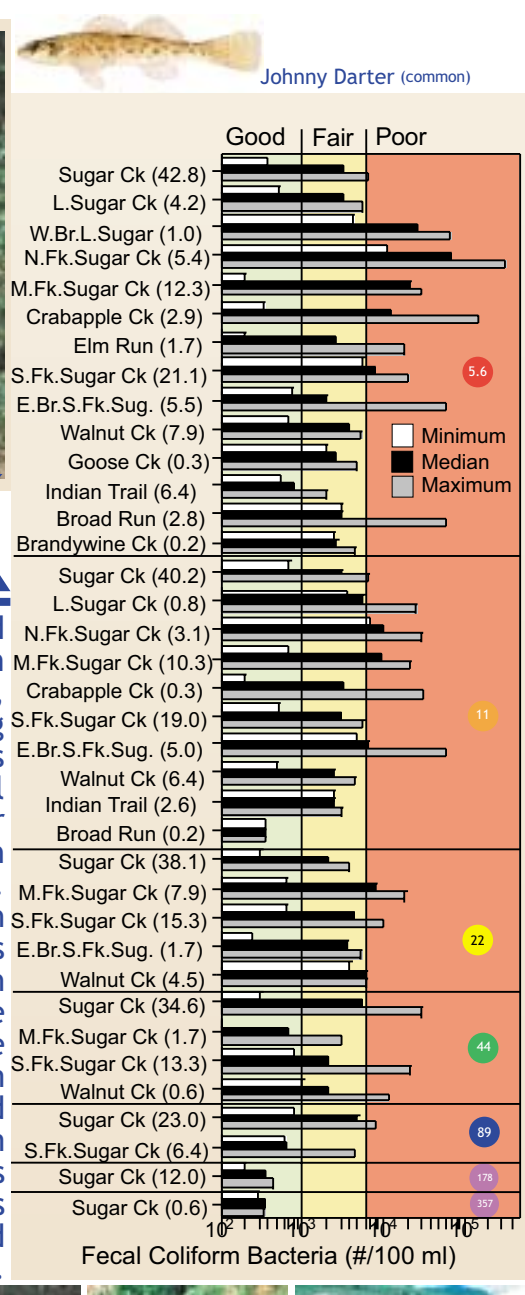


Groundwater
Stream health in the Sugar Creek basin depended on perennial flow. Strong groundwater flow in the Middle and North Forks helped make the otherwise fair to poor habitat conditions better for aquatic life. The Smithville WWTP was also a source of perennial flow. Little groundwater was available in the South Fork area.



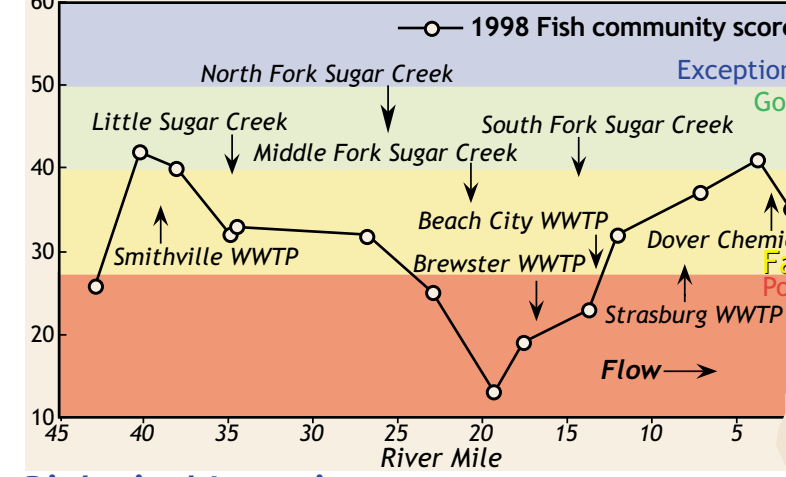
Sugar Creek

In 1998 the Ohio Environmental Protection Agency evaluated the biological health and water quality of the Sugar Creek basin. Fish and aquatic insect communities, water chemistry, stream sediments, and habitat types were studied. The Sugar Creek watershed is among the most degraded watersheds in all of Ohio. Fair or poor conditions exist in most of the basin. Starting in pastures, many small streams were trampled by livestock. Rocks and other stream bottom substrates were usually smothered with silt. Few wooded areas exist next to these streams. Lacking such buffer areas, polluted farm runoff with eroded soil and excessive nutrients was faulted for poor conditions. High bacteria levels commonly made swimming unsafe. Acid mine drainage, contamination from Dover Chemical, and acute toxicity from Holmes ByProducts made some streams dead or prevented better conditions.



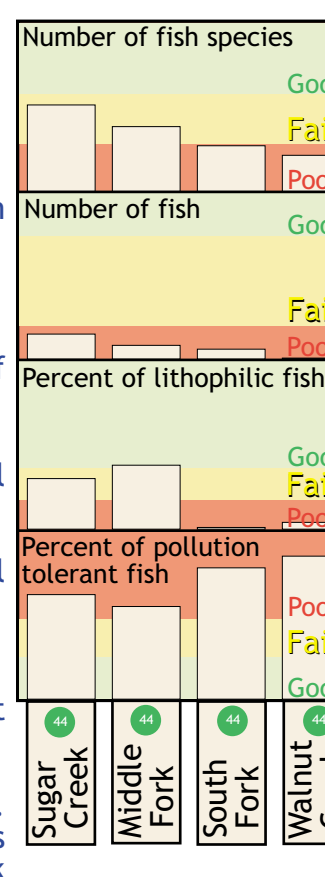
Stream Habitat

Most Sugar Creek streams were eroded, embedded, unshaded, and enriched. Agricultural land use, encroachment and drainage maintenance commonly prevented natural habitat forming functions performed by streamside trees and channel morphology. Wetland reaches also naturally limited stream biodiversity.



Biological Integrity

Ohio EPA calculates a biological integrity grade for each sampling site. Types and numbers of aquatic animals, eating and breeding patterns, and the ability to survive in polluted conditions are factored in this score. The Sugar Creek basin was inhabited by simple aquatic communities with few pollution sensitive species. Smallmouth bass were nearly absent from the basin. Like a "canary in a coal mine," the loss of this fish occurs as water quality declines. Biological integrity was naturally low in the Brewster area due to a large wetland which was not expected to support stream oriented aquatic communities.



Parts of the fish community biological integrity scores from four similar sites in the Sugar Creek basin appear at right. The few fish in Walnut Creek tolerated pollution and were capable of spawning in spite of silty conditions.

Lithophilic (stone loving) fish need clean, unembedded gravel to broadcast their eggs over. The voids between rocky substrates protect the eggs until the fry hatch. Few places in the Sugar Creek basin were conducive to lithophils.

The number of fish throughout the basin was poor. Habitat improvements are needed to improve aquatic communities. Fencing livestock from streams and planting trees along creek corridors are important first steps.



Acid Mine Drainage

Rain water draining through mined areas can leach metals from the soil and become acidic. This water can also be toxic to aquatic life. Cherry Run and Turkeyfoot Run were essentially dead due to acidity. Broad Run, Brandywine Creek and Goettge Run were also limited by mine drainage. Following efforts to reclaim a mined area, it can take years for a stream to recover.

Chemical Water Quality

Poorly managed livestock waste and home septic system overflows were two sources of high bacteria levels in the Sugar Creek basin. These sources along with municipal and industrial wastewater and farm fertilizer runoff contributed to high nutrient concentrations throughout the basin.



Symbols:
 * RM 3.0 Sampling site in miles upstream from mouth
 ★ NPDES Ohio EPA permitted treated wastewater discharge
 5.6 11 22 44 89 357 Drainage area of site from geometric stratification. The 357 sq. mi. basin was sequentially divided in halves. Subsequent locations were sampled and compared to each other.

Stream Health
 — Exceptional
 — Very Good
 — Good
 — Fair
 — Poor



Sugar Creek:
 Length: 45 miles
 Gradient: 6.3 ft/mi
 Drainage Area: 357 sq mi
 Fish Species: 55
 Aquatic Insect Types: 280
 Fish Consumption Advisories: None

