Assessing PAH movement

Implications for exposures, remediation and interventions

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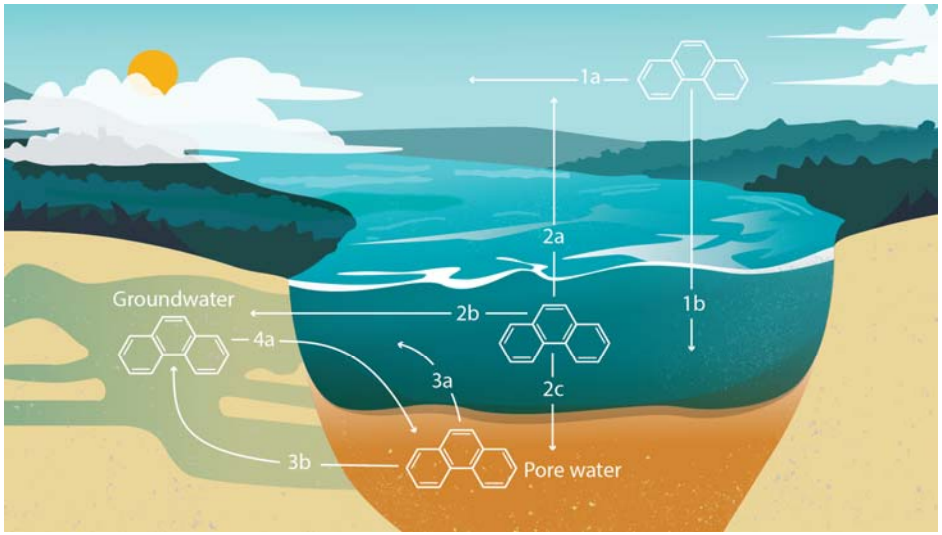
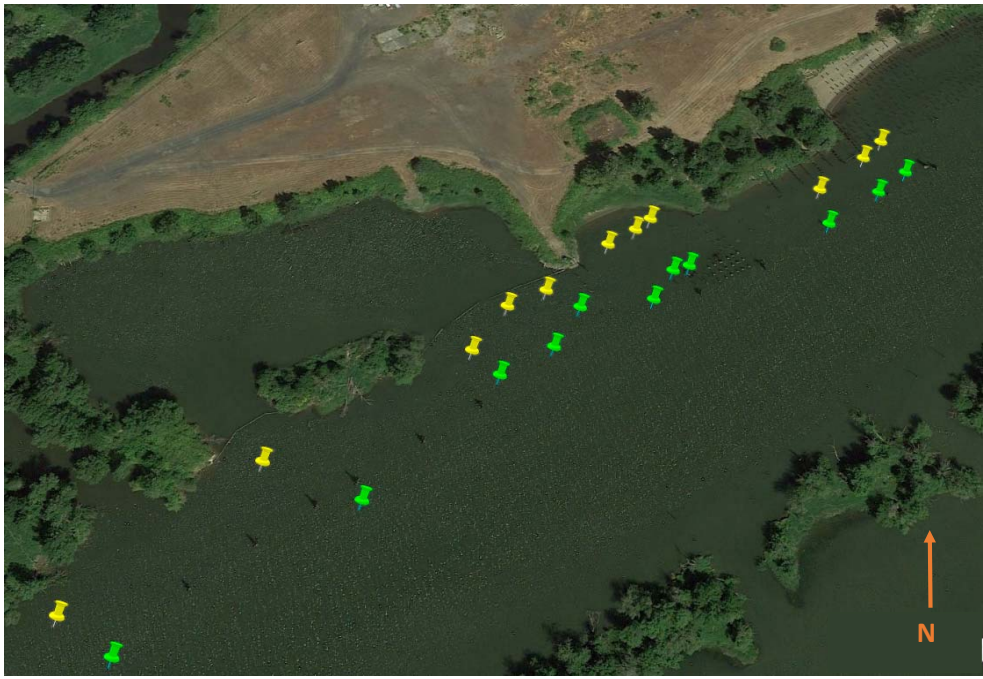
PAH MOVEMENT AFFECTS ASSESSMENT OF: Exposures, Remediation and Interventions

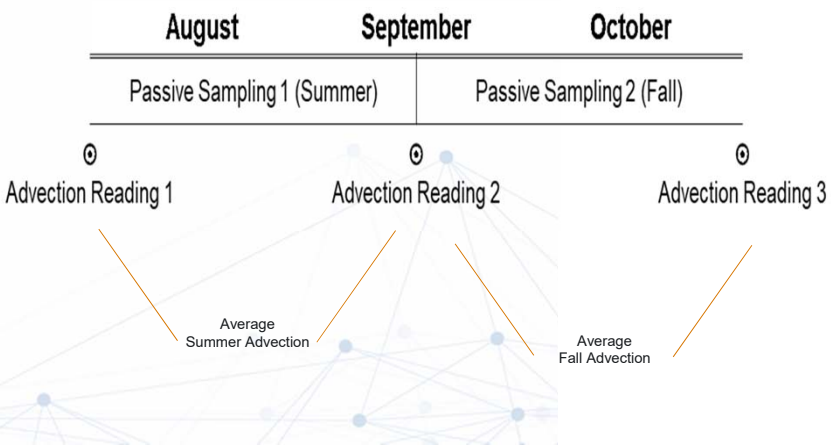
1. Bioavailable PAHs in the environment are moving constantly.
2. Will PAHs move differently depending on season?
3. Are PAHs moving by both diffusion and advection processes?

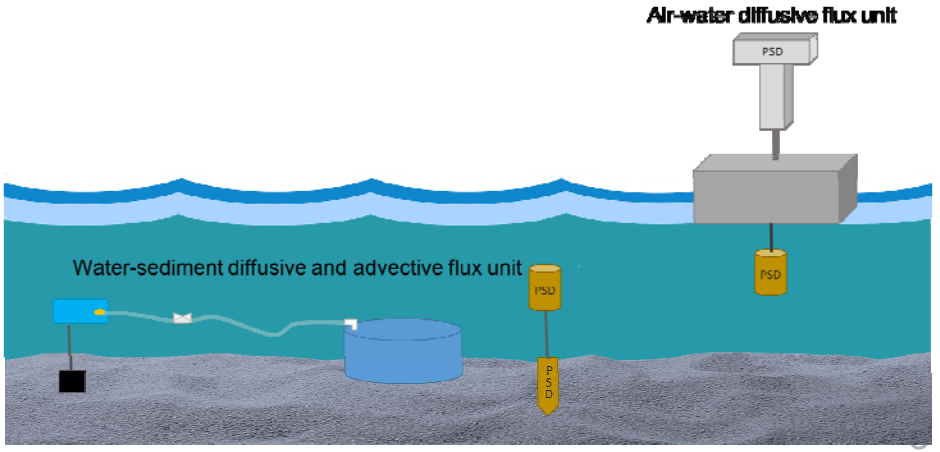


FIELD STUDY DESIGN

- Each sampling location had diffusive flux units and advective flux units co-deployed
- Passive samplers were deployed for 30 days in August, September and October 2019
  - ~ 150 PSDs total
- A 24-hour seepage meter reading was taken at each site in August, September and October 2019
  - ~ 35 readings total







GENERAL NAMING SCHEME

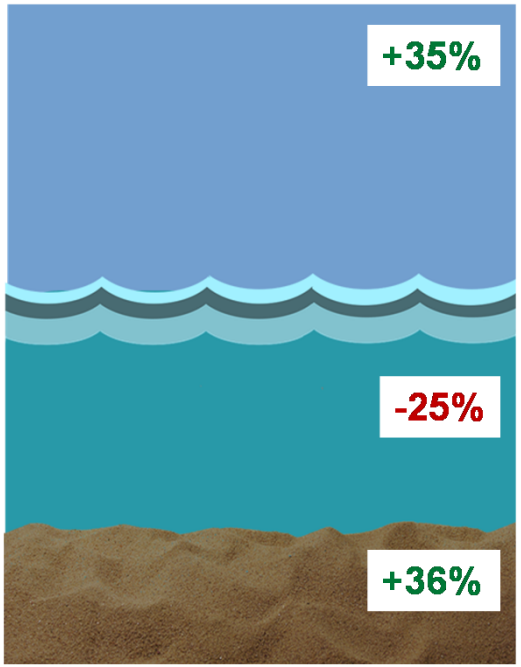
PSDs water, soil diffusion and advection

Air, water PSDs

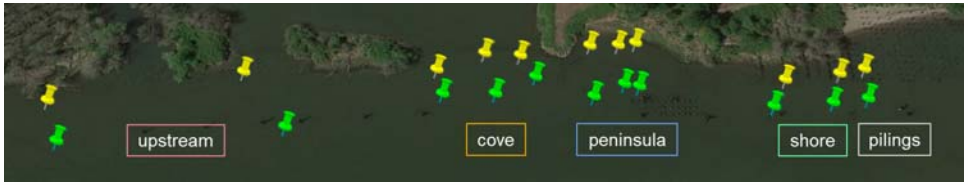
AIR, WATER AND POREWATER PAH CONCENTRATIONS CHANGE TEMPORALLY

HOW DOES THIS AFFECT CHEMICAL MOVEMENT?

- Air increased on average 35% from summer to fall
- Water decreased on average 25% from summer to fall
- Sediment porewater increased on average 36% from summer to fall

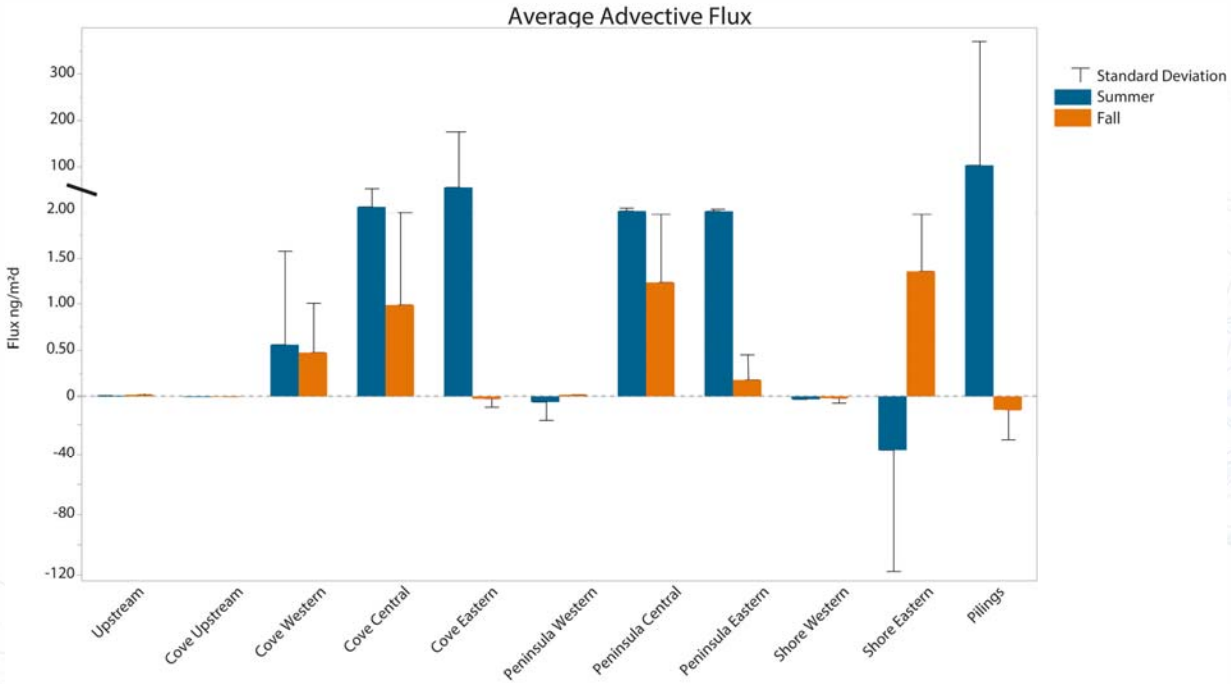


ADVECTIVE PAH FLUX: SUMMER AND FALL



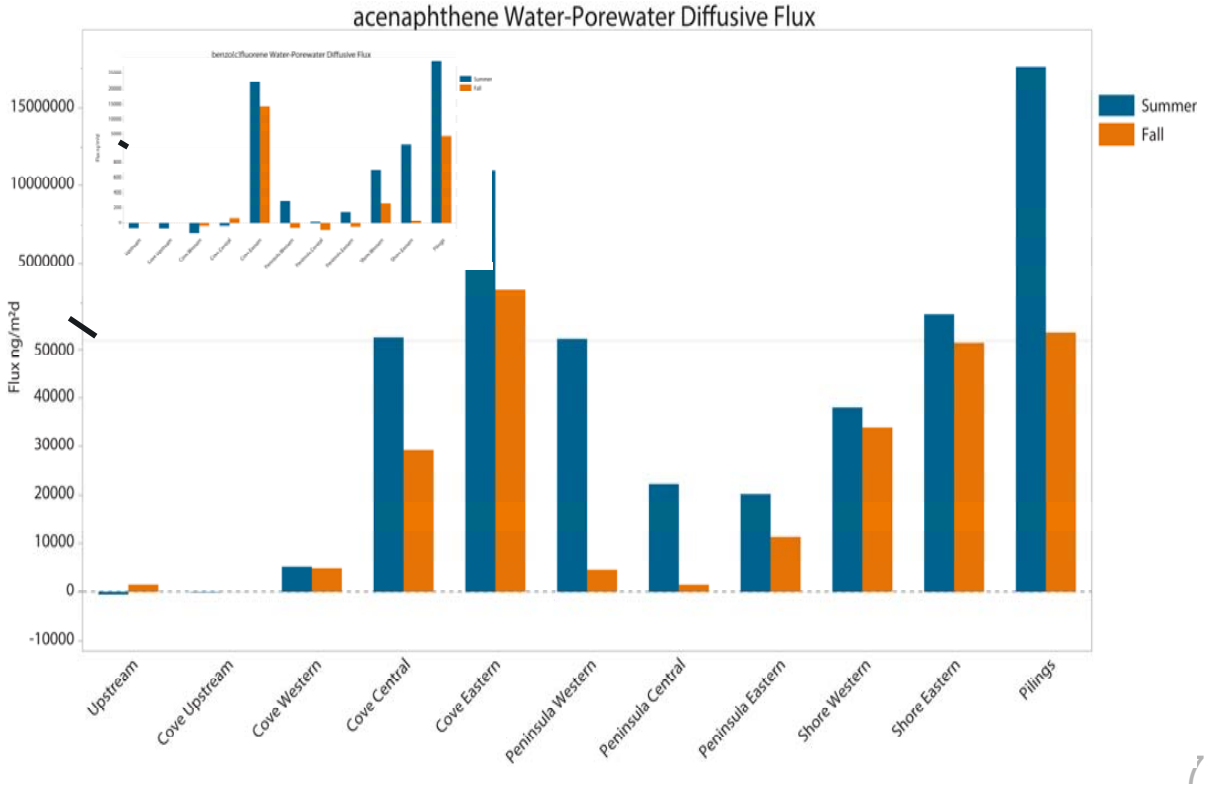
(***note scale break***)

- **MOST** sites PAHs are moving from the sediments to river
- **LESS** advective flux in fall compared with summer
- **BIG** difference in advective flux between sites



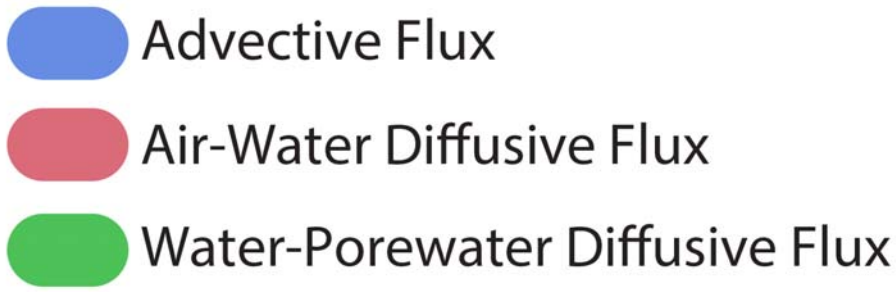
DIFFUSIVE PAH FLUX: SUMMER AND FALL

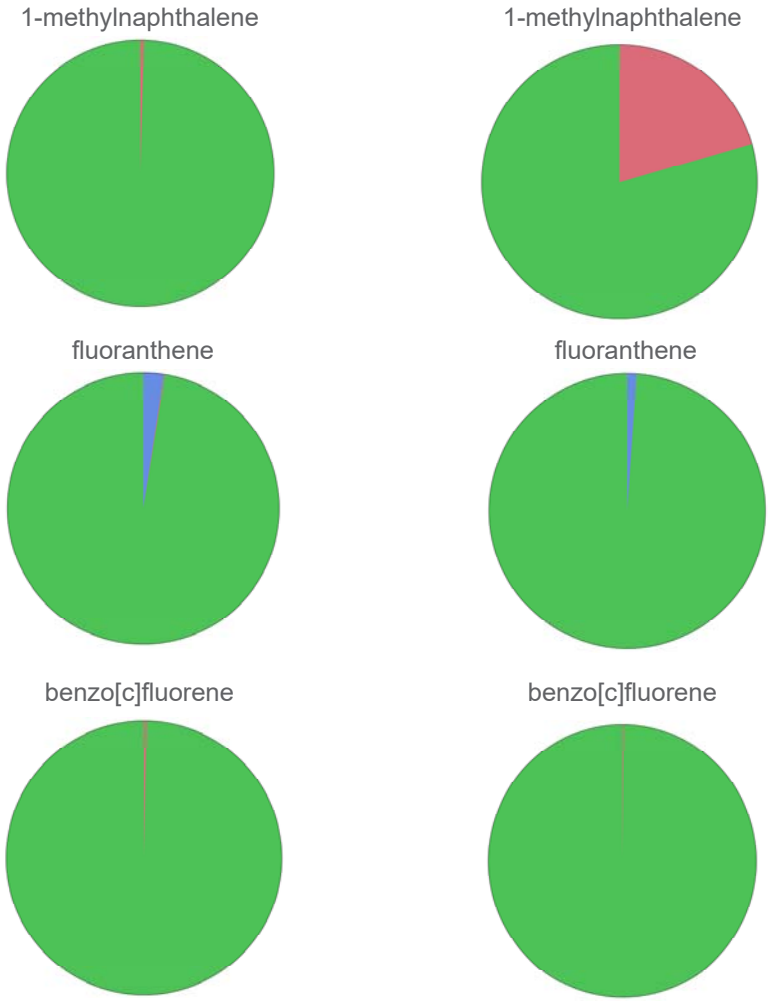
- **BIG** difference in diffusive flux of PAHs between sites
- **MOST** sites diffusing PAHs from sediments to water
- **LESS** diffusion in fall
- **SMALL, but MORE** change in diffusion btw summer and fall



DIFFUSIVE AND ADVECTIVE FLUX MAGNITUDE
SUMMER AND FALL

- DIFFUSIVE flux is the **LARGEST** contribution of chemical movement in summer and fall





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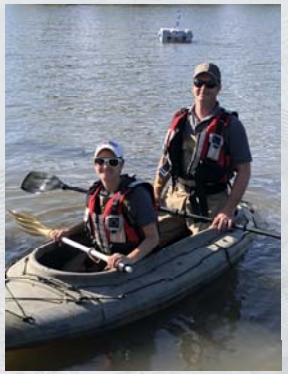

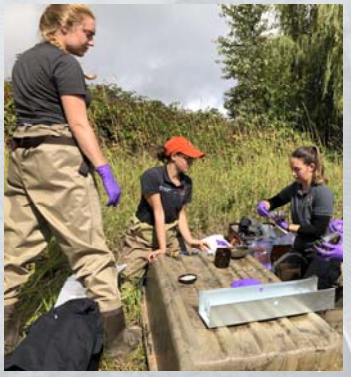

AIR-WATER DIFFUSIVE PAH FLUX
TEMPORAL CHANGE OF PAH MAGNITUDE

2 and 3 ring PAHs:

- **Most sites** are volatizing PAHs in summer
  - About 21% of compounds are in deposition
- Most sites are in deposition in fall
- **Suggests there are new atmospheric inputs into the system**

4 ring through 5 ring PAHs:

- Most sites are in volatilization

- In both summer and fall, the magnitude of deposition is greater than the magnitude of volatilization