Fish community structure in specific reaches can reflect the reach’s habitat and water quality. Overall, fish can be used to assess the current and past condition of aquatic environments, as well as the magnitude of stress and the rate of recovery after the implementation of remediation measures. Fish habitat studies are often combined with water quality and aquatic community surveys to determine the condition of aquatic environments.

MATERIALS AND METHODS
• Marmaton River sub-basin (hydrologic unit code 10290104) of the Osage basin located in southeast Kansas and western Missouri (Fig. 1)
• Sampled from late July to early October 1999
• Sample reaches ≈ 100 feet wide (minimum of 10 foot wide at meander)
• Each reach divided into ten equal segments; each with one transect at the upstream end of the segment
• Bounding transects selected where there was a natural or artificial fish barrier and a block net could be used across the channel to isolate the fish community
• Five channel morphologies (bank incised height, bank full height, bank angle, wetted width, and water depth) in each segment
• Four in-stream habitat (substrate particle size class, embeddedness rating, habitat type classification, and pool to riffle ratio)
• Two riparian zone (overhead cover and buffer zone widths)
• Discharge measured from a representative cross-section

RESULTS
• Water Quality Overview (Table 1)
  • Three of the 5 sites in the eastern portion of the sub-basin (in Missouri) were more mineralized. At M6, W1, and W2, TDS was greater than 0.50 mg/l, and conductivity over 1.0 mS/cm. Sulfates were highest at ED and W2 (over 1.000 mg/l), but was also high at W1 (208.6 mg/l). At M4 and M5, sulfate concentrations were intermediate (85.0 mg/l, and 35.5 mg/l), respectively and higher than the remaining sites (0.1-0.15 mg/l).
  • TP was highest at M6 (0.45 mg/l) and M2 (0.53 mg/l). TP at PA was third highest (0.41 mg/l), followed by the other sites in the order of W2/MC/W1, declining to 0.05 mg/l.
  • TRP highest again at M6 (0.39 mg/l), followed by MC at 0.30 mg/l.
  • The highest NO3-N concentrations were found among the Marmaton River sites.
  • Total N was highest at M6 (0.85 mg/l), similar among M (0.52 mg/l), MC (0.47 mg/l), and W1 (0.46 mg/l).

• Habitat Quality Overview (Table 2)
  • Maximum depth varied from 0.5-1.4 m among the river sites and 0.3-5.1 m among the tributary sites. Mean depth varied similarly, from 0.1-1.6 m among the river sites and 0.1-0.3 m among the tributary sites. Bank incised height (BH) tended to be higher among the river sites compared to the tributary sites and bank full height (BFH) tended to be greater among the main river sites compared to the tributary sites. Bank-full width (BFW) and wetted width (WW) were narrowing among the tributary sites.
  • Except for M1 and M2, canopy substrate areas (CSA) in the river sites were in the gravel to sediment classes. Only ED and W2 among the tributary sites were above CSA > 4.
  • The lowest percentage overhead covers (OC) were found in the Marmaton River sites downstream of M1 and at the tributary site W2.
  • Mean bottle zone width (BDW) varied widely among sites from 1.2 to 20 (20 meter) range to 4.0 (30 m or greater).

• Abundance of Species and Families (Tables 3 & 4)
  • The Red shiner was the most numerous species (38.0%), followed by the Brook silverside (12.2%), Central stoneroller (9.5%), and Redfin shiner (6.8%).
  • Among the Marmaton River sites, the Redfin shiner comprised 53.4% of the collection and was 83.6% of the collection at M6, declining to 20.2% or less at the 3 sites 1.0-21.5 mg/L respectively.
  • The cluster and ordination place the main river sites similarly, but treat the tributary sites differently.