

SELENIUM IN THE LAS VEGAS WASH AND ITS URBAN TRIBUTARIES

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Southern Nevada Water Authority

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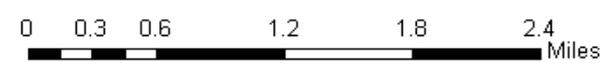
Outline of Presentation

- Se in the Las Vegas Wash
- Se from Urban Runoff (Tributaries)
- Se Sources in the Valley
- Se mass loading calculations
- Summary

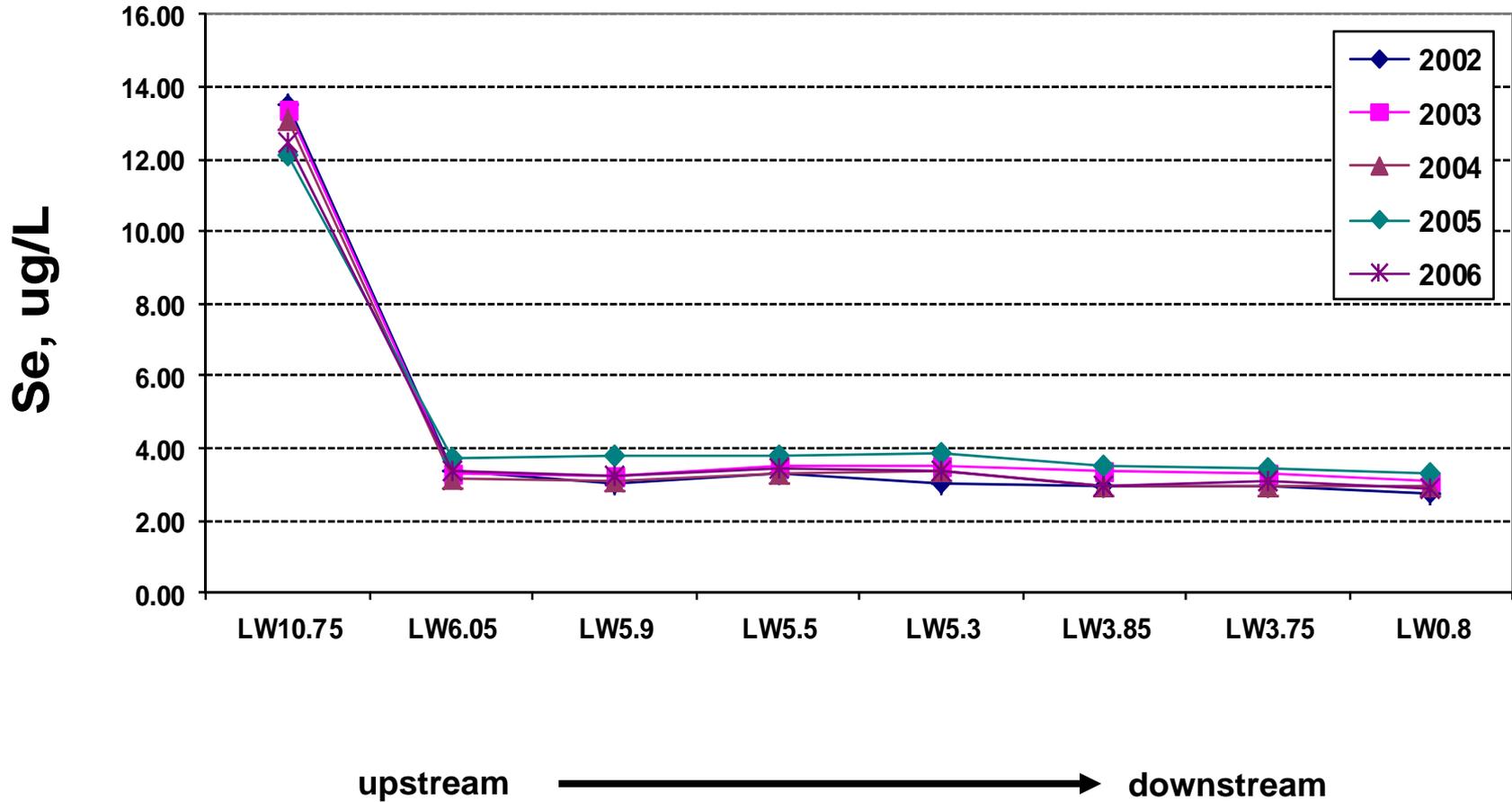
Aquatic Criteria for Selenium

- **Freshwater Acute: 20 µg/L**
- **Freshwater Chronic: 5 µg/L**
- **Presently under reevaluation by EPA**

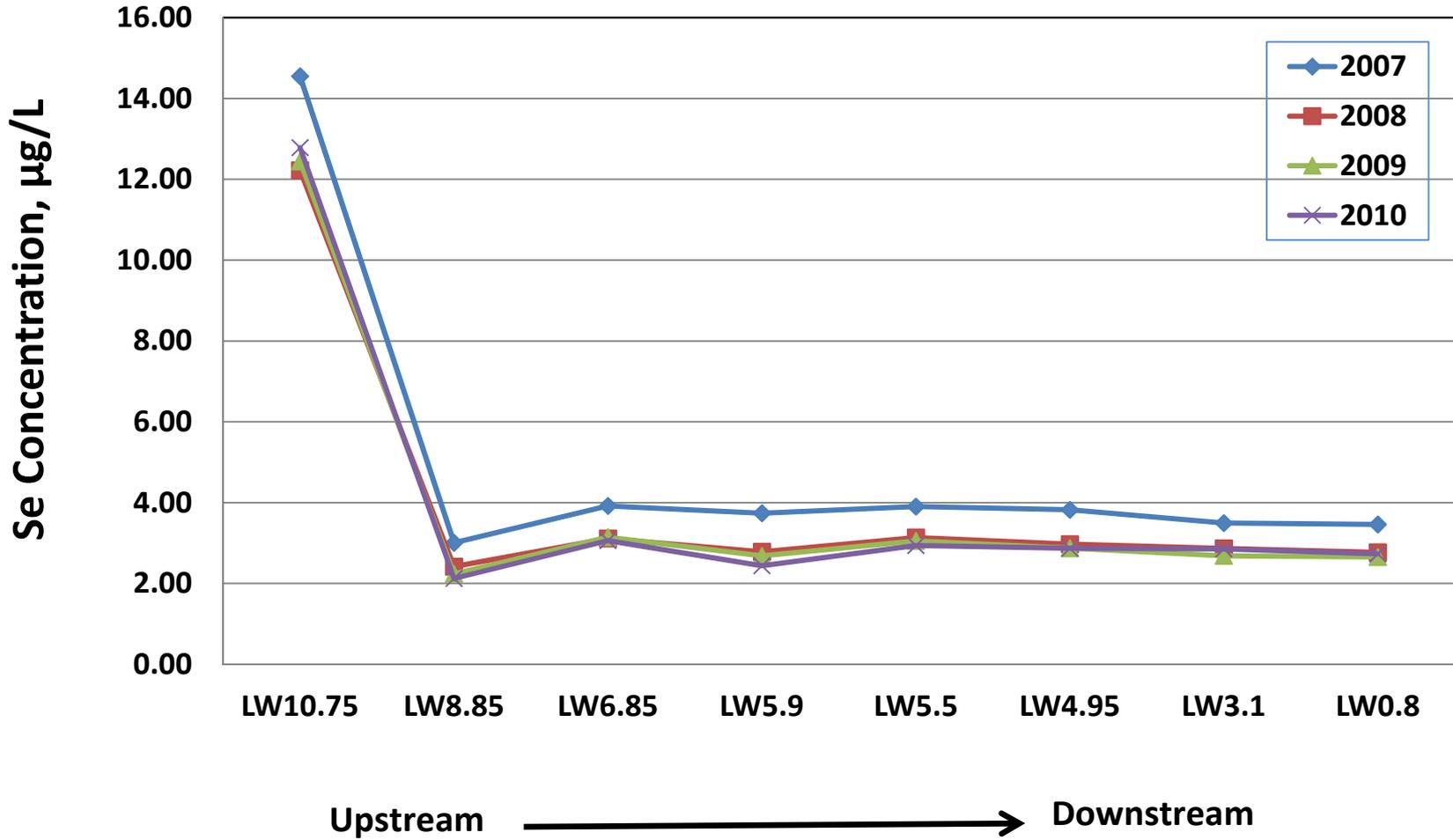
Current Mainstream Wash Sample Locations



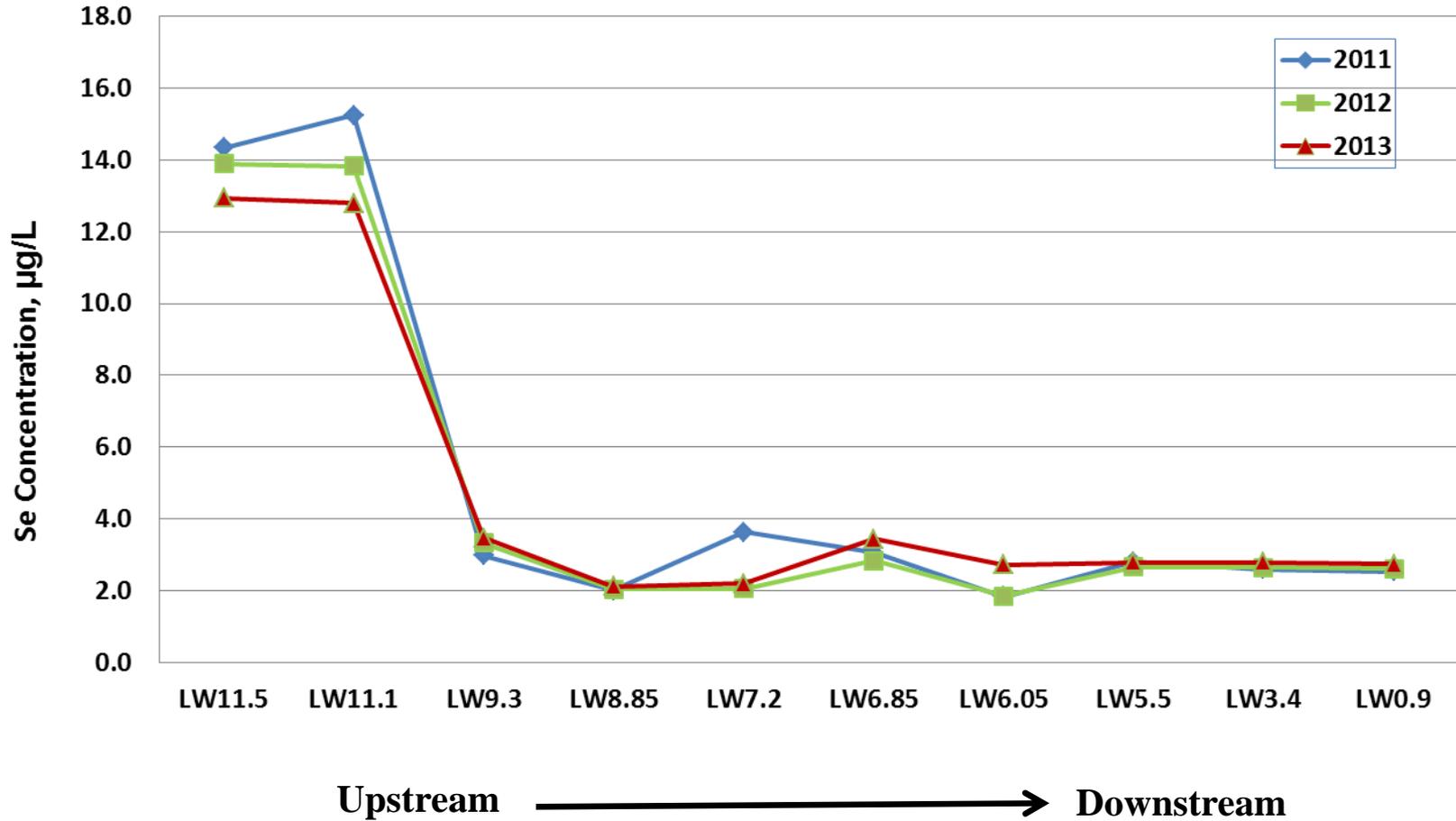
Yearly Average Selenium Concentrations in the Wash



Yearly Average Se Concentrations in the Wash (2007-2010)



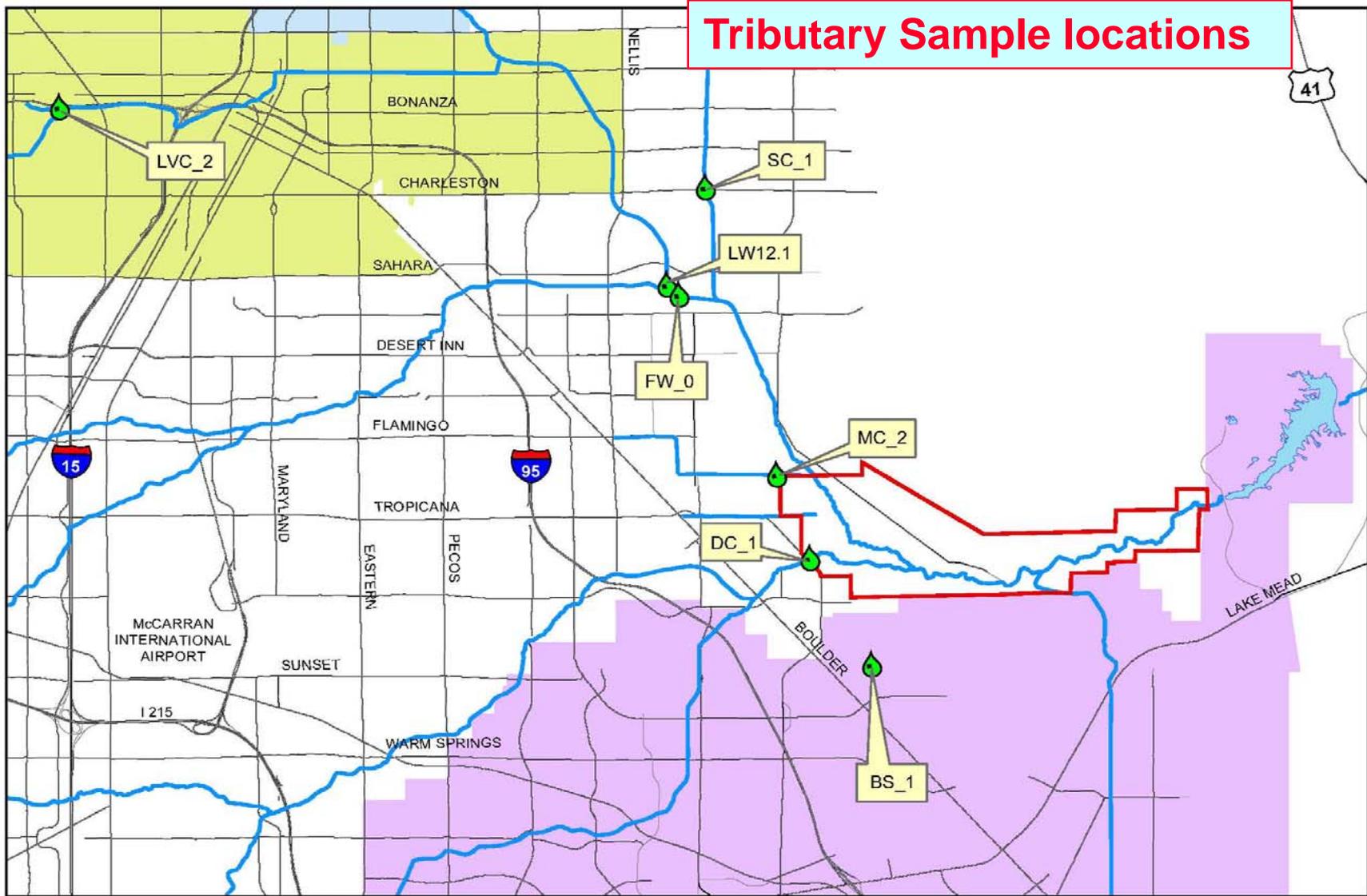
Yearly Average Se Concentrations in the Wash (2011-2013)



Selenium in the Mainstream Wash

- **Consistent levels from 2003-2013**
(<4 µg/L)
- **High selenium levels from urban tributaries greatly diluted by wastewater effluent.**

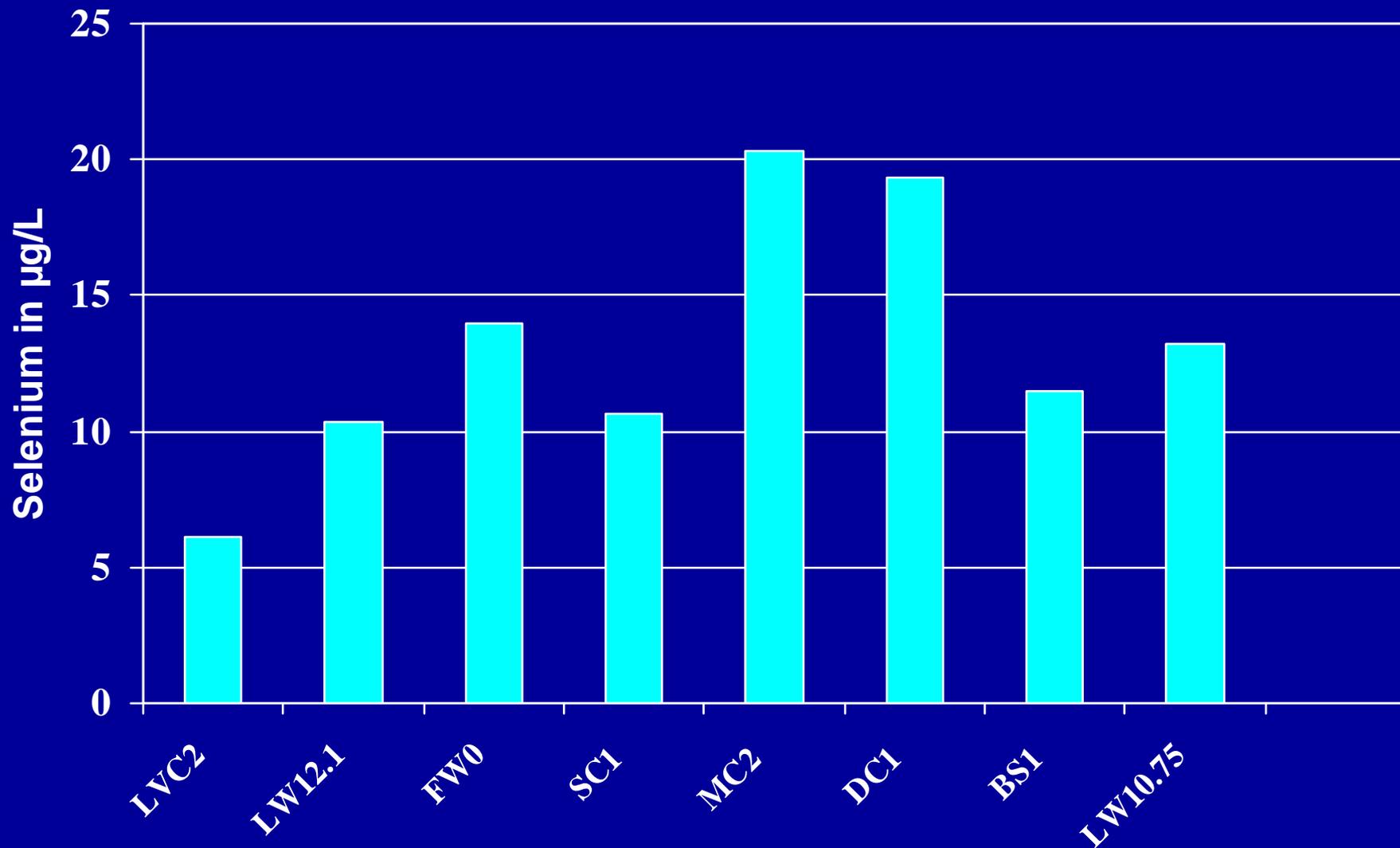
Tributary Sample locations



Wetland Park Boundary	City of Henderson	Tributary Monitoring Sites
Lake Las Vegas	City of Las Vegas	
Las Vegas Wash and Tributaries	City of North Las Vegas	

0 0.350.7 1.4 2.1 Miles
FOR PLANNING PURPOSES ONLY

Average Selenium Concentration for the Tributaries to the Wash (2002-09)



Selenium in Tributaries

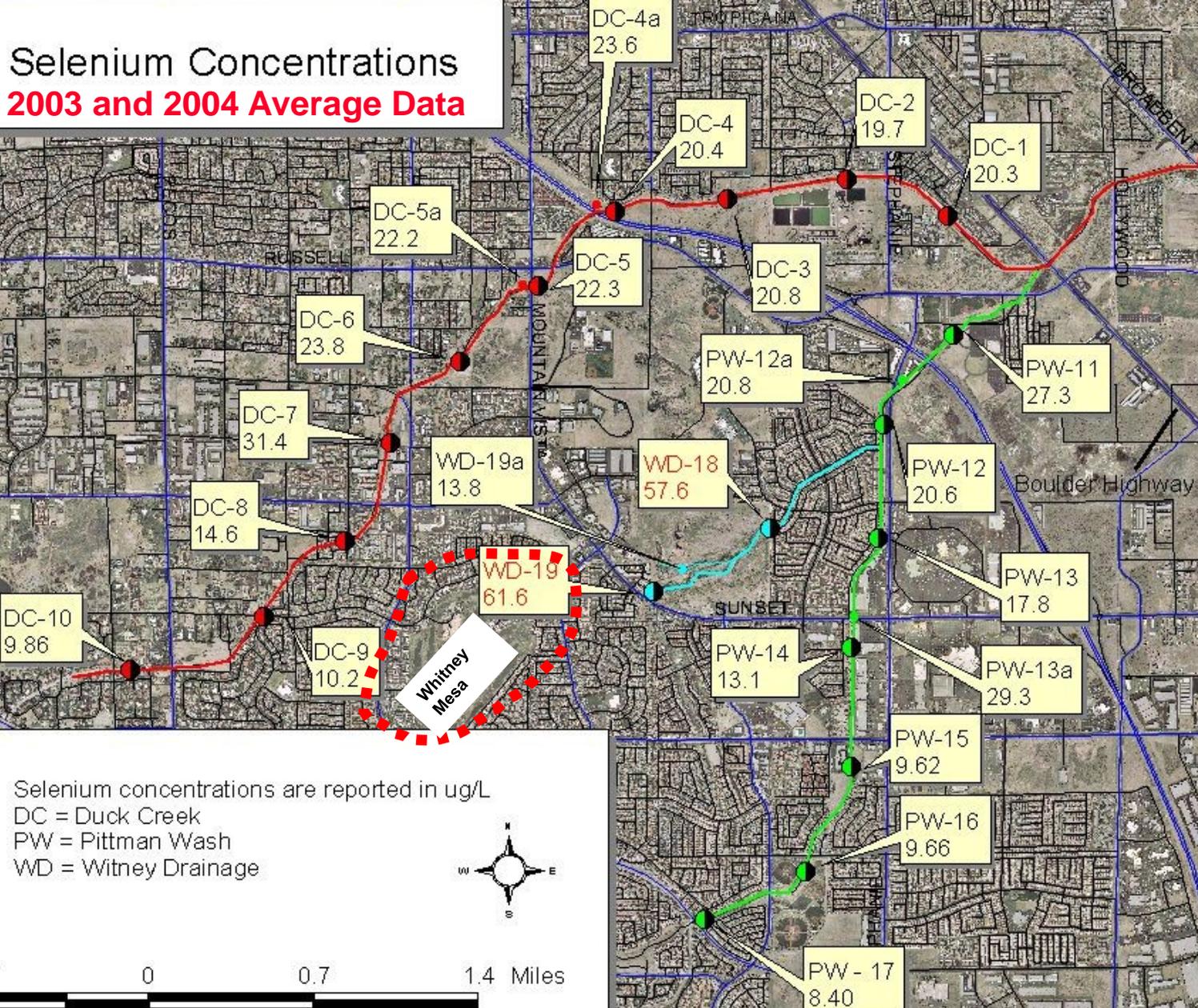
- All urban tributaries have elevated selenium concentrations
- Tributaries with high average selenium concentrations are:
 - Monson Channel – 20 ~ 22 $\mu\text{g/L}$
 - Duck Creek – 18 ~ 20 $\mu\text{g/L}$
- Average selenium level at LW10.75 is ~ 13 $\mu\text{g/L}$

Extensive Selenium Sampling from Tributaries

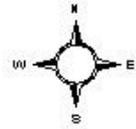
- **Purpose: Locate Se sources (Hot Spots)**
- **Sample Year: 2003-09**
- **Sample frequency: quarterly**
- **One sample every ½ mile**
- **Plus samples from dewater pipes**
- **Analyzed for Se ($\mu\text{g/L}$) by SDSU Lab.**



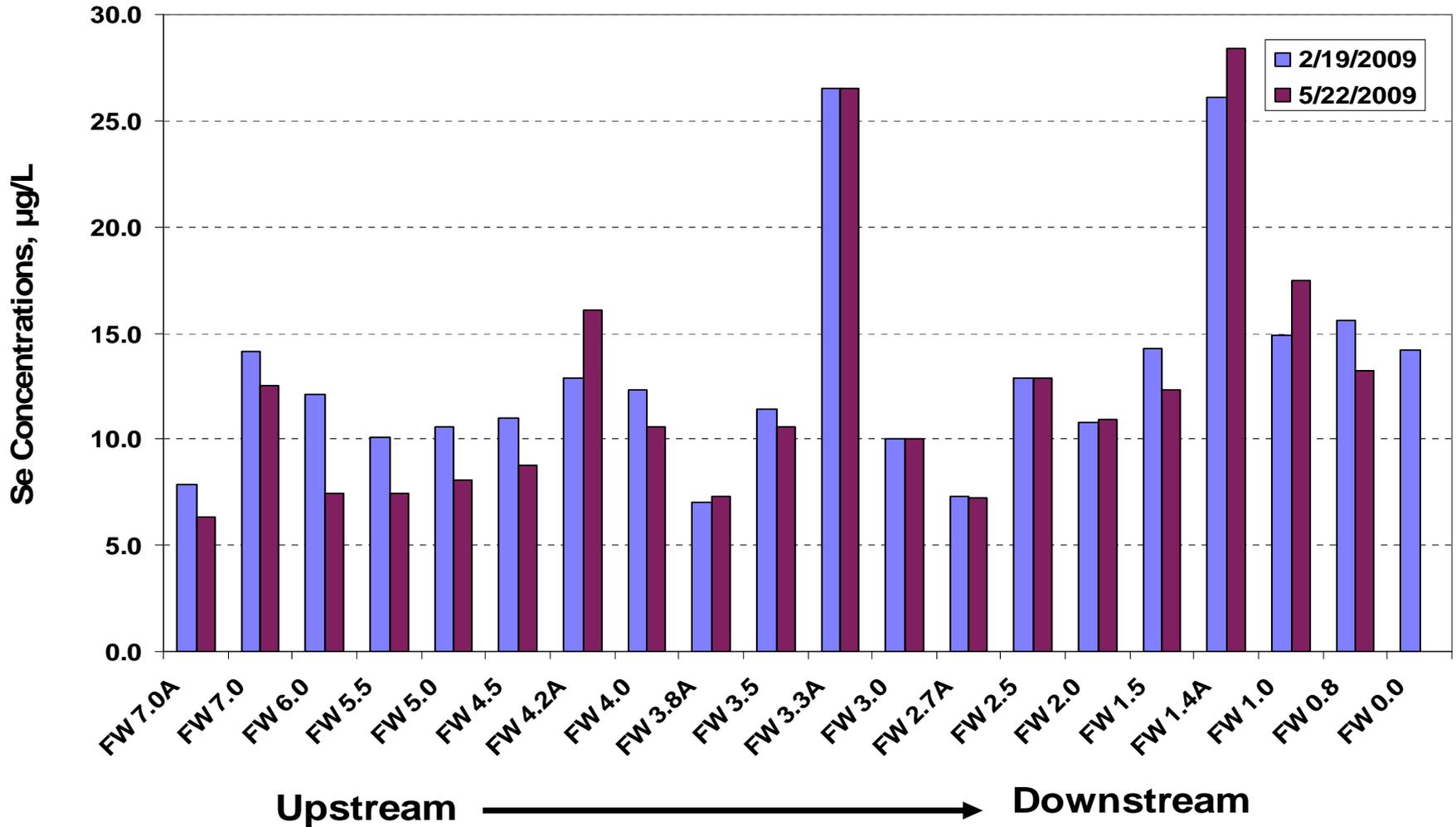
Selenium Concentrations 2003 and 2004 Average Data



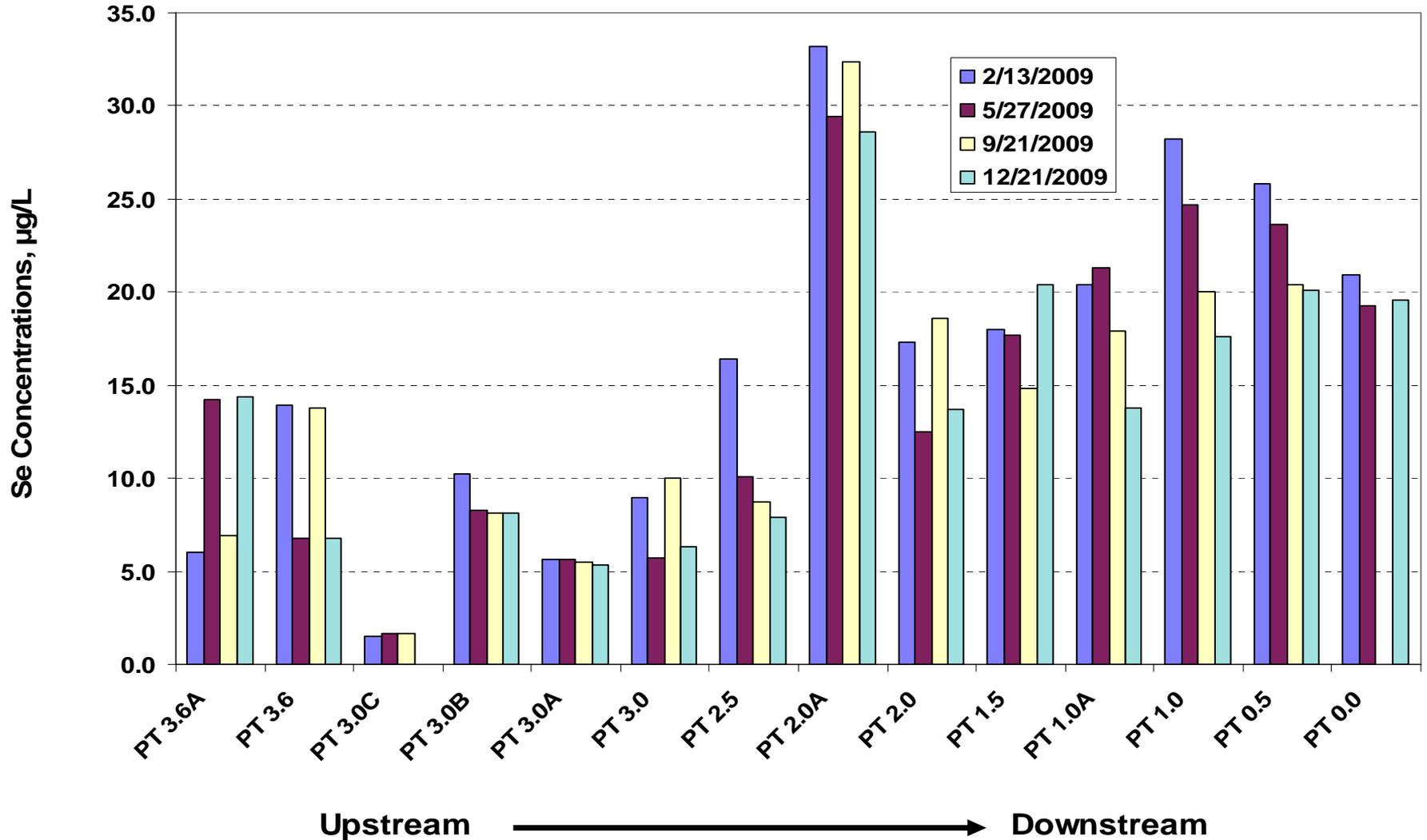
Selenium concentrations are reported in ug/L
 DC = Duck Creek
 PW = Pittman Wash
 WD = Witney Drainage



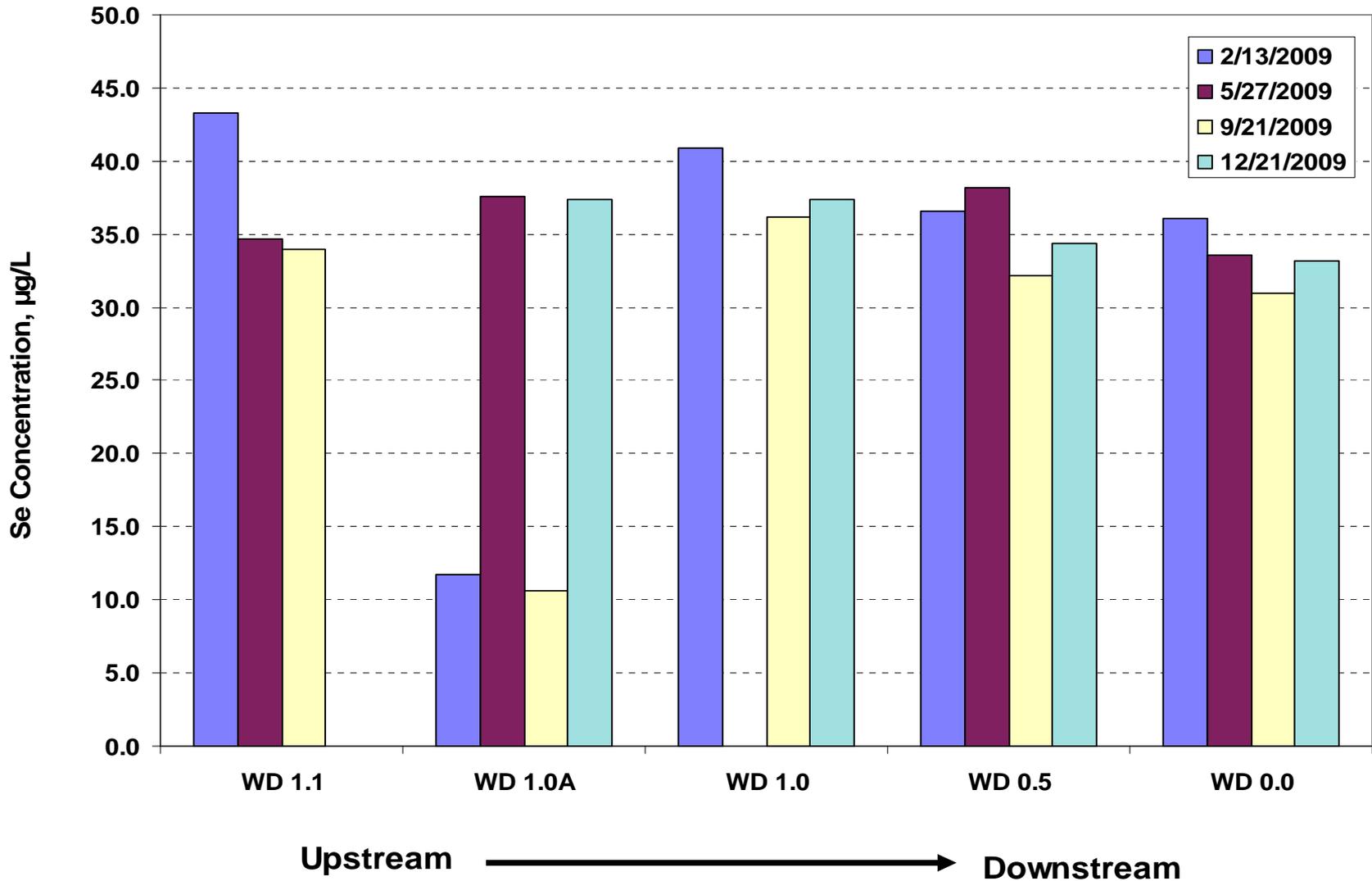
Se Concentrations from Flamingo Wash (FW) (2009)



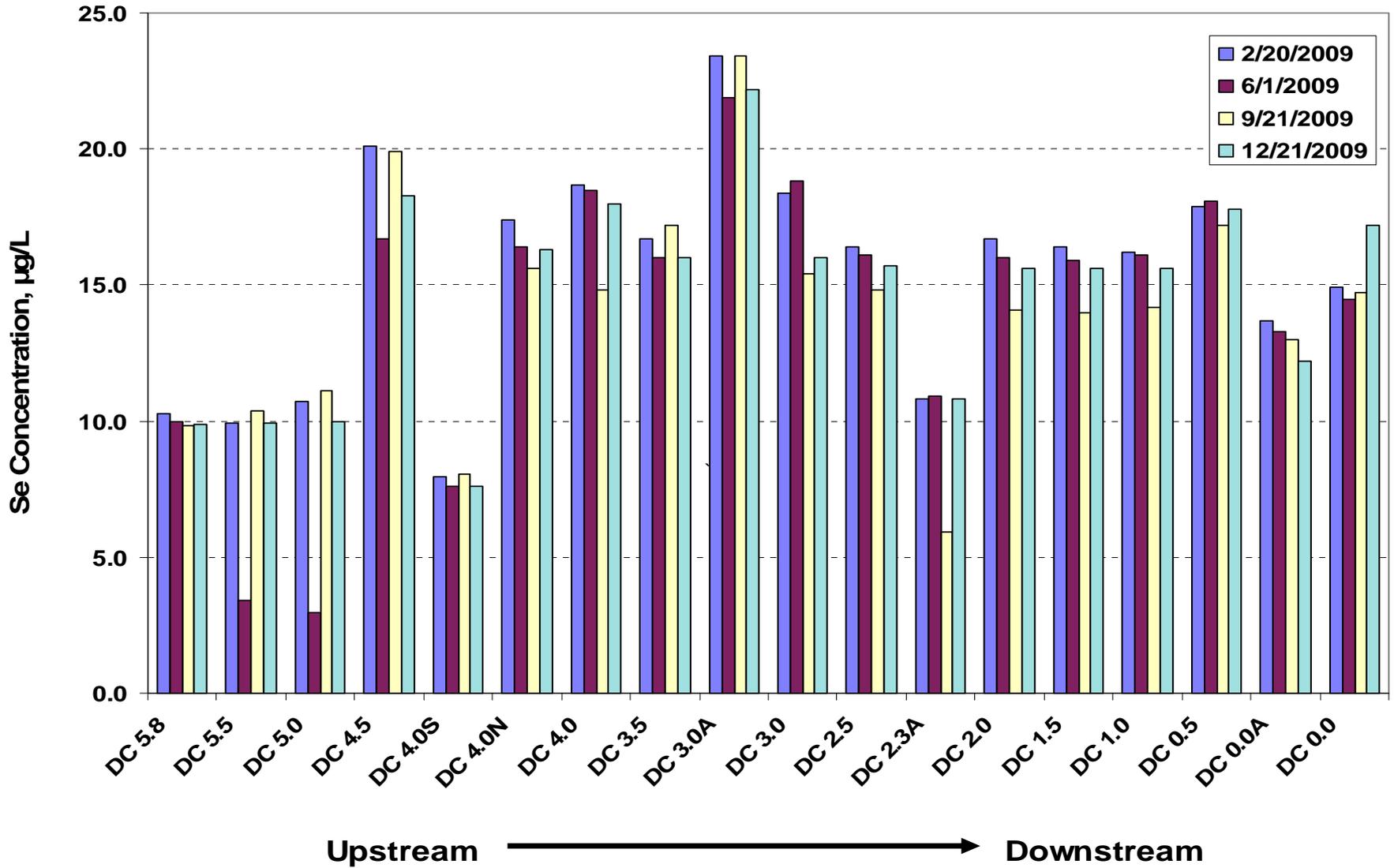
Se Concentrations from Pittman Wash (PT) (2009)



Se Concentrations from Whitney Drainage (WD) (2009)



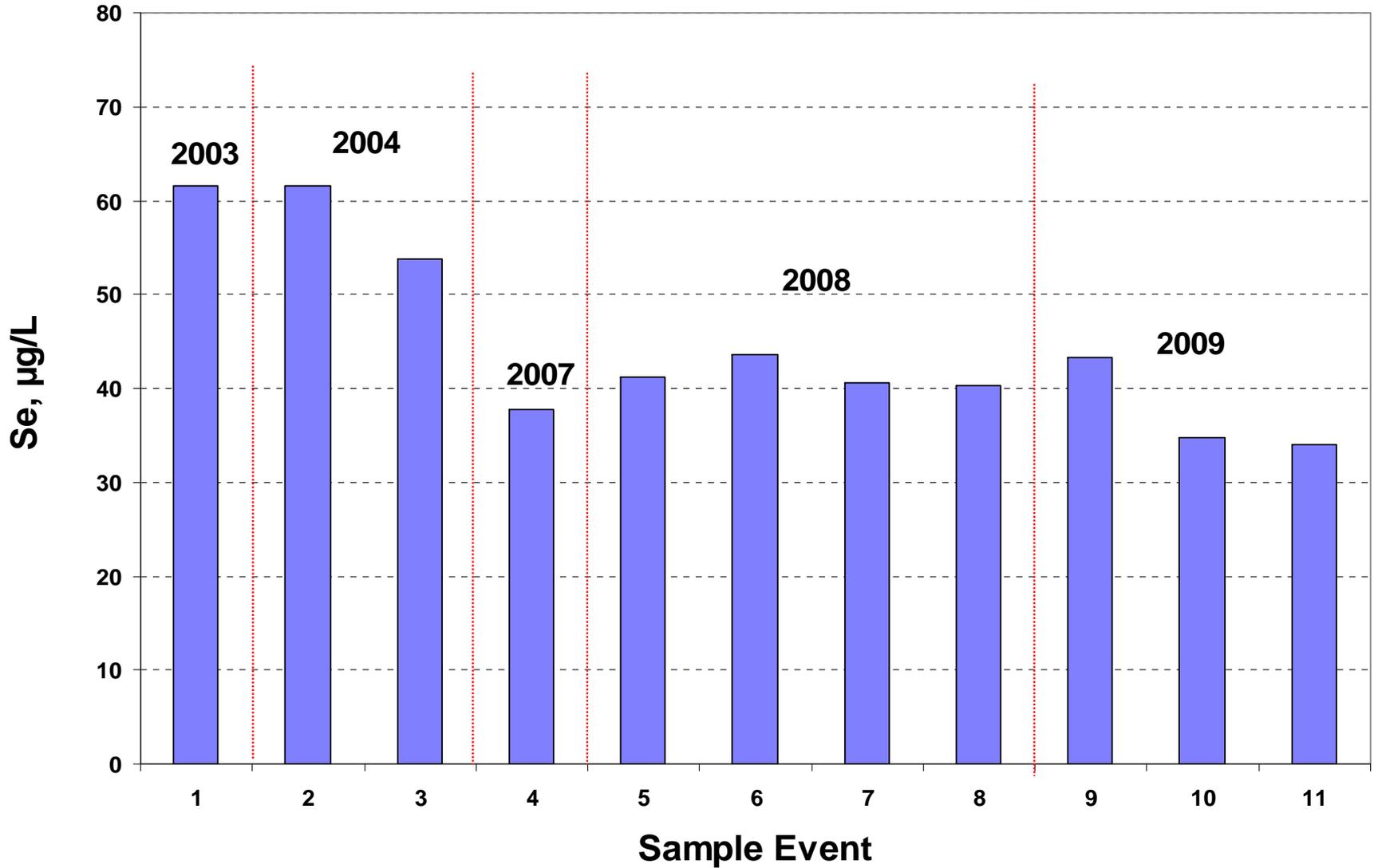
Se Concentrations from Duck Creek (DC) (2009)



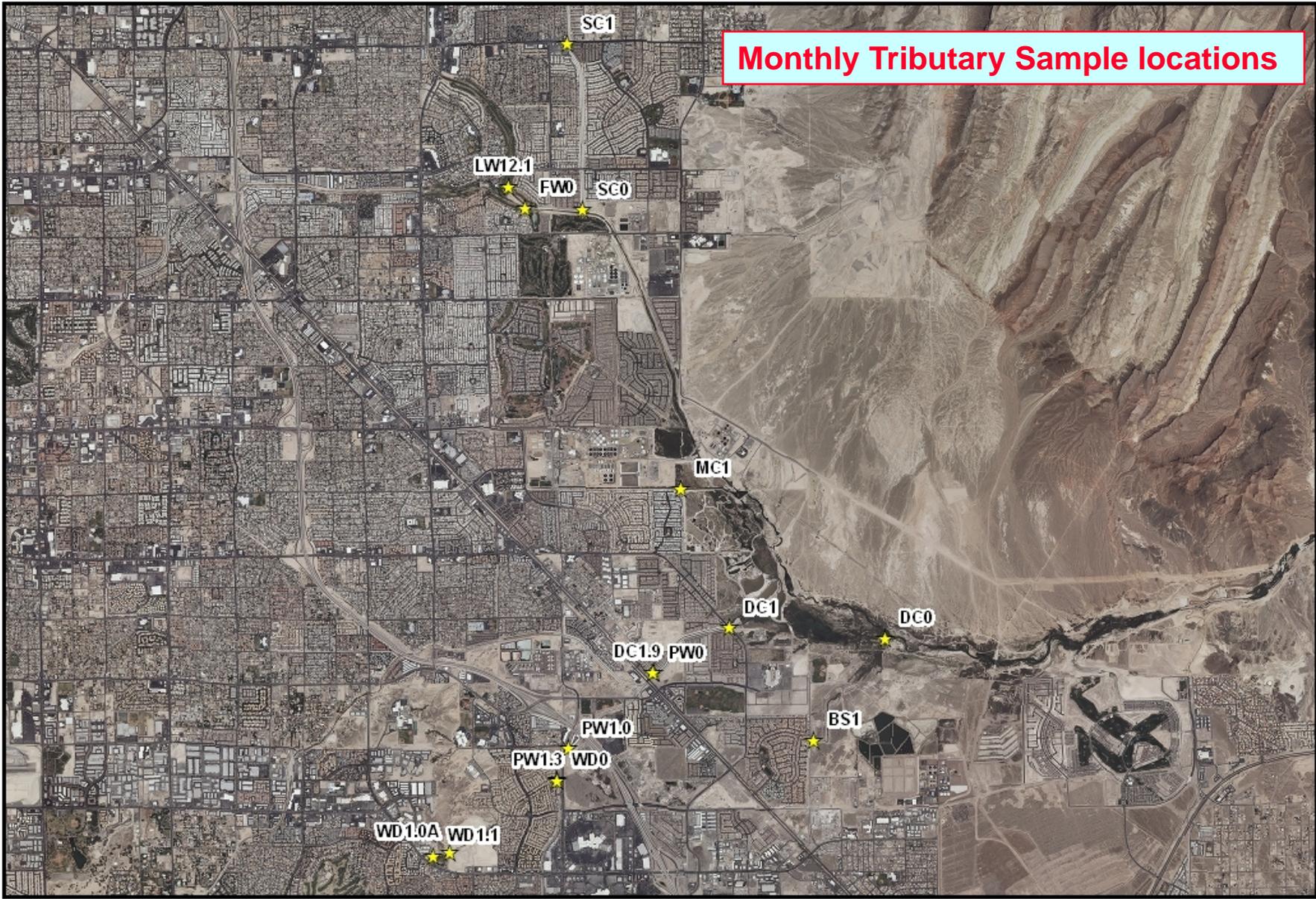
“Hot Spot” - Whitney Drainage (WD)



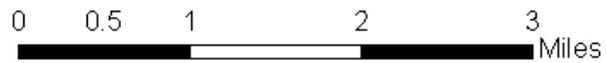
Se Concentrations from Whitney Drainage (WD)



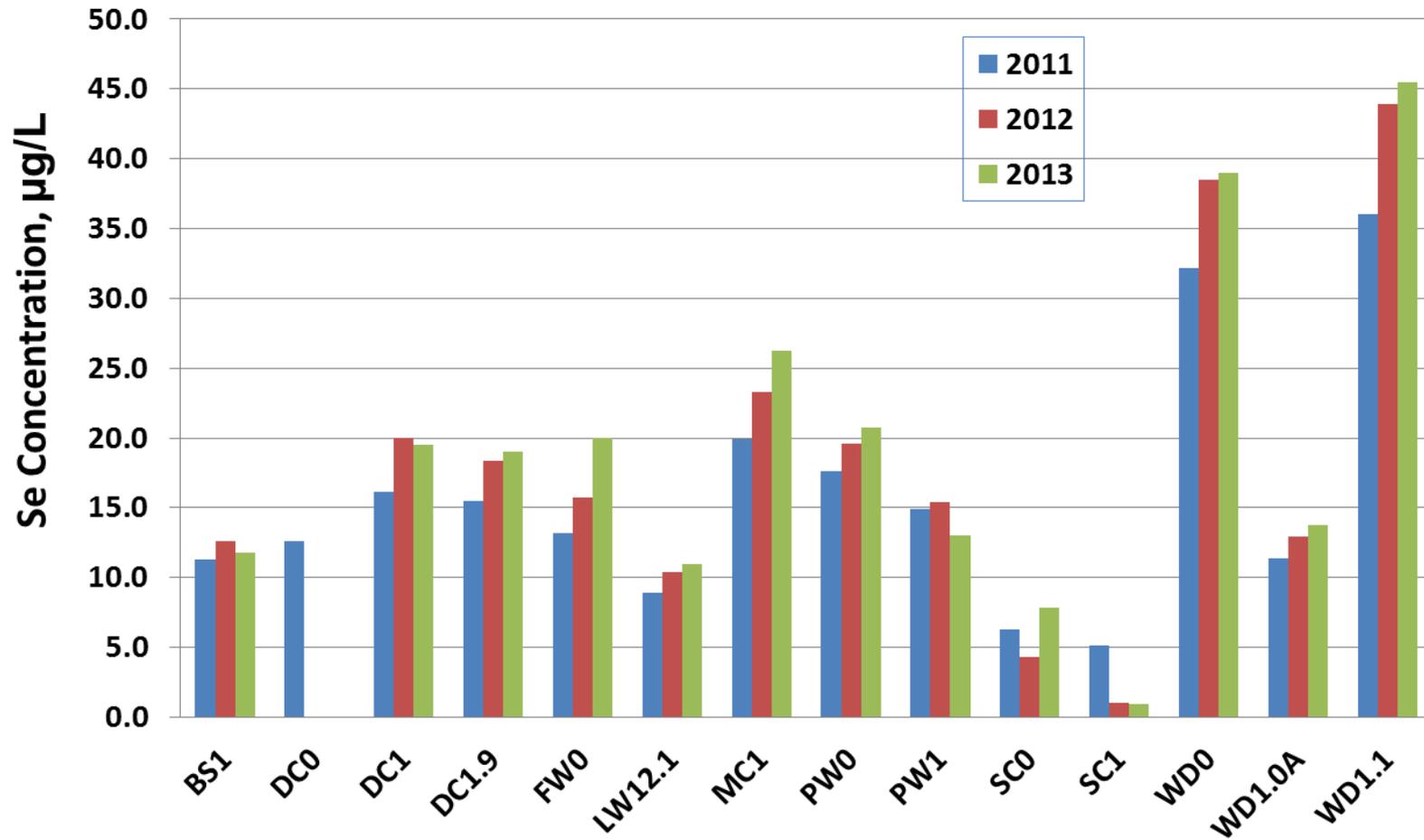
Monthly Tributary Sample locations



★ Tributary Sampling Sites



Yearly Average Se Concentrations from Tributaries (2011-13)



Flow Rate Determinations

- **From 6 tributaries to the Wash:**
 - ~20 cfs (~13 MGD)
 - ~14,213 AF/yr
 - ~7% of the total flow of the Wash
- **From the Wash to Lake Mead:**
 - ~285 cfs (184 MGD)

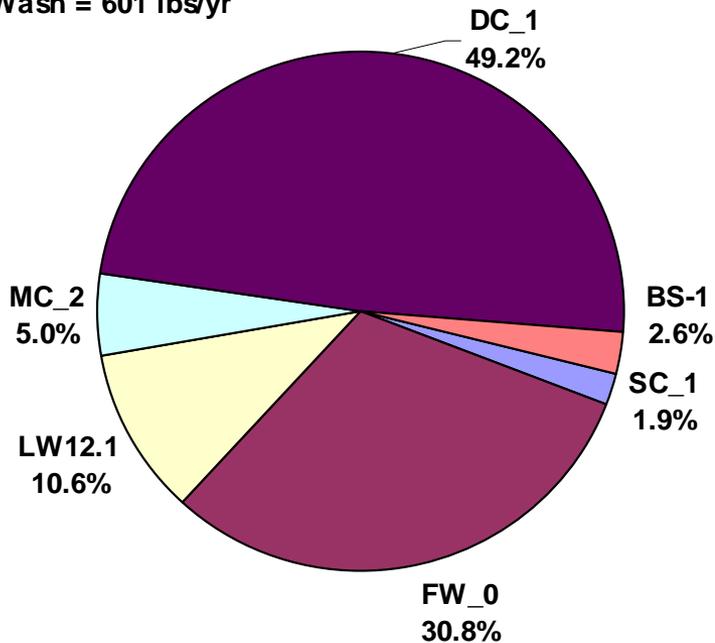
Yearly Se Mass Loading Rate (lbs/yr)

$$\begin{aligned} &= \text{Se Concentration } (\mu\text{g/L}) \times 10^{-3} \\ &\quad \times \text{Flow Rate (cfs)} \times 0.6463 \\ &\quad \times 8.34 \times 365 \text{ (days/yr)} \end{aligned}$$

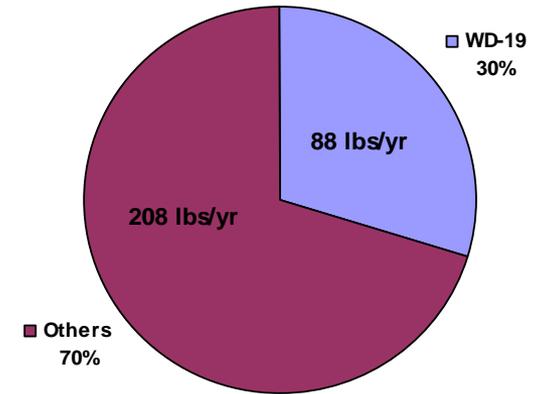
Relative Percentage of Yearly Se Mass Loading

(Based on 2002-09 Data)

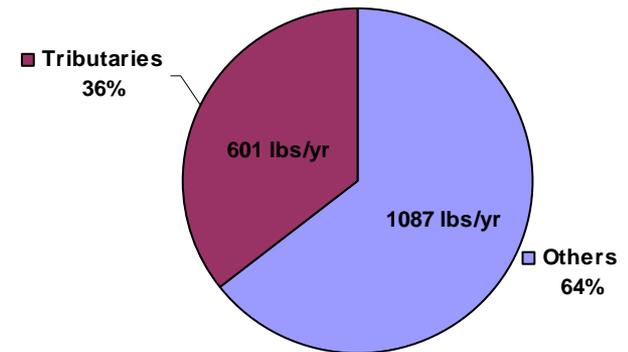
Total yearly Se loading from six tributaries to the Wash = 601 lbs/yr



Total yearly Se loading from Duck Creek to the Wash = 296 lbs/yr



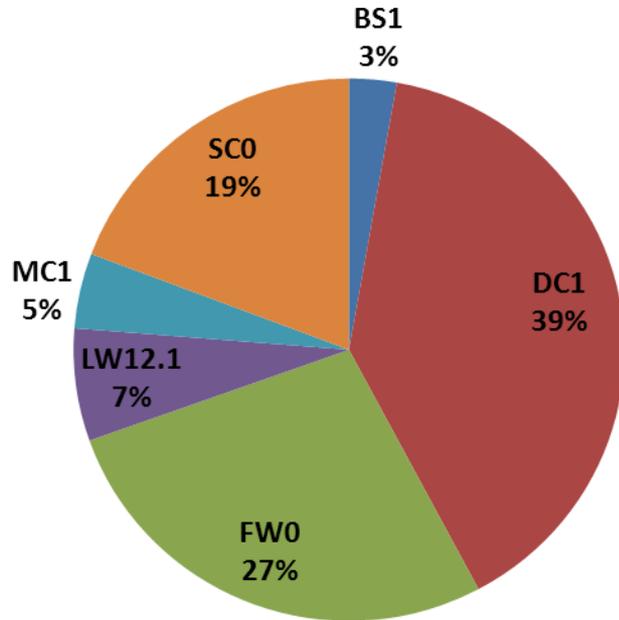
Total yearly Se loading from the Wash to Lake Mead = 1688 lbs/yr



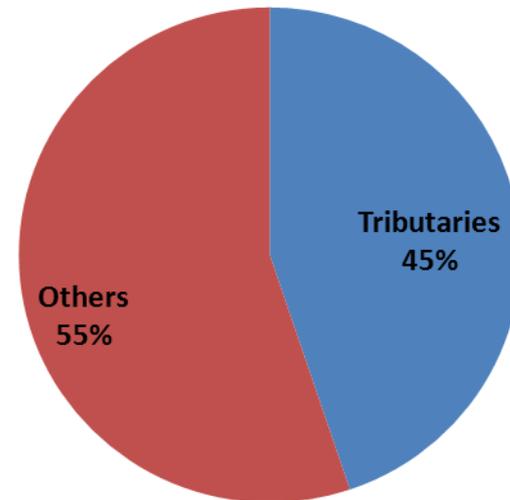
Relative Percentage of Yearly Se Mass Loading

(Based on 2011 Data)

Total yearly Se loading from Six tributaries to the Wash = 635 lbs/yr



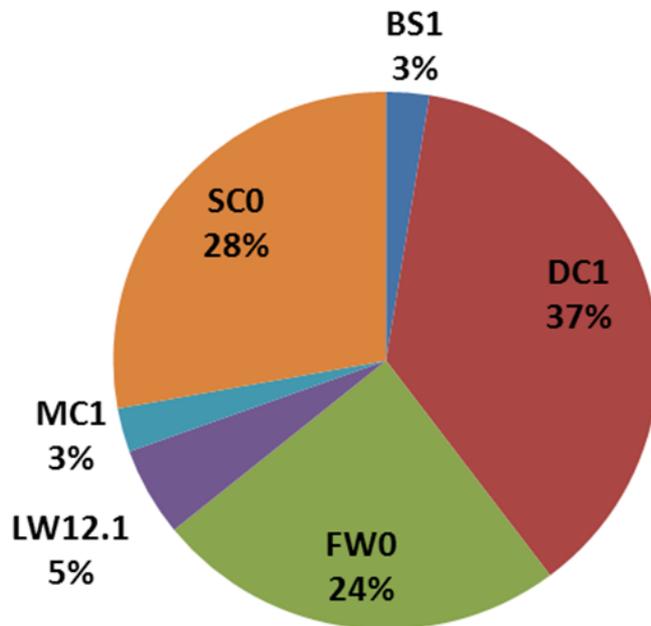
Total yearly Se loading from the Wash to Lake Mead = 1416 lbs/yr (based on 2011 data)



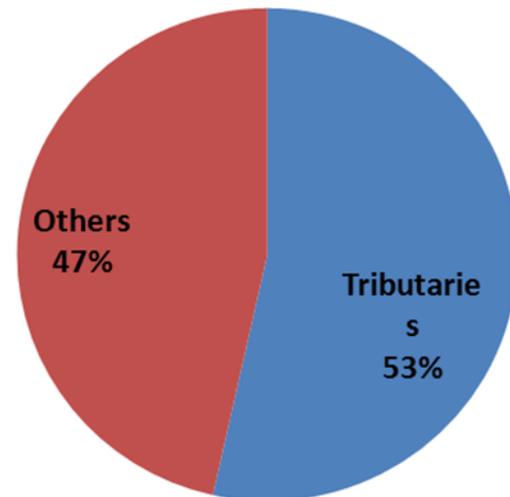
Relative Percentage of Yearly Se Mass Loading

(Based on 2012 Data)

Total yearly Se loading from Six tributaries to the Wash = 782 lbs/yr



Total yearly Se loading from the Wash to Lake Mead = 1463 lbs/yr (based on 2012 data)



Relative Percentage of Yearly Se Mass Loading

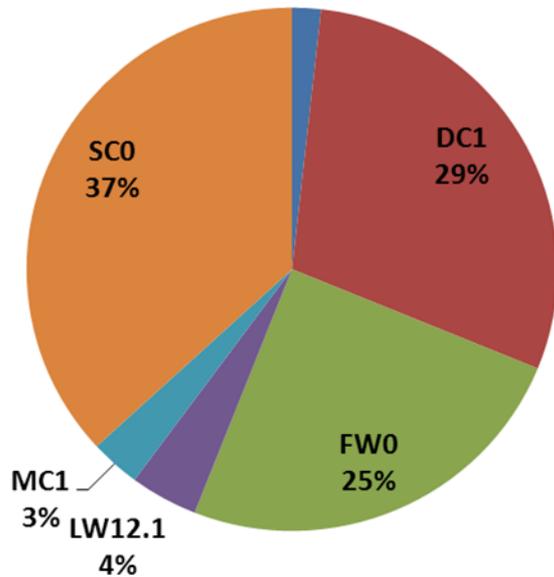
(Based on 2013 Data)

Total yearly Se loading from Six tributaries to the

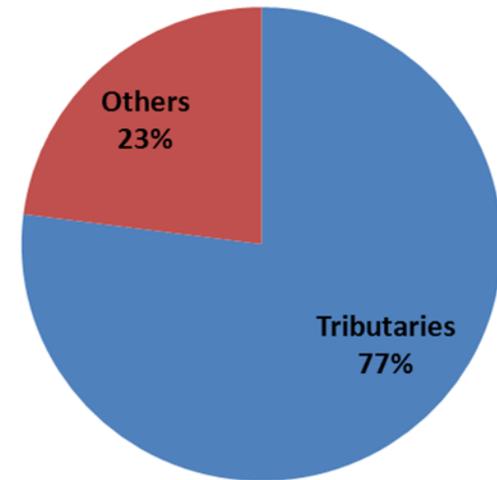
Wash = 1183 lbs/yr

BS1

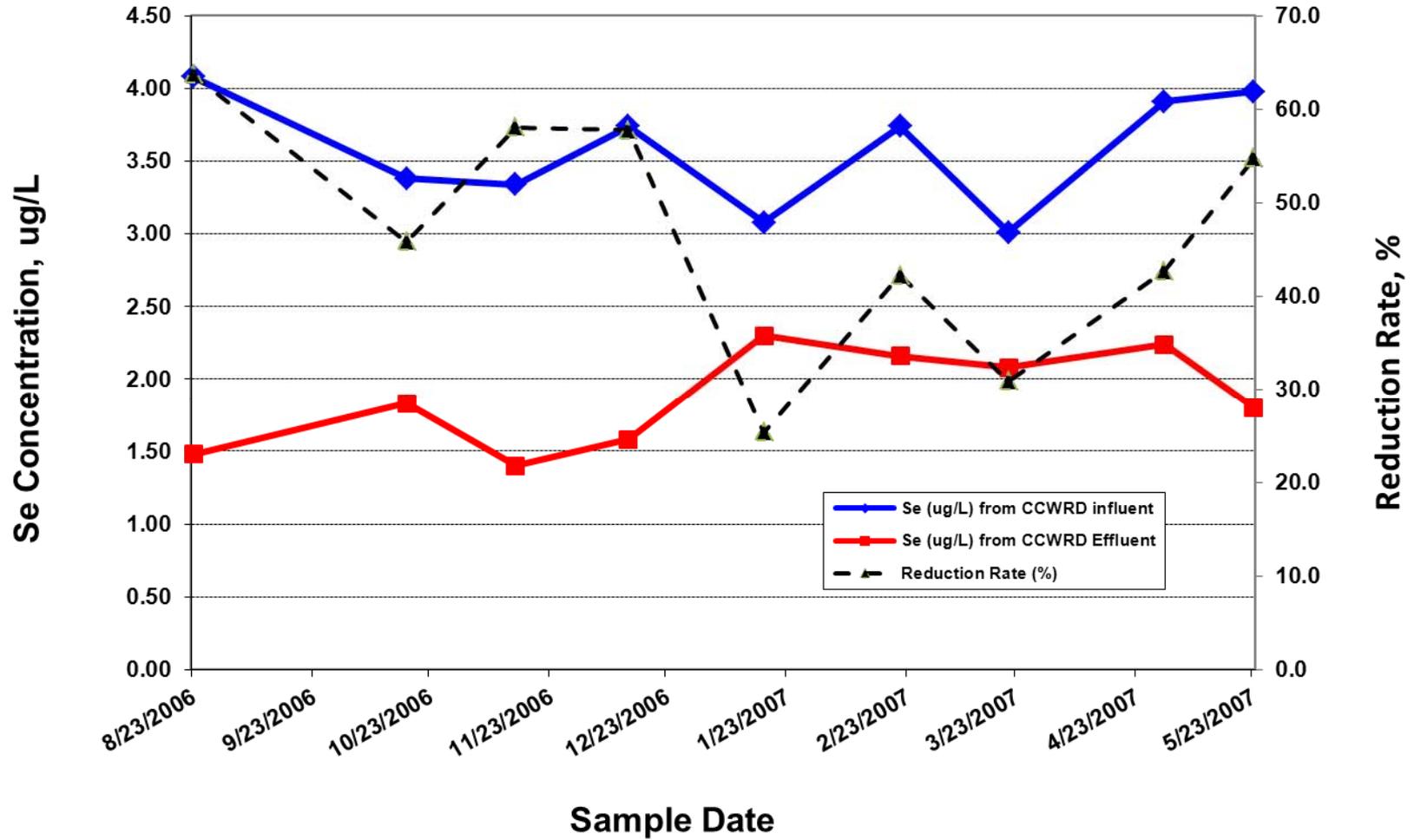
2%



Total yearly Se loading from the Wash to
Lake Mead = 1536 lbs/yr (based on 2013
data)



Se concentration ($\mu\text{g/L}$) in influent and effluent of CCWRD



Summary

- **Se in the mainstream Wash: $< 4 \mu\text{g/L}$**
- **Se from most tributaries: $> 5 \mu\text{g/L}$**
- **Hot spot: DC (WD) ($34 - 62 \mu\text{g/L}$)**
- **Se Mass Loading Calculations:**
 - From Wash to Lake Mead: 1400 ~ 1700 lbs/yr
 - Tributaries / Wash: 36 ~ 77%
 - Duck Creek / Tributaries: 29 ~ 49%



Questions?

