Otter Estuary

Lower Otter Restoration Programme

Fish Surveys - September 2021

Colclough & Coates
Aquatic Consultants
www.colcloughcoates.co.uk

PACCo Promoting Adaptation to Changing Coasts / Promouvoir l'Adaptation aux Changements Côtiers

Interreg France (Channel Manche) England

ifm Institute of Fisheries Management

Plate 1 Seine netting in the lower Otter estuary September 2021

Plate 2 Winged fyke net set in a secondary channel (fyke net 3)

All photographs by Devon Clinton Estates & S.R.Colclough

Draft Report

Client: **East Devon Pebblebed Heaths Conservation Trust**

Funding acknowledgement

This work was funded by the Interreg VA France (Channel) England programme and the East Devon Pebblebed Heaths Conservation Trust

Project Manager: Steve Colclough BSc (Hons), FIFM, C.Env.

SC² Reference: Lower Otter Restoration Programme Fish Surveys 2021/ 001

Colclough & Coates

SC²

Aquatic Consultants

www.colcloughcoates.co.uk

Colclough & Coates - SC2 Ltd
20 Brownelow Copse
Walderslade, Chatham
Kent, ME5 9JQ.
Tel: 01634 327899
Fax: 01634 327899
e-mail: colcloughcoates@gmail.com
website: www.colcloughcoates.co.uk

EXECUTIVE SUMMARY

Estuaries are extremely productive environments, playing a crucial part in the life cycle of many fish species. They act as key marine fish nursery grounds, as well as vital corridors for migratory species. These are highly dynamic environments, with abrupt changes in oxygen concentration, temperature, turbidity and salinity applying over both the short term and over longer seasonal cycles. The intertidal areas and saltmarsh of the estuarine fringes are vitally important refuge and feeding habitats for fish fry. Saltmarshes exist as a natural component of the estuarine system in the more saline reaches, extending as a band of higher plants on the foreshore between mean high water neap tide level and the mean highwater mark.

The Lower Otter Restoration Project (LORP) is working with local people and partner organisations to adapt and enhance the downstream part of the River Otter, its estuary, and its immediate surroundings for future generations in the face of a rapidly changing climate. The scheme will involve the creation of significant areas of new intertidal habitat.

LORP forms part of the Promoting Adaptation to Changing Coasts (PACCo) project (www.pacco-interreg.com). PACCo is a €26 million Interreg funded project, with €17.8m coming from the European Regional Development Fund (ERDF). The project focuses on two pilot sites: the lower Otter Valley, East Devon, England (www.lowerotterrestorationproject.co.uk) and the Saâne Valley in Normandy, France. The primary output of the project will be a transferable model to influence policy makers at national and EU level and enable climate change adaptation at more sites.

As part of the PACCo funding, several Work Packages will be completed; these will feed into the creation of the 'PACCo Model'. Work Package 1 includes environmental monitoring, to understand the environmental risks, solutions, benefits and disbenefits of these two managed realignment schemes. The lessons learnt will then feed into the model, which will act as a guide for 70 other potential estuaries in the France (Channel) England area that could be sites for this form of adaptation.

AS one element in LORP, the author was approached to conduct a fish survey programme in the Lower Otter estuary and associated salt marshes in advance of the scheme being implemented. The author provided the survey equipment and expertise. Clinton Devon Estates provided staff and volunteers. The surveys took place over the 29th & 30th of September 2021. On the morning of the 29th the author provided a presentation on how fish utilise estuaries and saltmarshes, on behalf of the Institute of Fisheries Management, to provide some background information for the field participants. In the afternoon, seine netting was conducted at a site close the mouth of the Otter. On the 30th, four winged fyke nets were deployed in the morning on the early flooding tide and an intertidal net was deployed adjacent to one set fyke net. The fykes were recovered in the afternoon and a second seine netting further up the estuary was executed.

The fish community in the Lower Otter estuary and associated saltmarshes has similar characteristics to that observed in the Exe estuary, dominated by common goby, bass and grey mullet species. These species have all been regularly reported from estuaries, saltmarshes and managed realignments in England, showing a high degree of penetration and utilisation. It is very likely that these species will utilise the new habitats now under construction in the Lower Otter estuary in a similar manner. With reconnection to the natural floodplain, these may well be joined by both freshwater species such dace and possibly migratory species such as eel and sea trout. These species

are all known to exist in the Otter and have been reported from saltmarshes elsewhere in England in particular circumstances.

Saltmarsh habitats might well represent the optimal nursery grounds for the early life stages of bass (Laffaille *et al* 2001). Green *et al* (2012) demonstrated high site fidelity for the same piece of saltmarsh over the first summer of life in bass. These two factors in tandem would suggest that overall local survival of bass over the first summer of life will be enhanced when the new realignment becomes available. This may well be true of other species too, but high site fidelity has only been demonstrated for bass so far.

Fish utilisation of saltmarshes rises and falls with the tidal cycle. The highest numbers will be present deep in the marsh on the largest tides. To optimise future studies on both the extant marshes and the new realignment it is important to plan future studies under spring tide conditions, where possible. This is particularly important for the inner sections of the new realignment. Fish will only be able to access these areas on a few tides each month.

Site evolution can happen rapidly in such artificially created areas (Burgess et al, 2019; Colclough and Cucknell, 2018). This can have important impacts on how fish can utilise these sites. Future fish sampling can help improve our understanding of how fish access and use the sites and how site evolution can impact upon such utilisation. Long term monitoring of all of the biota that is associated with these sites can only improve future management of the sites and contribute to more sustainable designs and management options for future sites. Citizen science can make a valuable contribution to long term fish monitoring programmes but will probably require technical support over the short to medium term.

CONTENTS

1. INTRODUCTION

Fish in estuaries

Estuaries provide extremely productive environments, playing a crucial part in the life cycle of many fish species (McHugh, 1967; Haedrich, 1983). They act as key marine fish nursery grounds, as well as vital corridors for migratory species. These are highly dynamic environments, with abrupt changes in oxygen concentration, temperature, turbidity and salinity applying over both the short term and over longer seasonal cycles (Thomas, in Attrill, 1998). This tends to limit the species of fish which survive in these conditions, but those that can do so thrive. (Blaber *et al*, 1989). As a reflection of these challenging conditions, the fish communities associated with estuaries are highly dynamic (Blaber, 1991; Colclough *et al,* 2000 & 2002). Very few species are sedentary, most are moving continually in response to this complex of factors. Migrating fish utilise Selective Tidal Stream Transport (STST) to minimise effort (Colclough *et al,* 2000; Jager, 1999). Those fish which are not actively migrating through the estuary, move passively with the tidal excursion to minimise osmotic stresses. Superimposed on this complex picture are pronounced seasonal rhythms in the movements of the fish species themselves. The sheer dynamic scale of all of these processes together has dictated that until recently, the fish communities of many estuaries across Western Europe have been poorly studied in comparison to their freshwater and marine counterparts. Therefore, the importance of these habitats for fish life is still not fully recognised (Elliott, in Elliott & Hemingway, 2002).

Fish in saltmarshes

Saltmarshes exist as a natural component of the estuarine system in the more saline reaches, extending as a band of higher plants on the foreshore between mean high water neap tide level and the mean high water mark. The largest remaining expanses of saltmarsh in Britain lie in the greater Thames estuary along the Essex coast and in Suffolk (Waite, in Attrill, 1998).

Elliott & Taylor (1989) demonstrated that intertidal habitats in estuaries are twice as productive in terms of invertebrate production when compared to subtidal equivalents. The intertidal areas and saltmarsh of the estuarine fringes are vitally important refuge and feeding habitats for fish fry (McLusky *et al*., 1992). This is particularly important for round fish fry, and for some species, such as sea bass, saltmarshes in particular may represent the optimal nursery habitat for the early life stages (Laffaille *et al*, 2001). This understanding of the importance of saltmarshes as nursery grounds for marine fish species is well understood in the US (Bell, 1997; Boesch & Turner, 1984; Roundtree & Able, 1992; West & Zedler, 2000) but is very new to Europe (Laffaille *et al*, 2001; Lyndon, 2002; Colclough *et al*, 2005).

80% of the historic saltmarsh habitat has been lost across Europe, with significant but often unrecognised impacts. McLusky *et al* (1992) estimated that land-claim and sea defence works in the Forth estuary over the past 200 years have reduced overall fish production in the estuary by 66%. In the Thames estuary, less than 1% of the original bank form still exists (Colclough *et al,* 2002). It is now recognised that juvenile fish use the intertidal foreshore for both feeding and as a refuge during the ebb tide. A continuous band of foreshore is an essential element in the ability of small fish to ascend estuaries using STST. (Colclough *et al*, 2000).

Two per cent of English saltmarshes are lost to the sea every year as a consequence of sea level rise (Dixon *et al*, 1998). Saltmarshes are a UK Biodiversity Action Plan habitat and, in England, form part of the Government High Level Target nine habitat series. Under these initiatives the intention is that there should be no further net loss of habitat and opportunities for environmental enhancement should be sought. The new Net Gain planning principle strengthens the case for positive action to create new habitat.

Managed realignment has been developed in the UK since the early 1990's as one of a suite of effective flood risk management measures to meet the challenges provided by storm surges and rising sea levels. There have now been more than 40 such treatments in the UK, with sites in the Humber, Greater Thames and Severn estuaries and on a number of coastal locations on the East, South and West coasts.

A lot of information on how saltmarshes function and the ecosystem services they provide, including fish utilisation, has been developed over the last 20 years in the UK, through the study of managed realignment treatments which develop saltmarsh plant communities over a period of years (Colclough *et al*, 2005; Dixon *et al*, 2007; Fonseca, 2009; Fonseca, *et al*, 2011; Yates, 2012; Green *et al*, 2012; Nunn *et al*, 2016; Colclough, 2017). Saltmarshes can provide a number of other valuable ecosystem services, including nutrient and micro-pollutant removal and carbon sequestration. (Luisetti, 2011; Viera da Silva,2012). Placing all of the currently known functionality of saltmarshes in Water Framework Directive terms, these habitats may prove to be vital components in achieving good ecological status.

Dixon *et al,* (2007) provided a review of the early experiences with design and development of some of the first UK sites (Blackwater and Crouch estuaries). As our knowledge of how sites evolve and how fish utilise these sites over time, we have begun to improve our guidance on site design (Burgess *et al*, 2019).

Intertidal habitat creation is also now occurring even in the confines of urban and industrial estuaries. Intensive development in the Thames estuary led to the development of an Encroachment Policy in the early 00's led by the Environment Agency (EA), to resist further encroachment on the grounds of unacceptable impacts on flood risk as well as a range of ecological issues. This policy led to the development through the Thames Estuary Partnership of the Estuary Edges Guidance to encourage no net loss of habitat and the proliferation of artificial marginal habitat features. A second iteration of this guidance in 2018 required assessments of how the early sites had performed. This process included fish surveys on a range of installed features with recommendations provided for future design improvement. (Colclough and Cucknell, 2018). For further information see https://thamesestuarypartnership.org/our-projects/estuary-edges/.

2. LOWER OTTER RESTORATION PROGRAMME

The Lower Otter Restoration Project (LORP) is working with local people and partner organisations to adapt and enhance the downstream part of the River Otter, its estuary, and its immediate surroundings for future generations in the face of a rapidly changing climate. The existing 200-year-old sea defences are now starting to fail and are becoming increasingly hard to maintain. This is already impacting on public infrastructure, local businesses and homes, and recreational facilities.

The major partners in the Lower Otter Restoration Project include Clinton Devon Estates, who own the land around the estuary, the Pebblebed Heaths Conservation Trust who are responsible for management in the Otter estuary and the Environment Agency which has responsibility for improving resilience to climate change, flood defence, increasing biodiversity and improving habitats and water quality.

The River Otter embankment is being breached in a managed way, reconnecting the natural floodplain, creating intertidal saltmarsh, mudflats and freshwater habitats. The Budleigh Brook will be released from its aqueduct and realigned in the floodplain. The project includes the provision of new revised public access and parking.

PACCo

LORP forms part of Promoting Adaptation to Changing Coasts (PACCo) project (www.pacco-interreg.com). PACCo is a €26 million Interreg funded project, with €17.8m coming from the European Regional Development Fund (ERDF). The project focuses on two pilot sites: the lower Otter Valley, East Devon, England (www.lowerotterrestorationproject.co.uk) and the Saâne Valley in Normandy, France. The primary output of the project will be a transferable model to influence policy makers at national and EU level and enable climate change adaptation at more sites.

As part of the PACCo funding, several Work Packages will be completed; these will feed into the creation of the 'PACCo Model'. Work Package 1 includes environmental monitoring, to understand the environmental risks, solutions, benefits and disbenefits of these two managed realignment schemes. The lessons learnt will then feed into the model, which will act as a guide for 70 other potential estuaries in the France (Channel) England area that could be sites for this form of adaptation.

As part of LORP, the author was approached to conduct a fish survey programme in the Lower Otter estuary and existing associated salt marshes in advance of the scheme being implemented. The author provided the survey equipment and expertise. Clinton Devon Estates provided staff and volunteers. Mike Williams of the Environment Agency also participated in the survey fieldwork.

A number of authorisations are often required for proper and legal delivery of fish survey programmes. The process undertaken in this instance and the authorisations involved are presented in Appendix X for future guidance.

3. FISH SURVEY METHODOLOGY

Effective methods to capture fish in the intertidal margins of estuaries and saltmarsh require a clear understanding of how the tide moves across the site. Seine netting techniques are normally applied in these situations at either high water slack or low water slack to minimise flow. Fixed fyke net are normally set after low water, fish through the tide and are removed during the ebb before fish become stranded. (Colclough *et al,* 2005). Since this was the first survey programme in the Otter, a lot was learnt about tidal timings for future studies.

The surveys took place over a two-day period in late September on the 29th and 30th. 2021. On the morning of the 29th the author provided a presentation on how fish utilise estuaries and saltmarshes, on behalf of the Institute of Fisheries Management, to provide some background information for the field participants. In the afternoon, seine netting was conducted at a site close the mouth of the Otter. Given the presentation in the morning, it was not possible to undertake typical seine netting at low water slack. The afternoon netting sessions on the 29th were therefore conducted in an area of reduced flow where a localised eddy made netting practicable.

On the 30th, four winged fyke nets were deployed with stakes in the morning on the early flooding tide. An intertidal net was later deployed just upstream of fyke net 2 as the flooding tide began to cover the ground. The seine net was deployed twice in the afternoon in another area protected from the strong ebb flow.

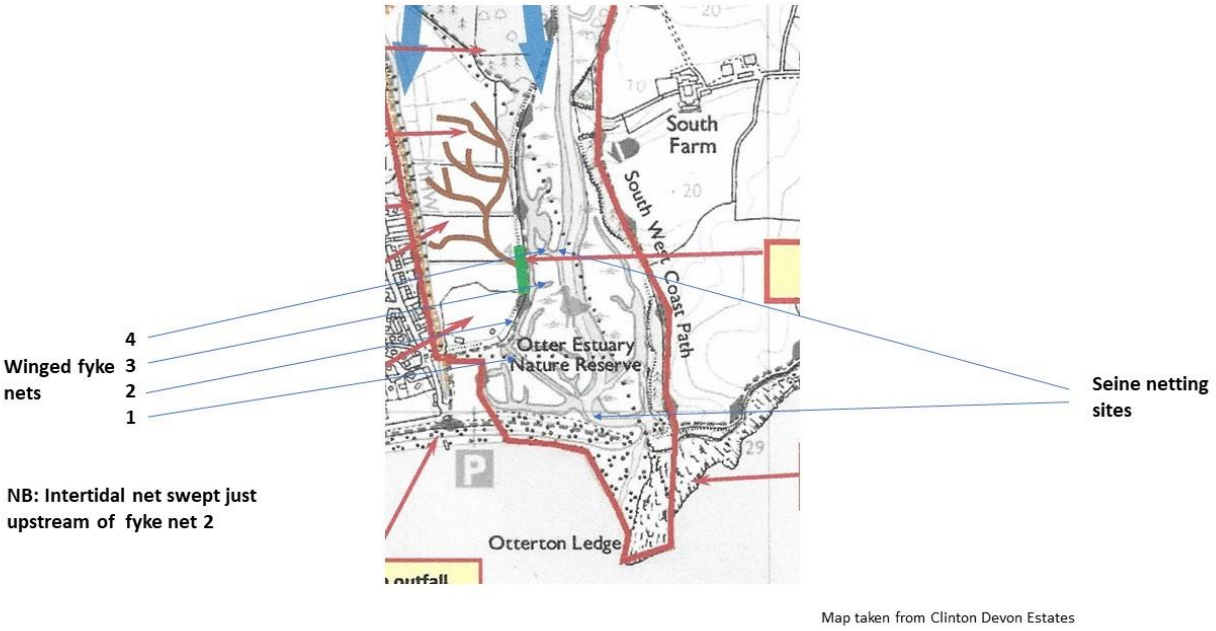
Details of the instruments are provided below. The locations of the netting operations are produced in Figure 1 and photographs of the instruments themselves appear in Appendix VII.

Seine net: 15m by 2.7 m micromesh.

Winged fyke net: 5m in length with a reducing knotless mesh of 10.8.6mm. The 2.5m wings have a 10mm knotless mesh. The fykes were fitted with rectangular otter guards and fixed in place with five metal stakes.

Intertidal net: 2.5m by 1.5m wall of 1mm knotless mesh set out on two 1.5m ash poles with a lead core line at the base.

Figure 1 Extract from LORP map to show positions of fish sampling in September 2021



Map taken from Clinton Devon Estates

4. RESULTS

Otter Estuary and saltmarsh sampling

Appendix I presents the data from the two days of netting. On the 30th September, the tide did not penetrate sufficiently for fyke net 3 in the small secondary channel to be fully covered and so the net was removed early (see Plate 2). The timing sequence on day 2 was driven by the timing of the tide ebbing across the site to avoid fish strandings.

All fish captured where identified and enumerated. Sub-samples (30 plus) were measured for total length in mm. with a small Perspex fish viewer. Superabundant numbers of the common goby in the second seine netting sweep on the 29th, in both seine nets sweeps on the 30th and in the final fyke emptied (fyke 1) rendered this impracticable and unnecessary. All fish were returned to the water as soon as possible. Photographs of the fish captured and the Perspex viewer appear in Appendix VI.

Salinity was measured at the seine netting sites on the 29th and at fyke 4 on the 30th with a calibrated refractometer.

Exe Estuary Fish Survey Data

The National Fish Population Database (NFPD) holds all Environment Agency (EA) freshwater and transitional waters fish data. This includes data arising from the WFD TraC waters multi-method fish survey programme, that the author's team in the EA set up in 2002-2006. Surveillance monitoring began in 2007 in 30 estuaries across England and Wales, employing the standardised biannual multi-method approach (Coates *et al*, 2007). The Otter was not included in the TraC water surveillance programme and there is no data for the estuary available on NFPD. However, there is a wealth of data available for the Exe estuary which is closely adjacent (<10km.). Experience suggests that given the proximity and the physical similarity of the two estuaries, then some description of the fish community in the Exe estuary might provide some useful context for the findings made in this study. NFPD data is available online. A selection of the data held on NFPD for the recent period 2014-2018 is presented in Appendices III-V.

The data for five sites has been grouped according to location. Appendix III shows data from a seine netting site at Topsham close to the head of the estuary. Appendix IV presents data for two sites fished in the middle reaches, one with the seine net and one with a 1.5m beam trawl. Appendix V presents the data for a seine net site and a 1.5m beam trawl, both close to the mouth of the estuary.

5. DISCUSSION

Elliott & Dewailly (1995) developed a functional guild approach that best describes the life history characteristics of fish species within an estuary -

- Estuarine residents (ER) – Fishes that spend their entire life in estuaries.
- Marine seasonal species (MS) – Fishes that use estuaries for part of the year.
- Freshwater species (FW) – Fishes that are present mainly or exclusively at low salinity values.
- Marine juvenile species (MJ) – Fishes that use estuaries as nursery grounds or during juvenile phases of their life cycle.

- Diadromous species (CA) – Species that migrate between fresh and salt water during different life stages.
- Marine adventitious species (MA) – Species that are considered fully marine but inhabit estuaries temporarily.

In the real world, this simplified system does not fit several species completely but is adequate for the present purpose to help describe how fish species use estuaries.

Otter Estuary and saltmarsh data

Appendix I displays the survey data from the recent Otter survey. All three species taken, common goby (*Pomatoschistus microps*)(ER) , bass (*Dicentrarchus labrax*) (MJ) and thin lipped grey mullet (Chelon ramada) (MS) were recovered in all of the sweeps with the seine net conducted over both days.

The common goby was abundant in three of the four sweeps conducted in total. Common goby live for less than two years. Males make nests in shells, rocks and crevices below the low water mark in the lower reaches of estuaries and display a vigorous nest guarding behaviour. Spawning may take place on multiple occasions during the spring and summer months. Spawning later in the summer might involve specimens which hatched in the early spring (Fouda and Miller, 1981). Juveniles as small as 9mm are adept at using STST to move deep in the estuarine environment and will heavily utilise saltmarsh creeks (Colclough *et al*, 2005). Most species of fish will only use the marsh during the upper half of the tidal cycle. Common goby will remain for much longer periods if sufficient depth and cover is available at low tide (Fonseca, 2009).

The use of the intertidal net demonstrates the value of the multimethod survey approach established for WFD in transitional waters (Coates *et al*, 2007). These gobies were so small that no other method would have reported their presence (Appendix II). These very small specimens must have arisen from a mid-summer spawning event. They were captured as soon as the water entered the channel under study, demonstrating a noted characteristic common to other species that use saltmarshes as well. Small fish show a strong motivation to enter the marsh as soon as the rising tide permits, to maximise the feeding opportunities available in warm shallow water with abundant food items available and where the vegetation provides effective cover from predation. The common goby is one of the most abundant species found in saltmarshes, providing a major food source for a range of fish and bird species (Healey, 1972; Fouda and Miller, 1981).

All of the grey mullet captured were identified on site as thin lipped grey mullet (see below under the Exe data for a description of the three species of grey mullet found in English waters). Even with juveniles of 20-30mm, a practiced eye can discriminate between the thin lipped and thick lipped species (*Chelon labrosus*) with a fair degree of accuracy, especially in the Perspex viewer with a hand magnifier. Furthermore, the ambient salinity conditions present at all sites on both days would suggest that the thick lipped species would not be present in the locations sampled. What is much more difficult is field discrimination between the thin lipped and golden grey mullet species (*Chelon aurata*) at these small sizes. It is possible that some of these small specimens might have been golden grey mullet. At least three year classes may be in evidence in the length frequency histogram for thin lipped grey mullet in Appendix II.

There are at least two year classes in the length frequency histogram for bass in Appendix II. Multiple waves of post-larvae of bass originating from different spawning site arrive in English estuaries in a series of waves at 12mm. plus through the summer months (Sabriye, *et al,* 1988). At the time of year of the sampling all of the fish at 90mm or less may well have originated from

spawning events in 2021.The single larger specimen at 150mm is a second year fish. What is noteworthy is that although first summer bass are known to penetrate to the head of estuaries and may for short periods penetrate freshwater conditions, there is no published data on larger specimens tolerating very low salinity levels. As note in Appendix I, the ambient salinity at the seine netting sites on 29th September was 0ppt. The salinity would have risen with the flooding tide in a few hours, but it does demonstrate that this fish could remain on station for a short period when conditions were not favourable.

Exe Estuary data

The fish data presented for the Exe in Appendices III-V describes a very typical estuarine fish community on the south coast of England, when compared to other estuarine data sets available on NFPD.

Freshwater species (FW) such as dace (*Leuciscus leuciscus*) are abundant in the inner estuary, along with more euryhaline species such as common goby, sand goby (*Pomatoschistus minutus*) (ER) and bass. There are three species of grey mullet in English waters and all three have been identified at Topsham. The large number of unidentified grey mullet (Mugilidae) at this site demonstrates the difficulty of field identification of juvenile grey mullet. Thick lipped grey mullet spawn offshore in the winter and spring. Early life stages and adults begin to appear in the coastal margins in late spring. The species does not penetrate freshwater conditions at any life stage. The thin lipped grey mullet) spawns in inshore waters between September and February. Both juveniles and adults will enter estuaries and saltmarshes in the summer months and can penetrate deep into freshwater conditions for long periods. The golden grey mullet, a more southerly species, is now breeding in English waters (A. Pinder, pers.comm.) Juveniles of all three species can often be found in mixed shoals in the lower reaches of estuaries making field identification of these similar species problematic (Henderson, 2014).

Common goby, sand goby and bass dominate in the middle reaches of the estuary with more marine species such as herring (*Clupea harengus)* (MS) and the lesser weever (*Echiichthys vipera*) (MA) beginning to appear.Common and sand goby both appear to be less common in the lower reaches with grey mullet species very common. The high numbers of sand smelt (*Atherina presbyter*) are of interest. This euryhaline species (ER) can often be found throughout an estuary in the summer months. More marine species such as the lesser sand eel (*Ammodytes tobianus*) (MA) and European pilchard (*Sardina pilchardus*) (MA) are common.

One interesting feature in the Exe estuary is the paucity of flatfish species. The flounder (*Platichthys flesus*) (ER) is a euryhaline species that penetrates to the head of the estuary in its first summer. Flounder often remain in the middle and lower reaches for the remainder of their life. The juveniles of more marine species such as plaice (*Pleuronectes platessa*) , dab (*Limanda limanda*) and sole (*Solea solea*) are commonly found in the lower reaches of many estuaries (Henderson, 2014).

Equipment and Personnel

The Institute of Fisheries Management is one of a several bodies who are now endeavouring to foster and support a relatively recent and strong growth in citizen science engagement in fish ecology studies. Since most fish survey programmes in tidal waters are conducted seasonally or infrequently, there is a challenge here in terms of competency and safety. It is very probable that in the early years of long-term survey programmes, some continuous active/remote technical support will be required, given the infrequency of sampling and volunteer turnover.

The equipment deployed in this survey programme is now regarded as some of the best practice instruments to use in these conditions. The 15 m seine net is a standard net supplied by Collins Nets at Bridport at £550 (inc VAT, 2021 catalogue). Similarly, the winged fyke nets are supplied by the same company at (£260 inc VAT). The intertidal net is a unique experimental but simple design. Construction costs are likely to be less than £100 per item. The author is very happy to provide further advice on equipment if required.

6. CONCLUSIONS AND RECOMMENDATIONS

The fish community described in the Lower Otter estuary and associated saltmarshes is similar to that described in more detail in the Exe estuary, dominated by common goby, bass and grey mullet species.

These species have all been regularly reported from estuaries, saltmarshes and managed realignments in England, showing a high degree of penetration and utilisation. It is very likely that these species (and others reported in the Exe) will utilise the new habitats now under construction in the Lower Otter estuary in a similar manner. With reconnection to the natural floodplain, these may well be joined by both freshwater species e.g. dace and possibly migratory species e.g. eel (*Anguilla Anguilla*) and sea trout (*Salmo trutta*) at times. These species are all known to exist in the Otter and have been reported from saltmarshes elsewhere in England in particular circumstances.

As stated earlier, saltmarsh habitats might well represent the optimal nursery grounds for the early life stages of bass (Laffaille *et al* 2001). In a later piece of work, Green *et al* (2012) demonstrated high site fidelity for bass to the same piece of saltmarsh over the first summer of life. These two factors in tandem would suggest that overall local survival over the first summer in bass will be enhanced when the new realignment becomes available. This may well be true of some other species too, but high site fidelity has only been demonstrated for bass so far.

Fish utilisation of saltmarshes rises and falls with the tidal cycle. The highest numbers will be present deep in the marsh on the largest tides. To optimise future studies on both the extant marshes and the new realignment it is important to plan future studies under spring tide conditions, where possible. This is particularly important for the inner sections of the new realignment. Fish will only be able to access these areas on a few tides each month
.
Site evolution can happen rapidly in these artificially created areas (Burgess et al, 2019; Colclough and Cucknell, 2018). This can have important impacts on how fish can utilise these sites. Future fish sampling can help improve our understanding of how fish access and use the sites and how site evolution can impact upon such utilisation.

Long term monitoring of all the biota that is associated with these sites can only improve future management and contribute to more sustainable designs and management options for future sites.

Citizen science can make a valuable contribution to long term fish monitoring programmes but will probably require technical support over the short to medium term. The author and the Institute of Fisheries Management are very willing to support such efforts going forwards.

7. ACKNOWLEDGEMENTS

The author is extremely grateful for all the assistance and advice provided by the following personnel - Kendal Archer, Kate Ponting, Mike Williams and some wonderful citizen science volunteers!

8. REFERENCES

Attrill, Martin J., ed. (1998). *A rehabilitated estuarine ecosystem: The environment and ecology of the Thames estuary*. Springer Science & Business Media.

Bell F.W. (1997) The economic valuation of saltwater marsh supporting marine recreational fishing in the southeastern United States. Ecological Economics 21, 243–254.

Blaber, S. J. M., D. T. Brewer, and J. P. Salini. (1989) "Species composition and biomasses of fishes in different habitats of a tropical northern Australian estuary: their occurrence in the adjoining sea and estuarine dependence."*Estuarine, Coastal and Shelf Science* 29.6 509-531.

Blaber, S.J.M. (1991). Deep sea, estuarine and freshwater fishes: life history strategies and ecological boundaries. South African Journal of Aquatic Sciences, 17, 2-11.

Boesch, D.F. & Turner, R.E. (1984) Dependence of fishery species on salt marshes – the role food and refuge. Estuaries. 7(4A). 460-468.

Burgess, H., Nelson K., Colclough,S and Dale, J. The impact that geomorphological development of managed realignment sites has on fish habitat. ICE Coastal Management Conference, La Rochelle, September 2019.

Coates, S., Waugh, A., Anwar, A., Robson, M., (2007). Efficacy of a multi-metric fish index as an analysis tool for the transitional fish component of the water framework directive. Marine Pollution Bulletin 55, 225–240.

Colclough, S. R., Dutton, D., Cousins, T. & Martin, A. (2000). *A Fish Population Survey of the Tidal Thames*. Bristol: Environment Agency.

Colclough, S. R., Gray, G., Bark, A., & Knights, B. (2002). Fish and fisheries of the tidal Thames: management of the modern resource, research aims and future pressures. *Journal of Fish Biology*, *61*(sA), 64-73.

Colclough, S. R., L. Fonseca, T. Astley, K. Thomas & W. Watts. (2005). Fish utilisation of managed realignments. Fisheries Management and Ecology 12: 351–360.

Colclough, S. & Cucknell, A. (2018). A survey of fish populations associated with a series of artificial habitat structures in the Thames Estuary. Thames Estuary Partnership.

Colclough, S. (2017) Hazlewood Marshes, Alde Estuary. A survey of fish populations associated with the marshes. Suffolk Wildlife Trust.

Dixon A.M., Leggett D.J. and Weight R.C., (1998). Habitat creation opportunities for landward coastal re-alignment: Essex case studies. Journal of the Chartered Institute of Water and Environmental Management 12, 107–111.

Dixon, M., Morris, R.K.A., Scott, C.R., Birchenough, A. and Colclough, S. (2007). Managed coastal realignment: lessons from Wallasea., UK Proceedings of the Institution of Civil Engineers Maritime Engineering 000. Month 2008 Issue MA0. Pages 1–11. Doi: 10.1680/muen.2008.

Elliott, M. (2002). *Fishes in Estuaries* (Elliott, M. & Hemingway, K. L., eds), pp. 410–509. Oxford: Blackwell Science Ltd.

Elliott, M., Dewailly, F., 1995. The structure and components of European estuarine fish assemblages. Netherlands Journal of Aquatic Ecology 29, 397–417.

Elliott, M. & C.J.L. Taylor (1989). The structure & functioning of an estuarine/marine fish community in the Forth Estuary, Scotland*. Proceedings of the 21st European Marine Biology Symposium Gdansk* 14-19 September 1986 Polish Academy of Sciences, Institute of Oceanology, Warsaw pp 227-240.

Fonseca, L. (2009). Fish Utilisation of Saltmarshes and Managed Realignment areas in SE England. Ph.D thesis, School of Biological and Chemical Sciences, Queen Mary, University of London.

Fonseca, L., Colclough, S., Hughes, R.G., (2011) "Variations in the feeding of 0-group bass Dicentrarchus labrax (L.) in managed realignment areas and saltmarshes in SE England." *Hydrobiologia* 672.1: 15-31.

Fouda, M.M. and Miller, P.J., 1981. Age and growth of the common goby, Pomatoschistus microps, on the south coast of England. *Estuarine, Coastal and Shelf Science*, *12*(2), pp.121-IN1.

Green, C.G., Smith, D.J., Grey J. and Underwood J.C. (2012) High site fidelity and low site connectivity in temperate salt marsh fish populations: a stable isotope approach. Oecologia (2012) 168:245–255

Haedrich, R.L. (1983). Estuarine Fishes. In (Ketchum, B. Ed*.). Estuaries and Enclosed Seas.* Elsevier, Amsterdam., pp. 183-207.

Healey, M.C., 1972. On the population ecology of the common goby in the Ythan estuary. *Journal of Natural History*, *6*(2), pp.133-145.

Henderson, P. (2014*). Identification Guide to the Inshore Fish of the British Isles.* 321pp. Pisces Conservation.

Jager, Z. Selective Tidal Stream Transport of Flounder Larvae (Platichthys flesusL.) in the Dollard (Ems Estuary), Estuarine, Coastal and Shelf Science, Volume 49, Issue 3, September 1999, Pages 347-362, ISSN 0272-7714, 10.1006/ecss.1999.0504.

Laffaille P., Feunteun E. and Lefeuvre J.-C., (2000). Composition of fish communities in a European macrotidal salt marsh (the Mont Saint-Michel Bay, France). Estuarine, Coastal and Shelf Science 51, 429–438.

Laffaille, P., Lefeuvre, J. Schricke, M.T. & Feunteun, E. (2001) Feeding ecology of 0-group Bass, *Dicentrachus labrax*, in salt marshes of Mont Saint Michel Bay (France) *Estuaries* 24 No1 116-125.

Luisetti, T. (2009). Alternative Economic approaches to the Assessment of Managed Realignment Policy in England. Ph.D thesis, School of Environmental Sciences, The University of East Anglia.

Lyndon A.R., Bryson J.G., Holding N. and Moore C.G., (2002). Feeding relationships of fish using intertidal habitats in the Forth estuary. Journal of Fish Biology 61 (Suppl. A), 74–80.

McHugh, J. L. (1967). "Estuarine nekton." *IN ESTUARIES, 1967, PP 581-620.*

Mc Clusky, D.S., Bryant, D.M. & Elliott, M. (1992). The impact of land-claim on the invertebrates, fish and birds of the Forth Estuary. Aquatic Conservation: *Marine & Freshwater Ecosystems*, 2, 211-222.

Nunn, A. D., D. Clifton-Dey, and I. G. Cowx. (2016) “Managed realignment for habitat compensation: Use of a new intertidal habitat by fishes.” *Ecological Engineering* 87 71-79.

Rountree R.A. and Able K.W., (1992). Foraging habits, growth and temporal patterns of salt-marsh creek habitat use by young of year summer Flounder in New Jersey. Trans. American Fisheries Society 121, 765–776.

Sabriye, A.S., Reay, P.J. and Coombs, S.H., 1988. Sea-bass larvae in coastal and estuarine plankton. *Journal of Fish Biology*, *33*, pp.231-233.

Vieira da Silva, L. (2012). Ecosystem Services Assessment at Steart Peninsula, Somerset, UK. Unpublished MSc thesis, Imperial College London.

West J.M. and Zedler J.B., (2000). Marsh-creek connectivity: fish use of a tidal salt marsh in Southern California. Estuaries 23, 699–710.

Yates, J. (2012). The Change in Fish Abundance and Diversity over time in Man-made Intertidal Habitats on the Thames Estuary. Unpublished MSc Dissertation. Kings College, London.

.Appendix I

Lower Otter estuary fish sampling 29th September 2021

Species	Length mm	Nos. measured	Others	Total captured
HW 11.35am; LW 17.34pm. Seine netting. Two sweeps at 13.30pm and 14.30pm (Catches combined) NGR SY07561 81979				
Thin lipped grey mullet	52,44,42,36,34,32,30, 42	8	0	8
Common goby	37 fish captured at 18-52mm	37	Abundant in second netting. None counted or measured.	-
Bass	30,55,55,62,64,65,72,82,88,90,93, 150	12	0	12

Note : High freshwater flows. Strong flow operating on ebbing tide. Salinity - 0 ppt.

Lower Otter Estuary Sampling 30th September 2021

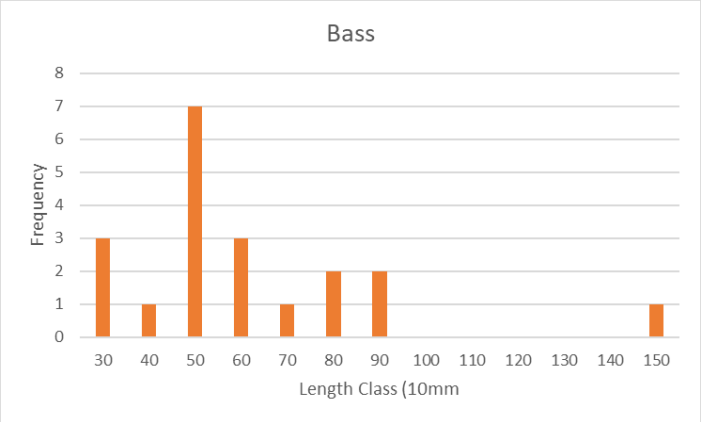
Species	Length mm	Nos. measured	Others	Total captured
HW 12.31 pm; LW 18.36 pm.				
Intertidal net 12.30pm. NGR SY07432 82285				
Common goby	9,10,10,10,10,11,11,12,12,15,16,18	12	0	12
Fyke net 4 recovered at 13.10pm. NGR 07471 82379				
Thin lipped grey mullet	46,45,42,42,38,36,32,32	8	0	8
Fyke net 2 recovered at 14.00 pm. NGR SY 07423 82261				
Thin lipped grey mullet	50,42,42,42,40,36,34,34,32,32,30,30,42,40,38,36.	16	0	16
Seine net. Two sweeps made at 14.40pm and 15.00pm. NGR 07495 82361 (Catches combined).				
Thin lipped grey mullet	65 fish captured at 28-170mm	65	0	65
Common goby	36,34,32,30,28,26,25,25,24,24,22,18.	12	Abundant. Many more not counted or measured (C & M)	-
Bass	52,40,38,35	4	0	4
Fyke 1 recovered at 15.30pm. NGR SY07390 82133				
Bass	60,58,55,50.	4	0	4
Common goby		-	Abundant. None C & M.	-

Note: Fyke 3 removed unfished. Salinity at fyke 1 at 15.30 pm - 2ppt.

Appendix II

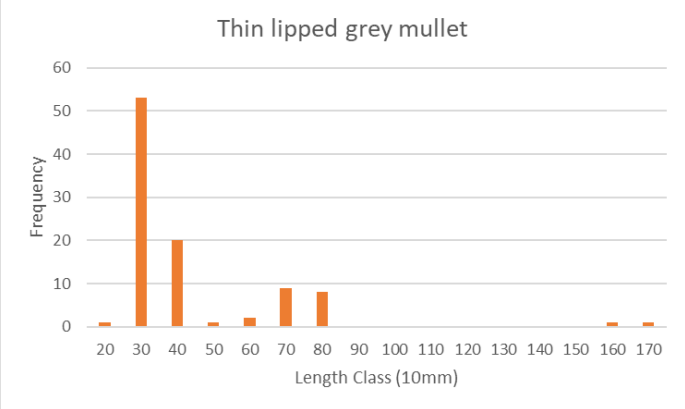
Length Frequency Histograms

Combined data for 29th & 30th September 2021



N=20

N= 49



N=96

Appendix III

Inner Exe Estuary

Fish species reported by the Environment Agency from Topsham SX 9606388505

2014-2018 (Autumn data only) - Seine netting

Latin Name	Common Name	Total Catch 2014-2018	Percentage of total catch	Comments
Chelon aurata	Golden grey mullet	1	-	
Chelon labrosus	Thick lipped grey mullet	328	12.4	All taken on 22/10/2014
Chelon ramada	Thin lipped grey mullet	1	-	
Dicentrachus labrax	Bass	648	24.5	
Gasterosteus aculeatus	Three-spined stickleback	1	-	
Leuciscus leuciscus	Dace	236	8.9	
Mugilidae	Grey mullet spp.	394	14.9	
Platichthys flesus	Flounder	4	-	
Pomatoschistus microps	Common goby	759	28.7	
Pomatoschistus minutus	Sand goby	270	10.2	
Rutilus rutilus	Roach	1	-	
Salmo trutta	Brown trout	1	-	
		2644	Total catch	

Appendix IV

Middle Exe Estuary

Fish species reported by the Environment Agency from Starcross SX 9750483878

2014-2018 (Autumn data only) - Seine netting

Latin Name	Common Name	Total Catch 2005-2018	Percentage of total catch	Comments
Ammodytes tobianus	Lesser sandeel	1	-	
Anguilla anguilla	European eel	1	-	
Atherina presbyter	Sand smelt	71	2.5	
	Solonette	1	-	
	Dragonet	1	-	
Chelon aurata		3	-	
Chelon labrosus		25	0.9	
Chelon ramada		72	2.5	
Ciliata mustela		7	-	
Clupea harengus	Herring	14	-	
Dicentrachus labrax	Bass	500	18.2	
Gasterosteus aculeatus	Three-spined stickleback	1	-	
Labrus bergylta	Ballan Wrasse	1	-	
Lipo	Shanny	1	-	
Mugil	Grey mullet spp.	73	2.5	
Parablennius gattorugine		1	-	
Platichthys flesus	Flounder	10	-	
Pleuronectes platessa	Plaice	6	-	
Pollachius pollachius	Pollack	3	-	
Pomatoschistus microps	Common goby	1430	52.0	
Pomatoschistus minutus	Sand goby	483	17.6	
	Brill	1	-	
Solea solea	Sole	4	-	
Sprattus sprattus	Sprat	32	1.2	
Sygnathus rostellatus	Lesser pipefish, Nilsson's pipefish	4	-	
	Long spined sea scorpion	1	-	
		2744	Total	

Fish species reported by the Environment Agency from Gas Pipe (Powderham) SX 9785585112

2014-2018 (Autumn data only) - 1.5m beam trawl

Ammodytes tobianus	Lesser sandeel	1	-	
Anguilla anguilla	European eel	1	-	
	Solonette	1	-	
Dicentrachus labrax	Bass	16	2.0	
Pholis gunnellus	Butterfish	1	-	
Platichthys flesus	Flounder	3	-	
Pleuronectes platessa	Plaice	1	-	
Pomatoschistus microps	Common goby	553	68.5	
Pomatoschistus minutus	Sand goby	222	27.5	
	Brilll	2	-	
	Sole	4	-	
	Greater pipefish	1	-	
Sygnathus rostellatus	Lesser pipefish, Nilsson's pipefish	1	-	
		807	Total	

Appendix V

Lower Exe Estuary

Fish species reported by the Environment Agency from Dawlish Warren SX 9903080226

2014-2018 (Autumn data only) - seine net

Latin Name	Common Name	Total Catch 2003-2013	Percentage of total catch	Comments
Ammodytes tobianus	Lesser sandeel	155	3.2	Taken 2006-2018
Atherina presbyter	Sand smelt	3200	65.7	
Belone belone	Garfish	1	-	
Chelon aurata	Golden grey mullet	1	-	
Chelon labrosus	Thick lipped grey mullet	425	8.7	
Chelon ramada	Thin lipped grey mullet	17	-	
Clupea harengus	Herring	7	-	2005-2018
Dicentrachus labrax	Bass	57	1.2	
Echiichthys vipera	Lesser weever	3	-	
Mugilidae	Grey mullet spp.	429	8.8	
	Worm pipefish		-	
Platichthys flesus	Flounder	1	-	
Pleuronectes platessa	Plaice	6	-	Taken 2005-2017
Pomatoschistus microps	Common goby	128	2.6	
Pomatoschistus minutus	Sand goby	43	0.9	
Sardina pilchardus		336	6.9	
Psetta maxima	Turbot	1	-	
Salmo trutta	Brown trout	2	-	
Solea solea		3	-	
Sprattus sprattus	Sprat	49	1.0	Taken 2005-2017
Sygnathus rostellatus	Lesser, Nilsson's pipefish	1	-	
		4872	Total catch	

Fish species reported by the Environment Agency from Shelly Beach SX 9849981180

2014-2018 (Autumn data only) - 1.5m Beam Trawl

Ammodytes tobianus	Lesser sandeel	7	1.5	
	Dragonet	1	-	
Echiichthys vipera	Lesser weever	2	-	
Pleuronectes platessa	Plaice	1	-	
Pomatoschistus microps	Common goby	116	25.6	
Pomatoschistus minutus	Sand goby	317	70.8	
Solea solea	Sole	1	-	
Sygnathus rostellatus	Lesser, Nilsson's pipefish	4	1.0	
		448	Total catch	

Appendix VI

Photographs of fish species captured

Plate 3 Common goby *Pomatoschistus microps*

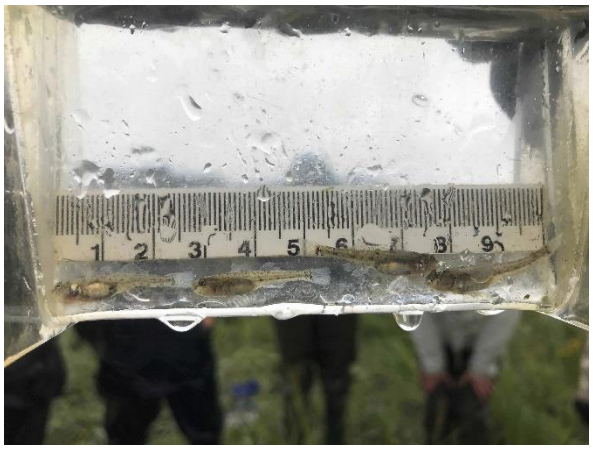


Plate 4 Thin lipped grey mullet *Chelon ramada*

Plate 5 Bass *Dicentrarchus labrax*

Appendix VII

Site and sampling photographs

Plate 6 Seine netting at Site 1

Plate 7 Setting fyke 4 at low water in main saltmarsh channel

Plate 8 Intertidal net

Appendix VIII

Other fish sampling locations

Plate 9 Site of fyke net1

Plate 10 Site of fyke net 2

Plate 11 Site of fyke net 4 and second seine netting site

Appendix IX

New managed realignment under construction

Plate 12 New bund wall under construction

Plate 13 New channel construction

Appendix X

Authorisations and Consents

Note:

To conduct such fish surveys, several authorisations, consents and byelaw exemptions are required. For future reference these are appended here.

The Environment Agency regulate salmon and freshwater fisheries in all inland waters out to 6 miles from the coast. In estuaries, this means that an authorisation to use fishing instruments is required under the Salmon and Freshwater Fisheries Act 1975 (as amended by the Marine & Coastal Access Act, 2009). The application for the work and the authorisation received are included below at 1 & 2. Note the requirement to fit otter guards to the fyke nets.

Since the site is designated as an SSSI, the Environment Agency were required to consult Natural England over this application . The third inclusion is a positive response after such consultation.

Under the Marine & Coastal Access Act 2009, Devon & Severn IFCA control marine fisheries around the Devon coast right up to the tidal limit in estuaries. An application to conduct the fish surveys and a request for relevant exemptions under the IFCA byelaws in order to conduct the surveys is included at 4. Since the site is also designated as an MCZ, the IFCA were required to also consult Natural England. The final inclusion is the exemption letter received after that consultation at 5. All inclusions are top covers only.

All of these processes are time limited. It will be necessary to apply for all of these documents well in advance of each future survey programme. Having established the necessary links for the recent works, which were the first of their kind in the Otter estuary, processing should be easier in future.

1. Application for EA authorisation

Form FR2: Application for authorisation to use fishing instruments other than rod and line in England

Application for authorisation to use fishing instruments other than rod and line in England

Environment Agency

Please read the additional notes on the reverse of this form before completing sections 1–6.

1 The applicant

Title (Mr, Mrs, Miss and so on): Mr
First name: Stephen
Last name: Colclough
Position: Estuarine and Marine Specialist Section Chair
Organisation: Institute of Fisheries Management
Address: 20 Brownelow Copse, Walderslade, Chatham, Kent
Postcode: ME5 9JQ
Phone: 01634 686480
Fax:
Mobile: 07804 306346
Email: srcifm@gmail.com

2 Contractor (if different from above)

Contact name
Title (Mr, Mrs, Miss and so on):
First name:
Last name:
Position:
Organisation:
Address:
Postcode:
Phone:
Fax:
Email:

3 About the water

Name of water: Lower Otter Estuary
Cefas Registration Number:
Nearest town and county: Budleigh Salterton, Devon
Location, give a national grid reference (an upstream and downstream point if on a stretch of river) or attach a clear map with the water marked
From: S Y 0 7 5 2 8 3 8 7
To: S Y 0 7 5 7 8 2 0 1
e.g. SY 1234 5678
Type of water
Canal ☐ River ☑ Stillwater ☐
Size of stillwater: acres ☐ or hectares ☐
Does the site have a conservation designation such as an SSSI?
No ☐ Yes ☑ Type of order: SSSI

4 About the task you plan to carry out

Planned date(s) of task, we cannot issue authorisation in retrospect
28th September - 1st October 2021
Netting or trapping ☑ Please give equipment details
15m* 2m seine(3mm) + 4 small winged fyke nets 5m (5mm)
Electric fishing ☐ Please give equipment details

5 Purpose of the task

Commercial ☐ Personal use ☐
Fishery Management ☐ Scientific and monitoring ☑
Any additional details
Training exercise and saltmarsh fish survey for the Lower Otter Restoration Project (EA & Devon Clinton Estates)
Are you intending to remove any fish from the site? If you intend to remove crayfish please apply for authorisation using the CR1 form.
No ☑ Go to 6 'Declaration'
Yes ☐ Please give details.

Species (please state if colour variant)	Total number	Size: length/ weight (cm/kg)	Total weight (kg)

Will the fish be introduced to another inland site? If Yes, please refer to guidance overleaf.
No ☐ Yes ☐

6 Declaration

If you give any information which is incomplete or inaccurate:
- we will return your application; and
- we will not grant authorisation.

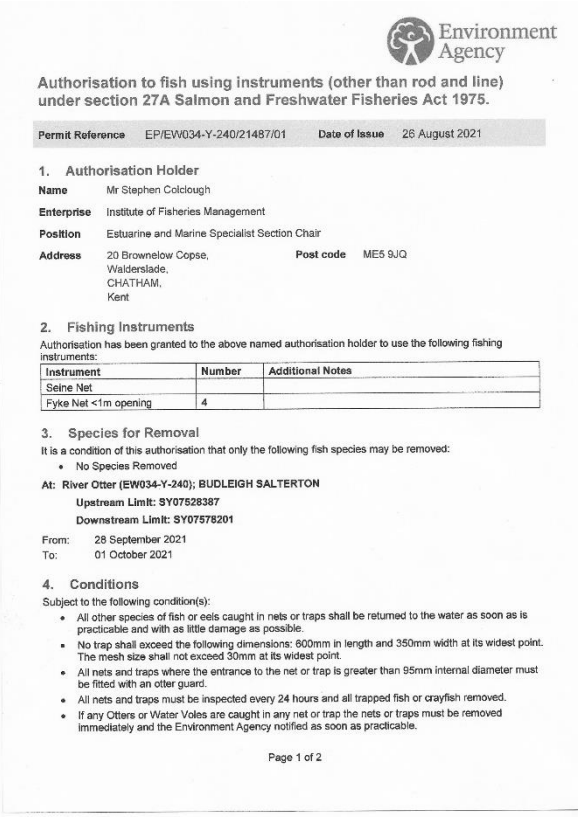
I have read and understood this form and the data protection notice in the additional notes on the reverse of this form. To the best of my knowledge and belief, the information I have given is correct.
☑ Tick this box to confirm that you understand and agree with the declaration above.
Print name: S.R. Colclough
Date (DD/MM/YYYY): 22/07/2021

What happens next

Please email, post or fax the completed form to Fish Movements Team (FR2 Applications), Environment Agency, Bromholme Lane, Brampton, Huntingdon, Cambridgeshire PE28 4NE.
Fax 01480 483 955 or 483 026.
Email: fmapplications@environment-agency.gov.uk

FR2 Version 3, November 2015 page 1 of 2

2. EA authorisation



Environment Agency

Authorisation to fish using instruments (other than rod and line) under section 27A Salmon and Freshwater Fisheries Act 1975.

Permit Reference EP/EW034-Y-240/21487/01 **Date of Issue** 26 August 2021

1. Authorisation Holder

Name Mr Stephen Colclough

Enterprise Institute of Fisheries Management

Position Estuarine and Marine Specialist Section Chair

Address 20 Brownelow Copse, Walderslade, CHATHAM, Kent **Post code** ME5 9JQ

2. Fishing Instruments

Authorisation has been granted to the above named authorisation holder to use the following fishing instruments:

Instrument	Number	Additional Notes
Seine Net		
Fyke Net <1m opening	4	

3. Species for Removal

It is a condition of this authorisation that only the following fish species may be removed:

- No Species Removed

At: River Otter (EW034-Y-240); BUDLEIGH SALTERTON

Upstream Limit: SY07528387

Downstream Limit: SY07578201

From: 28 September 2021

To: 01 October 2021

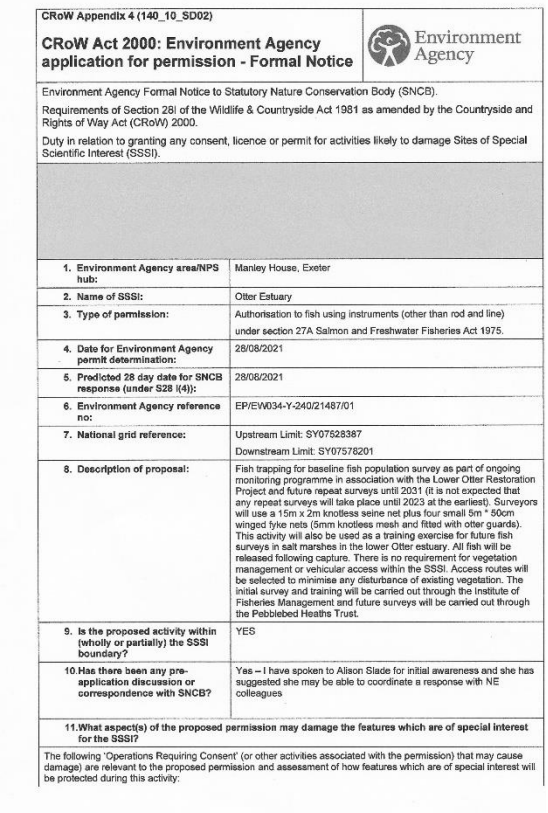
4. Conditions

Subject to the following condition(s):

- All other species of fish or eels caught in nets or traps shall be returned to the water as soon as is practicable and with as little damage as possible.
- No trap shall exceed the following dimensions: 600mm in length and 350mm width at its widest point. The mesh size shall not exceed 30mm at its widest point.
- All nets and traps where the entrance to the net or trap is greater than 95mm internal diameter must be fitted with an otter guard.
- All nets and traps must be inspected every 24 hours and all trapped fish or crayfish removed.
- If any Otters or Water Voles are caught in any net or trap the nets or traps must be removed immediately and the Environment Agency notified as soon as practicable.

Page 1 of 2

3. Crow Act formal notice (SSSI designation)



CRoW Appendix 4 (140_10_SD02)

CRoW Act 2000: Environment Agency application for permission - Formal Notice

Environment Agency

Environment Agency Formal Notice to Statutory Nature Conservation Body (SNCB).

Requirements of Section 28I of the Wildlife & Countryside Act 1981 as amended by the Countryside and Rights of Way Act (CRoW) 2000.

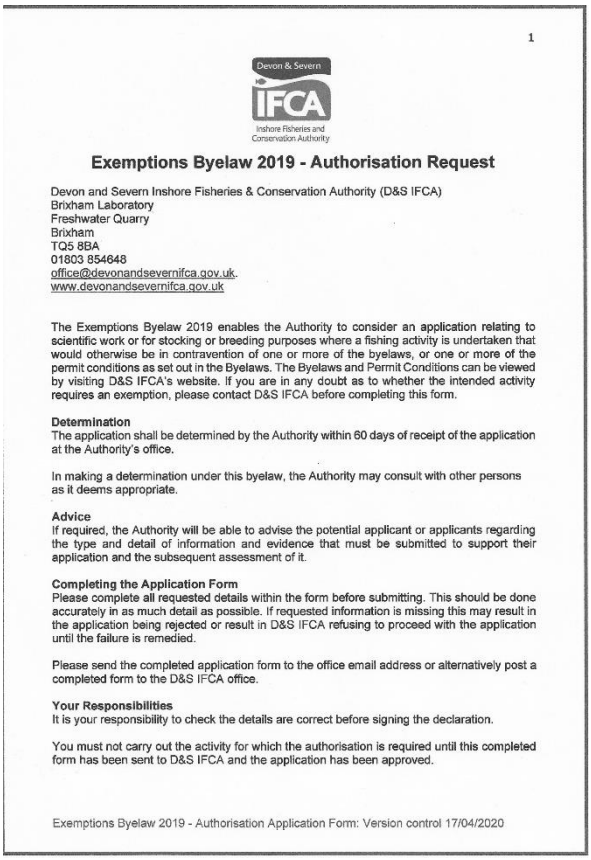
Duty in relation to granting any consent, licence or permit for activities likely to damage Sites of Special Scientific Interest (SSSI).

1. Environment Agency area/NPS hub:	Manley House, Exeter
2. Name of SSSI:	Otter Estuary
3. Type of permission:	Authorisation to fish using instruments (other than rod and line) under section 27A Salmon and Freshwater Fisheries Act 1975.
4. Date for Environment Agency permit determination:	28/08/2021
5. Predicted 28 day date for SNCB response (under S28 I(4)):	28/08/2021
6. Environment Agency reference no:	EP/EW034-Y-240/21487/01
7. National grid reference:	Upstream Limit: SY07528387 Downstream Limit: SY07578201
8. Description of proposal:	Fish trapping for baseline fish population survey as part of ongoing monitoring programme in association with the Lower Otter Restoration Project and future repeat surveys until 2031 (it is not expected that any repeat surveys will take place until 2023 at the earliest). Surveyors will use a 15m x 2m knotless seine net plus four small 5m * 50cm winged fyke nets (5mm knotless mesh and fitted with otter guards). This activity will also be used as a training exercise for future fish surveys in salt marshes in the lower Otter estuary. All fish will be released following capture. There is no requirement for vegetation management or vehicular access within the SSSI. Access routes will be selected to minimise any disturbance of existing vegetation. The initial survey and training will be carried out through the Institute of Fisheries Management and future surveys will be carried out through the Pebblebed Heaths Trust.
9. Is the proposed activity within (wholly or partially) the SSSI boundary?	YES
10. Has there been any pre-application discussion or correspondence with SNCB?	Yes – I have spoken to Alison Slade for initial awareness and she has suggested she may be able to coordinate a response with NE colleagues

11. What aspect(s) of the proposed permission may damage the features which are of special interest for the SSSI?

The following 'Operations Requiring Consent' (or other activities associated with the permission) that may cause damage) are relevant to the proposed permission and assessment of how features which are of special interest will be protected during this activity:

4. IFCA Byelaw Exemption application



Devon & Severn IFCA
Inshore Fisheries and Conservation Authority

Exemptions Byelaw 2019 - Authorisation Request

Devon and Severn Inshore Fisheries & Conservation Authority (D&S IFCA)
Brixham Laboratory
Freshwater Quarry
Brixham
TQ5 8BA
01803 854648
office@devonandsevernifca.gov.uk.
www.devonandsevernifca.gov.uk

The Exemptions Byelaw 2019 enables the Authority to consider an application relating to scientific work or for stocking or breeding purposes where a fishing activity is undertaken that would otherwise be in contravention of one or more of the byelaws, or one or more of the permit conditions as set out in the Byelaws. The Byelaws and Permit Conditions can be viewed by visiting D&S IFCA's website. If you are in any doubt as to whether the intended activity requires an exemption, please contact D&S IFCA before completing this form.

Determination
The application shall be determined by the Authority within 60 days of receipt of the application at the Authority's office.

In making a determination under this byelaw, the Authority may consult with other persons as it deems appropriate.

Advice
If required, the Authority will be able to advise the potential applicant or applicants regarding the type and detail of information and evidence that must be submitted to support their application and the subsequent assessment of it.

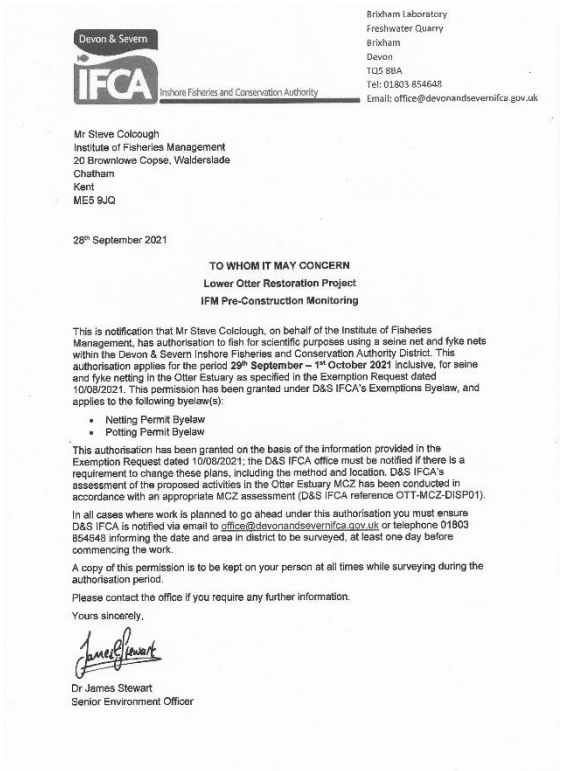
Completing the Application Form
Please complete all requested details within the form before submitting. This should be done accurately in as much detail as possible. If requested information is missing this may result in the application being rejected or result in D&S IFCA refusing to proceed with the application until the failure is remedied.

Please send the completed application form to the office email address or alternatively post a completed form to the D&S IFCA office.

Your Responsibilities
It is your responsibility to check the details are correct before signing the declaration.

You must not carry out the activity for which the authorisation is required until this completed form has been sent to D&S IFCA and the application has been approved.

5. IFCA Byelaw Exemption letter



Devon & Severn IFCA
Inshore Fisheries and Conservation Authority

Brixham Laboratory
Freshwater Quarry
Brixham
Devon
TQ5 8BA
Tel: 01803 854648
Email: office@devonandsevernifca.gov.uk

Mr Steve Colcough
Institute of Fisheries Management
20 Brownlowe Copse, Walderslade
Chatham
Kent
ME5 9JQ

28th September 2021

TO WHOM IT MAY CONCERN
Lower Otter Restoration Project
IFM Pre-Construction Monitoring

This is notification that Mr Steve Colclough, on behalf of the Institute of Fisheries Management, has authorisation to fish for scientific purposes using a seine net and fyke nets within the Devon & Severn Inshore Fisheries and Conservation Authority District. This authorisation applies for the period **29th September – 1st October 2021** inclusive, for seine and fyke netting in the Otter Estuary as specified in the Exemption Request dated 10/08/2021. This permission has been granted under D&S IFCA's Exemptions Byelaw, and applies to the following byelaw(s):

- Netting Permit Byelaw
- Potting Permit Byelaw

This authorisation has been granted on the basis of the information provided in the Exemption Request dated 10/08/2021; the D&S IFCA office must be notified if there is a requirement to change these plans, including the method and location. D&S IFCA's assessment of the proposed activities in the Otter Estuary MCZ has been conducted in accordance with an appropriate MCZ assessment (D&S IFCA reference OTT-MCZ-DISP01).

In all cases where work is planned to go ahead under this authorisation you must ensure D&S IFCA is notified via email to office@devonandsevernifca.gov.uk or telephone 01803 854648 informing the date and area in district to be surveyed, at least one day before commencing the work.

A copy of this permission is to be kept on your person at all times while surveying during the authorisation period.

Please contact the office if you require any further information.

Yours sincerely,

James G Stewart

Dr James Stewart
Senior Environment Officer