

Groundwater/Surface Water Interactions and Evaluating Impacts of Contaminated Groundwater Discharges: Tools, Ecological Risk, and Case Studies.

**November 14 and 15, 2018 - 9:00-4:30
77 W. Jackson, Illinois Room, 12th floor**

Presenters:

- Brewster Conant Jr., University of Waterloo
- Martin Briggs, USGS
- Bruce Duncan, EPA Region 10
- Others: To Be Announced

This workshop will provide a comprehensive overview of how to conceptualize, investigate, and evaluate groundwater/surface water (GW/SW) interactions to determine the impacts of contaminated groundwater (GW) discharges to surface water (SW) bodies (i.e., streams, rivers, ponds, lakes, and, to a lesser extent wetlands). Contaminated GW discharging to SW can adversely impact aquatic life, drinking water quality, and human health, and can be difficult to characterize and evaluate. Identifying preferential and high flux discharge zones and times of highest concentration discharge are critical for characterizing the impact of these plumes because these can potentially pose the most adverse impacts on ecological receptors. Often the challenge lies in characterizing large reaches of rivers or coastlines that have small-scale spatial variability in geology, groundwater flow, biogeochemical processes, and contaminant concentrations that can also be temporally variable. This workshop will present site characterization strategies, tools, and techniques to evaluate contaminated GW discharges and identify these areas for targeted insightful sampling, rather than random or “out-of-context” grid sampling. The advantages and disadvantages of the hydrogeological characterization tools will be discussed as will the need for targeted high resolution sampling to understand the complexities of the systems.

One focus of the workshop will be on the proper evaluation of the “transition zone” between GW and SW because it is both a valuable ecosystem that can be adversely-impacted by contaminants and is a zone with the potential to greatly modify and attenuate plumes discharging to SW. The workshop will also present strategies for monitoring and evaluating the transition zone from an ecological perspective. Finally, case studies will be presented to demonstrate how simple, cost-effective monitoring approaches have improved conceptual models of the sites, identified areas of greatest concern, and persuaded site owners to evaluate the transition zone and implement remedial actions.

Main Topics Covered Will Include:

- 1. An overview of fundamental GW/SW interaction processes** that occur in the “transition zone” and affect plumes discharging to streams, rivers, ponds, lakes, and wetlands.
- 2. A new conceptual framework for evaluating GW/SW interactions** that provides a logical and comprehensive guide to evaluate GW/SW systems to assess impacts on water quality, water quantity, and ecosystems.

3. **A rapid, multi-scale, multi-technique characterization approach to assessing GW discharge** that starts with large-scale reconnaissance methods and tools to quickly assess large areas, followed by progressively smaller-scale techniques (with successively higher sensitivity) to identify locations for detailed and strategic sampling in the interface.
4. **Overview of monitoring tools to characterize water fluxes, water quality, and ecological impacts.** Tools discussed will include: temperature as a tracer techniques (e.g., thermal infrared surveys, streambed temperature mapping, DTS), mini-piezometers and seepage meters; geophysical methods (e.g., electrical resistivity, electromagnetic induction, GPR); active and passive porewater sampling techniques; and ecological assessment tools (e.g., SPMDs, in situ-chambers, SPMEs, DGTs).
5. **Physical examples of equipment** to allow for hands-on examination and familiarization with equipment being discussed.
6. **Strategies and approaches for Ecological Risk Assessments.** An overview will be provided of how to incorporate the transition zone and GW/SW interactions into ecological risk assessments.
7. **Problems and challenges encountered when evaluating proposed remedies and their effectiveness.** A discussion will be provided regarding potential impacts of remediation on GW/SW systems.
8. **Case studies.** One main case study will illustrate the effectiveness of the rapid, multi-scale, multi-technique characterization approach to assessing GW discharge for a benzene plume discharging to Lake Michigan. Other brief case studies will provide examples of approaches at other sites where VOCs discharged to a stream and arsenic discharged to a pond.
9. **Rooky Mistakes.** Highlights common mistakes that can significantly impact your project.
10. **A question and answer session to discuss your own sites.**