Barton Village Pool Fishery Post Incident Report **28th November 2024**

Introduction

The Environment Agency were invited by Jeanette Taylor, Parish Council Member to attend the site visit following reports of fish mortalities at Barton Village Pool, Off Efflinch Lane, Barton-under-Needwood, DE138EU. National Grid Reference (NGR) SK 19106 18216. The purpose of this report is to highlight a programme of waterbody improvements and future management options, triggered by recent fish mortalities.

The attending Officer was Jody Hughes, West Midlands Fisheries Technical Team. Jeanette Taylor, Responsible Person for the fishery was also in attendance for the visits.

Barton Village Pool is a pleasure fishery located within a village centre. The Fishery provide free fishing to the local community and operates as a day ticket water for anglers travelling from outside of the village. The fishery is managed by Barton-under-Needwood Parish Council. It is thought that the waterbody contains an

assemblage of fish species including Common Carp *Cyprinus carpio*, Roach *Rutilus rutilus*, Tench *Tinca tinca*, Perch *Perca fluviatilis,* Rudd *Scardinius erythrophthalmus* and Common Bream *Abramis brama*.

Site details

The Fishery is circa 1.75 acres (0.70 ha) and would be classified as an 'On line Stillwater'. The fishery is registered with CEFAS (Ref EW054-I-946). There is no Environment Agency Site Permit in place. The depths within the waterbody range from 3ft to 6ft. The fishery does not operate a formal closed season, but the fishery does cease angling once fish are observed spawning and for a period of time following this. Angling pressure is thought to be low-moderate. The source water is from the adjacent Barton Brook. This is pumped into the fishery on the NW bank, there is an overflow on the NE bank returning water back to the Barton Brook. The location plan can be seen in *Figure 1* below.

Figure 1. Location plan.

Aims and objectives

The objective of the report is to highlight environmental and ecological enhancements of the fishery. The Environment Agency take a holistic approach to waterbody management and consideration is given to the use of the waterbody, surrounding land use, the surrounding topography of the waterbody as well as its localised ecology. The aim of the report is to provide the customer with a brief condition report and to highlight potential improvements for the waterbody in order to support a sustainable fish population. The ultimate aim is to maintain a balanced aquatic environment within the waterbody that ensures that the waterbody has

resilience to future climatic challenges and their associated impacts, without being detrimental to its primary function.

Fish mortalities

Barton Village Pool experienced chronic fish mortalities on between 24th September 2024 – 5th October 2024. The fish species impacted were primarily Common Carp *C. Carpio*, however the occasional dead Perch *P. fluviatilis* was observed. Mortalities primarily consisted of fish between 150-400mm. In total approximately 32 fish were lost. At no time were fish observed is distress or debilitated.

On the 8th October 2024 CEFAS placed an Initial Designation (ID) on the fishery, under suspicion of a notifiable disease.

On the 9th October 2024, the Environment Agency used seine net methodology to capture a sample of the fish population. Of the sample captured 1 Common Carp was provided to the Fish Health Inspectorate (FHI) who was also in attendance, for there diagnostics. The Environment Agency transported 4 Common Carp, 1 Common Bream and 1 Perch to the EA National Fish Laboratory (NFL) in Brampton for examination.

Water quality was analysed in situ and an algal sample was taken for laboratory analysis.

During this time the responsible person for the fishery employed recommended measures to reduce stress on the fish species such as cease angling.

The mortalities ceased in October. Laboratory analysis from the sample submitted indicated that there was not any evidence of disease with negative results obtained from virology testing, no evidence of bacterial pathogens and only occasional observations of parasite loadings during post-mortem examinations. Histology confirmed the lab observations with some variable hyperplasia (cell proliferation) within the gills, but these were not consistently bad. One fish had significant hyperplasia with lacunae formation (fusion of lamellae) and some evidence of epithelial lifting which can be indicative of water quality or algal blooms. However, these changes were not consistent with the gills of other fish being histologically normal. **As such, there were no clear and direct causes for the losses at this water, although the varied gill pathologies could be the result of historic algal bloom or water quality with recovery of fish health, or varied exposure within the population. As suggested in the initial report, environmental conditions continue to be the most likely cause for this mortality.**

Ageing analysis revealed recent slow growth in the carp, but good growth in all other species with no visible, long-term issues.

A water sample was taken from the source water and examined at the laboratory at Brampton. The lab reported 'Huge bloom of blue-green algae *Oscillatoria redekei,* significantly over the warning threshold also other blue-green *Oscillatoria sp*. and *Anabaena sp*. present at much lower abundance but overall abundance extremely high. The sample also contained diatoms predominantly the spiky form *Synedra sp*. at low abundance, unicellular motile green algae *Euglena sp*. and *Chlamydomonas sp.* at low abundance and multi-cellular green algae *Pediastrum sp*. and *Scenedesmus sp*. at very low abundance.'

On the 31st October 2024 CEFAS lifted the ID from the site.

Whilst the cause of the mortalities was not formally identified the underlying cause will likely be a combination of factors. By improving overall conditions for the fish population, this will provide resilience against future fish health issues arising. With a view to ensuring pro-active fisheries management *Notable Challenges* were identified and *Recommendations* for the fishery are documented below.

The most appropriate response to the recent mortalities is to ensure appropriate habitat and nutrition is available, combined with optimum water quality therefore limiting the overall stress on the fish population.

Notable Challenges

Detailed below are the challenges identified during the site visit. Remediation/ mitigation methods are discussed under the *Recommendations* heading.

Water Quality

During the site visit a sample of water was analysed for basic water quality parameters. Whilst in isolation chemical water quality results are not considered a challenge in this instance, however they are the foundations of a healthy fishery and should be monitored periodically, dependant on environmental factors. The results can be found in *Table 1*.

Table 1. Water quality results from Barton Village Pool on 24th September 24 at 13:45pm.

Parameter	Unit	Result
Dissolved oxygen (DO)	mg/l	8.78
Dissolved oxygen (DO)	% Saturation	90.5
Ammoniacal Nitrogen as NH_3-N	mg/l	0.03
Temperature (water)	°C	16.0
pH	pH	8.25

These results indicate Ammonia (NH_3-N) was recorded at 0.03mg/l. This value is below the concentration of 0.06mg/l when ammoniacal nitrogen will start to damage the gills of fish. Even at low concentrations ammonia is harmful to fish, it can lead to

poor growth, reduced hatching success and increased susceptibility to disease. The optimum concentration of ammonia would be between 0.00 mg/l and 0.06mg/l.

It is important to consider Ammonia concentrations alongside other parameters, especially pH, temperature, and dissolved oxygen and understand that these parameters can influence the toxicity of Ammonia, indicating these results are susceptible to fluctuation.

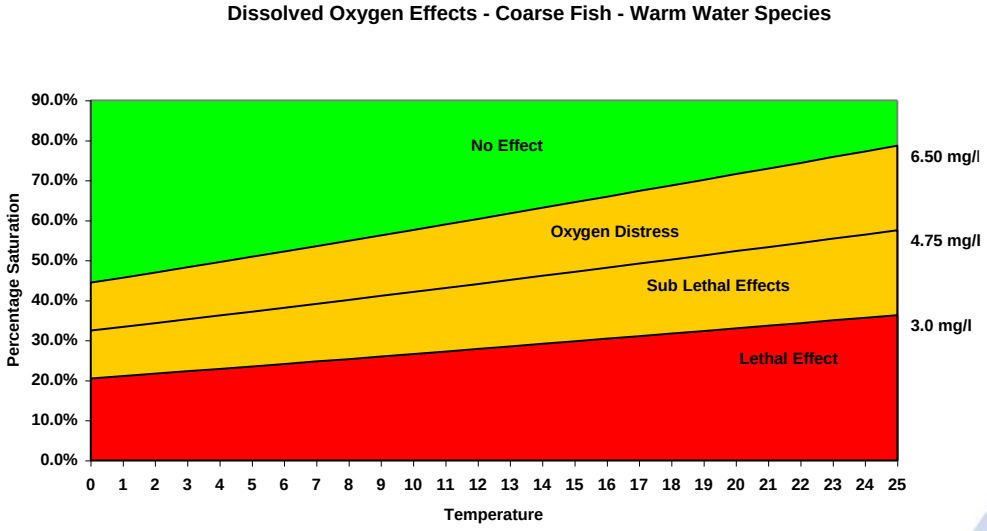
The pH within the waterbody was recorded at 8.25, this is within the optimal range is 6.5- 8.5. Waterbodies gradually become more acidic with time due to the build-up of organic materials, and this will lower the pH.

It is important to consider that pH fluctuates throughout the day due to respiration of aquatic organisms. pH can also be a reliable indicators of the abundance of algal cells present within the waterbody. Whilst issues can occur due to extreme levels of pH, either acid or basic, it is usually a sudden change in pH that can cause problems with fish species, such as point source pollution events, or the diurnal fluctuation that can occur when high numbers of algal cells are present.

The Dissolved Oxygen (DO) reading is considered optimum. Please note that a DO measurements (as with other parameters) are a snapshot in time and can fluctuate dependant on other factors such as, atmospheric pressure, temperature, photosynthesis, and the Biochemical Oxygen Demand (BOD) of the waterbody.

Graph 1 identifies the critical values of DO on a fishery

Graph 1. Dissolved oxygen.



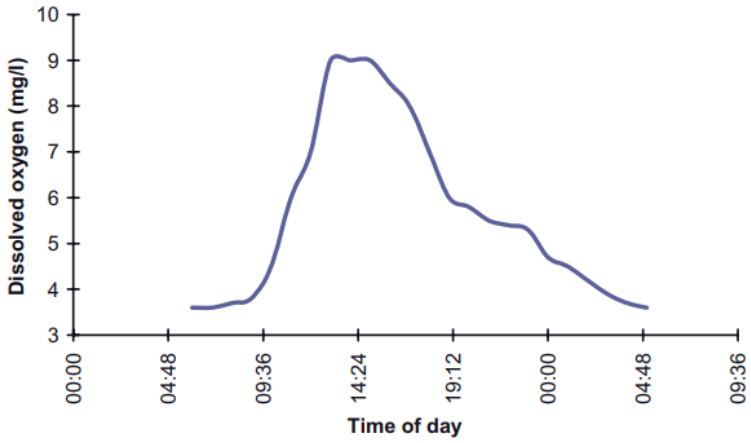
Algae

The high DO levels discussed above is likely a direct result of photosynthesis caused by algae. This is commensurate with the elevated pH within the sample. Elevated algae abundance can cause fluctuations in DO and pH throughout the day, which can be a stressor for the fish populations *(Graph 2).* Further issues can arise if a sudden algae die back occurs which can deoxygenate water due to aerobic bacterial action.

Whilst algae within a waterbody is beneficial as it is a primary producer and a food source for many aquatic fish and invertebrates, however problems can arise if the algae population becomes elevated. This is known as a bloom. Some algae species also have direct implications for fish species via gill abrasion or toxicity.

A means of recording basic water quality within the fishery is critical, this will equip the fishery manager with information that could potentially avoid deoxygenation and subsequent fish mortalities. Daily fluctuations within the waterbody can also be identified, indicating the algal activity and its influence on water quality.

Graph 2. **Diurnal fluctuations caused by algae.**



Fish population

Barton Village Pool is subject to low- moderate angling pressure. Species present are thought to be Common Carp *C. carpio*, Roach *R. rutilus*, Tench *T. tinca*, Perch *P. fluviatilis*, Rudd *S. erythrophthalmus* and Common Bream *A. brama*. This waterbody is primarily utilised by pleasure anglers.

The biomass of this waterbody is unknown. Whilst the individual fish had shown steady growth, this appears to have slowed within the last two years. This could indicate that the fishery had exceeded the waterbody's carrying capacity.

Condition of marginal habitat

The fishery has approximately 60% coverage of marginal, emergent vegetation as well as 10% surface coverage of lillies *Nymphaea sp*. Areas where aquatic macrophytes were absent coincided with areas subject to significant canopy shading and excessive siltation.

Aquatic plants have an important role in the freshwater ecosystem because they provide habitat; serve as a substrate for spawning; supply food; purify the water; produce oxygen; and regulate the nitrogen cycle. Also, plants are at the base of the food chain and play an important role in controlling the overall productivity and function of freshwaters. Aquatic plants can also help maintain a natural balance within the waterbody, by utilising the available nutrients, resulting in less availability for nuisance species such as algae.

Biosecurity

There are not any biosecurity facilities, such as disinfectant dip tanks in place at the fishery.

The primary impact of wet equipment can be the transfer of disease, parasites or invasive non-native species (INNS) into the waterbody. This in turn could have a detrimental impact on the existing fish population and wider ecology of the site.

Supplementary aeration

I was informed during the visit that the fishery has an aeration unit, however this had recently failed due to suspected vandalism. I was also informed that the aeration was primarily used to inhibit algae proliferation.

Whilst aeration can limit algae, it is likely that in order to be a successful preventative method, that is should be deployed as part of a combination of methods and not in isolation.

There are many specifications of supplementary aeration for specific conditions. The Environment Agency can assist with understanding and funding aeration equipment through the Fisheries Improvement Programme (FIP).

Recommendations

I have taken a holistic approach to offering prescriptions to overcoming the challenges identified during the site visit and following discussions with the customer. Whilst these recommendations will not guarantee that future mortalities or incidents will not occur, the improvements will however provide the fish population with the appropriate environment they require and enhance the site as a whole. This is turn will limit stress on the fish population, therefore reducing their susceptibility to future stressors. The biosecurity and monitoring aspects will provide the responsible person with more control over the site and be more informed when investigating an incident or making management decisions.

The recommendations are structured to firstly achieve a balanced, sustainable aquatic environment, and secondly to install a management plan for future fisheries management.

Water quality monitoring

I would recommend a continual monitoring programme of basic water quality parameters such as Dissolved Oxygen (DO). These records provide the Fishery Manager with basic knowledge of what is happening within the water at a snapshot in time. Water quality monitoring can identify consistencies as well as the impact that other factors can have on the waterbody, such as algae abundance, increased rainfall, low water level and temperature. Water quality records can also be useful when investigating fish mortality incidents. Ultimately basic water quality monitoring could forecast the requirement for supplementary aeration and preventing potential fish mortalities. The Environment Agency can provide advice on appropriate level of monitoring required and equipment can also be applied for through the Fisheries Improvement Programme (FIP).

Supplementary aeration

Supplementary aeration should be available in times when waterbodies are subject to environmental stressors, and not as a means of supporting a fishery. Therefore, it is recommended that the fishery have access to suitable aeration equipment that can be deployed as required. An efficient monitoring regime can assist with forecasting for this.

There are many specifications of supplementary aeration for specific conditions. The Environment Agency can assist with understanding dissolved oxygen and the different types of aeration available and their effectiveness.

Whilst the fishery does have aeration equipment in the form of a paddlewheel, this was not functioning at the time of the fish mortalities.

Algae control

I would recommend limiting the algae community within the waterbody to maintain stable water quality and reduce the risk of significant oxygen fluctuations. Successful algae control can be achieved by the addition of barley straw, I have attached a document detailing dose rates and deployment methods as an appendix to this report. Dosing with barley straw should be undertaken in March, before algae proliferation occurs, and maintained until October. Repeat doses should be added every 2-3 months during Spring/Summer. Please note that the biological process within the straw will take a period of time to become active, dependant on temperature. Therefore, the initial dose of barley straw should remain within the waterbody for 1 month following redosing, before it is removed.

The addition of barley straw is a preferred method of algae control as it does not impact the overall ecology of the fishery.

Some consultants (and fisheries) make and sell barley straw extract. This has been used with varying degrees of success. Certainly, it is less laborious to apply than raw barley straw, however the concentration of the active ingredient that inhibits algae cannot be quantified accurately. This may be a preferred if deploying raw barley straw is not a viable option.

Aquatic dye has been used to control algae in fisheries in recent years, however this method reduces UV penetration therefore impacts the establishment of organisms at the base of the food chain. This will essentially impact the overall productivity of the fishery and is not recommended unless other control methodologies have been exhausted.

Fish population survey

As previously discussed, the laboratory scale analysis identified inter species conflictions regarding growth rates. The consequences of an overstocked fishery are poor water quality, fish health problems including elevated disease risk, poor growth rates and reduced capture rates.

A full stock assessment will provide the Fishery Manager with a population estimate and to identify species present and their abundance. A sustainable pleasure fishery should try and achieve an overall biomass (carrying capacity) of 500lbs per acre. Obviously, this is dependent on interlinking ecological factors therefore it is difficult to associate stocking densities with a numerical figure, and fish also grow and reproduce!

Stocking densities in excess of the carrying capacity will require additional management intervention such as supplementary feeding and aeration, and fish may be more vulnerable to environmental stressors. Therefore, in some circumstances it

may be appropriate to remove excess fish species from a waterbody.

Before any fishing instrument other than rod and line is used the operator must obtain Environment Agency permission.

Biosecurity

Appropriate biosecurity measures will reduce the risk of disease and INNS coming onto the site. There is no mention of biosecurity measures within the rules on the waterbody's social media site.

Disinfectant net dip stations are an effective way to reduce the risk of unwanted introductions in the fishery. Net dips can be placed adjacent to the waterbody and anglers should be encouraged to dip nets prior to angling. I am conscious that this would require some management, and they maybe at risk of vandalism (and perhaps some health and safety considerations) however good biosecurity practises are essential when considering limiting the risk of pathogens being brought into the fishery. Biosecurity signage around the perimeter of the fishery may be a more viable option. A biosecurity fact sheet will be provided as an appendix to this document.

Tree maintenance

The fishery has significant tree growth around the margins of the north and west banks resulting in overall, circa 60% canopy shading. Tree cover creates shading and subsequent cooler areas that fish utilise for sanctuary from sunlight and piscivorous predators. Conversely, excess canopy shading can reduce wind action on the waterbody, therefore limiting movement on the water's surface and reducing its ability to absorb oxygen from the atmosphere. Trees can also contribute to the organic loading on the waterbody through seasonal leaf fall. Canopy shading also reduces UV penetration and limit the establishment of aquatic marginal vegetation in these areas.

I would recommend a maintenance programme to selective trees located around the perimeter of the waterbody. The recommended works include the following:

- Selectively remove/ or thin out deciduous trees to open up the tree canopy to create 'wind tunnels', to allow agitation of the water surface.
- Remove any self-set trees that have established to prevent them from maturing and increasing the organic loading on the waterbody through autumn leaf fall.

Aquatic vegetation

In areas where the margins have not been impacted by canopy shading, there is desirable aquatic vegetation. If the recommended tree maintenance works are undertaken, it is likely that the aquatic vegetation present will self-propagate into these niches. If this isn't the case, manual planting can be undertaken to help plants establish in these areas.

Management plan and record keeping

It is recommended that the future management and aims of the fishery is clearly documented in a 5 year management plan. It is obvious that some management methodologies are ongoing, such as water quality monitoring, whereas other aspects may not be required as frequent, fish stock assessments for example.

A management plan would provide a structured document that will allow for overall improvements and maintenance measures over a prolonged time period, often dictated by available funding and overall aims of the fishery. Records of previous management techniques should also be documented so that the successfulness of the works can be assessed in the future. Essentially a management plan will also assist when allocating funds for the fishery and assist with prioritising tasks.

Water quality data, such as DO readings should also be retained as this could be of assistance when making decisions regarding supplementary stocking, requirement for aeration and in possible future mortality investigations etc.

Fisheries Improvement Programme

The Fisheries Improvement Programme (FIP) is funded by Rod licence sales, to help provide fisheries with financial support when undertaking essential fisheries management tasks. Details of what can be applied for are documented on the link below, but certainly DO meters and habitat improvements would be considered.

Further information on the Fisheries Improvement Programme can be found at https://anglingtrust.net/funding/fisheries-improvement-programme/

For any further information, or questions related to the document please contact Jody Hughes, Fisheries Technical Officer jody.hughes@environment-agency.gov.uk or 07407 186599