

Spring Funding Report

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My PhD focuses on the occurrence and effects of pharmaceuticals in estuaries. The main routes of entry into the aquatic environment is through sewage systems, improper disposal, run off from agriculture and aquaculture. After consumption, a proportion of the drug is used by the body, and then is excreted into the sewage system via urine and faeces. Topical pharmaceuticals can also enter sewage systems or directly into aquatic systems after being washed off. Once in the aquatic environment, have the potential to enter organisms. Pharmaceuticals are unique in comparison to other pollutants as they are designed to be biologically active and alter the physiology of the consumer. They have the potential to negatively impact aquatic organisms and as a result have been identified as emerging contaminants of concern.



Figure 1 Map showing Estuaries where sediment and water samples were collected for pharmaceutical analysis

Pharmaceuticals are being increasingly detected at potentially harmful concentrations in such environments. However, monitoring programs often lack the detail required to determine spatial and/or temporal patterns. Such studies are limited in freshwaters, and even more so in marine waters, with no understanding of the interactions between these environments.

I conducted a year-long study in the Humber Estuary, where I collected water and sediment samples every other month to analyse for the presence of pharmaceuticals. The funding from Water@Leeds allowed me to extend this monitoring to other estuaries in the UK, in order to determine if the levels of pharmaceuticals found in the Humber is representative of the rest of the UK. In September 2017, I carried this out and visited 11 different estuaries. At each estuary, I collected surface water and sediment samples from three different locations at high tide.

Upon returning to the lab, these samples were prepared for analysis by LC-MS/MS. Filtering and solid phase extraction (SPE) are steps used to separate the pharmaceuticals and pre-concentrate them in order to maximise detection efficiency. Analysis is currently ongoing, so the results from this study are not yet available.



Fig 2: (From Left to Right): Ythan Estuary, Tyne Estuary, Solway Estuary