

Toxic Substances Hydrology Program Cape Cod Site Overview and Research Approach

Denis LeBlanc, Richard Smith,
Douglas Kent, Larry Barber, and
Ronald Harvey

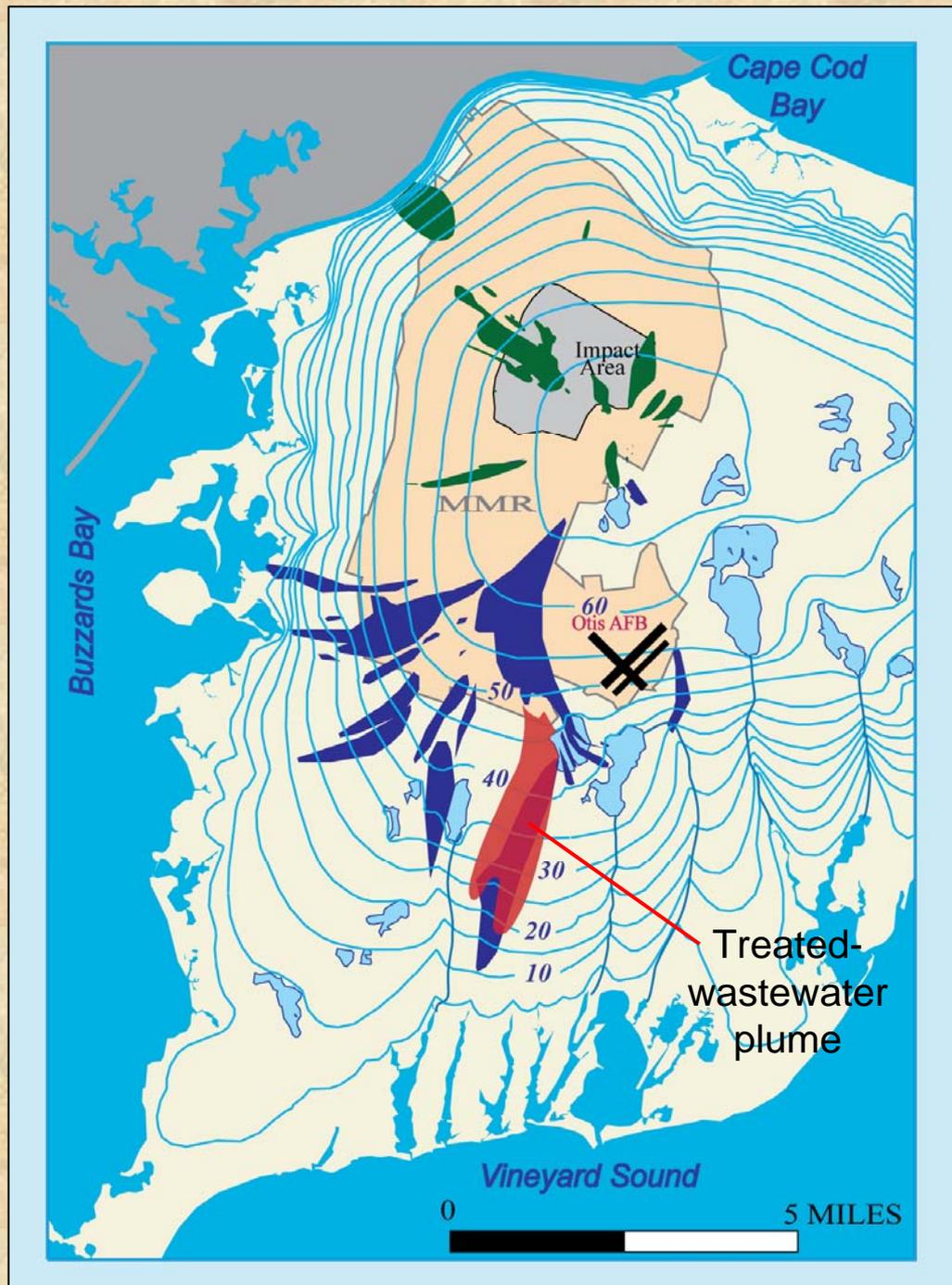


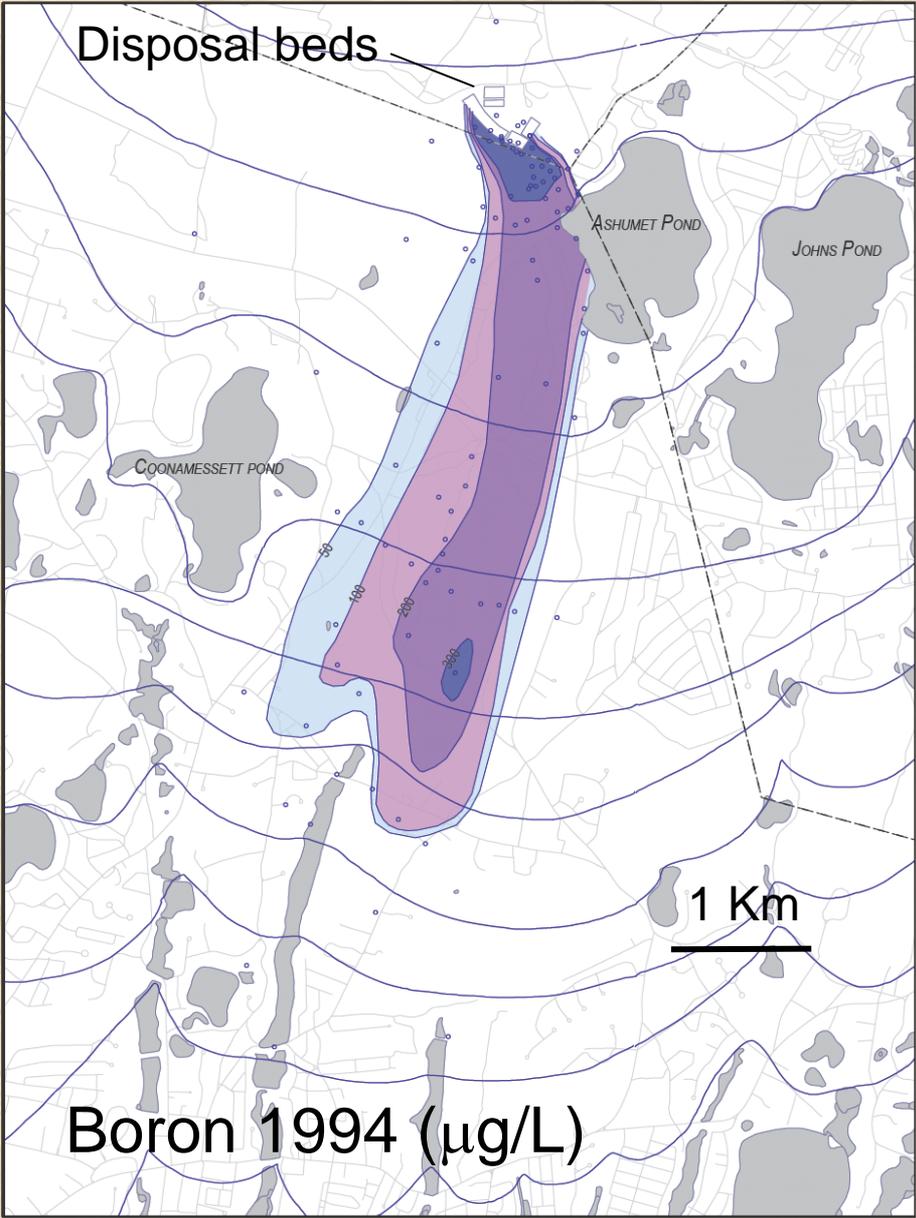
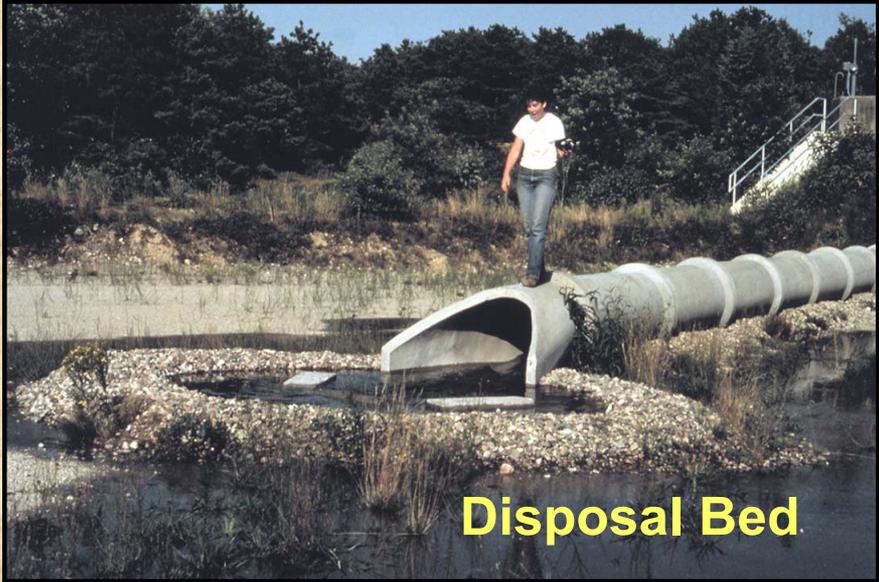
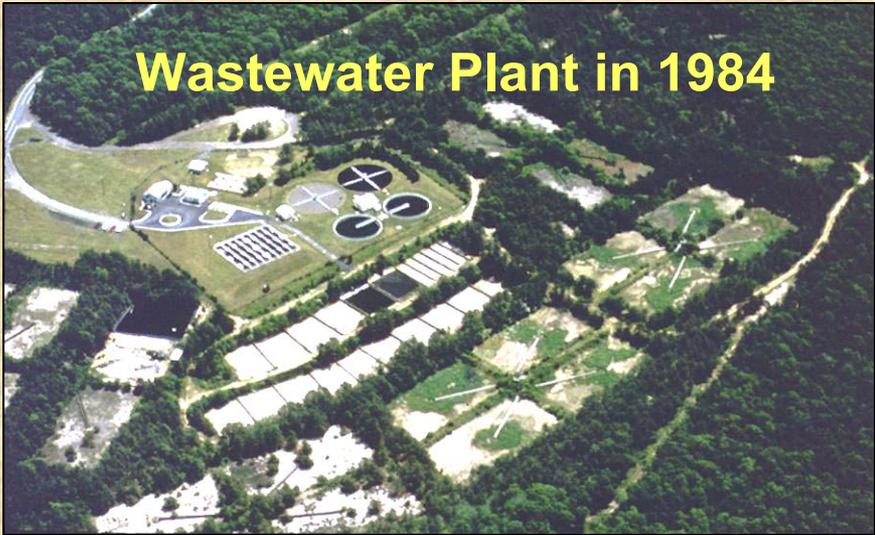
**Toxic Substances
Hydrology Program**

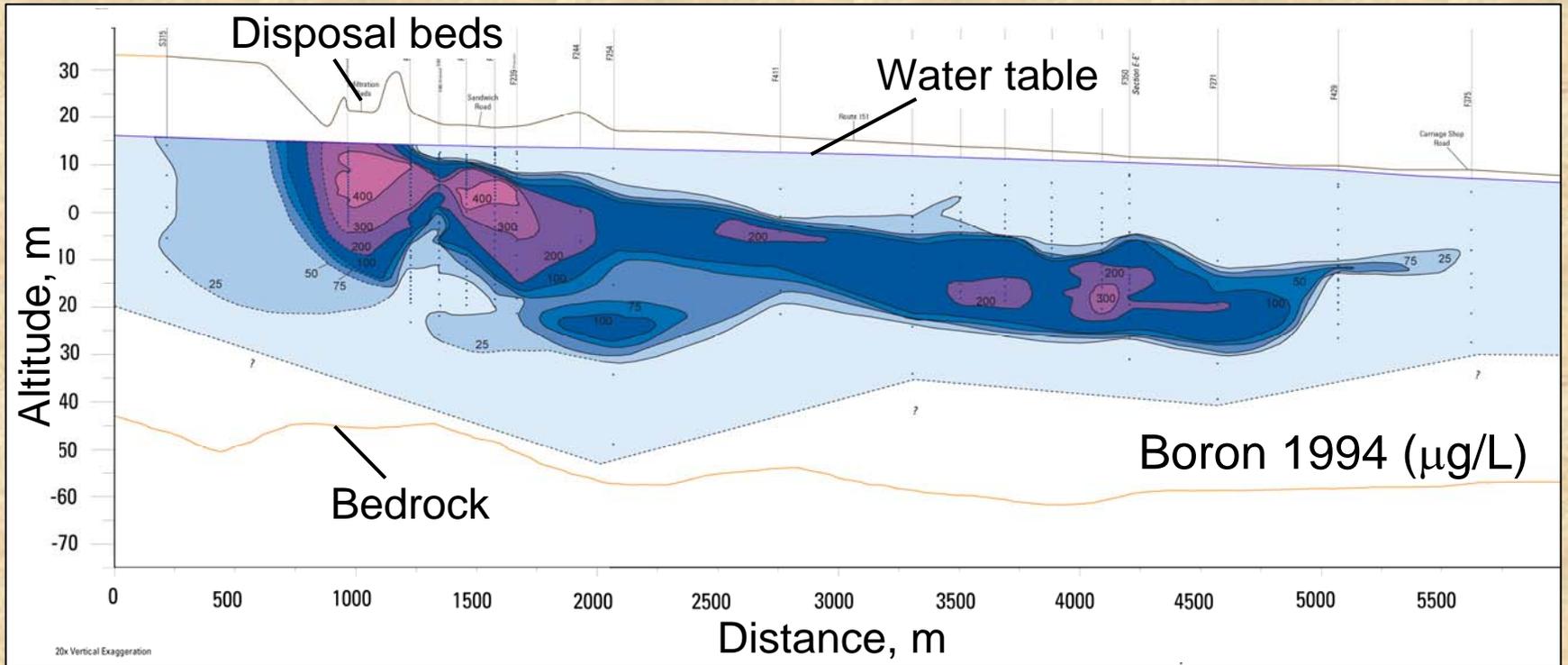
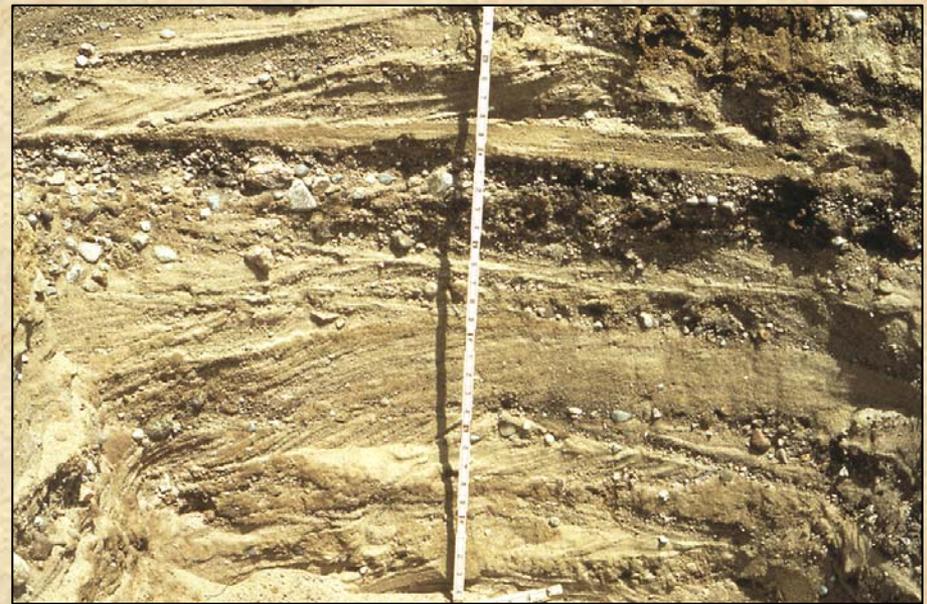




**Ground-Water Plumes on the
Massachusetts Military Reservation
April 2007**







Research Objective

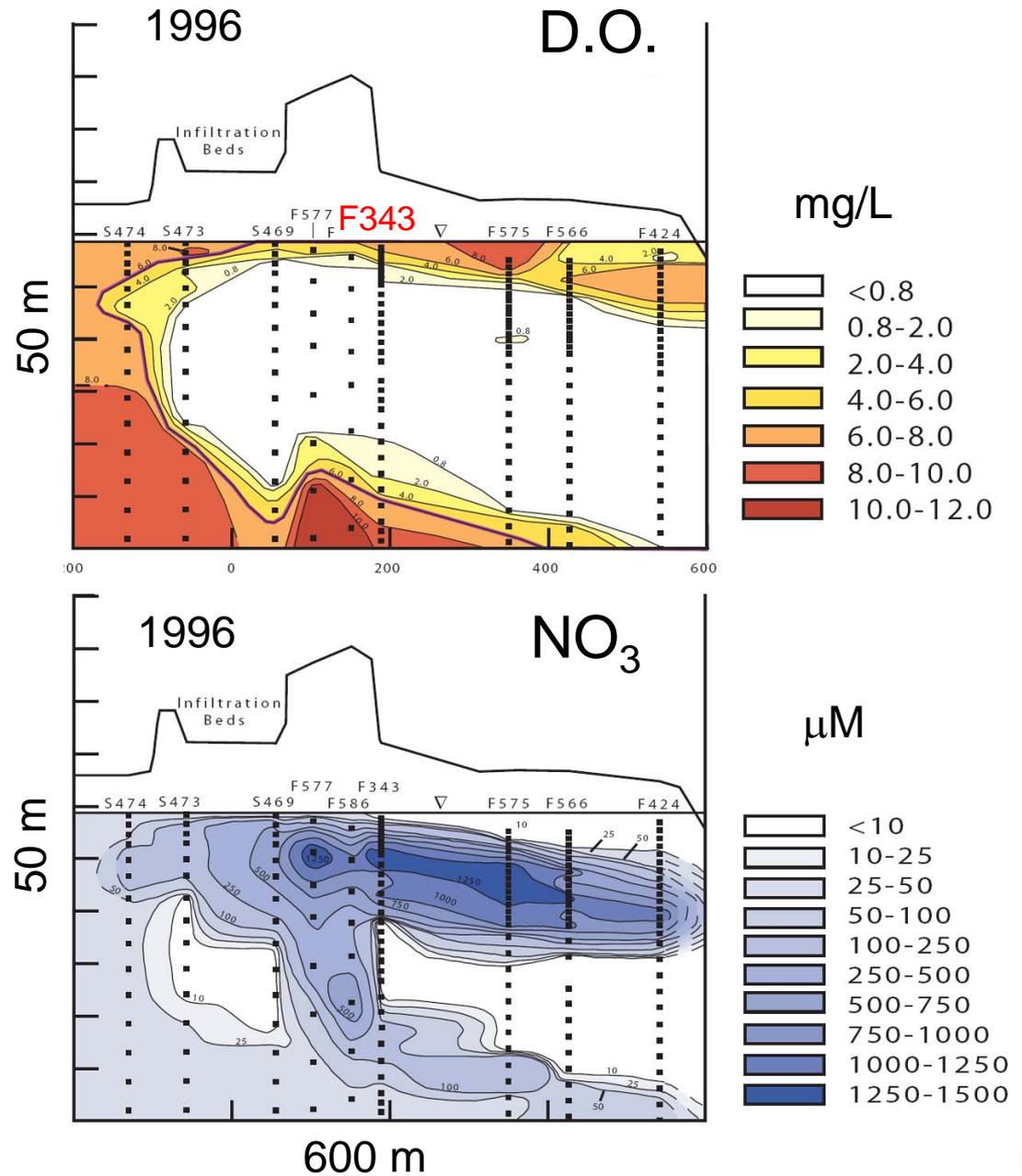
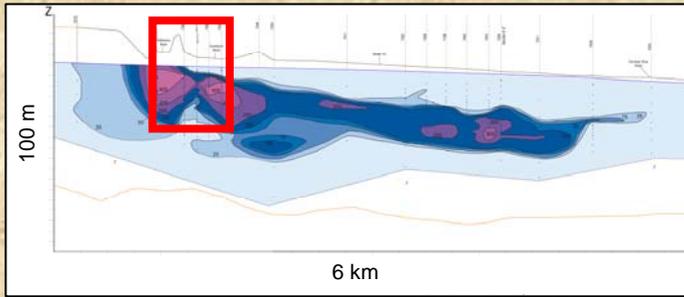
Describe interaction of physical, chemical, and microbiological processes affecting fate and transport of contaminants of global concern in unconsolidated aquifers

- Foster multidisciplinary approach at field site research “laboratory”
- Conduct sustained, detailed research to transcend site-specific features and obtain transferable results

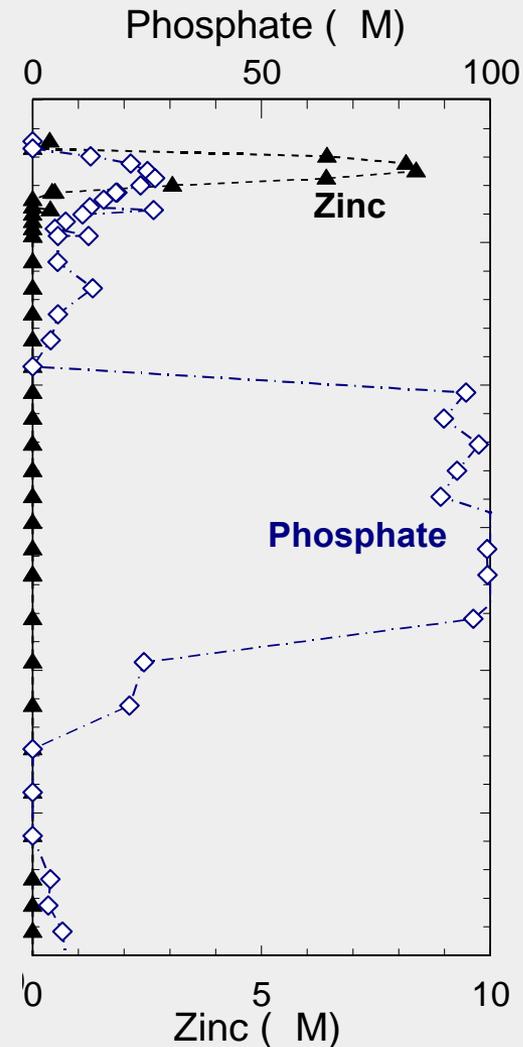
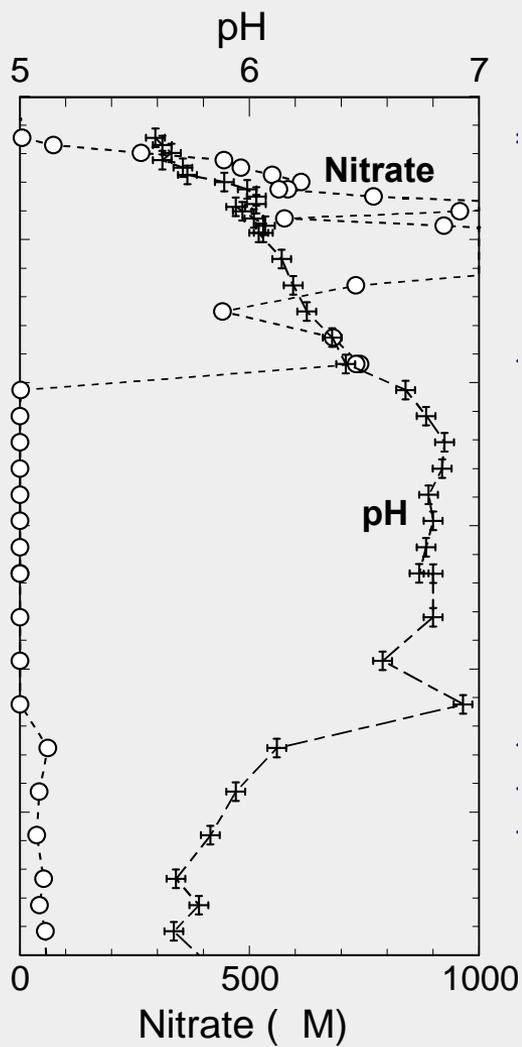
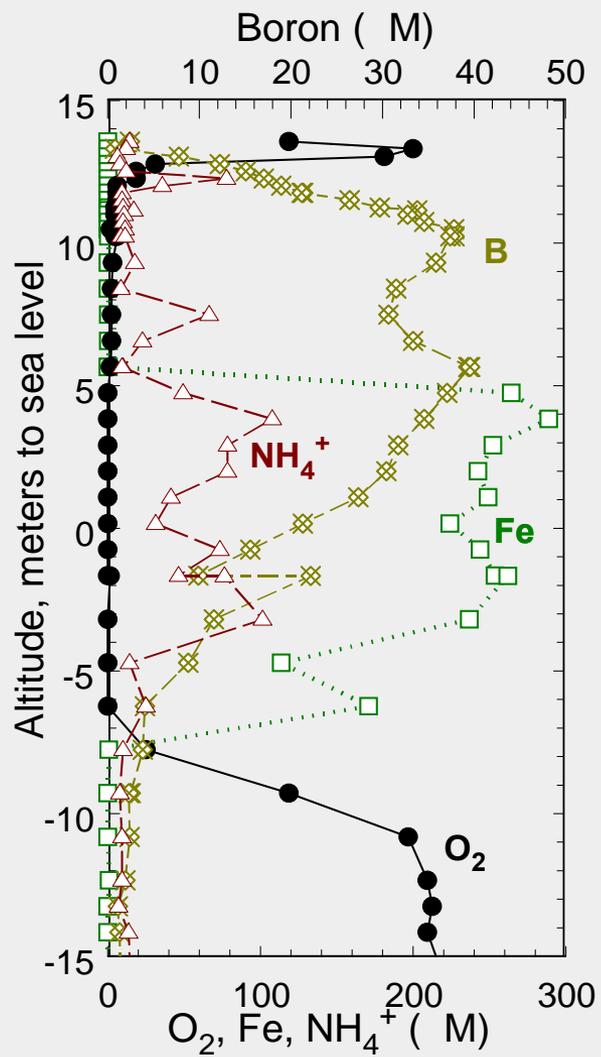
Research approach

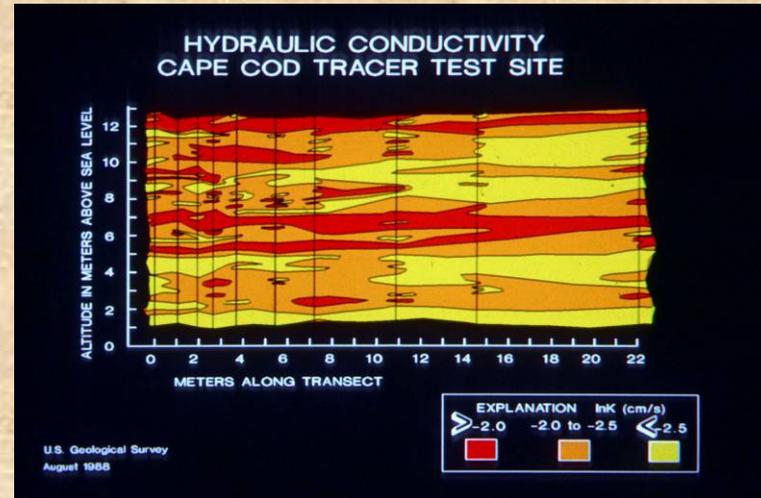
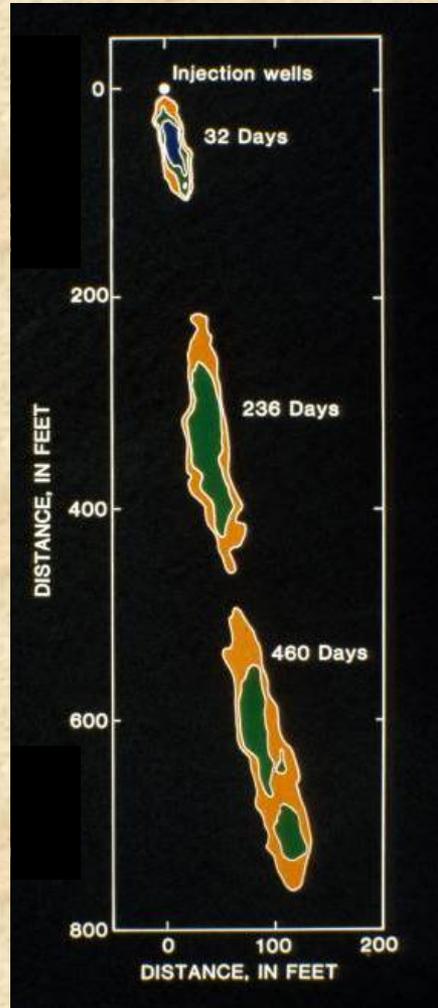
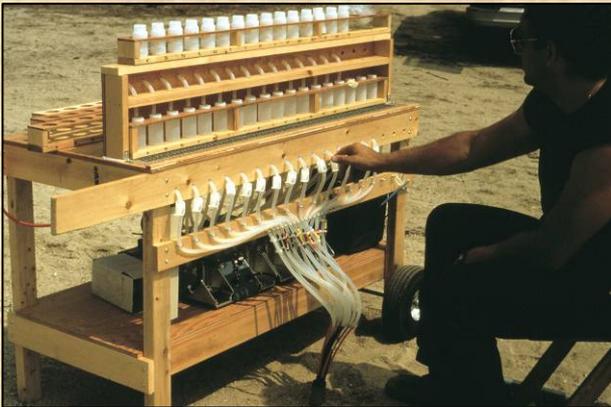
- Study treated-wastewater plume for evidence of key transport processes
- Conduct field and laboratory experiments to understand and quantify processes
- Test process-level understanding by interpretation and simulation of the plume
- Report results and apply findings to similar problems worldwide





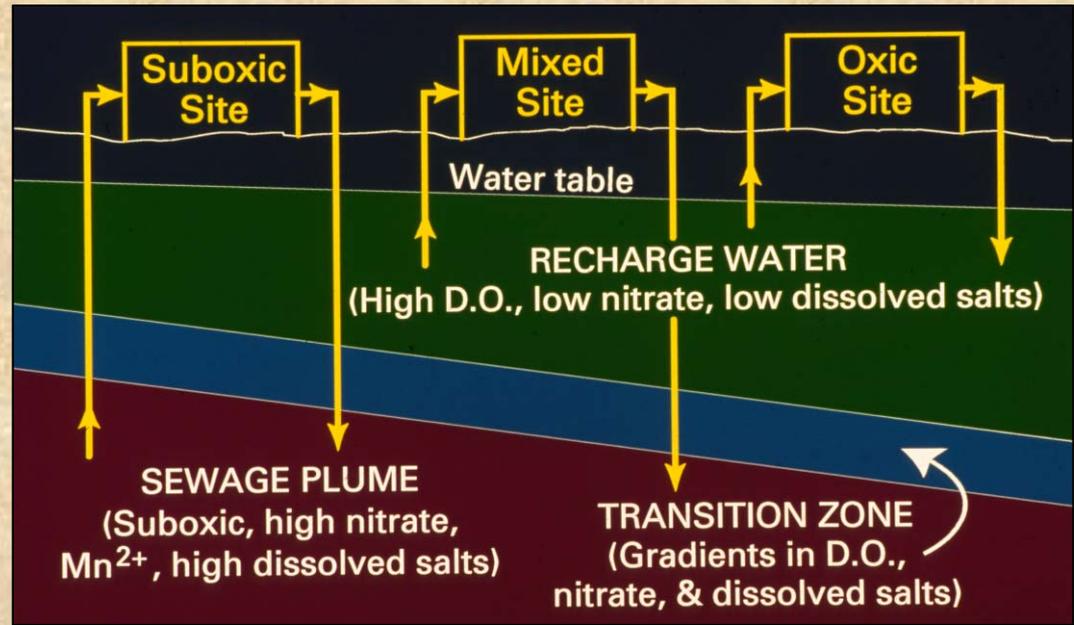
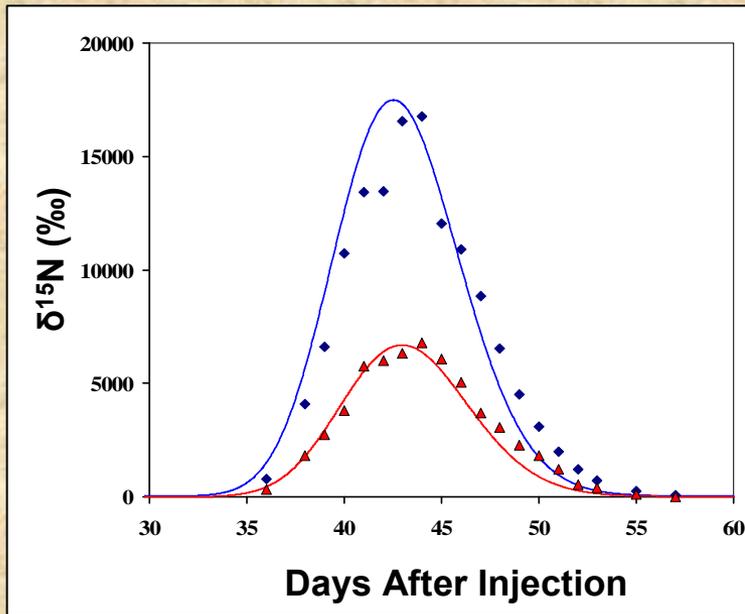
Site F343





1985-88 Natural-Gradient Tracer Experiment

- Macrodispersion was shown to be related stochastically to aquifer heterogeneity

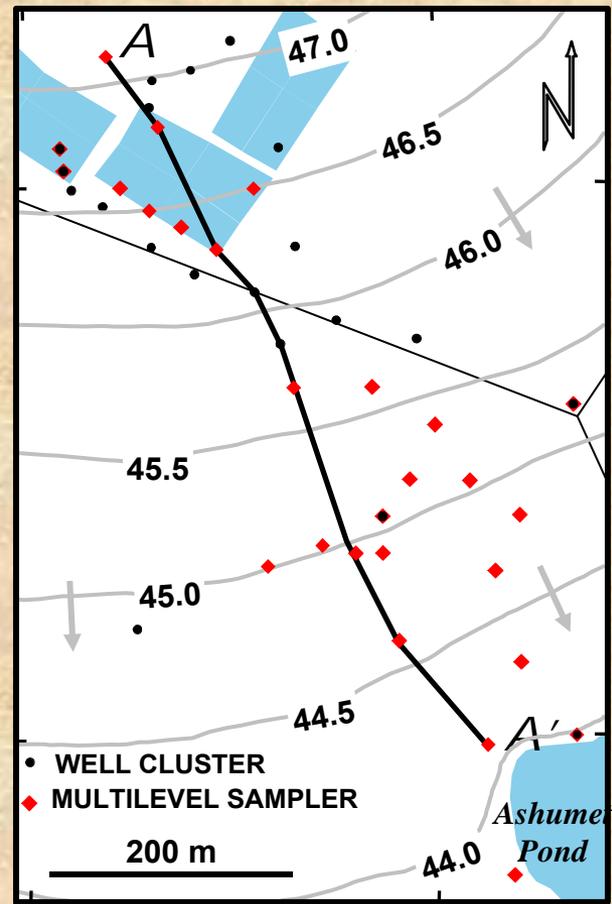
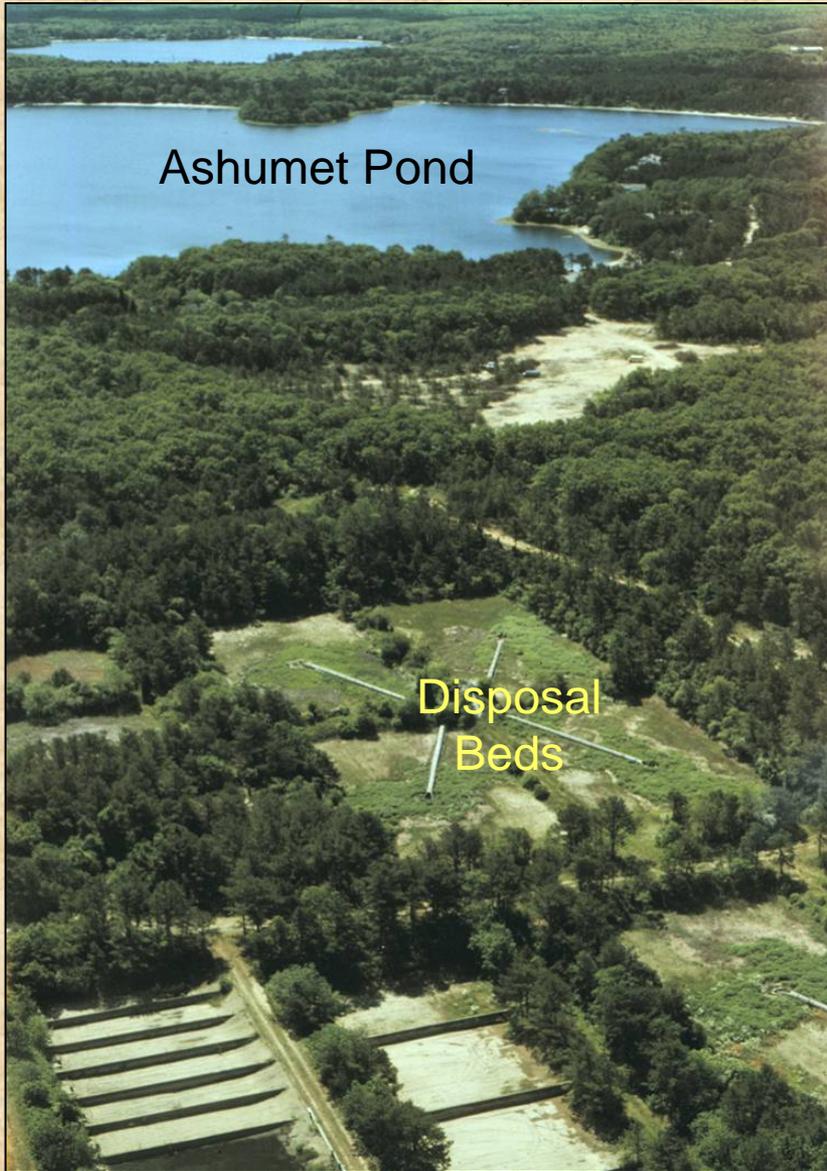


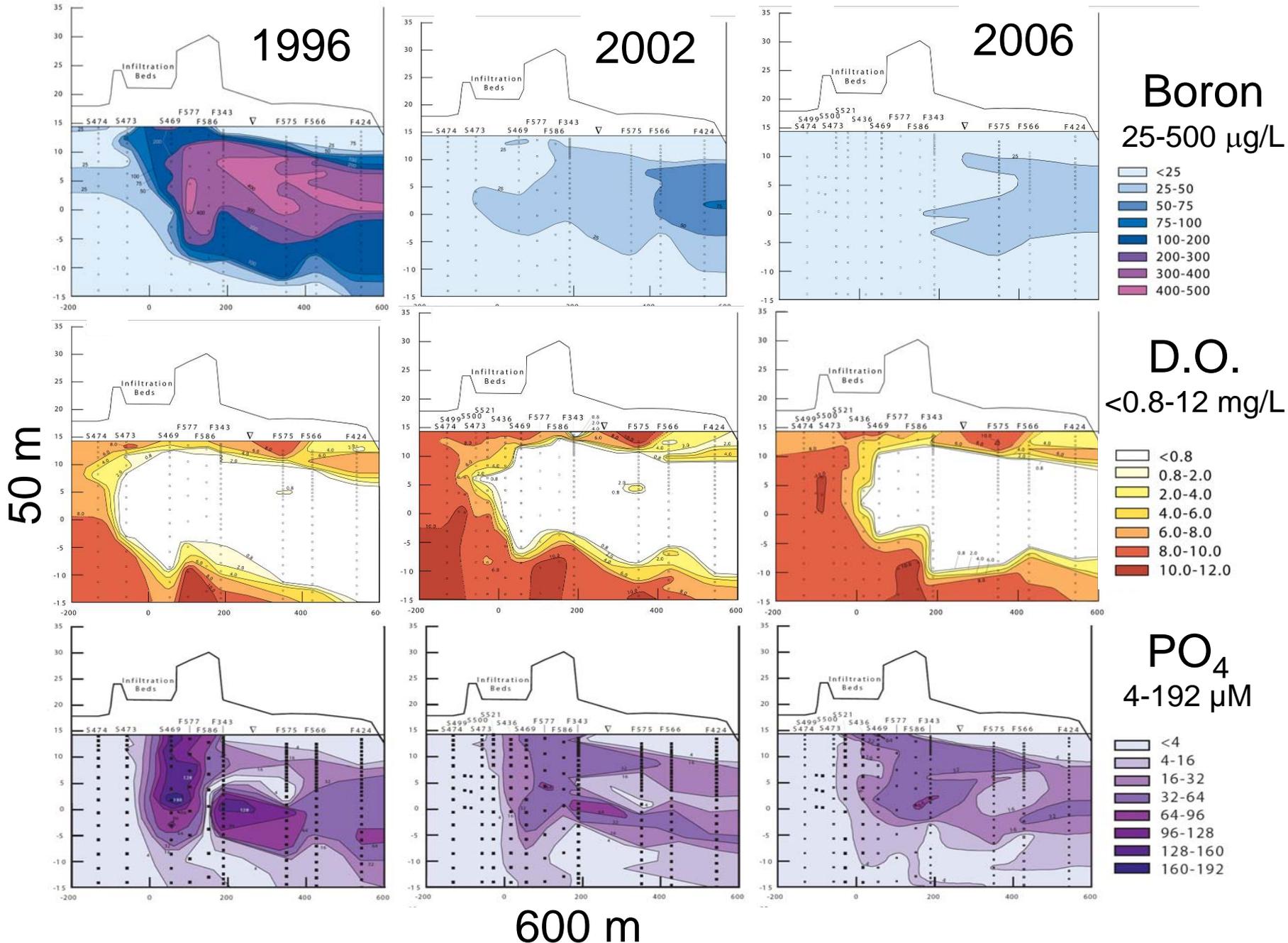
Examples of Tracers Used in Small-Scale Experiments

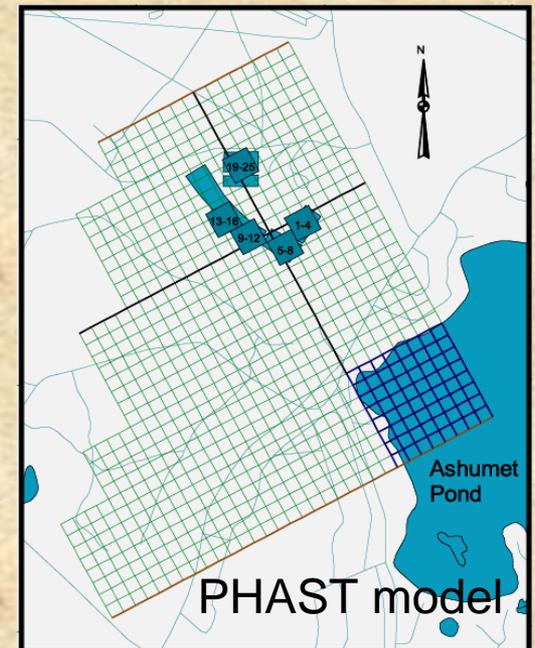
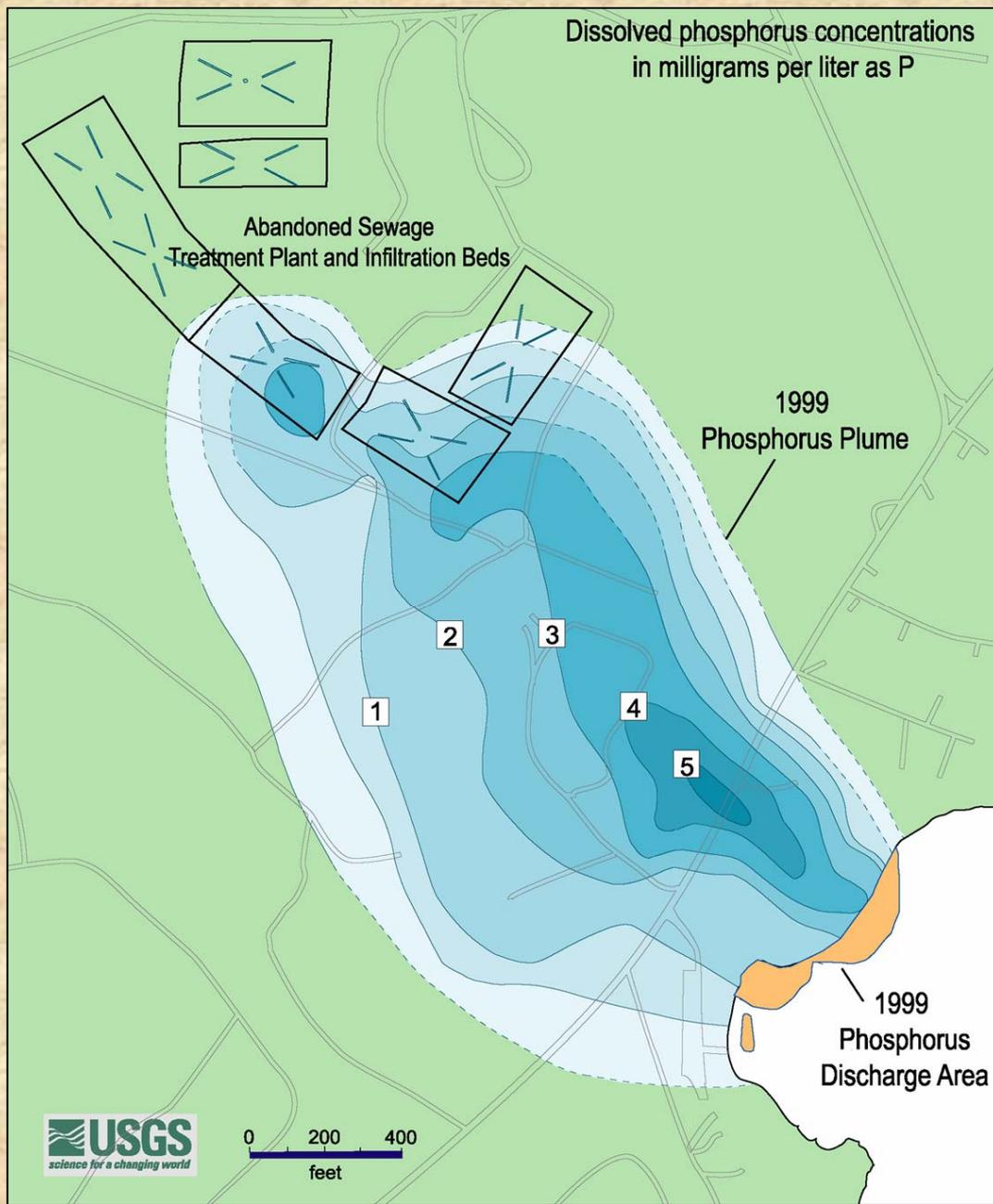
- Br and Cl
- Pb, As, and other metals
- Nitrogen species
- PPCPs
- Bacteria and viruses

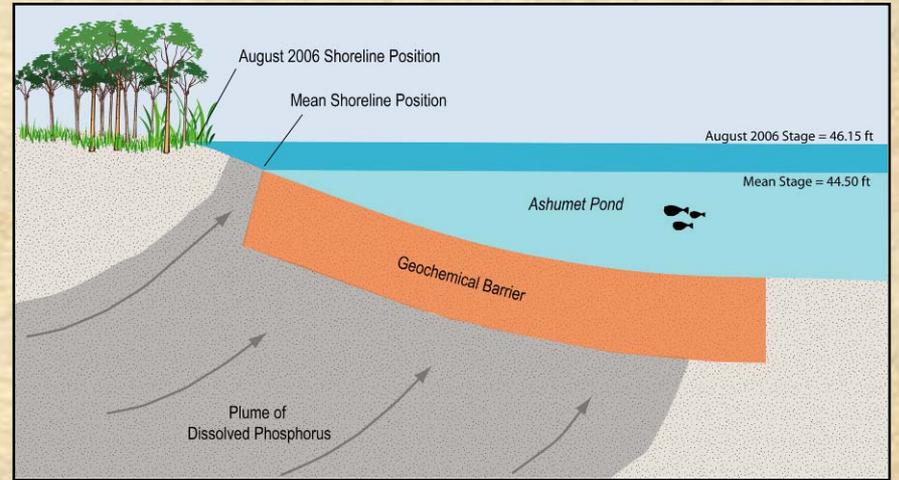
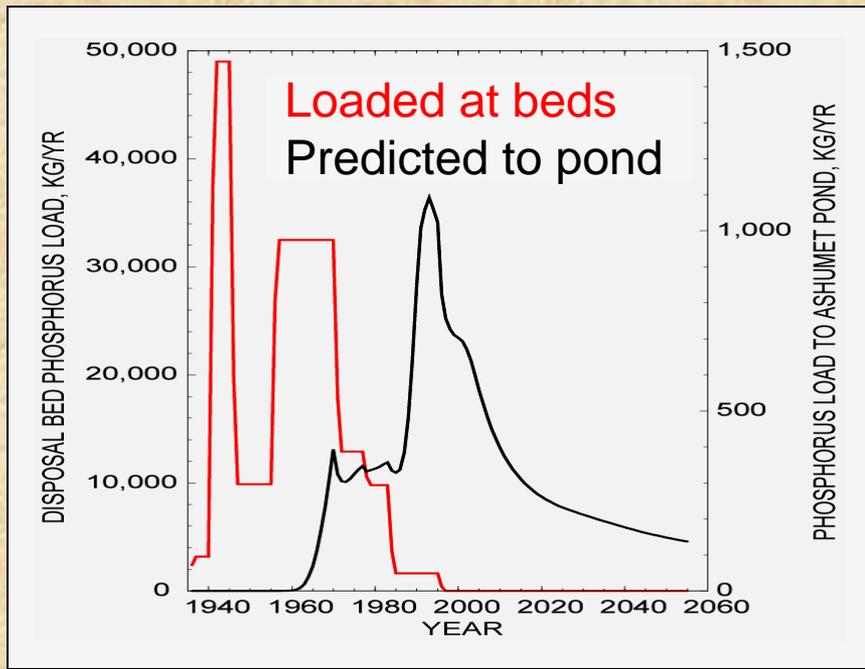


Wastewater Disposal Ended in 1995



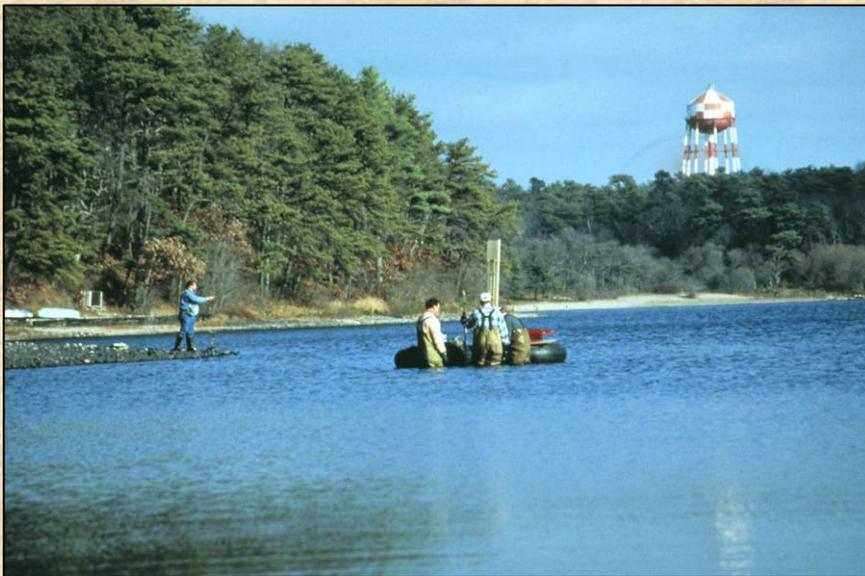






Final Thoughts

- Treated-wastewater plume is shared “lab bench” for team
- Multidisciplinary research at scales from cm to km
- Research plan focuses resources but is open to opportunities



- Detailed field study with sufficient time to develop research potential

For more information
<http://ma.water.usgs.gov/capecodtoxics>

- Transport is studied at different scales

