

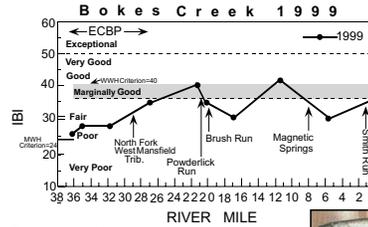
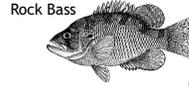
Bokes Cr. @ SR 292



### Habitat Changes and Biological Consequences

Poor habitat, such as treeless banks with a continuous straight channel exposed to the sun, will allow streambanks to become heavily eroded. High stormwater flows carry sediment and smother the stream bottom. Sand or silt substrates replace larger rocks limiting aquatic life to those animals which tolerate such conditions. Few deep pools are usually present. Nutrients in unshaded stream segments are used by algae. Large growths of algae are produced in open canopy areas with highly fluctuating and lethally low D.O. concentrations.

# Bokes Creek



### Biological Integrity

Ohio EPA uses a grading system to score biological integrity at various sites within a basin. The types and numbers of different fish, eating and breeding patterns, and the ability to survive in polluted conditions are some factors of biological integrity. Aquatic insects also reflect the health of the streams they reside in. Only a few types are tolerant of pollution. A healthy stream has a diverse array of life. Based on the types of animals in a stream, Ohio EPA is able to determine the health of the aquatic environment.

### Protective Habitat and Flow

Habitat quality is the key to healthy aquatic communities. A tree lined stream, like this Bokes Creek site, helps to absorb and bind up nutrients, filters sediments, absorbs water from storm runoff, shades the suns heat, and slows algal production. Good habitat provides many living spaces for fish, aquatic insects, mussels, and also for a variety of terrestrial wildlife, birds, reptiles, and amphibians.

## Logan County

Macroinvertebrates associated with good water quality in the Bokes Cr. basin were mayflies and caddisflies (illustrated above, right, and near mouth), elmid beetles, water pennies, and fingernail clams (right). Others were baetid mayflies, tanytarsini midges and riffle beetles.

cased caddisfly

### Attainment Status

**FULLY attaining WWH:**  
(10%) 3.5 miles  
**PARTIAL attainment:**  
(53%) 19.5 miles  
**NON attainment - WWH or MWH:**  
(37%) 13.5 miles

Bokes Creek and its tributaries were surveyed in 1999. Previous basin surveys were conducted in 1981, 1990, 1992, and 1993. The 1999 survey results are shown on this poster.

Fair to poor conditions exist in most of the basin. Polluted runoff from farms, poor habitat, and modified drainage networks were driving factors behind the degraded water quality.

Two pollution intolerant stonecat madtoms (below) were collected at RM 20.2 (adj. SR 31).



Upper Bokes Cr. BMP straw bale sediment trap



River snail Elimia generally found in creek mouth waters



Crayfish were commonly collected in mainstem



Electrofishing equipment just Yearsey Rd. (RM 21.3)



Electrofishing dst. from Phelps Rd. (RM 27.3)



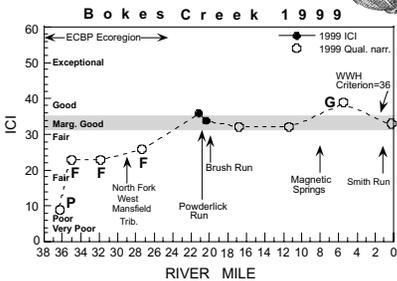
Bokes Cr. adjacent St. Rt. 31 (RM 20.2).



Ust. St. Rt. 257



Banded darters, one of only two pollution intolerant fish species collected, were identified at RM 0.2.



Macroinvertebrates associated with poor water quality or impacts are illustrated above: leeches, Physella snails, limpet snails, red midges and flatworms. Others not shown were aquatic worms and nonred midges.

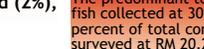


Fish tolerant of pollution or degraded conditions predominated in the impacted stream reaches and comprised 63 percent of the total fish population. The tolerant fish collected during 1999 field sampling were: bluntnose minnow (19%), creek chubs (17%), green sunfish (8%), white suckers (7.5%), stonerollers (5%), fathead minnows (4%), yellow bullhead (2%), and carp (1%).

Bluntnose Minnow



Green Sunfish



The predominant tolerant fish collected at 30 to 40 percent of total community surveyed at RM 20.2 (adj. SR 31) and RM 17.0 (Ford Reed Rd).



sewage



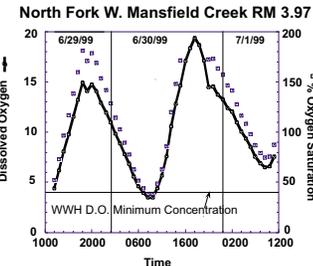
sewage



sewage

### Water Quality Chemistry

Ohio EPA tests stream water and the treated wastewater discharged by facilities. The amount of nutrients, oxygen-depleting substances, bacteria, metals and other pollutants in a sample can be used to identify pollution sources and evaluate water quality.



### Nutrients and Pollution

Excessive nutrients (nitrogen, phosphorus, fecal matter) from agricultural runoff, tiling, unsewered runoff, or some urban stormwater runoff overstimulate algal growth which causes daytime supersaturated dissolved oxygen (D.O.) conditions instream and disrupts the aquatic food web. Then the plant material decays at night and critically lowers dissolved oxygen (D.O.) concentrations at night. Nutrient concentrations in Bokes Creek and its tributaries are contributing to stream water quality degradation. D.O. concentrations less than 4 mg/l, which can limit aquatic diversity and/or be lethal, occurred periodically in: Bokes Creek (at RMs 36.3, 35.1, 31.8, 11.4, 5.5, and 0.2), North Fork West Mansfield Trib., West Fork West Mansfield Trib., Powderlick Run, & Smith Run (example @ left).

Some reaches of Bokes Creek watershed show some success attaining water quality criteria, but impacts to the mainstem and/or tributaries include:

- 1) lack of woody riparian areas along the streams
- 2) extreme hydromodification
- 3) channelization / bank erosion
- 4) nutrient enrichment
- 5) siltation buries rocky bottom
- 6) low night D.O. concentrations
- 7) lack of stable woody debris left in stream channel

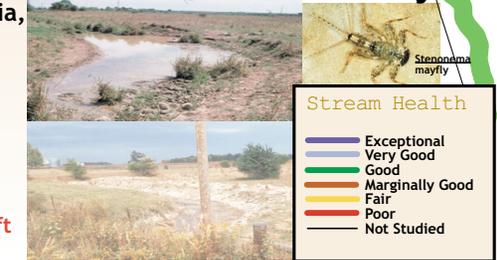
### Stream Health

- Exceptional
- Very Good
- Good
- Marginally Good
- Fair
- Poor
- Not Studied



### Bokes Creek basin:

Drainage Area: 84.2 sq. mi.  
Length: 39.7 miles  
Gradient: 6.3 ft./mile  
Fish taxa collected: 38  
and 1 hybrid  
Bug taxa collected: 167  
mainstem only: 145



Stenonema mayfly

