



Summary and Interpretation of Mercury Data from the Willamette River Basin

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INTRODUCTION

❖ Problem

- Elevated fish tissue Hg levels \Rightarrow basin-wide fish advisory
- Fish advisory \Rightarrow TMDL process
- TMDL process \Rightarrow better understand Hg in the Basin

❖ Questions

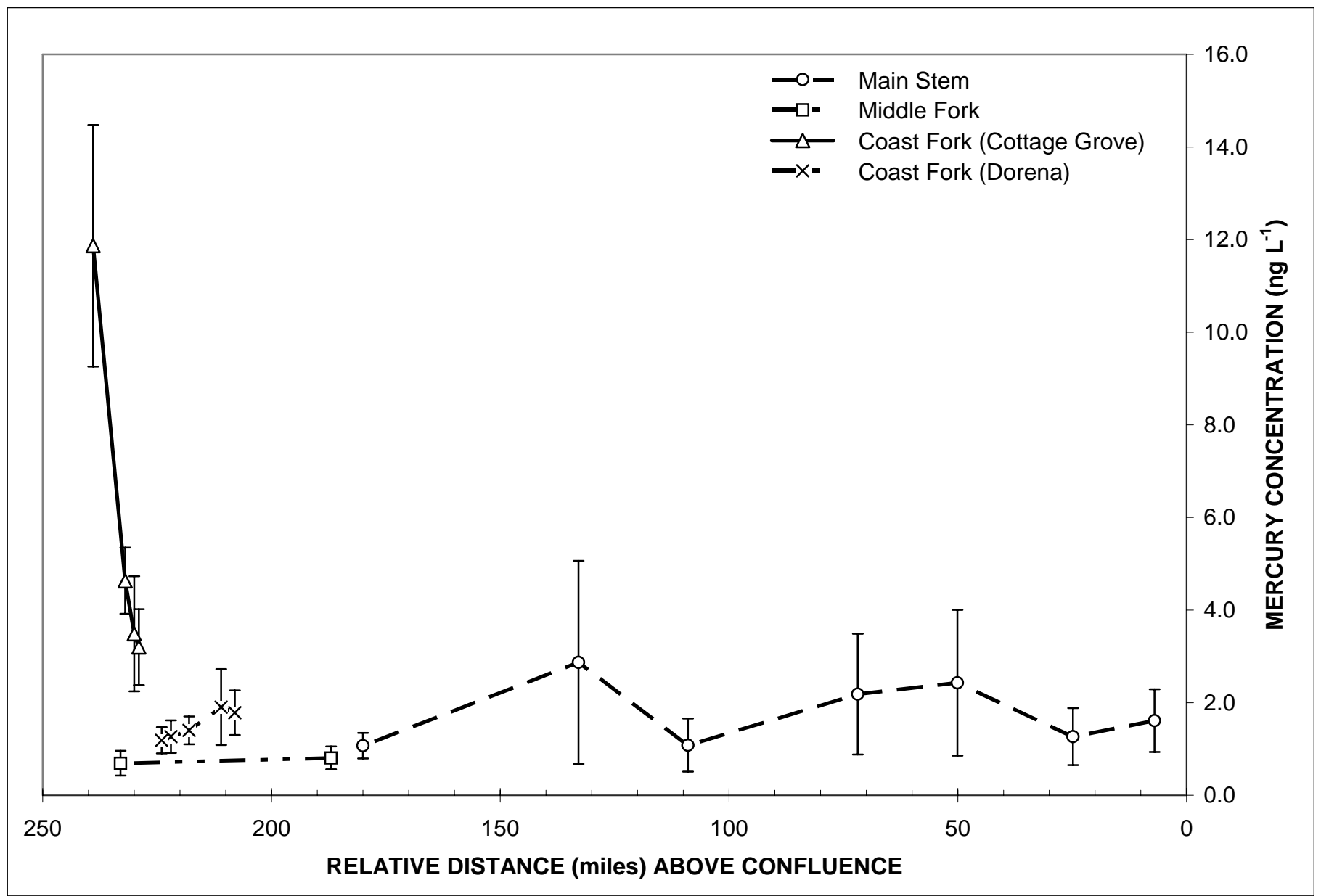
- What are the relationships between mercury in fish tissue and in the water column?
- What are the relationships between THg and MeHg in water and sediment?
- What are the sources for, and amounts of, mercury entering and leaving the Basin?



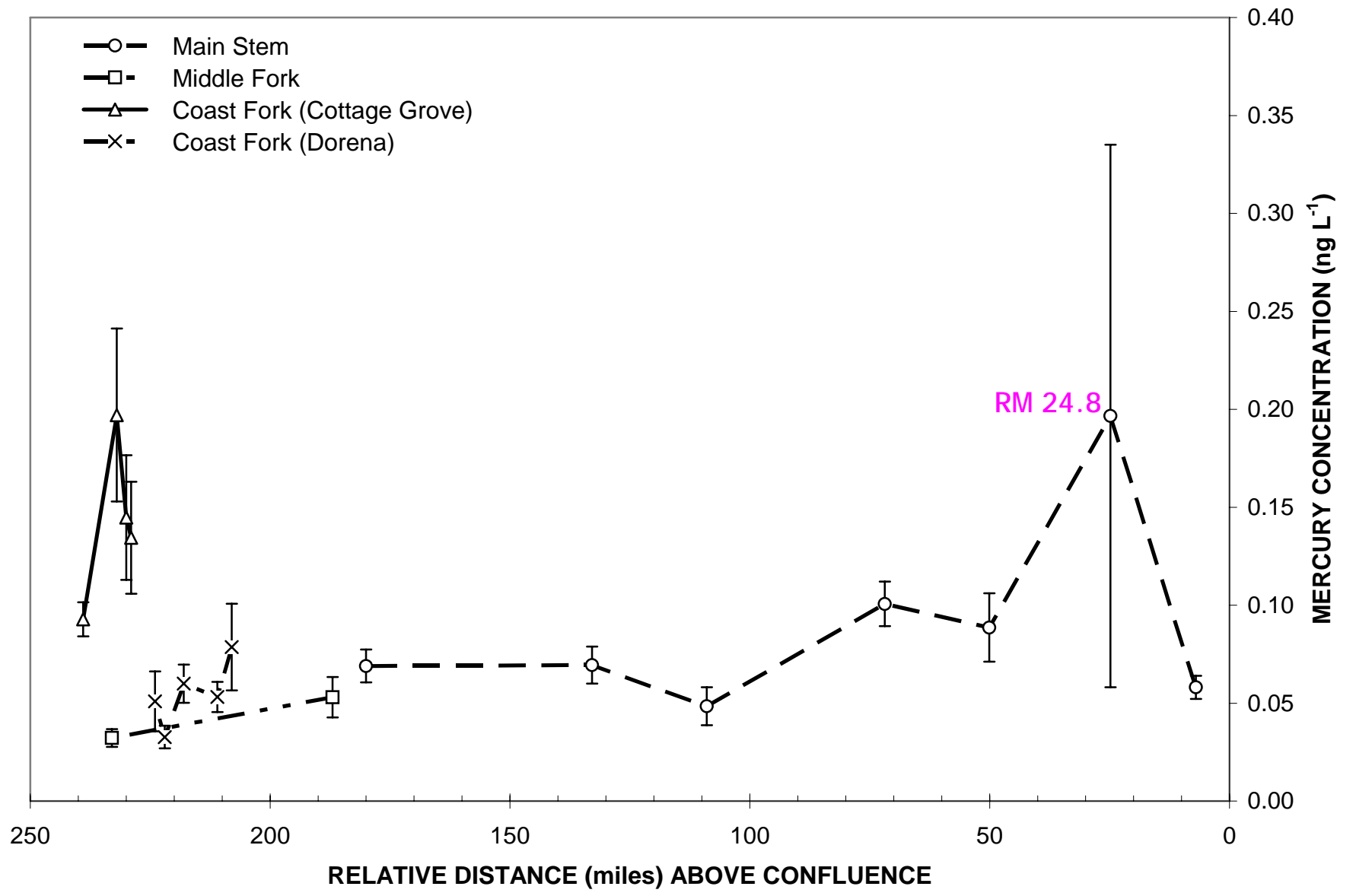
RESULTS - Surface Water

- ❖ **Spatial – THg & MeHg highest in Coast Fork (Cottage Grove), lowest in Middle Fork**
 - Mine discharges impact Coast Fork
 - But retention behind dams
- ❖ **Average annual levels**
 - THg: 0.5 – 1.0 ng L⁻¹
 - MeHg: 0.04 – 0.06 ng L⁻¹
 - MeHg levels may be explained by % wetlands in Basin
- ❖ **Temporal - THg highest levels in winter, lowest in summer; MeHg opposite**

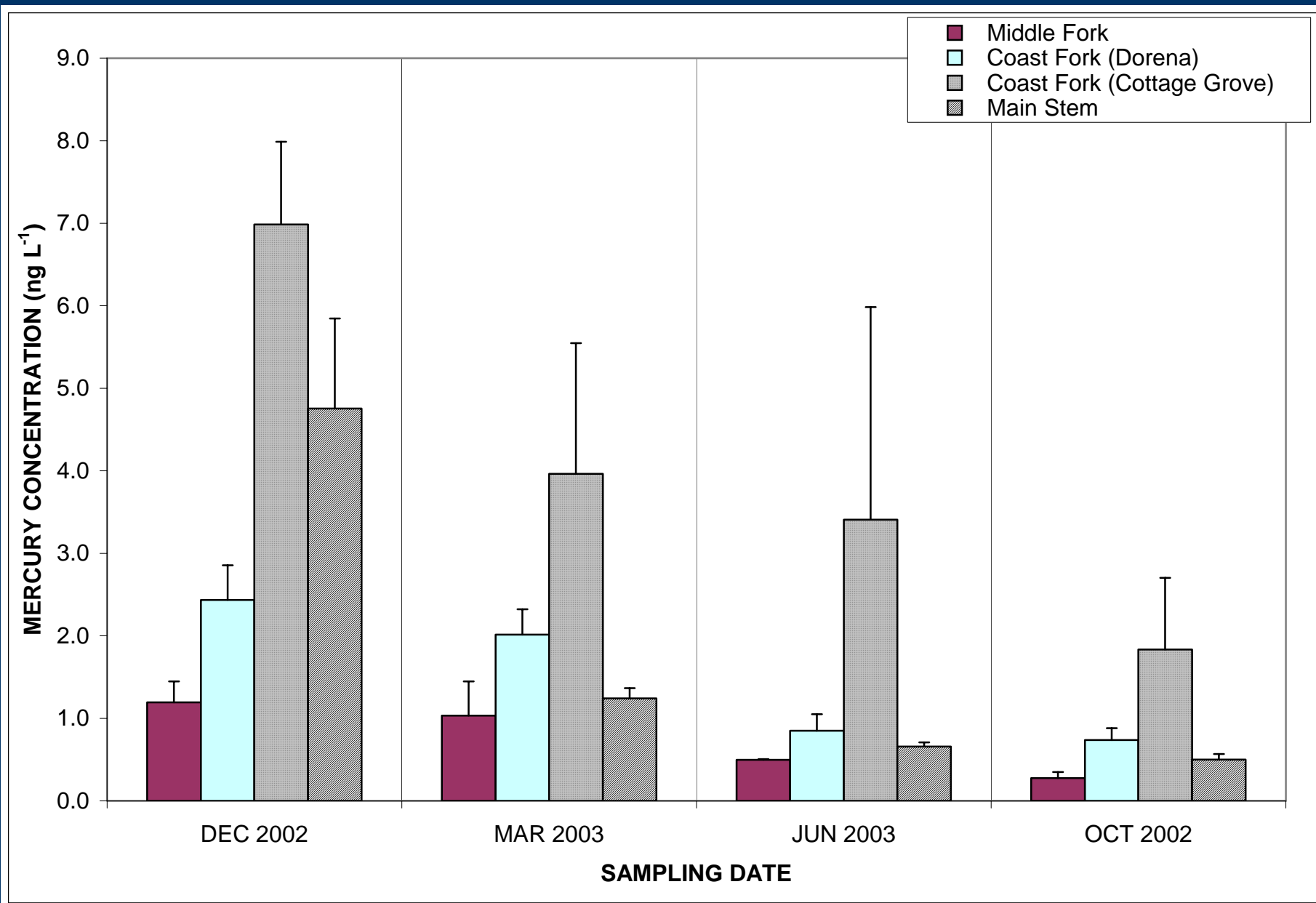
SPATIAL DISTRIBUTION OF TOTAL Hg IN WATER



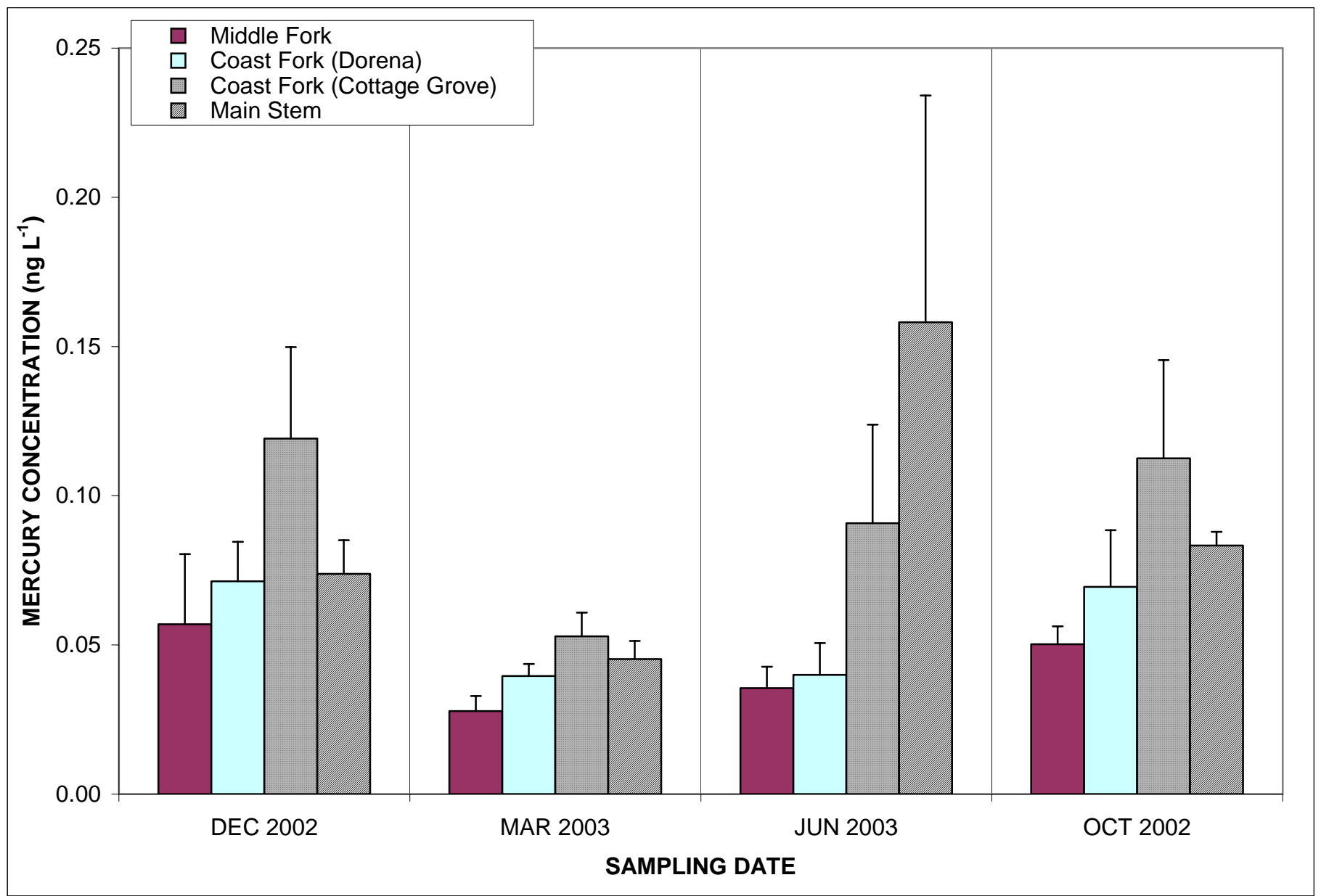
SPATIAL DISTRIBUTION OF TOTAL MeHg IN WATER



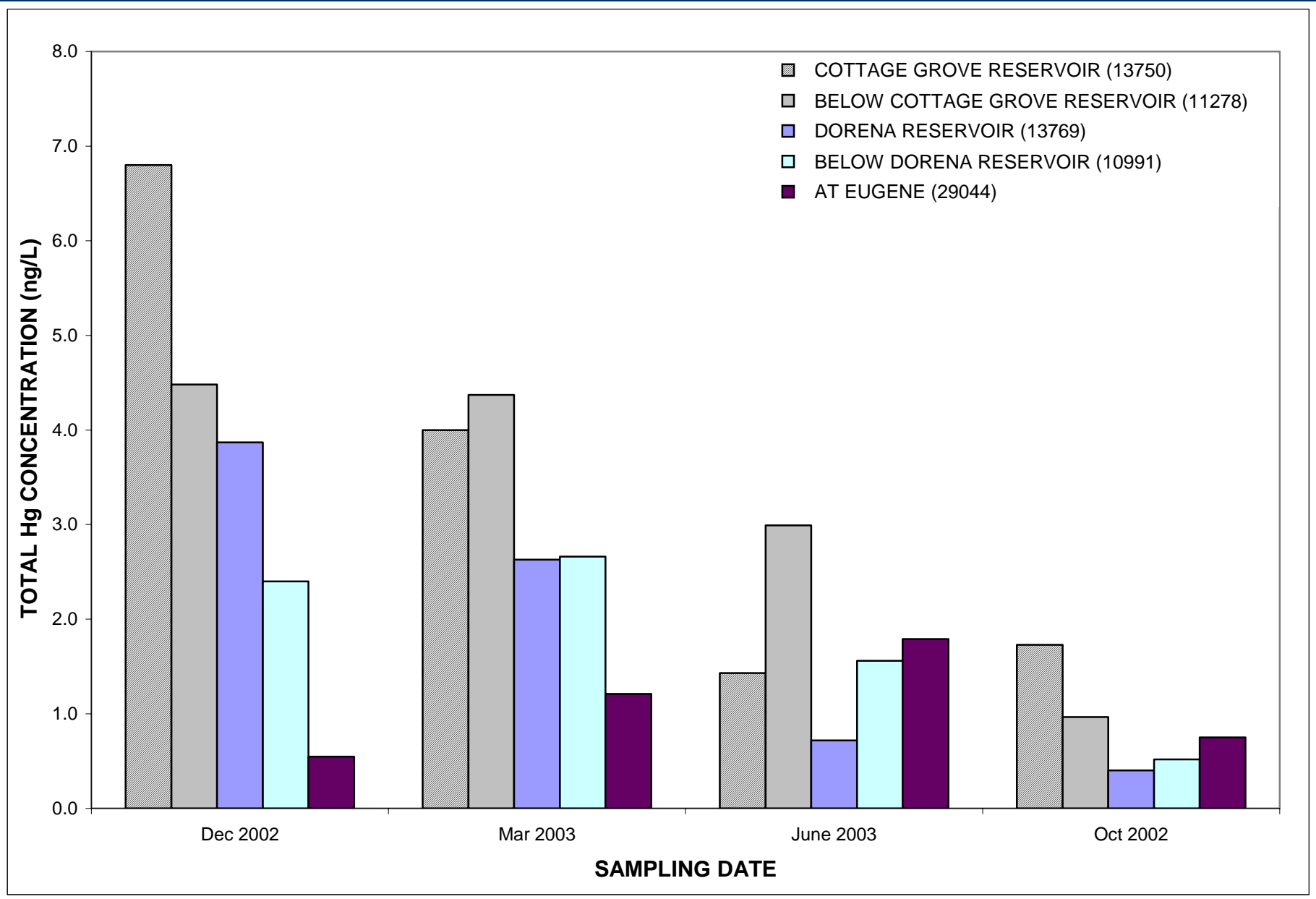
TEMPORAL DISTRIBUTION OF TOTAL Hg IN WATER



TEMPORAL DISTRIBUTION OF TOTAL MeHg IN WATER



Hg RETENTION BEHIND DAMS

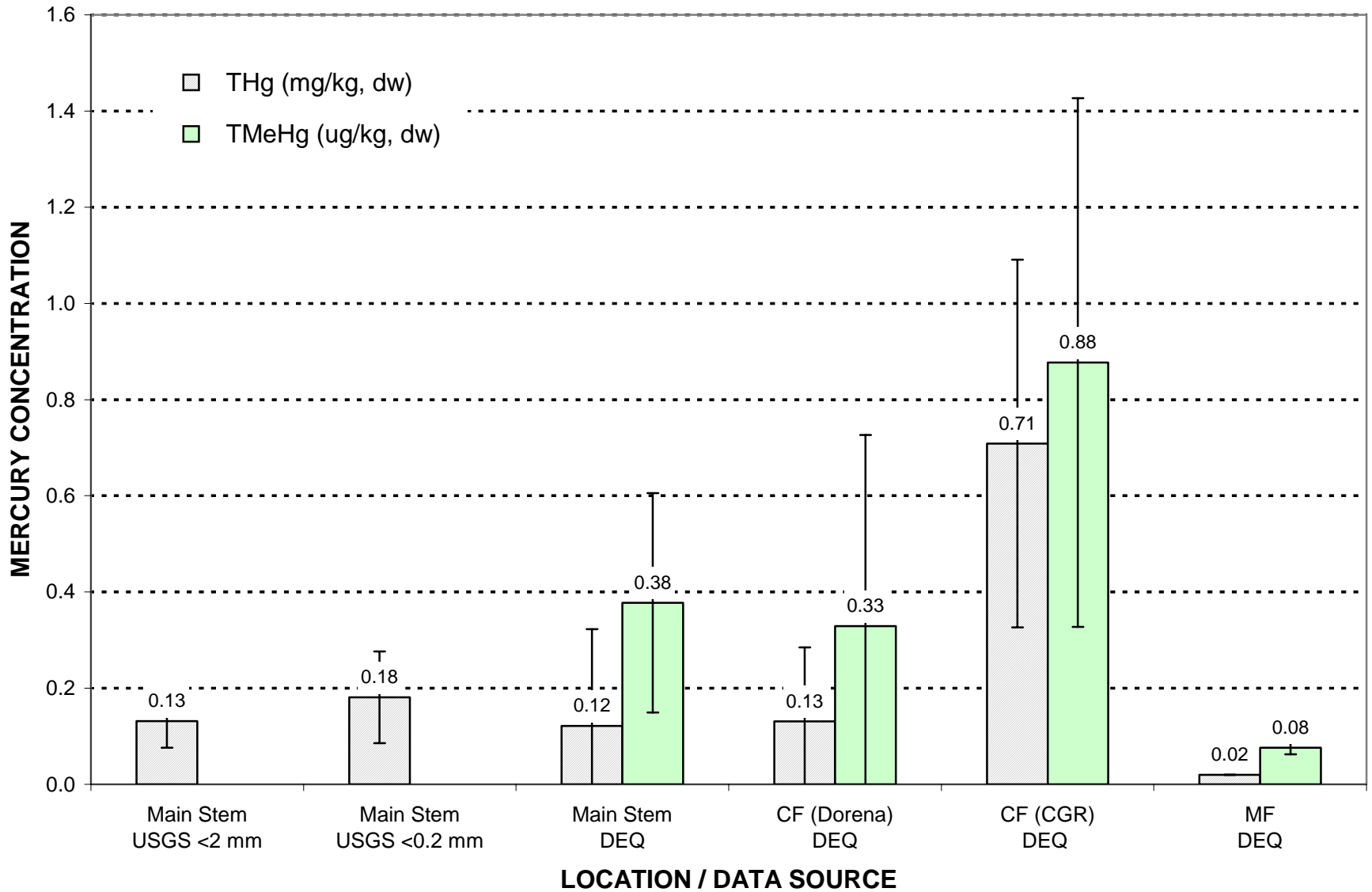




RESULTS - Sediment

- ❖ **Sediment levels near background in Main Stem**
 - No clear evidence of point sources to sediment in Main Stem
- ❖ **Elevated in Coast Fork (Cottage Grove)**
 - Evidence of loading to reservoirs from mine runoff
 - MeHg production in CG reservoir is evident
- ❖ **Weak relationships between Hg in sediment and Hg in surface waters**
 - MeHg in water is better predictor of MeHg in fish (USGS)

MERCURY CONCENTRATIONS IN SEDIMENT

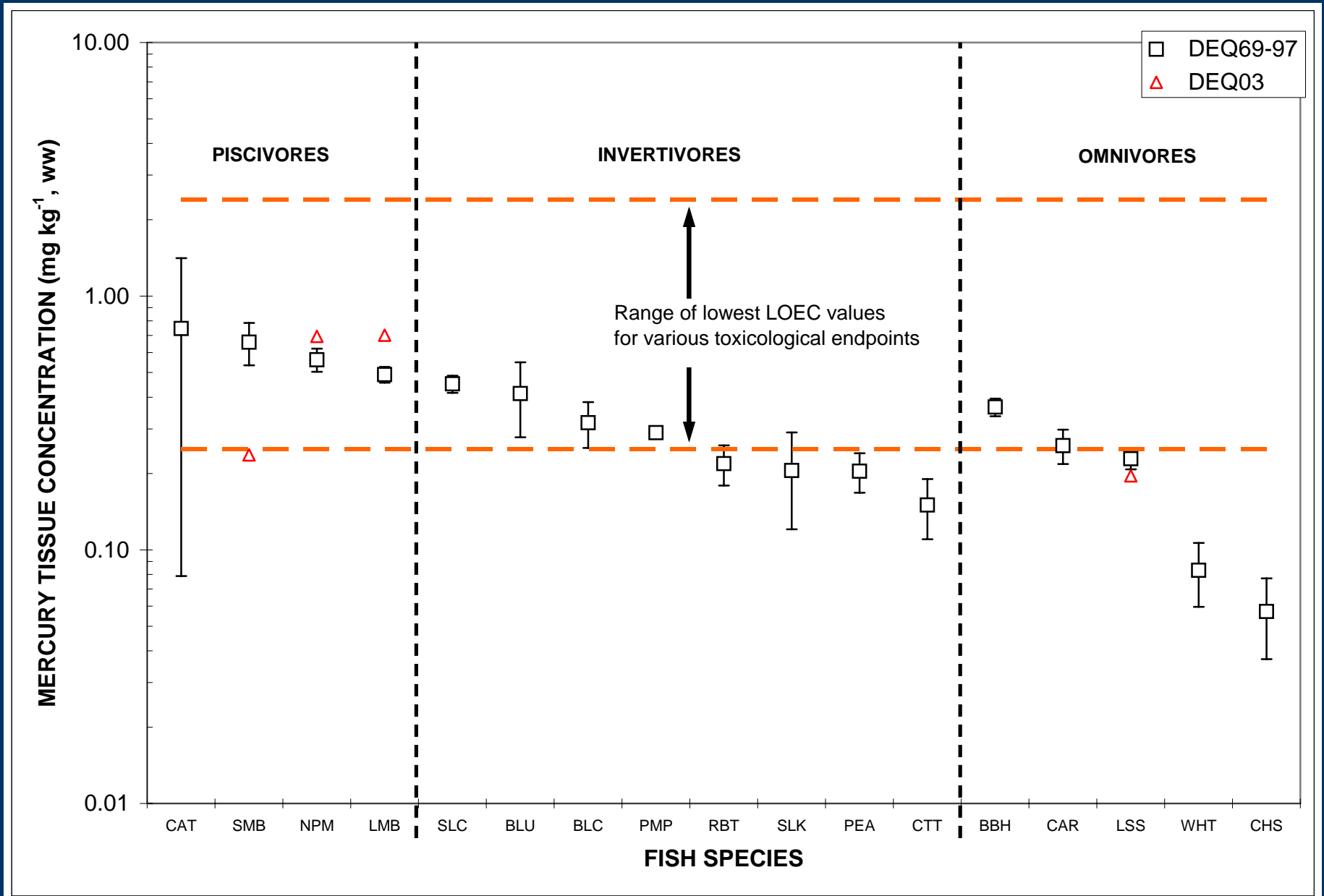




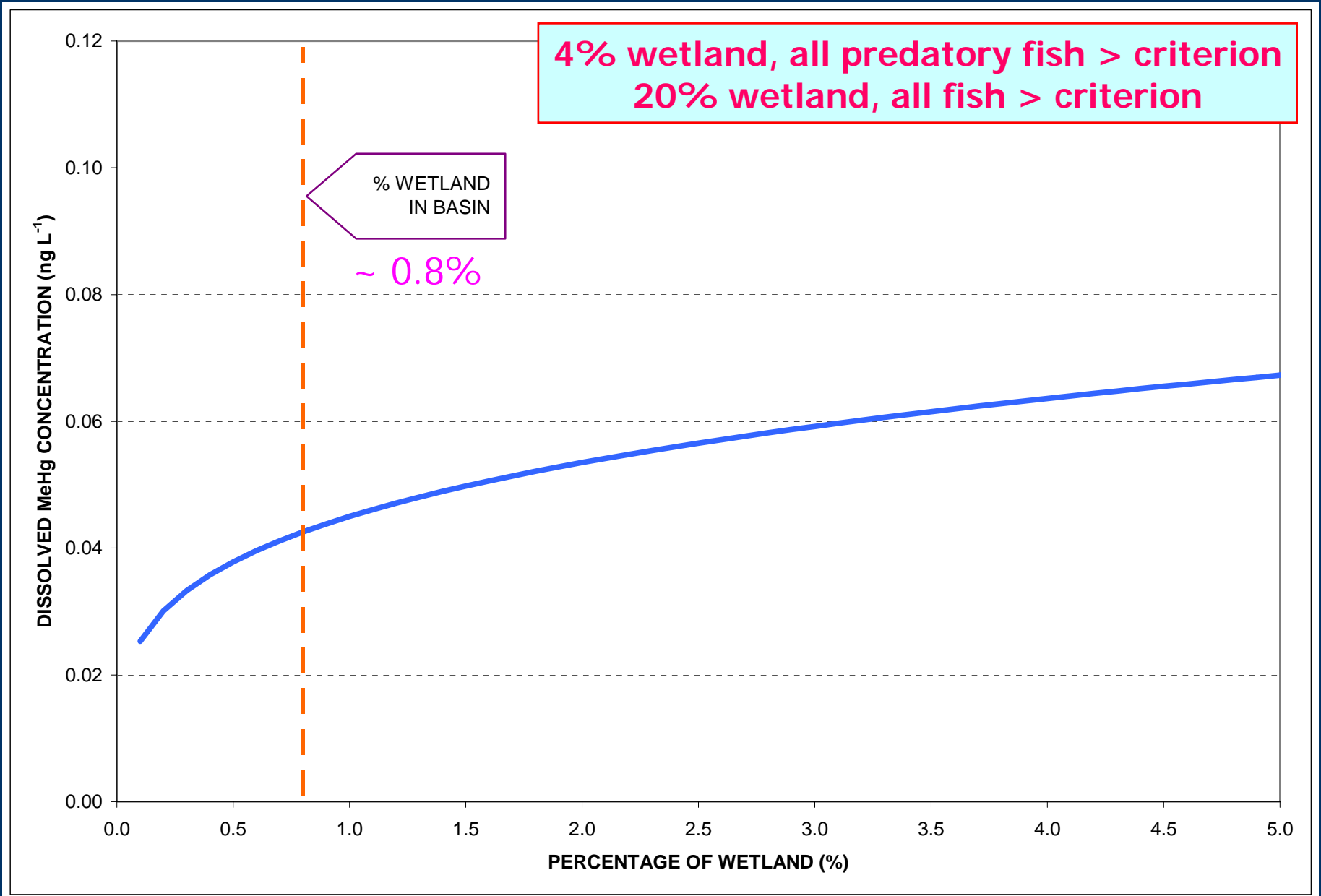
RESULTS – Fish Tissue

- ❖ MeHg highest in piscivores, lowest in invertivores
- ❖ No single reliable water quality predictor of MeHg levels in fish
- ❖ Natural MeHg levels ($\approx 0.04 \text{ ng L}^{-1}$) can account for observed mean fish tissue levels
 - A few fish hot spots over the years
 - These levels may be explained by % of wetlands in Basin

MERCURY CONCENTRATIONS IN FISH TISSUE



WETLAND AREA ~ MeHg RELATIONSHIP





RESULTS - Translator

- ❖ **“Translator” empirically links THg and DMeHg**
 - Not a statistical relationship
- ❖ **Agreement with EPA DMeHg / THg translator**
 - Median value derived from yearly Basin-specific data matches U.S. EPA national value for lakes & reservoirs
 - 50% of the time, 5% of THg is DMeHg
 - Seasonal median range: 3% - 12%
- ❖ **The Willamette as a slow moving lake...**

DMeHg / THg RELATIONSHIPS

