75 Sites Randomly Selected for the Study
Suitable habitat to use TDEC’s semi-quantitative protocols

Rooted Bank Habitat

Riffle Kicks
Comparison of discharge types

% Maintain flow

- Standpipe
- Spillway
- Subsurface
- Multiple
Macroinvertebrate Samples

Semi-quantitative Single Habitat Spring and Fall

Tennessee Macroinvertebrate Index (TMI)

- Taxa Richness
- EPT Richness
- %EPT
- %OC
- NCBI
- %Dominant
- %Clingers
- Ky % Nutrient Tolerant
Field Parameters

- Flow
- Dissolved Oxygen
- Temperature
- pH
Chemical Analysis

- Total Suspended Solids (TSS)
- Nutrients
  - Total Phosphorus
  - Total Ammonia
  - Total Kjeldahl Nitrogen
  - Nitrate+nitrite
- Metals
  - Iron
  - Manganese
Iron and Manganese

61% of sites above recommended iron criterion of 1000 µg/L

93% of sites above reference levels for manganese
Benthic Community Structure

- 96% failed # distinct EPT taxa
- 86% failed %EPT
- 87% failed taxa richness
- 76% failed NCBI
- 58% failed %OC
- 67% failed %Cling
- 43% failed %Dom
  - Fall Trichopteran *Cheumatopsyche*
  - Spring Chironomid *Parametriocnemus*
Flow

• **Seasonality**
  - 52% insufficient flow for FAL at least one season
  - 25% no flow at least one season

• **Stream Order**
  - 1\(^{\text{st}}\) Order 43% insufficient flow
  - 2\(^{\text{nd}}\) Order 38% insufficient flow
  - Larger Order 21% insufficient flow
Nutrients

- **Total Phosphorus**
  - 75% exceeded guidelines

- **Total Ammonia**
  - 81% exceeded Ref Data

- **Total Kjeldahl Nitrogen**
  - 65% exceeded Ref Data

- **Nitrate+nitrite**
  - 41% exceeded guidelines