

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

alkalinity standards. In fiscal year 2005, high flows may have impacted the water quality and biological conditions at the NY-PA border streams.

Nonimpaired biological conditions existed at two (25.0 percent) of the eight PA-MD interstate streams and six sites (75.0 percent) were slightly impaired. Six (75.0 percent) of the PA-MD border sites had excellent habitats, one (12.5 percent) had supporting habitat, and one site (12.5 percent) had partially supporting habitat. Biological conditions at PA-MD sites appeared to improve or remain the same, with the exception of South Branch Conewago Creek, which showed some degradation. Water quality at two sites exceeded Pennsylvania and Maryland water quality standards: nitrite plus nitrate at CNWG 4.4 and total chlorine at EBAU 1.5. The PA-MD border streams are located in a heavily agricultural region, and many of the parameters that exceeded the 90<sup>th</sup> percentile at these sites were nutrients. Also, streambank erosion and sedimentation created instream habitat problems in this region.

River sites consisted of nine stations located on the Susquehanna River, Chemung River, Cowanesque River, and Tioga River. One station (SUSQ 10.0) is never sampled for macroinvertebrates due to a lack of riffle habitat and deep water at the site, while five stations were not sampled for macroinvertebrates during fiscal year 2005 due to high river flows throughout the summer sampling period. The remaining sites (SUSQ 365.0, COWN 1.0, and COWN 2.2) were compared to Cascade Creek, the reference station for the NY-PA stations. The biological communities of two sites (66.7 percent) were nonimpaired, while COWN 2.2 was moderately impaired. Habitat at SUSQ 365.0 was excellent, and both Cowanesque River sites had supporting habitat. Water quality parameters that exceeded state standards were total iron and total aluminum. Standards were exceeded at CHEM 12.0, COWN 2.2, COWN 1.0, SUSQ 365.0, SUSQ 340.0, SUSQ 289.1, and TIOG 10.8. The biological condition at the one Susquehanna River site sampled remained the same from previous years. COWN 1.0 improved from the last time it was sampled in 2002-2003, while COWN 2.2 remained moderately impaired as in the past. Water quality appeared to improve with a decreased number of state water quality standard violations.

Of the 20 Group 3 sites, eight stations (40.0 percent) were considered nonimpaired. Eight sites (40.0 percent) had slightly impaired biological communities, and four stations (20.0 percent) had moderately impaired conditions. Four (20.0 percent) of the 20 stations sampled had excellent habitat conditions, while 10 (50.0 percent) had supporting and six had partially supporting habitats. Most of the Group 3 streams remained the same as previous years, although five sites did show slight degradation in the biological community.

The current and historical data contained in this report provide a database that enables SRBC staff and others to better manage water quality, water quantity, and biological resources of interstate streams in the Susquehanna River Basin. The data can be used by SRBC's member states and local interest groups to gain a better understanding of water quality in upstream and downstream areas outside of their jurisdiction. Information in this report also can serve as a starting point for more detailed assessments and remediation efforts that may be planned on these streams.