

DEBEN ESTUARY

2025 FISH SURVEYS



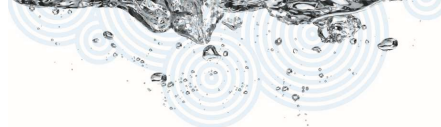
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Institute of Fisheries
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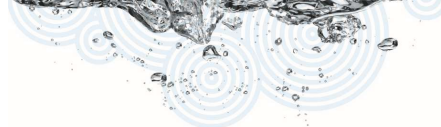
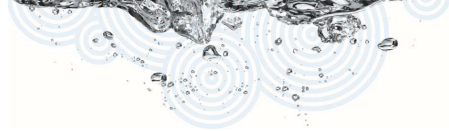


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This report and its findings have been produced by Panthalassa Ltd. for River Deben Association and Suffolk Wildlife Trust in 2025.





INTRODUCTION

The Institute of Fisheries Management (IFM) have conducted citizen science fish surveys with the River Deben Association (RDA) and Suffolk Wildlife Trust across multiple years. The surveys are conducted at two sites: Bawdsey beach and Martlesham Wilds Nature Reserve. The aim of these surveys is to understand how the juvenile fish assemblage use and move around the saltmarsh.

FISH IN ESTUARIES

Fish use estuarine habitats throughout the course of their lifecycle for a variety of reasons (Haedrich, 1983). Some species use estuaries to spawn while others use them as nursery and feeding grounds. Fish also use estuaries as they provide areas of shelter and safety. Many species use estuaries including salmonids, anguillids and clupeids. Estuaries are unique habitats that connect freshwater and marine aquatic environments, making them important features in the lifecycle of migratory fish species. Although these habitats can support a large abundance of species, the diversity of species capable of surviving these dynamic habitats are limited (Blaber, Brewer, & Salini, 1989). The environmental characteristics of an estuary that vary include the salinity, temperature, turbidity and oxygen concentrations. Such variations in these parameters create a stressful and harsh environment for fish species.

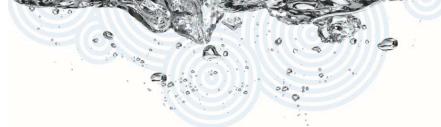
The importance of estuarine and coastal habitats, and their subsequent restoration and conservation, are becoming increasingly more recognised, due to the ecosystem services these habitats provide. However, the complex nature, and highly variable nature, of estuarine habitats has meant that until recently the importance of this habitat in the lifecycle of fish has been poorly studied which leads to poor recognition of the role of estuaries for fish (Elliott, 2002).

FISH IN SALTMARSH HABITATS

Saltmarshes are an important part of estuarine ecosystems; they are the intermediate zone between the land and sea. Saltmarshes themselves can be divided into different zones as well notably the low marsh and high marsh zones. The low marsh interacts with the mudflat and low tide level. The high marsh zone joins the low marsh at the Mean High-Water mark. Due to the many different environmental parameter and stressors in saltmarsh habitats, different saltmarsh plants can be found in both the high marsh zone and low marsh zone. The high marsh at its highest level away from the water level connects to traditional terrestrial plant species.

In the UK there are 45,000 hectares of saltmarsh, however this number has significantly decreased as 85% of saltmarsh has been lost since 1860, in England alone. The main areas of existing saltmarsh are the Thames, Severn, Humber and Solway Firth estuaries. Further to supporting fish, healthy saltmarshes provide a wide range of other ecosystem services as well (UKCEH). They protect coastlines from erosion and flooding, sequester pollutants and contaminants between the sea and land interface, mitigate against climate change by storing carbon as well as providing a habitat and food source for both fish and migratory birds in the UK (King & Lester, 1995) (Adams, Andrews, & Jickells, 2012) (Beaumont, Jones, Garbutt, Hansom, & Toberman, 2011) (Green, Smith, & Underwood, 2012).

Primary productivity is the basis of the food web. Saltmarshes have been the focus of many scientific studies looking at their rates of primary productivity. Some of which have indicated that for, common



plant species in the UK like, *Puccinellia* and *Spartina* it could be as high as 1,400g/m²/yr (Long & Mason, 1983). While the microscopic algae contributions of the saltmarsh could be between 28-341g/m²/yr (Sullivan & Currin, 2000). As this is the basis of the food web it is not surprising that saltmarshes can support large amounts of predatory species like fish. If we consider the provision of fish habitat directly most of the scientific literature has looked at qualitative studies. With a lot of results showing greater numbers of fish in saltmarshes. Fish density and biomass were usually greater in vegetated habitats than unvegetated shore habitats (Stolen, Collazo, & Percival, 2009). Fish abundance has been as much as three times greater in saltmarshes than in unvegetated shore habitats (Shute, et al., 2025). However, one study found that only 100m² of saltmarsh could support 4.95 (+/- 1.37) individuals (Green, Smith, & Underwood, 2012). It is now recognised that fish fry use the saltmarsh for feeding and sheltering purposes during the flood tide (Colclough, Dutton, Cousins, & Martin, 2000).

Saltmarshes are listed as a habitat under the UK Biodiversity Action Plan; subsequently, the conservation and restoration, of UK saltmarshes are of utmost importance. This is further implemented through different government led schemes, like the development of managed realignments since the early 1990's. Managed realignments are important collaborations between man-made structures and natural flood defences; in a managed realignment the man-made flood-defence is breached, and the natural saltmarsh is left to re-establish itself. This provides more coastal protection than the man-made structure alone, reduces maintenance costs of the structure and restores important habitats. The study of managed realignment sites has generated a wide addition to the literature on saltmarsh functioning and its ecosystem services (Colclough, Fonseca, Astley, Thomas, & Watts, 2005) (Dixon, Morris, Scott, Birchenough, & Colclough, 2008) (Fonseca, 2009) (Fonseca, Colclough, & Hughes, 2011) (Green, Smith, & Underwood, 2012) (Nunn, Clifton-Dey, & Elliott, 2016) (Colclough S., 2017) (Colclough S., 2017)

DEBEN ESTUARY

The Deben estuary is situated in Suffolk near the town of Felixstowe; it covers an area of around 981 hectares from Felixstowe Ferry at the mouth to Woodbridge. The estuary is designated as a Site of Special Scientific Interest (SSSI), a Special Protection Area (SPA) and a RAMSAR site. The Deben is a sheltered estuary that hosts areas of mudflats and saltmarsh that are composed of some of the most complete range of saltmarsh communities in Britain. As an important site for birds the Deben estuary supports Dark-bellied Brent geese (*Branta bernicla*) during the winter. However, its ecological importance is only one part of the overall importance of the Deben estuary which also hosts commercial fishing, recreation, hunting and wildlife grazing.



Figure 1 Map of sampling location for Bawdsey beach and Martlesham Wilds Nature Reserve sites (taken from www.gridreferencefinder.com. © Grid Reference)

SAMPLING

Fish surveys were conducted on the 24th and 25th of July 2025 at Bawdsey beach and Martlesham Wilds Nature Reserve respectively. The methodologies used throughout these two days were selected to fit the best practice protocols being developed by Steve Colclough and the IFM.

At Bawdsey beach the survey consisted of using the seine net, a technique which is best suited for the site's characteristics. The seine net was deployed from the shore as the tide rose until high tide. The 15m long seine net was deployed inside different creeks up to 2.7m with a 3mm micromesh. At Martlesham Wilds Nature Reserve on the 25th of July three different fishing techniques were used to best sample the fish assemblage that use the saltmarsh habitat. The above seine net was deployed as the tide rose and around high tide. Fyke nets were deployed at low tide, facing upstream to catch fish leaving the channel after the falling tide, having used the area above the net. The fyke nets were removed as the tide retreats when they are accessible on foot after high tide. The fyke net measurements are 5m winged fyke nets with reducing mesh nets of 10, 8 and 6.5mm. There are otter guards in the fyke nets as an Environment Agency consent condition. An intertidal scoop net was also used to compliment the study in permanent pools across the saltmarsh with a 3mm fine mesh.



Figure 2 Fyke net set up at Martlesham Wilds Nature Reserve

At least 50 fish of each species was identified and measured. When species were caught in large numbers, they were counted, without being measured, after identification. Fish were placed in measuring trays to facilitate easier identification and measurements. The measurement used for fish caught in these surveys is the total length, rather than the fork length. Fish identification was conducted to the lowest possible taxonomic level. Identification was facilitated with the ZSL field guide and the Sussex Inshore Fisheries and Conservation Authority fish ID guide. External conditions, water temperature and fish behaviour was used to monitor the welfare of fish as significant differences in temperature change can shock fish. Fish buckets are oxygenated to improve oxygen levels in the water; as water temperatures rise, less oxygen is available for fish which impacts their welfare. Finally, fish handling was minimised by using nets and measuring devices to reduce further stress to the fish.



Figure 3 Common goby

RESULTS

BAWDSEY BEACH

The seine net was deployed for a total of 4 sweeps over the tide from the beach. The sweeps were conducted between 9.40am and 11.25am. The first seine net was conducted at 9.40am as the tide was rising.

Table 1 First seine net at Bawdsey beach

Latin name	Common name	Number	Length or length range (mm)
<i>Atherina presbyter</i>	Sand smelt	1	35
<i>Pomatoschistus microps</i>	Common goby	11	20-30
<i>Dicentrarchus labrax</i>	Sea bass	1	135

Table 2 Second seine net at Bawdsey beach

Latin name	Common name	Number	Length or length range (mm)
<i>Atherina presbyter</i>	Sand smelt	17	35-70
<i>Pomatoschistus microps</i>	Common goby	33	18-40
<i>Dicentrarchus labrax</i>	Sea bass	3	140-143
<i>Clupea harengus</i>	Herring	25	40-78

Table 3 Third seine net at Bawdsey beach

Latin name	Common name	Number	Length or length range (mm)
<i>Pomatoschistus microps</i>	Common goby	5	
<i>Dicentrarchus labrax</i>	Sea bass	5	145-180

Table 4 Fourth seine net at Bawdsey beach

Latin name	Common name	Number	Length or length range (mm)
<i>Atherina presbyter</i>	Sand smelt	11	45-54
<i>Ammodytes tobianus</i>	Sand eel	1	45
<i>Dicentrarchus labrax</i>	Sea bass	5	115-155

For Bawdsey beach only the seine net was deployed; a total of 4 sweeps were conducted from the shore of the beach. The sweeps were conducted between 9.40am and 11.25am. The first seine net was conducted at 9.40am as the tide was rising. The salinity was measured at 35ppt and the water temperature was recorded at 21°C. Then at 10.00am, 10.20am and 11.15am the second, third and fourth seine nets were conducted. Salinity was re-measured during the 11.15am seine net, however it remained unchanged at 35ppt. High tide was at 12.10pm.

A total of 5 species were caught during the overall survey of Bawdsey beach: 14 sea bass, 29 sand smelt, 48 common goby, 25 herring and 1 sand eel. The most abundant species sampled was common goby and the least abundant species was the sand eel. Moon jelly fish were observed in some of the

seine sweeps and washed up on the beach. Common shore crabs (*Carcinus maenus*) were also caught and observed around the foreshore of the beach during the surveys.

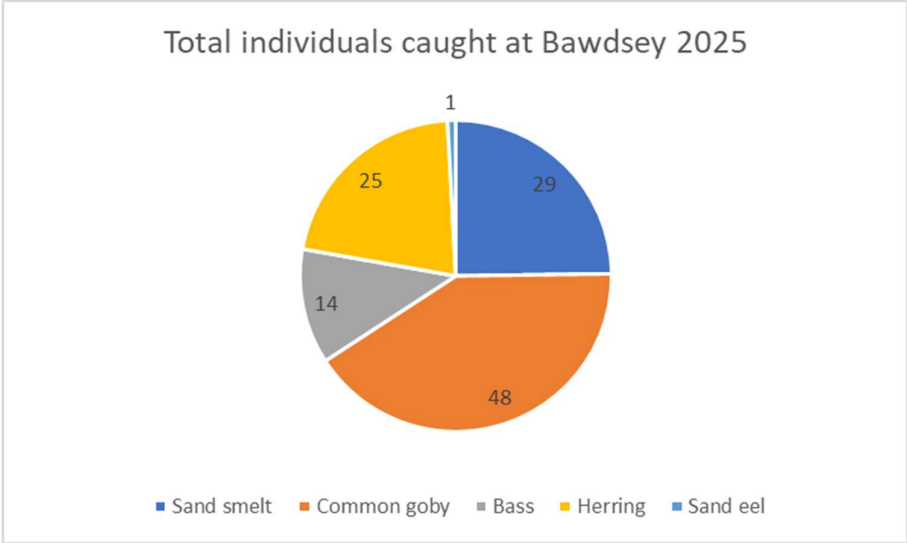


Figure 4 Pie chart showing the total count of fish caught in each species during the survey of Bawdsey beach

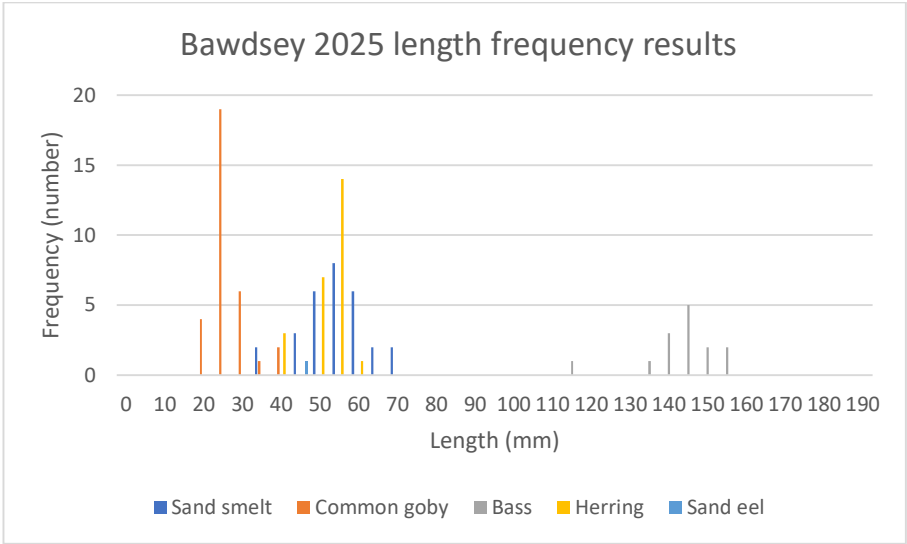


Figure 5 Length frequency chart showing the length-frequency curves for the total Bawdsey catch in 2025. Horizontal axis representing the length of fish in mm and vertical axis showing the frequency



Figure 6 Sea bass being measured

MARTLESHAM WILDS NATURE RESERVE

In the nature reserve two seine nets sweeps were conducted before the tide came over the habitat preventing further duplicates, two fyke nets were placed in the creek features that have been retained since 2024 and the push nets were used twice across the site. The seine nets were conducted before and on the flooding tide at the extent of the saltmarsh and mouth of the creek. The fyke nets, which were placed in the rear channel (1) and the side creek system (2) were removed on the ebb tide at 1400 and 1431 respective.

Table 5 First seine net sweep at Martlesham Wilds Nature Reserve

Latin name	Common name	Number	Length or length range (mm)
<i>Atherina presbyter</i>	Sand smelt	197	16-60
<i>Pomatoschistus microps</i>	Common goby	1	25
<i>Dicentrarchus labrax</i>	Sea bass	2	25-35

Table 6 Second seine net sweep at Martlesham Wilds Nature Reserve

Latin name	Common name	Number	Length or length range (mm)
<i>Atherina presbyter</i>	Sand smelt	35	
<i>Pomatoschistus microps</i>	Common goby	1	
<i>Dicentrarchus labrax</i>	Sea bass	1	135

Table 7 First fyke net at Martlesham Wilds Nature Reserve

Latin name	Common name	Number	Length or length range (mm)
<i>Atherina presbyter</i>	Sand smelt	1	23
<i>Dicentrarchus labrax</i>	Sea bass	3	44-54

Table 8 Second fyke net at Martlesham Wilds Nature Reserve

Latin name	Common name	Number	Length or length range (mm)
<i>Dicentrarchus labrax</i>	Sea bass	1	132

Salinity was measured at 30ppt and temperature was measured at 24°C. High tide was at 1340. Push nets only found common shrimp (*Crangon crangon*). Only 3 species were caught and identified at Martlesham Wilds Nature Reserve; sea bass, sand smelt and common goby. With sand smelt being the most abundantly sampled. Furthermore, common shore crabs (*Carcinus maenus*) were observed and caught in both fyke and seine nets.

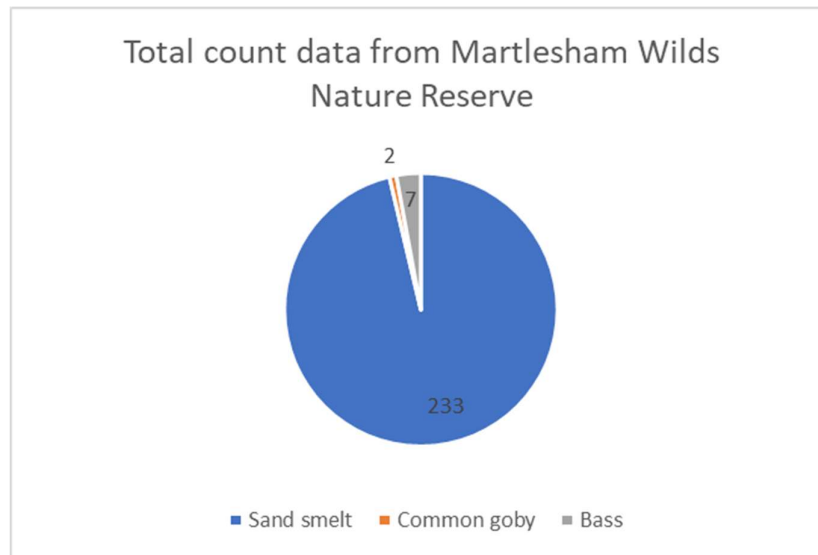


Figure 7 Pie chart showing the total number of individuals caught in Martlesham Wilds Nature Reserve surveys

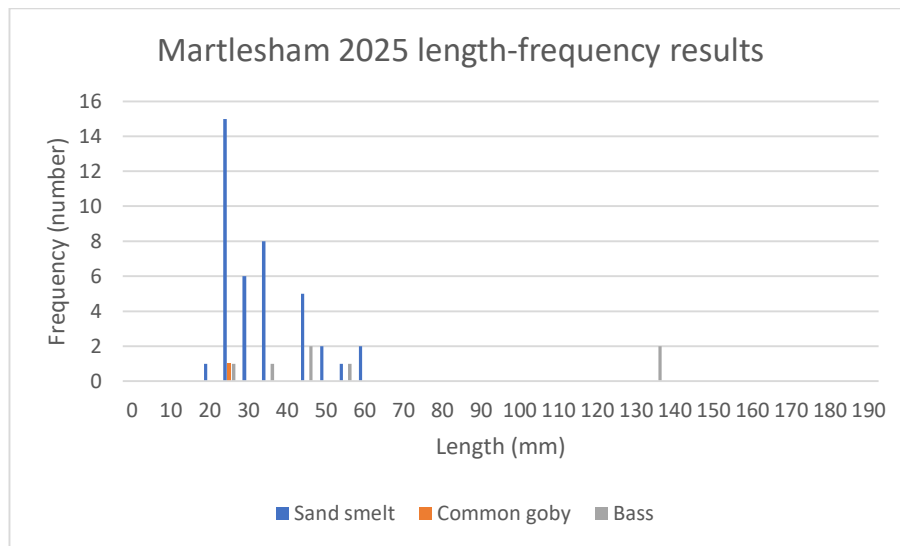
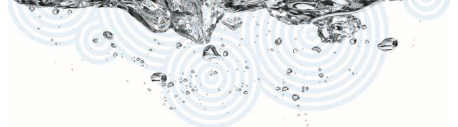


Figure 8 Length-frequency distribution showing the total catch from Martlesham Wilds Nature Reserve surveys in 2025. Horizontal axis representing the length of fish in mm and vertical axis showing the frequency

QUALITATIVE COMPARISON THROUGH THE YEARS

BAWDSEY BEACH

This year the tide at Bawdsey was noted to be higher than the previous year on arrival at the site; this was expected as the tidal height for 2025 was 3.73m compared to 3.44m in 2024. The weather was wet and windy, and some waves/swell was noted. Bawdsey beach has been surveyed since 2022. The species diversity across the years has been relatively consistent across the 4-year survey period; 6



species in 2022, 7 species in 2023 and 2024 and 5 species in 2025. Sea bass and sand smelt are a recurring species throughout the survey period at Bawdsey beach. Thin lipped grey mullet and sand gobies have been recorded during these surveys from 2022 to 2024, however this year they were not caught during the survey. While herring and common gobies, although not caught during the first survey of the site in 2022, have been caught yearly since. Sand eels were caught in 2022, 2024 and 2025, but were not caught in 2023. Black gobies were only caught in 2022, and Flounder were only caught in 2023. Consistently at this site a species of goby has been caught in the greatest abundances; for 2022 and 2024 sand gobies were the most dominant species in the assemblage caught while for 2023 and 2025 common gobies were the most dominant species.

MARTLESHAM WILDS NATURE RESERVE

The height of the tide was not noted to be as high this year in comparison with last year; this was expected as the high tide for 2025 was 3.87m while in 2024 it was 3.94m. Martlesham Wilds has been surveyed since 2023. During this period the surveys have covered a range of salinities and temperatures. In 2024 the temperature was 21°C and the salinity was 24ppt while in 2023 the temperature was only 19°C with increasing salinity throughout the day from 22ppt – 28ppt. This year the community surveyed at Martlesham Wilds Nature Reserve was like the community recorded in 2024, although the addition of sand smelt this year was different from the community of 2024. However, the presence of sand smelt at this site was also identified in 2023. In 2023, a greater diversity of fish species was identified at this site including thin lipped grey mullet, golden grey mullet, sand goby and lesser pipefish. Although sand smelt at Martlesham Wilds is not classified as a novel species for the site, its abundance in 2025 is considerably greater than has been recorded in previous years. The abundance of common gobies although consistently present at the site has decreased, while the abundance of sea bass across the 3 years has fluctuated.



Figure 9 Volunteers sorting the catch from the intertidal push net, of a permanent saltmarsh pool, in Martlesham Wilds



DISCUSSION

Both sites have exhibited fish utilisation however this has changed since the previous year and could be due to a number of external factors. Looking at the data in relation to other surveys around the coast and in the estuary or the region will help contextualize the local differences.

RELEVANCE TO CURRENT POLICIES

JOINT FISHERIES STATEMENT

Mostly these surveys satisfy the objective entitled 'Science and Evidence' in the Joint Fisheries Statement. Conducting regular monitoring of coastal fish surveys with this project contributes to the newly established Joint Fisheries Statement (JFS). As set out in the objectives of the JFS, the surveys conducted at Bawdsey and Martlesham Wilds Nature Reserve each year contribute to the growing database of scientific knowledge on fish utilisation in coastal habitats. The fact that these surveys support charities and provide different social benefits satisfy the 'national benefit objective' in the JFS (DEFRA, Llywodraeth Cymru, The Scottish Government, & DAERA, 2022).

The surveys are an opportunity to improve the fisheries evidence based in terms of fish utilisation in coastal habitats. The surveys provide an opportunity to work in partnership with different UK stakeholders thanks to the citizen science approach. Furthermore, they ensure that regular monitoring occurs at different UK sites through time. The Deben estuary is important for recreational fishing due to the diversity of fish, present within the habitat, which are supported under the JFS (DEFRA, Llywodraeth Cymru, The Scottish Government, & DAERA, 2022).

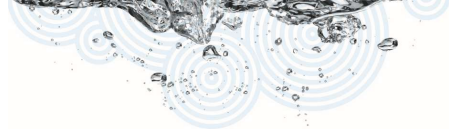
FISHERIES MANAGEMENT PLANS

The fisheries management plans (FMP) are documents that set out clearly the policies aimed at restoring or maintaining specific fish stocks within a given area. The FMPs relevant to the surveys at Bawdsey and Martlesham Wilds Nature Reserve include sea bass and Herring. Both these species are important commercial fisheries and the surveys at these two sites contribute to the scientific evidence of how they use coastal habitats and the Deben estuary (DEFRA, Llywodraeth Cymru, The Scottish Government, & DAERA, 2022).

RELEVANCE TO CURRENT PROJECTS

MARINE NATURAL CAPITAL ECOSYSTEM ASSESSMENT

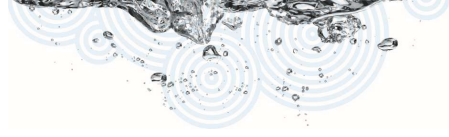
The marine Natural Capital Ecosystem Assessment (mNCEA) is a programme led by DEFRA whose aim is to provide research and development projects, in the marine sector, around the UK. Some of the goals of this 3-year project were to provide a robust evidence base, suite of tools and a framework where ecological, societal and economical information is stored. The Institute of Fisheries Management was provided funding by the program for the citizen science surveys, as well as produce new identification guides and survey manuals that will be published shortly.



SALTMARSH CODE

The UK Centre for Ecology and Hydrology (UKCEH) is leading 'Saltmarsh Code' attempting to create a voluntary carbon market; financing large-scale restoration is becoming increasingly viable for businesses as carbon emission reductions become increasingly important. They have established a consortium which includes charities, finance and academic sectors to create a rigorous and scientific certification standard to ensure carbon stored in saltmarshes can be purchased. However, carbon storage is only one of the ecosystem services provided by saltmarshes.





CONCLUSION & RECOMMENDATIONS

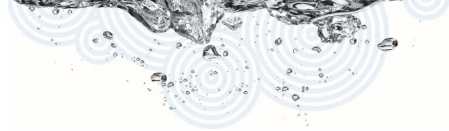
CONCLUSIONS

Another year of successful surveys were achieved at Bawdsey Beach and Martlesham Wilds Nature Reserve. The citizen scientists and member of both Suffolk Wildlife Trust and the River Deben Association showed enthusiasm and participated in the 2 days of fish surveys. Differences in environmental conditions were noted between 2024 and 2025; for Bawdsey the weather was wetter and windier with higher water level noted, while for Martlesham it was noted that the tide was not as high as the previous years. More species were caught at Bawdsey but the abundance of individuals caught was greater at Martlesham Wilds Nature Reserve. Length-frequency curves showed smaller variations in Martlesham Wilds Nature Reserve when compared with Bawdsey.

RECOMMENDATIONS

Continuing to monitor the seasonal changes at these sites is an important contribution to the growing evidence base on fish utilisation in coastal habitats. They also provide further valuable scientific insights into the benefits of citizen science led marine projects. Broadening the implementation of these surveys to other sites in the Deben estuary and other local estuaries would further contribute to the understanding of how fish fry use the estuary and region.





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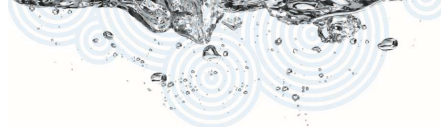
The authors would also like to thank Steve Colclough and his wife Gill Colclough for their dedication, enthusiasm and support in providing expert knowledge and reviews of this report. Special thanks to the IFM for the provision of equipment necessary for the successful delivery of these surveys.





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