River Yealm – towards a designated bathing water site

Tony Hawkins 26 March 2022

The River Yealm is a short, but beautiful river that runs from Dartmoor at Yealm Head to its exit into the sea at the Bar Mouth in the Yealm Estuary.

River Yealm - Wikipedia

Yealm Estuary - AONB (southdevonaonb.org.uk)

Although not officially designated, popular swimming spots include “Pimple Rock” in the river at Yealmpton, plus Popes Quay and Cellars Beach further down in the estuary.

pimple rock yealmpton - Google Search

popes quay noss mayo - Google Search

cellars beach river yealm - Google Search

Historically, our river has also afforded recreational salmon and trout fishing. However, stocks have been in serious decline.

Salmon in River Yealm to be protected as stocks fall to all-time low - Plymouth Live (plymouthherald.co.uk)

Introduction to the Upper Yealm Fishery: (flyfishingdevon.co.uk)

Successful past cultivation of oysters in the estuary has also been challenged and now ceased, primarily for reasons associated with pollution.

limosa oyster - Google Search

All 7 riparian Parish Councils that adjoin the River Yealm are concerned about water quality in the river, coming together with other local organisations within the River Yealm Water Quality Group, to help establish both the extent and sources of pollution, including how it might be mitigated.

Of particular concern, are sewage inflows, for despite being only 12 miles long from its source on Dartmoor to the sea, South West water have as many as 5 sewage treatment works that discharge into the Yealm catchment, designated as STW in Figure 1 below.

The presence in any water sample of *Escherichia coli* (E. coli) bacteria indicates that human or animal faeces may be present, together with other organisms, such as viruses, also derived from faeces, which can cause illness. For this reason, the Environment Agency takes

water samples for *E. coli* at each of England's designated bathing waters during the bathing water season between May and September each year. A classification for each bathing water is calculated annually based on samples from the previous four years. These classifications are, from best to worst:

- excellent – the highest cleanest seas
- good – generally good water quality
- sufficient – the water meets minimum standards
- poor – the water has not met the new minimum standards, work being planned to improve bathing waters not yet reaching sufficient

Bathing Water Quality (data.gov.uk)

To help understand what bathing water status the river Yealm might have, concentrations of *E. coli* have been downloaded from the Environment Agency (EA) Water Quality Archive, drawing upon measures made through the Yealm catchment over past 20 years.

Open WIMS data

Figure 2 shows EA Water Quality Archive results for *E. coli* measured from 2007 to 2022 at two sites, each illustrated in Figure 1; Hele Cross towards the top of River Yealm, above all sewage treatment plants, and Puslinch Gauging Station towards the bottom of River Yealm, only three hundred metres below the above-mentioned popular swimming spot at "Pimple Rock" at Yealmpton.

Average values (± 90% confidence interval) for *E. coli* from 2007 to 2022 at Puslinch Gauging Station were 6543 ± 573 (cfu/100 ml), as much as 25 times the coincident average recorded at Hele Cross (263 ± 188 cfu/100ml), also indicating levels that were consistently and very significantly ($p < 0.05$) above the Environment Agency water quality environmental threshold for inland bathing waters of 900 cfu/100ml, as defined by the red horizontal line in Figure 2, and above which threshold the associated classification is also "Poor", confirming values that are "worse than the sufficient".

Bathing Water Quality (data.gov.uk)

Bivalve mollusc (shellfish) harvesting areas are classified by the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) according to the extent of microbial (faecal) contamination measured as *E. coli* in shellfish flesh, *E. coli* having been accumulated with other food particles by shellfish as they feed by filtering surrounding water. Treatment processes before shellfish can be marketed are then stipulated according to the resulting classification status of the area.

Shellfish classification and microbiological monitoring - Cefas (Centre for Environment, Fisheries and Aquaculture Science)

Towards such classification, *E. coli* have been monitored by CEFAS in shellfish on the River Yealm since about 1999. To afford a historical perspective that matches the Environment Agency water quality data described above for *E. coli* from 2006, data were downloaded

from the CEFAS data archive to enable comparison of *E. coli* content in the tissues of Pacific oysters cultured in the river Yealm estuary at Fox Cove over past 22 years, and which measures are illustrated in Figure 3.

Shellfish monitoring results - Cefas (Centre for Environment, Fisheries and Aquaculture Science)

Findings illustrated in Figure 3 show no statistically significant change ($p > 0.05$) over time. Further, the associated range of values for *E. coli* content in Pacific oyster tissues most often resulted in classifications requiring significant treatment processes before shellfish could be marketed, with associated financial costs to the shellfish farm.

Collectively, these separate and complimentary analyses both by the EA and CEFAS establish unacceptable levels of E. coli as a key marker of faecal contamination within the River Yealm over the past two decades. Most shockingly, despite so much effort and evidence, there has been little or no evident improvement during that time.

Addressing the sources from which *E. coli* originate in the River Yealm, CEFAS (p.24 of their Sanitary Survey Report dated 2010) stated that: "Statistically significant positive relationships were detected between rainfall and levels of E. coli in bivalves from all current representative monitoring points in the estuary. Therefore, rainfall seems an adequate parameter to predict levels of E. coli in bivalves in this estuary. However, the strength of the association varied according to the monitoring point and the time of sampling relative to the rainfall event. Higher coefficients were computed when sampling took place 1–2 days after the rainfall event. No positive associations were found between flows in the River Yealm and levels of E. coli in bivalves. Taken together, these results indicate that rainfall-dependent sewage discharges and dairy washings/surface runoff from agricultural land are the most likely significant sources of faecal contamination impacting the quality of bivalves in the Yealm. This is confirmed by microbial source tracking studies undertaken by the Environment Agency across the Yealm catchment, which have indicated mixed dominance of animal/human sources across the catchment".
final-yealm-estuary-sanitary-survey-report-2010.pdf (cefas.co.uk)

For the above reasons, initiatives undertaken by the River Yealm Water Quality Group to date include the following:

- informing and educating through newsletters;
- monitoring and advising planning applications to ensure that they include separation of surface water from sewage (SuDS); and
- ***consulting with concerned groups including among others Surfers Against Sewage, the Wye Catchment Partnership and Windrush Against Sewage pollution towards understanding how best to achieve designation of stretches of our river Yealm as bathing waters, thereby helping ensure that faecal contamination will be more closely accounted for both by the EA and South West Water***, at the same time driving action to clean up pollution from all sources such as include water company assets, private sewerage, agriculture, road run-off and china clay extraction pits;
- preparing a report on past water quality monitoring within the Yealm catchment by the Environment Agency; and

- submitting an Environmental Information Request in August 2021 for discharge information from South West Water for all five sewage treatment plants in the catchment, towards establishing any illegal discharges, which information we have yet to receive, SWW to date providing only excuses and apologies.

In a related initiative, both to demonstrate wide community support and to build evidence for leverage, the Yealm Estuary to Moor project (YEM) is coordinating catchment-wide voluntary sampling for measures of water quality as part of the Westcountry Rivers Trust (WRT) Citizen Science Investigation. At the same time, YEM and the WRT are currently seeking funds to obtain a probe that will monitor our river water quality continuously, with the primary objective of providing real time alerts by mobile phone of pollution events, thereby enabling immediate responsive investigation and sampling.

Figures 1 to 3

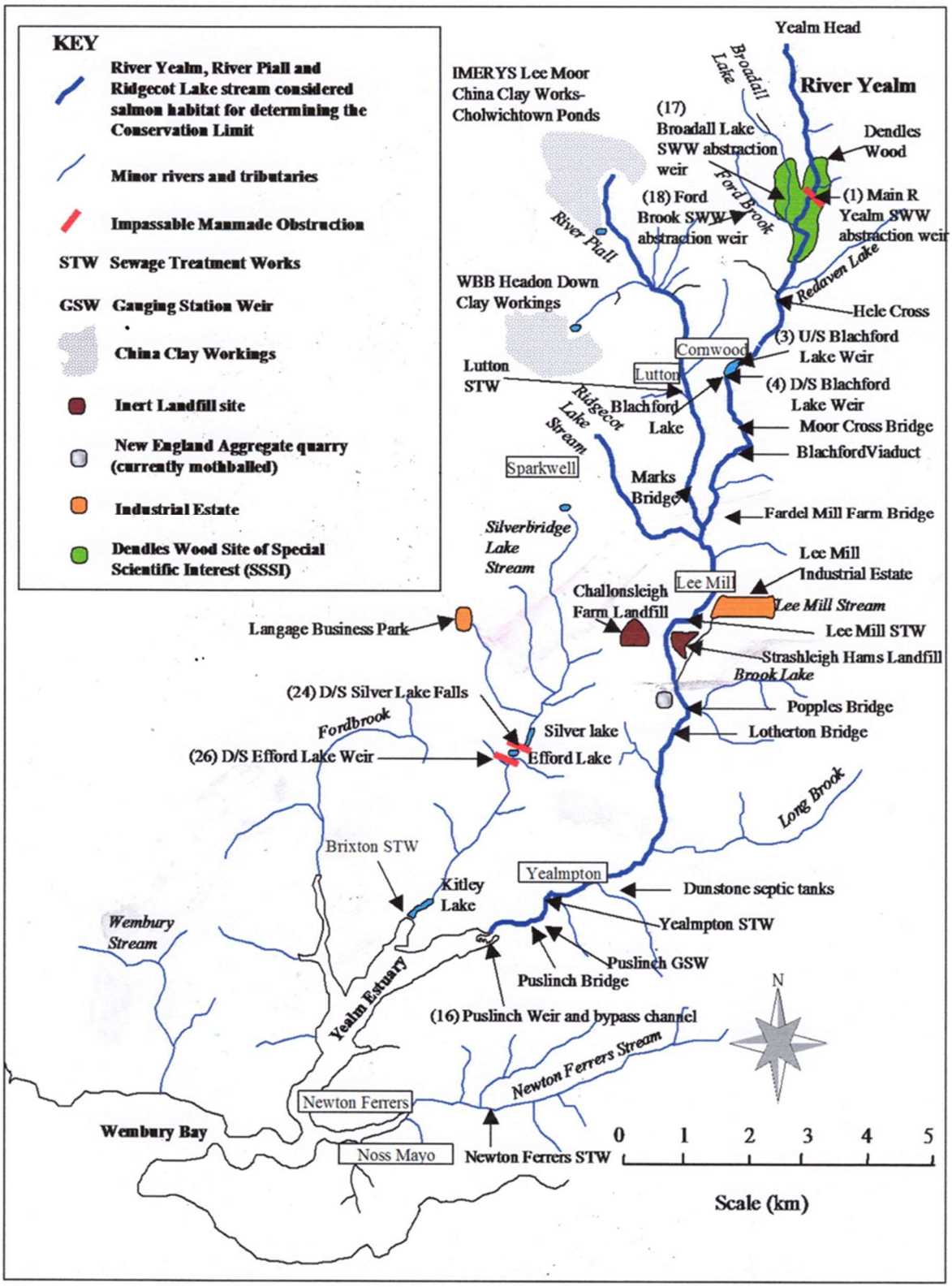

Figure 1. Map of the River Yealm catchment, taken from the Environment Agency's "River Yealm Final Salmon Action Plan" dated 2020 (http://www.environmentdata.org/archive/ealit:1392).

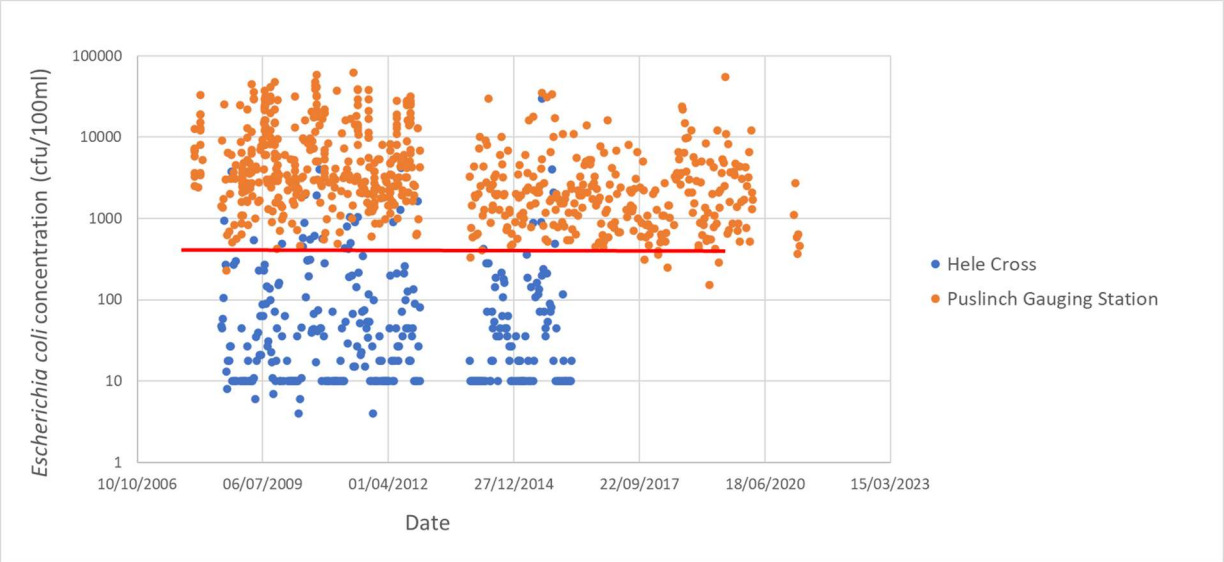

Figure 2. Environment Agency Water Quality Archive results downloaded to show *Escherichia coli* measured from 2007 to 2022 at two sites: Hele Cross towards the top of River Yealm and Puslinch Gauging Station towards the bottom of River Yealm, The horizontal red line denotes the Environment Agency water quality environmental threshold for inland bathing waters of 900 cfu/100ml, above which threshold the associated classification is "Poor".

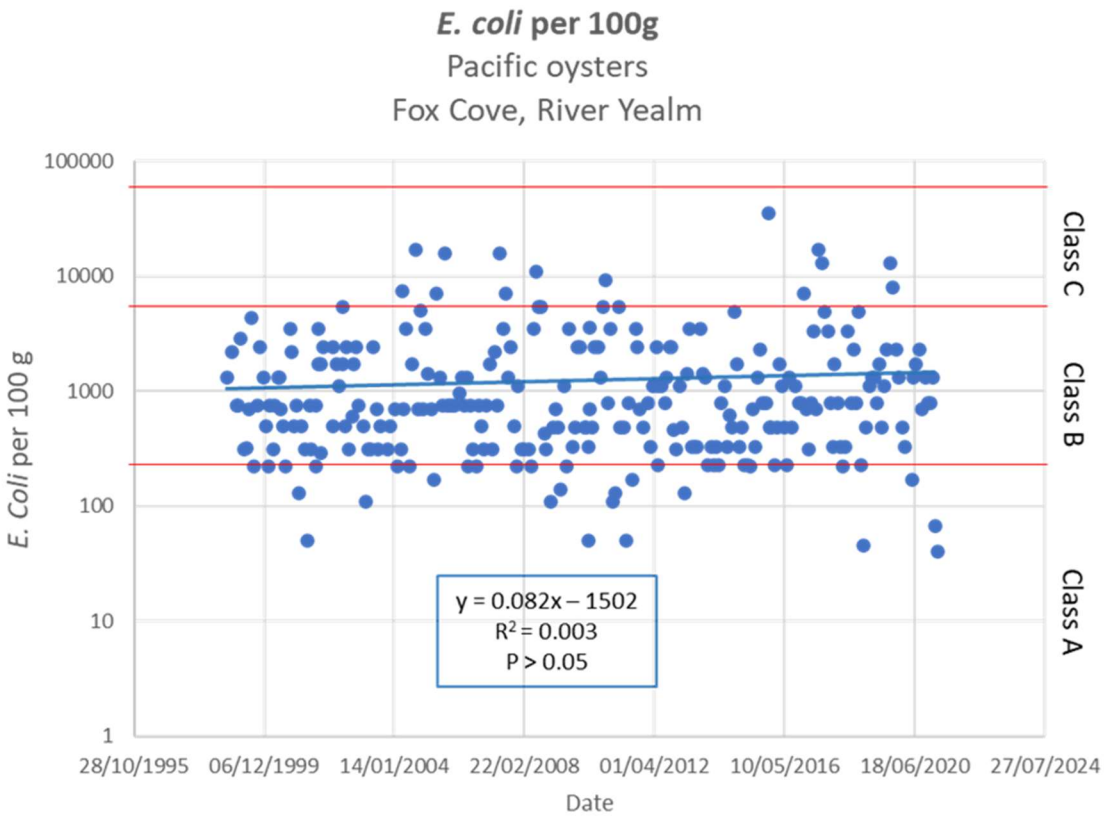

Figure 3. Centre for Environment, Fisheries and Aquaculture Science CEFAS) archive results downloaded to show *E. coli* per 100 mg soft tissue in Pacific oysters from Fox Cove over 22 years from 1999 to 2021. Horizontal red lines denote thresholds for associated classification of harvesting areas by CEFAS, with consequences for the treatment processes required before shellfish can be marketed (https://www.cefas.co.uk/data-and-publications/shellfish-classification-and-microbiological-monitoring/england-and-wales/).