

APPENDIX F

LPAHs Data Analysis

Results for LPAHs

LPAH sampling with the bulk deposition methods used in this study does not capture the significant fraction of LPAH flux that occurs through gas absorption. In addition, LPAHs are volatile and loss during the sample deployment period is substantial, further magnifying the low sampling bias. The low bias from volatilization is indicated by the results of the PAH field spike blank samples (see Section 5.8.2 for details) where recovery of particular LPAHs was less than 20% (acenaphthalene, anthracene) and other common LPAHs, such as naphthalene, experienced modest recovery of less than 65%. Because of this low bias, the bulk atmospheric deposition data collected in this study should not be used as an absolute estimate of LPAH deposition, e.g. such as for loading estimates. However, it is included in this appendix because the results are still valuable for spatial comparison.

LPAH fluxes at Enumclaw were consistently lower than other stations with the exception of one sampling deployment collected in May 2012; LPAH flux at South Park was just below that of Enumclaw for this deployment (Figure 1). The maximum LPAH flux at Enumclaw was 0.044 $\mu\text{g}/\text{m}^2\text{-day}$ (Table 1). Throughout the sampling period, LPAH fluxes were highest at either Kent or Duwamish stations, reaching maxima of 0.79 and 0.91 $\mu\text{g}/\text{m}^2\text{-day}$, respectively. LPAH fluxes at Beacon Hill, South Park and Kent SC stations generally fell in the middle, between the fluxes at the other three stations.

In the late summer to fall months (i.e., August through early November) of 2011, LPAH fluxes varied minimally between stations. LPAH fluxes at Beacon Hill and South Park peaked in late November, late January, and mid-March and otherwise varied little over the year. The Duwamish LPAH fluxes followed this same pattern of peaks with an additional peak in October of 2012. LPAH fluxes at the Kent station were similar to other stations in the fall of 2011. Then in late November, fluxes rose hitting peaks in February to mid-March before stabilizing in April at an elevated flux relative to the previous fall. LPAH fluxes at Enumclaw did not follow these temporal patterns, remaining relatively similar throughout the year. When LPAH fluxes were measured at Kent SC, they were consistently and notably lower than at the Kent station indicating microscale effects of location on LPAH flux.

Ignoring temporal differences by grouping fluxes by station reveals that the median LPAH flux at Enumclaw was lower than any other station (Figure 2). Variability in LPAH flux also appears lowest at Enumclaw. Beacon Hill, South Park and Kent SC stations were similar in median flux and flux ranges. The widest variation in LPAH flux occurred at the Duwamish and Kent stations. The 90th and 95th percentile fluxes were similar at Duwamish and Kent; however, the median of 0.28 $\mu\text{g}/\text{m}^2\text{-day}$ was two times higher at Kent than the Duwamish median of 0.14 $\mu\text{g}/\text{m}^2\text{-day}$ (Table 16). When both Kent stations were sampled, LPAH flux was always higher at Kent station. Higher LPAH fluxes at Kent may reflect the influence of mobile sources such as the adjacent rail line.

The one-way ANOVA test showed LPAH fluxes at Enumclaw were significantly lower ($p < 0.05$) than all other stations. Also, LPAH fluxes at Kent station were significantly higher than the Beacon Hill, South Park and Kent SC stations and LPAH fluxes at Duwamish station were significantly higher than Beacon Hill station. No other significant differences were found. Notably, LPAH fluxes at the Duwamish were not significantly different than the two Kent stations.

Table 1. Summary of LPAH Flux Data by Station ($\mu\text{g}/\text{m}^2\text{-day}$)

Station	Beacon Hill	Duwamish	South Park	Kent	Kent Sr Ctr	Enumclaw
Sample Size	22	25	24	25	7	21
Minimum	0.021	0.040	0.040	0.014	0.036	0.0042
Maximum	0.22	0.91	0.30	0.79	0.18	0.044
Median	0.076	0.14	0.092	0.28	0.086	0.011
Mean	0.090	0.22	0.12	0.29	0.10	0.014

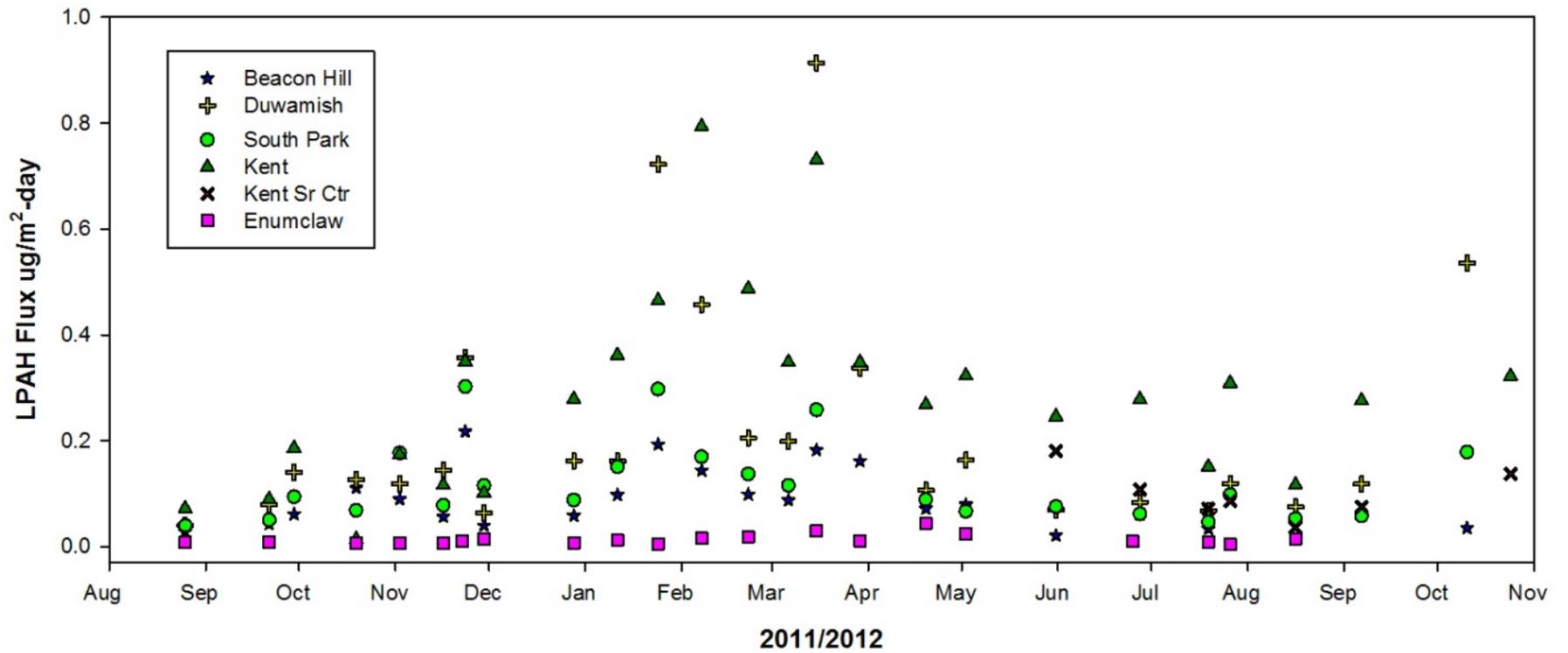


Figure 1. LPAH Flux for each Collection Period by Collection Date and Station.

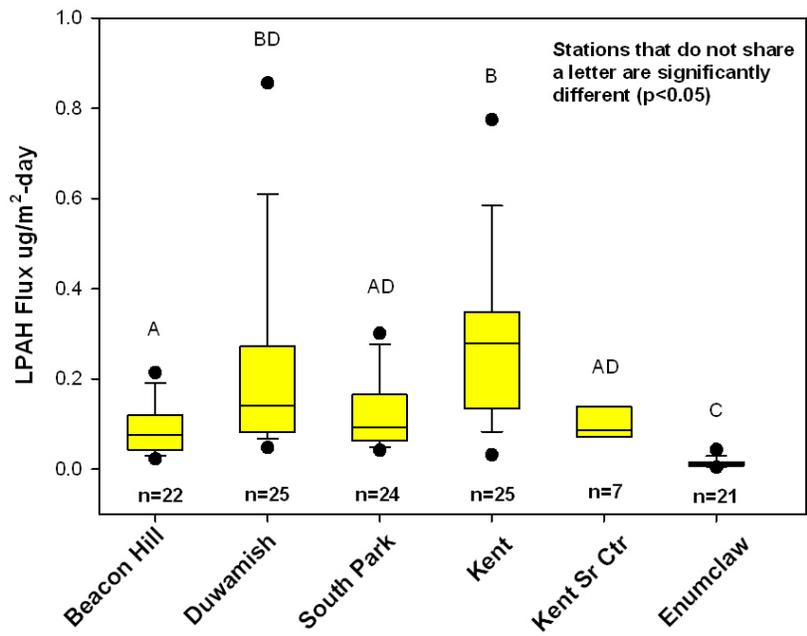


Figure 2. Boxplots of LPAH Flux by Station.