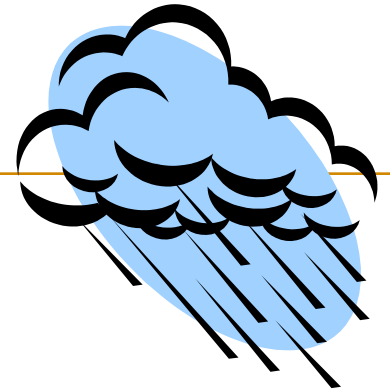


# SALT LAKE COUNTY

## What's In Our Stormwater?



# SUMMARY



- Permit and sampling program
- Sampling summary
- Sample analyses
  - Landuse
  - Population
  - Event Mean Concentration
  - Trends
  - Receiving waters
  - Municipal comparison
- Additional sampling
- Future sampling?

# Salt Lake County's UPDES Stormwater Discharge Permit

- Issued by DWQ in 1995
- Requires representative storm sampling
- Sampling initiated in 1992; have collected ~5,000 data points
- Requires submittal of report summarizing stormwater quality data
- Stormwater quality data technical reports submitted to DWQ in 2000, 2005 & 2008



Decker Lake sample site

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Decker Lake sample site



# REPRESENTATIVE STORM SAMPLING

- Six sample stations including one UDOT station
- Sampling conducted during representative storm (>0.2 inches of rain) during the spring & fall
- Grab samples collected before and during storm
- Samples collected through-out storm for flow-weighted composites

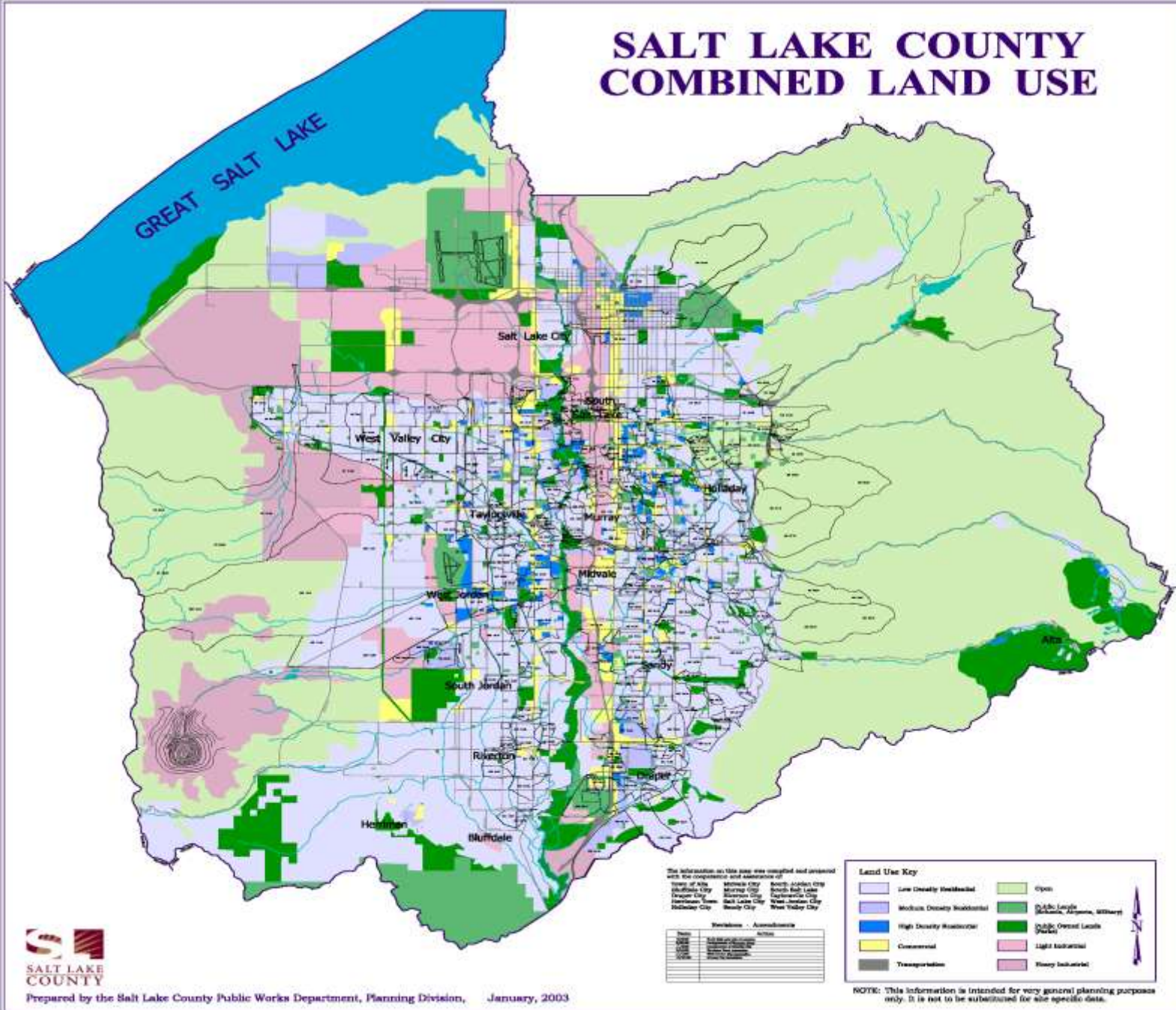


# SAMPLE STATIONS REPRESENTING LANDUSES

- Decker Lake - Commercial
- Decker Lake - Industrial
- Jordan River – Representative Mix
- Jordan River - Transportation
- Little Cottonwood - Residential
- Mill Creek - Residential



# SALT LAKE COUNTY COMBINED LAND USE



The information on this map was compiled and prepared with the cooperation and assistance of:  
 Mayor of Salt Lake City  
 Mayor of West Valley City  
 Mayor of Taylorsville  
 Mayor of Murray  
 Mayor of Midvale  
 Mayor of West Jordan  
 Mayor of South Jordan  
 Mayor of Sandy  
 Mayor of Riverton  
 Mayor of Ogden  
 Mayor of Heber  
 Mayor of Bluffdale

Year	Authority
2003	Salt Lake County
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1905	Salt Lake County
1904	Salt Lake County
1903	Salt Lake County
1902	Salt Lake County
1901	Salt Lake County
1900	Salt Lake County

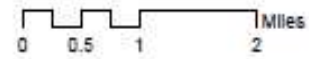
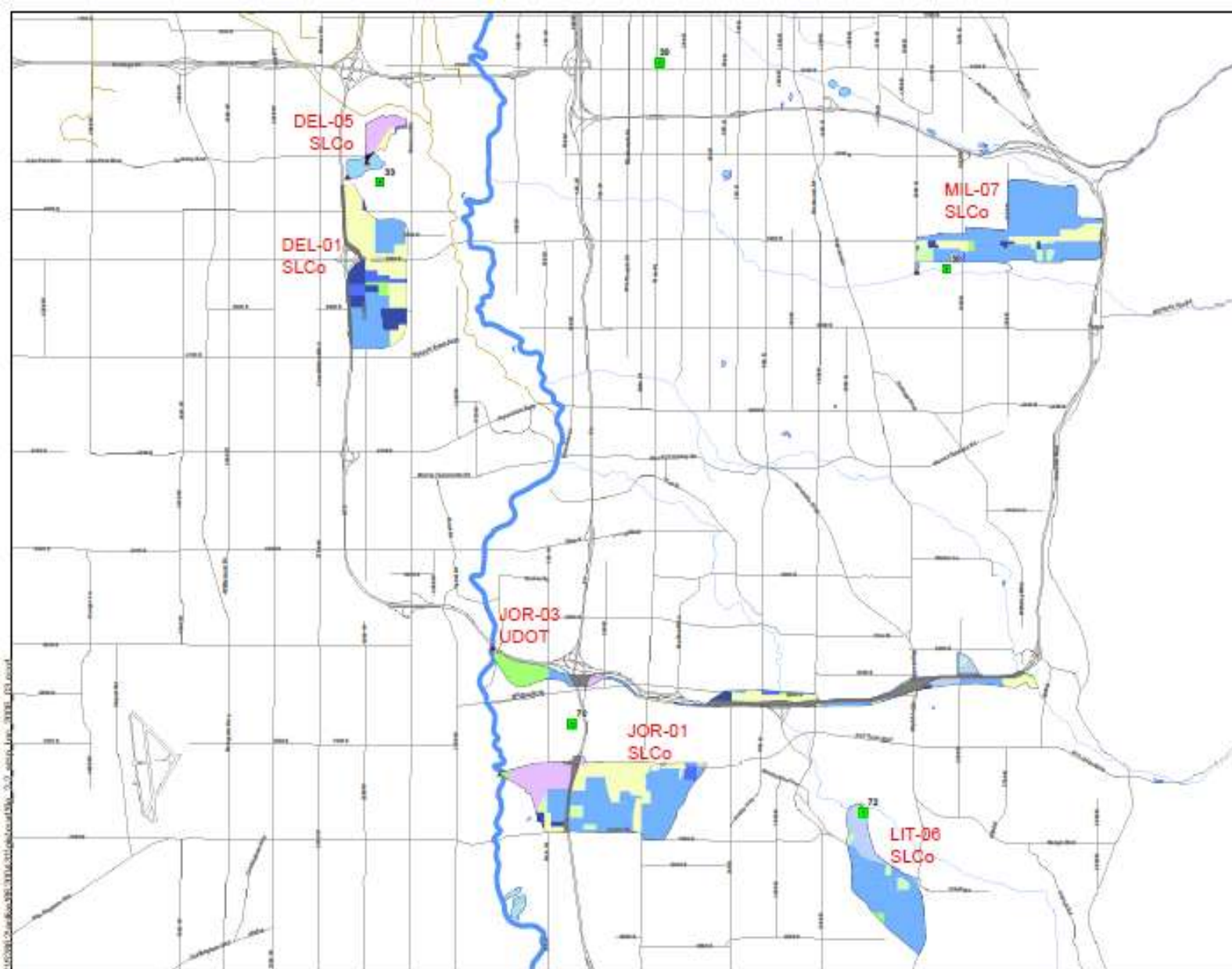
**Land Use Key**

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Transportation
- Open
- Public Lands (Baldwin, Adams, Willard)
- Public Open Lands
- Light Industrial
- Heavy Industrial

NOTE: This information is intended for very general planning purposes only. It is not to be substituted for site specific data.







**LEGEND**

- Rain Gage Locations
- RES-RURAL
- RES-LOW
- RES-MED
- RES-HIGH
- COMMERCIAL
- PUBLIC
- PARKS
- INDUSTRIAL
- UTILITY
- TRANSPORTATION



**Figure 2-3  
Sampling Location  
and Land Use Map**



# Decker Lake (DEL01)



Service Area 328 acres  
Drainage Basin 556 acres  
Commercial Landuse

# Decker Lake (DEL05)



Service Area 59.6 acres  
Drainage Basin 67 acres  
Industrial Landuse

# Jordan River (JOR01)



Service Area 225 acres  
Drainage Area 804 acres  
Representative Mix Landuse



# Jordan River (JOR03)



Service area 313 acres  
Drainage Basin 355 acres  
Transportation Landuse





# Little Cottonwood Creek (LIT06)



Service Area 309 acres  
Drainage Basin 378 acres  
Residential Landuse



# Mill Creek (MIL07)



Service Area 370 acres  
Drainage Basin 648 acres  
Residential Landuse



# SAMPLING SUMMARY

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- 35 storms sampled
- Majority of sampling conducted in May & Oct.
- Difficulty inherent with stormwater sampling
  - Storms do not meet representative criteria
  - Equipment problems
  - Laboratory holding times

# SAMPLING CONSTITUENTS

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- Total Suspended Solids
- Total Dissolved Solids
- Hardness
- Nitrate
- Nitrite
- Total Ammonia
- Total Kjeldahl Nitrogen
- Total Phosphorus
- Ortho-Phosphate
- BOD<sub>5</sub>
- COD
- pH
- Dissolved & Total Cd
- Dissolved & Total Cu
- Dissolved & Total Pb
- Dissolved & Total Zn
- Oil and Grease\*
- E. Coli\*

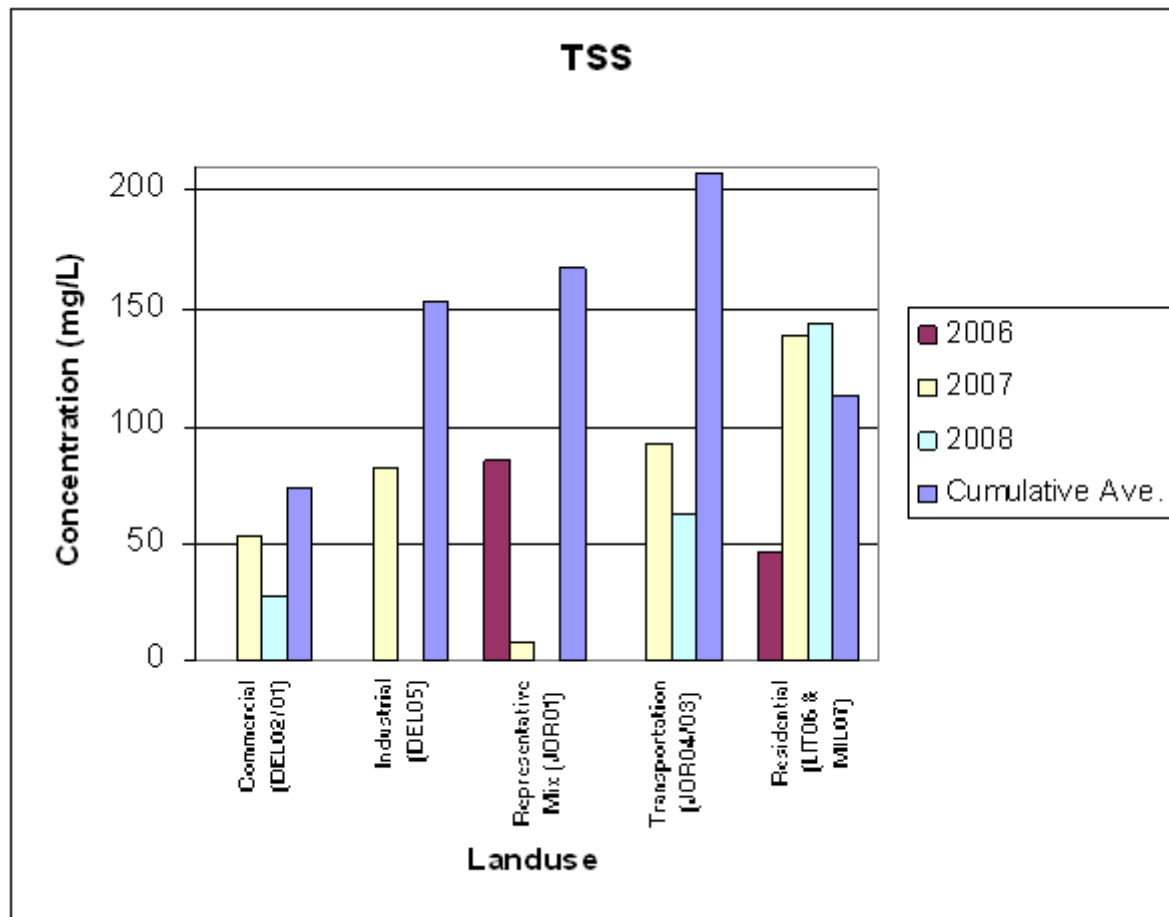
\*Only collected for base and rise samples



# ANALYSIS

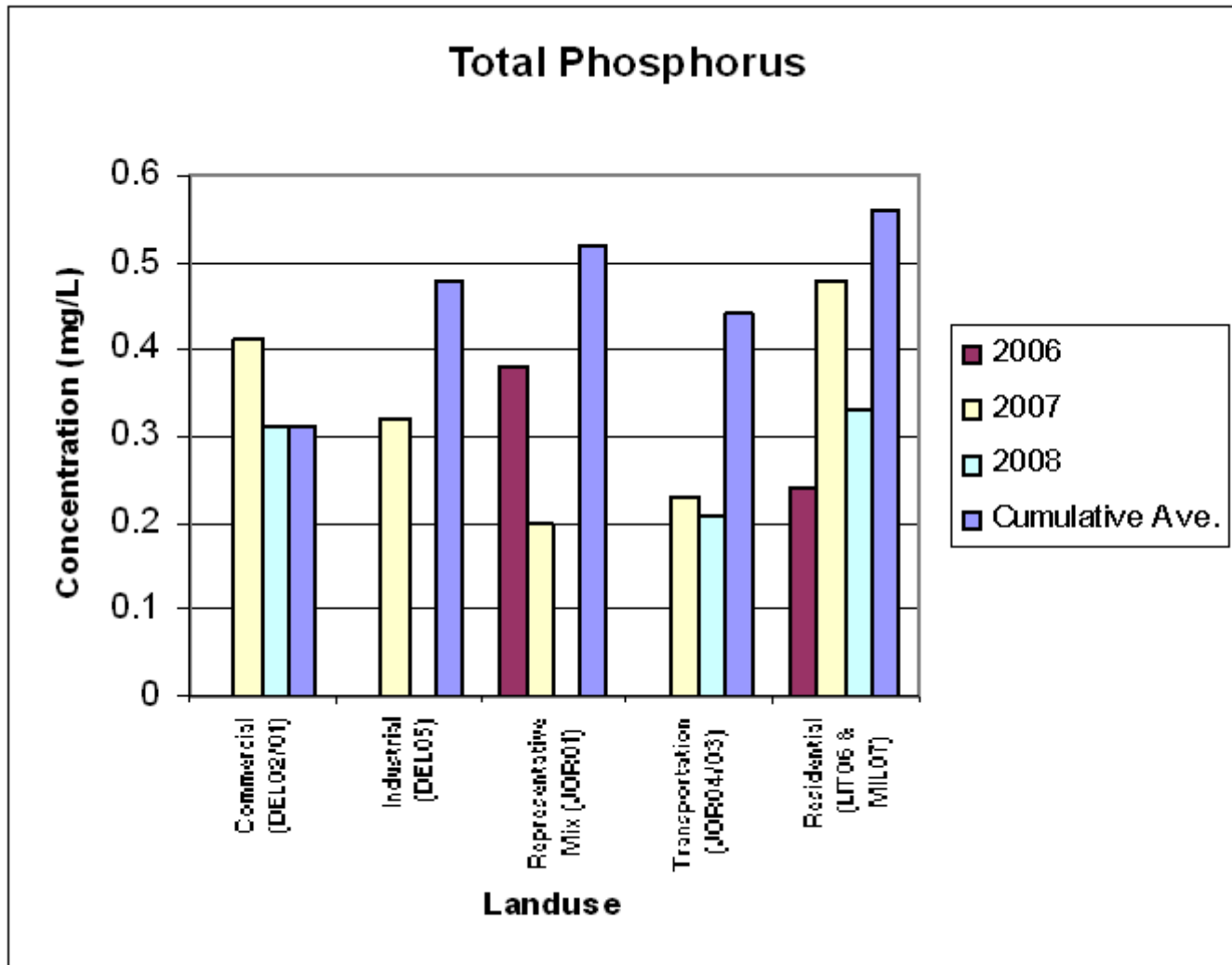
## Landuse

Average pollutant discharges from each outfall to evaluate landuse influences



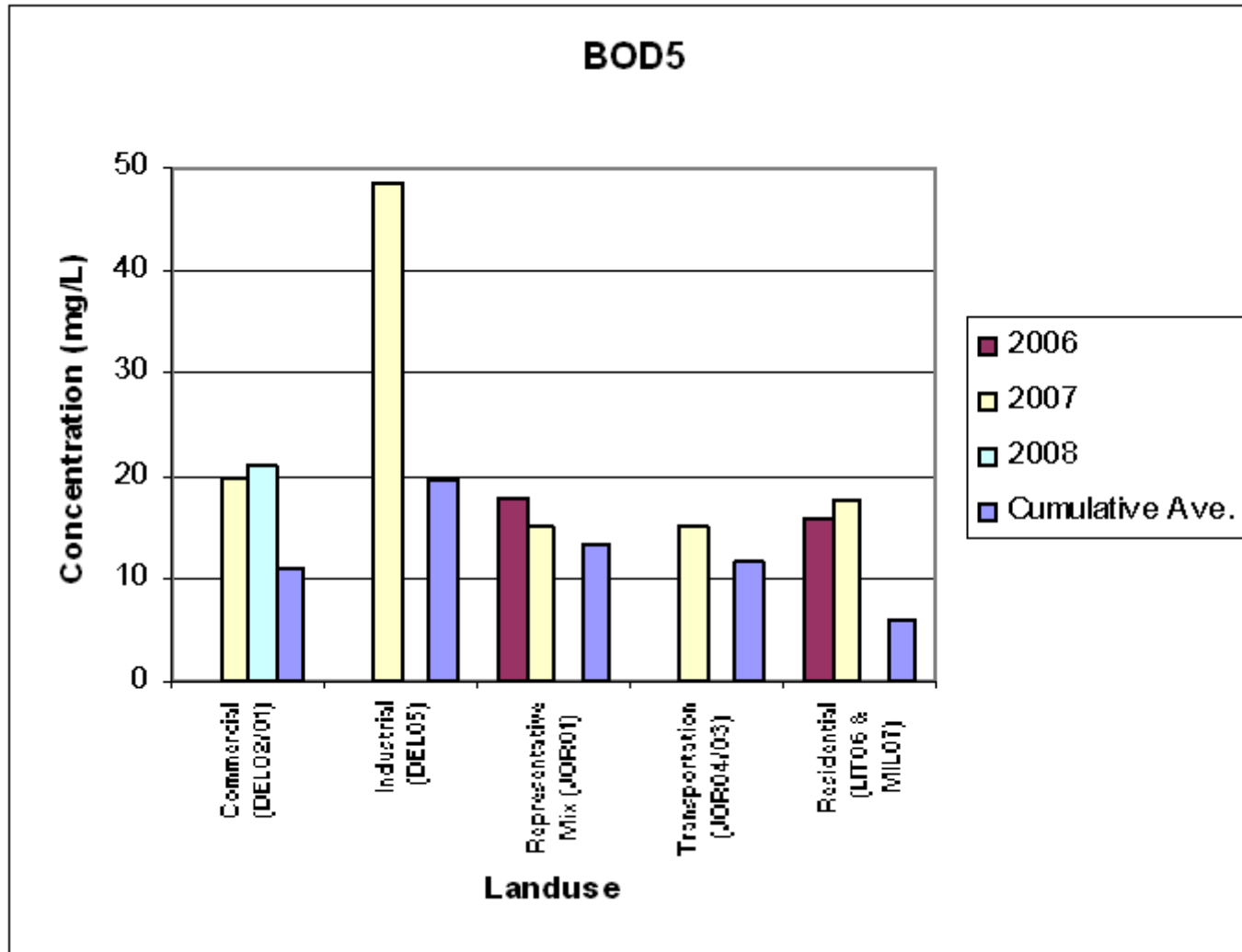
# ANALYSIS

## Landuse



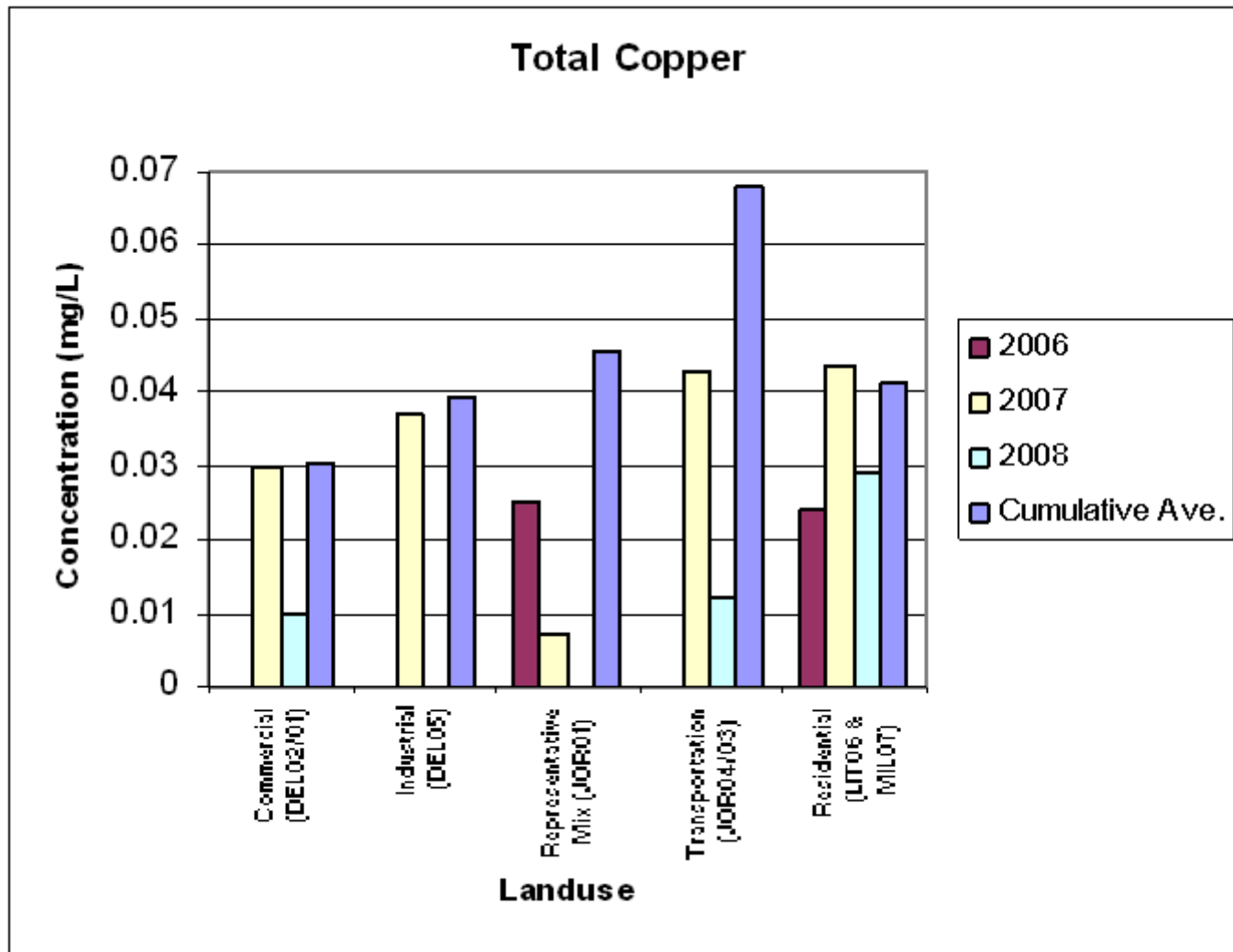
# ANALYSIS

## Landuse



# ANALYSIS

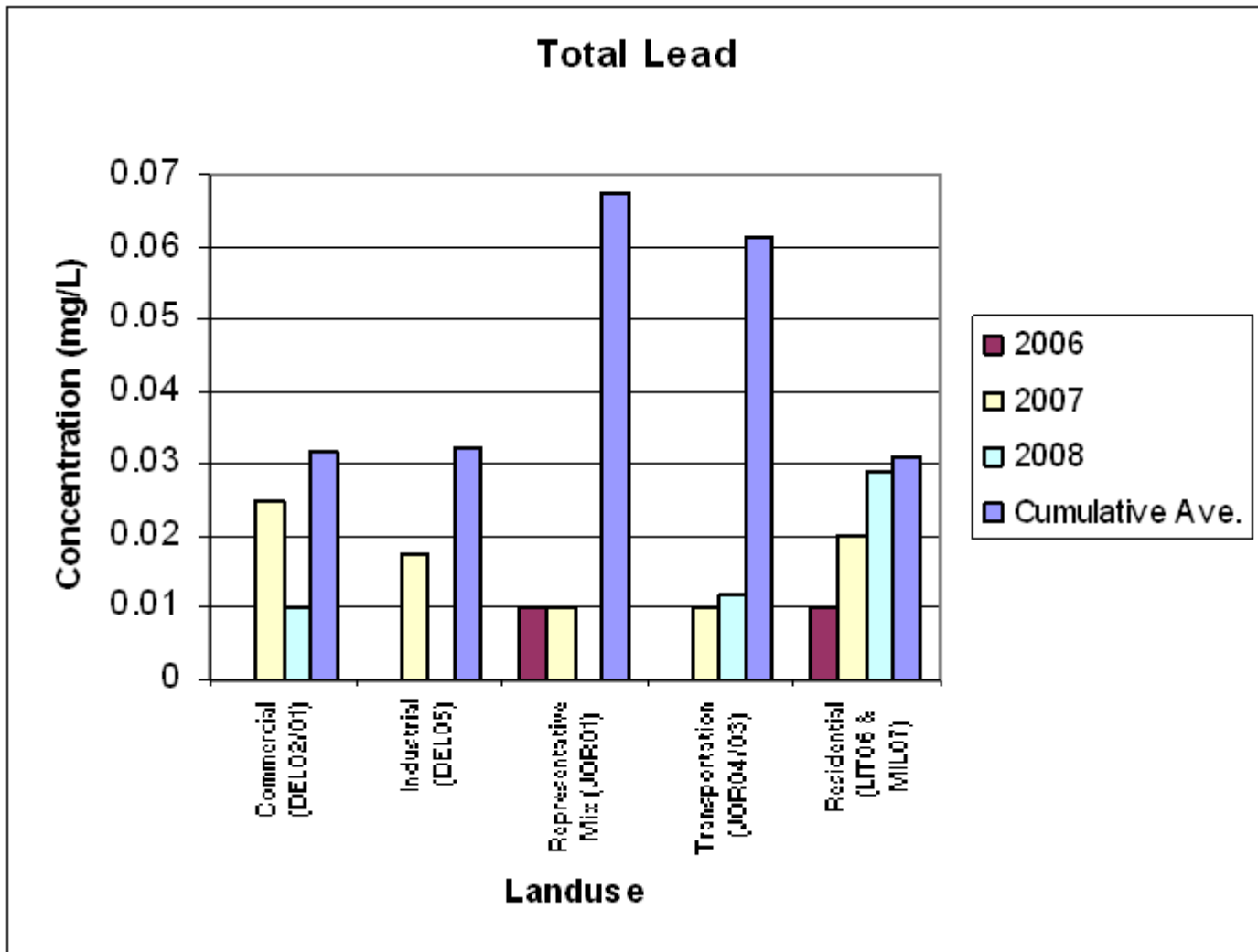
## Landuse





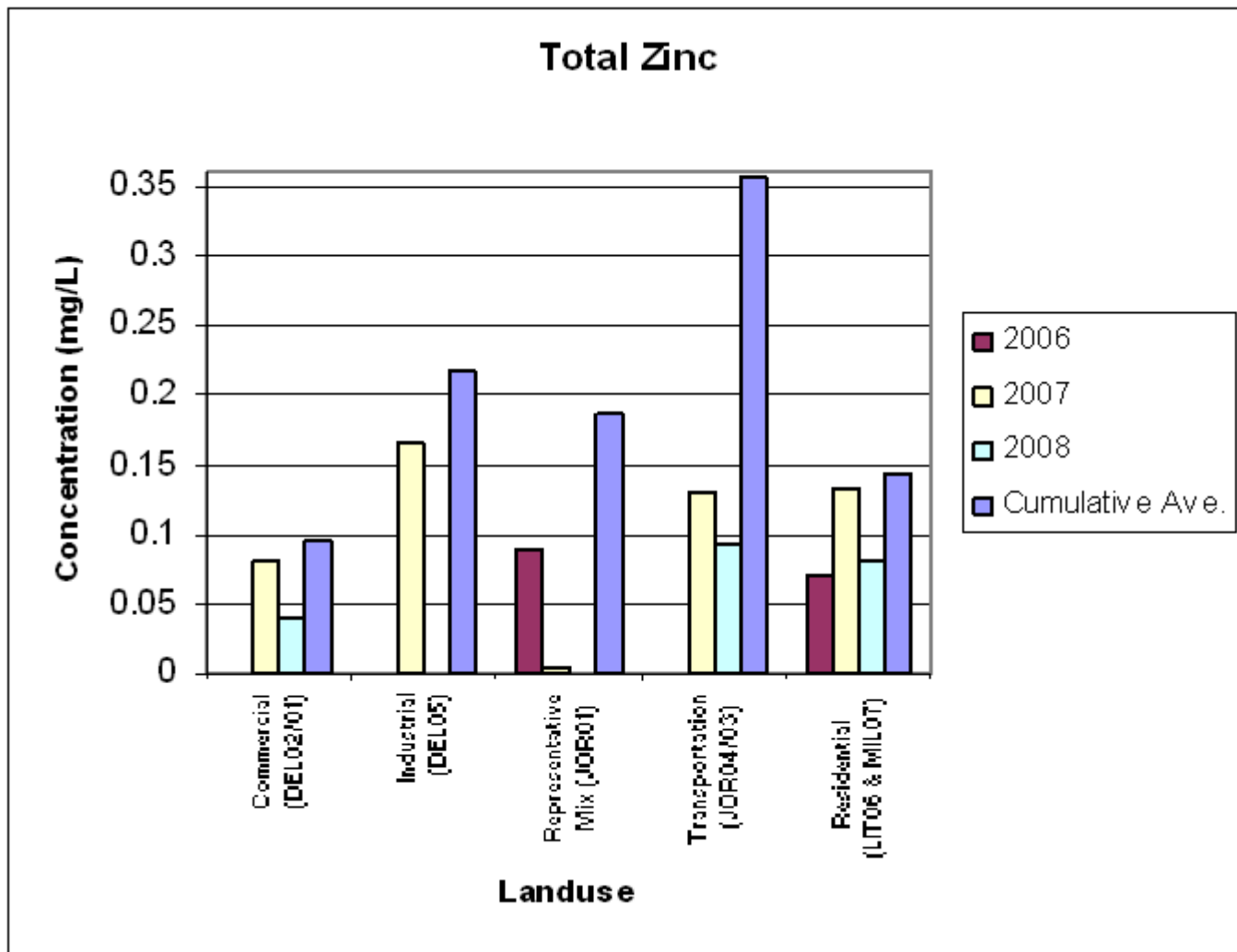
# ANALYSIS

## Landuse



# ANALYSIS

## Landuse



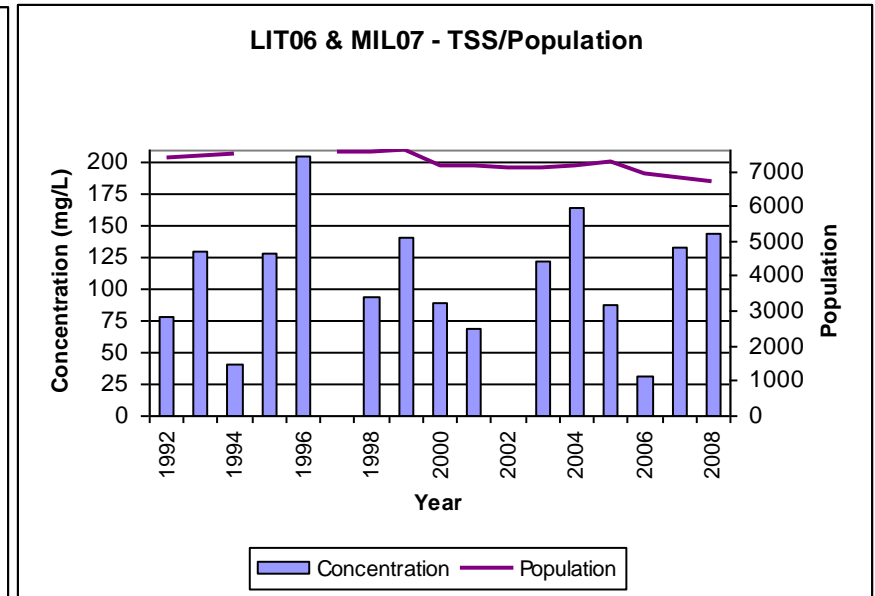
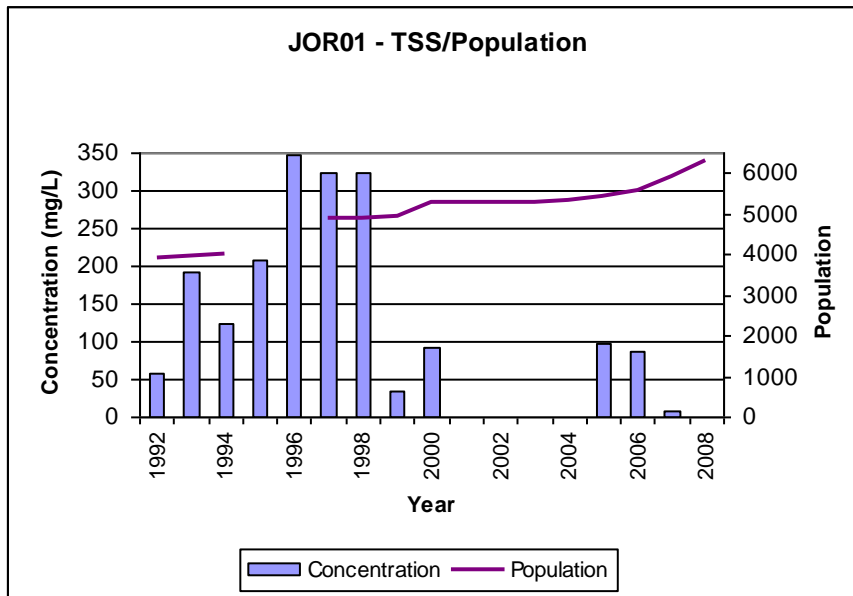
# Event Concentrations Summary

- Transportation: TSS↑ TCu↑ TZn↑
- Residential: TP↑ TPb↓
- Mixed Use: TPb↑
- Industrial: BOD<sub>5</sub>↑
- Commercial: TSS↓ TP↓ BOD<sub>5</sub>↓ TCu↓ TZn↓

# ANALYSIS

## Population

- Compared event pollutant concentration with population data (WFRC)
- Did not see anticipated correlation



# ANALYSIS

## Event Mean Concentration

Event Mean Concentration (EMC) calculated on flow-weighted composite results to obtain an estimated average pollutant concentration for the County

$$EMC = \frac{\Sigma L_x \bullet 12}{\Sigma P \bullet R_a \bullet A_s \bullet 2.72}$$

$L_x$  = load for the storm event (pounds)

$P$  = precipitation for the storm event (inches)

$R_a$  = weighted average runoff coefficient based on landuse of serviced area

$A_s$  = serviced area of basin (acres)

(12 and 2.72 are conversion factors for pounds to mg/L)



# EMC Summary

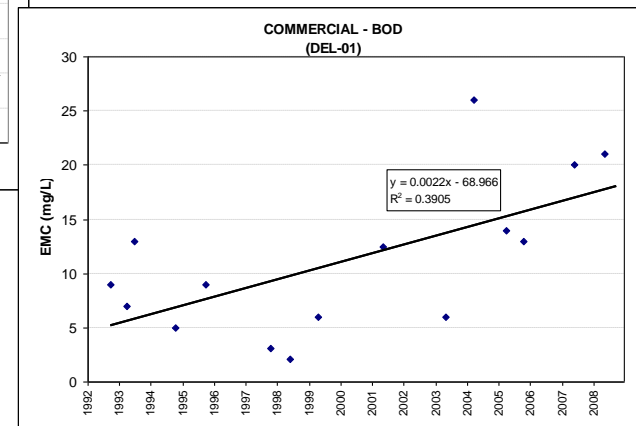
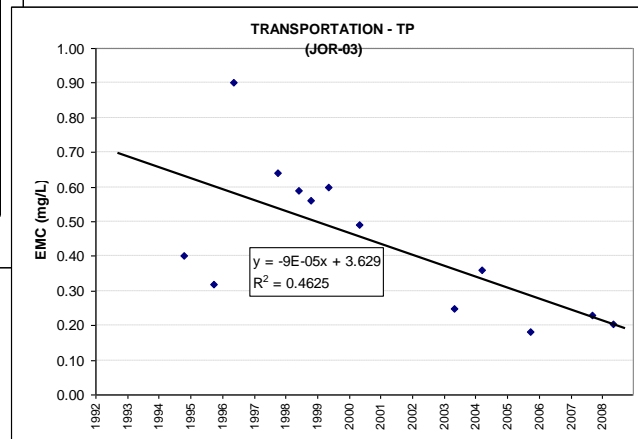
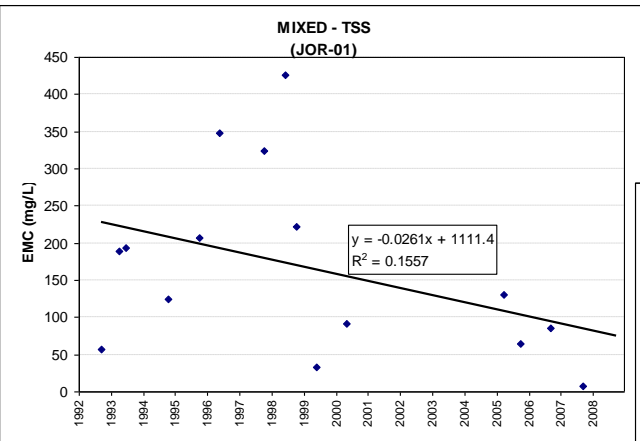
Constituent	2000 EMC (mg/L)	2005 EMC (mg/L)	2008 EMC <sup>1</sup> (mg/L)
TSS	141	106	117
TP	0.63	0.57	0.6
BOD <sub>5</sub>	13	12.1	14.4
TCu	0.031	0.036	0.041
TPb	0.037	0.033	0.037
TZn	0.198	0.136	0.148

<sup>1</sup> Methods for EMC calculations were modified for 2008

# ANALYSIS

## Outfall EMC Trends

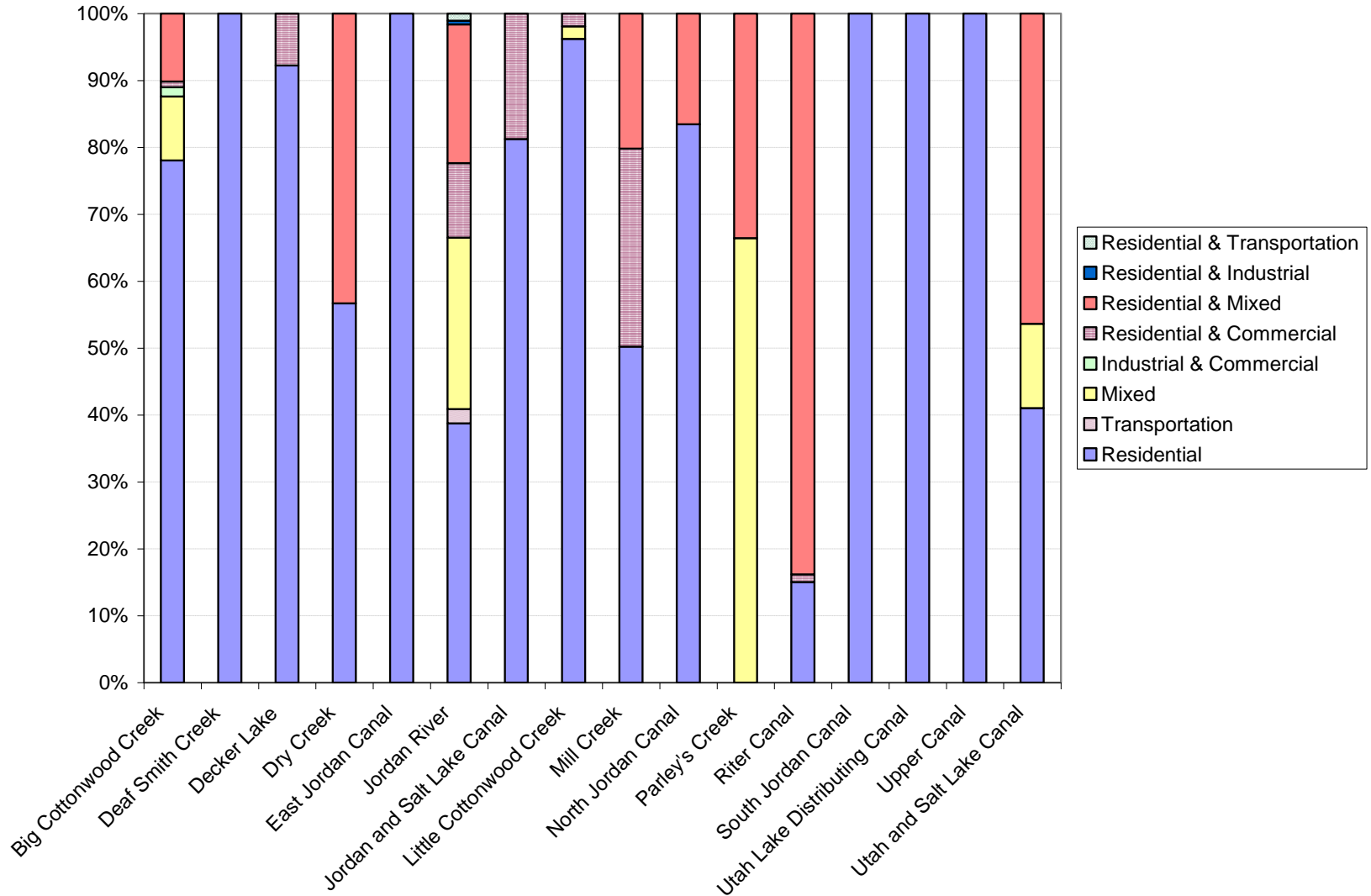
Linear regression to identify historical trends in outfall concentrations



# Outfall EMC Trends

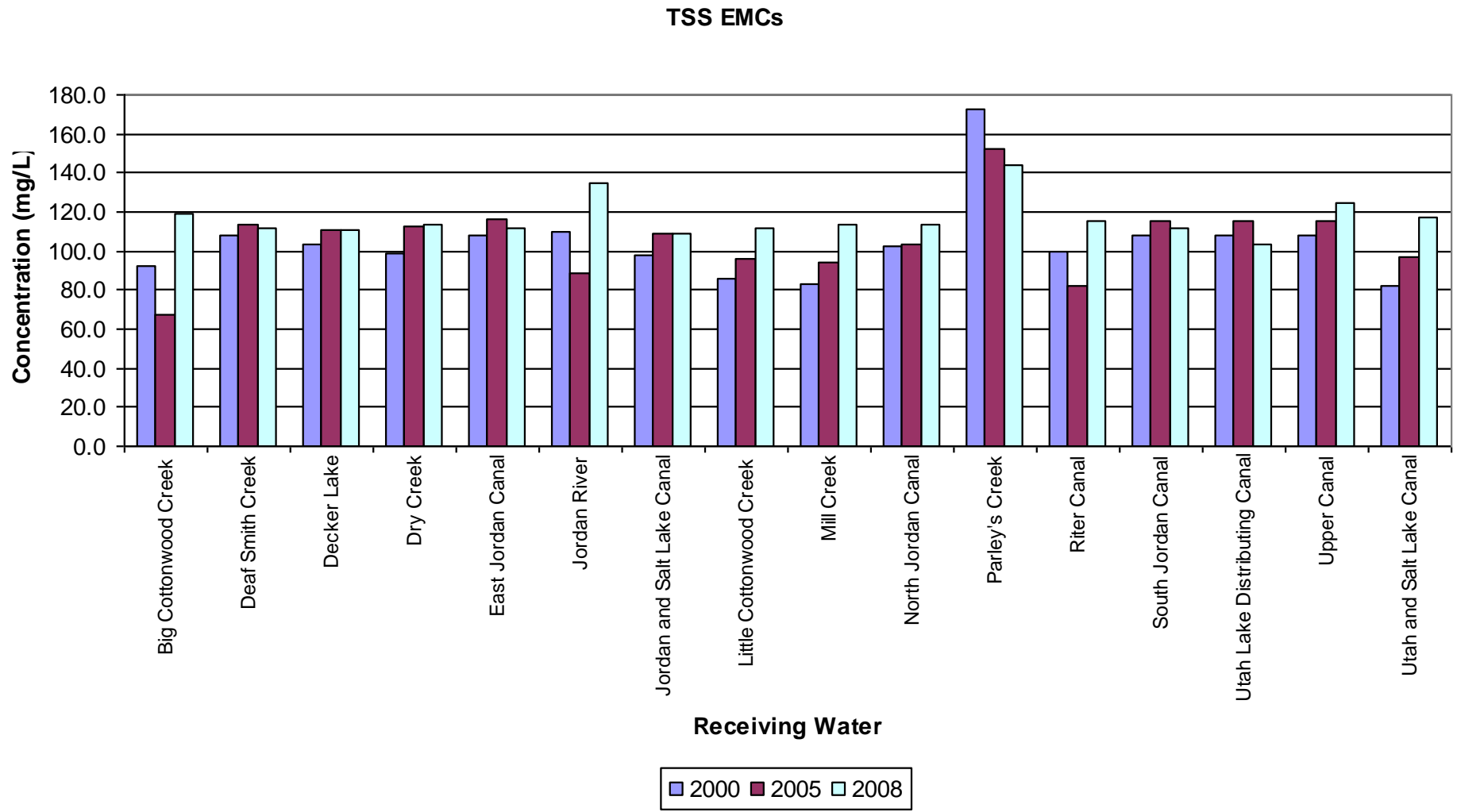
- TSS showed a general trend downwards for all landuses (weak trend)
- Total Phosphorus trend varied: upward trend for commercial landuse, downward trend for mixed, transportation and residential (weak trend)
- BOD<sub>5</sub> was generally upwards, particularly for the commercial landuse; transportation and residential landuses were flat.
- Total Zinc generally trended downwards, with the exception of the industrial landuse (weak trend)

# Receiving Waters



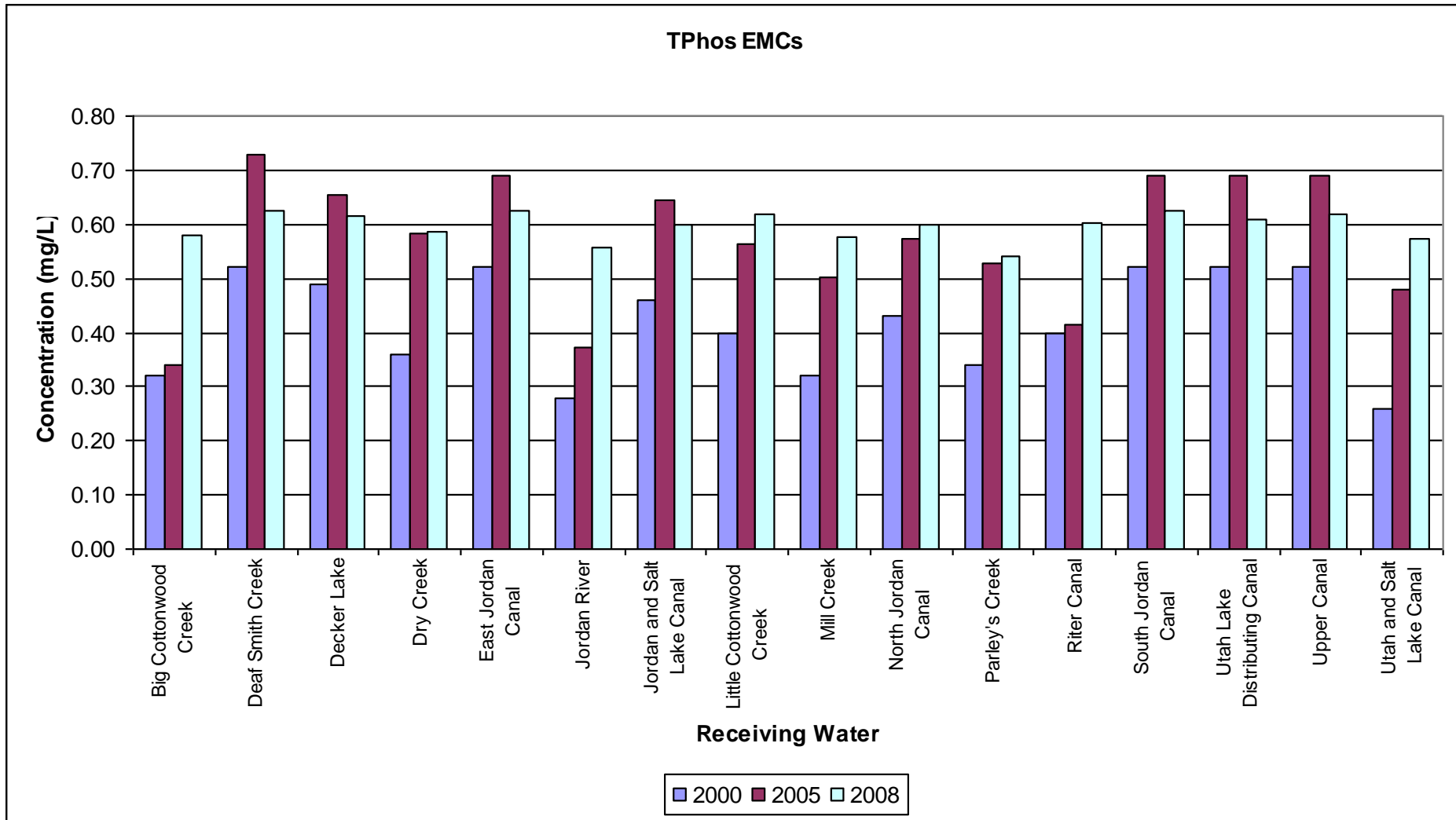
# Receiving Water EMCs

## TSS

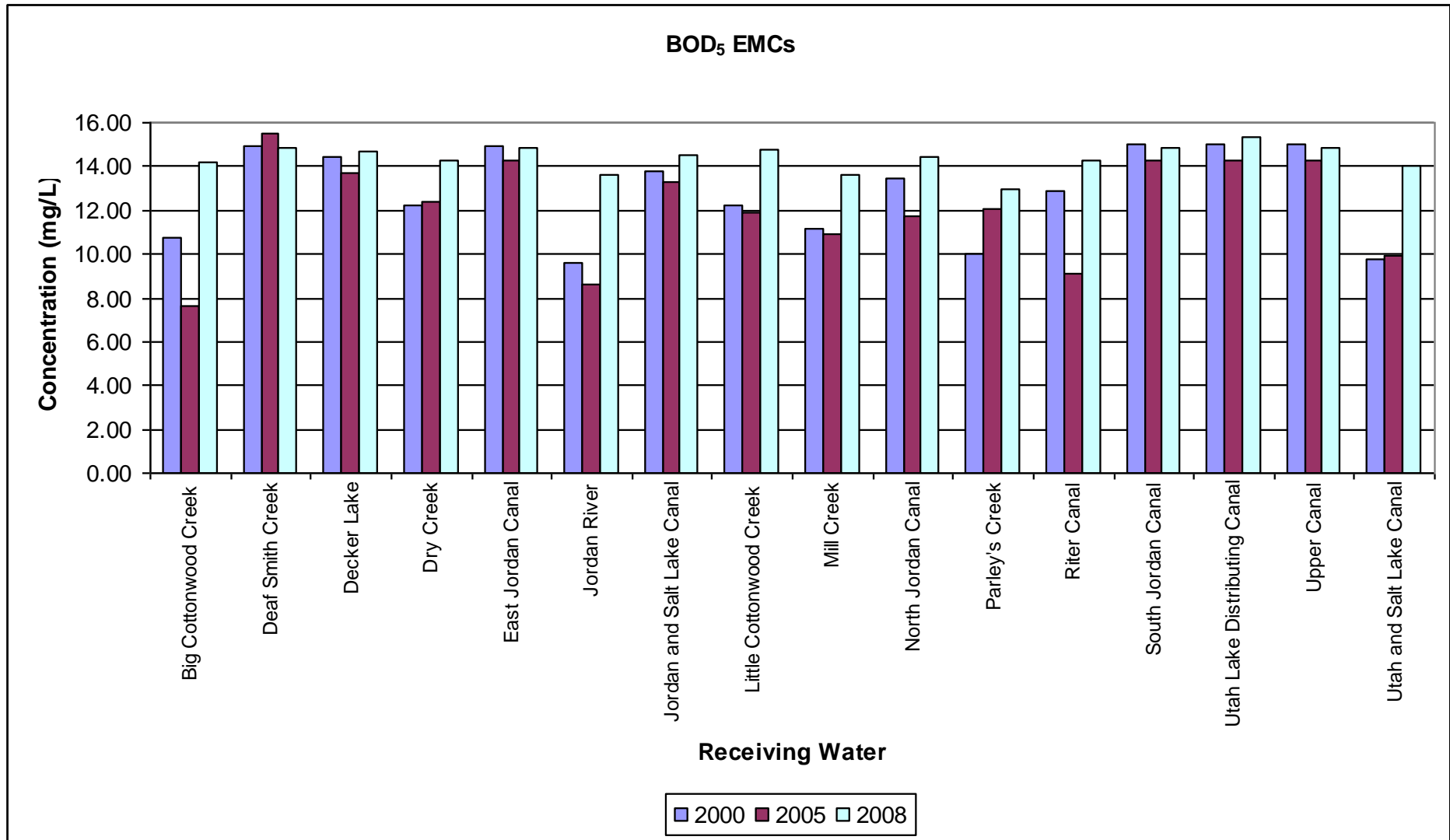




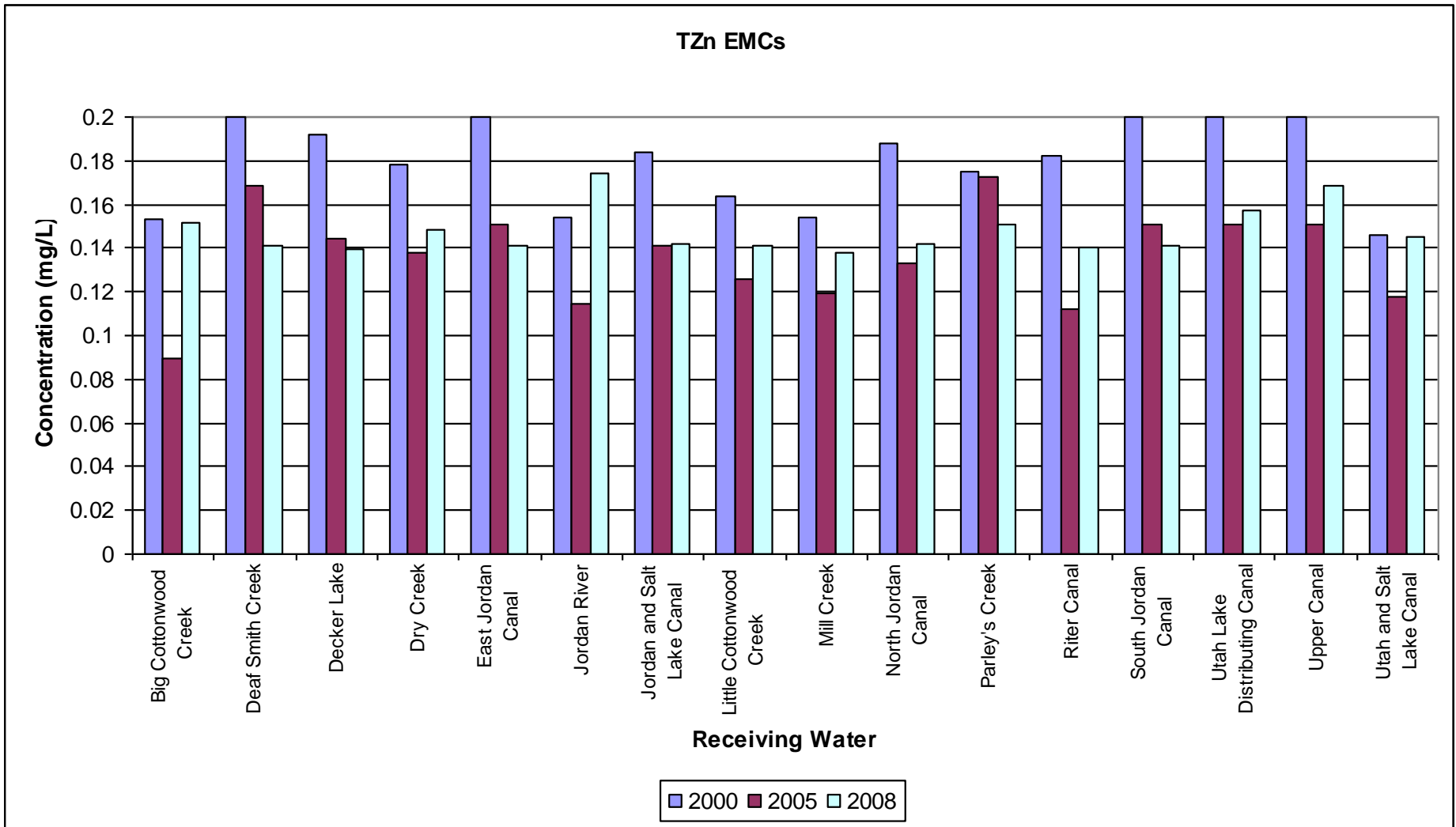
# Total Phosphorus



# BOD<sub>5</sub>



# Total Zn



# Receiving Water EMCs Summary

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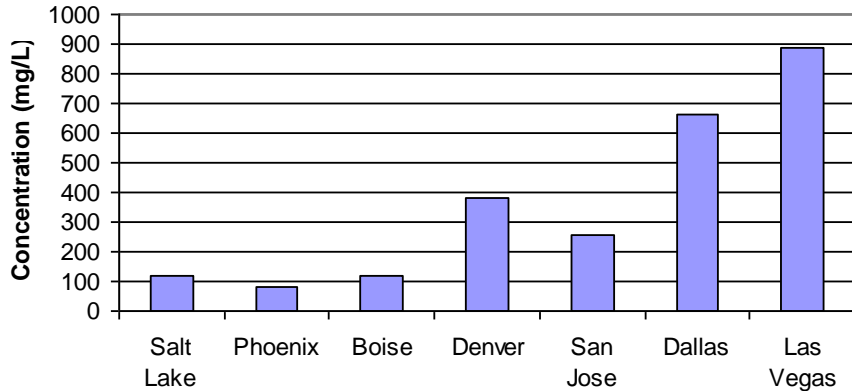
- Big Cottonwood Creek basin EMC is lower for all parameters, with the exception of metals in 2008 (residential landuse)
- Parley's Creek basin EMC was higher for TSS and TPb (mixed residential)
- Total suspended solid levels were fairly consistent from 2005 to 2008.

It is noted that an increase in many constituents occurred in 2008. This is likely due to the fact that the EMC methodology changed in 2008.

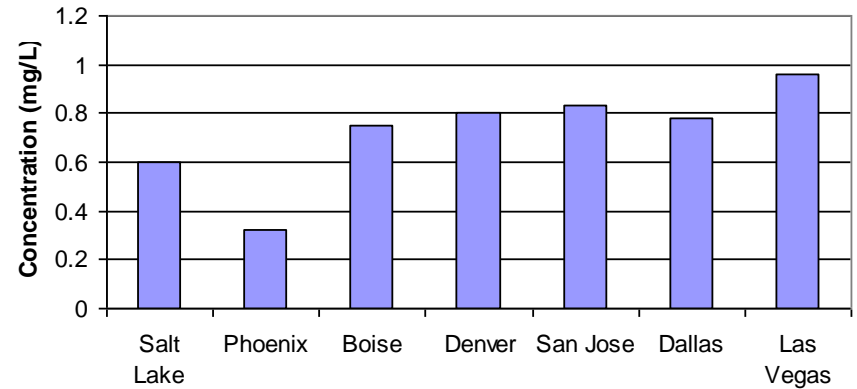
# Municipality EMC Comparison

(Municipal data from 2000, SLCo data 2008)

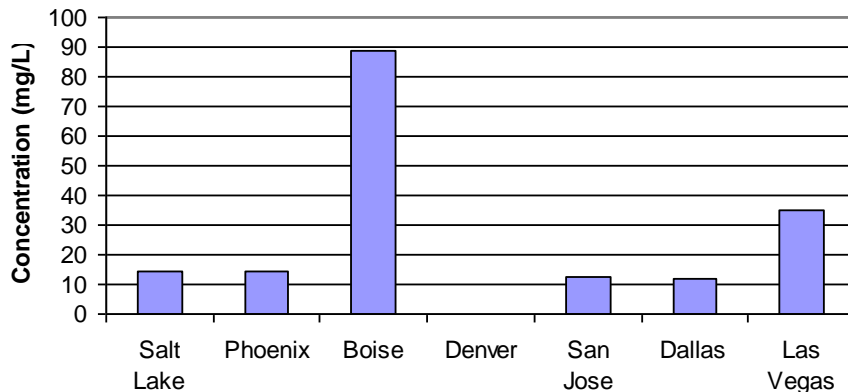
### Total Suspended Solids



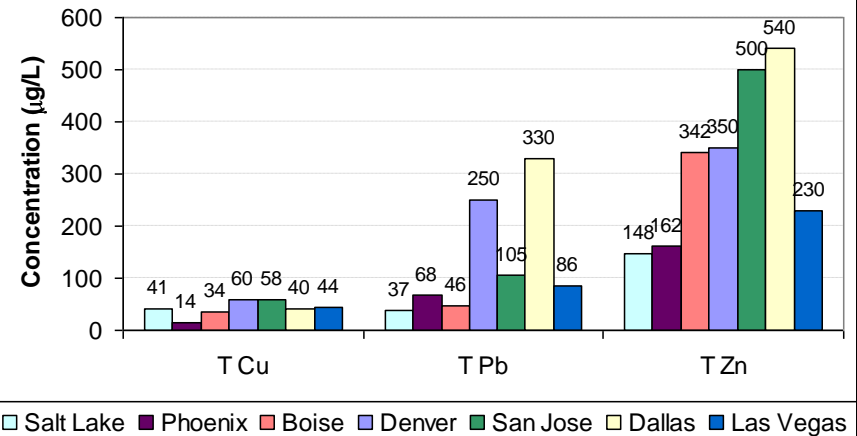
### Total Phosphorus



### BOD5



### Metals





# Additional Sampling

- **Pollutograph Sampling**

- Collection & analysis of multiple discrete samples throughout a storm event
- Conducted in conjunction w/ representative sampling
- Evaluate concentration and pollutant loading during the storm
- First flush analysis – treatment ramifications

- **Jordan River TMDL**

- Additional constituents associated with Jordan River TMDL
  - Volatile Suspended Solids
  - Suspended Solids Concentration
  - Carbonaceous BOD
  - Soluble Carbonaceous BOD



# FUTURE?



- **Instream sampling**

Analyze impacts of stormwater runoff on stream water quality

- **Particle size distribution analysis**

Determine particle size of sediment in stormwater for treatment considerations

- **Antecedent dry periods analysis**

Compare pollutant concentrations with antecedent dry periods

- **County-wide stormwater quality**

Conduct stormwater sampling in areas other than unincorporated County

# QUESTIONS?

