
Characterization of Ground Water Flow to a Bacteria Impaired Surface Water Body Using Heat as a Tracer

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ABSTRACT

Oso Bay is a small (<7.2 mi²) and shallow (<3.3 ft or 1 m) secondary bay of Corpus Christi Bay that receives freshwater from Oso Creek. The watershed drains an area of approximately 255 mi². High concentrations of bacteria in both the creek and the bay have resulted in these segments being placed on the Texas Commission on Environmental Quality (TCEQ) 303(d) list of impaired water bodies. Recent investigations in support of a Total Maximum Daily Load program have indicated that persistent bacteria loading unassociated with runoff events or known point sources prevent the creek segment from attaining desired water quality goals. Ground water influx to the creek has been suggested as a transport pathway for bacteria to enter the creek during dry (no runoff) periods.

A study has been initiated, using heat as a tracer, to characterize the spatial and temporal magnitude of interaction between ground water and surface water in Oso Creek and Oso Bay. Data collected from monitoring wells installed near the creek and bay as well as from sensors installed in the stream and streambed are used to create temperature profiles. Using basic heat flow theory, this information is used to constrain aquifer characteristics such as hydraulic conductivity and stream characteristics like streambed leakage in the subsequent calculations of ground water – surface water flux.