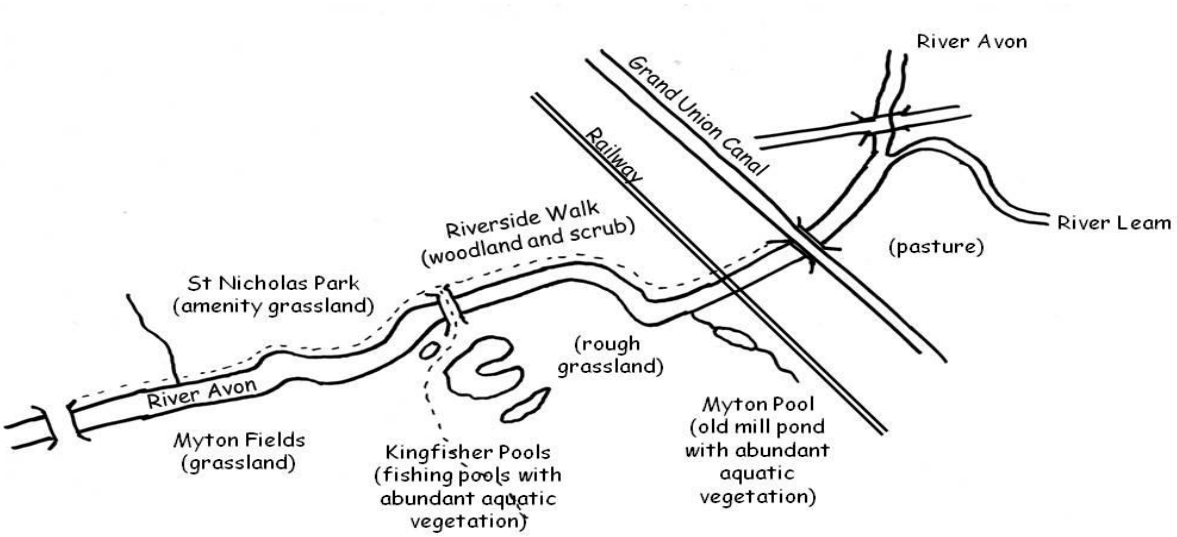


St Nicholas Park and Kingfisher Pools

The river at St Nicholas Park is very busy with visitors and boats and offers less suitable riverine habitat for voles structural but does ensure that predation risk from Mink is at a minimum.

Good habitat can be found at Kingfisher Pools. This small collection of fishing lakes and pools were built in 1996 for use by children and the disabled. The smaller pools offer abundant aquatic vegetation whilst the main lake has patches of thick emergent vegetation. Species present on the site include *Juncus inflexus*, *Juncus effusus*, *Glyceria maxima*, Greater Spearwort, Brooklime, Marsh Marigold and Purple Loosestrife.

Further up river from the park is Myton Pool. This old mill pond is designated as Eco-Site 93/26 and contains Rigid Hornwort, Water Cress, Gypsywort, Water Figwort and Lesser Water Parsnip.



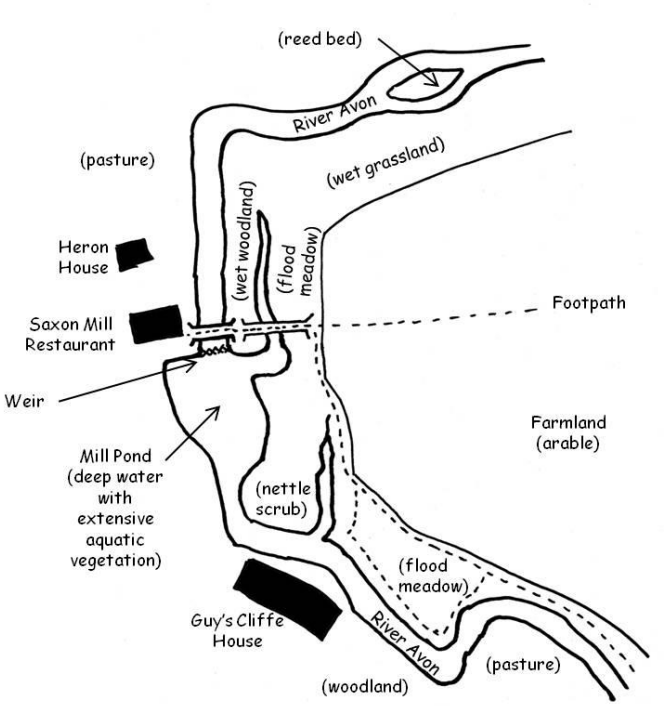
SAXON MILL AND GUYS CLIFFE

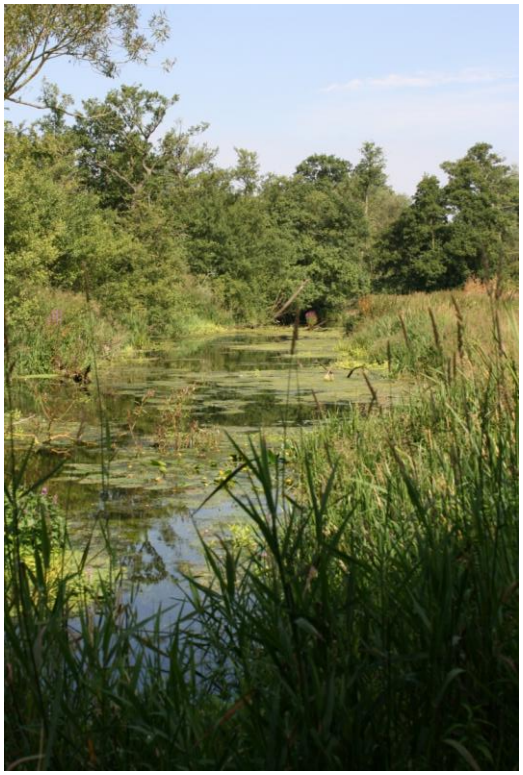
The site is listed locally as Eco-site 21/26 and contains a geological SSSI.

The river at Guy's Cliffe and the Saxon Mill is one of the best sites for Water Vole reintroduction. The River is wide by the mill where a large mill pond contains lots of aquatic vegetation. The two backwaters are likewise well vegetated with Yellow Water Lily, *Schoenplectus* and *Typha latifolia.*

Along this stretch on the western bank is woodland with steep slopes and banks for burrows whilst on the eastern bank there are flood meadows and wet woodland with plenty of food plants and refuge habitat.

The site does have a number of predators including Fox, and Mink, although mink numbers are believed to be declining, possibly as a result of increased Otter activity in this area

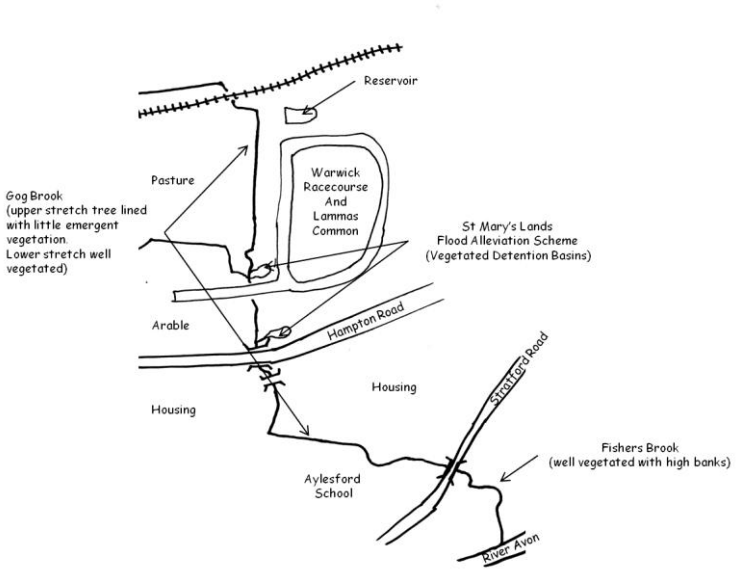




GOG AND FISHERS BROOK

Gog Brook and Fishers Brook are a single tributary to the River Avon joining the river south of New Waters. Fishers Brooks is the lower stretch of the watercourse and contains the best habitat.

Gog Brook is longer and shallower running from the Grand Union Canal along the length of the Racecourse. Much of its length lacks sufficient aquatic vegetation to support Water Voles.



1.4 Reintroduction

There are currently two major Water Vole Projects in operation in Warwickshire region, one on the Sowe and the other on the Stour. The Coventry Water Vole Project is run by the Warwickshire Wildlife Trust and focuses on projects on the Sowe at Edgefield Road, Lake View Park, Guphill Brook and Longford Park. The Stour River Project is focused on the river between Halford and Stourton.

It is proposed that the Warwick Avon become a third project in the county following IUCN guidelines on reintroductions and detailed advice provided in Strachan and Moorhouse's Water Vole Conservation Handbook (2006).

Any reintroduction programme will by necessity need to include some measure of Mink identification and control. Mink are the Water Voles major predator and are highly mobile. Any such programme of Mink control which would require assessment and then live trapping with despatching by shooting and fully endorsed by the UK Water Vole Steering Group.

1.5 Funding and Incentives

As with all projects success is linked to funds available for such work. Any work would need to be funded by contributions from conservation organisations, fundraising and application to funding streams such as the Lottery Fund.

In terms of incentives for landowners involved many of the habitat management plans required for maintaining suitable habitat for Water Voles are present in Entry Level and Higher Level Stewardship schemes, meaning that they could gain extra points for support of the scheme and thereby maximise payments received.

1.6 Suggestions

Having analysed in a very broad way the suitability for a reintroduction to the Warwick Avon it is possible to put forward 3 suitable sites where a programme could be successful. These three sites should be treated a single proposal. Figure 4 shows the nearest neighbour distances between the three sites and illustrates that whilst these locations would create 3 separate populations the distances allow for interchange between themselves. This allows for natural recolonisation between locations. The wider areas of suitable habitat provides potential for natural expansion whilst maintaining a core population to provide support during times of population contraction.

Suggested Sites

Site 1: Saxon Mill and Guy's Cliffe
Site 2: Warwick Castle
Site 3: Warwick Castle Park and New Waters

Figure 4. Nearest Neighbour Matrix

	Warwick Castle	New Waters	Saxon Mill	Kingfisher Pool
Warwick Castle				
New Waters	0.74 km			
Saxon Mill	3.00 km	4.50 km		
Kingfisher Pools	0.90 km	3.00 km	1.99 km	
Myton Pool	2.59 km	3.23 km	1.51 km	0.63 km

The advised stocking rate is 100 individuals per 1.5-2km in the breeding season (Strachan and Moorhouse, 2006) although in areas prone to flooding which include Warwick Castle and Saxon Mill the stocking density should be reduced to 30-60 individuals per 2km. Therefore suggested stocking for the three sites would be:

Saxon Mill and Guy's Cliffe: 70 – 100 individuals

Warwick Castle: 58 -74 individuals

Warwick Castle Park and New Waters: 100 individuals (Capacity of 177 – 350)

PROPOSED TIMELINE

Year 1-2: Create partnerships. Survey proposed sites to create an inventory of vegetation and predators including the presence of Mink. Secure funding and management agreements.

Year 2-3: Mink Control Programme – Live Trapping between February and April

Year 3-4: Staggered Water Vole acclimatisation and release

Year 5-6: Resurvey and Population Counts.

REFERENCES

Front cover line drawing by Lyndy Bew

BRIGHT, P. & CARTER, S. 2000 Refuges and national key sites for Water Voles. *English Nature Research Report No. 386.*

HARRIS, S. & YALDEN, D. ed. 2008 *Mammals of the British Isles: Handbook*. 4th Edition. The Mammal Society.

MACLEAN, N. ed. 2010 *The state of wildlife in Britain and Ireland.* Cambridge University Press

MOORHOUSE, T. 2004 Factors affecting the success of reintroduction as a species conservation tool for the Water Vole (Arvicola terrestris). *Research and Development Report Wt040/TR.* Wildlife Conservation Research Unit and Environment Agency.

STRACHAN, R. & MOORHOUSE, T. 2006 *Water Conservation Handbook* 2nd Edition. Wildlife Conservation Research Unit.

APPENDIX

	Structural Plants	Generic Food	Winter Food	Breeding Food		Saxon Mill Carr and Guys Cliffe	Warwick Castle	New Waters	Kingfisher Pools and the Avon	Gog and Fishers Brook
Reeds										
Phalaris arunidnacea	√									
Phragmites australis	√	√				√				
Glyceria maxima	√					√		√	√	√
Grasses										
Poa sp.	√	√				√	√	√	√	√
Dactylis glomerata	√	√				√				
Glyceria fluitans	√	√								
Glyceria notans	√	√								
Arrhenatherum elatius	√	√							√	
Deschampsia caespitosa	√	√								
Anthoxanthum odoratum	√	√				√				
Holcus lanatus	√	√				√				
Holcus mollis	√	√								
Agrostis stolonifera	√	√								
Phleum pratense	√	√								
Alopecurus geniculatus	√	√				√				
Alopecurus pratensis	√	√								
Molinia caerulea	√	√								
Rushes										
Juncus inflexus	√	√							√	√
Juncus effuses	√	√				√			√	√
Juncus conglomerates	√	√								√
Juncus acutiflorus	√	√							√	√
Juncus articulatus	√	√								√
Sedges										
Carex paniculata	√	√								
Carex otrubae	√	√								
Carex hirta	√	√								
Carex rostrata	√	√								
Carex vesicaria	√	√								
Carex pendula	√	√								√
Carex nigra	√	√								

Carex acutiformis	√	√					√		
Carex riperia	√	√					√		
Water Plants										
Sparganium erectum		√							√
Sparganium emersum		√							
Sagittaria sagittifolia		√							
Alisma plantago-aquatica		√						√	
Butomus umbellatus		√							
Potamogetum natans		√							
Ceratophyllum demersum		√						√	
Myriophyllum spicatum		√							
Iris pseudocorus		√			√	√	√	√	√
Menyanthes trifoliate		√							
Nymphoides peltata		√							
Nuphar lutea		√			√	√	√	√	
Nymphaea alba		√							
Schoenoplectus lacustris		√			√				
Ranunculus peltatus		√		√					
Ranunculus aquatilis		√		√					
Ranunculus pencillatus		√		√					
Ranunculus fluitans		√		√					
Oenanthe aquatic		√							
Nasturtium officinale		√						√	√
Wetland and Marginal's										
Polygonum amphibium		√			√				
Caltha palustris		√			√				
Ranunculus scleratus		√			√		√		
Ranunculus flammula		√							
Ranunculus lingua		√							
Cardamine pratensis		√			√			√	
Filipendula ulmaria	√	√	√		√			√	
Geum rivale		√							
Potentilla palustris		√							
Lythrum salicaria	√	√			√		√		
Apium nodiflorum		√							
Angelica sylvestris		√			√		√		√
Galium palustre		√					√		
Myosotis scorpoides		√			√		√		√
Mentha aquatic		√			√				
Veronica beccabunga		√							
Valeriana officinalis		√							
Sonchus palustris		√							
Scrophularia auriculata		√			√			√	
Lycopus europaeus		√						√	
Bankside Plants										
Alliaria petiolata		√			√				
Chamerion angustifolium	√	√							
Epilobium hirsutum	√	√			√			√	
Anthriscus sylvestris		√			√		√	√	√
Myrrhis odorata		√							

Aegopodium podagraria		√							
Symphytum officinale		√			√	√		√	
Eupatorium cannibinum		√							
Taraxacum officinale		√		√					
Urtica sp.	√	√			√				
Woody Shrubs and Trees									
Salix fragilis	√	√	√	√	√		√		√
Salix alba	√	√	√	√			√		√
Salix purpurea	√	√	√	√			√		√
Salix pentandra	√	√	√	√					
Salix viminalis	√	√	√	√					
Salix caprea	√	√	√	√					
Salix cinerea	√	√	√	√			√		√
Populus tremula	√								
Populus nigra	√				√				
Alnus glutinosa	√	√			√		√		√
Corylus avellana	√	√							
Acer campestre	√				√		√		
Sorbus aucuparia	√	√							
Cretaegus monogyna	√	√	√		√				
Malus sylvestris	√								
Prunus padus	√				√				
Rhamnus carthartica	√								
Sambucus nigra	√	√	√		√		√		
Other Foods									
Molluscs				√	√	√	√		
Crayfish				√			√		√
Insects				√	√	√	√	√	√

Contact Details:

Mark C. Smith

2 Beaufell Close, Woodloes Park, Warwick, CV34 5UG. mark.smith36@ntlworld.com