NARPM

Portland, OR – July 7, 2008

Ground-Water/Surface-Water Interaction - Concepts, Field Methods, and Site Management Challenges Panel Session

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Richard E. Willey

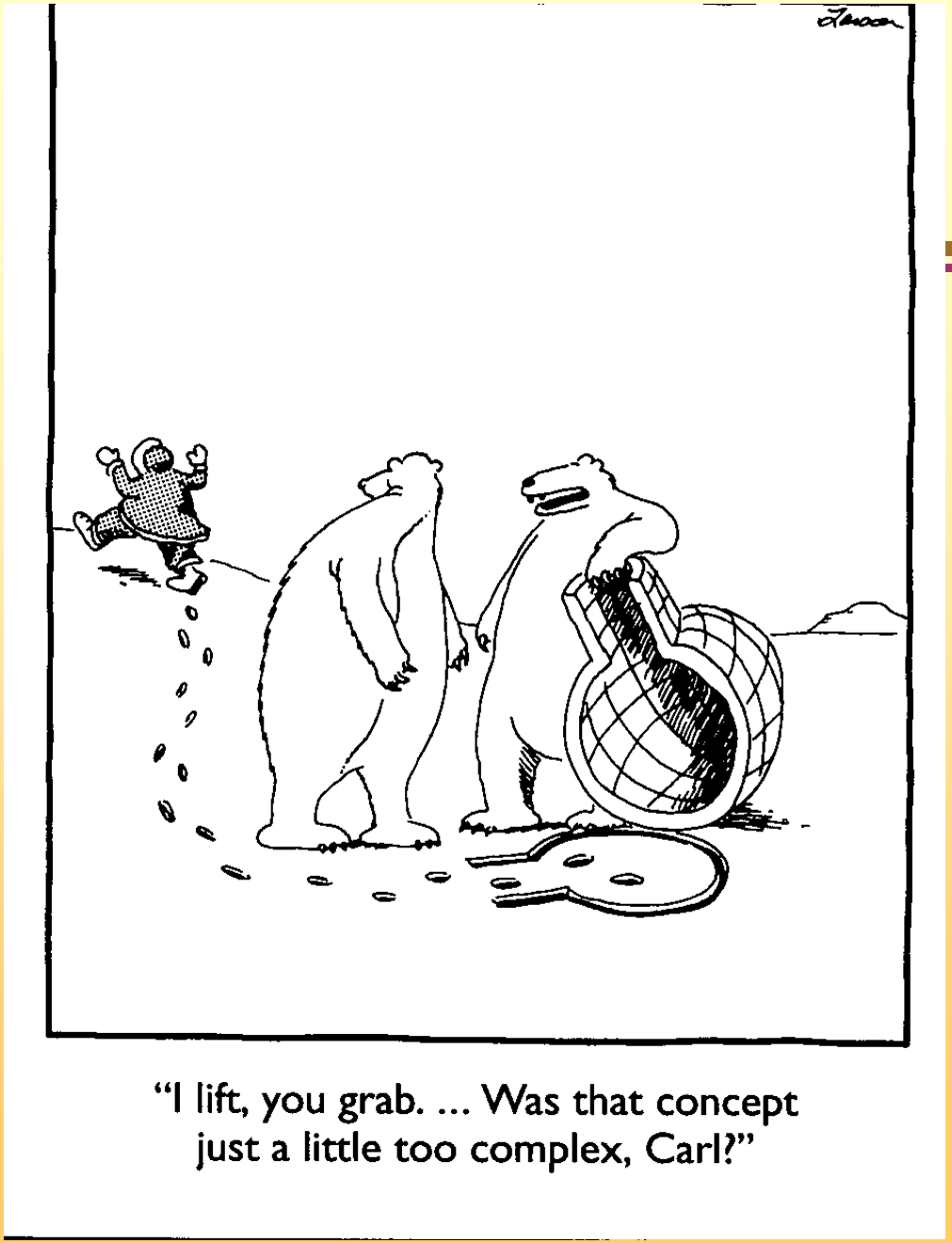
Introduction

Discharge of Ground-Water Plumes to Ponds at the Massachusetts Military Reservation

Denis R. LeBlanc
U.S. Geological Survey

Case Study of the Angus PCE Plume

Brewster Conant Jr.
University of Waterloo
Ontario, Canada



"I lift, you grab. ... Was that concept just a little too complex, Carl?"

- **Systems are complex, but NOT a problem!**

Just develop a good conceptual model and TEAMWORK !

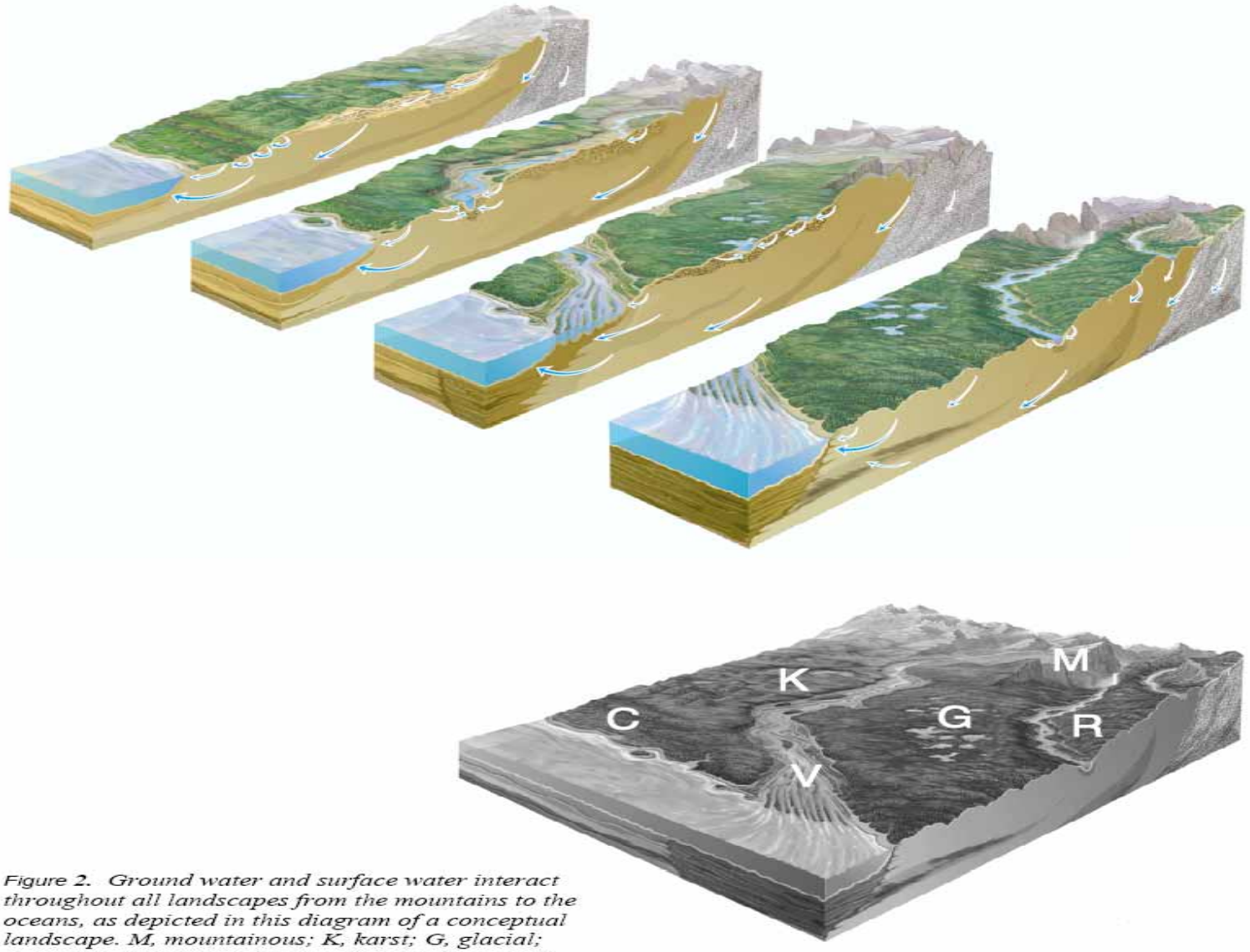
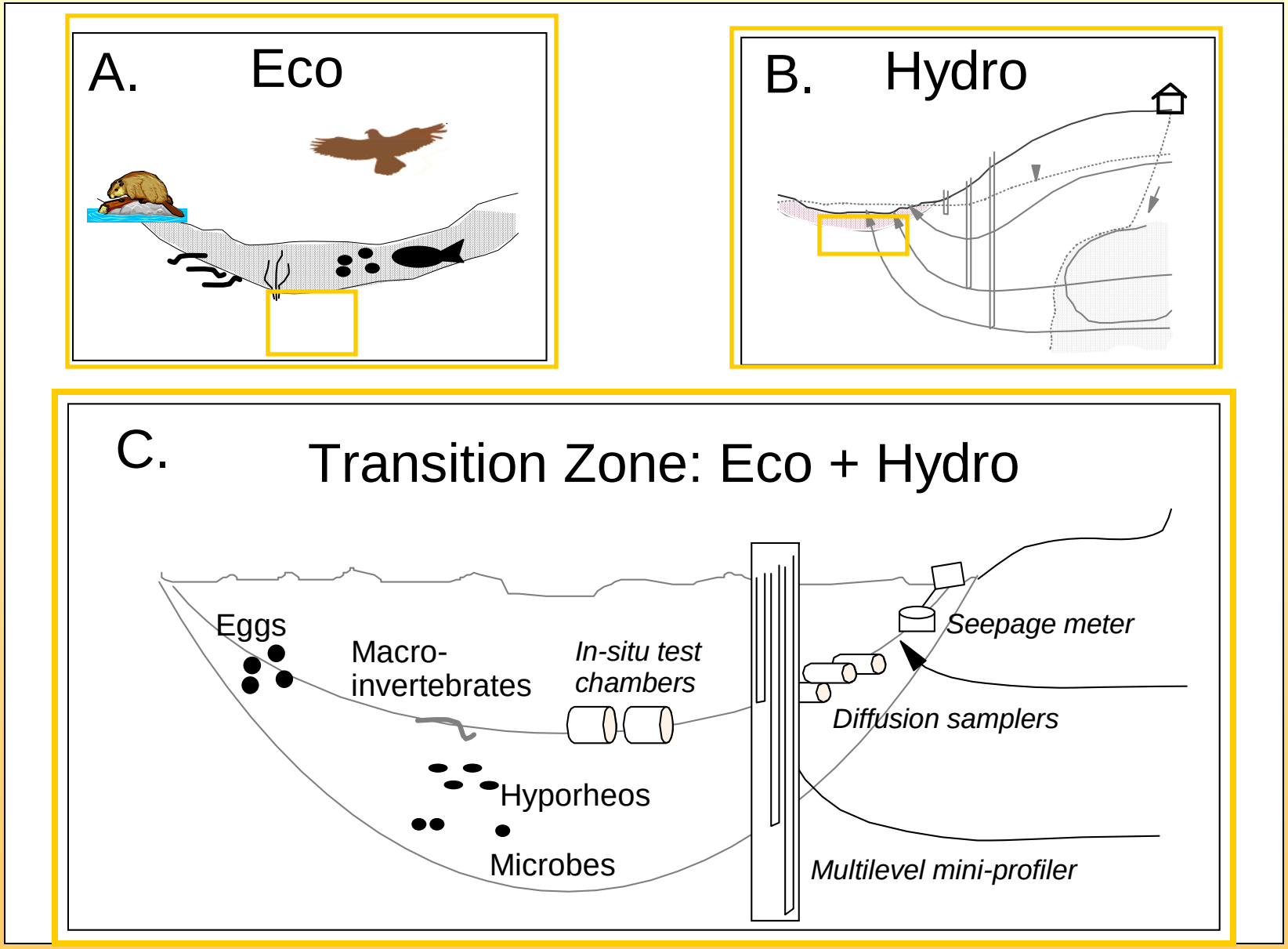


Figure 2. Ground water and surface water interact throughout all landscapes from the mountains to the oceans, as depicted in this diagram of a conceptual landscape. M, mountainous; K, karst; G, glacial; R, riverine (small); V, riverine (large); C, coastal.

Ground Water and Surface Water—A Single Resource USGS Circular 1139

Integrative Conceptual Model



Duncan 1999 Learned discourse

Transition Zone (TZ)

The location where ground water transitions to or from overlying surface water,

and

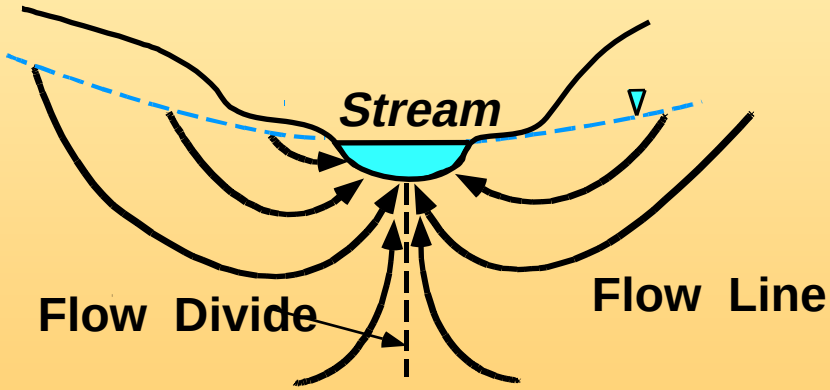
where the mixing of ground water and surface water occurs as the waters move through the substrate.

Hydro: Typical Goals and Objectives

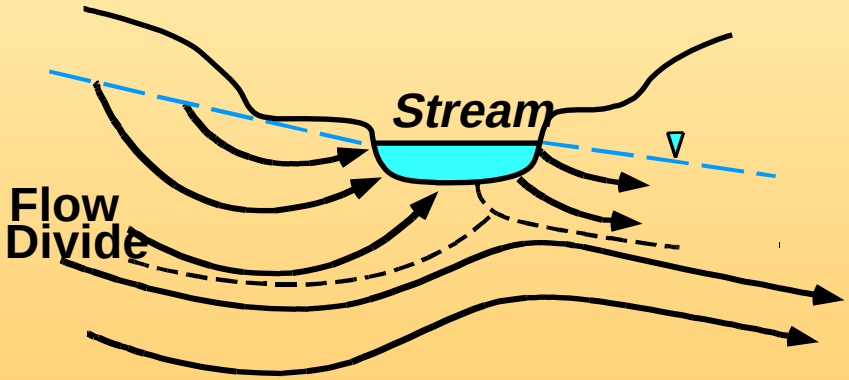
1. Understand distribution, fate, and transport of contaminants
2. Obtain representative samples
3. Estimate concentrations (exposures) & fluxes (loading)
4. Help develop a predictive conceptual model
5. Provide information for Eco Risk Assessment

Types of GW/SW Interaction

GAINING STREAM

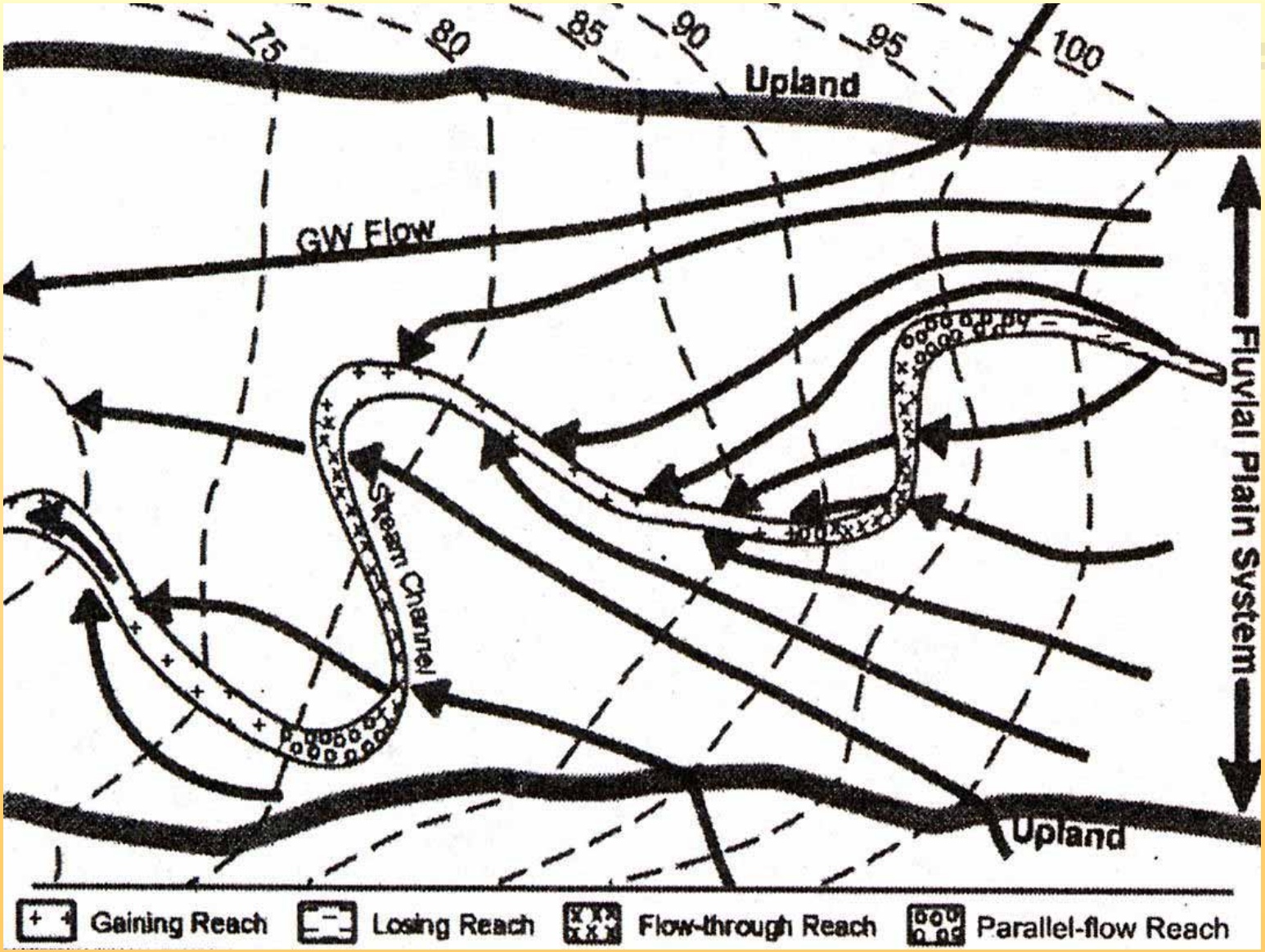


FLOW THROUGH STREAM
BOTH GAINS AND LOSES WATER



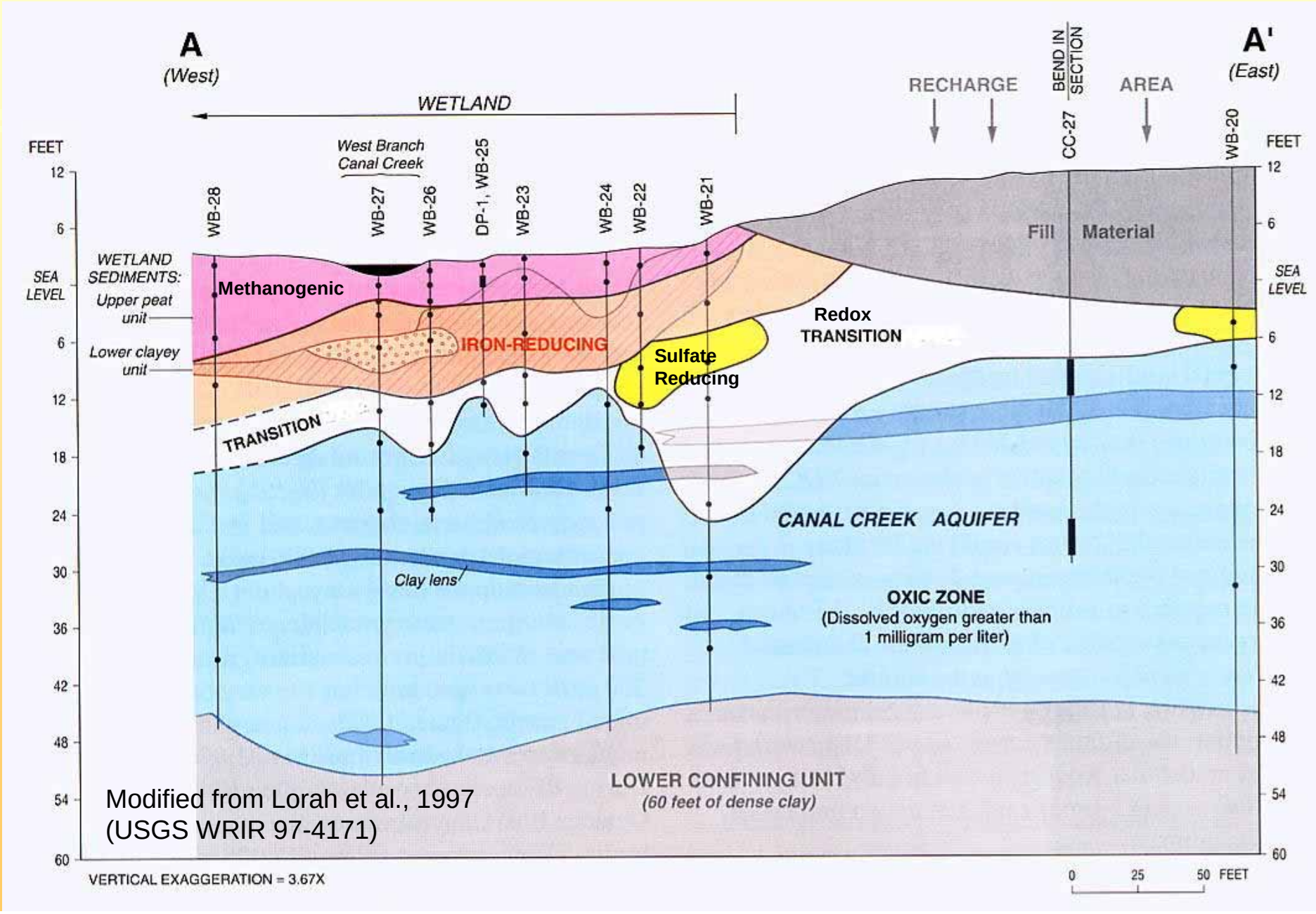
Modified from Bear (1979)

Interactions Along a River



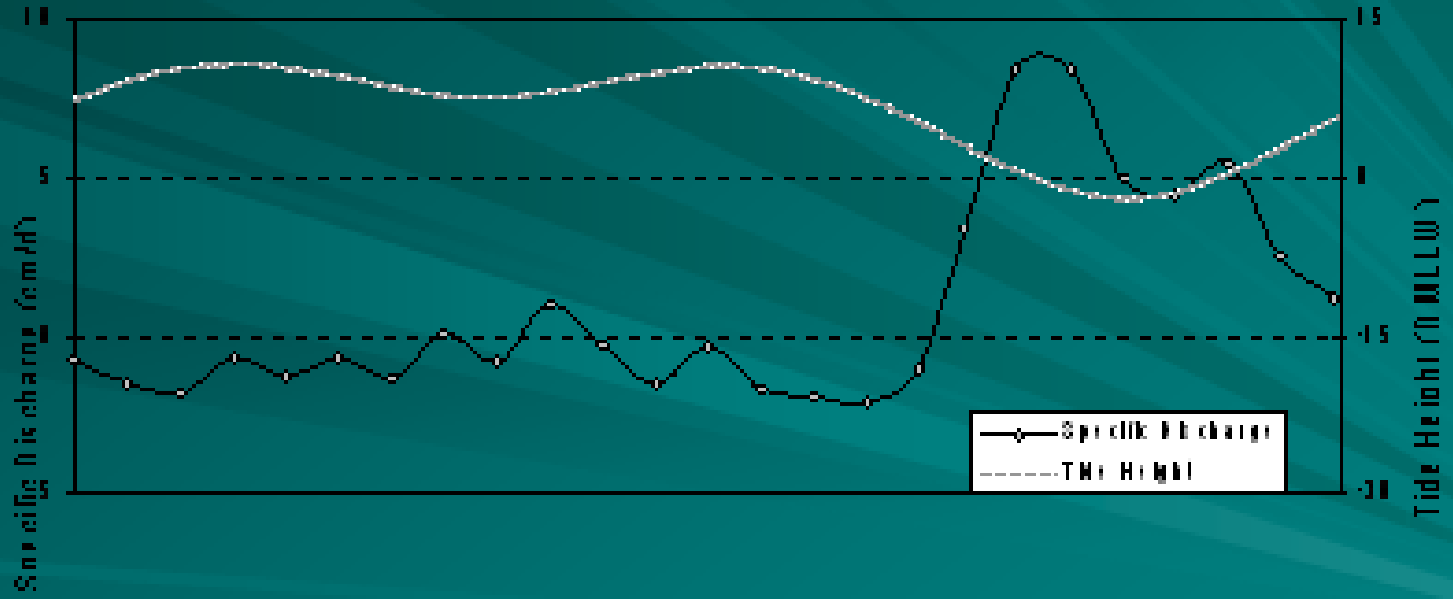
Woessner (2001)

Variability in Redox Conditions



Modified from Lorah et al., 1997
(USGS WRIR 97-4171)

Ground Water Discharge and Tidal Stage within Hylebos Waterway



Draft Seepage Meter Monitoring Report, 2006 Occidental Chemical Corp. Tacoma, WA

Conclusions

- **Coordinate efforts -**
  project manager, hydrogeologists, and risk assessors
- **Develop appropriate conceptual model**
- **Use the available simple tools first-**
  for transition zone hydrology and exposure/chemistry
- **Consider plume differences -**
  idealized versus real plumes