The Thames European Eel Project Report, 2017

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Estuaries & Wetlands Conservation Programme
Zoological Society of London
Regent's Park
London, NW1 4RY

marineandfreshwater@zsl.org

www.zsl.org/eels

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- Canal and Rivers Trust;
- Environment Agency;
- Friends of the River Crane Environment;
- Ham United;
- Historic Royal Palaces;
- Kingston University;
- Medway Valley Countryside Partnership;
- National Trust;
- Thames Anglers Conservancy;
- Thames Water;
- South East Rivers Trust;
- Surrey Wildlife Trust; and
- Wandle Heritage.

Contact: Joe Pecorelli, Project Manager; marineandfreshwater@zsl.org.

Executive Summary

- The annual recruitment of the European eel into continental waters has declined by as much as 90% in the past 30 years across its geographic range. In 2008, the International Union for the Conservation of Nature (IUCN) classified the European eel as Critically Endangered.
- In response to this reported decline, in 2005 ZSL established a monitoring project to determine the recruitment of elvers (juvenile eels) into the River Thames catchment and found a similar reduction. The study established that there were up to 99% fewer eels arriving than in the 1980's into the Roding catchment.
- In 2011 the project expanded, incorporating citizen science, to become the largest elver monitoring scheme within a single catchment in the UK. The goals of the project are to monitor recruitment of the European eel into the Thames tributaries and to identify and make additional habitat available by allowing passage over barriers to upstream migrating European eel.
- The number of elver monitoring sites has increased from 3 in 2005 to 11 sites in 2017. This increase has been made possible through collaboration with local partners and the recruitment and training of citizen scientists.
- The monitoring data and subsequent barrier investigations have enabled an evidence-based assessment to inform management measures and prioritise barrier mitigation action such as eel passes. Barriers to migration are identified as one of the major threats to eel stocks in the Thames Catchment.
- This report summarises key findings from the monitoring data collected from 2005 to 2017.
- Catch per unit effort (CPUE) was calculated for each trap (number of elvers caught per day) to assess changes in elver recruitment. Although the CPUE shows high variability, with large annual fluctuations and differences observed between sites, the mean CPUE was 2.3 times higher this year compared to 2016 when averaged for the 9 sites monitored during both years, suggesting an increase in recruitment in the Thames catchment.
- With five or more years of data for multiple sites, it is now possible to identify trends in the annual CPUE. At sites where trapping and barrier conditions remain unchanged, these patterns reflect what is being seen across Europe. Data from other sites highlights the impact of improved eel passage downstream.
- In 2017, new monitoring sites were established in Morden Hall Park on the River Wandle in partnership with the National Trust and at Island Barn Sluice on the River Ember in partnership with Surrey Wildlife Trust. An eel pass was also installed on the River Roding at Passingford Mill. Over the duration of the project, ZSL and partners have installed eel passes which have made 83.3 hectares of additional eel habitat accessible in the Thames catchment.

- To date, 765 volunteers and 22 partner organisations have been involved within the project. Multiple educational and outreach benefits have resulted through the training and empowerment of large numbers of individuals and organisations.

- This project is an example of the numerous benefits citizen science initiatives can provide for freshwater conservation. The Thames European Eel Project demonstrates that continued two-way communication between conservation practitioners and volunteers can sustain volunteer engagement to provide cost-effective, reliable and robust data that can be used to guide environmental management decisions.

Contents

1. Introduction

1.1. Background

The European eel, *Anguilla anguilla* (L.), has been listed as 'Critically Endangered' on the IUCN Red List since 2008 due to dramatic declines in abundance recorded across all stages of its life cycle and much of its natural range (IUCN, 2014). In 2007, the European Commission Regulation (EC no. 1100/2007; EC 2007) *'Establishing measures for the recovery of the stock of European eel*, was enacted. This requires Member States, with habitat supporting the European eel, to develop mandatory Eel Management Plans for their river basin districts (RBD). In addition to this, the European eel is included within Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and Appendix II of the Convention on Migratory Species (CMS).

The stages of the European eel life cycle are shown in Figure 1. Juvenile eels arrive on the coast as glass eels, having drifted on ocean currents as leptocephali from the Sargasso Sea. The glass eels then pigment to form elvers during the early stages of their upstream migration. During their growth lifecycle stage they develop into yellow eels before metamorphosing into silver eels prior to commencing their migration back to the Sargasso Sea where they breed. The numbers of glass eels arriving each year, termed glass eel recruitment, has decreased by over 90% in the North Sea compared to the 1960-1979 average (ICES, 2016). This sustained decline is having a negative impact on yellow eel populations and ultimately silver eel escapement as the high levels of mortality in continental waters do not allow recruitment to compensate for the losses (Henderson *et al.,* 2012).

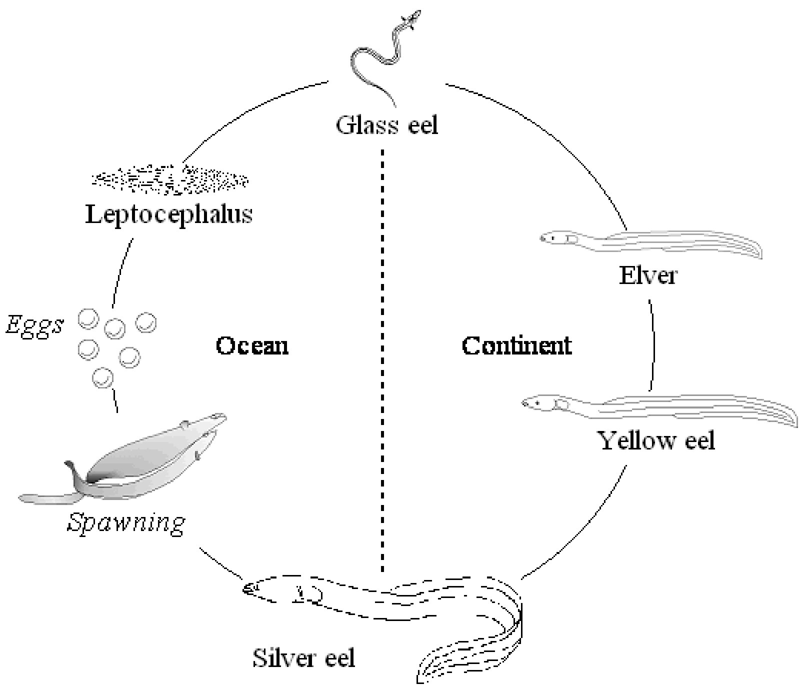


Figure 1: The life cycle of the European eel (Maes & Volckaert, 2007).

The Working Group on Eels (WGEEL) collates data from the monitoring of European eel populations across Europe. Whilst the recruitment levels have remained extremely low compared to when stocks were more sustainable in the 1960's, from 2012 to 2014 an increase was observed, peaking in 2014 (Figure 2). This period saw recruitment in the North Sea increase to 3.7% of the 1960-1979 level from what had been less than 1%; and elsewhere in Europe saw an increase of 5% to 12.2% (ICES, 2014). Since 2014 however, recruitment levels have again been declining with the annual recruitment of glass eels across the North Sea in 2017 at just 1.6% of the 1960-1979 level; a further decline from the 2.7% level recorded in 2016. Such levels are below safe biological limits and therefore the population status of the European eel remains critical (ICES, 2016 & ICES, 2017).

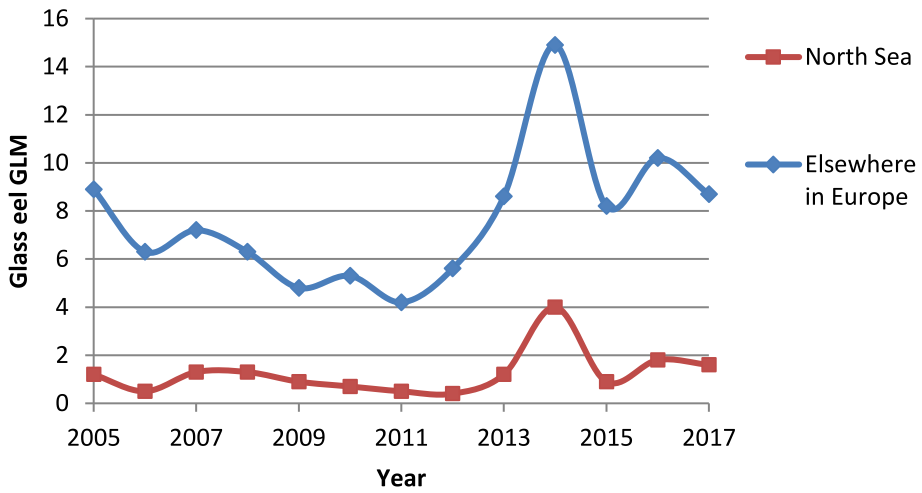


Figure 2: Glass eel recruitment indices for the European eel in the continental North Sea and 'elsewhere in Europe' from 2005 to present. The data were taken from the 2017 ICES stock advice. Glass eel recruitment was predicted as a function of area, year and site giving the geometric means of estimated recruitment (GLM). This was fitted to 43 time-series, comprised of either a combination of glass eels and yellow eels or purely glass eels and was then scaled to the 1960–1979 geometric mean (ICES, 2017).

A number of anthropogenic, oceanic and climatic factors have been identified as potential causes of the recorded decline in recruitment. They include the loss of habitat, pollution, barriers to migration, hydropower, and exploitation from commercial and recreational fishing (Feunteun, 2002; Dekker, 2003; Chadwick *et al.,* 2007). These pressures impact all life stages of the eel; affecting glass eel and elver survival and limiting silver eel escapement (Winter *et al.,* 2006; Piper *et al.,* 2012). Some studies have shown oceanic and climate variability impact the transport of larvae and recruitment of glass eels (Bonhommeau *et al.,* 2008; Baltazar-Soares *et al.,* 2014). These factors in-combination is likely to be responsible for the decline in eel recruitment in the UK (Jacoby *et al*., 2015).

1.2. Eels in the Thames

The Thames River Basin District (RBD) comprises 11% of the freshwater and lake habitat in England and Wales (EA, 2010). As a result, it has historically provided an important area of habitat for the growth stage of the European eel, supporting large population stocks (Wheeler, 1979; Naismith and Knights, 1988). However, south east England is a highly developed and densely populated area, with a long history of heavily engineered waterways. Barriers to migration, in the form of flood defences and weir construction, have been identified as a major threat to eel migration (DEFRA, 2010). There are 2,412 structures which are potential barriers to upstream migration within the Thames RBD (Clifton-Dey, D., pers. comm., 2016). It is likely these structures prevent access to suitable habitat by blocking upstream migration, leading to patchy distribution and reduced eel production in the Thames RBD compared to historical records.

1.3. ZSL Monitoring Programme

ZSL began monitoring of upstream elver migration in the Thames tributaries in 2005. The focus of the monitoring between 2005 and 2011 was at three sites on the Rivers Darent, Roding and Mole. Traps are placed at river barriers and upstream eel movements monitored from April to October, during the elver migration season. Long term datasets from these sites have provided an insight into the decline of the European eel, identifying a 99% decrease in elver recruitment in the Roding Catchment compared to the 1980s (Gollock *et al.,* 2011). Monitoring sites on the Rivers Mole and Darent were closed in 2017 due to eel pass installations on the former and river engineering works on the latter but monitoring on the Roding continues. Data from the site are sent annually, via the Environment Agency, to the Joint European Inland Fisheries and Aquaculture Advisory Commission / International Council for the Exploration of the Sea / General Fisheries Commission for the Mediterranean (EIFAAC/ICES/GFCM) and WGEEL. This is used along with other datasets to inform eel stock management advice from the WGEEL.

Since 2011, the scope of the Thames European Eel Project has increased through the creation of a citizen science monitoring scheme. Volunteers from 22 partnership organisations have been carrying out monitoring of the upstream eel migration at 13 sites. ZSL provide training, monitoring equipment and some of the traps. Licenses and some traps have been supplied by the Environment Agency. The South East Rivers Trust (SERT), National Trust and the Thames Rivers Trust have also provided monitoring traps used within the project.

2. Method

2.1. Trap Locations

A map of the 11 sites monitored in 2017 is shown in Figure 3. Through a close working relationship with the Environment Agency chaired Eel Management Plan Implementation Group (EMPIG), ZSL take every opportunity to monitor new passes built in the region. Monitoring can only happen however where partnership groups are available to monitor traps and access to the site is safe. The project has expanded further in 2017 with the initiation of monitoring in Morden Hall Park on the River Wandle and Island Barn Sluice on the River Ember.

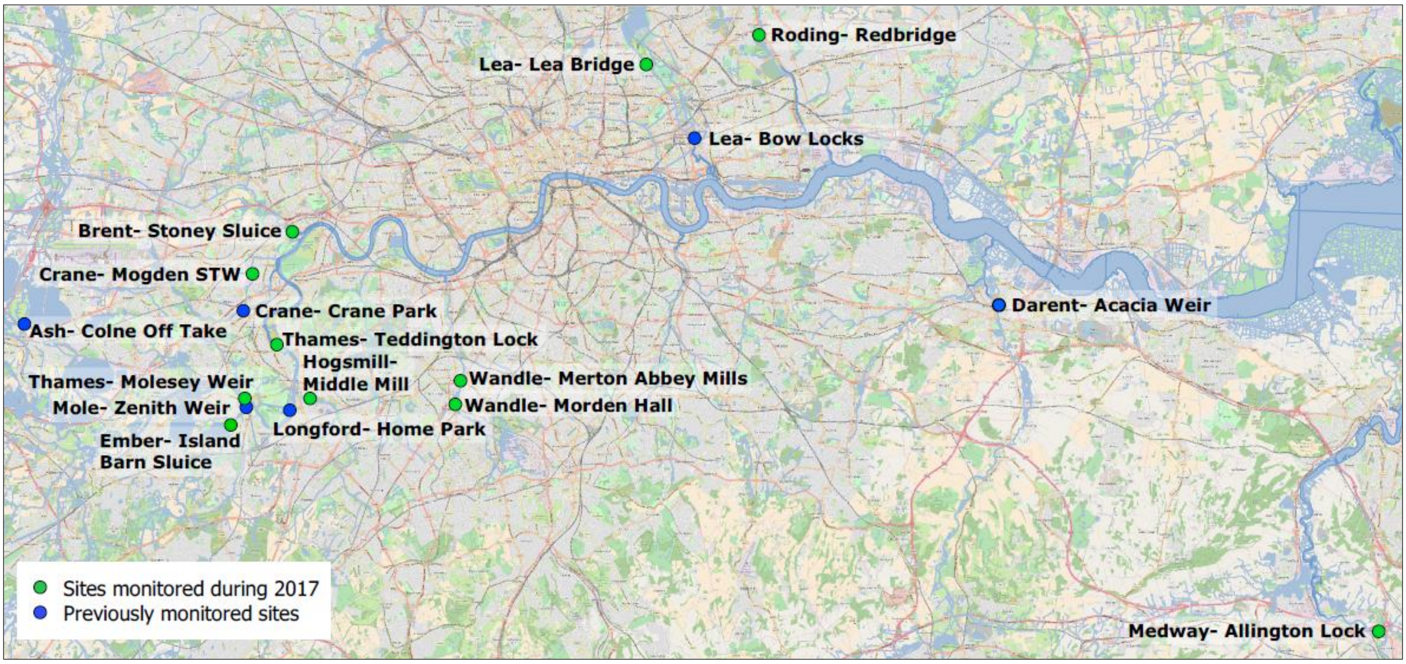


Figure 3: Locations of the monitoring sites within the Thames catchment. Map created using QGIS©

2.2. Trap Design

Traps are installed at barriers to migration where eels naturally congregate. This is a straightforward and reliable approach to monitoring glass eel and elver migration (Harrison *et al.,* 2014). The basic trap design, as developed by Naismith and Knights (1988), is shown in Figure 4. The water flowing down the ladder from the water pipe attracts eels, encouraging them to climb up the ladder and into the holding tank that provides a safe refuge for them away from direct sunlight (EA, 2011a; Piper *et al.,* 2012). While based on the same design principles, the traps at each site differ, example shown in Figure 5. As a result, the trapping performance will also differ, and therefore direct comparisons of catches between sites should only be made with an understanding of the performance of the traps used.

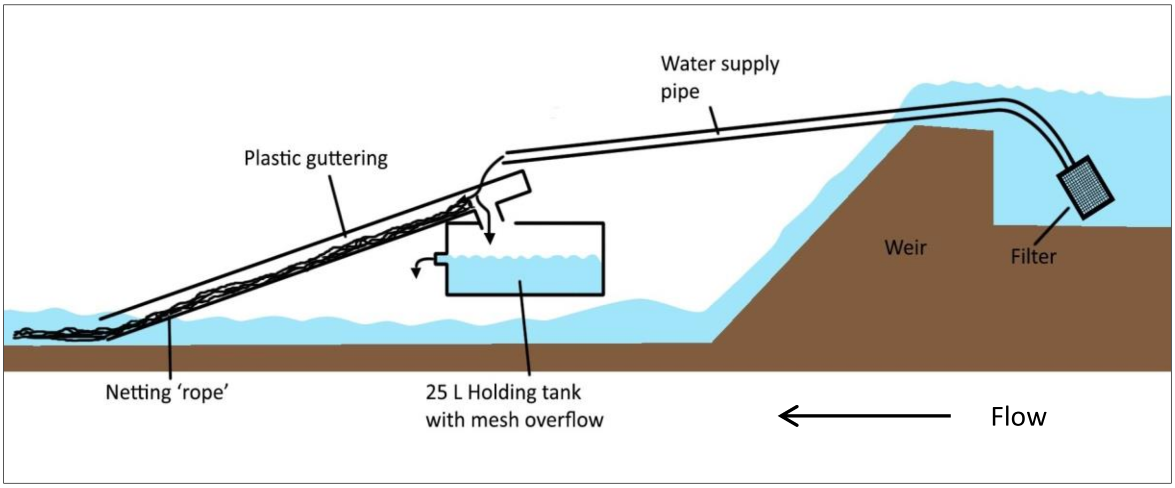


Figure 4: Schematic of the basic trap design used within the ZSL monitoring project.

Figure 5: Two of the different types of traps used for monitoring. (a) a gravity supplied trap at Hogsmill - Middle Mill, and (b) a pumped trap at Crane- Mogden Sewage Treatment Works (STW).

Table 1 gives a first order assessment of the performance of the traps used in the monitoring project. Trap performance gives an indication of the proportion of the total number of eels moving upstream at the trapping site that might be caught by each trap. Those traps with a high performance rating are assumed to be trapping a higher proportion of passing eels compared to medium or low performing traps. It is used as a guide only to inform analysis of the catch data.

Trap performance varies according to:

- The presence or absence of a bypass channel around the trap- performance decreases with the presence of a bypass route that avoids the trap.
- The channel width- the wider the channel that the trap is positioned on the lower the performance rating.

- The passability of the barrier that the trap is positioned downstream off - the more impassable, the greater the performance of trapping.

Table 1: The Performance rating of the eel traps used in the project

Site	Efficiency rating
Ash- Colne Off Take	medium
Brent- Stoney Sluice	high
Crane- Crane Park Island	low
Crane- Mogden STW	medium
Darent- Acacia Weir	medium
Ember- Island Barn Sluice	high
Hogsmill- Middle Mill	medium
Lea- Bow Locks	low
Lea- Lea Bridge	high
Longford- Home Park	high
Medway- Allington Lock	medium
Mole- Zenith	low
Roding- Redbridge	low
Thames- Molesey Weir	low
Thames- Teddington Lock	low
Wandle- Merton Abbey Mills	high
Wandle- Morden Hall	high

2.3. Citizen Scientist Training and Monitoring

All volunteers on the project have read and signed risk assessments prepared for each site and attended a training session covering health and safety, eel biology, survey methods, data collection and online data submission. These training sessions have been attended by 124 new volunteers in 2017 taking the cumulative total to 765 since the project launch in 2011. Each trap site has a lead coordinator, or coordinating partnership organisation. Traps are inspected at least twice per week during the monitoring period. The frequency of trap inspections ensures elvers are never held in the traps for longer than four days. At some sites, where catches become greater than 100 eels per day, the frequency of inspections is increased, and can be completed as often as daily. The length of trapped eels is measured and recorded at all sites (Figure 6). Eels shorter than 120 mm are classified as elvers or young of the year and used to determine recruitment. Where more than 50 eels are recorded, a sub-sample of 50 eels are randomly selected and measured to provide a representative sample of all the eels trapped on that occasion. Following measurement, eels are released back into the river, near the bank edge, upstream of the barrier. To avoid volunteers handling large eels, those estimated to be longer than 300mm are released without measuring and recorded on the database as >300mm.

Figure 6: Trained citizen scientists and ZSL staff collecting and measuring eels.

The aim is to have a minimum of three years data collected from each site and then close the monitoring. However, where the volunteers are willing, monitoring beyond three years is encouraged as longer term data sets have more value in showing trends in upstream freshwater eel migration. Trapping duration at each site varies between years due to occasional trap failure. Trap failure is documented to enable a record of the total number of days the trap is active over the monitoring period, termed the “effort”. The total number of eels caught is divided by the total number of successful trapping days in order to calculate the catch per unit effort (CPUE). This accounts for annual variability in trapping effort as a result of trap failure enabling for a more accurate comparison of eel recruitment over time.

3. Results

3.1. 2017 Catch Totals

A total of 54,102 eels have been recorded in 2017 (Table 2). This is the highest annual total recorded throughout the programme. This includes 30,071 eels caught at Brent- Stoney Sluice recording the highest number of eels of any site for the fourth consecutive year. It is, however, vital that any comparison of catch between years recognises the effort made and therefore a more useful comparison of elver recruitment over time is made using CPUE.

Elvers, eels of <120mm, are used in this study to show recruitment. The proportion of elver to yellow eels remained similar across most sites, however a few sites showed a reduction and both new sites had small proportions of elver. The percentage of the annual catch recorded as elver is also shown in Table 2.

Table 2: Distance from the tidal limit and total number of eels caught at each site. Values in brackets represent the percentage of the catch that are elvers (body length <120mm).

Site Name	Distance from tidal limit (km)	2012	2013	2014	2015	2016	2017
Ash- Colne Off Take	28.6	-	-	27 (0%)	16 (0%)	16 (6%)	-
Brent- Stoney Sluice	0	-	1,239 (75%)	36,646 (91%)	20,410 (86%)	12,985 (75%)	30,071 (83%)
Crane- Crane Park Island	4.2	0	0	-	-	-	-
Crane- Mogden STW	2.2	-	-	-	565 (51%)	946 (58%)	588 (40%)
Darent- Acacia Weir	0.5	45 (36%)	9 (89%)	466 (97%)	26 (73%)	26 (88%)	-
Ember- Island Barn Sluice	7.7	-	-	-	-	-	756 (26%)
Hogsmill- Middle Mill	3.8	1 (0%)	7 (58%)	11 (83%)	13 (30%)	27 (19%)	34 (47%)
Lea- Bow Locks	0	13 (100%)	208 (71%)	399 (88%)	121 (83%)	133 (85%)	-
Lea- Lea Bridge	6	-	-	-	-	8,089 (39%)	20474 (37%)
Longford- Home Park	4.5	-	49 (98%)	240 (75%)	316 (87%)	173 (73%)	-
Medway- Allington Lock	0	1079 (91%)	12,802 (99%)	4,934 (99%)	421 (99%)	75 (97%)	115 (96%)
Mole- Zenith Weir	7.8	138 (23%)	18 (82%)	19 (89%)	90 (58%)	-	-
Roding- Redbridge	6	11 (60%)	113 (75%)	2,318 (96%)	404 (71%)	156 (92%)	140 (79%)
Thames- Teddington Lock	0	-	-	10 (100%)	5 (100%)	33 (100%)	47 (97%)
Thames- Molesey Weir	8.1	133 (23%)	2,473 (99%)	327 (98%)	261 (96%)	250 (87%)	117 (85%)
Wandle- Merton Abbey Mills	5.5	139 (14%)	69 (32%)	332 (25%)	68 (3%)	213 (7%)	1497 (7%)
Wandle- Morden Hall	6.2	-	-	-	-	-	241 (2%)
Total number of eels		**1,559**	**16,987**	**45,729**	**22,716**	**23,122**	**54,102**

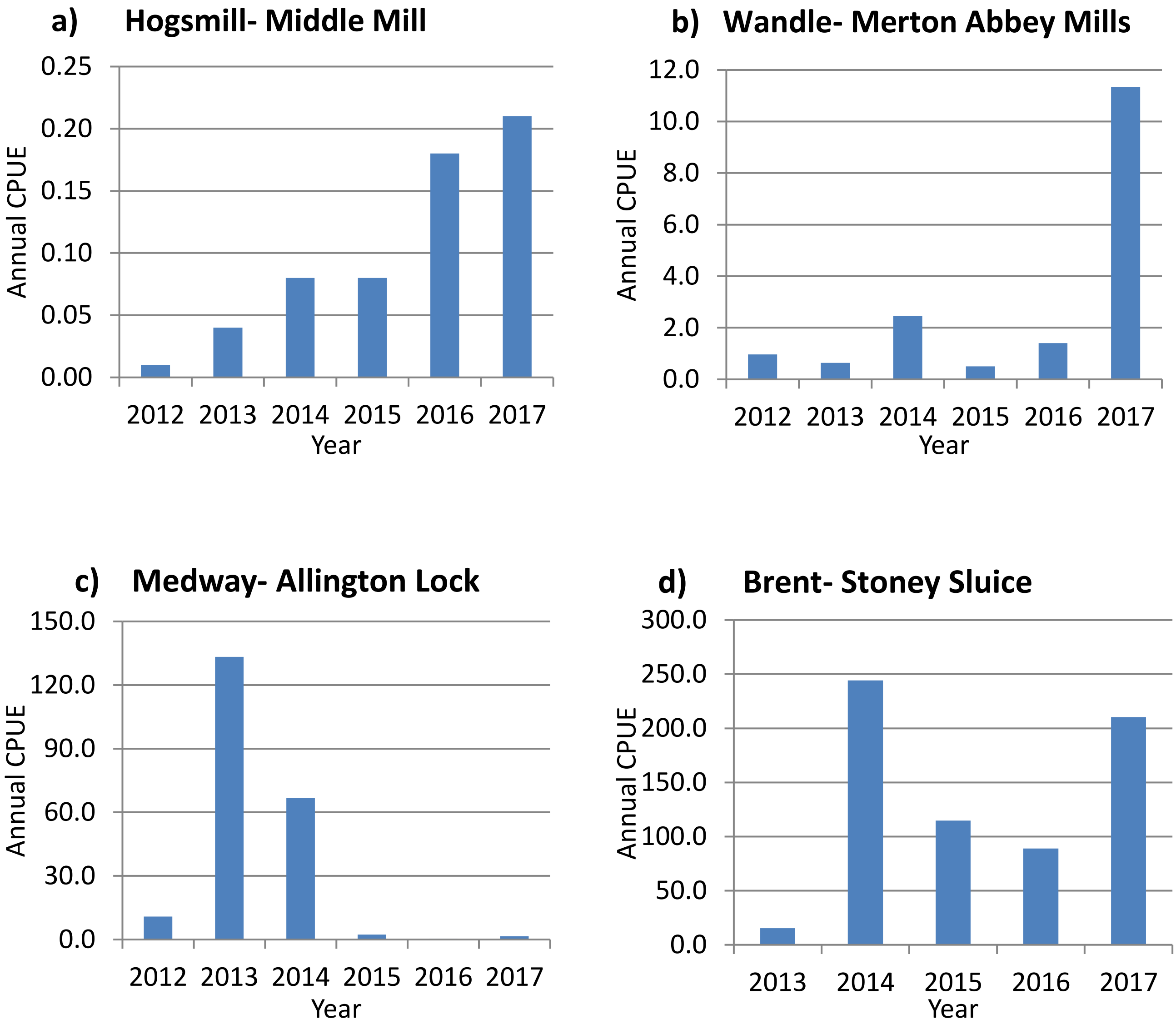
3.2. CPUE – Catch Per Unit Effort

The annual mean CPUE, 2012 to 2017, for each site is shown in Table 3. CPUE fluctuates between years across most sites and shows high variance from the mean within a single season. Of the 9 sites that were monitored in both 2016 and 2017, 2 recorded a reduction in CPUE and 7 recorded an increase. Brent- Stoney Sluice and Lea- Lea Bridge, both high performing traps, have recorded significantly larger CPUE's than other sites in the past two seasons with Brent- Stoney Sluice recording the highest CPUE for a fourth consecutive year.

The annual CPUE from citizen science sites in 2017 that have been monitored for 5 years or more are illustrated in Figure 7. A range of trends are displayed including gradual increases over time and multiple sites with small peaks in 2013 or 2014. Figure 8 shows the CPUE data for Roding- Redbridge from 2005, when monitoring at the site started, to 2017. This ZSL staff monitored site provides a valuable long-term data set.

Table 3: Annual CPUE (eel day^{-1}) per site.

Site Name	2012	2013	2014	2015	2016	2017
Ash - Colne Off Take	-	-	0.27	0.10	0.10	-
Brent - Stoney Sluice	-	15.30	244.31	114.63	88.94	210.29
Crane - Crane Park Island	0.00	0.00	-	-	-	-
Crane - Mogden STW	-	-	-	5.96	6.35	3.87
Darent - Acacia Weir	0.16	0.02	1.21	0.08	0.09	-
Ember - Island Barn Sluice	-	-	-	-	-	6.81
Hogsmill – Middle Mill	0.01	0.04	0.08	0.08	0.18	0.21
Lea - Bow Locks	0.09	1.48	2.98	0.61	0.88	-
Lea – Lea Bridge	-	-	-	-	56.57	132.95
Longford-Home Park	-	0.62	2.82	2.53	2.31	-
Medway - Allington Lock	10.90	133.30	66.68	2.34	0.48	1.49
Mole - Zenith Weir	1.25	0.09	0.10	0.52	-	-
Roding - Redbridge	0.08	0.47	7.20	2.36	0.83	1.15
Thames - Molesey Weir	0.82	14.63	2.10	1.68	1.63	0.82
Thames - Teddington Lock	-	-	0.36	0.02	0.25	0.31
Wandle – Merton Abbey Mills	0.97	0.64	2.46	0.50	1.41	11.34
Wandle- Morden Hall	-	-	-	-	-	2.43
Annual CPUE	**1.59**	**15.14**	**27.55**	**10.11**	**12.31**	**33.79**



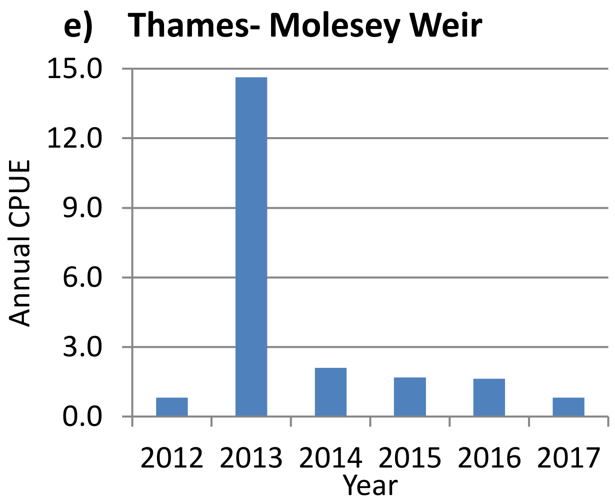


Figure 7: Annual CPUE for 2017 citizen science sites with five or more years data.

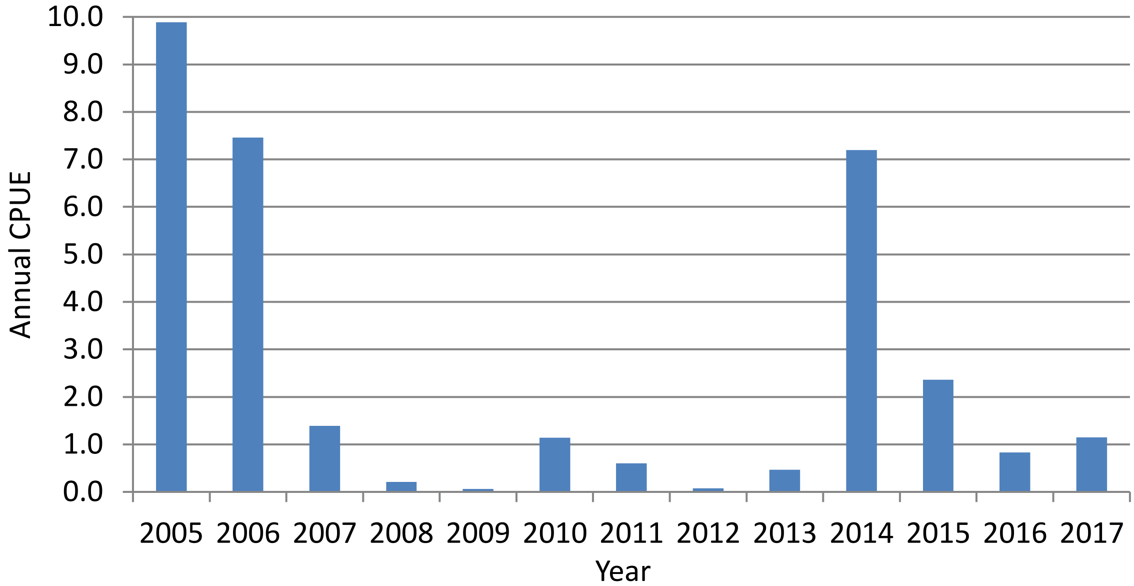


Figure 8: Annual CPUE for Roding- Redbridge since monitoring began in 2005.

4. Discussion

4.1. Elver Recruitment and Catch Data

As a consistent methodology for monitoring eel recruitment throughout the Thames RBD has now been used at three sites for five years and five sites for six years, the data provides a useful source of information on changes in recruitment over time. By having multiple sites we can also infer recruitment trends into the wider Thames RBD.

Recruitment continues to be low when compared to levels of recruitment recorded prior to the 1980s (ICES, 2017), and most sites show a pattern of recruitment similar to those observed in other catchments in the North Sea (ICES, 2017), and across Europe (Figure 2), where a small peak in recruitment was observed in 2014 (ICES, 2014). Traps on the River Brent- Stoney Sluice, Roding- Redbridge and Wandle- Merton Abbey Mills all experienced an increased CPUE in 2014 compared to the years either side and Medway- Allington Lock and Thames- Molesey Weir had a more prominent peak in 2013, within the 3-year time period during which the increase was observed across Europe (Figure 7 & 8) (ICES, 2014).

The large spatial distribution of sites also allows us to see patterns of recruitment within the RBD. Generally it is the sites nearest the tidal limit on the tributaries that catch a higher proportion of elver. The proportion of yellow eel in the catch increases with distance from the tidal limit. There are exceptions to this however, such as Thames- Molesey Weir.

Variation in catch size is thought to largely be a function of trap performance, river size/flow and distance from the tidal limit. For instance Brent- Stoney Sluice is a high performing trap that records high levels of recruitment at its location on the tidal limit. It is surprising however that such low catches have been recorded at Medway- Allington Lock over the past two years, given the location of the trap and size of the river.

4.2. Migration Barriers and Passes

Being mindful of differing trapping performance ratings the monitoring data allows for a comparison of catches across sites or, perhaps more importantly, a comparison between actual and expected catch for a site. Low or zero catches at sites may indicate barriers to migration located downstream of monitoring sites. The ideal for eel migration and the wider river ecology is barrier removal but where this is not feasible the installation of eel passes can help mitigate impacts. Several examples of the positive, localised impact of eel passes have been highlighted by the monitoring data. For instance Figure 7a shows CPUE from Hogsmill- Middle Mill increasing over time during the same period that SERT and ZSL have been improving eel passage on structures downstream of the monitoring site on the River Hogsmill. The River Crane is also an example of this. In 2011 and 2013 the trap monitored at Crane-Crane Park Island (CPI) caught no eels, prompting the installation of two eel passes that allow eels to migrate up into the Crane catchment, via the Duke of Northumberland's River, from the Thames. One of these passes, at Crane- Mogden STW, has a trap in it and monitoring of the trap has recording the recruitment of eels to the catchment every year since its installation in 2015.There are no barriers on the River between Crane-Mogden STW and Crane- CPI. In future years, in order to directly gauge the impact of the new eel passes, it will be of interest to re-monitor at Crane-CPI using the same trap used in 2011 to 13.

The removal of a barrier may also have influenced the 2017 catch at Wandle- Merton Abbey Mills. In early 2017 a tidal weir, and the contaminated sediment that had built up behind it, were removed by Wandsworth Council from the confluence of the River Wandle with the Thames. As illustrated in Figure 7b, the Wandle- Merton Abbey Mills trap showed an increase in CPUE from 1.41 eels day^{-1} in 2016 to 11.34 eels day^{-1} in 2017, perhaps in response to this change but further monitoring is needed to be confident of this.

Since 2005 the project has been using passes with traps to restore migratory pathways for eel but recently the project has started building eel passes where due to practical or safety issues monitoring is not included.Table 4 lists the passes without traps built by the project.

Table 4: Eel passes (without traps) built by the ZSL Thames European Eel Project since 2013.

Year	Site	Location	Funder
2013	River Darent	A24 Road bridge	Esmee Fairbairn Foundation
2014	River Hogsmill	Clattern Bridge	Esmee Fairbairn Foundation & SERT
2015	Duke of Northumberland's River (Crane Catchment)	Kidds Mill	SITA Trust
2015	River Brent	Osterley Weir	SITA Trust & Environment Agency
2016	River Mole	Zenith Weir	SITA Trust
2017	River Roding	Passingford Mill	BT

To date the cumulative total of eel habitat made accessible by both the project's monitoring sites and the eel passes, is calculated to be 83.27ha. DEFRA's eel population model estimates that 5.88 kg silver eel biomass, escapes from each hectare of habitat in the Thames RBD (DEFRA, 2015). This means that as a result of this project a further 489.65 kg of silver eels are expected to escape to the Sargasso per year.

4.3. Partnership Support

A key objective of the project is to support our partnership organisations in taking measures that contribute to the conservation of the European eel. ZSL do this by offering technical advice on improving eel passage, highlighting funding opportunities, supporting funding bids and assisting with eel pass and easement installations.

Further eel conservation activities that were undertaken in 2017 as part of this work included:

- ZSL, supported by the Living Wandle Landscape Partnership, ran a workshop for National Trust staff at Morden Hall. The aim of the workshop was to support more conservation work for the European eel across the National Trust Estate.
- A survey of structures and assessment of their passability to upstream eel migration was conducted on the River Roding.
- A survey of obstructions to eel migration in the North Kent Marshes has led to securing funding for screening the abstraction pumps at Elmsley Nature Reserve.

4.4. Project Plans for 2018 and Beyond

In 2013, the EA introduced an 'Alternative Measures by other means' option to the enforcement of the Eel (England and Wales) Regulations 2009. This allows asset owners who cannot achieve best practice for eel protection on their own sites, despite doing all that is reasonable, to mitigate their impacts through alternative measures such as funding eel conservation work elsewhere.

In 2018 the project will deliver the remaining works related to alternative measures payments from BT and Uniper. The outputs of this work include:

- Eel passes on Redbridge roundabout (TQ 5415 1883) and Loughton gauging (TQ4414295573) weirs on the River Roding.
- An eel pass at Kedies weir (TQ 36381 95289) on the River Lea Diversion.

ZSL has also been awarded funding from the Disney Conservation Fund (DCF) and the European Maritime Fisheries Fund (EMFF) for works in 2018/19:

- DCF will support the development of the eel project on the River Mole with Surrey Wildlife Trust. Plans include the development of a new monitoring site upstream of Ember – Island Barn Sluice; a survey of the barriers of the middle section of the River Mole; and the production of a methodology for assessing the passability of barriers to upstream eel migration for use by ZSL's peer organisations.
- The EMFF is supporting the installation of an eel pass on the River Cray at Vitbe Sluice (TQ 52797 75399) and a pass and trap at Hall Place (TQ 50202 74256) on the River Cray for monitoring with the North West Kent Countryside Partnership.

4.5. Project Impact and Citizen Science Engagement

The project has been a success thanks to the significant commitment of partnership organisations and volunteer citizen scientists. Some volunteers and organisations have remained engaged with the project over six years, allowing consistent monitoring data to be collected across a large area. To date, 22 partner organisations and 765 volunteers have been involved within the programme, representing the significant capacity of the project to raise awareness and deeper understanding amongst the public of the issues facing the European eel in the Thames RBD.

One factor that has contributed to continued participation of citizen scientists has been a sustained two-way communication between conservation practitioners and volunteers. The project officer has remained readily available and responsive to project partners and citizen scientists. At the end of each migration season, all citizen science volunteers involved in the project are invited to the 'Citizen Science Eel Forum' (Figure 10). The forum gives ZSL an opportunity to thank volunteers, provide feedback on the outputs of the project and also encourages a free-flow exchange of information and ideas between citizen scientists and the invited expert speakers.

Figure 10: Citizen Scientists at the 2017 Annual Eel Forum.

The sustained high level of engagement of project participants has enabled the programme to develop into the largest single catchment study of elver migration within the UK. The project demonstrates that citizen scientists provide a cost-effective contribution to freshwater conservation at a catchment scale, and produce a reliable source of data to advise regional, national and international conservation management.

It is important to recognise that the European eel status still remains 'critical' (ICES, 2017). Eels have a long generation period so the impacts of recent conservation efforts on eel recruitment are unlikely to be observed for at least several years and up to a decade (ICES, 2014). The continuation of elver recruitment monitoring to assess longer term trends is considered to be of high importance given the observed fluctuations and the 'critical' conservation status of this species. Data from the ZSL monitoring program contribute to this and are incorporated within EA eel management plans and supplied for European stock assessment, contributing towards the larger scale monitoring of juvenile eel recruitment across Europe.

For full details of barrier assessment reports and future projects please contact ZSL

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