

Occurrence and Fate of Pharmaceuticals in the Pomperaug River

Basic Information

Title:	Occurrence and Fate of Pharmaceuticals in the Pomperaug River
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Principal Investigators:	Allison Mackay, Allison Mackay

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PROJECT TITLE: OCCURRENCE AND FATE OF PHARMACEUTICALS IN THE POMPERAUG RIVER

PRINCIPAL INVESTIGATORS: Dr. Allison MacKay, University of Connecticut

STATEMENT OF CRITICAL REGIONAL OR WATER PROBLEM:

Pharmaceuticals and other compounds of wastewater origin have been observed throughout the US in surface waters impacted by urban activities. Environmental occurrence of pharmaceuticals is of particular concern in the Pomperaug River watershed. Here the primary source of pharmaceutical inputs is a wastewater treatment plant that serves a retirement community of 5000 with an average of 6 medications per person. The treatment plant provides up to 20% of river flow and thus pharmaceutical impacts are expected to be greater in this watershed than the national average. Few data regarding temporal and spatial distributions, or environmental degradation rates of pharmaceuticals in surface waters have been collected that would enable ecological exposure risks of these bioactive compounds to be calculated.

OBJECTIVES:

The objectives of this proposed study are to monitor the temporal and spatial distributions of pharmaceutical compounds introduced to the environment from a well-defined wastewater treatment plant discharge to a river to: (1) identify pharmaceutical compounds with potential for ecotoxicological risk in this watershed, and (2) to estimate the magnitude of sink mechanisms for unconserved compounds.

METHODOLOGY:

The fate of pharmaceuticals in the Pomperaug River will be assessed in the reach beginning at the Heritage Village Wastewater treatment plant and continuing to the Housatonic River. Samples will be obtained quarterly using standard stream tracer techniques to delineate a 'packet' of fluid at the outlet of the wastewater treatment plant. Five downstream sample locations have been identified from which to obtain stream water samples from this packet for pharmaceutical analyses by standard gas chromatography/mass spectrometry techniques. Sample analyses will include neutral and acidic high-use pharmaceutical compounds. Observed concentrations in the river will be compared to predicted concentrations from using a conservative transport model developed from the dye tracer. Decreases in pharmaceutical compounds from the conservative model will be used to calculate environmental degradation rate constants.

COMPLETED ACTIVITIES:

A field sampling trip was conducted in November 2005. A dye release was conducted to characterize the travel times and flow conditions in the Pomperaug River. No pharmaceutical compound analyses were conducted at the time. A second field trip will be conducted in July 2006 low-flow conditions to characterize travel times and pharmaceutical compound concentrations.