

Dear [REDACTED] and [REDACTED],

Following our discussions in February 2021, on the planned Flood Risk Activity Permit (FRAP) application submission from Natural England for Hoveton Broad proposals, we agreed that AFNE would provide a view on the evidence submitted and an opinion on the general risks and merits of the project to the fishery and the wider ecology. This included providing some help in the form of a synopsis if possible on the Water Framework Directive (WFD) deterioration aspects.

Please find below our advice as requested as part of the assessment and determination for the Flood Risk Activity Permit (FRAP) for EPR/RB3557SW - Hoveton Great Broad. Most of these comments were made in our original response to the Area Director Simon Hawkins during December 2019:

Synopsis on General Ecology

Hoveton Great Broad and Hudson Bay are part of the Broadland Special Area of Conservation (SAC), an internationally important nature conservation site designated under the European Habitats Directive. It is currently in unfavourable condition. Natural England, working with partners including the Environment Agency (EA), has a statutory obligation to restore the SAC site to favourable conservation status under the Conservation of Habitats and Species Regulations 2017 (which transposes the Habitats Directive into UK law). We also have a duty to achieve good ecological status and to ensure no deterioration of the site under the Water Framework Directive (WFD). This means that action does need to be taken to restore Hoveton Great Broad to a clear water state which can support the macrophyte communities that are a designated interest feature of the SAC and to achieve good ecological status under the WFD. As you are also aware, given the proposed intervention additional legislation must be considered. This includes our duties under the Environment Act, Salmon and Freshwater Fisheries Act and the Eels Regulations. Ensuring the right balance is found across these responsibilities is a key factor in determining this application.

The reason that Hoveton Great Broad and Hudson's Bay fell into unfavourable condition is due to elevated nutrient levels in this system. The EA has worked with a range of consent and permit holders to continually reduce levels of pollution entering into these sites and their catchments, with the goal of restoring protected sites to favourable/favourable recovering conservation status, in accordance with our duties under both the Habitats and the Water Framework Directives. Whilst we will continue to work with stakeholder to further reduce pollution there is likely to be a limit to how much levels of key nutrients can be further reduced in the Broadland catchment. Eutrophication is a major issue within the River Bure and wider Broadland catchment. Although we would expect most lowland river and lake systems to be naturally eutrophic, the high levels of eutrophication at these protected sites are damaging to the ecosystem and the designated features. This is reflected in the current ecological status of the waterbodies under WFD and the unfavourable no change status of the protected sites referred to Natural England's report (Item 6 in the FRAP application pack).

Maintaining the status quo (i.e. unfavourable status) of the sites is not an option under the Habitats Directive. Whereas, for ecological status objectives under the Water Framework Directive, there is the ability to set a less stringent objective where it is not possible to reach the objective due to disproportionate costs or technical feasibility. Other interventions are therefore needed to achieve a clear water state and the re-establishment of the designated macrophyte communities. To reach favourable condition/favourable -recovering and good ecological status (GES) the hyper-eutrophication needs to be addressed. It is a key cause of the site's failure to meet favourable condition and GES. The site needs to meet both of these objectives regardless of past conditions and how long they have persisted. Large populations of bream and roach have been shown in the

scientific literature (referenced in the reports provided with the FRAP application, such as documents 6 and 23) to be positively correlated with increases in nutrient levels and decreases in numbers of macrophytes and both of these trends underpin the failure of the site to meet its requirements under the two directives.

Notwithstanding the above, the reference conditions for fish populations in HGB and HB are not clearly understood, which makes it difficult to ascertain whether the proposal will cause deterioration in the fish element of WFD. In principle the fish communities consistent with reference conditions should develop as an outcome of restoration to clear water, macrophyte dominated conditions. However this doesn't preclude the possibility of deterioration in the interim. We are aware that the Area team has commissioned an independent assessment which should help to address this uncertainty.

Bio-manipulation is a proven technique that has been shown to be an effective intervention in the wider Broadland catchment already and the relevant reports (such as documents 6 and 15 in the FRAP application pack) provides reference to scientific evidence on this aspect. A trial of bio-manipulation at this site (Figure 17 on page 24 of document 6) demonstrates its potential for likely success. However, the majority of examples in the literature are for closed systems (lakes) or sites with permanent barriers. There is some uncertainty therefore about how an open system such as HGB and HB will respond after the barriers are removed.

In our initial response to Area Director during December 2019 we asked why it was not considered possible to create refuge areas for fish or deliver bio-manipulation in a staged or zoned manner over a more extended period of time, so as to mitigate for the impact on the fishery. The evidence provided in the updated report (document 6 in the FRAP application pack), suggests that excluding fish from the whole of Hoveton Great Broad and Hudson's Bay provides the best chance of success building on the findings of the original Environmental Statement from 2014 (document 15). This is because a large body of water is much more likely to maintain stable clear water conditions in the long term without the same risk of reversion to turbid algal conditions that might occur if a phased approach was taken. However, it may still be useful to seek further clarity on options for fish barriers that would facilitate some spawning and migration across the broad whilst still allowing the establishment of a large body of clear water across the majority of the lake.

We would advise that you seek further clarification on the following points which are explained in full in Annex 1:

- Water Framework Directive – potential for a deterioration in the fish element within HGB, HB and linked water bodies and relevance of Article 4.7 and 4.8
- Environment Act (1995) duty to 'maintain, improve and develop' fisheries and the potential impact of disruption to bream spawning
- The Eels (England and Wales) Regulations 2009 – ensuring the free passage of juvenile and adult eels across the exclusion barriers
- Salmon and Freshwater Fisheries Act (1975) Section 2 (4) – potential for this proposal to be seen to be disturbing spawning fish by preventing bream, or other species, from reaching their desired spawning location and being unable to spawn
- The efficacy of bio-manipulation in 'open' systems once barriers are removed and the long term sustainability of this option
- A clear explanation of the management steps/decision structure after the proposed 10 year presence of the fish barriers

- A clear presentation of how monitoring and assessment information will be used to shape management decisions throughout this project

Annex 1 – points for further consideration

Water Framework Directive

All WFD ecological assessments are based on the same principle as defined in the legislation and associated guidance. Status is assessed as a deviation from what would be expected under reference conditions i.e. free from anthropogenic impacts. For fish, we are encouraged to use species presence/absence, density and age structure. For the rivers tool we use the first two metrics. The model compares the observed fish community with that expected under reference conditions. We can use these principles to determine whether a deterioration might happen following an intervention based on our understanding of what changes that might cause. We have to apply these principles in places where we have no data to provide a classification. We do this by understanding what the reference condition would be, what the current population is and what impact the intervention would have. This is actively used in licensing regimes such as hydropower to ensure we do not allow activities to result in a deterioration in status to the local fish community. We do not have a classification tool for fish in lakes but I believe the same principle would apply. Not having a classification tool is not, in our view, a defence for not considering whether an action would cause a deterioration. It would seem an easy and potentially successful route for challenge. For Hoveton Great Broad (HGB), Hudson's Bay (HB) and associated water bodies we have excellent information on the resident fish communities, and because of the nature of the intervention (Biomanipulation) we can describe what impact it will have on that fish community.

With respect to this application, we must consider the potential for deterioration in the fish element as a consequence of the proposed biomanipulation. This is true for HGB and HB and the wider fish populations in this system. Key to determining the potential for a deterioration under the WFD is an understanding of the reference fish community in all areas of the broads system that may potentially be affected by the proposal, i.e. that that would be expected in the absence of anthropogenic pressures. While the application has attempted to describe this, it fails to address other evidence (e.g. <https://www.caistercaravan.co.uk/articles/fishing-history.shtml>) that suggests large numbers of bream and roach were present before eutrophication of the broads. Indeed, the application notes that Moss et al (1996) recognise "that bream can coexist with a vegetated state as part of a diverse fish community". It is therefore probable that the reference fish community across the broads, including HGB and HB would have included numbers of bream. Selectively removing them from the system would constitute a deterioration under the WFD and justification for such an intervention would need to be provided through an Article 4.7 test.

WFD deterioration must also be considered with respect to species other than bream and roach within HGB and HB. The proposed fish barriers, with an effective mesh size of 2mm, would act as a complete barrier to all other species that might need to move into, and out of, HGB and HB to complete their life cycle. The application considers bream and roach to be the species responsible for the current conditions observed but it does not explicitly state which species would be removed once the barriers are in place. Removal of any species expected under reference condition would present a deterioration risk. Moreover, one must ask whether the presence of barriers preventing free movement of all fish species expected in the broad under reference condition would prevent those species from feeding, breeding and avoiding predation. This risk of deterioration to other species (e.g. pike, tench, perch, eel and rudd) has not been considered and must be if the true impacts of this biomanipulation are to be understood.

Finally, it has been clearly demonstrated that bream are highly selective in using HB for spawning. Juvenile bream from HB will distribute across this system. If bream are unable to spawn in HB there is a risk that this will impact bream numbers across this part of the broads system. It has been argued that because bream are both ubiquitous and able to spawn on a variety of substrates, there is unlikely to be an impact on wider bream populations. Accepting this to be true, why would bream show such selectivity for HB? There remains significant uncertainty that those bream prevented from entering HB will be able to spawn successfully elsewhere and therefore there remains uncertainty that this intervention would not result in a wider impact and subsequent WFD deterioration.

The **Environment Act (1995)** provides the Environment Agency with a general duty to maintain, improve and develop fisheries. It is the principal legislation that drives our work in relation to fisheries. In 2000, Ministers issued statutory guidance (s.4(2) Environment Act, 1995), that this duty should be interpreted as:

- to ensure the conservation and maintain the diversity of freshwater fish, salmon, sea trout and eels and to conserve their aquatic environment.
- to enhance the contribution salmon and freshwater fisheries make to the economy, particularly in remote rural areas and in areas with low levels of income; and
- to enhance the social value of fishing as a widely available and healthy form of recreation.

Key to this duty and statutory guidance is an understanding of the definition of a fishery, which is taken to mean fish populations or stocks that are or can be fished for (e.g. through rod and line). The Broadlands are one of the most significant, popular and famous fisheries in England, generating significant income to the local economy. Angling accounts for at least 17% of visitors to the area and in excess of £20 million to the local economy each year (Environment Agency – Angle on the Broadlands).

We must therefore consider how the proposed biomanipulation of HGB and HB would impact on all affected fisheries both within HGB, HB and the wider broads catchment area. The potential for impacts are described in the WFD responses above. While some of these remain uncertain, it is clear that the selective removal of some species from HGB and HB would directly change that fishery. Wider impacts, particularly in relation to bream spawning, are also possible. Considered in isolation from other legislation, it is clear that the proposed biomanipulation would be a significant concern. However, in this case we have multiple pieces of legislation in play (Habitats Directive, Water Framework Directive, Eels Regulations and the Environment Act). It isn't always easy to define an objective hierarchy in these cases and often, subjective views dominate but we must balance our respective duties. It could be argued that the proposed biomanipulation, apart from any direct impacts on fishing in HGB and HB, will not stop the presence of a fishery, but rather it is intended to change the nature of the fishery. While this has the potential to be unpopular and impact local communities, tourism and the local economy, the risk around our duty to maintain, improve and develop fisheries is reduced if we are changing the nature of the fishery to achieve objectives under the Habitats Directive, providing other elements remain equal e.g. angler access. If the impacts were to extend beyond the area of Habitats Directive designation, e.g. reduced bream recruitment across the local Broadlands system, then this risk of challenge increases.

The Eels (England and Wales) Regulations 2009 The regulations afford powers to the Environment Agency to implement measures for the recovery of the European eel stocks, including the safe passage of eels. The fish barriers proposed have an effective mesh size of 2mm. Under the Eels Regulations the default best practice screening to prevent the ingress of juvenile eels is also 2mm. This indicates that the fish barriers will represent an almost total barrier to all sizes of eel in the

Broads. Eels are catadromous: young eels migrate from the sea where spawning occurs to freshwaters where they gain size before returning to the sea as adult, silver eels. The fish barriers would prevent any juvenile eels (elvers) entering HGB and HB and any adults leaving. If the barriers were to be implemented we would need to ensure that the safe passage of eels into and out of the enclosed site. This should be a condition of the permit and meet with the approval of the National Eel Screening Helpdesk.

Section 2 of the **Salmon and Freshwater Fisheries Act (1975)** consider impacts on 'Roe, spawning and unclean fish, etc.' Section 2 (4) describes circumstances under which the disturbance of spawning fish is an offence. It could be argued that the introduction of fish barriers and the exclusion of fish constitutes the wilful disturbance of spawning fish. This is particularly relevant to this case if bream that would ordinarily spawn in HB are no longer able to spawn, or that fish that are retained within HGB and HB are no longer able to access spawning habitat outside of these locations. If installing fish screens would constitute disturbance under s.2(4), it may be possible to permit the activity under s.2(5), that it is "for some scientific purpose". However we believe the intention of this legislation is to prevent the disturbance of actively spawning fish, rather than preventing fish from reaching their spawning site.

Biomanipulation the application highlights the success of biomanipulation of fish populations to achieve clear water, macrophyte dominated conditions. That biomanipulation, through the removal of benthic foraging (bream) and zooplanktivorous (roach) species can be successful is not in question. What is of concern is whether short term (10 years) biomanipulation provides a sustainable and long term solution to the achievement of Habitats Directive objectives. HGB and HB are part of an open system, with water quality and nutrient concentrations being directly controlled by the wider system of broads and rivers. Removal of barriers after the biomanipulation will also allow the free movement of fish, including bream and roach, back into HGB and HB. While the application suggests that HGB and HB will, by then have moved into the desired, and stable, ecosystem. The evidence to support this for an open system isn't clear or compelling.

In the FAO Fisheries Circular No, 952 "Consequences of biomanipulation for fish and fisheries" it is noted that biomanipulation should be considered in relation to the whole ecosystem and is only one of the options for restoration. Using fish for biomanipulation may require a continual, sustained removal effort and may be efficient only when applied in tandem with other nutrient control and reduction mechanisms. It seems highly likely given the open nature of HGB and HB that a continued manipulation of the fish community would be necessary to maintain clear water, macrophyte dominated conditions. This brings into sharp focus the question of what happens if the proposed 10 year biomanipulation is unsuccessful.

What happens after 10 years of biomanipulation?

The application lacks clarity on what will happen after the proposed 10 year presence of the fish exclusion barriers. The documents provided give a differing view on the likelihood of success in moving HGB and HB into the desired, and ecologically stable, state. Whether this can be achieved in 2-3 years or 10 years plus is not clear. There would appear to be two risks associated with what happens after 10 years.

1. That clear water, macrophyte dominated conditions are met, but after removal of the barriers, this new state is not ecologically stable, due to continued and elevated nutrient conditions causing a return to the pre-barrier condition. What is the process for decision making in this case? Does this prove that biomanipulation can

only provide a solution if some fish species are permanently excluded? Does it show that nutrient conditions must be lower than the assumed values provided in the application to achieve clear water, macrophyte dominated conditions? Either way, a clear management system should be provided before this application is determined.

2. That clear water, macrophyte dominated conditions are not met. This could be driven by a lack of propagules, either in number or by species for example. While the application makes clear that under this circumstance an additional application will be submitted, what checks are in place to ensure we understand the reasons why the assumed outcomes have not been reached? Again, this should be in place before this application is determined.

Monitoring

Given the potential risks to fish populations and fisheries outside of HGB and HB it has been recognised that active monitoring will be a key component if the biomanipulation of HGB and HB proceeds. However, no detail on what elements will be monitored (and funded), how and when this will be undertaken, what assessment of the data collected will be undertaken and how this information will be used to undertake adaptive management. Experience shows that assuming this can be resolved after key decisions have been made almost always ends in a failure to fund and make appropriate use of the data collected. In order to approve this application I would advise having a much clearer description, or indeed agreement, of how monitoring and assessment will be used to understand the consequence of biomanipulation both within HGB and HB and in the wider connected broad system. Any such monitoring should address the risks identified above and provide triggers for a change of approach where it is considered necessary. At the very least these should address the key legislative challenges and assumptions made in this application e.g. that bream will successfully spawn elsewhere.