

Figure 1. A conceptual diagram describing the creation and transport of PAHs with respect to wildfires. Burning of trees and the forest floor will emit PAHs into the atmosphere and deposit PAHs into soils. Runoff events can lead to PAH transport to adjacent waterbodies due to overland erosion (short-range transport) and from PAHs in the atmosphere (long-range transport).

**Research Objective:** Assess the available research that pertains to the contamination by PAHs of surface waters and sediments and create a roadmap for future PAH apportionment studies.

**Key Findings:** There is a limited number of studies investigating post-wildfire contamination by PAHs in surface waters, but even more so in sediments. The majority of the literature either focuses on PAHs in soils post-wildfire, or on PAHs in sediments in heavily industrial areas. The use of diagnostic ratios is most common in determining sources of PAHs but lacks the ability to differentiate between pyrogenic sources of PAHs (i.e., burning vegetation vs. burning fossil fuels).

**Conclusion:** Post-wildfire research of the aquatic environment should be an area of increased and urgent research. Relying only on diagnostic ratios for PAH apportionment does not allow for a detailed understanding of PAH sources, and thus, a number of different methods should be used together, such as diagnostic ratios, chi-squared tests, and other statistical analyses such as principal component analysis and generalized additive models.

**Future Implications:** There needs to be a concentrated effort on assessing PAH contamination post-wildfire, particularly as wildfire size and severity is expected to increase globally due to anthropogenic climate change. The provided roadmap for designing PAH apportionment studies is a starting point to jumpstart this area of research.

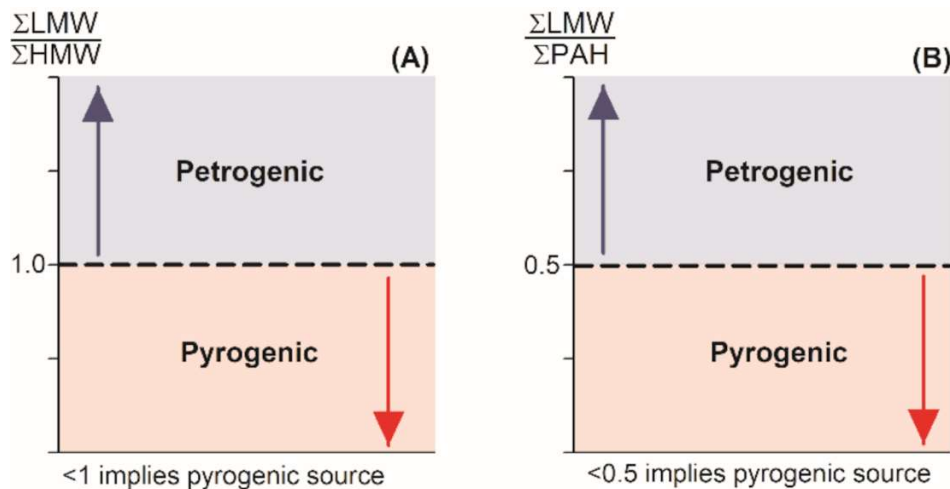


Figure 4 Discriminating petrogenic (natural fossil fuel deposits) and pyrogenic PAH sources on the basis of the sum concentrations of low molecular weight PAHs ( $\Sigma$ LMW), high molecular weight PAHs ( $\Sigma$ HMW), and total PAH ( $\Sigma$ PAH) ratios. The concentration-based ratios are based on parent (non-alkylated) PAHs. (A)  $\Sigma$ LMW/ $\Sigma$ HMW >1 implies petrogenic source, <1 implies pyrogenic source (Zhang et al. 2008; Barakat et al. 2011; Tobiszewski and Namieśnik 2012; Mansilha et al. 2019; Wu et al. 2019). (B)  $\Sigma$ LMW/ $\Sigma$ PAH >0.5 implies petrogenic source, <0.5 implies pyrogenic sources (De La Torre-Roches et al. 2009; Dong et al. 2020).