



Addendum to Hoveton Great Broad Restoration Project Monitoring Plan

Updated June 2021



1. Purpose of addendum

This document is submitted as part of this Flood Risk Activity Permit (FRAP) application and should be viewed in conjunction with to the 'Hoveton Great Broad Restoration Project Monitoring Plan'¹ which contains details of the monitoring to be delivered under condition 1 of planning application BA/2019/0343/COND. The 'Hoveton Great Broad Restoration Project Monitoring Plan' is subject to change and will be updated via a condition variation application, and by agreement from the Broads Authority, to reflect updated project timelines once the project has the appropriate FRAP to enable scheduling of the works. As such this addendum outlines the projects commitments to continued water quality monitoring beyond 2021.

This addendum also provides details of additional fish monitoring the Hoveton Great Broad Restoration Project will be undertaking above and beyond that agreed under planning application BA/2019/0343/COND. This additional monitoring will monitor for changes in the fish community and their movements as a result of the installation of three temporary (10 years) barriers in HGB. The additional monitoring is being undertaken under the projects agreed LIFE programme to monitor the impact of the project on ecosystem functions.

2. Monthly water sampling

Currently monthly water sampling is conducted by the project at five sample points on both Hoveton Great Broad and Hudson's Bay. The factors monitored are:

- Zooplankton
- Phytoplankton (June – September)
- Water Clarity
- pH
- Temperature
- Conductivity

In addition, during the monthly sampling three water quality samples are collected by project staff at two locations – one in Hoveton Great Broad and one in Hudson's Bay. These samples are sent to Environment Agency laboratories for analysis with data publicly available through EA's water quality archive (<https://environment.data.gov.uk/water-quality/view/download/new>). The analyse includes: Colour (filtered), Conductivity at 25°C, Solids (suspended at 105 °C), Alkalinity to pH 4.5 as CaCO₃, Chloride, Total Phosphorus as P, Chlorophyll a, Total Nitrogen as N, Orthophosphate (Filtered as P), Total oxidised Nitrogen (filtered as N), Ammoniacal Nitrogen (Filtered as N), Silica (reactive as SiO₂)

Following installation of the fish barrier the project will continue this monthly water sampling for 5 years including collection of water quality samples for analysis by EA, provided the continued support of the Environment Agency to undertake analysis of samples.

¹ Submitted with the FRAP application as 'D2016 00163443 HWRP Appendix 4 Monitoring Plan v4_04102019'



Following this period Natural England commit to reviewing this monitoring schedule in partnership with the Environment Agency with a view to establishing a continued monitoring protocol appropriate to the level of site recovery.

3. Additional fish monitoring

Whilst this addendum is submitted for the discharge of condition 6 of the FRAP, there are no legislative drivers obligating Natural England to deliver monitoring outside of HGB and HB related to the installation of the barriers. Therefore, the additional monitoring is offered as appropriate to assessing the impact of the project on ecosystem functions, and within the associated project budgets. This data will also be used to inform the Fisheries Advisory Group as outlined in the 'HWRP Fisheries Advisory Group' document as submitted with the Flood Risk Activity Permit application.

3.1 PASE surveys

A baseline fish community within the middle Bure broads was established during 2016/17 as reported in 'Hoveton Great Broad Restoration Project: Seasonal Comparative Fish Surveys Summary Report. April 2017'. This survey surveyed:

- Hoveton Great Broad
- Hudson's Bay
- Wroxham Broad
- Salhouse Broad
- Decoy Broad
- Hoveton Little Broad/Pound End

Repeat quarterly PASE surveys, using the same methodology, will be undertaken in the year following the installation of the fish barriers and biomanipulation of HGB and HB at:

- Wroxham Broad
- Salhouse Broad
- Decoy Broad
- Hoveton Little Broad/Pound End

HGB and HB are excluded from the repeat PASE surveys as a new baseline for these broads will be established following biomanipulation and monitored a minimum of every 3 years during further fish removals.

3.2 Fish tracking (post-doc)

The Hoveton Great Broad restoration project has funded a PhD with Bournemouth University (2017-2020) with the following objectives:

O1. Quantify the population and ecological responses of the fish community to the biomanipulation of Hoveton Great Broad.

- Q1. What is the baseline population and trophic ecology of the fish community of HGB prior to biomanipulation, including population abundances, growth rates and trophic ecology?
- Q2. Are there measurable effects within the fish community of HGB during biomanipulation, including changes in population abundances, growth rates and trophic



ecology?

O2. Quantify the consequences of disconnection and biomanipulation of HGB from the River Bure on the movements, spawning and recruitment of the focal fish.

- Q3. What is the home range size of the focal fish species in the River Bure around HGB, what are the drivers of spatial and temporal movement patterns and how fidelic are individuals to specific functional habitats?
- Q4. How do the home range sizes, spatial and temporal movement patterns, and fidelity to specific functional habitats shift in relation to the disconnection of HGB during biomanipulation?
- Q5. For focal fish captured around HGB, what is their wider use of the River Bure system in relation to lentic/ lotic habitats, spawning and seasonal movements, and their utilisation of different habitats across a freshwater/ mixohaline salinity gradient?
- Q6. Is there any evidence that within the River Bure and neighbouring rivers, there is a meta-population of fishes that show regular movement and mixing between them?

Due to delays in the biomanipulation programme the PhD has been unable to assess the consequences of the disconnection and biomanipulation of HGB from the River Bure. However, these delays have allowed the PhD to establish a robust baseline for the home ranges, spawning and seasonal movement, and site fidelity, for the focal fish species.

The Hoveton Great Broad Restoration project will be funding a continuation of the acoustic tracking of bream with Bournemouth University. This will be as a 0.5fte part-time post-doctoral study or as a PhD study depending on the timings of barrier installation. The fish tracking research will have the following objective:

O2. Quantify the consequences of disconnection and biomanipulation of HGB from the River Bure on the movements, spawning and recruitment of the focal fish.

- Q1. How do the home range sizes, spatial and temporal movement patterns, and fidelity to specific functional habitats shift in relation to the disconnection of HGB during biomanipulation?
- Q2. For focal fish captured around HGB, what is their wider use of the River Bure system in relation to lentic/ lotic habitats, spawning and seasonal movements, and their utilisation of different habitats across a freshwater/ mixohaline salinity gradient?

The study will run for 3 years following the installation of the fish barriers.

3.3 eDNA fish surveys

The project will undertake eDNA lake fish monitoring of the following broads:

- Wroxham Broad
- Salhouse Broad
- Decoy Broad
- Hoveton Little Broad/Pound End

The surveys will consist of 10 samples per lake during the winter, with a minimum of 4 annual surveys during the 10 years the fish barriers are in situ. The current proposed sampling years



are 2021, 2023, 2026.

The sampling will use the UKTAG eDNA approach which has already been agreed in principle by EA and NE and represents a robust and cost-effective approach to meeting the EA's requirements. The data provided is suitable for the assessment of the Water Framework Directive lake fish community status as per UKTAG's recommendations. Completing eDNA sampling alongside the 2021 PASE surveys will enable effective comparison of the eDNA results to a PASE baseline.

4. Mitigation

No mitigation is proposed by the Hoveton Great Broad Project in relation to the installation of the fish barriers on Hoveton Great Broad and Hudson's Bay as associated with this FRAP application. Mitigation, in this context, refers to additional measures undertaken as part of a plan or project to stop it having an adverse effect on the integrity of an N2K site.

The project is '*directly connected with or necessary to the management of the site*' and is required to deliver favourable condition and good ecological status under the Habitats Directive and Water Framework Directive respectively. The project has no other purpose and will have no adverse effects on the N2K site. Angling amenity are not a consideration under the Habitats Directive or Water Framework Directive and therefore there are no legislative drivers for Natural England to deliver mitigations as part of the FRAP application and permit.

Whilst the project does not offer any mitigation related to the FRAP application, the project has committed to the formation of the Hoveton Fisheries Advisory Group. Following the 'terms of Reference' (TOR) as stipulated in the HWRP Fisheries Advisory Group document submitted as part of the FRAP application, this advisory group will have £25,000 of project budget reserved for works which will help understand the fishery or help deliver a diverse and resilient fish community within the wider Broads system. This budget can be increased through approaching the Project Steering Group for additional funds. For more details please consult the 'HWRP Fisheries Advisory Group. January 2021' document as submitted as part of the FRAP application.

