



Intra-annual differences in the availability of drifting  
invertebrates near the  
Little Colorado River, Grand Canyon, AZ.

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&  
EcoNatura

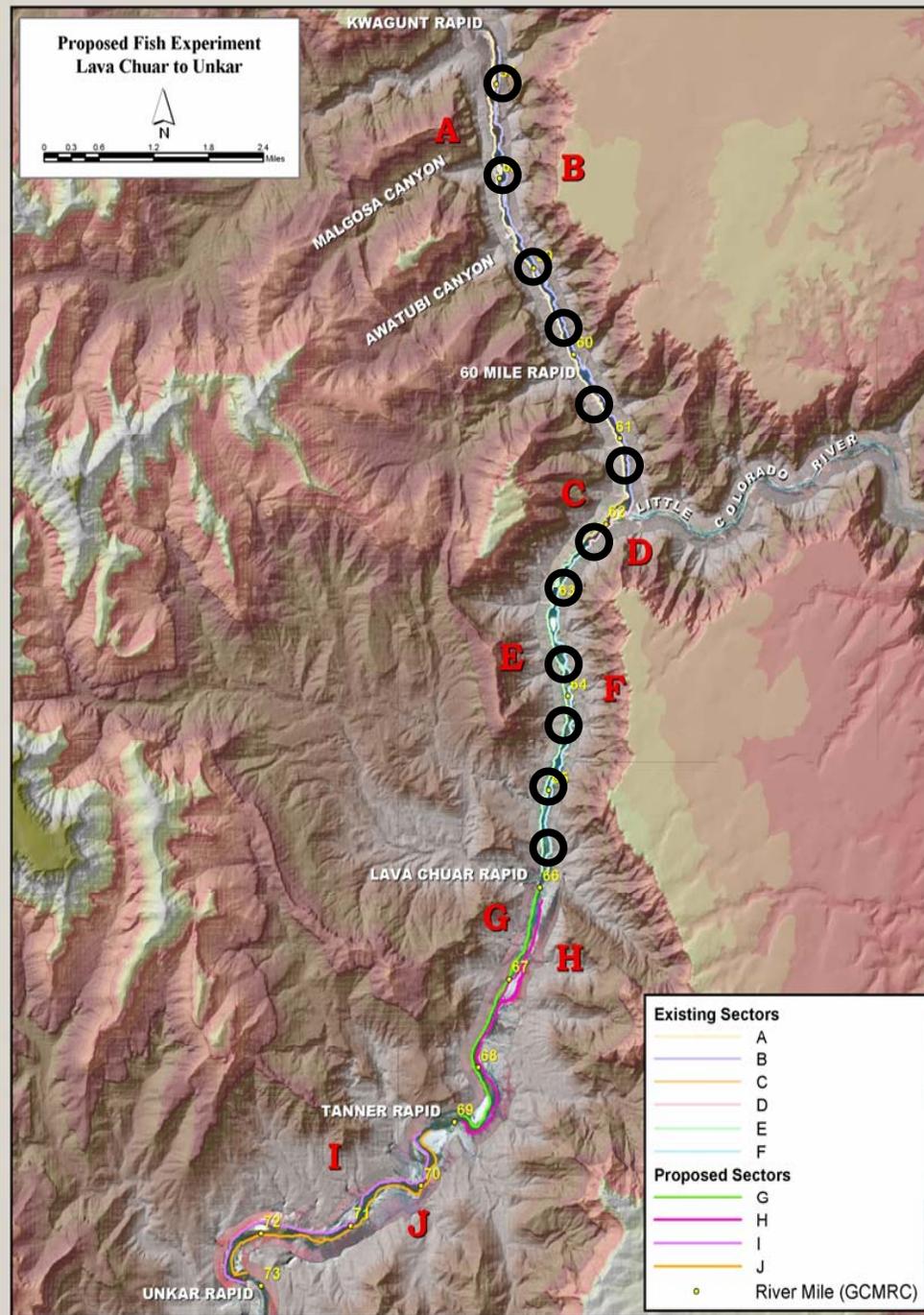


# STUDY OBJECTIVES

- Determine the quantity of drifting invertebrate density and biomass
- Determine the proportion of invertebrates contributed by terrestrial and aquatic environments
- Determine if invertebrate drift density/biomass varies seasonally
- Determine if invertebrate drift density/biomass varies spatially in relation to upstream/downstream of LCR
- Determine the proportion of drift consisting of zooplankton

# STUDY AREA

- 2 Sampling Periods
  - Year 2003
  - Year 2004
- 12 Sample Sites
  - 6 Upstream
  - 6 Downstream
- 24 Samples / Trip
- 6 Sample Trips / Year
  - 3 Winter Trips
  - 3 Summer Trips
- 4 Replicates / Sample Site

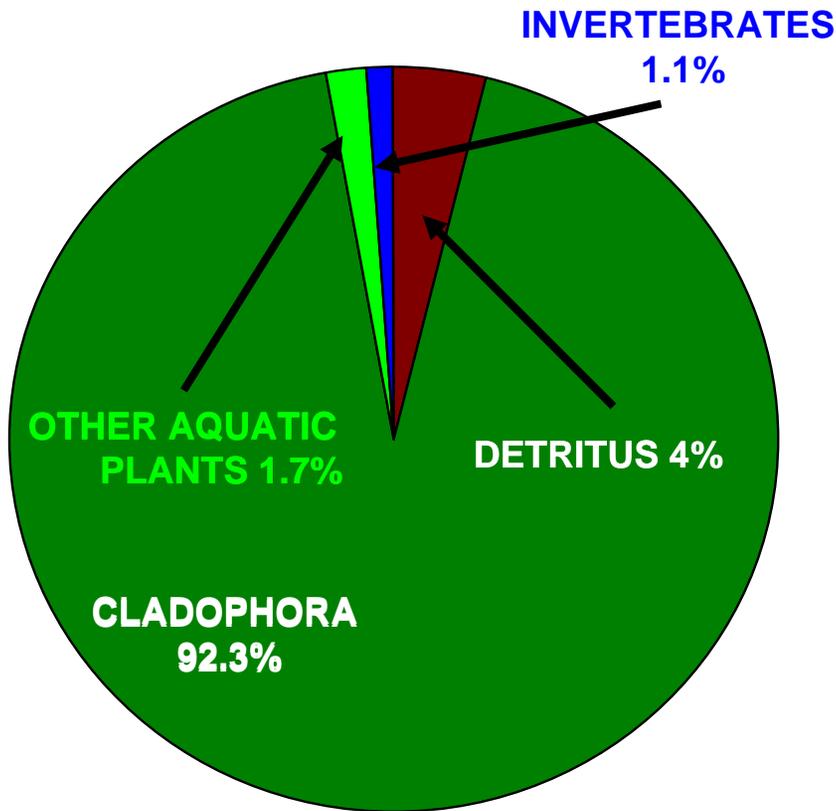


- Four (4) replicates per sample
- Flow velocity (m/s)
- Surface collection depth (1m)
- 6-min deployment
- Mid-channel collection
- Drift analysis
  - Total organics (CPOM) > 0.35 mm
  - Macroinvertebrates
  - Zooplankton
  - Separated & sorted by sieve size
    - (8mm, 4mm, 2mm, 1mm, 0.7mm, 0.6mm, 0.5mm, 0.4mm, & 0.35mm)

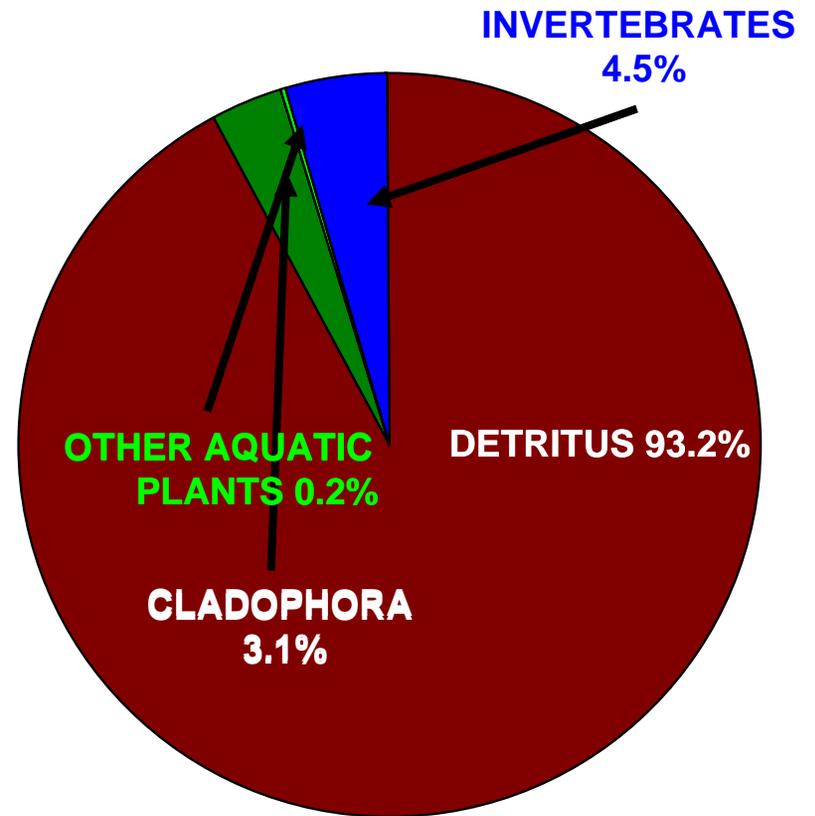


# DRIFT COMPARISONS

LEES FERRY AREA  
0 to -15 RM

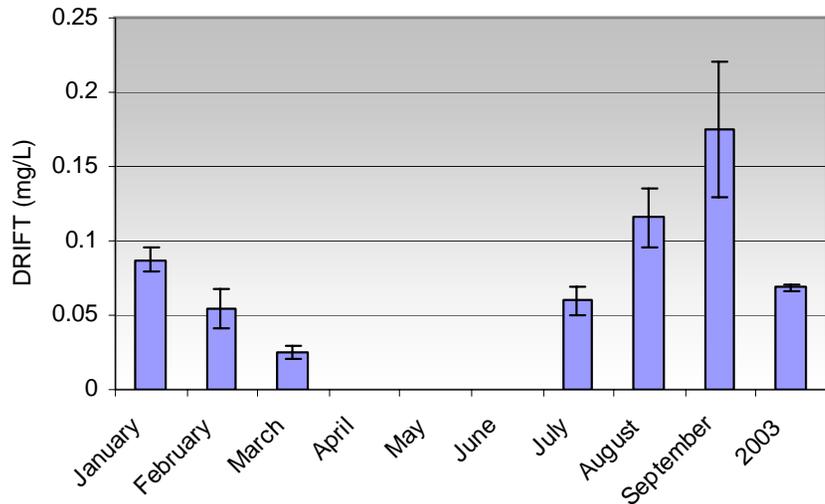


LITTLE COLORADO RIVER REGION  
57 to 65 RM

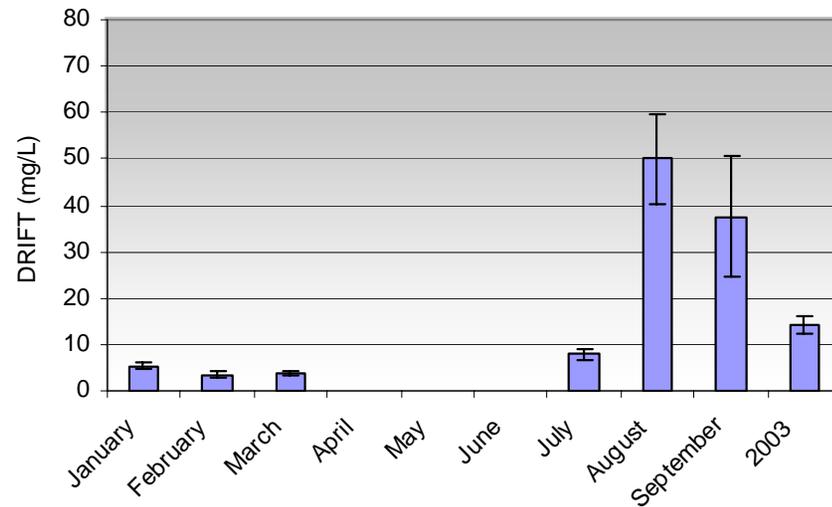


# DETRITAL & VEGETATIVE DRIFT IN THE LCR REGION

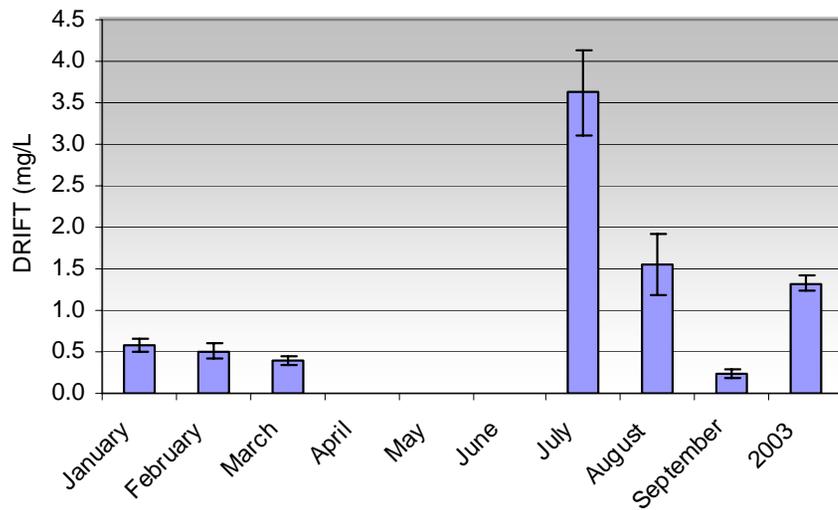
## OTHER AQUATIC PLANTS



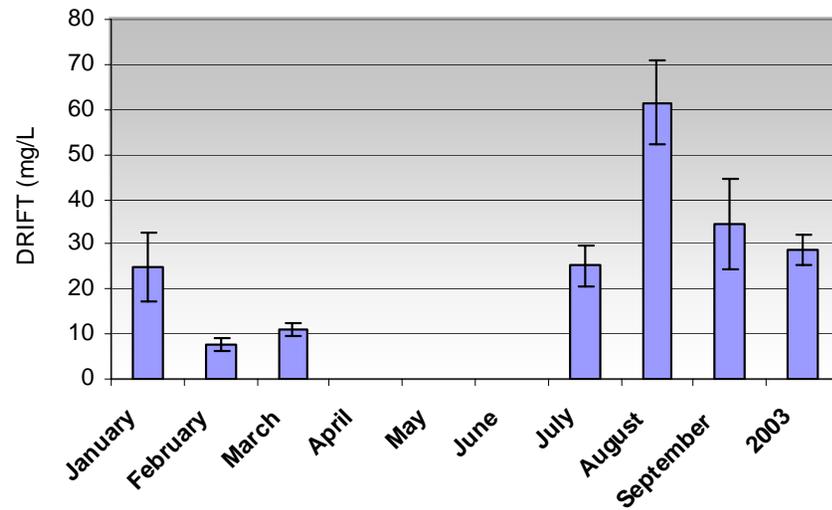
## TERRESTRIAL VEGETATION



## CLADOPHORA

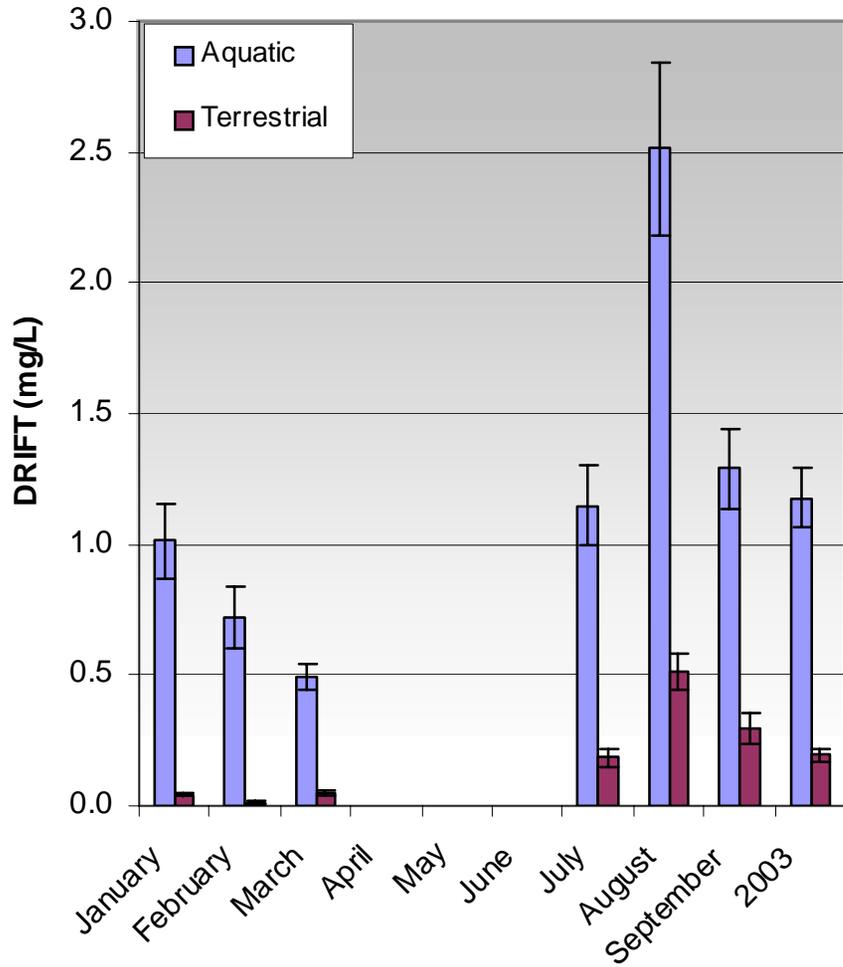


## DETRITUS

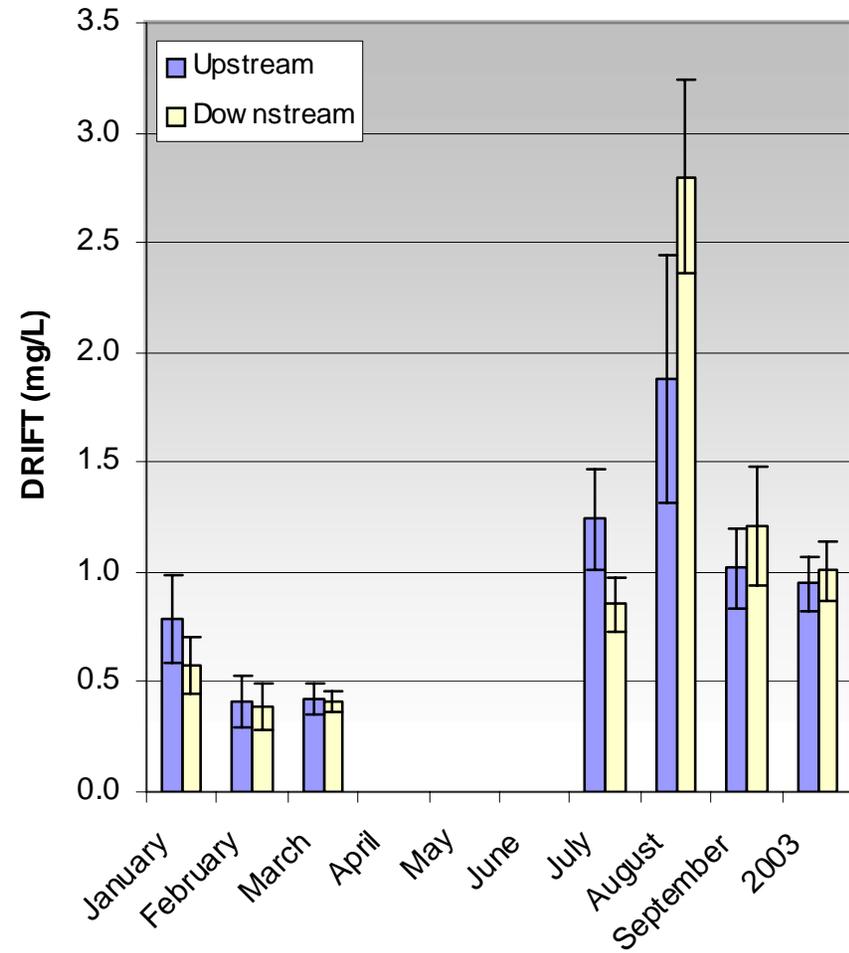


# MACROINVERTEBRATE DRIFT IN THE LCR REGION

## INVERTEBRATE ORIGIN

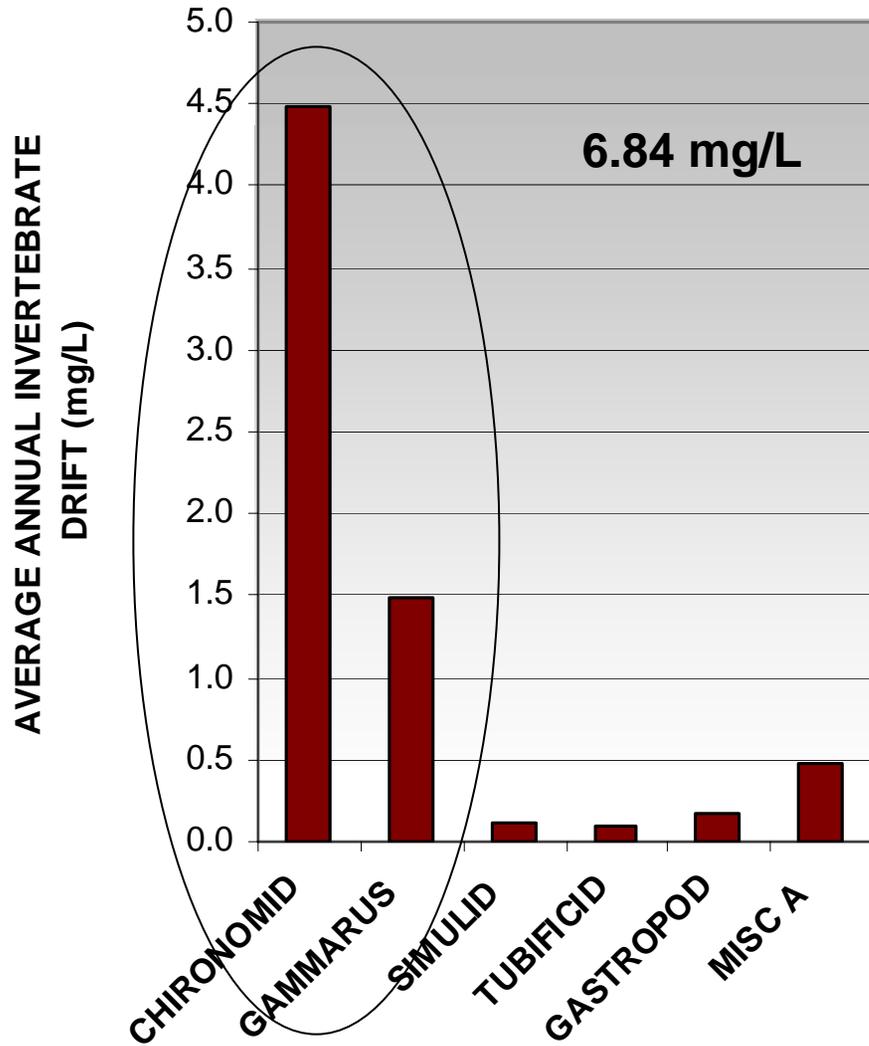


## SPATIAL DISTRIBUTION

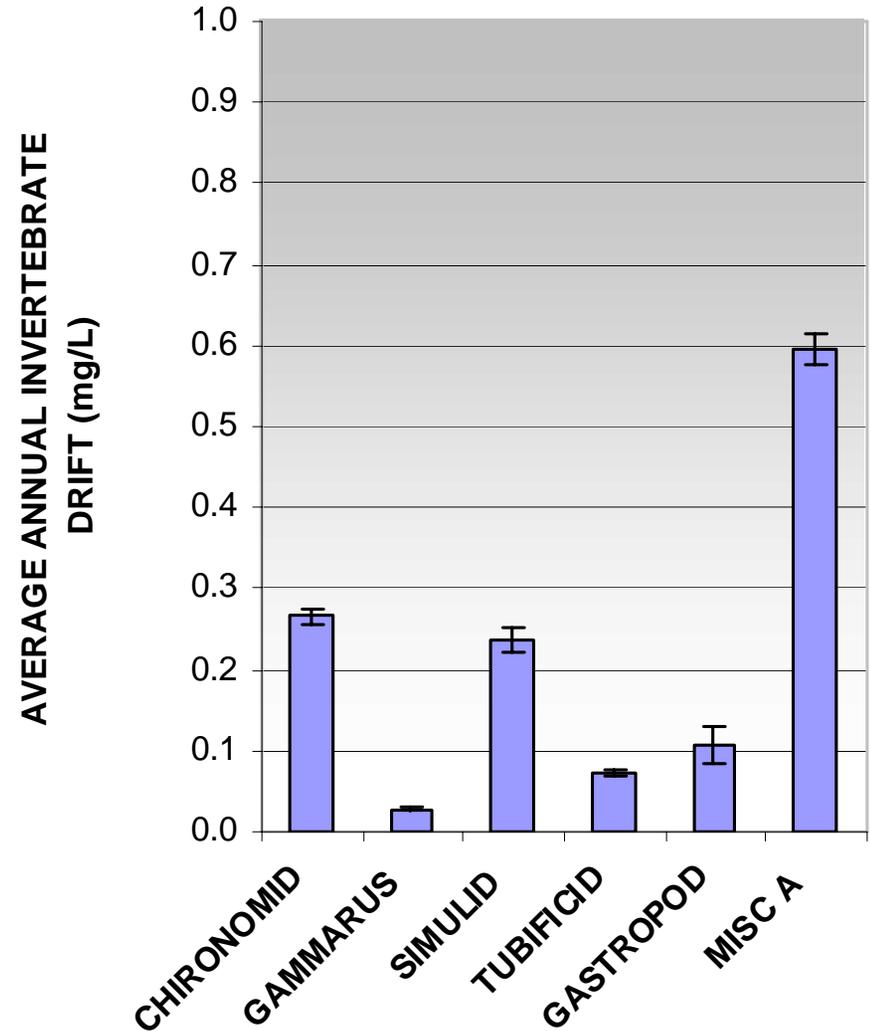


# MACROINVERTEBRATE DRIFT COMPARISONS

## LEES FERRY (1995)

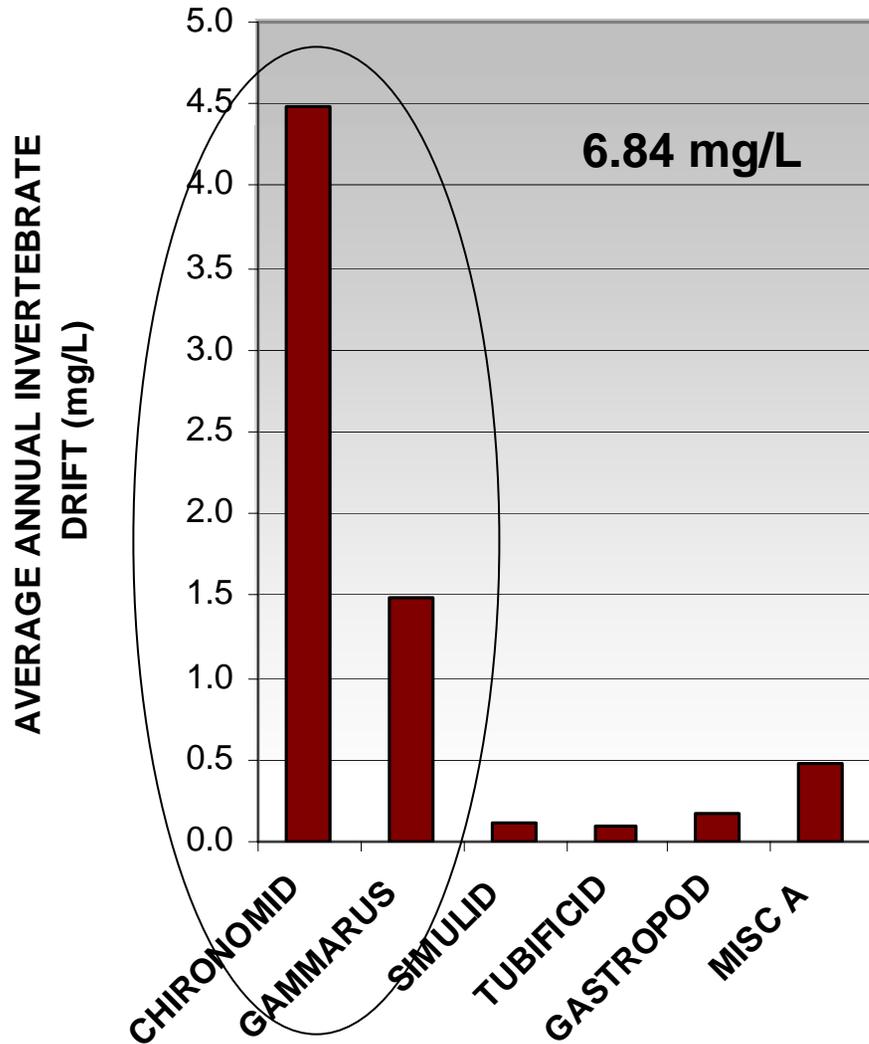


## LCR REACH

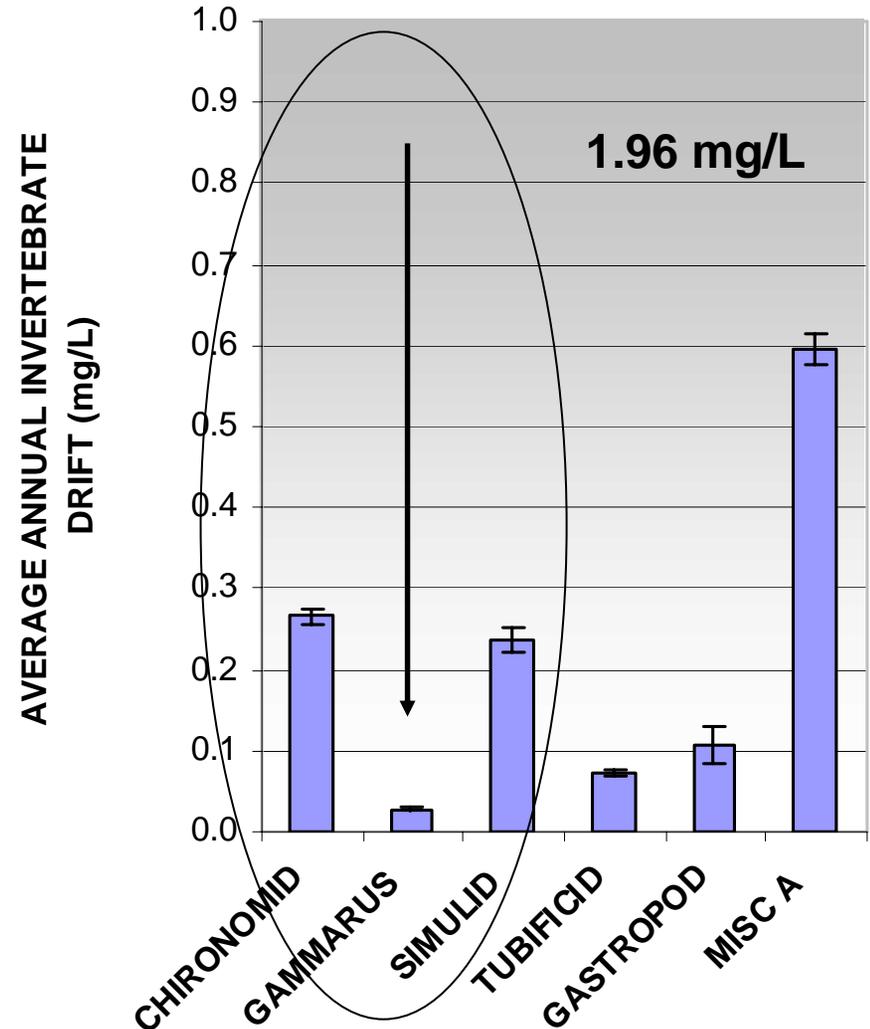


# MACROINVERTEBRATE DRIFT IN THE LCR REGION

## LEES FERRY (1995)

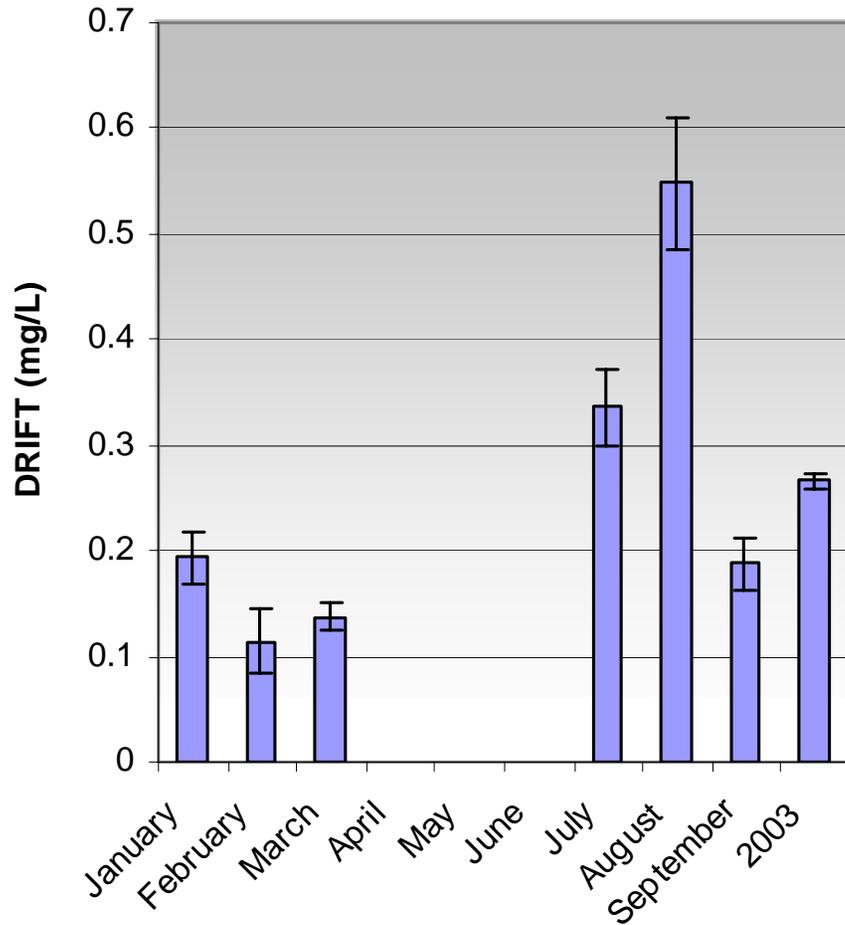


## LCR REACH

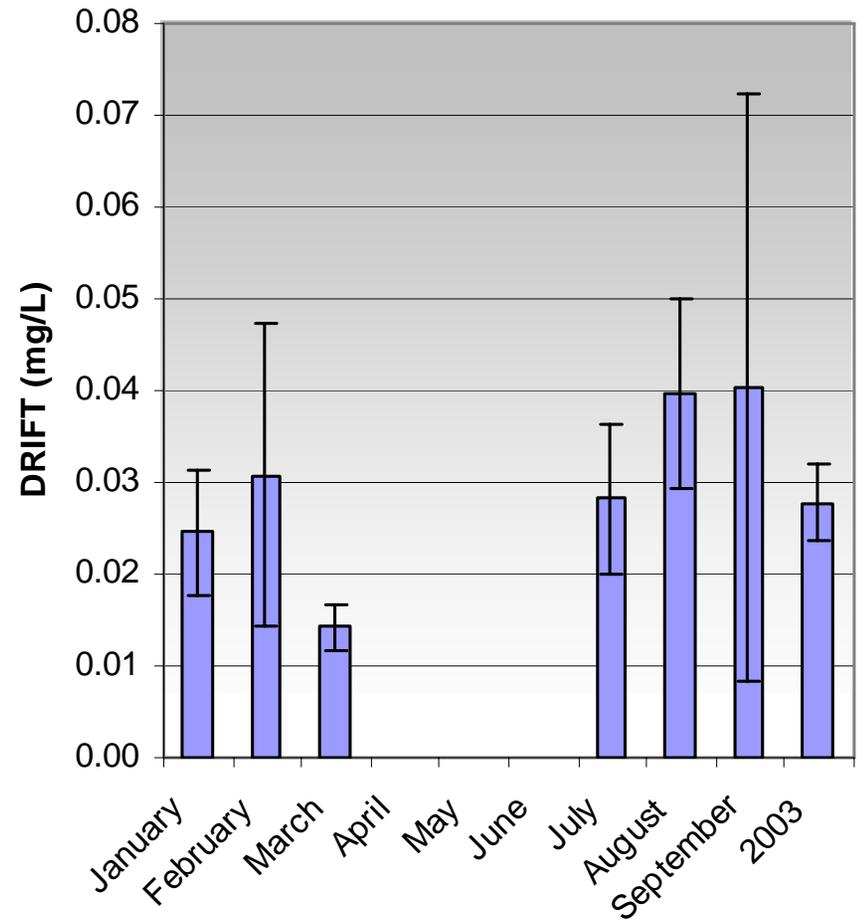


# MACROINVERTEBRATE DRIFT IN THE LCR REGION

## CHIRONOMIDS

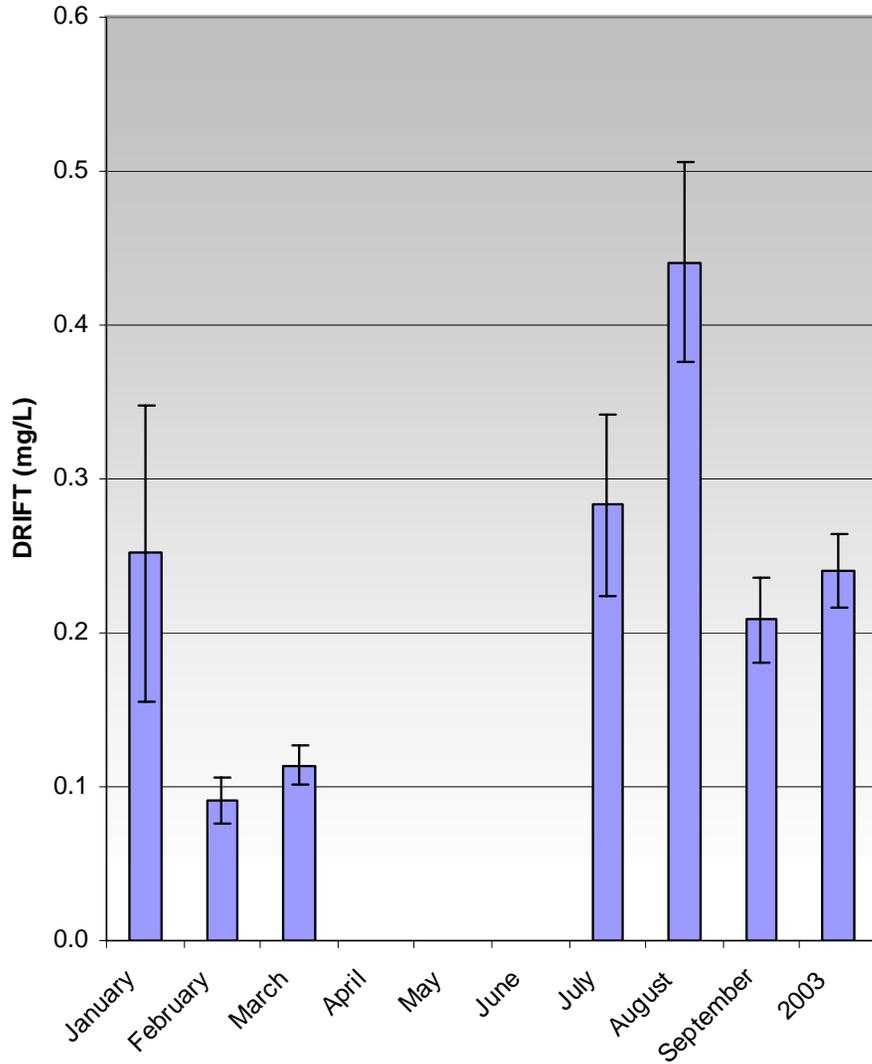


## GAMMARUS

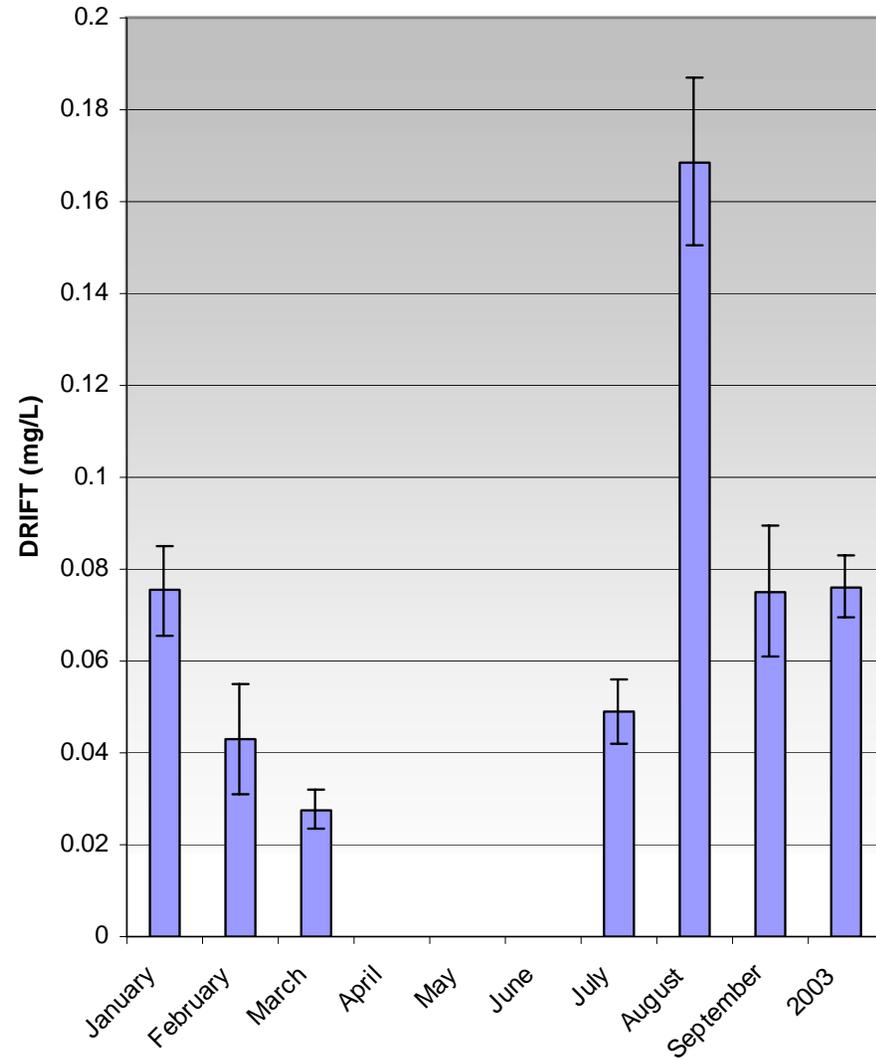


# MACROINVERTEBRATE DRIFT IN THE LCR REGION

## SIMULIDS (Aquatic)

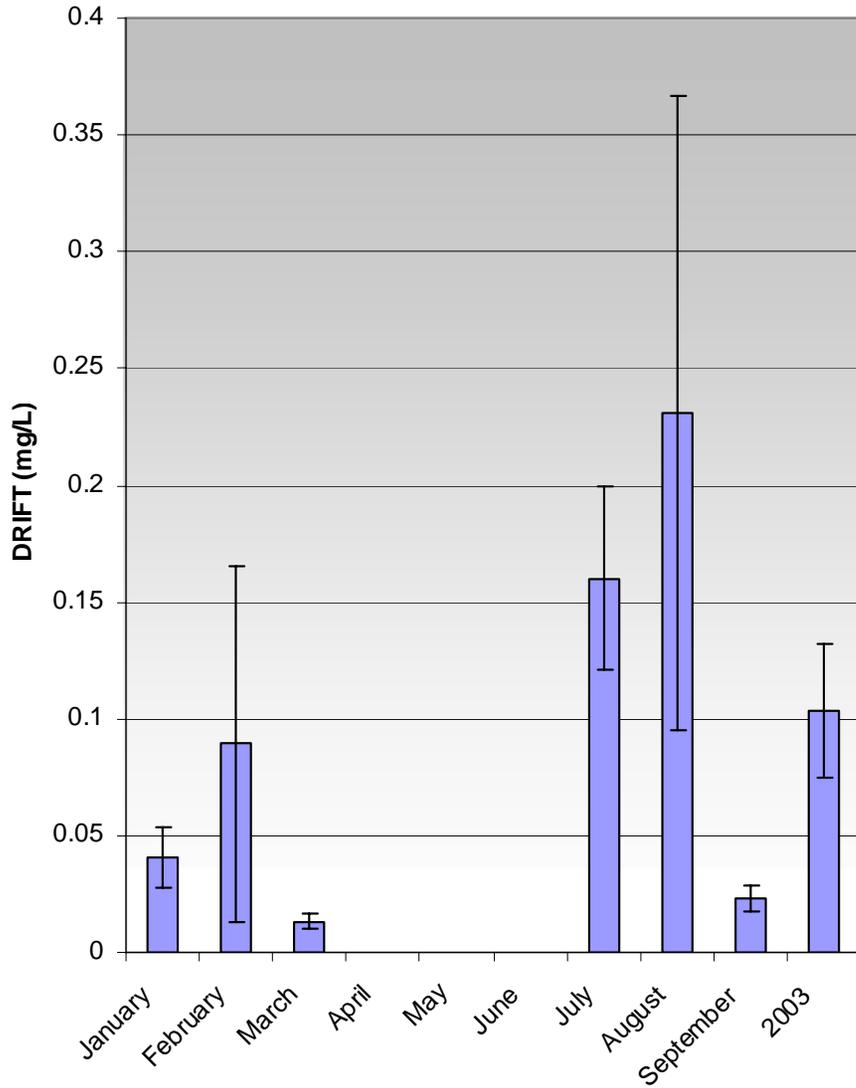


## TUBIFICID

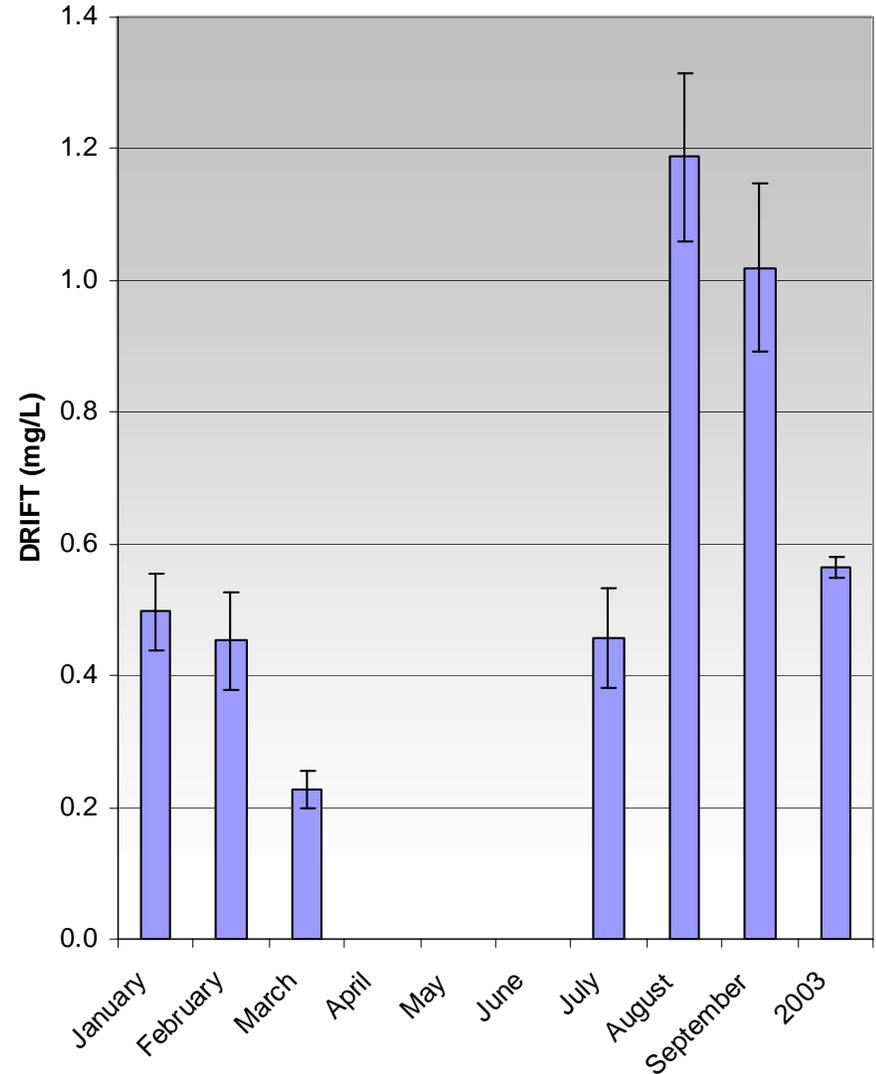


# INVERTEBRATE DRIFT IN THE LCR REGION

## GASTROPODS

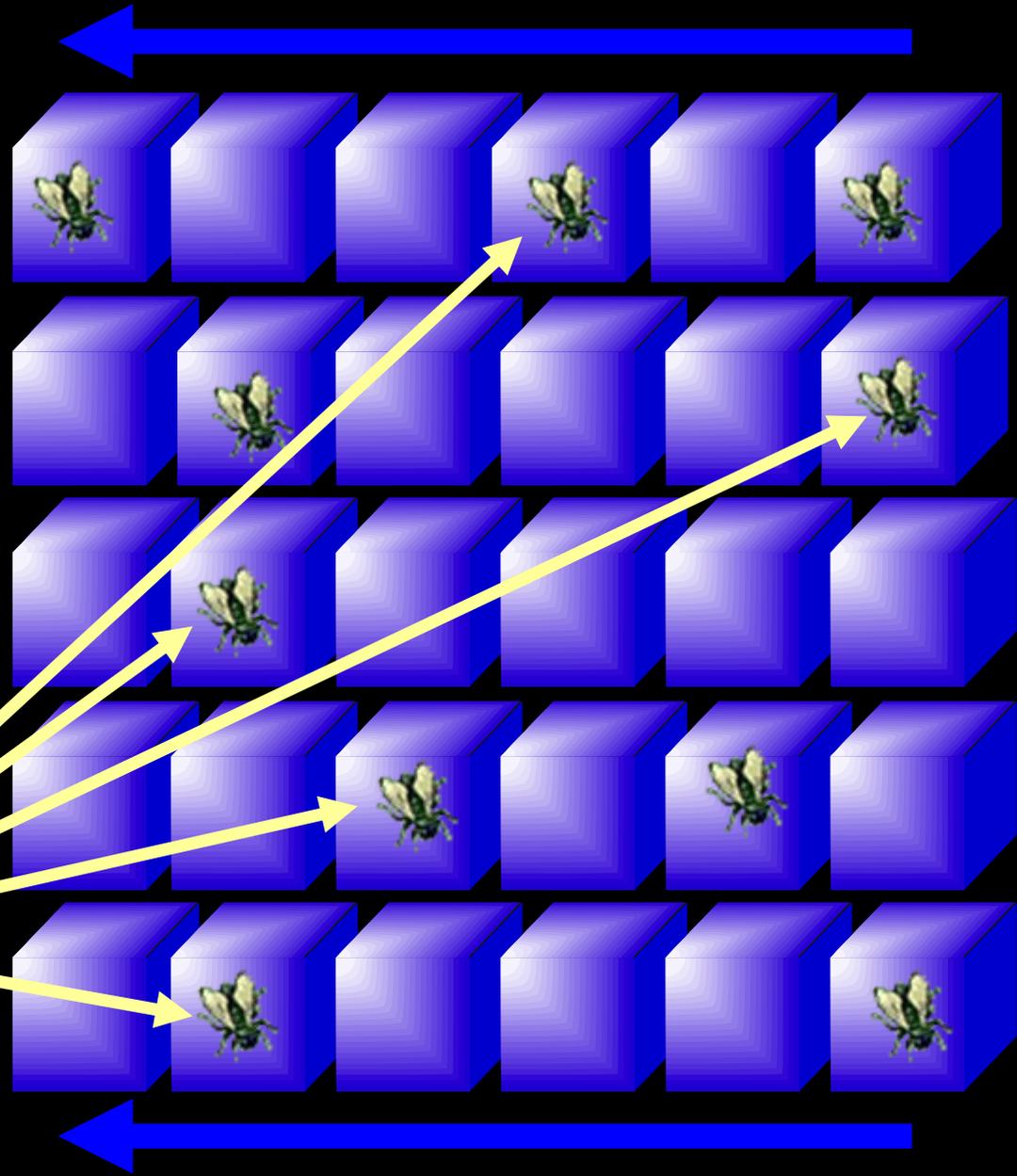
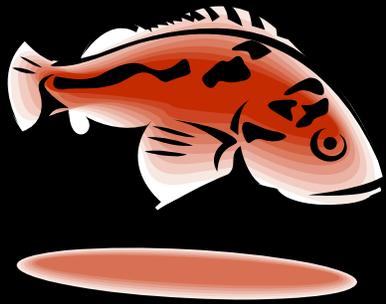


## MISCELLANEOUS INVERTEBRATES

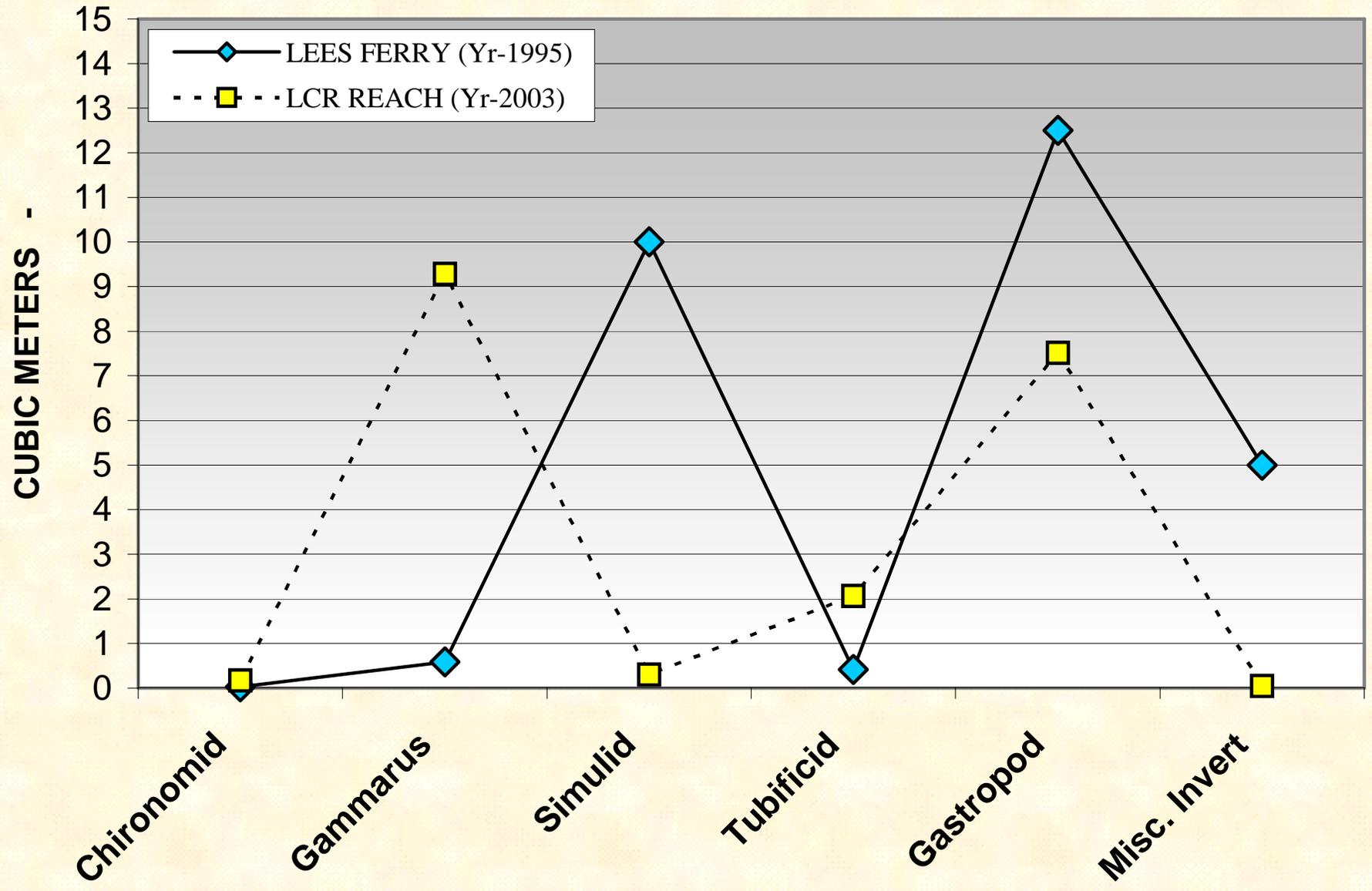


**ENCOUNTER  
RATE WITH PREY**

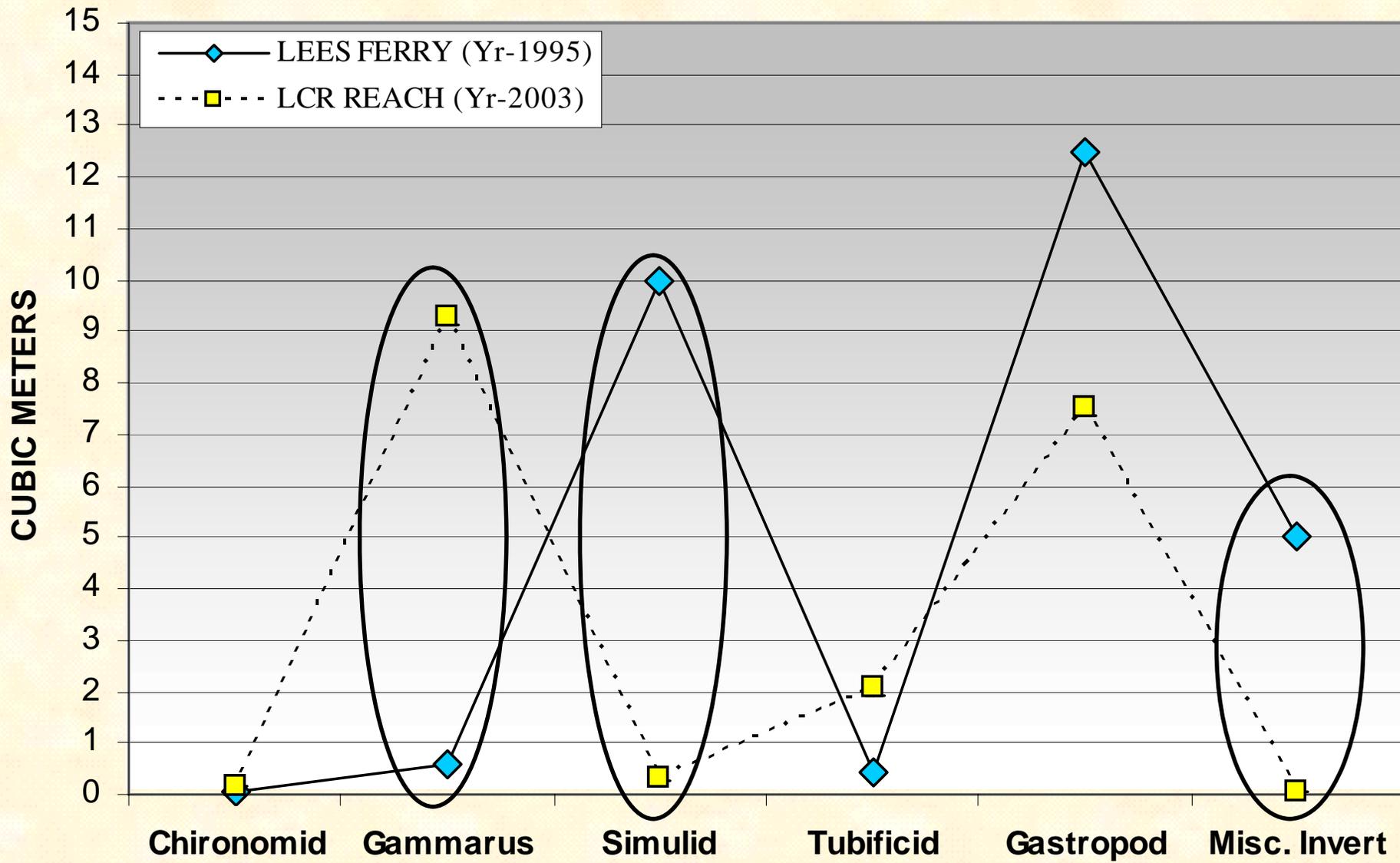
**AVERAGE ENCOUNTER  
VOLUME**



# AVERAGE VOLUME TO ENCOUNTER PREY ITEM

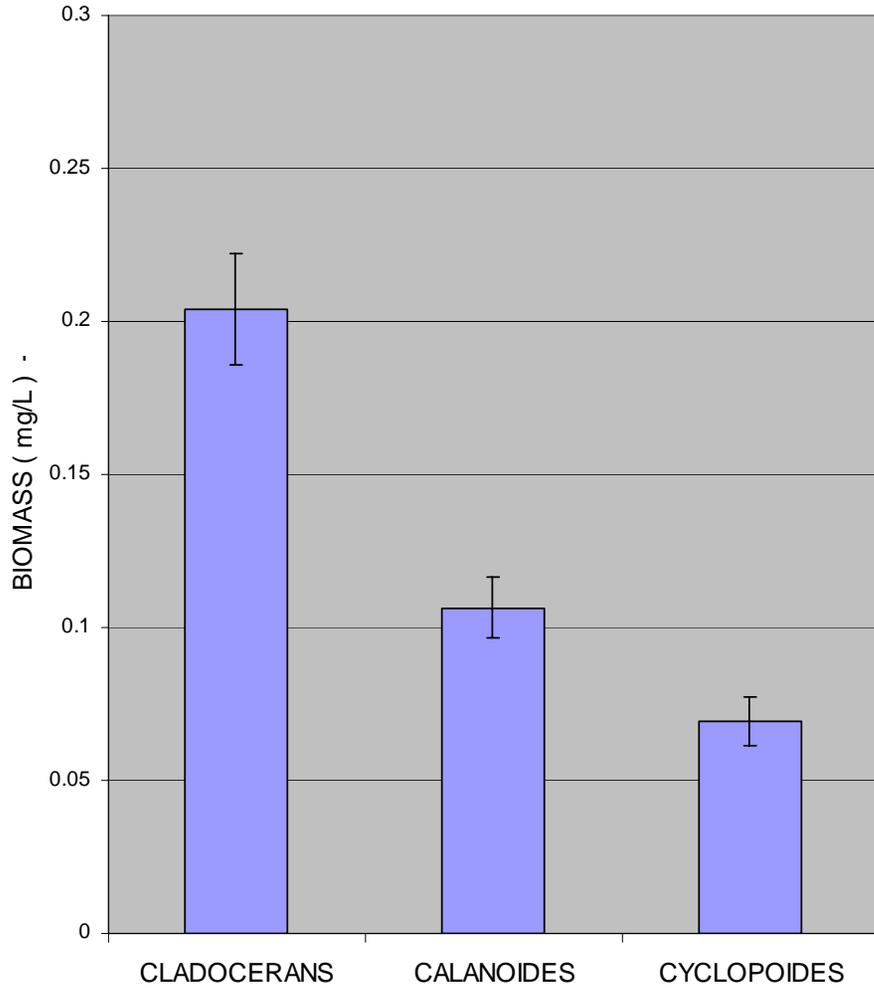


# AVERAGE VOLUME TO ENCOUNTER PREY ITEM

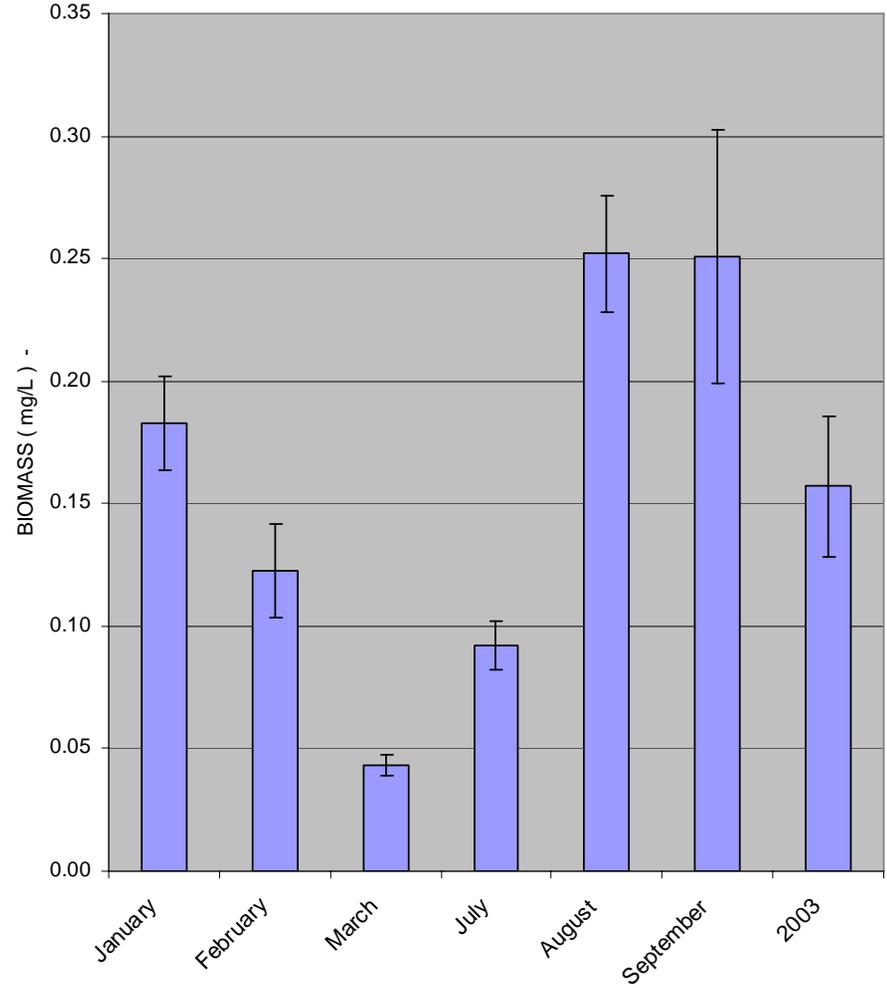


# ZOOPLANKTON DRIFT IN THE LCR REGION

2003 - ZOOPLANKTON

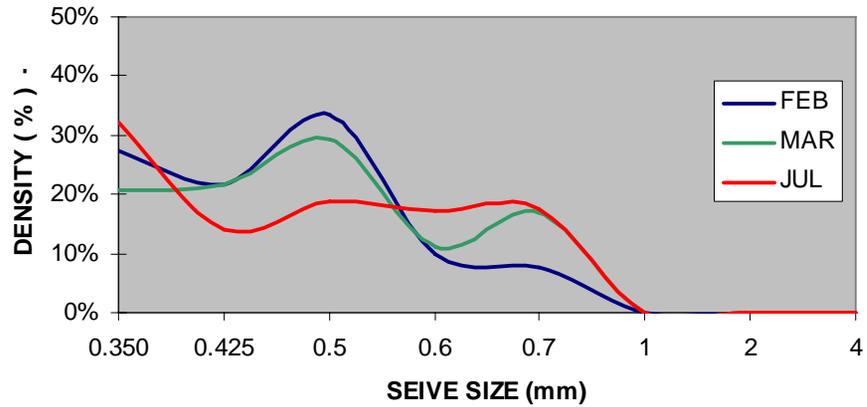


2003 - ZOOPLANKTON

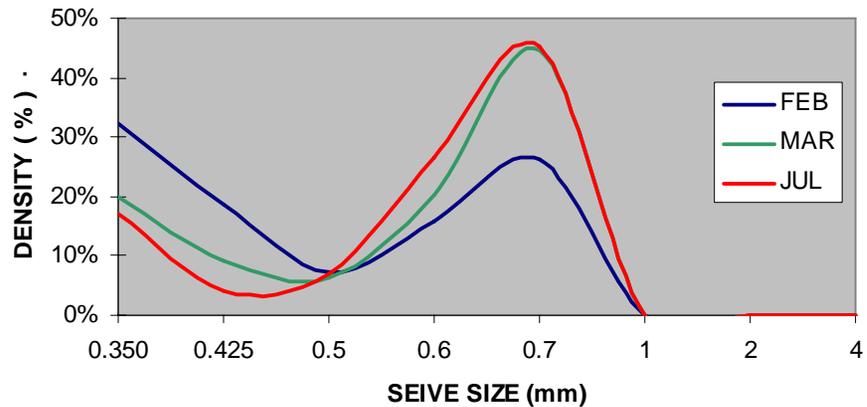


# Density of Zooplankton Distributed by Size

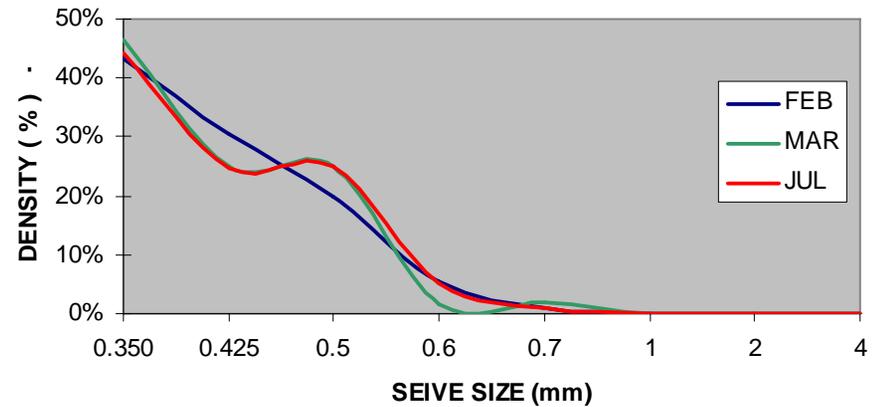
## CLADOCERANS



## CALANOIDES

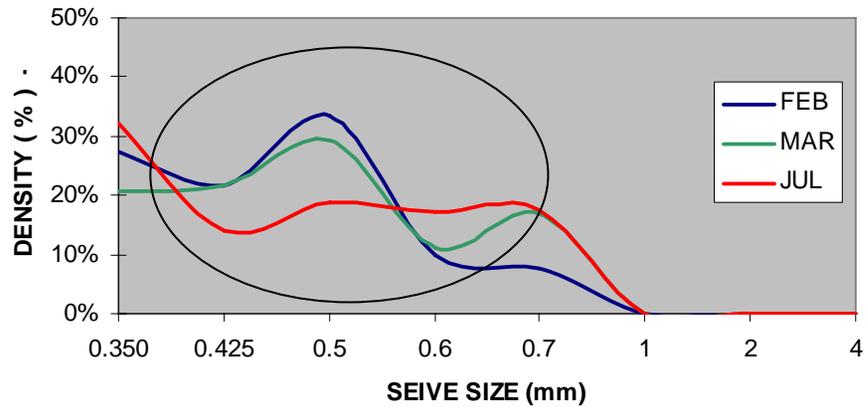


## CYCLOPOIDES

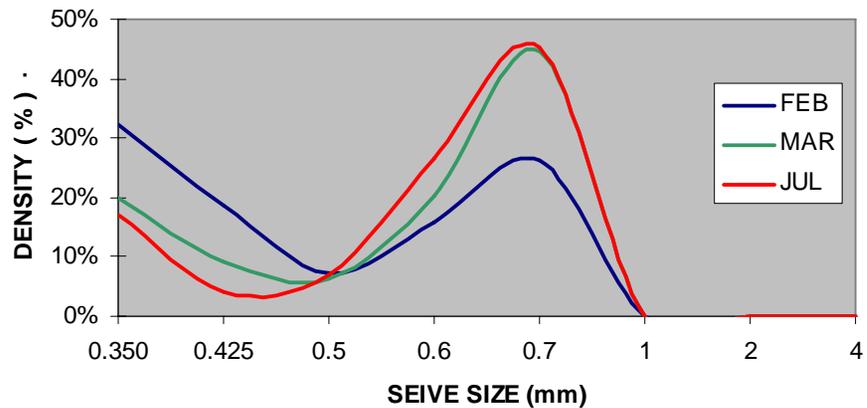


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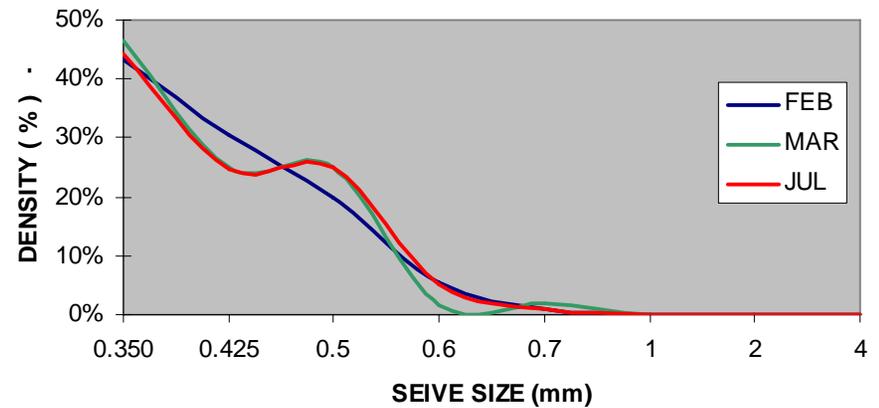
## CLADOCERANS



## CALANOIDES

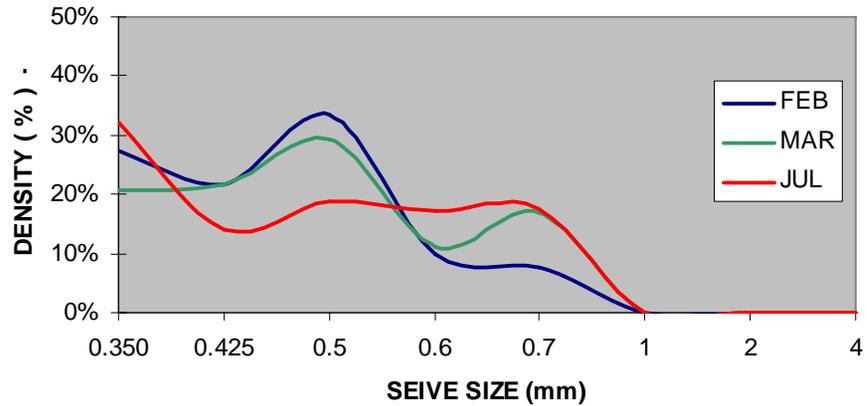


## CYCLOPOIDES

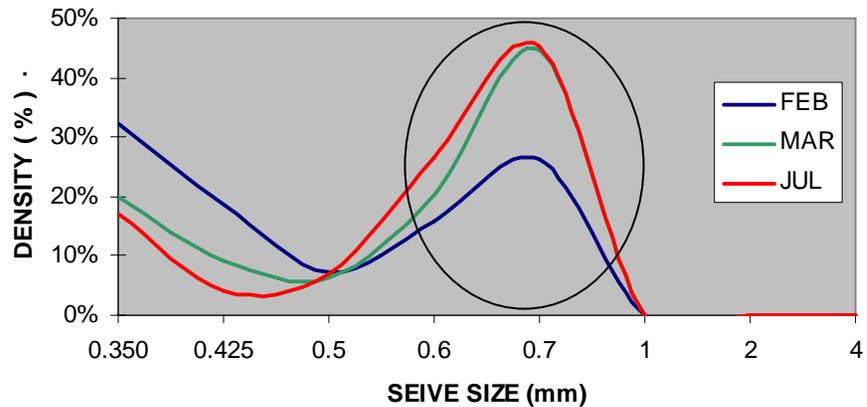


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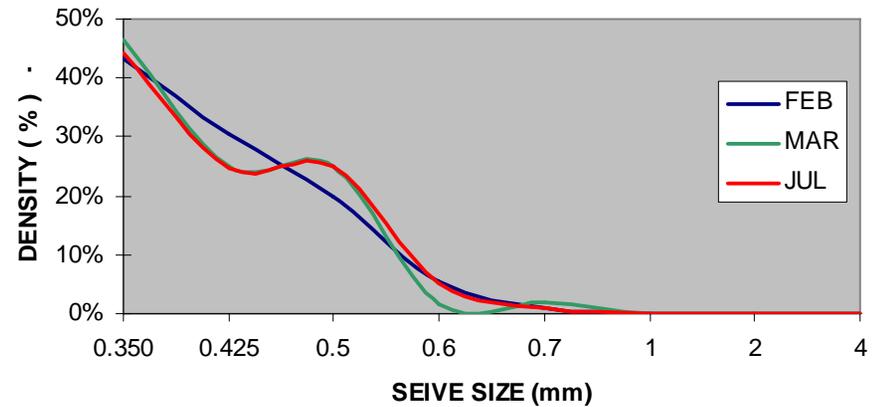
## CLADOCERANS



## CALANOIDES

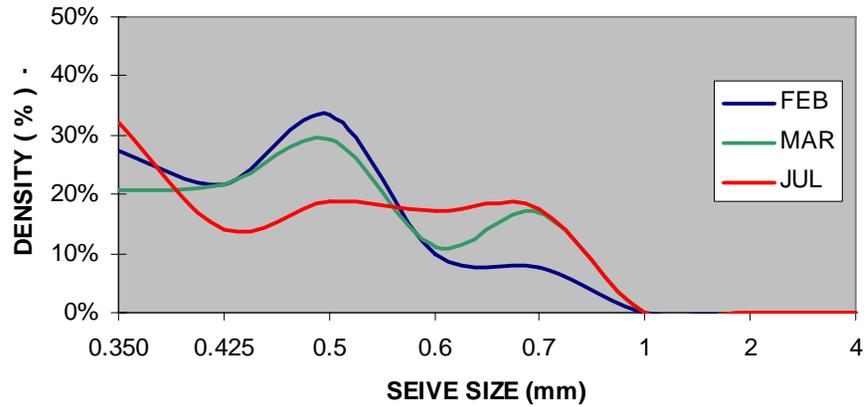


## CYCLOPOIDES

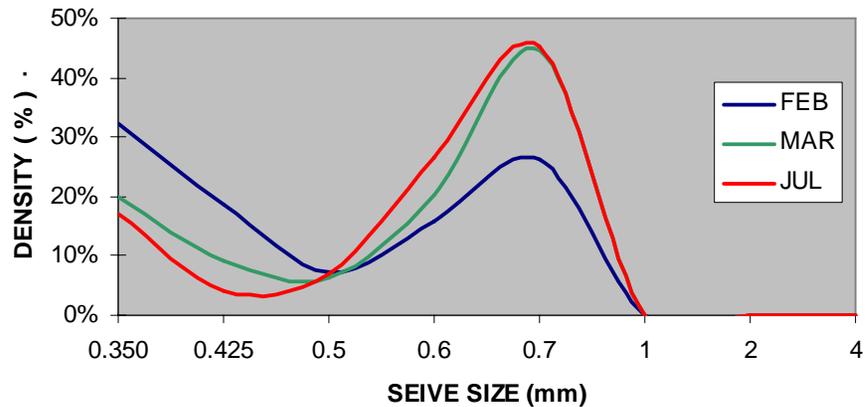


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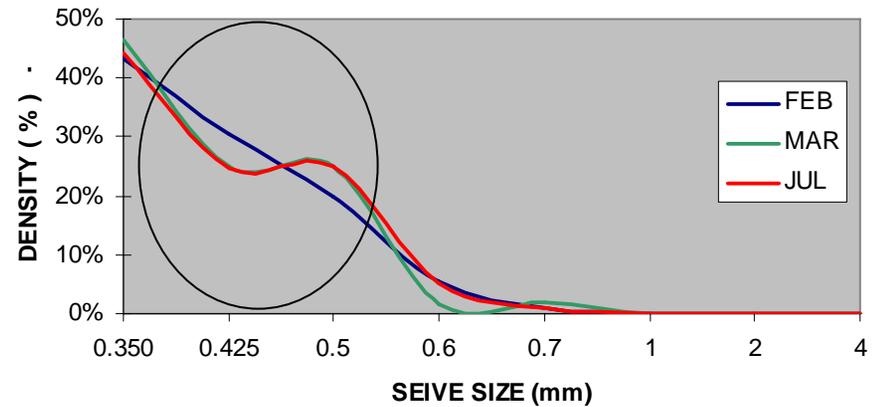
## CLADOCERANS



## CALANOIDES



## CYCLOPOIDES



# Conclusion

- In the LCR area, average invertebrate drift concentration was less than drift concentration reported for Lees Ferry (<70%).
- Drift concentration was seasonally variable, highest in the summer, lowest during the onset of Spring runoff.
- In LCR area, aquatic Dipterans were the primary invertebrate that comprised the drift.
- There were no spatial differences observed in the availability of drifting invertebrates found upstream or downstream of the LCR confluence
- The primary source of drifting invertebrates were derived from an aquatic rather than a terrestrial origin.
- 10% of the invertebrates in the drift (> 0.35 mm) are zooplankton. The primary source of these inverts appear to have been Lake Powell reservoir.