Consented Discharges
Processing and Making More of Available Data

Headlines

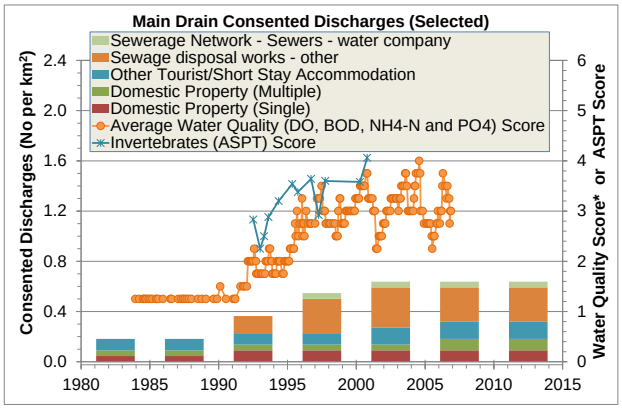
Why this Might be Important for You

It is easy to see a discharge to a watercourse and assume it is the cause of problems but natural streams can often look murky too. So we must assess which consented discharges may be influencing the water quality parameters that are a problem in our water bodies. And then see whether the way the consents vary in time and space points to particular causes.

It is equally important to rule out these discharges where we can, so that we focus our efforts on the "real" but sometimes less obvious, problems.

Understanding how discharges have changed over time can also give you a feel for how important a discharge may be on water quality and aquatic life:

Linking Changes in Water Quality to Consents



Note: *For WFD status (right hand axis) upwards is better: High=5, Good=4, Mod'=3, Poor=2, Bad=1. This chart (from the Tidal Ribble) shows that as controls on discharges tightened in the 1990s, particularly on non-water company sewage disposal and water company sewer storm overflow discharges (green + orange bars), water quality (orange circles) and invertebrates (blue crosses) improved. Sewage therefore used to be a problem.

There are no invertebrate and water quality monitoring data after 2000 and 2008 respectively.

The smaller dips in water quality in 2002 and 2006 coincided with high numbers of sewage-related pollution incidents (not shown).

Processing Environment Agency Data

We have focussed on the consented discharges most likely to affect ammoniacal nitrogen and phosphorus concentrations because WFD assessments identified these as key problems in the catchments we were looking at.

We then simplified the types of consents into a smaller number of categories so we could compare discharge pressures between catchments and over time (as illustrated in the above chart).

The work is documented in two of our reports (see Further Information).

About Consented Discharges

There are many artificial discharges to the water environment and those with a potential to pollute are controlled through the conditions of a consented discharge or environmental permit issued by the Environment Agency (EA).

Allowing discharges directly to water courses in this way reduces flows to, and storm capacity requirements for, sewage treatment works. It also helps to maintain a good distribution of flow through a catchment by collecting and discharging water locally.

In theory, consented discharges should have an acceptably low impact on the water environment, but sometimes they operate outside their design constraints. Also long-term or repeated episodic discharges may have a chronic effect on the aquatic environment that we do not understand yet.

Our Processing of Consent Data

Raw data

The EA supplied Excel spreadsheets containing a) the grid-referenced consented discharges and b) the type of consent (field = DSI Type Code Meaning), with descriptions such as "Domestic Property (Single)", "Livestock Prod. Food Prod.", and "Sewage Disposal Works - water company". Data in these two spreadsheets were combined so that each consent had a DSI Type Code Meaning description. The water body ID (and its area) within which the consent was located was added using GIS.

Processing for the Eden Water Bodies

In our evaluation of 86 water bodies in the Eden catchment in Cumbria (Ref 1), we highlighted to stakeholders those consents which were likely to be sources of ammoniacal nitrogen, organic loading and orthophosphates (807 in number) based on their DSI Type Code Meaning. The proposed consent types included: agriculture, industry, sewage and water treatment (see Ref 1). Using GIS we then derived the density of each consent type (No /km^2) in each water body. We subsequently grouped the different types of consented discharges these into fewer summary categories according to the rules described in Ref 1.

Processing for the Tidal Ribble WBs

In our evaluation (Ref 2) of 8 water bodies draining to the Tidal Ribble between Preston and Lytham St Annes, we similarly categorised consents and also examined the date when they had come into effect, and if and when they had been revoked.

Discussion with the EA's consents team, led to the conclusion that the increase in the number of discharge consents was related to the increase of

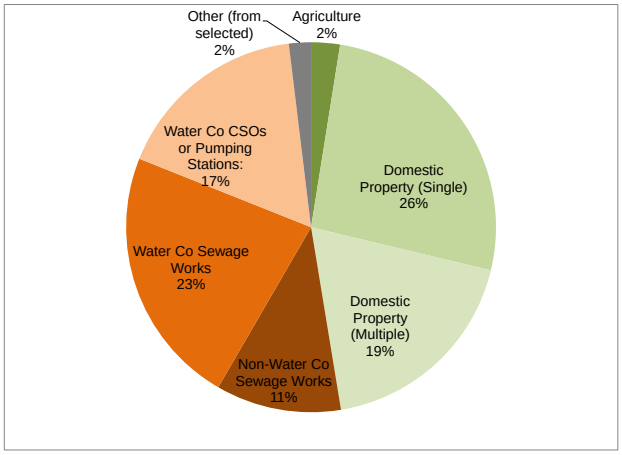
consents on sites with a precedent licence rather than for completely new discharges in places where there had previously been none.

Use of Consent Data

Overviewing the Main Consents

The image below is derived from our work on the Eden (Ref 1) and shows the proportion of different consents likely to be affecting ammoniacal nitrogen and phosphate concentrations. Besides water company discharges, there are "non-water" company discharges and numerous private sewage (e.g. septic tanks) discharges. Although discharges from agriculture could have a significant effect, these are not controlled through consents.

Eden Catchment – Consents



Note: 675 consented discharges in total possibly affecting ammoniacal N and phosphate. A further 58 including tourist – short stay accommodation should also have been included.

Examining Changes over Time

Examining how the number and type of discharge consents vary over time can provide useful insights into the system's behaviour. E.g. the chart on page 1 shows how the increase in consents in the 1990s led to improvements in water quality and invertebrates.

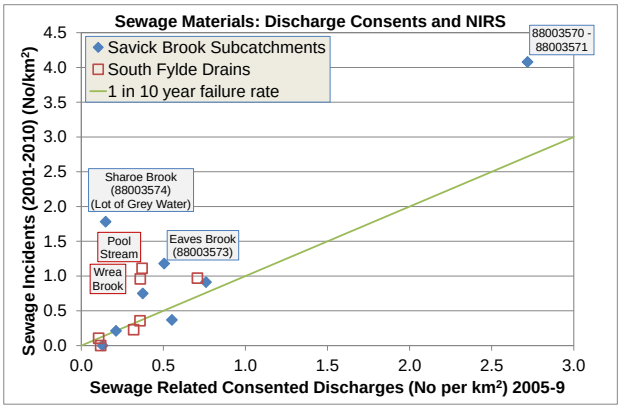
Examining Downstream Changes

Checking water quality or biology above and below a consented discharge provides evidence of whether or not a discharge is a problem. If the discharge is intermittent, the timing of sampling and flow conditions will be important.

Spotting Problem Discharges

The density of sewage related consented discharges (e.g. from private and water company sewage treatment works, CSOs and PSOs - combined sewer and pumping station overflows) was compared to sewage related pollution incidents for the Tidal Ribble water bodies (Ref 2). A broad relationship (1 event in ten years per consent) was apparent for most of the water bodies; consistent with a designed failure rate (storm capacity) during high rainfall conditions. Some water bodies had proportionally more incidents and this was discussed with stakeholders to contrast this information with inputs of sewage from wrong sewage connections in these areas.

Spotting Problem Discharges



Note: Those areas (above the green line) with a high number of sewage incidents for the number of consents suggest consents which may be operating outside their constraints. Note that for one of these (Sharoe Brook) Environment Agency pollution incidents data indicated a lot of grey water (e.g. waste water from baths and sinks) pollution incidents so the problem here may be from wrong connections rather than poorly designed storm overflows.

Find out More?

Ref 1: Evaluation of Evidence for WFD Failure in 86 Eden Water Bodies - Summary Report for the Evidence and Measures Project. For Defra and the EA, *In Press.*

Ref 2: Tidal Ribble Water Bodies – Summary Report for the Evidence and Measures Project. For Defra and the EA, 2015.

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Evidence and Measures Projects

Evidence and Measures is a programme of work funded by Defra and the Environment Agency which has been working in a variety of catchments since 2008. It uses readily available evidence to help stakeholders identify locally-targeted measures aimed at delivering ecological improvements.