THE DYNAMICS OF ESTUARIES AND THEIR FISH POPULATIONS: implications for fish conservation in the Tidal Thames

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ESTUARIES AND THEIR VALUE: wildlife
ESTUARIES AND THEIR VALUE: leisure
ESTUARIES AND THEIR VALUE: commercial fisheries
ESTUARIES AND THEIR VALUE: development & transport
ESTUARIES AND THEIR VALUE: power generation
Threats to fish populations

- Pollution (industrial, domestic, agriculture)
- Habitat loss
- Noise
- Entrainment / impingement
WHY DO FISH USE ESTUARIES?: Diadromy

WHY DO FISH USE ESTUARIES?: Nursery function

- Globally recognised as important nursery zones
- Freshwater and marine species
- Rich feeding opportunities / Predator avoidance prospects
THE CONCEPT OF ONTOGENETIC ECOLOGY
MORPHOLOGICAL AND PHYSICAL CHANGE IN FISHES

- Fish transition through a number of well defined ontogenetic stages
- Thresholds between stages often translate to sudden shifts in behaviour and ecology
CHANGING HABITAT AND ITS VALUE TO 0+ FISHES
Factors influencing estuarine utilisation of 0+ fishes

Flow rate

Flow rate → Salinity & turbidity → Tidal cycle

Salinity & turbidity

Production of freshwater 
& anadromous fauna ⇒ Production of estuarine & anadromous fauna

Seasonal bio-rhythms

Seasonal bio-rhythms

Highly mobile and temporally dynamic fish communities

Production of Marine
& catadromous fauna

Seasonal bio-rhythms
Current research on the Tidal Thames

0+ FISH IN THE THAMES

Investigating the ecological function of the Tidal Thames and the impact of improved water quality on fish populations

Tidal Thames Biological Timeline

125 species since 1964; nursery for 21 species
PROJECT OBJECTIVES

- Characterise temporal variability in fish species community structure and abundance
- Construct pre-Tideway improvement ecological baseline
- 3D utilisation of space and tides?
• Developed to help quantify recruitment and exploitation of glass eels ascending the Bristol Channel rivers

PROJECT OBJECTIVES

• Characterise temporal variability in fish species community structure and abundance
• Construct pre-Tideway improvement ecological baseline
• 3D utilisation of space and tides?
• Communicate the importance of the tidal Thames to the general public through citizen science involvement
Current monitoring – Temporal and spatial survey effort

- Two year programme (2017-2018)
- Fortnightly (March – November)
Current monitoring – survey methods

- Bespoke multi-method approach
- Seine netting (3mm mesh) at low tide (general fish community structure at each site)
Current monitoring – survey methods

- Marginal push nets (1.5mm mesh) used two hours either side of low tide (importance of extreme margins for refuge and STST)
Mid-channel ichthyoplankton trawls during flood and first hour of ebb tides (to determine utilisation of main channel for eggs/larval transport (STST))
Current monitoring – initial observations

<table>
<thead>
<tr>
<th>Freshwater</th>
<th>Diadromous</th>
<th>Marine</th>
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</thead>
<tbody>
<tr>
<td>Roach <em>Rutilus rutilus</em></td>
<td>European eel <em>Anguilla anguilla</em></td>
<td>Sea bass <em>Dicentrarchus labrax</em></td>
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<tr>
<td>Dace <em>Leuciscus leuciscus</em></td>
<td>Smelt <em>Osmerus eperlanus</em></td>
<td>Thinlip mullet <em>Chelon ramada</em></td>
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<tr>
<td>Perch <em>Perca fluviatilis</em></td>
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<td>Sand smelt <em>Atherina presbyter</em></td>
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<tr>
<td>Bullhead <em>Cottus gobio</em></td>
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<td>Common goby <em>Pomatoschistus microps</em></td>
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<tr>
<td>3-sp’ stickleback <em>Gasterosteus aculeatus</em></td>
<td></td>
<td>Sand goby <em>Pomatoschistus minutus</em></td>
</tr>
<tr>
<td>9-sp’ stickleback <em>Pungitius pungitius</em></td>
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<td>Flounder <em>Platichthys flesus</em></td>
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<tr>
<td>Common bream <em>Abramis brama</em></td>
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<td>Snake pipefish <em>Entelurus aequoreus</em></td>
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<td>Ruffe <em>Gymnocephalus cernua</em></td>
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<tr>
<td>Zander <em>Sander lucioperca</em></td>
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<tr>
<td>Chub <em>Squalius cephalus</em></td>
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<tr>
<td>Bleak <em>Alburnus alburnus</em></td>
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</tbody>
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20 species so far....
Current monitoring – ontogenetic shifts

Flounder
_Platicthys flesus_
MANAGEMENT IMPLICATIONS

Theoretical approach

Evidence based management strategy
Thank you – any questions?