NEW FOREST WATER NEWS

NEW FOREST CATCHMENT PARTNERSHIP NEWSLETTER

The New Forest Catchment Partnership is coordinated by the New Forest National Park Authority and Freshwater Habitats Trust who are working alongside other organisations and communities to protect and improve the special freshwater habitats of the New Forest. This newsletter showcases the work of those who are committed to improving the freshwater environment of the New Forest

Mar 19 Issue: 7

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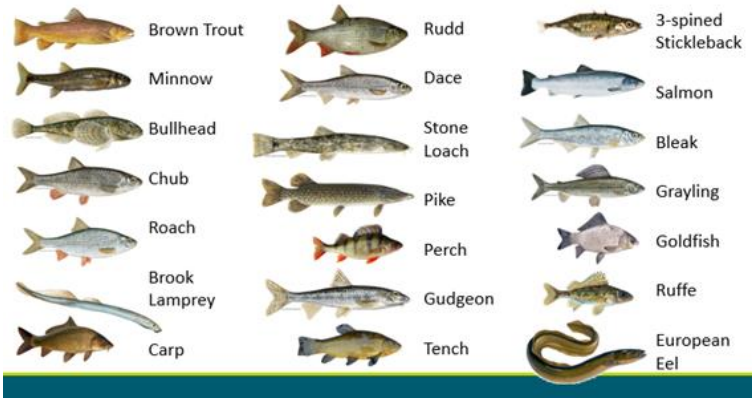
NEW FOREST FISH SURVEYS USING EDNA

The New Forest is exceptionally important for its freshwater wildlife. Many ponds, lakes, and headwater streams are in better condition than is usual for lowland Britain because a large part of the surrounding land is made up of uncultivated habitats which have been managed traditionally for 100s of years. We know this because of the number and rarity of freshwater species found in the New Forest.

However, there are issues and threats, which mean that currently none of the Water Framework Directive monitored waterbodies are classified as having High ecological status, and many important smaller bodies of water are only partly monitored, or not monitored at all. Without this monitoring, it becomes difficult to assess the outcome of management actions designed to restore, manage and protect habitats and species; and biologists are worried that some of the special features of the New Forest's freshwaters could be in decline.

This is a real concern because elsewhere in Britain Freshwater Habitats Trust's long-term monitoring has shown that waterbodies, even in the most protected landscapes (SSSIs, NNRs), have declined in quality, and lost protected freshwater species. It has also become clear that a major stumbling block to protecting freshwater biodiversity is the lack of regular monitoring data for both species and habitats, especially for smaller waters (ponds, streams, ditches). This means that declines are detected only after they have passed the point of no return.

The question is, how do we gather credible evidence, over a large number of sites, to cover ecologically meaningful taxonomic groups? Although citizen-science is a potential solution to providing more data, engaging people with freshwater biodiversity is difficult because of the 'taxonomy gap': many freshwater species are difficult to survey and hard to identify, and collecting technically credible data requires years of training and practice.



Twenty one freshwater fish species have been recorded from New Forest streams and ponds.

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NEW FOREST FISH SURVEY USING EDNA

Environmental DNA

Environmental DNA (eDNA) could transform this problem. In this approach DNA, which all freshwater species release into the water, is detected in easily-collected water samples. Over the last 5 years, working with Defra and Natural England, Freshwater Habitats Trust has established the world's first national, volunteer-based, eDNA monitoring programme for a protected species, the Great crested newt. The data now provides the basis of the UK's reporting on this species to the EU.

Now Freshwater Habitats Trust is working with NatureMetrics, an eDNA specialist laboratory, to test and apply this revolutionary method to a wide range of lesser-known and difficult-to-survey species, and across the full range of freshwater habitats. This means that, now, anybody who can collect a water sample can potentially provide taxonomically reliable data about freshwater animals and plants.

An eDNA approach to monitoring freshwater fish

We will begin the development of this approach in the New Forest, focussing on recording fish species using eDNA. Following discussion with the Environment Agency and Forestry Commission we have compiled a list of 21 sites where:

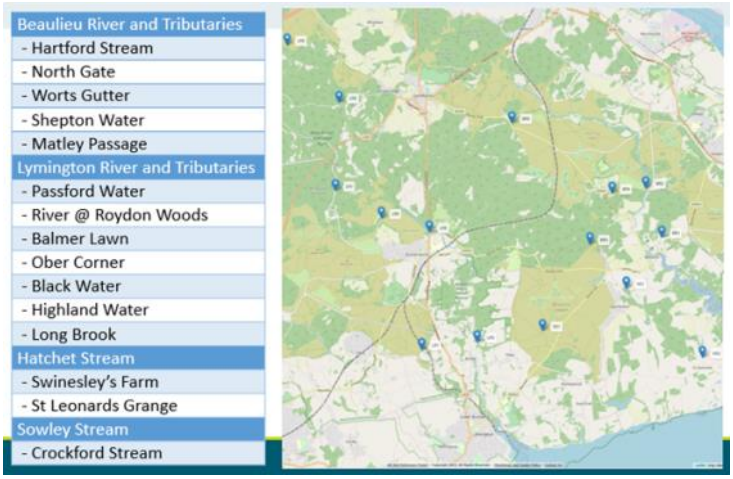
(a) We can compare eDNA techniques with traditional surveys (electrofishing or netting)

(b) Additional information on fish communities could be useful outside of the formal monitored network (e.g. headwater streams).

Surveys using eDNA were completed on Hatchet Pond and Hatchet Little Pond on Saturday 26th January 2019. We then collected the remaining 15 samples, from the Beaulieu River, Lymington River, Crockford Stream and Hatchet Stream, with a group of volunteers on Wednesday 13th February 2019 and Saturday 16th February.

We've sent the samples off to be analysed and will be able bring you the results in the next newsletter.

Volunteers collect eDNA samples from Ober Corner



New Forest streams eDNA sample locations

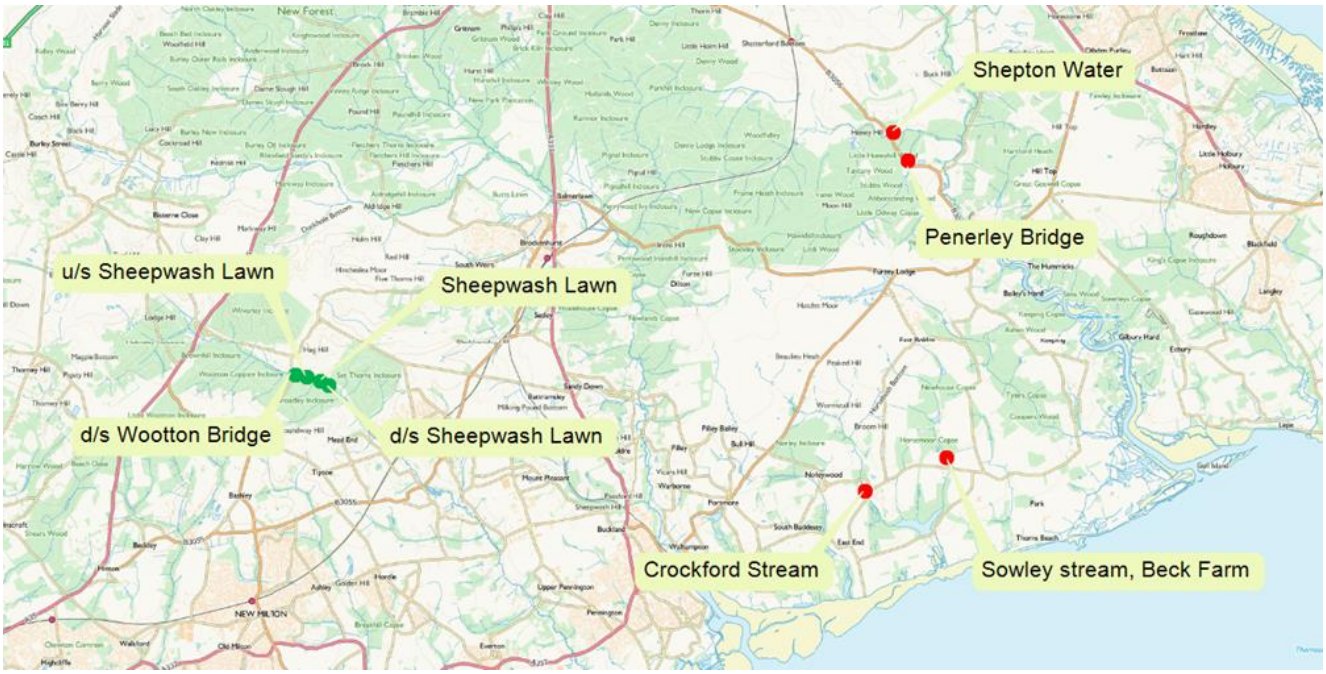
Hatchet Pond and eDNA sample locations

By Dr Naomi Ewald, Director of Policy and Research, Freshwater Habitats Trust

Environment Agency New Forest Fish Population Survey 2018

We carried out four fish population surveys in the New Forest in 2018, these were all Water Framework Directive surveys. In addition, a fish relocation on the Avon Water also took place.

The map below shows the locations of the sites surveyed in 2018. The Water Framework Directive surveys are shown in red and the fish relocations in green. those venues.



Locations of sites where surveys were completed, New Forest, 2018

Water Framework Directive surveys

Water Framework Directive (WFD) surveys are carried out once every six years in order to assess the fish population and determine the ecological status of a waterbody.

The dry river bed at Penerley Bridge

Beck Farm on the Sowley Stream

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Environment Agency New Forest Fish Population Surveys 2018

Figure 1 shows the actual density of fish caught at each survey site. A zero catch was recorded at Penerley Bridge as this ephemeral stretch of the Beaulieu River was dry.

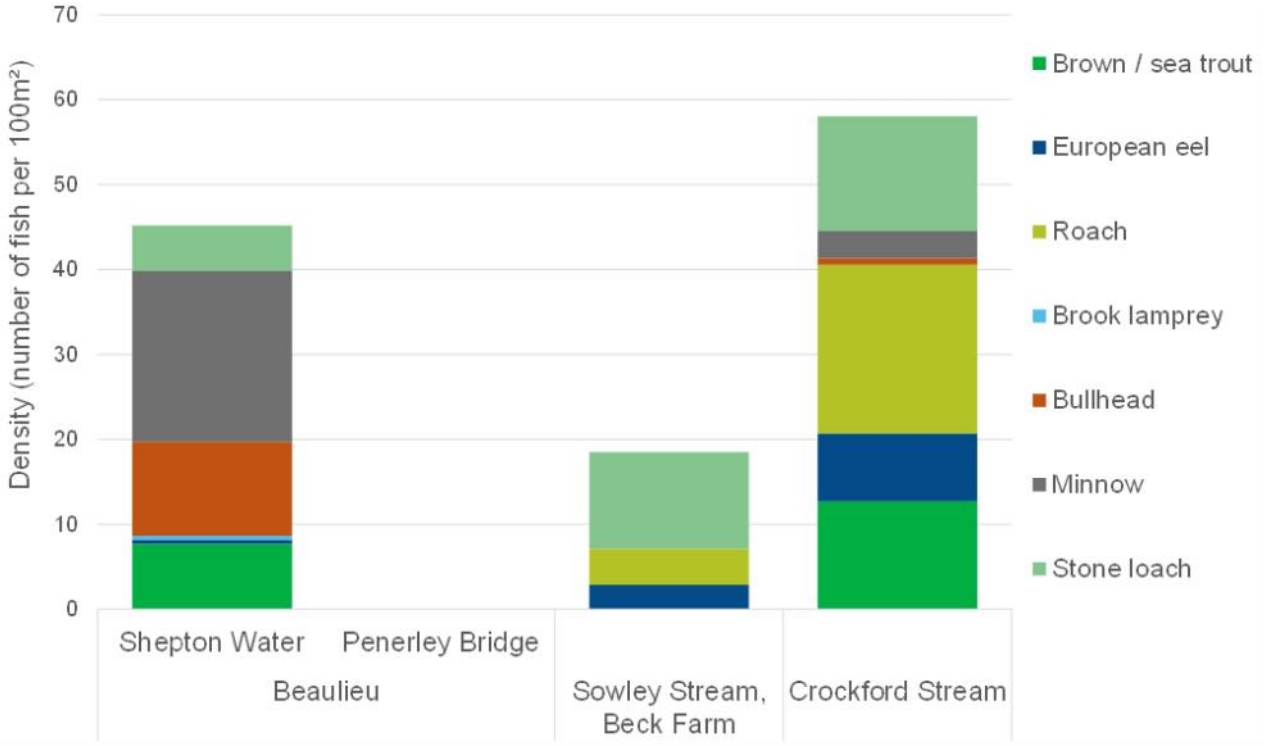


Figure 1: Fish population densities (actual number of fish per 100m²), WFD sites, 2018

An eel from Crockford Stream

A brown trout from Shepton Water

Avon Water fish relocation

Fish were relocated from 800 metres of the Avon Water, downstream of Wootton Bridge, in order to allow river restoration works to be undertaken for the Wootton Riverine Restoration project. The project, run by the Forestry Commission on behalf of the New Forest Higher Level Stewardship Scheme, aims to reinstate meanders to the artificially straightened reach.

The work will slow the flow of water, allowing the wetland habitats to absorb rainfall and helping to prevent flash floods that can pose a risk to properties downstream. By restoring the natural watercourses the project is helping to ensure the Avon Water and the surrounding habitats are more resilient in both winter floods and summer droughts.

The number and range of fish species that were relocated is shown in Figure 2.

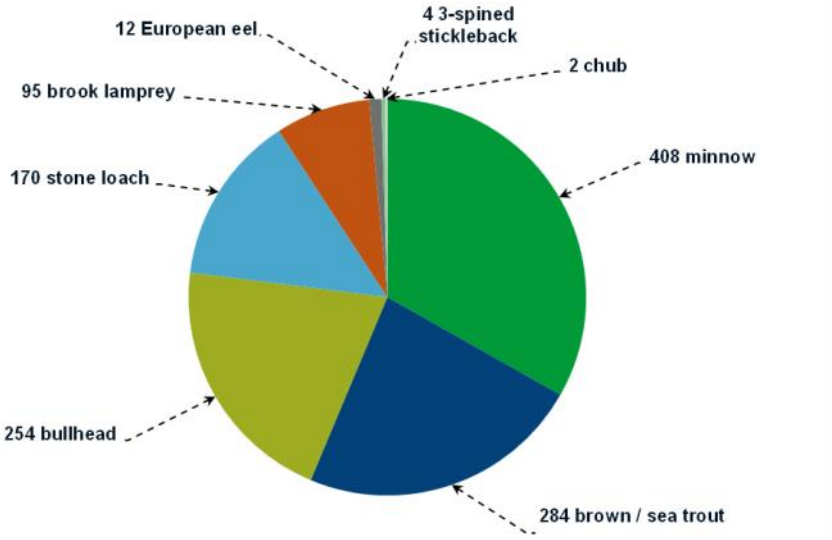


Figure 2: Total number of fish relocated from the Avon Water, 2018

Figure 3 is a length-frequency histogram, depicting the age structure of the brown trout population in 5mm length categories.

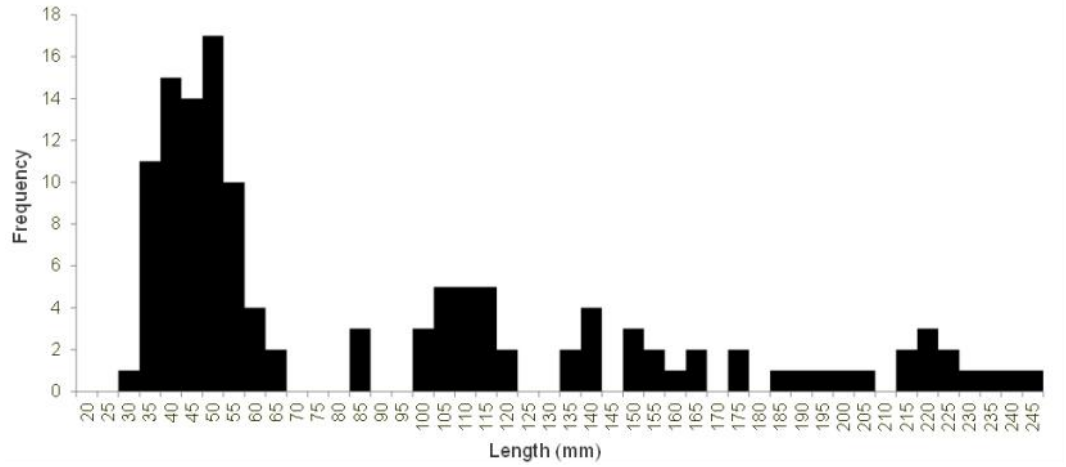


Figure 3: Length-frequency histogram, brown trout, Avon Water (N=129 of 284)

Discussion — Water Framework Directive surveys:

Fish populations varied across the 4 WFD sites in the New Forest. Crockford Stream and Sowley Stream were the most species rich and poor, respectively, with corresponding high and low population densities (Fig. 1).

The long hot and dry summer caused ephemeral streams in the New Forest to dry completely and Penerley Bridge was no exception. Here, the number of trout correlates with the minimum summer flow, as with very low flows, the habitat available is reduced to a series of pools. This data will be used to classify the relevant waterbodies under the WFD as Bad, Poor, Moderate, Good or High for fish and the results can be used to form the basis for any necessary improvement projects.

Discussion — Fish relocations:

In total, 1,229 fish, comprising 8 species, including brown trout, chub and critically endangered European eel, were caught and relocated (Fig. 2). Brown trout dominated the catch and although the majority of these fish were young-of-the-year a number of age classes were present (Fig. 3).

The fish were relocated 5km downstream at Gordleton Mill in a section of river which previously suffered a fish kill due to pollution.

Collecting fish data whilst performing fish relocations prior to restoration works is beneficial in order to record information from locations not previously visited and to allow for comparisons to be made once the habitat improvements have been completed.

By Georgina Busst, Environment Agency Environment and Monitoring Officer (Analysis & Reporting)

SPECIES PROFILE: NEW FOREST SEA TROUT

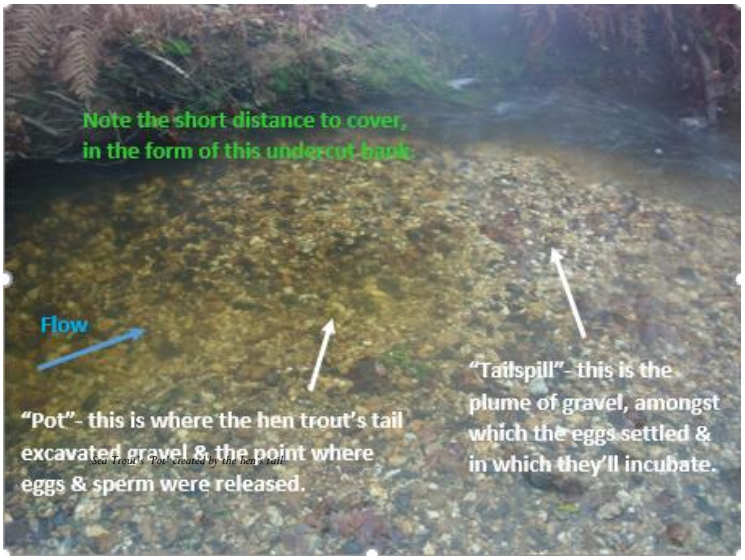
The video clip below shows two sea trout (*Salmo trutta*), each weighing approximately 3lb and observed spawning on a stream in the New Forest. These fish are essentially brown trout however a combination of genetics and a lack of food availability result in some fish, mostly females or hens, heading to sea where they forage on a protein rich diet quickly increasing in size which ultimately results in more eggs being produced by the fish at spawning time. This behaviour reveals a fascinating link between the Forest streams and the marine environment.

Sea Trout Spawning Video Clip

Sea trout are known to spawn throughout the New Forest. The fish in the clip would have entered the river system, from the Solent, in late spring making the journey upstream to spawn in December. The journey up river is broken down into segments and is often triggered by elevated flows associated with rainfall events. As river flows reduce adult sea trout require specific habitat types that they uses for cover until the next rainfall arrives. These areas are called lies and include deep pools, overhanging terrestrial vegetation, tree roots and undercut river banks.

The hen fish in the film clip can be seen turning on her side, she does this to release eggs and excavate clean gravel in which to lay them. The excavation is called a redd and consists of a mound of gravel behind a hollow in the riverbed. The eggs have a sticky coating which adheres to the gravel mound of the redd. The cock fish then fertilises the eggs by releasing milt. He can be seen doing this in the video by gently vibrating his body. The fertilised eggs are then covered with a layer of clean gravel by the hen fish for protection. This spawning behaviour is repeated and can last for hours with huge volumes of gravel often being moved by larger fish. Hens will lay c. 900 eggs per pound of body weight. These small eggs, which measure between 2 – 5mm, will remain within the redd for approximately 15 weeks; although hatching time is dependent on a number of parameters such as temperature and oxygen levels . Survival within the redd can be low with up to 85% of eggs lost before they hatch. The developing eggs depend on deep, silt free gravels, ranging in size between 16 and 64mm , with a good supply of cold, clean, oxygen rich water for survival.

Once the tiny fish, which are called alevins, hatch they remain within the gravel voids living off of their yolk sack until they finally emerge as fry. The fry grow into parr which have distinct bar colouration running vertically down their flanks. Both trout fry and parr are territorial and soon set about claiming their patch of riverbed. Trout parr require cool clean shallow water that is not too fast flowing with an abundance of weed, larger cobbles and marginal cover. The shade provided by wooded sections of river in the New Forest are essential during the long hot months of summer as temperatures outside of these areas can soon rise reaching the upper lethal limit for a trout which is approximately 270C!



Between the age of 1 and 3 years those juvenile trout that exhibit sea trout traits undergo yet another physiological process prior to making the journey to sea as sea trout. This change is called smoltification and gives brown trout the ability to cope with the extremes of a saltwater environment. The brown trout lose their camouflage colouration, turn silver and alter their swimming behaviour to face downstream and swim with the flow of water in readiness for the journey to sea. These small silver trout are called smolts, they shoal up between mid-March and May and often migrate at night. This shoaling behaviour, change in colour and night time migration is thought to be part of a predator avoidance strategy evolved to ensure as many fish as possible survive this annual downstream migration.

In the New Forest naturally functioning river systems are vital to ensuring the ongoing success of this enigmatic species. The adults require cool temperatures, the sanctuary provided by deep pools and other natural features such as undercut riverbanks during their journey upstream. Natural features such as woody debris dams are no obstacle for these athletic fish. They can leap and have fast burst speed capabilities that assist them when overcoming many natural obstructions and are quite capable of squeezing through seemingly impossible gaps.

Some rivers in the New Forest exhibit evidence of past anthropogenic influences having been straightened for drainage. Although brown trout and many other species still utilise these watercourses many of the features associated with more sinuous natural systems are absent. Ultimately this equates to an overall net loss of linear river length and habitat potential. The energy within a straightened channel is directed towards the bed which results in a river that erodes downwards. Although straightened river channels are very efficient for land drainage purposes they can result in un-natural water velocities and downstream flooding events that destroy redds and "washout" juvenile life stages of fish. The work currently being undertaken by the Forestry Commission and other stake holders to reverse these changes will eventually return the New Forest catchment to a more naturally functioning and resilient state. This work not only benefits the aquatic environment, the frequent wetting of terrestrial habitats help reconnect the river with the floodplain and restore SSSI habitats to a more favourable condition. Increased natural flood storage reduces the risks of downstream flooding and sinuous river channels also slow water velocities resulting in the retention of areas of deep alluvial material so important for the New Forest sea trout .

These fantastic fish have been using these habitats since before the last ice age through times of great change. With sympathetic restoration of the New Forest streams we can secure their future as well as protect people from flooding .

A medium sized sea trout on a redd on the Highland Water – the photo is a little dark, as it was taken through the lens of Polaroid sunglasses; essential for fish or redd spotting.

By Paul Newman, Environment Agency, Fisheries, Biodiversity and Geomorphology Technical Officer

PURE ATTRACTION – WATER SUPPLY AT BEAULIEU

The importance to freshwater wildlife of a pure unpolluted water supply has been highlighted by surveys undertaken across the New Forest by Freshwater Habitats Trust. The high quality of freshwater habitats in the Forest being reflected by the wide range of rare species to be found within them. In the not too distant past, before the advent of water treatment works and piped supplies, access to a clean reliable water supply was also of prime importance to people.

The geological make-up of the Hampshire Basin in which the New Forest lays is such that reliable water supplies are not hard to come by, particularly from springs issuing from water held up by impermeable clays which are found intermixed with sands and gravels across the Forest. Such springs would likely have attracted human attention during the prehistoric period. The Mesolithic (Middle Stone Age) site at discovered Boarmans (north east of Palace House, Beaulieu) in the 1930s, sits upon a ridge between two spring-fed streams and this may have been an important factor in the positioning of the site. Certainly in later periods there is much evidence to show how important reliable springs were to prehistoric people who would often deposit valuable objects in such locations. Throwing coins into a wishing well may even be a practice derived from such prehistoric reverence.

When the Beaulieu area was chosen as a site for a Cistercian Abbey in 1204, the boundary of the land then granted was carefully laid out to include the springs which fed the Syreburn (Shireburn) one of the two streams which flow down to Palace House. At these springs a conduit-head was constructed to collect the water which was then piped down to the Abbey where it was fed into a tank before being piped to required locations about the Abbey offices. One of which was a large shallow sink (still surviving) where the monks could wash their hands before entering the refectory for their daily meals. The conduit-head is now known as the Monks Well and was constructed in the late 13th century. To convey the water from the Monks Well to the Abbey pipes of lead and also bored elm trunks were used. Presumably this supply continued in use during the time the Abbey continued to operate as such, but it had been long out of use by the early 19th century.

The monks also built a waste water system which took water from the combined Hartford Heath Stream and Shireburn as it passed the Abbey. This was used to flush out the waste water, carrying it through substantially built sewers to discharge into the Beaulieu River.

Away from the Abbey precinct the grange farms presumably relied on a mixture of springs and wells depending on availability. Certainly the Forest edge encroachments set out in the 18th century relied largely on wells dug down to a water table held up upon the Headon clays, which having passed through the overlying plateau gravels was reliably clean.

Painting of the Monks Well by Walter Tyndale an English watercolour painter (1855-1943)

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PURE ATTRACTION — WATER SUPPLY AT BEAULIEU

Down in the village of Beaulieu the density of settlement and the low lying site appears to have caused problems in terms of water supply, perhaps being contaminated by brackish water. In 1823, Walter Scott, writing to Lord Montagu, recalled an earlier visit to Beaulieu, stated that he had 'seen it from the water and admired it very much but I remember being told an evil genius haunted it in the Shape of a Low Fever to which the inhabitants were said to be subject.' This fever perhaps provided the impetus to restore the Monks Well water supply, and this was done in 1834 with the addition of a small reservoir; the water being supplied to the village and area around Palace House. Over time, demand increased so that in the 1880s a larger reservoir was built to replace the 1834 original and a new 4-inch cast iron main laid to transport the water.

Maintaining the water supply incurred some not inconsiderable expense so that by 1920 a new water rate was proposed. This was not well received by some of the water's recipients. In particular, Mr Gwynne-Hall of The Rookery insisted loudly that "god had given the water". Though Lord Montagu agreed, "he felt strongly that as there were many further steps that his forbears had taken" in the process. A number of droughts around this time stretched the supply to its limits and as such in 1934 a new supply was sought after and found just inside the grounds of Hartford House, from which the water was piped down to meet the main Monks Well supply in the Park north-east of the Abbey.

1880s reservoir with a rustic access point

This research is all part of the Living Waters Project, coordinated by the New Forest Catchment Partnership, and seeks to increase our knowledge of the water heritage and freshwater wildlife of the Beaulieu River catchment . To find out more click here

The water although very pure was also of an acidic nature, so much so that the concrete rendering within the reservoirs was constantly failing and when the Montagu Arms was rebuilt John, Lord Montagu insisted on having lead tin or copper tin lined pipes. Despite this obvious knowledge of what the water could do to unlined pipes both he and his father, Henry, Lord Montagu, considered the water sacrosanct, to the extent that the former would 'have his drinking water sent up [presumably to London] from the Monkswell every day by train.'

Elsewhere on the estate some people decided to invest in hydraulic rams to supply their properties, these would use a piped flow from a dammed stream to pump water up to reservoir at the house. Usually the water pumped was that which powered the pump and was obtained directly from the stream, though more advanced systems could be used to take water from another nearby purer source, such as a spring. The well-watered nature of the estate lead to plans being discussed as to supplying all the outlying properties on the estate with hydraulic rams, however, before such plans could be brought to fruition modern times intervened. In 1953, the West Hampshire Water Company (est. 1893) approached the estate. Their water supply was derived from the River Avon and therefore somewhat less acidic. At first the Company's supply did not replace the Monks Well supply, but once pipes had been laid through to Beaulieu it was not long before the company discovered 'problems' with the old supply. So, in 1964, work began on providing a replacement, and a water tower was erected in Newlands Copse. Finally in 1968, the Company took over complete supply of water to the Beaulieu Estate.

By Richard Reeves

PARTNER REPRESENTATIVE PROFILE: IAN BARKER—ECOLOGIST, NEW FOREST NATIONAL PARK AUTHORITY

Little did I know when I undertook a term studying freshwater ecology at college that I would one day be writing about it in a water based newsletter and working with the conservation charity Freshwater Habitats Trust whose founders helped deliver the course content. At that time Pond Conservation as it was then known was an embryonic organisation which then grew into the successful Freshwater Habitats Trust that we know today as co-host in the Catchment Partnership.

I currently work as an ecologist within the Wildlife and Conservation Team of the New Forest National Park Authority and I am the Authority's lead in co-hosting the New Forest Catchment Partnership. I've known the New Forest for almost 30 years and took up the role of ecologist at the Authority soon after it starting fully operating in 2006. Although I'd been working locally for a number of years, I originally come from Cambridgeshire where my interest in the natural environment began in my youth with visits to reserves such as Wicken Fen, Hayley Wood and the North Norfolk coast. Since then I've been fortunate to work in a range of conservation roles with the Wildlife Trusts, local Councils, ADAS and the Countryside Commission, however working in the New Forest area is something really special for me.

My position at the New Forest National Park Authority has encompassed a range roles over the years from assessing planning applications and producing strategic biodiversity plans, to practical conservation work and species survey work. The New Forest is such an amazing and intriguing place, it's so varied and there's always something new to learn. It's also great to be able to work with such a range of local experts who bring with them knowledge and insight into the area. That is particularly true of the Catchment Partnership, and I've found that working for the National Park Authority as a co-host has been particularly rewarding.

It was thanks to the enthusiasm of experts such as the Freshwater Habitats Trust and local people that we were able to make a successful bid to the government to become one of only twelve pilot areas to trial the Catchment Based Approach and develop a Catchment Partnership. Our feedback and local expertise has helped shape national best practice and garner government support for the approach.

From a personal perspective though, what I enjoy most is that we have been able to translate the vision of local people and their passion for conserving the Forest's environment into effective action on the ground. Thanks to everyone who has helped support the work of the Partnership over the years in order to achieve this, let's hope it can continue for years to come!

VOLUNTEER OPPORTUNITIES

Our Past, Our Future (New Forest National Park Authority)

Volunteer for a variety of activities across the National Park, including wildlife surveys and practical conservation tasks.

W: Volunteer

E: richard.austin@newforestnpa.gov.uk

THE NEW FOREST CATCHMENT PARTNERSHIP

The partnership is a group of organisations that are working with local communities to protect and improve the outstanding freshwater environment of the New Forest.

W: freshwaterhabitats.org.uk/projects/catchment-projects

E: gstride@freshwaterhabitats.org.uk

Key partners include:

Beaulieu Estate

To subscribe click here

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