

MANAGEMENT IMPLICATIONS

Long-term studies of this nature are critical to establish water quality trends and understand biological conditions. To effectively manage the resources, officials and local interest groups must have a true picture of ecological dynamics and possible problem areas, which can only be obtained through long-term studies such as this one.

Several management implications can be extracted from the chemical water quality, macroinvertebrate community, and physical habitat data collected from sampling areas. These observations, although based on a small sample size, are presented as possible subject areas for future research and as issues to be considered by aquatic resource managers, local interest groups, elected officials, and other policy-makers.

New York – Pennsylvania Sites

The sites in this reference category have shown and continue to show a large degree of variability in water quality; however, they do not vary much in biological or habitat condition. The biological conditions overall are nonimpaired or only slightly impaired. Habitat conditions were rated as excellent or supporting at all the NY-PA border sites, with the degradation at numerous sites due to dredging in the stream, inadequate riparian vegetative buffers, and the unstable nature of these glacial streams. Of particular interest is the prevalence of elevated total iron and total aluminum values throughout the sampling period, although there were fewer samples exceeding water quality standards in 2004-2005 than in 2003-2004.

Pennsylvania – Maryland Sites

In fiscal year 2005, total nitrogen and total nitrate concentrations continued to be elevated in the PA-MD interstate sites. The area surrounding the PA-MD border monitoring stations was largely agricultural. Intensive agricultural activities without proper Best Management Practices often result in streambank erosion and sedimentation, contributing to poor instream habitat quality and to nutrient enrichment. Nutrient enrichment encourages excessive plant growth, which can depress dissolved oxygen levels during plant decomposition. The most common habitat problem at the PA-MD sites was lack of riparian vegetative buffer zones along the stream corridors.

River Sites

Due to high river flows, staff collected biological samples at only three of the river stations during summer 2004. SUSQ 365.0 has continuously exhibited higher quality conditions than other river stations in the ISWQN. The Cowanesque River (COWN 2.2) downstream of the Cowanesque Reservoir had the poorest conditions with moderately impaired biological conditions and supporting habitat. Overall, high total iron and total aluminum concentrations were prevalent in the water quality conditions of the river sites during fiscal year 2005.

Group 3 Streams

The Group 3 streams were located on the NY-PA border, so many of them were glacial streams that were dredged for gravel. These disturbances in habitat may have attributed to degradation in the biological community. Conversely, many of the Group 3 streams were small order streams that were largely forested. These protective habitat conditions may have attributed to nonimpaired biological conditions. In fiscal year 2005, these sites were sampled after a high water event which caused noticeable

degradation at many of the Group 3 sites and resulted in lower habitat scores this year than in previous years.

Future Study

Future study and remediation efforts should focus on those streams that had moderately impaired macroinvertebrate communities or exceeded water quality standards. Moderately impaired biological conditions were found at Camp Brook, White Branch Cowanesque River, Denton Creek, Sackett Creek, and the Cowanesque River downstream of the Cowanesque Reservoir (COWN 2.2). Additional study of stream water chemistry, biology, and habitat at varying flows may help explain some impairment problems.

During this sampling period, a large number of streams had water quality parameters that exceeded standards. These streams included Bentley Creek, Cascade Creek, Cayuta Creek, Choconut Creek, Little Snake Creek, North Fork Cowanesque River, Seeley Creek, South Creek, Troups Creek, Trowbridge Creek, Conowingo Creek, Ebaughs Creek, Chemung River, Cowanesque River (1.0 and 2.2), the Susquehanna River (289.1, 340.0, and 365.0), Tioga River, and Denton Creek. The water quality conditions of these streams should be monitored for future violations. Furthermore, the source of these pollutants should be identified. State water quality standards vary across state lines, and problems may arise when the source of these pollutants is located in an adjacent state.

CONCLUSIONS

Twenty-two (48.9 percent) of the 45 interstate streams sites at which macroinvertebrate samples were collected contained nonimpaired biological communities. Biological conditions at another 18 sites (40.0 percent) were slightly impaired, while five sites (11.1 percent) were moderately impaired. No sites were designated severely impaired. Six sites (SUSQ 10.0, SUSQ 44.5, SUSQ 289.1, SUSQ 340.0, TIOG, and CHEM) were not sampled using RBP III techniques and, thus, were not averaged into the final scores. Nineteen sites (42.2 percent) had excellent habitats. Nineteen sites (42.2 percent) had supporting habitats, and seven sites (15.6 percent) had partially supporting habitats.

Overall, 72 observations (9.8 percent) of water chemistry parameters exceeded state standards, which is approximately the same proportion of exceedance values as the previous year. Total iron exceeded standards most frequently with 31 violations (43 percent). Total iron and total aluminum appear to be naturally high in some of these watersheds. Tioga River is the only stream that has documented abandoned mine discharge indicated by high metals and high acidity. Elevated aluminum and depressed alkalinity may be due to acid precipitation, especially in the NY-PA border streams. Total dissolved solids, nitrate plus nitrite, and dissolved oxygen are all indicators of organic pollution.

Of the NY-PA border streams, the biological community of ten (71.4 percent) of these streams was nonimpaired, and four sites (28.6 percent) were slightly impaired. Eight sites had excellent habitats (57.1 percent), and six sites (42.8 percent) had supporting habitats. Overall, biological conditions improved at four sites and stayed the same at the other 10 stations. High metal concentrations, particularly total iron and total aluminum, appeared to be the most common sources of water quality degradation in this region. The parameters that exceeded New York and Pennsylvania state standards were total iron, total aluminum, total chlorine, and alkalinity. Iron standards were exceeded at Bentley Creek, Cascade Creek, Cayuta Creek, Choconut Creek, Little Snake Creek, North Fork Cowanesque River, South Creek, Troups Creek, and Trowbridge Creek. Aluminum standards were exceeded at Bentley Creek, Cayuta Creek, Choconut Creek, Little Snake Creek, North Fork Cowanesque River, Seeley Creek, and Troups Creek. Total chlorine was exceeded at Cayuta Creek, while Cascade Creek and Little Snake Creek exceeded