



# **PCBs in the Mission Reach: A Cosine Similarity Analysis**

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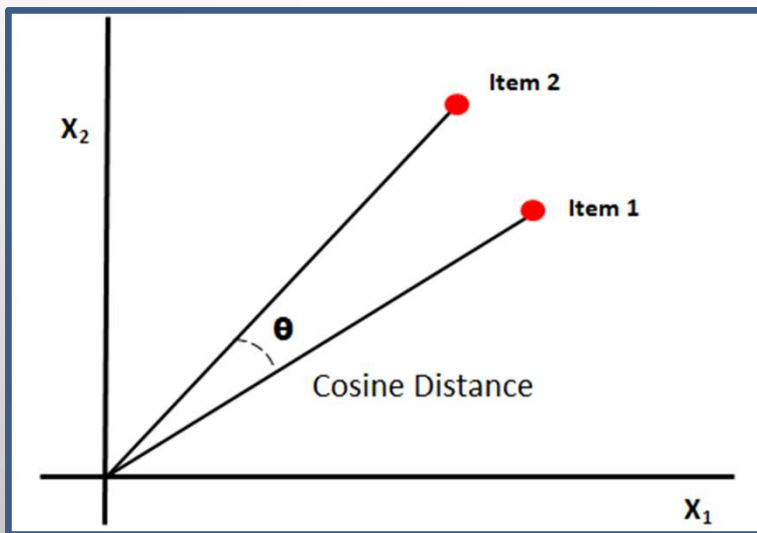


# Map of Sites

- A-HAM
- B-MIB-LB
- IB
- MIB
- MIB-LB
- B-MIB-RB
- SR3A-BRICK
- SR3A-RB
- SR3A-RB-DUP
- SR3A-ROCK
- TB
- GZ-BF
- GR-LB
- GR-RB
- ★ Mission
- ★ Riverton
- ★ Superior
- ★ Ralph Street



# Cos Similarity Process



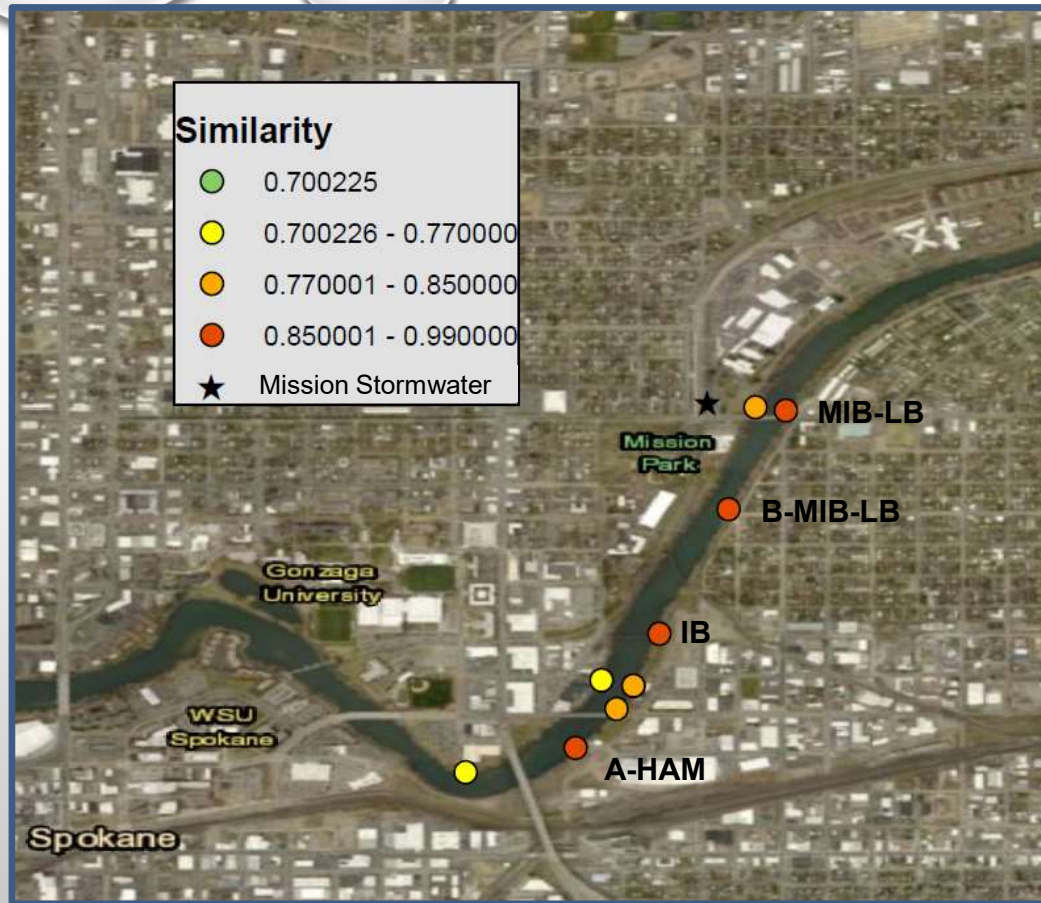
*Cosine similarity analysis is a way to measure the similarity between two vectors – in this case, we are determining the similarity in PCB composition between two samples.*

*Aroclors typically have a cosine similarity  $\approx 0.77$ . Therefore, anything greater than that potentially implies a common source.*

*Assigning non-detects a concentration of “zero” for the purpose of this analysis.*

# Results

## Mission

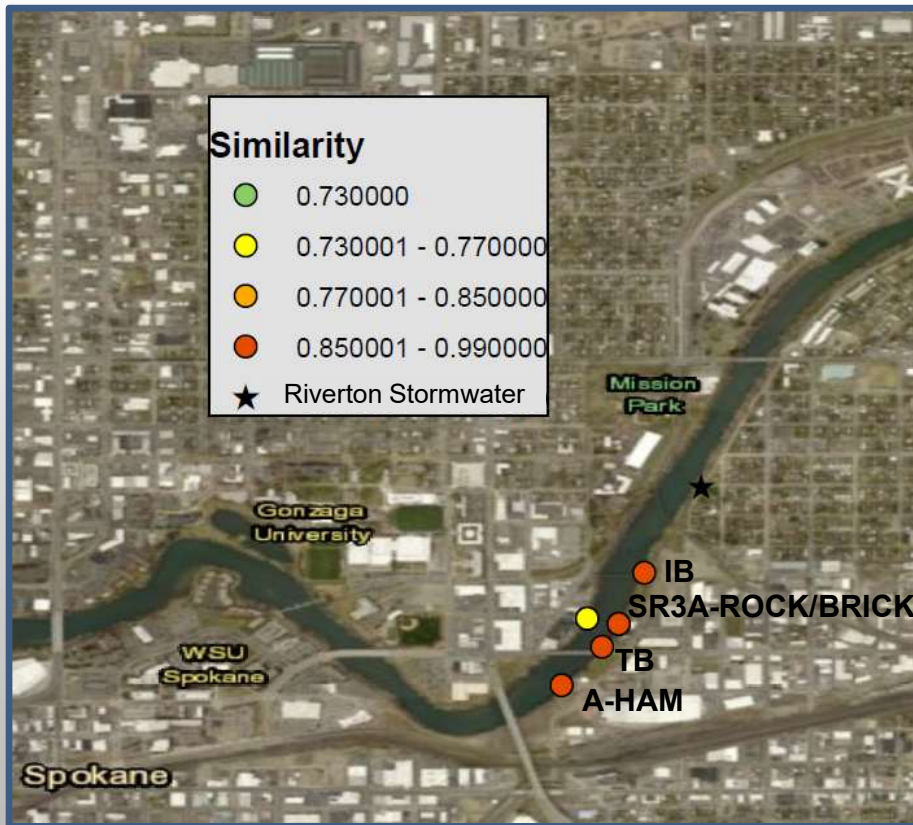


TMDL Stormwater Data (2007)

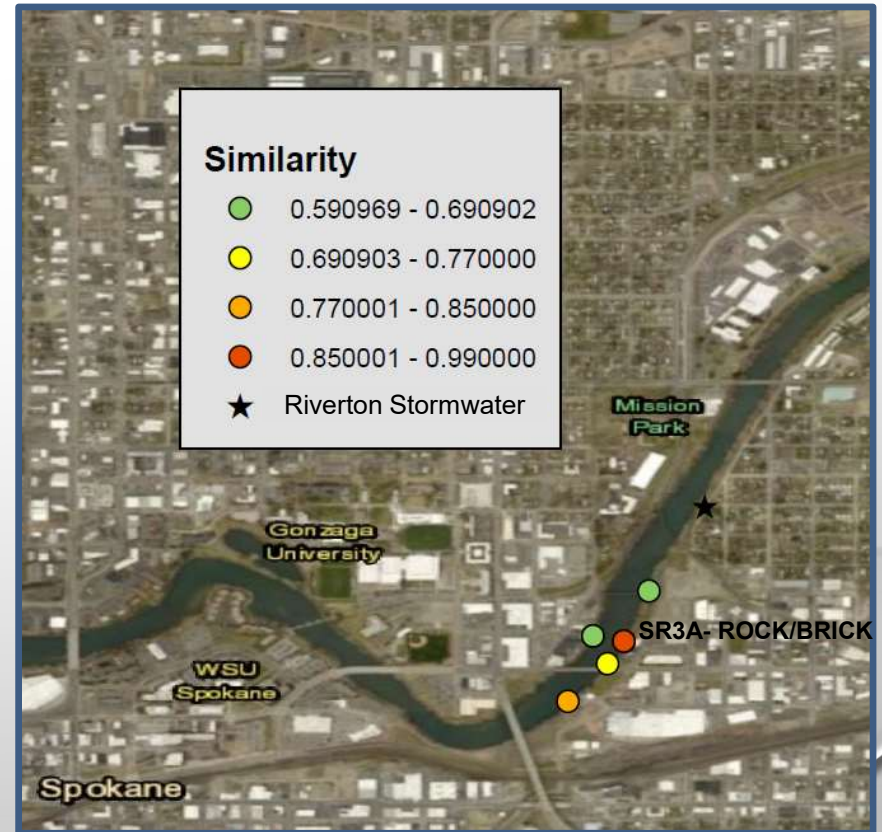


# Results Riverton

Cosine similarity between TMDL and UW= 0.85

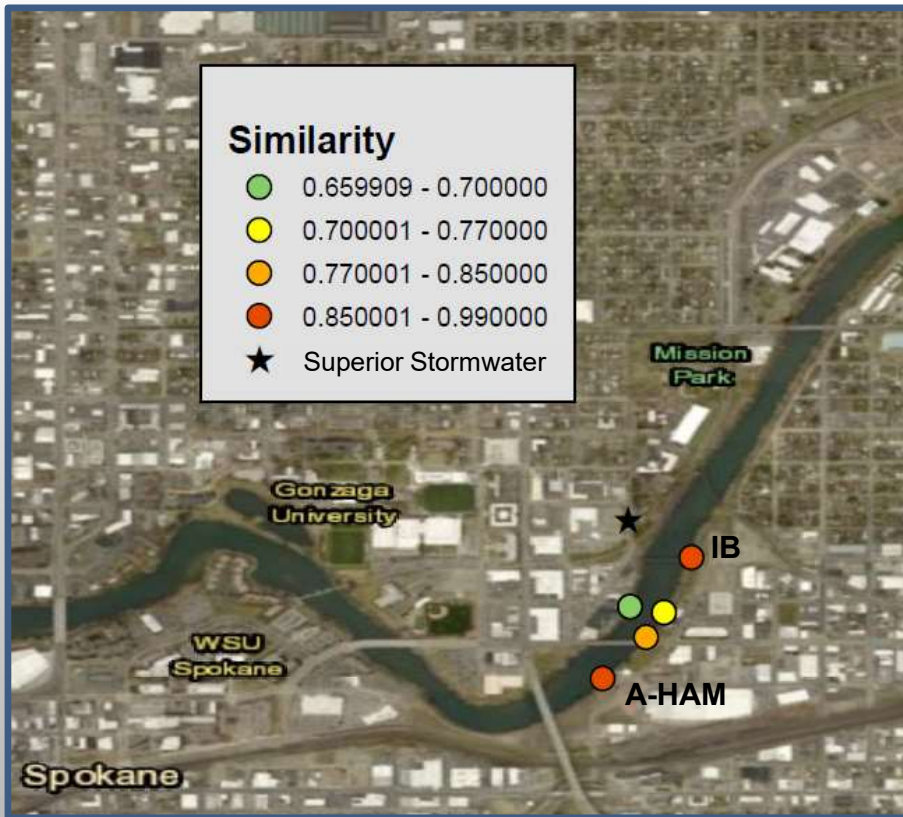


TMDL Stormwater Data (2007)

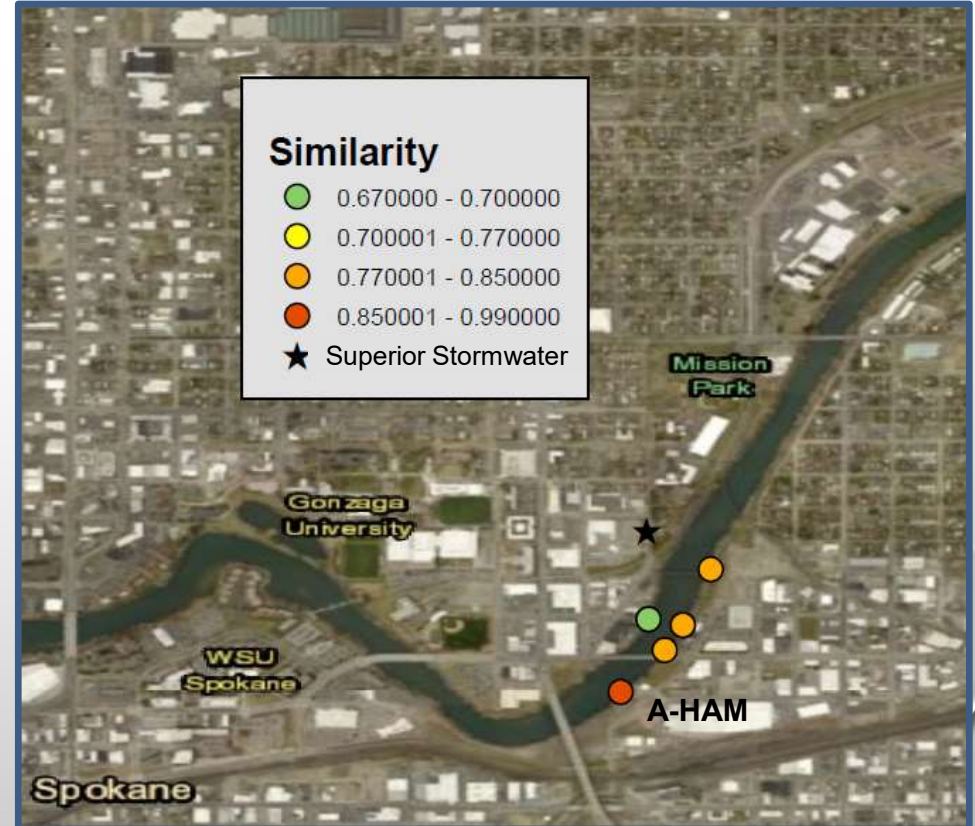


UW Stormwater Data (2011)

# Results Superior



TMDL Stormwater Data (2007)

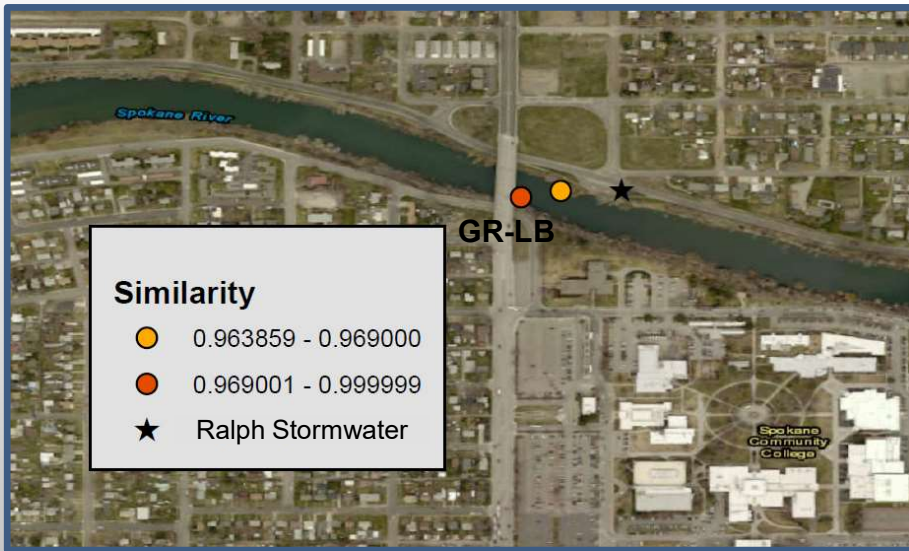


UW Stormwater Data (2011)

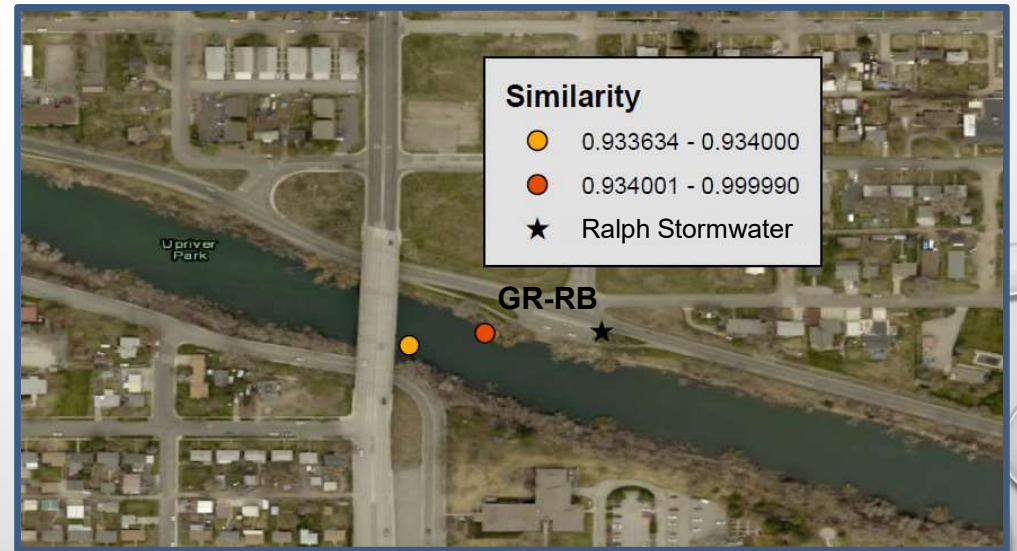


# Results

## Ralph Street



2011



2017

# Brick vs. Rock

- Total PCB concentration at the SR3A (left bank) biofilm sampling site in 2018 = 630,368 pg/g
- In 2019, more extensive sampling:
  - SR3A-BRICK
  - SR3A-RIGHT BANK
  - SR3A-ROCK



*Similarity to 2018 SR3A (left bank) PCB values :*

SR3A-RB	0.65
SR3A-BRICK	0.95
SR3A-ROCK	0.85

*Similarity to 2019 SR3A-RB PCB values :*

SR3A 2018	0.65
SR3A-BRICK	0.84
SR3A-ROCK	0.91



# Inadvertent PCBs MIB Biofilm (2018)

	concentration (pg/L)	co-eluting congener(s)
PCB-11	68.9	
PCB-30	9.81	PCB-018
PCB-36	0.239	
PCB-50	5.6	PCB-053
PCB-61	126	PCB-070/074/076
PCB-62	4.92	PCB-059/075
PCB-65	47.5	PCB-044/047
PCB-68	0	
PCB-69	36.4	PCB-049
PCB-72	0.603	
PCB-78	0	
PCB-113	94.3	PCB-090/101
PCB-116	33.5	PCB-085/117
PCB-121	0	
PCB-148	0.11	
PCB-160	172	PCB-129/138/163
PCB-161	0	
PCB-168	120	PCB-153
total inadvertent PCB	719.882	
total PCB	2824.158	
% inadvertent of total PCB	25.490	

**PCB-11 % of total = 2.440%**

# Inadvertent PCBs SR3A Biofilm (2018)

	concentration (pg/L)	co-eluting congener(s)
PCB-11	359	
PCB-30	340	PCB-018
PCB-36	0	
PCB-50	556	PCB-053
PCB-61	5510	PCB-070/074/076
PCB-62	181	PCB-059/075
PCB-65	3260	PCB-044/047
PCB-68	0	
PCB-69	1410	PCB-049
PCB-72	7.14	
PCB-78	0	
PCB-113	11800	PCB-090/101
PCB-116	1760	PCB-085/117
PCB-121	0	
PCB-148	8.51	
PCB-160	35800	PCB-129/138/163
PCB-161	0	
PCB-168	30600	PCB-153
total inadvertent PCB	91591.65	
total PCB	630367.741	
% inadvertent of total PCB	14.530	

# Inadvertent PCBs GZ Biofilm (2018)

	concentration (pg/L)	co-eluting congener(s)
PCB-11	165.8	
PCB-30	327.3	PCB-018
PCB-36	0	
PCB-50	58.19	PCB-053
PCB-61	408	PCB-070/074/076
PCB-62	31.67	PCB-059/075
PCB-65	259.7	PCB-044/047
PCB-68	1.05	
PCB-69	171.8	PCB-049
PCB-72	1.621	
PCB-78	0	
PCB-113	271	PCB-090/101
PCB-116	62.3	PCB-085/117
PCB-121	0	
PCB-148	0.15	
PCB-160	374	PCB-129/138/163
PCB-161	0	
PCB-168	247	PCB-153
total inadvertent PCB	2379.581	
total PCB	9512.192	
% inadvertent of total PCB	25.016	

**PCB-11 % of total = 1.743%**



# Inadvertent PCBs

## Mission Stormwater

	concentration (pg/L)	co-eluting congener(s)
PCB-11	219.5	
PCB-30		
PCB-36		
PCB-50		
PCB-61		
PCB-62		
PCB-65		
PCB-68	281.85	PCB-041/064
PCB-69		
PCB-72		
PCB-78		
PCB-113		
PCB-116		
PCB-121	1120	PCB-093/095
PCB-148		
PCB-160	945	PCB-138
PCB-161	127.7	PCB-146
PCB-168	1019	PCB-153
total inadvertent PCB	3713.05	
total PCB	16465.75	
% inadvertent of total PCB	22.550	

PCB-11 % of total = 1.333%

TMDL Stormwater Data (2007)

# Inadvertent PCBs

## Riverton Stormwater

	concentration (pg/L)	co-eluting congener(s)
PCB-11	205.5	
PCB-30		
PCB-36		
PCB-50		
PCB-61		
PCB-62		
PCB-65		
PCB-68	243	PCB-041/064
PCB-69		
PCB-72	87.9	PCB-071
PCB-78	29.1	
PCB-113		
PCB-116		
PCB-121	2480	PCB-093/095
PCB-148		
PCB-160	594.5	PCB-138
PCB-161	154.3666667	PCB-146
PCB-168	2440	PCB-153
total inadvertent PCB	6234.366667	
total PCB	22394.33333	
% inadvertent of total PCB	27.839	

TMDL Stormwater Data (2007)

	concentration (pg/L)	co-eluting congener(s)
PCB-11		
PCB-30		
PCB-36		
PCB-50		
PCB-61		
PCB-62		
PCB-65		
PCB-68		
PCB-69		
PCB-72		
PCB-78		
PCB-113		
PCB-116	93.2	PCB-097
PCB-121		
PCB-148		
PCB-160	1400	PCB-138
PCB-161		
PCB-168		
total inadvertent PCB	1916.2	
total PCB	24382.7	
% inadvertent of total PCB	7.859	

UW Stormwater Data (2011)

% PCB-11 of total = 1.668%

# Inadvertent PCBs Superior Stormwater

	concentration (pg/L)	co-eluting congener(s)
PCB-11	302	
PCB-30		
PCB-36		
PCB-50		
PCB-61		
PCB-62		
PCB-65		
PCB-68	244.8333333	PCB-041/064
PCB-69		
PCB-72	182	PCB-071
PCB-78		
PCB-113		
PCB-116		
PCB-121	1525	PCB-093/095
PCB-148		
PCB-160	947.22	PCB-138/160
PCB-161	203	PCB-146/161
PCB-168	1297.22	PCB-153/168
total inadvertent PCB	4701.273333	
total PCB	18106.05667	
% inadvertent of total PCB	25.965	

	concentration (pg/L)	co-eluting congener(s)
PCB-11	150	
PCB-30		
PCB-36		
PCB-50		
PCB-61		
PCB-62		
PCB-65		
PCB-68		
PCB-69	109.9	PCB-052
PCB-72	36.83333333	PCB-064
PCB-78		
PCB-113		
PCB-116		
PCB-121		
PCB-148		
PCB-160		
PCB-161		
PCB-168		
total inadvertent PCB	296.7333333	
total PCB	681.8231843	
% inadvertent of total PCB	43.521	

TMDL Stormwater Data (2007)

UW Stormwater Data (2011)



# Inadvertent PCBs

## Ralph Stormwater

% PCB-11 of total = 2.874%

	concentration (pg/L)	co-eluting congener(s)
PCB-11	224	
PCB-30		
PCB-36		
PCB-50		
PCB-61		
PCB-62		
PCB-65		
PCB-68		
PCB-69		
PCB-72		
PCB-78		
PCB-113		
PCB-116	77.6	PCB-097
PCB-121		
PCB-148		
PCB-160	330	PCB-138
PCB-161		
PCB-168		
total inadvertent PCB	631.6	
total PCB	7794.1	
% inadvertent of total PCB	8.104	

2011

	concentration (pg/L)	co-eluting congener(s)
PCB-11		
PCB-30	33.8	PCB-018
PCB-36	0.922	
PCB-50		
PCB-61	191.6	PCB-070/074/076
PCB-62	10.85	PCB-059/075
PCB-65	140.1	PCB-044/047
PCB-68		
PCB-69		
PCB-72		
PCB-78		
PCB-113	195.6	PCB-090/101
PCB-116	45.7	PCB-085/117
PCB-121		
PCB-148		
PCB-160	464	PCB-129/138/163
PCB-161		
PCB-168	323	PCB-153
total inadvertent PCB	1405.572	
total PCB	6865.8	
% inadvertent of total PCB	20.472	

2017

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the slide.

# ***Questions/Comments***