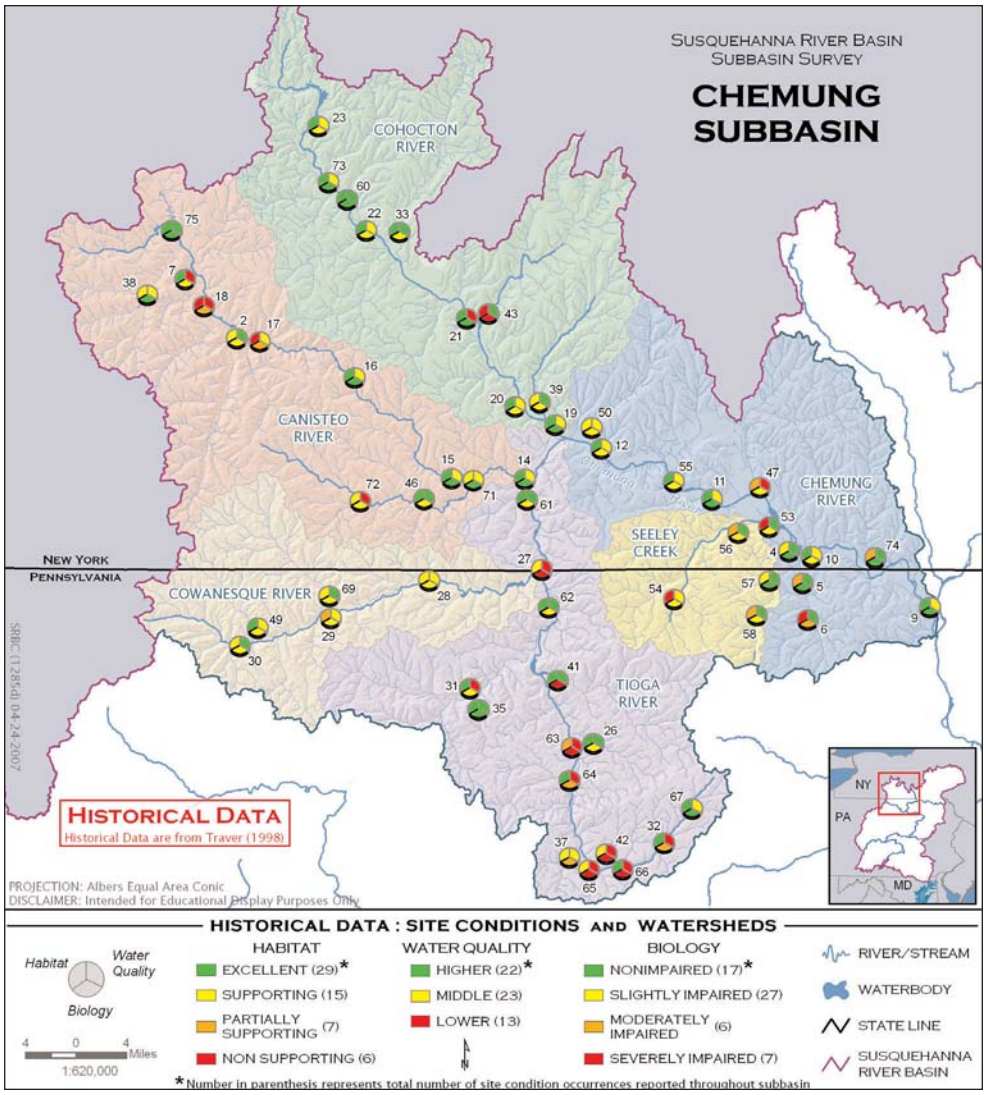
COMPARISON of 1997 and 2006 Data

Overall biological, habitat, and water quality conditions in 1997 and 2006 were indicative of a mostly healthy subbasin. The results for water quality, biological, and habitat conditions in the 1997 Chemung Subbasin Survey (Traver, 1998) are depicted in Figure 5. One site, CNST 55.5, was sampled historically, but not in the current 2006 survey. This site is listed in red print in the Appendix as site number 75. The methods have changed slightly throughout the years, and the methods for the 1997 survey can be found in Traver (1998). Specifically, the number of macroinvertebrates subsampled changed from 100 to 200, the habitat assessment form changed to assigning each parameter 20 points instead of weighting the parameters with different point ranges, and the water quality assessment analysis has changed. In the 1998 report, Traver assessed water quality using Principal Components Analysis and cluster analysis and did not assign rating categories for site conditions. For comparison purposes, the 1997 data were analyzed using current methodology to acquire water quality site condition ratings. In addition, the reference categories have changed due to advances in Geographic Information Systems technology and calculation of drainage size. Another difference between the data sets was flow, which varied from site to site for different years.

A comparison of 1997 and 2006 data showed mostly similar conditions; however, biological conditions appeared to be slightly better in 2006. The overall percentage of each biological condition in 1997 was very similar to the conditions in 2006, although there was a slightly higher percentage of nonimpaired and slightly lower percentage of severely impaired in 2006 (Figures 6 and 7). In 1997, 23 percent of the sites were moderately and severely impaired, and in 2006, 20 percent of the sites were moderately and severely impaired. Conversely, 77 percent were nonimpaired and slightly impaired in 1997 and 80 percent were nonimpaired and slightly impaired in 2006. Twenty-one sites had the same biological condition category in 2006 as they did in 1997. The biological condition had degraded at thirteen sites and improved at 19 sites. Five of the sites that improved had improved by more than one step in condition category, specifically CNST 33.0, COWN 0.1, JOHN 0.1, MILL 1.4, and MUDC 1.1.



J. Zimmerman

(station names corresponding to sample site numbers on map are located in Appendix)

Figure 5. *Water Quality, Biological, and Habitat Conditions in 1997 Sample Sites in the Chemung Subbasin.*

Habitat conditions improved in some categories, but degraded in others. Fifty-one percent were rated excellent in 1997 while only 34 percent were excellent in 2006. Only three percent were rated nonsupporting in 2006, whereas 11 percent were nonsupporting in 1997. Two sites degraded in habitat condition by more than one condition category from 1997 to 2006. Those two sites were COHO 25.0 and TENM 0.2. On the other hand, habitat conditions improved at five sites from 1997 to 2006. Those sites were COWN 20.5, SEEL 2.8, SEEL 11.4, SOUT 2.0, and TIOG 29.8.

The water chemistry at the time of sampling in 2006 was worse than at the time of sampling in 1997. This may have been due to flow or unusual water chemistry conditions at the time of sampling. Twenty-eight percent were rated "higher" quality and 41 percent "lower" quality in 2006, whereas 38 percent were "higher" and 22 percent "lower" in 1997. Thirty-two of the sites remained in the same water quality condition category from 1997 to 2006, while nineteen degraded and six improved. Seven sites degraded by more than one category step. Those sites were BNTY 5.7, CORY 1.5, FMIL 1.1, MUDC 1.1, SOUT 5.9, SOUT 9.1, and TIOG 6.2. Table 7 shows a comparison of the total number of sites exceeding levels of concern for the sites that were

Year	Alkalinity	Aluminum T	Hardness T	Iron T
1997	8	11	1	3
2006	8	29	1	3
	Magnesium T	**Manganese T**	**Nitrate-N T**	**Nitrogen TOT**
1997	1	6	7	14
2006	1	4	7	17
	Phos T Ortho	**Phosphorus T**	**Sodium T**	**Sulfate T**
1997	6	1	22	1
2006	5	5	19	1
	T Org Carbon	**T Susp Solid**	**Acidity (Field)**	**pH (Field)**
1997	0	3	4	6
2006	1	3	3	5
	Specific Conductivity (Field)		**Water Temperature (Field)**	
1997	2		0	
2006	2		16	

Table 7. *Number of Water Quality Values Exceeding Levels of Concern for the same sites in 1997 and 2006*

sampled in both 1997 and 2006. The top three parameters with the highest number exceeding levels of concern were the same in 1997 and 2006. They were sodium (22), nitrogen (14), and aluminum (11) in 1997 and aluminum (29), sodium (19), and nitrogen (17) in 2006. The number of sites exceeding levels of concern for each parameter was very similar between the two surveys, except for aluminum and temperature, which increased in 2006. The high temperatures may have been due to the fact that the summer of 2006 was the second warmest on record (NOAA, 2006a; NOAA, 2006b). In particular, July was the second hottest on record (NOAA, 2006c), and July or early August was the time when most of the samples were collected for sites that exceeded temperature levels of concern.

The sites that were impaired due to AMD in 1997 still were impaired in 2006, except for Johnson Creek, which improved significantly, and Fellows Creek, which improved only slightly. Morris Run remained the most severely impaired AMD site from both surveys.

Cowanesque River showed improvement from 1997 to 2006 at COWN 0.1 and COWN 12.0. Habitat and water quality conditions at COWN 20.5 improved, but biological conditions did not. Biological and water quality conditions improved and the habitat remained excellent at North Fork Cowanesque River. The Cowanesque River Watershed has been impacted in the past by problems with a tannery, wastewater treatment systems, and agricultural runoff (Traver, 1998). The improvement seen may be due to upgrades in treatment systems and agricultural best management projects. Numerous Stream ReLeaf Projects (http://www.dep.state.pa.us/dep/deputate/watermgt/WC/Subjects/StreamReLeaf/default.htm) are documented in this watershed (eMap PA, 2007). Also, the improvement seen at COWN 0.1, which is located downstream of the Cowanesque Reservoir, may be attributable to the improvements made to the dam around 2000. During the late 1990s, problems with the control mechanisms for the low flow control gates and intake structure gates resulted in low flow releases coming off the bottom of the reservoir, which is water low in dissolved oxygen. Since those repairs have been made, the water released from the dam can be mixed with other layers in the lake to produce better water quality (Lazorchick, 2007).

Impairment of the Canisteo River in the Hornell-Canisteo area was documented in the 1997 sampling at CNST 33.0 and CNST 38.7 and appeared to continue in the 2006 survey. Habitat and water quality degradation was attributed to the urban land use and to poor quality conditions on Canacadea Creek. The 1997 survey also documented improvement in water quality on the Canisteo River downstream at sites CNST 22.6 and CNST 7.7.

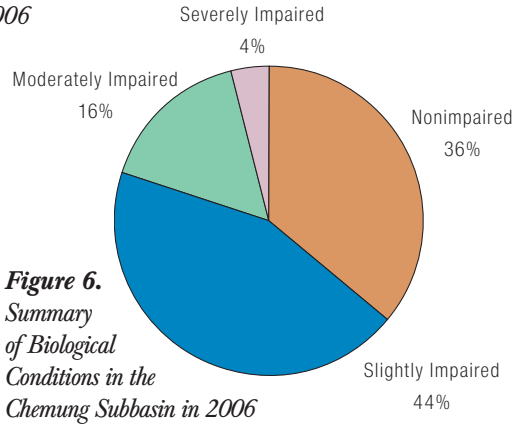


Figure 6. *Summary of Biological Conditions in the Chemung Subbasin in 2006*

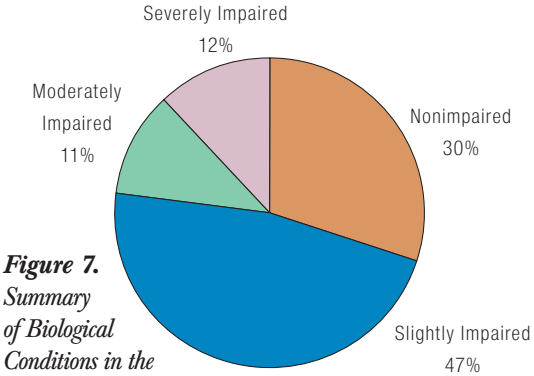


Figure 7. *Summary of Biological Conditions in the Chemung Subbasin in 1997*