Background

Following on from some collaborative work in 2019 which resulted in the Wensum - Past, Present and Future WWG document and subsequent formation of the Wensum Catchment Partnership, Tim Ellis one of the founder members and Chair of WACA has tried to gather some thoughts and tentatively suggest an achievable way forward with Wensum Roach. (Achievable as in acceptable to all parties, including statutory bodies, and within budgets and resources available.)

Tim believes we have ascertained that there IS a self-sustaining Roach population in the river system as a whole, although this may not be as numerous nor reaching the ultimate individual sizes anglers would like to see. This is now confirmed through the recent updated EA Wensum survey report and comparative surveys on other rivers. But there remain key lengths of the river almost devoid of Roach, as indicated by the spot surveys and these do correlate to angler's ability to catch.

It has proven very difficult to understand where Wensum Roach actually spawn in the river these days, although one site (Taverham Mill) was identified by Rich Keeble in 2018, and in 2019 Roach were observed spawning on weed, probably fontinalis, at Lyng road bridge by Mikey Mann.

It appears highly likely that a proportion, possibly quite significant, of our Roach originate in the loosely connected drains, tributaries etc and also stillwaters in the valley. Certainly some of the IDB drains etc are known to have very good stocks of fish, apparently better water quality and more weed growth than the main river and fish are often able to move between them and the river, though usually only via one route - the downstream end of the drain, trib etc - except in flood conditions. Floods are known to allow an interchange of fish in both directions, in many of the water bodies in the floodplain, as chub and dace frequently turn up in the generally unconnected stillwaters. Undoubtedly some stillwater Roach are also moved into the river by anglers.

The point to take from all this is that the Wensum is not considered to be in the same dire situation as the Hampshire Avon was some years ago, when Environment Agency surveys determined that the Avon Roach were almost certainly at a point where their continued existence was itself under threat. This was the trigger for Trev Harrop and Budgie Price's Avon Roach Project, which has famously rebuilt Avon Roach stocks using ground-breaking techniques to collect, hatch and grow on native Avon Roach spawn for restocking the river. It should be remembered as well of course, that the Project has also advocated and implemented action to restore Avon habitats, end excessive weed-cutting and manage over-predation.

At the present time, it appears to Tim at least, that there is no obvious need for us to try to emulate all the amazing work done by Trev and Budgie on the Avon, ie the spawn collecting, growing on etc. It is doubtful whether we have the resources in terms of people and time to do so anyway, let alone the funding. However, given that roach are recruiting somewhere in the system, (although presently long term individual survival and growth seem to be restricted) then anything which can be done to enhance their chances of survival and good health/growth in the main river must surely be worthwhile.

To have any hope of achieving this, ideally we would need to understand, or at least have some idea, what the "blockers" or 'limiting factors' actually are in the river. Accepted wisdom is that there is a shortage of suitable habitat and food for survival and good growth of early life stages, also arguably excessive predation (and other indirect impacts) by alien Signal Crayfish, and also at later stages by what we believe to be European Cormorants (Phalacrorax carbo sinensis) which are colonising inland Britain and feeding in their preferred freshwater habitat. The broader picture also includes impacts from decreasing water flows, diffuse water pollution in a number of forms, climate change and other factors generated by human activity. More study is probably needed to help enhance this knowledge, there is already a starting point

though in Dr Helen Beardsleys paper on Wensum Roach growth rates etc. The ongoing work with invertebrate populations by members of WWG will potentially give more insight here.

Further received wisdom from the ARP team is that at about year three, Roach in particular in some rivers put on a growth spurt, as they become able to cope with molluscs. This is due to “gape limiting” - basically how wide their jaws will open. Also a plentiful supply of suitable molluscs needs to be present. It is not known whether the Wensum Roach have access to such a food source in quantity.

This document lays out how we propose to gathers evidence of current connected channels and drains to the river, which may be suitable for increasing habitat as recommended in the report below made within the agreed Natural England restoration strategy. It’s also a reflection 10 years since the report was produced and lack of improvement as evidenced in the recent study on comparative fish surveys.

Fisheries – Extract from the Wensum Restoration Strategy June 2009. [i]

2.31 Between 1940 and the 1970s, the River Wensum had a national reputation as a roach fishery. Phase I of the ECON study (Perrow and Punchard, 1998) concluded that there has been a major modern decline in the abundance of a number of native fish species in the river (for example, roach, dace, perch and trout). Failure to recruit was identified as the prime cause of decline, and this was attributed to:

- Sedimentation of spawning gravels - this particularly affects dace, brown trout, brook lamprey and bullhead, all of which are lithophilous (gravel spawning).
- Increased concentrations of ammonia and nutrients.
- A reduction in the complexity/diversity of habitat - the co-existence of a number of fish species, whose habitat requirements alter with life stage and season, depends on habitat complexity.
- A reduction in the number and quality of nurseries for larvae and fry (backwaters, structurally diverse dykes and side streams, as well as marginal and submerged macrophytes).

2.32 Where habitat quality is a limiting factor, large species such as chub dominate (they have expanded their population and range and now dominate the middle/lower reaches of the river). There has been widespread concern, amongst anglers, fisheries specialists and members of the Norfolk Anglers Conservation Association (NACA) that the value of the Wensum fishery continues to decline.

2.33 For this reason, the River Wensum Fisheries Action Plan group was established by the Environment Agency as a mechanism to address fisheries related issues, and to involve stakeholders in this process. Increasing physical habitat diversity is seen as one of the best ways of improving the quality of the fishery. Methods to achieve this and associated benefits include:

- The creation of gravel glides/riffles - used as foraging and spawning habitat. These provide flow diversity (including slack flow of use to fry as resting sites when moving upstream) and, hence, habitat diversity. An added advantage is that the bed becomes self-flushing due to local shallowing (and, therefore, greater stream power), so is kept free of silt and aerated, thereby enabling species with a higher water quality preference to colonise.
- The rehabilitation/creation of marginal features to provide shelter (nursery and refuge habitat, particularly for juvenile fish), temperature gradients and flow diversity. Improvements to river margins, such as development of wetland plant communities, more extensive plant cover and interaction with the river channel, also help to improve channel habitat as a more diverse range of ecological niches are created.
- The creation of off-river supplementary units - provide fish fry with cover, food, warmth and refuge from high velocity flows and predators.

2.34 The creation of gravel glides/riffles, the rehabilitation/creation of marginal features and the creation of off-river supplementary units are all compatible with Natural England"s objective of restoring the river to favourable condition.

2.35 River restoration is a key objective in attempts to establish a self-sustaining population of barbel but it should be carried out so as to recreate river channels with a form and function that are characteristic of a chalk river in Norfolk.

Backwaters – Extract from the Wensum Restoration Strategy June 2009.

Benefits

In heavily managed river systems, areas of slow or still water connected to the main channel are rare. Backwaters tend to silt up and colonise with vegetation, eventually succeeding to fen. They are important as refuge areas for fish and invertebrates in times of flood/high flow velocities and they provide shallow warm water for fry. As they are a transition between the running waters of the main river and the still

water of a pond, they also add to the diversity of habitat available in a reach. Backwaters are very limited in extent along the Wensum valley.

Methods

The creation of backwaters or Off-River Support/Supplementary Units (ORSU) may occur as a useful by product of re-routing or re-meandering of an old river course. Grazing marsh drains, cattle drinks and abandoned side channels also form important backwaters.
Backwaters should be designed with a variety of animal and plant species in mind. A mosaic of water depths, bank slopes, margin substrates etc. should be incorporated into the design.

Examples

At Swanton Morley and at Costessey Point along the River Wensum, ORSUs were created primarily as fish fry refuges. The Swanton Morley (Phase I) report by the Environment Agency stated that one of the major factors limiting the River Wensum fishery is poor recruitment success, linked to changes in river form and the number and quality of nursery areas for larvae and fry. The Environment Agency identified the channel habitat in the Worthing stretch as particularly limiting for fry, with long stretches subjected to relatively high flows and with little natural cover.
During the implementation of Swanton Morley (Phase 1), two fry refuges were created on the left hand bank. Each refuge consisted of a small bay (varying between 8 and 12m by 5 and 8m) with a narrow opening to the river channel. The depth of the bay was excavated such that it would contain both deep and shallow sections during the summer.

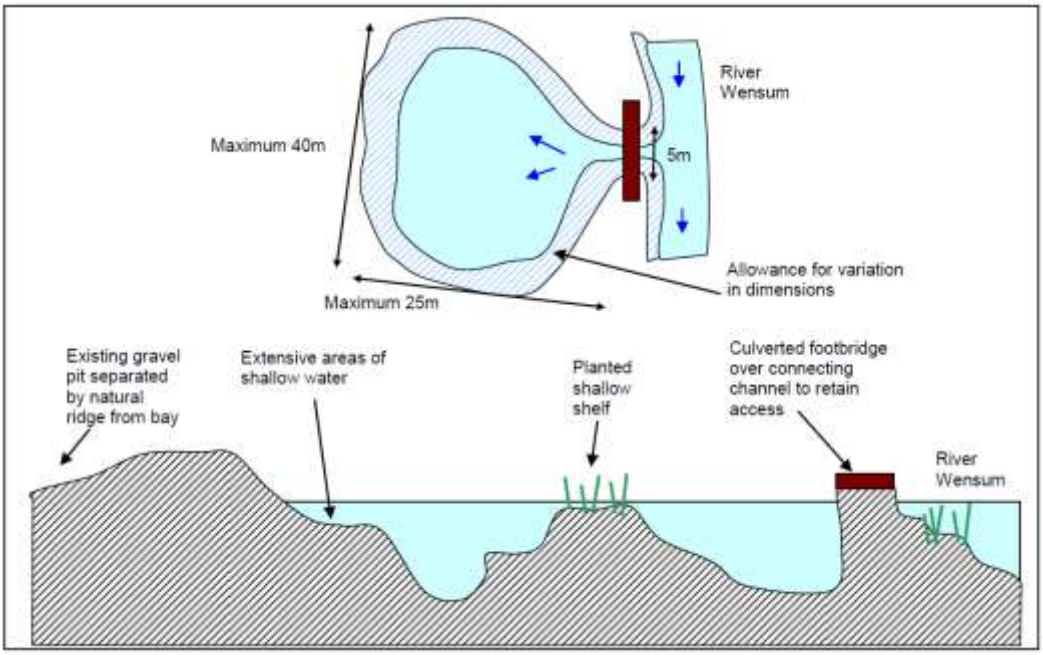

Figure E5 Fry Refuge at Swanton Morley (Phase 3)

Swanton Morley (Phase 3) involved the creation of 4 fry nursery and refuge bays similar, but on a larger scale, to those of Phase I (Figure E5). Each bay had a varied shape and a variety of bank profiles to maximise habitat diversity. Extensive areas of gently sloping bank were created to provide the shallow water conditions favoured by fry. Excavation depths were mainly between 0 and 0.5m below the mean summer water level, although depths up to 1.5m were created. Within each bay, areas of submerged and emergent vegetation were established to provide cover, using imported pre-planted coir rolls containing native wetland species (*Carex* spp., *Phalaris* spp. and *Juncus* spp.). In the case of the largest bay, a culverted footpath was created over the connecting channel to allow access by anglers and walkers.

Possible Actions:

Starting at the beginning: spawning areas and fry survival. As stated above, little is known about the actual present-day spawning sites of Wensum Roach, although it seems likely that main river sites will be positioned at the very top of each section, this usually being in the vicinity of the relevant redundant mill/weir structures. The two sites which have been identified recently both confirm support this. This follows ARP (and others) received wisdom, in that there is an instinctive action by the fish here, to enable maximum downstream drift to spread offspring through the system.

Two spawning boards were positioned in the mill pools at Lyng in April 2019, however no Roach were observed using them. In early May 2020, Roach were observed spawning a short distance away on what is believed to be Ffontinalis mossweed, just downstream of the nearby road bridge. So it appears that our positioning at least was not far out. Unfortunately the area is popular with canoeists, swimmers etc and the site was subsequently disturbed. This is a problem with most mill pools on the river, public access precludes using spawning boards at the majority of them . There are some pools with exclusively private access, but they are few and far between, and it has to be asked whether we actually need to invest time and money into spawning boards at all, especially bearing in mind that the primary reason for the ARP boards was spawn COLLECTION, for the purposes of hatching and rearing Roach spawn from the Avon for later restocking. (There is one additional hidden extra benefit of spawning boards, according to ARP, in that they do provide safety for Roach eggs from Signal Crayfish, so this could be an argument for carrying on some trials, especially if Roach are seen to be using them when in position.)

An obvious alternative action to boost Roach numbers in the main river might seem to be moving fish from the apparently more prolific, connected drains etc, possibly consequently encouraging the production and survival of yet more progeny in their original homes. If these other water bodies are productive enough nursery areas without intervention, maybe they could simply be “harvested” on a rotating basis. Obviously any such fish movements would need correct consents, and the sure knowledge that they are current Wensum stock and have not been isolated, in a stillwater for example, for even one generation. This knowledge should ensure that their future spawning synchronises with fish in the main river already.

It may actually be preferable to let the fish in these drains “do their own thing”, ie move in and out as they wish with changing seasons etc. Current advice from the EA indicates that due to National policy and SSSIi/SAC status, the chances of gaining consent to move fish from nearby drains etc, even if connected, are slim.

Another possible action here could be to work to ensure free passage for fish up and down the entire length of these drains, so they could move out into the main river more easily (some of them are at least partially blocked to fish movements) and back again to shelter from winter floods etc.

There may also be actions which could be taken to enhance any such drains if any of them were felt to be less effective and the reasons why could be identified. This could include habitat improvement, as in the main river, also perhaps protection from predators.

Actions on the main river to improve survival and growth of Roach could involve yet more purpose built refuge areas for juvenile fish, more provision of bankside cover and other similar measures. These would have multiple beneficiaries of course, in that juveniles of all species of fish could benefit, and indeed other life forms which would otherwise suffer in high flows or from lack of shelter from predators. Various types of enhanced refuges, from restored ditch mouths to purpose designed fry bays are already present, but only in relatively few areas.

One common theme to all these types of refuge, being sheltered marginal areas, is that they tend to be shallower and will warm up faster in the spring. This will mean that as well as providing physical shelter for smaller and juvenile fish, both from strong flows and in some cases predators, they may well provide a suitable food source for growing young fish, namely zooplankton. This was touched on in Dr Helen Beardsleys report. One of her conclusions was I believe that phosphate strippers on sewage treatment works might be limiting the amount of zooplankton etc the river was producing, but also that the lack of connectivity between the river and the network of ditches etc throughout the floodplain was a factor, as the ability of fish to access these similarly rich feeding areas was much reduced. All good reasons surely to support the implementation of more fry refuges, ditch re-connection etc.

A fair amount of fry refuge work has been done on the Sayers Meadow stretch at Lyng, we believe that this is helping juvenile fish survival etc, based on observations alone. An amount of similar work is planned on the next stretch upstream, Sparham Hall. If appropriate surveying was carried out beforehand, it might be possible to quantify the results ongoing.

Large Woody Debris features may also be useful where appropriate, as not only do they encourage the river to speed up on the outside and deposit silt on the sheltered side, they will also provide cover and protection from strong flows and predators for juvenile fish.

Note: Diffuse Water Pollution covers a multitude of sins, from the obvious curse of fine sediment choking the gravels, through agricultural run-off containing the foregoing plus farm chemicals and high levels of nitrates etc causing eutrophication (over-enrichment) of the river, to treated and untreated sewage from treatment works. Phosphates have been recognised as a problem also but have been mitigated to some extent at least by phosphate strippers on sewage treatment works. Over time WWG partners and stakeholders are monitoring and surveying for a number of pollutants found in DWP, hopefully this can help us understand the problem and find ways to lessen it's impact.

Figure 1 below shows the relationship with the IDB drains and their connectivity with the main river. In general the drainage network is free flowing, using the natural step between mill structures to drain the surrounding land. Many of these ditches run adjacent to the main river, but the connectivity is downstream, sometimes by quite a distance. These drains perform a critical function in terms of flood defence and as such have considerable high flows and potential over topping in winter.

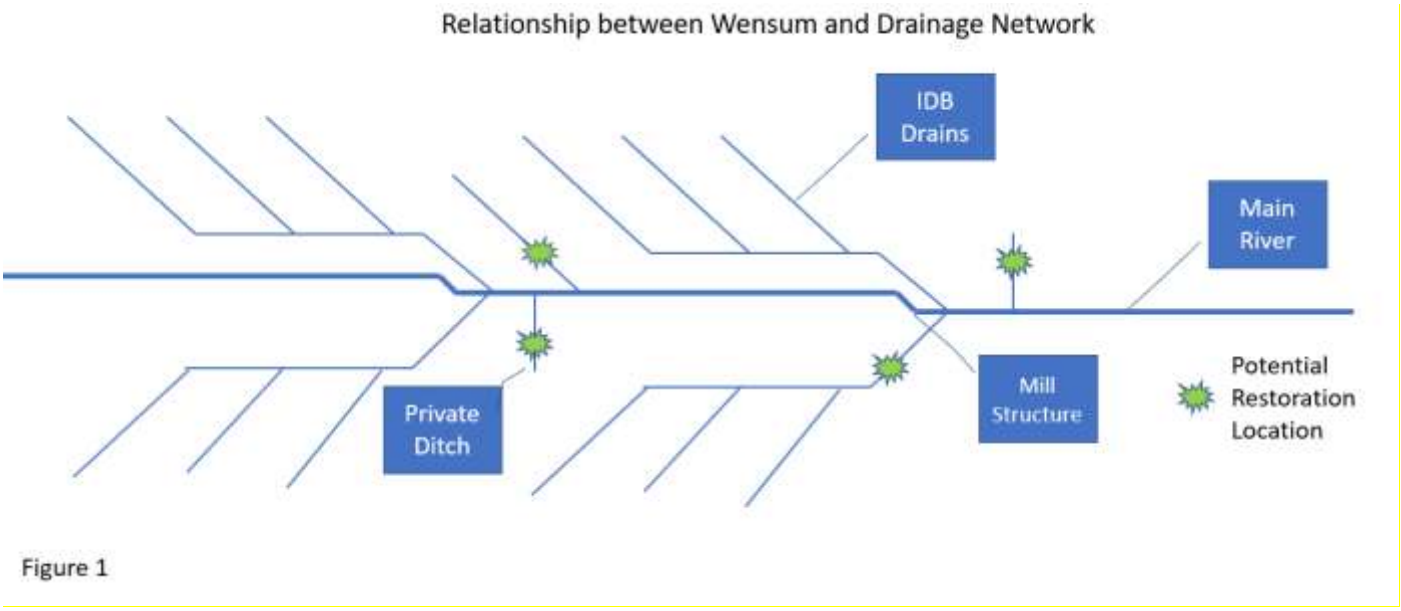

Figure 1

Predator control is extremely difficult on the Wensum, Natural England will not grant licences to shoot cormorants anywhere other than nominated stillwaters, ie NOT the river and the Environment Agency will not at present allow any trapping of Signal Crayfish, as this is perceived as a threat to any remaining native White Clawed Crayfish. Jake Devoille of the Angling Trust has looked at the river wide cormorant situation, apparently without a great deal of success. The best option open to us, other than the fringe benefits of licenced cormorant shooting on nearby stillwaters, would appear to be scope for local volunteer cormorant-deterring patrols at times when the river is particularly vulnerable, such as when the stillwaters freeze over.

Potential approaches that through the combined efforts of the WWG we anglers can take to help enhance Wensum Roach populations:

1. Implement more fry refuges, cattle drinks, ditch reconnections, planting of bankside cover, large woody debris features etc. (Potential to utilise the proposed work at Sparham Hall to measure performance.) This all mainly relates to the main river channel, but could equally be carried out in suitable drains, ditches, tributaries and bypass channels.

2. As above, nurture the connected drains, ditches, tributaries etc and improve connectivity to the river. (Bearing in mind that some of their value may be due to their water quality apparently being better than the river, so take extra care when considering connections which may feed river water INTO them) If it proves acceptable, and is felt necessary, subject to relevant consents obtained and stocks ascertained as true Wensum fish, maybe relocate juvenile Roach from connected ditches and drains into main river. Alternatively, just rely on improved connectivity to do the job naturally, or maybe find ways to "encourage" fish to move river-wards.

3. Consider carrying out a programme of Roach spawning board use, to provide extra spawning sites with better security from Signal Crayfish predation, probably limited to millpools etc with little or no public access.

4. Instigate "anti-cormorant" patrolling, ie human presence on the river bank (with or without fishing tackle!) at times when threat is perceived as greatest, for instance in a prolonged freeze when stillwaters are iced over.

5. There may be some benefit for juvenile and/or adult Roach in trying to limit the build up of fine sediment, for instance by gravel-jetting, on at least some of the recognised gravel riffles in the river. Certainly this should benefit some invertebrates which require clean gravel, (potential fish food source) also ranunculus weed species and of course the gravel-spawners such as dace and chub, maybe even odd barbel and trout in some areas.....this would tick another box of course, as dace are certainly not doing as well in the river as we would like, and there even seems to be an ongoing decline in chub numbers.

6. Further investigate the theories put forward by Dr Helen Beardsleys PhD, in terms of molluscs and Roach growth rates.

It is glaringly obvious that there is very little purely Roach-specific action mentioned here, other than the spawning boards. This is largely I believe due to the "generalistic" nature of roach themselves, as they share a lot of habitat/food requirements with other species, particularly in the vulnerable juvenile stages. Much of what is suggested will of course have multiple beneficiaries, ie other fish species, invertebrates etc, possible even some weed species, which is of course no bad thing in itself.

Clearly this is a momentous task and needs careful thought as to it's approach. It would be wise to select 3-4 locations with approachable landowners to bring together a management plan to reach a consensus and trial these actions. Each location would have it's own report, options appraisal and management plan, as a working document to build upon.

Initial potential locations, spread across the catchment, with grid ref and what 3 words.

Blackwater Worthing	TG002199 / mimics.pizzas.truckload
Swanton Morely Falls	TG020184 / darling.coasting.tribune
Swanton Morely White House Farm	TG021805 / stack.consonant.computer
Lyng Mill and Kingfisher Lakes	TG070178 / mammoth.webcams.booms
Lyng Sparham Pools	TG075175 / musically.baseballs.bids

Other potential locations of Wensum Drain and backwaters under investigation.

Fakenham Hempall Road	TF917529 / beside.picturing.octopus

Bintree Mill	TF996241 / dates.impeached.hairpin
Yarrow House	TF990232 / whiplash.lots.lawfully
Mill House Farm	TG004203 / anchovies.else.sensible
Billingford Burgh Common	TG014193 / trash.doors.mango
Swanton Morely Fry Refuges	?
Mill Street Divert Channel	TG050178 / arshes.manager.bedspread
Lyng Rectory Road	TG072175 / pricing.listen.fiery
Lenwade Mill Lane	TG101182 / decorate.radically.sand
Lenwade A1067 Bridge	TG103182 / midfield.vaccines.then
Attlebridge Church Farm	TG129167 / fountain.goodness.gentlemen
Costessey Meadows	TG187112 / cared.runs.dent

Document author's

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21st July 2021

Wensum Drain and backwaters at Swanton Morely Falls

NGR what 3 words	TG020184 / darling.coasting.tribune
Landowner	John Carrick
IDB Managed	Yes
River Connectivity	Yes
Attached Habitat m2	200x10
River Compartment	9

Images


[A] Confluence with river SM


[B] Upstream of gauging station


[C] Upstream 800m behind


[D] Upstream behind NFC


[E] Gauging Station weir 200m from confluence Limit to fish


[F] Upstream 1000m behind


[G] Limit Upstream 1500m behind NFC

Image Notes

[A] the drain is part of the previous mill bye pass channel with an adjoining weir 400m upstream. [E] is the Swanton Morely gauging station and weir some 200m from the main river confluence. It is affectively a barrier to fish migration out and into the drain.

[C] is some 800m upstream of the ditch and for the section including [D] and [F] is seemingly full of smallish fish. The ditch ends at the culvert at [G] some 2000m from point [A] and has no further connectivity to the river. The section upstream from the gauging station around [C] narrows and becomes shallow, which impounds the fish in the upper sections.

Measures

Options	Measure Proposal	Priority	Risks
Measure 1	Create Fry Refuges in the section between Swanton Morely gauging station and the confluence with the river some 200m.		
Measure 2	Electro Fish the drain where the fish are impounded and move into the section of the drain closer to the weirs and gauging station.		
Measure 3	Electro Fish the drain where the fish are impounded and move into the main river		
Measure 4	Electro Fish the drain where the fish are impounded and move into the adjacent connected drain above location [G]		
Measure 5	Agree with the EA for additional ARIS monitoring to measure movement of fish at the convergence at dusk.		
Measure 6	Discuss the potential to dredge the shallow areas of the drain to enable improved connectivity and free the impounded fish.		

Management Plan

[i] http://publications.naturalengland.org.uk/publication/43006