

The characterisation of rural and urban pollution sources: observation compilation

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Despite major investment in new sewerage and sewage treatment infrastructure during the 1990's, the bathing waters along the Fylde Coast of North West England failed to consistently comply with the Bathing Waters Directive. Consequently, investigations were carried out by the Environment Agency of England and Wales (EA) into the impact of possible diffuse pollution sources. The same phenomena occurs in the northern area of the "Mareclean" Life-Environment project (SW Cotentin just over Granville on the Normandy coast) after high tides, in the vicinity of 3 large estuaries ("havres") where up to 1000 sheep are grazing during spring, so investigations were led on the potential microbiological load of sheep manure on salted marshes, and the fluxes (floating solids, and suspended matter in water) linked to their submersion, at the outlet of the estuaries.

1. Grazing animals: The inter-tidal salt-marshes along the estuary of the River Ribble in NW England are managed by the grazing of cattle and sheep. The marshes are flooded by high spring tides and solid faecal matter is washed into the estuary. On occasions, this material has been visible in the sea and deposited on nearby beaches causing aesthetic and bacterial quality issues. Investigations carried out in 2001/02 showed that the ebb tide was approximately an order of magnitude more contaminated by faecal indicators than the flood. Areas of these salt-marshes are Sites of Special Scientific Interest (SSSI) and the Ribble Estuary is a RAMSAR site. Consequently there is the potential for conflict between the competing aims of the Bathing Waters and Habitats Directives. In the Normandy study, the decay of *E.coli* and intestinal Enterococci was observed in manure, the quantity of solid manure (around 200-300 kg/ha) was measured on pilot areas, and concentration of suspended bacteria in water column was measured during submersion (5000 to 20 000 *E.coli*/100 ml), resulting in fluxes up to 10^{15} *E.coli*/day at the "havre" outlet. Proposals are made for improved sheep grazing management, during weeks before high tides.

2. Birds: Along the Fylde Coast at Blackpool, large numbers of birds roost at night on buildings and on the three piers, particularly North Pier. The numbers of starlings rise significantly through the summer months to peak in late August and September. In 2001/02 the EA undertook surveys of bird populations and distribution, investigated the quantity and bacterial quality of bird droppings, and considered possible means of removing the starlings. It has been estimated (Feare 2001) that 4g/starling/night would be deposited under a roost. Multiplied by the peak starling count of 37000, an estimate of 148kg of faeces deposited/night is obtained. The calculated weight/night from the investigation was 210kg/night. The geometric mean *E.coli* concentration was 4.6×10^7 cfu/g, giving a *E.coli*/night load of almost 10^{13} cfu/night.

3. Less "exotic" urban and rural "characteristic values", e.g for "inhabitant-equivalents" of microbiological fluxes from wastewaters, urban rainwaters, boat moorings, or emitted by watersheds with graduate density of cattle breeding and animal manure "pressure", under various rain conditions, can be found in literature ; but local factors can widely influence these "key figures", so they must be used with precaution, and validated anyway by some field measurements, when used during "profile" studies.