PA FISH AND BOAT COMMISSION
COMMENTS AND RECOMMENDATIONS
June 8, 1992

WATER: Catawissa Creek Basin (405E)
Carbon, Schuylkill, Luzerne, and Columbia Counties

EXAMINED: June and July, 1997

BY: R. Moase, T. Copeland, R. Wnuk, and R. Mulberger

Bureau Director Action:	Approve Delano R. Graff	Date:	10-2-98
Division Chief Action:	Richard A. Snyder	Date:	10-1-98
WW Unit Leader Action:		Date:	
CW Unit Leader Action:	R. Thomas Greene	Date:	9/29/98

CW UNIT COMMENTS:

The Catawissa Creek basin (405E) was examined during June and July 1997 to update inventory information on Catawissa Creek, Sections 01-04; Catawissa Creek, Little, Sections 01-02; Trexler Run, Section 01; Beaver Run, Sections 01-02; Scotch Run, Sections 01-02 and to collect baseline inventory information on 17 tributary streams.

CATAWISSA CREEK:

Catawissa Creek, Sections 01-04, can be characterized as a stream that has been chronically degraded by mine acid drainage. Sampling at a total of 15 sites recorded the presence of only six fish species. In general, fish populations were severely depressed and occurred only in the proximity of tributary streams or in the lower reaches of the stream where the impacts of acid mine drainage had been diluted by the combined influence of a number of tributary streams.

CATAWISSA CREEK, LITTLE:

Section 01

This segment can be characterized as a small infertile, freestone stream. The 1997 inventory recorded the presence of three fish species, including a Class A wild brook trout fishery estimated in excess of 30 kg/ha.

Section 02

Section 02 can be characterized as a small freestone stream. Historically, this section has been managed with the planting of PFBC catchable trout. The 1997 inventory (conducted at three sites) recorded the presence of 12 fish species, including a sparse biomass Class D wild brook and brown trout fishery estimated at 5.08 kg/ha.

Raccoon Creek, Crooked Run, Klingermans Run, Fisher Run, and Furnace Run addition, Davis Run supported a fine Class A mixed wild brook and brown fishery estimated at 48.30 kg/ha. In general, the waters that suppor fish community were infertile streams (pH 5.8 - 6.6; total alkalinity 1-6 mg/l) with the exceptions of Dark Run, Tomhicken Creek, Section 01 and Raccoon Creek (pH 7.0 - 7.4; total alkalinity 20-42 mg/l).

CW UNIT RECOMMENDATIONS:

1. The following stream sections (405E) should be managed as Class A wild brook trout fisheries; Messers Run, Section 02; Negro Hollow, Section 01; Rattling Run, Section 01; Catawissa Creek, Little, Section 01; Crooked Run, Little, Section 01; Raccoon Creek, Section 01; Crooked Run, Section 01; Klingermans Run, Section 01; Fisher Run, Section 01; and Furnace Run, Section 01. Conventional statewide regulations should apply with no stocking.

2. Trexler Run (405E), Section 01, should continue to be managed as a Class A wild trout fishery. Conventional statewide regulations should apply with no stocking.

3. Davis Run (405E), Section 01, should be managed as a Class A mixed wild brook and brown trout fishery. Conventional statewide regulations should apply with no stocking.

4. Messers Run (405E), Section 01, should be managed as a biomass Class B water under the Natural Yield Option. Conventional statewide regulations should apply with no stocking.

5. Messers Run (405E), Section 03, and Tomhicken Creek, Section 01, should be managed as biomass Class C waters under the Natural Yield Option. Conventional statewide regulations should apply with no stocking.

6. Dark Run (405E), Section 01; Tomhicken Creek, Section 02, and Scotch Run, Section 01, should be managed as biomass Class D waters under the Natural Yield Option. Conventional statewide regulations should apply with no stocking.

7. Beaver Run (405E), Section 02; Catawissa Creek, Little, Section 02, and Scotch Run, Section 02, should continue to be managed with the planting of PFBC catchable trout. Stocking rate and frequencies should be determined by classification according to program guidelines.

8. Beaver Run (405E), Section 01, should be managed as a warmwater stream under the appropriate warmwater option.

9. Due to severe water quality degradation, no further management action is recommended at this time for the following waters; Catawissa Creek (405E), Sections 01-04; Stony Run, Section 01; Tomhicken Creek, Little, Section 01; Sugarloaf Creek, Section 01, and Cranberry Run, Section 01.

10. Due to complete closure to public access, no further management action is recommended at this time for the following waters; Hunkydory Creek (405E), Section 01 and Catawissa Creek, Little, Section 03.

11. A brook trout restoration effort should be initiated on Mine Gap Run (405E), Section 01. The preferred option would involve a transfer of wild brook trout from an adjacent wild brook trout population.

12. Due to the presence of Class A wild trout fisheries the DEP Water Quality Standards should be upgraded to HQ-CWF for the following waters; Rattling Run, Trexler Run, Crooked Run, Little; Raccoon Creek, Crooked Run, Klingermans Run, Fisher Run and Furnace Run. The upgraded protection status should apply to the entire basin on each water from the headwaters downstream to the mouth. A copy of this report should be forwarded to DEP via Environmental Services.

13. Due to the presence of a Class B wild trout fishery, the DEP Water Quality Standards should be upgraded to HQ-CWF for the Long Hollow basin from the headwaters to the mouth. A copy of this report should be forwarded to DEP via Environmental Services.

14. The Area 4 staff should make the appropriate database change to reflect a revised upstream river mile for Messers Run (405E), Section 01.

15. I concur with the Area 4 recommendations regarding the water quality reclamation efforts in the Catawissa Creek (405E) basin.

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

PENNSYLVANIA FISH AND BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION

Catawissa Creek Basin (405E)
Fisheries Management Report

Prepared by:
Robert Wnuk, Robert Moase, Timothy Copeland, and Robbie Mulberger

Date Sampled: June and July, 1997 Date Prepared: January, 1998

Introduction

There is a substantial fishery resource in the 40,000+ miles of flowing waters throughout Pennsylvania. To realize the potential of this resource the Pennsylvania Fish and Boat Commission (PFBC) has established a policy of resource examination and classification. The primary objectives of the examination are the documentation of the state of the fishery and the collection of social, physical, and chemical data that influence how the fishery can be utilized. Establishing relationships among these parameters allows each individual stream section to be classified and placed into a resource category. Once assignment to a resource category has been completed, a management plan that is consistent with statewide goals and objectives can be implemented.

The Area 4 Fisheries Management Office has been conducting stream examinations on a drainage basin level to facilitate management by resource classification. The Catawissa Creek basin was selected for investigation in 1997 because the fishery of many of the streams in this relatively large drainage had never been documented. Additionally, the information we had on previously surveyed streams was fairly dated. Thus, the objectives of this examination were to: 1) provide baseline data on the fishery in those streams which had never been surveyed so that they could be assigned to a resource category, and 2) to evaluate past management practices on previously surveyed streams, and implement new management strategies where appropriate.

Study Area

Catawissa Creek is formed by the confluence of Hunkydory Creek with an unnamed tributary in an active strip mine near the village of Kelayres. The stream flows generally west for 65.8 km to its confluence with the Susquehanna River, North Branch at River Mile (RM) 20.60 in the Borough of Catawissa (Fig. 1). The 396 km^2 drainage basin encompasses portions of Carbon, Luzerne, Schuylkill, and Columbia Counties. The watershed can be located on the USGS 7.5 minute quadrangles of Hazleton, Conyngham, Delano, Shenandoah, Ashland, Nuremburg, Shumans, and Catawissa, Pennsylvania. There are

25 named streams, 6 named reservoirs (Table 1), and numerous unnamed tributaries, farm ponds, strip mine pits, and wetlands in the drainage.

The Catawissa Creek basin lies within the Appalachian Mountain section of the ridge and valley physiographic province. The topography of the basin from the headwaters downstream to Mainville is that of the northern sandstone ridge and anthracite regions. These areas are generally characterized by sharp ridges and narrow valleys. The topography of the basin downstream from Mainville is that of the northern shale valley region. This area is generally characterized by rolling valleys and isolated hills. Soils throughout the Catawissa Creek basin are usually well drained and acidic.

The underlying geology of the upper portion of the Catawissa Creek basin, from the headwaters downstream to the confluence with Tomhicken Creek, is dominated by the Mississippian Age Mauch Chunk Formation. This formation consists of infertile shales, siltstones, sandstones, and some conglomerate. In addition, this portion of the basin contains significant deposits of Pennsylvanian Age anthracite coal from the Llewellyn Formation and the Pottsville Group.

The underlying geology of the middle portion of the Catawissa Creek basin, from the confluence with Crooked Run downstream to Mainville, is dominated by a combination of the Mauch Chunk and Pocono Formations. The Pocono Formation is Mississippian in Age and consists of infertile sandstone with minor siltstone. Small amounts of the Spechty Kopf Formation are present in tributaries to the southwestern edge of this portion of the basin, and a small coal deposit is present on McCauley Mountain between the Beaver and Scotch Run watersheds. The Spechty Kopf Formation is Mississippian/Devonian in Age, and consists of sandstone, siltstone, and local polymictic diamictite.

The underlying geology of the lower portion of the Catawissa Creek basin, from Mainville downstream to the mouth, is composed of Devonian Age materials from the Buddys Run Member. The Buddys Run Member consists of sandstone, siltstone, and claystone. This portion of the basin does not contain any named tributaries.

The predominant land use in the Catawissa Creek basin is Appalachian Oak forest. State Game Lands (SGL) # 308, in the Messers Run drainage, encompasses 432 hectares of forested land, and SGL # 58, located along Catawissa and Nescopeck Mountains in Columbia County, encompasses 5,117 hectares of forested land. The remaining forests in the basin are privately owned. Single family rural residences and small farming operations are scattered throughout the drainage. More concentrated residential development is present in the Boroughs of McAdoo (population 2,459), Ringtown (population 853), and Catawissa (population 1,683), while the City of Hazleton (population 24,730) lies just outside of the northeastern edge of the basin. New residential development is taking place in Eagle Rock Village along Sugarloaf Creek and on Green Mountain in the headwaters of Little Tomhicken Creek and

Little Crooked Run. Fairly large, private, vacation style campgrounds are present along the lower portions of Catawissa and Tomhicken Creeks. Major roads that provide access to the Catawissa Creek basin include I-81, SR 339, SR 924, and SR 487.

Land use in the upper portion of the Catawissa Creek basin has been greatly affected by the region's anthracite coal deposits. Much of this area has been subjected to both deep mining and strip mining. Deep mining in the drainage was discontinued in the early 1970's when it was no longer profitable (Gannett et al. 1974), but some strip mines remain active. The natural drainage patterns of many tributaries in this portion of the basin have been destroyed or altered by mining activities, and several streams have been polluted by acid mine drainage (AMD). AMD pollution and the ability of streams degraded by AMD to support stocked trout fisheries prompted many of the first stream surveys in the Catawissa Creek basin.

Historical Perspective

The PFBC has surveyed the main stem of Catawissa Creek three times. Bielo and Lech (1957) performed the initial PFBC examination of the stream in response to a request from an area angler to initiate a trout stocking program. The investigators concluded that Catawissa Creek possessed excellent physical characteristics and suitable water temperatures for trout management, but that the stream was virtually devoid of aquatic life due to AMD. Graff (1966) conducted a chemical survey of Catawissa Creek and many of its tributaries following newspaper reports that AMD pollution had abated. Graff identified four major sources of AMD in the basin and concluded that Catawissa Creek remained severely impaired. Tributary streams were described as naturally infertile and incapable of diluting AMD pollution in the main stem. Daniels (1976) conducted a chemical survey of Catawissa Creek and its tributaries using some of the same sampling locations as Graff (1966). Water chemistries in 1976 were similar to those in 1966, although pH and alkalinity values for Catawissa Creek showed some improvement.

The engineering firm of Gannett et al. (1974) completed a detailed report of AMD abatement measures for Catawissa Creek at the request of the Pennsylvania Department of Environmental Protection (DEP). Three separate coal basins were identified as contributing AMD to the stream: North Green Mountain, South Green Mountain, and Jeansville. The engineers concluded that the Audenried Tunnel was the main source of AMD to Catawissa Creek, and recommended that the tunnel be sealed. The tunnel was never sealed, however, and it continues to discharge both AMD and municipal sewage to the headwaters of Catawissa Creek. The DEP did not seal the Audenried Tunnel because the engineers were unable to access enough of its length to determine if the seal would be effective, and because the acid water would have simply discharged to another portion of the basin (K. Laslow, DEP. Personal communication, 1997).

The PFBC has surveyed Little Catawissa Creek nine times. Lech (1939a) performed the initial examination and recommended the stream for trout stocking. Lech (1939b), Bielo (1957a), and Graff (1967) performed cursory examinations related to a silted in dam, stream widths, and a proposed impoundment, respectively. Daniels (1965) examined Little Catawissa Creek in response to reports of extensive posting. He determined that Section 03 was entirely posted against public trespass and removed it from the trout stocking program. Section 02 remained in the program but was considered unsuitable for inseason stockings because of low flow. Daniels (1971) and Hesser et al. (1971) confirmed Section 03 was posted against public trespass and recommended that Section 02 continue to be stocked preseason only.

Past fisheries management practices on Little Catawissa Creek were reevaluated by Daniels et al. (1976a) as part of the statewide effort to inventory and classify all stocked trout waters. Following this survey, Section 01 was classified as a Class A wild brook trout fishery, Section 02 was classified as a rural stream with good recreational use potential, and Section 03 was classified as a rural stream with poor recreational use potential because it was closed to public access. Under this new classification system and revised section limits, Section 02 qualified for a single inseason stocking.

The management changes implemented on Little Catawissa Creek by Daniels et al. (1976a) were evaluated by Daniels (1985a). The 1984 survey recommended the continuation of previous management strategies in Sections 02 and 03, but that conditions in Section 01 merited a change in classification. The wild brook trout population had declined from a Class A to a Class D biomass, possibly as a result of declining alkalinity due to AMD in the headwaters coupled with increasing deposition of sand and silt in the stream channel. The potential for AMD in the headwaters of Little Catawissa Creek had previously been noted by Daniels (1965, 1971) and Graff (1967).

The most recent biological survey of Little Catawissa Creek was performed by the DEP in response to a PFBC request to upgrade the Chapter 93 water quality classification of Section 01 (Pennsylvania Department of Environmental Protection 1991). The DEP documented instream water quality that was better than applicable criteria, a diverse aquatic macroinvertebrate community, and a naturally reproducing brook trout population. The DEP had previously issued four mining permits for the same parcel of land along the northern ridge of the drainage, but could not document any evidence of water quality degradation in Little Catawissa Creek as a result of these mines. The Chapter 93 water quality classification of Section 01 was subsequently upgraded to high quality coldwater fishery (HQ-CWF).

The PFBC has surveyed Tomhicken Creek twice. Bielo (1957b) described the stream as excellent physically but degraded throughout its length by AMD. Graff (1966) located two sources of AMD in the Tomhicken Creek drainage in the vicinity of T 455. One discharged directly to Tomhicken Creek and the other, which was described as particularly bad, discharged to Little Tomhicken Creek near its mouth.

The PFBC has surveyed Beaver Run twice. The initial examination, by Daniels et al. (1976b), classified Section 01 as a rural stream with poor recreational use potential because it was closed to public access. No electrofishing was conducted here because of low flows. Section 02 was classified as a rural stream with good recreational use potential. The investigators recommended the continuation of an historic trout stocking program in this portion of stream. Daniels (1988) reevaluated these management strategies and found them to be appropriate. Section 01 remained closed to the public and, once again, no electrofishing was conducted due to low flows. Section 02 remained suitable for catchable trout management.

Daniels et al. (1977c) conducted the only previous PFBC survey of Scotch Run. The investigators classified Section 01 as a rural stream with poor recreational use potential because it was mostly closed to public access. Electrofishing efforts in this section documented a sparse population of wild and hatchery brook trout. The investigators classified Section 02 as a rural stream with good recreational use potential, and recommended this section for adult trout stocking.

The PFBC has conducted three previous surveys of Trexler Run. Shoemaker (1932) performed the initial examination and rejected the stream for trout stocking because it was too small. Lech (1939c) rejected the stream for trout stocking because it was posted against public access. Nevertheless, PFBC records indicate that Trexler Run was stocked with fingerling brook and brown trout five times between 1940 and 1957. Daniels (1985b) classified Trexler Run as a rural stream with a Class A wild brown trout population. Recreational use potential was rated low because of significant posting against public access.

The PFBC has conducted two other biological surveys on tributaries to Catawissa Creek. The environmental services branch (Young 1990) documented the presence of 7 fish species in Messers Run, including a dense population of wild brook trout. Copeland (1992) documented a Class B wild brook trout population in Long Hollow. The results of all historical examinations in the Catawissa Creek basin have led to the development of current DEP and PFBC management strategies for surveyed waters in the drainage. These management strategies are described below.

Current Management Strategies

The DEP classifies the majority of the streams in the Catawissa Creek basin as coldwater fisheries (CWF) in its Chapter 93 water quality standards. Exceptions include the main stem of Catawissa Creek from the confluence with Rattling Run downstream to the mouth, Little Catawissa Creek from the headwaters downstream to T 431, and Messers Run, Negro Hollow, and Davis Run. Catawissa Creek from the confluence with Rattling Run downstream to the mouth is classified as a trout stocked fishery (TSF). The headwaters of Little Catawissa Creek, Messers Run, Negro Hollow, and Davis Run are classified as HQ-CWF.

For the purposes of resource classification, the PFBC manages all streams in the Catawissa Creek basin as a single section extending from the headwaters downstream to the mouth with the following exceptions (Table 2):

Catawissa Creek

Section 01:	Confluence of Hunkydory Creek and an unnamed tributary (RM 40.86) to SR 924 (RM 30.19), 17.2 km.
Section 02:	SR 924 to the confluence with Tomhicken Creek (RM 22.38), 12.6 km.
Section 03:	Confluence with Tomhicken Creek to T 403 (RM 6.83), 25.0 km.
Section 04:	T 403 to the mouth (RM 0.00), 11.0 km.

Messers Run

Section 01:	Headwaters (RM 4.60) to Lofty Rs (RM 3.28), 2.1 km.
Section 02:	Lofty Rs to Blue Head Rs (RM 0.74), 4.2 km.
Section 03:	Blue Head Rs to the mouth (RM 0.00), 1.2 km.

Little Catawissa Creek

Section 01:	Headwaters (RM 10.30) to T 431 (RM 8.10), 3.4 km.
Section 02:	T 431 to T 435 (RM 2.90), 8.5 km.
Section 03:	T 435 to the mouth (Rm 0.00), 4.6 km.

Tomhicken Creek

Section 01:	Headwaters (RM 10.64) to the confluence with Little Tomhicken Creek (RM 6.03), 7.4 km.
Section 02:	Confluence with Little Tomhicken Creek to the mouth (RM 0.00), 9.7 km.

Beaver Run

Section 01:	Headwaters (RM 6.48) to Moyers Farm (RM 3.20), 5.3 km.
Section 02:	Moyers Farm to the mouth (RM 0.00), 5.2 km.

Scotch Run

Section 01:	Headwaters (RM 7.60) to the first bridge upstream from Mifflin Creek Road (RM 5.10), 4.0 km.
Section 02:	First bridge upstream from Mifflin Creek Road to the mouth (RM 0.00), 8.2 km.

The PFBC manages Section 02 of Little Catawissa Creek, Beaver Run, and Scotch Run, along with Lofty Reservoir and Pumping Station Dam, as stocked trout waters under statewide angling regulations. All three stream sections are classified as Optimum Yield 2 - Rural waters, and each receives a preseason and a single inseason stocking. Special remarks prohibit the substitution of rainbow trout in Little Catawissa Creek because of potentially acidic water conditions during the early spring stocking period. In addition to PFBC stockings, two PFBC Co-operative Nurseries, the Black Creek Sportsmens Club and the Beaver Township Rod and Gun Club, stock adult trout in Beaver and Scotch Runs.

The PFBC does not actively manage Catawissa, Tomhicken, and Little Tomhicken Creeks because these streams are considered to be polluted by AMD on the basis of historical surveys. The PFBC manages all other streams in the basin for their natural fish populations under conventional, statewide angling regulations.

Methods

The examination of the Catawissa Creek basin was conducted in June and July of 1997 with the exception of Long Hollow. Long Hollow was examined by Copeland in June of 1992 but is included in this report for completeness. All survey procedures were carried out according to Marcinko et al. (1986).

We surveyed 25 named streams in the Catawissa Creek basin (Table 1) encompassing 35 stream sections (Table 2). Only named streams were sampled. We collected physical and some social data for all 35 sections (Table 3) but did not assess parking and ownership characteristics.

We assessed physical, chemical, and biological characteristics at 51 sampling stations (Fig. 3; Tables 4, 5, and 6) in 32 stream sections. We did not establish sampling stations in Hunkydory Creek or Section 03 of Little Catawissa Creek because these sections were entirely posted against public trespass. Additionally, we did not establish a sampling station in Stranger Hollow due to equipment failure and time constraints. Chemical characteristics at all sampling stations were assessed in the field using a mixed indicator for alkalinity, a colorimetric method for pH, and EDTA titration for hardness (Tables 7, 8, and 9). The common and scientific names of all fish species captured in the Catawissa Creek basin during the 1997 (Table 10) and historical surveys (Table 11) follow Robins et al. (1991). Fish communities (Tables 12, 13, and 14) were assessed with backpack electrofishing gear.

We used a Coffelt backpack electrofisher (Model BP-1C, alternating current) with two electrodes to capture fish at 27 sites, and a Smith-Root backpack electrofisher (Model 12-A POW, pulsed direct current) with a single electrode and a rat-tail cathode to capture fish at 23 sites. Electrofishing was not conducted at RM 8.45 of Tomhicken Creek because the stream was impounded and too deep to wade. All fish were identified to species and released at the site of capture with the exception of sculpins. Sculpins were only identified to genus because it was difficult to accurately separate mottled from slimy sculpins in the field.

All trout captured were classified as being of wild or hatchery origin based on species, coloration, size, and fin wear. Wild trout were measured to 25 mm length groups (Table 15) and given an upper caudal fin clip, while hatchery trout were noted but excluded from further analysis. At sites where we captured $\geq$ 30 wild trout, we made a second electrofishing pass to obtain a Chapman modified Petersen population estimate (Ricker 1975). At all other sites, the number of wild trout captured was considered to be the total population present. Wild trout population abundance and biomass estimates for stream sections (Table 16) were derived by expanding the estimated number and weight of trout at a site to number per kilometer and number and kilograms per hectare. State average weights were used. Angler expectation rankings for stream sections (Table 17) were calculated according to the procedures developed by Moase et al. (1993).

Results and Discussion

In general, the streams of the Catawissa Creek basin were characterized by soft, infertile water with limited buffering capacity against the effects of acid precipitation. According to the criteria of Johnson (1983), streams become vulnerable to acid precipitation when total alkalinity drops below 10 mg/l. This was the case at 40 of the 51 sites we examined in the Catawissa Creek basin. Additionally, total alkalinity was $\leq$ 15 mg/l at 5 of the 11 sites where buffering capacity was above Johnson's critical level. Two streams, Cranberry and Stony Runs, had been degraded by acid precipitation to the point where they were incapable of supporting fish life. Four more streams supported brook trout only.

Water quality in the Catawissa Creek basin was also affected by AMD. The Audenried, Catawissa, and Green Mountain Tunnels discharged AMD directly to the headwaters of Catawissa Creek, while the Oneida # 1 and # 3 Tunnels discharged to the Tomhicken Creek watershed. Active strip mines and abandoned culm banks contributed additional AMD to basin streams (Fig. 2). The Audenried Tunnel was the most significant source of AMD in the drainage. Over nine measurements taken by the DEP between July 1996 and July 1997, the flow from Audenried averaged 7,905 gpm, with an average pH of 4.0 (I. Nasilowski, DEP. Personal communication, 1997). In total, 65.8 km of Catawissa Creek, 9.7 km of Tomhicken Creek, 1.6 km of Little Tomhicken Creek, and 3.9 km of Sugarloaf Creek were degraded by AMD to the point that they were unable to support viable fisheries.

Substantial wild trout populations were present in those streams of the basin where water quality had not been severely impacted by acid precipitation or AMD. Thirteen of the 32 sections we electrofished supported Class A wild trout densities, and angler expectation ratings in these sections were generally good or excellent. Two of the sections supported Class B wild trout populations. Brook trout were the dominant gamefish, as they were found at 28 of 50 sites. Brown trout, which are more sensitive to acidic conditions than brook trout, were found at 14 of the 50 sites. Except for Davis and Trexler Runs, brown trout populations throughout the basin were sparse.

We documented the presence of 22 species of fish in the Catawissa Creek basin during this work. For the most part, fish communities in the basin were dominated by coldwater and transitional species. Warmwater fishes were uncommon. Palomino and tiger trout were recorded for the first time in 1997, while the other twenty species had been captured in previous surveys. The palomino and tiger trout were either stocked fish or had escaped from Zion Grove Hatchery.

There were seven species of fish which had been recorded in historical surveys of the Catawissa Creek basin but were not found during the 1997 work: common carp, yellow perch, bluntnose minnows, channel catfish, white catfish, brown bullheads, and river chubs. The former six species had probably escaped into the drainage from local farm ponds and/or were introduced through angler's bait buckets. These are warmwater species that would not have been likely to maintain populations in the basin's streams. River chubs disappeared from Little Catawissa Creek for unknown reasons.

Water quality, trout biomass, and fish species occurrence varied among the basin streams. Initially, we will discuss specific findings for each stream and section individually, as the PFBC currently manages on a stream/section basis. This approach will facilitate presenting the resource classifications needed to generate management plans (Pennsylvania Fish and Boat Commission 1987). Finally, we will examine water quality trends and AMD abatement measures for Catawissa and Tomhicken Creeks.

Catawissa Creek

Catawissa Creek was divided into four sections for fisheries management purposes. All four sections were severely impacted by AMD which originated in Sections 01 and 02. Water quality in these two sections was toxic to fish life except for short stretches immediately downstream from uncontaminated tributaries. Physical habitat in the upstream sections was excellent and water temperatures were below 20.0°C throughout the survey. These characteristics implied that Sections 01 and 02 of Catawissa Creek would have tremendous potential for coldwater management if AMD pollution can be remedied.

Water quality in Sections 03 and 04 of Catawissa Creek was improved over that in Sections 01 and 02 because AMD input ceased and tributary streams began to dilute the flow in the main stem. For the most part, though, these two sections only supported low density populations of creek chubs. As pH rose above 5.1 downstream from RM 26.28, aluminum precipitate began to form on rocks in the stream bed. Additionally, a coating of bacterial slime was prevalent over the substrate between RM 23.99 and RM 14.36. We were unable to determine the origin of this slime.

As in Sections 01 and 02, physical habitat in Sections 03 and 04 of Catawissa Creek was excellent. Water temperatures, however, indicated that Sections 03 and 04 would be more suitable for warmwater management should water quality improve in future years. Water temperature in these lower sections ranged from 17.5 to 25.2°C during the 1997 survey.

Section 01

Section 01 of Catawissa Creek extends 17.2 km from the confluence of Hunkydory Creek with an unnamed tributary downstream to the SR 924 bridge. This portion of the drainage contains four named tributaries and five named reservoirs. Land use is dominated by strip mines and forests. Residential development in this portion of the basin is limited to the villages of Kelayres and Sheppton. AMD enters Section 01 from the Audenried, Catawissa, and Green Mountain Tunnels, as well as from numerous strip mines and abandoned culm banks.

The 1997 survey of Section 01 included sampling at three stations: RM 36.95, RM 33.43, and RM 30.96. Historically, no fish sampling had been done in Section 01. Bielo and Lech (1957) and Graff (1966) sampled water chemistries at RM 33.43. Additionally, Bielo and Lech (1957) sampled water chemistries at the SR 924 bridge (RM 30.19), while Graff (1966) sampled water chemistries downstream from the mouth of Davis Run (RM 30.55). These two samples can be compared to our site at RM 30.96.

Access to Section 01 was poor, as only 21% of its length was within 300 m of a road. Water chemistry values throughout the section indicated an infertile, acidic system that had been severely impacted by AMD. Total alkalinity was 0 mg/l at all three stations. Total hardness ranged from 16 to > 150 mg/l, specific conductance ranged from 68 to 277 umhos, and pH ranged from 4.3 to 5.2. The better water chemistries in Section 01 were at RM 36.95, which was located upstream from the Audenried and Green Mountain discharges.

Total alkalinity in Section 01 of Catawissa Creek did not change from historical values, but pH has improved through the years. At RM 33.43, Bielo and Lech (1957) recorded a pH of 3.2 and Graff (1966) recorded a pH of 3.5. In 1997, the pH at this site was 4.3. Additionally, Bielo and Lech (1957) recorded a pH of 3.2 at RM 30.19, while Graff (1966) recorded a pH of 3.5 at RM 30.55. The 1997 survey recorded a pH of 4.6 at RM 30.96.

The acidic conditions in Section 01 precluded the development of a viable fishery. The only fish we captured in the section were two brook trout at RM 36.95. These fish were found immediately downstream from the confluence with an unnamed tributary that supported a dense population of wild brook trout.

Section 02

Section 02 of Catawissa Creek extends 12.6 km from the SR 924 bridge downstream to the confluence with Tomhicken Creek. This portion of the drainage contains ten named tributaries and one named reservoir. Land use is dominated by private forests, small farms, and small villages. More concentrated residential development is present in Brandonville, Ringtown, and along Green and Little Sugarloaf Mountains. Mining in this portion of the basin is centered in the Tomhicken Creek watershed.

The 1997 survey of Section 02 included sampling at three stations: RM 28.68, RM 26.28, and RM 23.99. Historically, no fish sampling had been done in Section 02. Bielo and Lech (1957) and Graff (1966) sampled water chemistries at RM 26.28 and RM 23.99. Additionally, Daniels (1976) sampled water chemistries at RM 26.28, while Graff

(1966) sampled water chemistries upstream from the mouth of Little Catawissa Creek (RM 25.71).

Access to Section 02 was excellent, as 93% of its length was within 300 m of a road. Water chemistry values throughout the section indicated an infertile, acidic system that had been severely impacted by AMD. Total alkalinity ranged from 0 to 2 mg/l, total hardness ranged from 72 to > 150 mg/l, specific conductance ranged from 157 to 229 umhos, and pH ranged from 4.6 to 5.8. The better water chemistries in Section 02 were at RM 23.99, which was located downstream from the confluence with Dark Run and Little Catawissa Creek. These two streams contributed relatively fertile water that offset some of the acidity in the main stem. Total alkalinity at the most downstream site on Dark Run was 28 mg/l, while total alkalinity at the most downstream site on Little Catawissa Creek was 13 mg/l.

Total alkalinity in Section 02 of Catawissa Creek did not change from historical values, but pH has improved through the years. At RM 26.28, Bielo and Lech (1957) recorded a pH of 3.2, Graff (1966) recorded a pH of 3.6, and Daniels (1976) recorded a pH of 3.8. In 1997, the pH at this site was 4.6. At RM 23.99, Bielo and Lech (1957) recorded a pH of 3.4 and Graff (1966) recorded a pH of 3.6. In 1997, the pH at this site was 5.8.

The acidic conditions in Section 02 precluded the development of a viable fishery. The only fish we captured in the section were creek chubs and white suckers at RM 23.99.

Section 03

Section 03 of Catawissa Creek extends 25.0 km from the confluence with Tomhicken Creek downstream to the T 403 bridge. This portion of the drainage contains ten named tributaries. Land use is dominated by forests, small farms, and small villages. State Game Lands # 58 is located along the slopes of Catawissa and Nescopeck Mountains. The only mining that has taken place in this portion of the basin was a small site on McCauley Mountain between the Beaver and Scotch Run drainages.

The 1997 survey of Section 03 included sampling at six stations: RM 21.24, RM 17.57, RM 14.36, RM 12.95, RM 9.66, and RM 8.52. Historically, no fish sampling had been done in Section 03. Bielo and Lech (1957) and Graff (1966) sampled water chemistries at RM 21.24. Additionally, Graff (1966) sampled water chemistries at RM 8.52.

Access to Section 03 was very good, as 77% of its length was within 300 m of a road. Water chemistry values throughout the section indicated an infertile, acidic system that had been impacted by AMD. Total alkalinity was 1 mg/l at all sites. Total hardness ranged from 40 to 49 mg/l, specific conductance ranged from 136 to 157 umhos, and pH ranged from 6.1 to 6.6. Although acidic, water quality in Section 03 was improved over that in Sections 01 and 02 because AMD input ceased and tributary streams began to dilute the flow in the main stem.

Total alkalinity in Section 03 of Catawissa Creek was not measured in historical surveys, but pH has improved through the years. At RM 21.24, Bielo and Lech (1957) recorded a pH of 4.4, and Graff (1966) recorded a pH of 3.8. In 1997, the pH at this site was 6.1. At RM 8.52, Graff (1966) recorded a pH of 4.0, while the pH at this site was 6.6 in 1997.

The acidic conditions in Section 03 of Catawissa Creek precluded the development of a viable fishery. Fish were absent from two of the six sites (RM 21.24 and RM 14.36), while three of the six sites (RM 12.95, RM 9.66, and RM 8.52) supported low density populations of adult and young-of-the-year creek chubs. At the sixth site (RM 17.57), we captured three creek chubs and a single largemouth bass.

Section 04

Section 04 of Catawissa Creek extends 11.0 km from the T 403 bridge downstream to the confluence with the Susquehanna River, North Branch. This portion of the drainage does not contain any named tributaries or reservoirs. Land use is dominated by private forests, agricultural operations, and a few small villages. More concentrated residential development is present in the Boroughs of Mainville and Catawissa. There has been no mining in this portion of the basin.

The 1997 survey of Section 04 included sampling at three stations: RM 5.67, RM 2.97, and RM 1.41. Historically, no fish sampling had been done in Section 04. Additionally, none of the sites we sampled in 1997 had been sampled previously, but Graff (1966) and Daniels (1976) sampled water chemistries near Mainville (RM 6.80). These historical water chemistries can be compared to our site at RM 5.67.

Access to Section 04 was excellent, as 100% of its length was within 300 m of a road. Water chemistry values throughout the section indicated an infertile, acidic system that had been impacted by AMD. Total alkalinity ranged from 2 to 3 mg/l, total hardness ranged from 38 to 40 mg/l, specific conductance ranged from 126 to 129 umhos, and pH was 6.7 at all sites. Although acidic, water quality in Section 04 was improved over that in the upstream sections as AMD was further diluted through increased flow. The 1997 water chemistries at RM 5.67 also represented an improvement from historical measurements at RM 6.80. Graff (1966) recorded a pH of 4.1 at this site, while Daniels (1976) recorded a pH of 4.7 and a total alkalinity of 2 mg/l. The 1997 survey recorded a pH of 6.7 and a total alkalinity of 3 mg/l at RM 5.67.

Although water quality in Section 04 of Catawissa Creek was better than in the upstream sections, fish populations in Section 04 were still very limited. Creek chubs were the only fish species present at RM 2.97 and RM 1.41. At RM 5.67, we captured creek chubs, white suckers, blacknose dace, and three brown trout. Two of the brown trout were likely hatchery fish, but the third was a wild fingerling. This fingerling had originated from an unnamed tributary that confluenced with Catawissa Creek within the station limits of RM 5.67. Cursory electrofishing operations in this tributary confirmed that it supported a low density population of wild brown trout.

Hunkydory Creek

Hunkydory Creek is a small, low gradient tributary to the headwaters of Catawissa Creek. Access to the stream was limited because it flowed through active strip mines on privately owned land. We did not establish a sampling station on Hunkydory Creek because we were unable to gain access to it. It was likely, however, that this stream did not contain fish. The underlying geology of the drainage was almost entirely composed of anthracite coal and its watershed has been extensively mined.

Messers Run

Messers Run is a 7.5 km long tributary to Catawissa Creek. Messers Run originates on Spring Mountain near I-81, and its drainage is almost entirely forested. A portion of the stream, from Lofty Reservoir downstream to Blue Head Reservoir, flows through SGL # 308. Negro Hollow is the only named tributary in the Messers Run drainage.

The 1997 survey of Messers Run included sampling at a single station in each section. The sampling stations at RM 3.94 and RM 0.50 were in approximately the same locations as those sampled by Young (1990). The sampling station at RM 1.85 was examined for the first time in 1997.

Section 01

Section 01 of Messers Run extended 2.1 km from the headwaters downstream to Lofty Reservoir. Access to the section was poor, as no portion of its length was within 500 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 3 mg/l and pH was 6.3. Water chemistry values recorded at RM 3.94 during the 1997 survey were similar to those documented in the vicinity by Young (1990), although specific conductance was substantially higher in 1997. This difference may have been due to the difference in timing between the two surveys, as the 1990 survey was conducted in November. Additionally, Young (1990) did not measure total hardness. Total hardness in 1997 was 47 mg/l, which was surprisingly high when compared to total alkalinity.

Two species of fish were present in Section 01 of Messers Run: brook trout and blacknose dace. Young (1990) found brook trout, blacknose dace, white suckers, and pumpkinseeds in Section 01. The white suckers and pumpkinseeds may have been found in 1990 because the 1990 site was located closer to Lofty Reservoir.

Brook trout biomass in Section 01 of Messers Run was estimated at 29.00 kg/ha. It should be noted, however, that this estimate was arrived at through the catch per unit effort method. Dense overgrowth at the station prevented us from sampling a sufficient length of stream for a valid recapture run. Wild brook trout in Section 01 ranged from 25 to 224 mm, but the angler expectation rating was poor. Because of its infertile nature and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Section 01 of Messers Run. The DEP classification of HQ-CWF provided appropriate water quality protection.

The wild brook trout population in Section 01 of Messers Run during the 1997 survey was similar to that documented by Young (1990). The 1997 survey captured 37 brook trout in a 120 m long station, while the 1990 survey captured 24 brook trout in a 100 m long station.

Section 02

Section 02 of Messers Run extended 4.2 km from Lofty Reservoir downstream to Blue Head Reservoir. Access to the section was limited by SGL roads that remained closed for most of the year. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 4 mg/l, and pH was 6.6. Total hardness was 18 mg/l, which was substantially lower than the total hardness measurement at RM 3.94.

Three species of fish were present in Section 02 of Messers Run: brook trout, brown trout, and blacknose dace. Total wild trout biomass was estimated at 38.48 kg/ha, sufficient to qualify the section for Class A wild trout management. Brook trout comprised 38.39 kg/ha and brown trout comprised 0.09 kg/ha of the total biomass. Wild brook trout ranged from 25 to 274 mm, and the three wild brown trout measured between 50 and 74 mm. The angler expectation rating was excellent. Because of its infertile nature and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Section 02 of Messers Run. The DEP classification of HQ-CWF provided appropriate water quality protection.

Section 03

Section 03 of Messers Run extended 1.2 km from Blue Head Reservoir downstream to the mouth. Access to the section was poor, as only 23% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 5 mg/l and pH was 6.6. Water chemistry values recorded at RM 0.50 during the 1997 survey were fairly similar to those documented in the vicinity by Young (1990).

Six species of fish were present in Section 03 of Messers Run. Brook trout, blacknose dace, and tessellated darters were documented by Young (1990), while brown trout, white suckers, and sculpins were found for the first time during this work. Young (1990) only electrofished for 100 m, so it was possible that brown trout, white suckers, and sculpins were present in Section 03 but not detected during the 1990 survey.

Total wild trout biomass in Section 03 of Messers Run was estimated at 17.50 kg/ha, sufficient to qualify the section for Class C wild trout management. Brook trout comprised 14.77 kg/ha and brown trout comprised 2.73 kg/ha of the total biomass. Brook trout ranged from 50 to 224 mm, and brown trout ranged from 50 to 274 mm. The angler expectation rating was good. Because of its infertile nature and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Section 03 of Messers Run. The DEP classification of HQ-CWF provided sufficient water quality protection.

It was not possible to compare the wild trout population in Section 03 of Messers Run between the 1990 and 1997 surveys. The 1990 site was only 100 m long and did not include a recapture run. Additionally, the 1990 site was in a slightly different location than the 1997 site, so local habitat differences would further confound any comparisons.

Negro Hollow

Negro Hollow is a small, high gradient tributary to Messers Run. Negro Hollow originates at the confluence of two unnamed tributaries on the northern slope of Locust Mountain and its drainage is almost entirely forested. The lower half of the drainage is contained within SGL # 308. Access to the stream was limited by SGL roads that remained closed for most of the year. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 4 mg/l and pH was 6.6.

Two species of fish were present in Negro Hollow: brook trout and sculpins. Brook trout biomass was estimated at 55.77 kg/ha, well in excess of the density needed to qualify for Class A wild trout management. Wild brook trout ranged from 25 to 249 mm and the angler expectation rating was good. Because of its infertile nature and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Negro Hollow. The DEP classification of HQ-CWF provided appropriate water quality protection.

Davis Run

Davis Run is a small, high gradient tributary to Catawissa Creek. Davis Run originates on the northern slope of Locust Mountain and its drainage is almost entirely forested. Pumping Station Dam impounds Davis Run near its mouth. Access to the stream was fair as 31% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 4 mg/l and pH was 6.6. Graff (1966) documented a methyl orange alkalinity of

17 mg/l in Davis Run, but he did not record the location of his sampling site. It was likely that his site was downstream from Pumping Station Dam and that his alkalinity value was inflated by biological and chemical processes in the reservoir. The geology of the drainage upstream from Pumping Station Dam is infertile and there is very little agricultural activity.

Six species of fish were present in Davis Run. Brook and brown trout were the gamefish species captured. Total wild trout biomass was estimated at 48.30 kg/ha which was sufficient to qualify the stream for Class A wild trout management. Wild brook trout comprised 23.49 kg/ha and wild brown trout comprised 24.81 kg/ha of the total biomass. The brook trout ranged from 50 to 249 mm and the brown trout ranged from 25 to 324 mm. The angler expectation rating was excellent. Because of its infertile nature and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Davis Run. The DEP classification of HQ-CWF provided appropriate water quality protection.

Rattling Run

Rattling Run is a small, high gradient tributary to Catawissa Creek. Rattling Run originates at the confluence of two unnamed tributaries near Brandonville and flows through a narrow, generally forested valley. Access to Rattling Run was fair as 42% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 5 mg/l and pH was 6.6.

Three species of fish were present in Rattling Run: brook trout, blacknose dace, and sculpins. Brook trout biomass was estimated at 56.64 kg/ha well in excess of the density needed to qualify for Class A wild trout management. Wild brook trout ranged from 25 to 224 mm and the angler expectation rating was excellent. Because of its infertile nature and limited physical habitat statewide angling regulations were adequate to protect and manage the fishery in Rattling Run. The DEP classification of CWF, however, did not provide sufficient water quality protection. Rattling Run should be upgraded to HQ-CWF because of its Class A wild trout population.

Dark Run

Dark Run is a small, low gradient tributary to Catawissa Creek. Dark Run originates west of Pattersonville and flows across an agricultural valley. Access to the stream was good as 66% of its length was within 300 m of a road. Water chemistry values at two stations (RM 2.66 and RM 1.71) indicated a moderately fertile system that was influenced by agricultural runoff. Total alkalinity ranged from 16 to 28 mg/l and pH ranged from 7.0 to 7.4.

Eight species of fish were present in Dark Run. Brook trout, brown trout, and largemouth bass were the gamefish species captured. The brown trout were judged to be hatchery fish and the largemouth bass had originated from local farm ponds so these species were excluded from further analysis. Wild brook trout biomass was estimated at

6.85 kg/ha (Class D), with fish ranging from 50 to 249 mm. The angler expectation rating for wild trout was poor and the stream's average width was too narrow to qualify for trout stocking. The DEP classification of CWF provided sufficient water quality protection for Dark Run.

Little Catawissa Creek

Little Catawissa Creek is a 16.5 km long tributary to Catawissa Creek. The Little Catawissa Creek drainage contains two named tributaries: Trexler Run and Stony Run. Little Catawissa Creek originates in a narrow valley on Big Mountain near the village of Aristes. Aristes and Ringtown Borough are the centers of residential development in the Little Catawissa Creek basin and Aristes is the only area of the basin where mining operations have taken place. Other land uses in the drainage include private forests, small agricultural operations, and rural residences.

The 1997 survey of Little Catawissa Creek included sampling at a single station in Section 01 (RM 8.90) and three stations in Section 02 (RM 5.40, RM 3.85, and RM 2.90). No sampling was conducted in Section 03 because this section was entirely closed to public access. All four of these stations had previously been examined by Daniels (1985a) who conducted his field work during June of 1984 and Daniels et al. (1976a). Additionally, Daniels (1965) conducted water chemistry sampling at two locations in Section 02.

Section 01

Section 01 of Little Catawissa Creek extended 3.4 km from the headwaters downstream to T 431. Access to the section was excellent as 100% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 2 mg/l and pH was 6.4. Water chemistry values recorded at RM 8.90 during the 1997 survey were similar to those documented at the station by Daniels (1985a) and Daniels et al. (1976a).

Three species of fish were present in Section 01 of Little Catawissa Creek: brook trout, blacknose dace, and creek chubs. Brook trout and creek chubs were found in the section during the 1984 and 1976 surveys while blacknose dace were found for the first time in 1997. White suckers were found during the 1976 survey but were absent from the section in 1984 and 1997.

Brook trout biomass in Section 01 of Little Catawissa Creek was estimated at 30.85 kg/ha sufficient to qualify the section for Class A wild trout management. Brook trout ranged from 25 to 224 mm but the angler expectation rating was poor. Because of its infertile nature and limited physical habitat statewide angling regulations were adequate to protect and manage the fishery in Section 01. The DEP classification of HQ-CWF provided sufficient water quality protection.

Wild brook trout population density in Section 01 of Little Catawissa Creek was estimated at Class A levels in 1976 but had declined to Class D levels in 1984. Daniels (1985a) speculated that the decline in wild brook trout biomass was related to a combination of AMD resulting from the overflow of mine wastewater lagoons and a buildup of instream sediments. Daniels (1985a) recorded pH values in the low 5's from the lagoon overflows. Apparently, AMD input to Little Catawissa Creek has ceased as the brook trout population has recovered to Class A levels. Neither the present survey nor the 1991 DEP survey documented any evidence of water quality degradation due to AMD in Section 01 of Little Catawissa Creek.

Section 02

Section 02 of Little Catawissa Creek extended 8.5 km from T 431 downstream to T 435. Access to the section was good as 66% of its length was within 300 m of a road. Water chemistry values indicated an infertile, mildly acidic system that was potentially vulnerable to the effects of acid precipitation. Total alkalinity ranged from 10 to 13 mg/l and pH ranged from 6.8 to 7.0. Water chemistry values documented in Section 02 during the 1997 survey were fairly comparable to those documented in the section by Daniels (1985a), Daniels et al. (1976a), Hesser et al. (1971), and Daniels (1965).

Twelve species of fish were present in Section 02 of Little Catawissa Creek all of which had been documented in historic surveys with the exception of green sunfish. Species which had been documented in historic surveys but were absent during 1997 were rainbow trout (1985 and 1976), fathead minnows (1976, 1971), common carp (1976), golden shiners (1985, 1976), river chubs (1976), brown bullheads (1985, 1976, 1971), pumpkinseeds (1985, 1976, 1971), bluegills (1985, 1976), largemouth bass (1976), and yellow perch (1971).

Rainbow trout were absent from Little Catawissa Creek during the 1997 survey because the PFBC no longer stocks this species in Section 02 due to potentially acidic early spring water quality. Fathead minnows and golden shiners had likely been found previously as a result of bait bucket introductions. Common carp, brown bullheads, pumpkinseeds, bluegills, largemouth bass, and yellow perch are warmwater species that had probably escaped into Section 02 from local farm ponds and would not have been likely to maintain populations in the stream. The disappearance of river chubs, which were documented in Section 02 by Daniels et al. (1976a), was puzzling. This species is native to the Susquehanna River drainage and is adapted to streams with a clean gravel substrate (Cooper 1983).

Brook trout and brown trout were the gamefish species present in Section 02 of Little Catawissa Creek during the 1997 survey. Total wild trout biomass was estimated at 5.08 kg/ha (Class D) with brook trout comprising 0.11 kg/ha and brown trout comprising 4.97 kg/ha of the total. Wild brook trout ranged from 50 to 224 mm and wild brown trout ranged from 50 to 299 mm. The angler expectation rating for wild trout was poor but angling opportunities in this section were enhanced through inclusion in the statewide trout stocking program. Inclusion of Section 02 in the trout stocking program was appropriate because of its low density wild trout population and good recreational use potential. This section, however, has been stocked in error as a rural stream since 1990. Section 02 should be stocked at the suburban rate as the 1990 human population density was 40 persons/km^2. The DEP classification of CWF provided sufficient water quality protection.

Daniels (1984a) and Daniels et al. (1976a) documented low levels of brown trout reproduction in Section 02 of Little Catawissa Creek. The 1997 survey also documented low levels of brown trout reproduction at RM 5.40 and RM 3.85. At RM 2.90, however, brown trout reproduction was excellent. This survey captured 113 fingerling brown trout at RM 2.90 while the 1984 and 1976 surveys at this station captured a combined total of 6 fingerling brown trout. This occurrence was puzzling, particularly considering that the 1997 survey captured only two fingerling brown trout at RM 3.85 located less than one mile upstream from RM 2.90. It remains to be seen whether the excellent brown trout reproduction at RM 2.90 in 1997 will contribute to a future increase in the adult wild trout population of Section 02.

Section 03

Section 03 of Little Catawissa Creek extended 4.6 km from T 435 downstream to the mouth. We did not sample this section in 1997 because it was entirely posted against public access. Daniels et al. (1976a) documented 8 species of fish in Section 03 with brown trout being the only gamefish species present. Two brown trout measuring between 300 and 324 mm were captured at a single sampling station. Water chemistry values in 1976 indicated that this section possessed sufficient buffering capacity against the effects of acid precipitation.

Trexler Run

Trexler Run is a small, low gradient tributary to Little Catawissa Creek. Trexler Run originates on Little Mountain and the ridges that border its watershed are forested, but agricultural lands are prevalent on the valley floor. The 1997 survey of Trexler Run included sampling at a single station located at RM 0.80. This station was previously examined by Daniels (1985b).

Access to Trexler Run was very good as 89% of its length was within 300 m of a road. Water chemistry values indicated an infertile, mildly acidic system that was potentially vulnerable to the effects of acid precipitation. Total alkalinity was 10 mg/l and pH was 6.6. Water chemistry values recorded at RM 0.80 during the 1997 survey were somewhat improved over those documented by Daniels (1985b). Daniels (1985b) documented a total alkalinity of 4 mg/l and a pH of 6.4.

Seven species of fish were present in Trexler Run six of which had been documented previously (Daniels, 1985b). Pumpkinseeds were recorded for the first time during this work. These fish had originated from local farm ponds and would not have been likely to maintain populations in the stream. All of the species documented by Daniels (1985b) were present in 1997.

Brook trout, brown trout, and largemouth bass were the gamefish species captured in Trexler Run during the 1997 survey. The largemouth bass had originated from local farm ponds and so were excluded from further analysis. Total wild trout biomass was estimated at 50.85 kg/ha which was sufficient to qualify Trexler Run for Class A wild trout management. Wild brook trout comprised 11.19 kg/ha and wild brown trout comprised 39.66 kg/ha of the total biomass. Brook trout ranged from 50 to 249 mm and brown trout ranged from 25 to 349 mm. The angler expectation rating was excellent. Because of its infertile nature and limited physical habitat statewide angling regulations were adequate to protect and manage the fishery in Trexler Run. The DEP classification of CWF, however, did not provide sufficient water quality protection. Trexler Run should be upgraded to HQ-CWF because of its Class A wild trout population.

Total wild trout biomass in Trexler Run declined from 85.19 kg/ha in 1984 to 50.85 kg/ha in 1997. The causes of this decline were unknown but were related to a decline in brown trout density. Brown trout biomass decreased from 81.18 kg/ha in 1984 to 39.66 kg/ha in 1997. The 1984 survey captured a total of 101 brown trout while the 1997 survey captured a total of 70 brown trout. Conversely, brook trout density in Trexler Run increased from 4.01 kg/ha in 1984 to 11.19 kg/ha in 1997. The 1984 survey captured a total of 10 brook trout while the 1997 survey captured a total of 61 brook trout.

Stony Run

Stony Run is a small, high gradient tributary to Little Catawissa Creek. Stony Run originates on Little Mountain and its drainage is a mixture of forested and agricultural lands. Our sampling station, however, was located upstream from any agricultural influences in the basin. Access to Stony Run was fair as 35% of its length was within 300 m of a road. Water chemistry values indicated a very acidic system that had been severely impacted by acid precipitation. Total alkalinity was 0 mg/l, total hardness was 0 mg/l, specific conductance was 19 umhos, and pH was 6.0. These acidic conditions precluded the development of a viable fishery. We did not find any fish in Stony Run.

Tomhicken Creek

Tomhicken Creek is a 17.1 km long tributary to Catawissa Creek. The Tomhicken Creek drainage contains four named tributaries: Little Tomhicken Creek, Sugarloaf Creek, Little Crooked Run, and Raccoon Creek. Tomhicken Creek originates in a broad valley between Little Sugarloaf Mountain to the north and Pismire Ridge to the south.

Strip mines are prevalent in the drainage from the headwaters downstream to Millers Corner. AMD enters the main stem of Tomhicken Creek from the Oneida # 3 Tunnel and from Little Tomhicken and Sugarloaf Creeks. Other land uses in the drainage include undeveloped forests, small farms downstream from the village of Millers Corner, and residential development in the boroughs of Weston, Nuremburg, and Oneida, as well as on Green and Little Sugarloaf Mountains.

The 1997 survey of Tomhicken Creek included sampling at two stations in Section 01 (RM 8.45 and RM 6.03) and three stations in Section 02 (RM 4.89, RM 3.19, and RM 1.44). Fish sampling was not conducted at RM 8.45 because the stream was impounded and too deep to wade. Historically, no fish sampling had been done in Tomhicken Creek. Water chemistries at RM 4.89 were sampled by Bielo (1957) and Graff (1966). Additionally, Bielo (1957) sampled water chemistries at RM 0.00. Bielo's sample at RM 0.00 can be compared to our site at RM 1.44.

Section 01

Section 01 of Tomhicken Creek extended 7.4 km from the headwaters downstream to the confluence with Little Tomhicken Creek. Access to the section was good as 56% of its length was within 300 m of a road. Water chemistry values indicated a fertile system that possessed sufficient buffering capacity against the effects of acid precipitation. Total alkalinity ranged from 31 to 42 mg/l and pH ranged from 7.0 to 7.4.

Total alkalinity values in Section 01 of Tomhicken Creek were the highest alkalinity values recorded in the Catawissa Creek basin during the 1997 survey. This was surprising considering the underlying geology and land use patterns in the upper Tomhicken Creek watershed. The high alkalinity values we recorded were most likely related to the Can Do (Humboldt) Industrial Park sewage treatment plant (STP) which discharges to the headwaters of Tomhicken Creek. The alkalinity of this discharge was 24 mg/l in May of 1996 and is generally quite variable. Alkalinity values as high as 370 mg/l have been recorded from this discharge in recent years (J. Holmes, DEP. Personal Communication, 1998).

Fish sampling was not conducted at RM 8.45 but fish were seen in the pool at the SR 924 bridge. Four species of fish were present at RM 6.03: brook trout, blacknose dace, creek chubs, and bluegills. Brook trout biomass was estimated at 18.14 kg/ha (Class C) with fish ranging from 25 to 274 mm. Brook trout measuring between 100 and 199 mm were absent from the population, however, indicating that year class failure had occurred in 1996 and, possibly, 1995. The angler expectation rating was good. Because of its small size and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Section 01 of Tomhicken Creek. The DEP classification of CWF provided sufficient water quality protection.

Section 02

Section 02 of Tomhicken Creek extended 9.7 km from the confluence with Little Tomhicken Creek downstream to the mouth. Access to the section was excellent as 93% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that had been impacted by AMD. Total alkalinity ranged from 2 to 7 mg/l, total hardness ranged from 30 to 32 mg/l, specific conductance ranged from 134 to 149 umhos, and pH was 6.6 at all sites.

Water chemistry values in Section 02 of Tomhicken Creek were improved over those measured in historical surveys. At RM 4.89, Bielo and Lech (1957) recorded a pH of 3.4 while Graff (1966) recorded a pH of 4.5 and a methyl orange alkalinity of 0 mg/l. In 1997, the pH at this site was 6.6 and total alkalinity was 2 mg/l. Additionally, Bielo (1957) recorded a pH of 4.4 at the mouth of Tomhicken Creek while we recorded a pH of 6.6 at RM 1.44.

Fish populations in Section 02 of Tomhicken Creek were severely limited by AMD. No fish were present at RM 3.19. At RM 4.89, we captured two brook trout, one pumpkinseed, and one green sunfish. At RM 1.44, we captured four brook trout, two palomino trout, two creek chubs, and two blacknose dace. Poor water quality limited current management options for Section 02 of Tomhicken Creek. If AMD pollution can be reduced in the future, however, this section has great potential for coldwater management. Water temperature, stream flow, and physical habitat characteristics were all conducive to the development of a substantial wild trout population. The DEP classification of CWF provided sufficient water quality protection for Section 02.

Little Tomhicken Creek

Little Tomhicken Creek is a small, high gradient tributary to Tomhicken Creek. Little Tomhicken Creek originates in a strip mine on Green Mountain which contributes AMD to the stream. AMD also enters Little Tomhicken Creek near its mouth (Graff 1966). Access to the stream was excellent as 100% of its length was within 300 m of a road. Water chemistry values indicated a very acidic system that had been severely impacted by AMD. Total alkalinity was 0 mg/l, total hardness was 22 mg/l, specific conductance was 107 umhos, and pH was 4.4. These acidic conditions precluded the development of a viable fishery. We did not find any fish in Little Tomhicken Creek.

Sugarloaf Creek

Sugarloaf Creek is a small, moderate gradient tributary to Tomhicken Creek. Sugarloaf Creek originates in a residential development on Little Sugarloaf Mountain and flows through three impoundments before its confluence with Tomhicken Creek near Millers Corner. AMD enters Sugarloaf Creek from the Oneida # 1 Tunnel. Access to the stream was excellent as 100% of its length was within 300 m of a road. Water chemistry values indicated a very acidic system that had been severely impacted by AMD. Total alkalinity was 0 mg/l, total hardness was greater than 150 mg/l, specific conductance was 117 umhos, and pH was 5.0. These acidic conditions precluded the development of a viable fishery. We did not find any fish in Sugarloaf Creek.

Little Crooked Run

Little Crooked Run is a small, high gradient tributary to Tomhicken Creek. Little Crooked Run originates in a residential development on Green Mountain, but its drainage is mostly forested. Access to the stream was good as 59% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 4 mg/l and pH was 6.6.

Brook trout was the only fish species present in Little Crooked Run. Brook trout biomass was estimated at 52.74 kg/ha well in excess of the density needed to qualify for Class A wild trout management. Wild brook trout ranged from 25 to 199 mm but, because of the low number of fish ≥ 175 mm, the angler expectation rating was poor. Because of its infertile nature and limited physical habitat statewide angling regulations were adequate to protect and manage the fishery in Little Crooked Run. The DEP classification of CWF, however, did not provide sufficient water quality protection. Little Crooked Run should be upgraded to HQ-CWF because of its Class A wild trout population.

Raccoon Creek

Raccoon Creek is a small, moderate gradient tributary to Tomhicken Creek. Raccoon Creek originates in a valley between South Buck Mountain to the north and Little Sugarloaf Mountain to the south. Agricultural lands were prevalent in the Raccoon Creek drainage, and the upper portions of the stream contained two areas of concentrated residential development in the boroughs of Weston and Nuremburg. The proximity of these boroughs to Raccoon Creek resulted in excellent access as 99% of the stream was within 100 m of a road. Water chemistry values also reflected the anthropogenic influences in the drainage. Total alkalinity was 20 mg/l and pH was 7.0.

Seven species of fish were present in Raccoon Creek. Brook trout and largemouth bass were the gamefish species captured. The largemouth bass had originated from local farm ponds and so were excluded from further analysis. Brook trout biomass was estimated at 65.55 kg/ha well in excess of the density needed to qualify for Class A wild trout management. Wild brook trout ranged from 50 to 299 mm and the angler expectation rating was excellent. It should be noted, however, that the size distribution of wild trout in this stream was somewhat unusual. Fish from 100 to 149 mm were absent from the population and the number of fish ≥ 200 mm was surprisingly high. It was possible that this population included some stocked trout which we were unable to identify.

Because of its small size and limited physical habitat statewide angling regulations were adequate to protect and manage the fishery in Raccoon Creek. The DEP classification of CWF, however, did not provide sufficient water quality protection. Raccoon Creek should be upgraded to HQ-CWF because of its Class A wild trout population.

Crooked Run

Crooked Run is a small, high gradient tributary to Catawissa Creek. Crooked Run originates on Catawissa Mountain and flows through a mixture of forested and agricultural lands. Access to the stream was fair as 49% of its length was within 300 m of a road. Water chemistry values at two stations (RM 2.75 and RM 0.81) indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity ranged from 3 to 5 mg/l while pH ranged from 5.8 to 6.6. Graff (1966) documented a methyl orange alkalinity of 16 mg/l in Crooked Run near RM 0.81, possibly indicating that this stream has suffered a substantial loss of its buffering capacity. Alternatively, Graff's alkalinity measurement may have been influenced by the discharge from the Zion Grove trout hatchery.

Brook trout was the only fish species present at RM 2.75. Brook trout biomass was estimated at 106.48 kg/ha which was the highest wild trout biomass documented in the Catawissa Creek basin during the 1997 survey. Wild brook trout ranged from 25 to 224 mm and the angler expectation rating was excellent. Electrofishing operations at RM 0.81 documented brook, brown, rainbow, and tiger trout but many of these fish had originated from the nearby Zion Grove Trout Hatchery. It was difficult to separate wild from hatchery trout at this station and no attempt was made to quantify trout populations here. Because of this difficulty the trout population at RM 2.75 was considered to be representative of the entire section for fisheries management purposes.

Because of its infertile nature and limited physical habitat statewide angling regulations were adequate to protect and manage the fishery in Crooked Run. The DEP classification of CWF, however, did not provide sufficient water quality protection. Crooked Run should be upgraded to HQ-CWF because of its Class A wild trout population.

Cranberry Run

Cranberry Run is a small, high gradient tributary to Catawissa Creek. Cranberry Run originates in natural Cranberry bogs atop Catawissa Mountain and its drainage is almost entirely forested. The upstream half of the drainage is contained within SGL # 58. Access to the stream was poor as only 15% of its length was within 300 m of a road. Water chemistry values indicated a very acidic system that had been severely impacted by acid precipitation. Total alkalinity was 0 mg/l and pH was 5.8. These acidic conditions precluded the development of a viable fishery. We did not find any fish in Cranberry Run.

Klingermans Run

Klingermans Run is a small, high gradient tributary to Catawissa Creek. Klingermans Run originates on Catawissa Mountain and its drainage is almost entirely forested. The upstream half of the drainage is contained within SGL # 58. Access to the stream was fair as 29% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 1 mg/l and pH was 6.0.

Brook trout was the only fish species present in Klingermans Run. Brook trout biomass was estimated at 33.09 kg/ha sufficient to qualify the stream for Class A wild trout management. Wild brook trout ranged from 25 to 224 mm, but the angler expectation rating was poor. Because of its infertile nature and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Klingermans Run. The DEP classification of CWF, however, did not provide sufficient water quality protection. Klingermans Run should be upgraded to HQ-CWF because of its Class A wild trout population.

Klingermans Run was the nearest stream to Cranberry Run. The underlying geology and land use characteristics of these two small basins were very similar, but Klingermans Run supported a Class A wild brook trout population while Cranberry Run did not support any fish life. This was related to small differences in water chemistries. Klingermans Run had 1 mg/l of total alkalinity and pH was 6.0. Cranberry Run did not have any alkalinity and pH was 5.8. The most likely explanation for the small water chemistry differences was the presence of natural cranberry bogs in the headwaters of Cranberry Run.

Stranger Hollow

Stranger Hollow is a small, very high gradient tributary to Catawissa Creek. Stranger Hollow originates on Catawissa Mountain and its drainage is almost entirely forested. The majority of the drainage is contained within SGL # 58. Access to the stream was poor as no portion of its length fell within 500 m of a road. We did not establish a sampling station in Stranger Hollow because of equipment problems and time constraints.

Long Hollow

We did not sample Long Hollow during this work because it was recently sampled by Copeland (1992). The following discussion is based primarily on Copeland's work.

Long Hollow is a small, high gradient tributary to Catawissa Creek. Long Hollow originates on Catawissa Mountain and its drainage is almost entirely forested. The majority of the drainage is contained within SGL # 58. Access to the stream was poor as only 14% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 4 mg/l and pH was 7.0.

Two species of fish were present in Long Hollow: brook trout and brown trout. The single brown trout captured appeared to be a hatchery fish and so was excluded from further analysis. Wild brook trout biomass was estimated at 23.67 kg/ha sufficient to qualify the stream for Class B wild trout management. Wild brook trout ranged from 25 to 199 mm but the angler expectation rating was poor. Because of its infertile nature and limited physical habitat statewide angling regulations under the Natural Yield Option were adequate to protect and manage the fishery in Long Hollow. The DEP classification of CWF, however, did not provide sufficient water quality protection. Long Hollow should be upgraded to HQ-CWF because of its Class B wild trout population and the unspoiled character of its watershed.

Beaver Run

Beaver Run is a 10.5 km long tributary to Catawissa Creek. The stream flows across a valley between McCauley Mountain to the north and Buck Mountain to the south. The Beaver Run drainage is generally forested although scattered farms are present on the valley floor and some residential development is present in the village of Shumans near the mouth.

The 1997 survey of Beaver Run included sampling at a single station in each section. The station at RM 4.03 was previously examined by Daniels (1988) although the 1988 survey did not document the fish community in Section 01 because of low flows. The station at RM 0.45 was previously examined by Daniels et al. (1976b) and Daniels (1988). Additionally, Graff (1966) sampled water chemistries in the vicinity of RM 0.45.

Section 01

Section 01 of Beaver Run extended 5.3 km from the headwaters downstream to Moyers Farm. Access to the section was good as 66% of its length was within 300 m of a road. Water chemistry values indicated a moderately fertile system that possessed sufficient buffering capacity against the effects of acid precipitation. Total alkalinity was 16 mg/l and pH was 7.0. Water chemistry values recorded in Section 01 of Beaver Run during this work were somewhat different from those documented in the section by Daniels (1988). Total alkalinity increased from 8 mg/l in 1988 to 16 mg/l in 1997 while total hardness decreased from 38 mg/l in 1988 to 24 mg/l in 1997. Specific conductance and pH values were similar between the two surveys.

Eleven species of fish were present in Section 01 of Beaver Run but gamefish species were absent. The fish community included margined madtoms and water temperature at the time of the survey was 22.0°C, indicating that this section probably becomes too warm for trout to survive through the summer months during most years. Warm water temperatures in Section 01 were the result of swamps in the headwaters of the stream. Because seasonally warm water temperatures precluded the development of a wild trout population and this section was too narrow to qualify for trout stocking Section 01 of Beaver Run would most appropriately be managed as a warmwater fishery. The DEP classification of CWF provided sufficient water quality protection.

Section 02

Section 02 of Beaver Run extended 5.2 km from Moyers Farm downstream to the mouth. Access to the section was good as 60% of its length was within 300 m of a road. Water chemistry values indicated a moderately fertile system that possessed sufficient buffering capacity against the effects of acid precipitation. Total alkalinity was 14 mg/l and pH was 7.0. Water chemistry values recorded in Section 02 of Beaver Run were fairly similar to those documented in the section by Daniels et al. (1976b) and Daniels (1988) with the exception of total hardness. Total hardness was 32 mg/l in 1988 and 30 mg/l in 1976 but decreased to 22 mg/l in 1997. Graff (1966) recorded a total hardness value of 17 mg/l in the vicinity of RM 0.45.

Nine species of fish were found in Section 02 of Beaver Run during the 1997 survey all of which had been found in previous surveys. Daniels et al. (1976b) and Daniels (1988) documented a total of 19 different species of fish in Section 02. Brown trout, green sunfish, and tessellated darters were captured during both historical surveys but were absent in 1997. Golden shiners, brown bullheads, white catfish, and largemouth bass were only captured in 1976 while bluntnose minnows, channel catfish, and bluegills were only captured in 1988.

Brown trout that had previously been captured in Section 02 were likely the result of PFBC stockings. No brown trout were stocked in Beaver Run during the 1997 season. With the exception of tessellated darters the remaining species that were present historically but absent in 1997 had most likely entered the stream through bait bucket introductions or as escapees from private farm ponds in the drainage. These species would not have been likely to maintain populations in Beaver Run. Although tessellated darters were not captured in 1997 they may have been present in the stream. Electrofishing at RM 0.45 was only conducted for 150 m in 1997 and a low density population of darters could have gone undetected. Electrofishing was conducted for 300 m in 1976 and 1988.

Brook and rainbow trout were the gamefish species captured in Section 02 of Beaver Run during the 1997 survey but all of the trout were judged to be hatchery fish. Angling opportunities in Section 02 were enhanced through inclusion in the statewide trout stocking program. Trout stocking was appropriate for this section because it possessed good recreational use potential. The DEP classification of CWF provided sufficient water quality protection.

Mine Gap Run

Mine Gap Run is a small, high gradient tributary to Catawissa Creek. Mine Gap Run originates on Catawissa Mountain and its drainage is almost entirely forested. A small portion of the drainage is within SGL # 58. Access to the stream was very good as 80% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 4 mg/l and pH was 6.6.

We did not find any fish in Mine Gap Run. This was surprising because water quality in the stream was well within acceptable limits for brook trout. Additionally, water chemistries in Mine Gap Run were very similar to many of the basin streams that supported substantial wild trout populations. The only potential explanation we could suggest was that, for unknown reasons, a complete fish kill may have occurred in Mine Gap Run at some time in the past. If a complete fish kill had occurred repopulation would not have been possible due to AMD pollution in Catawissa Creek. Considering that water quality was acceptable but fish were absent Mine Gap Run would be a good candidate for stocking with fingerling brook trout if unallocated fish become available through the production system.

Fisher Run

Fisher Run is a small, high gradient tributary to Catawissa Creek. Fisher Run originates on Catawissa Mountain and its drainage is almost entirely forested. The upstream half of the drainage is contained within SGL # 58. Access to the stream was fair as 43% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 4 mg/l and pH was 6.4.

Three species of fish were present in Fisher Run: brook trout, blacknose dace, and sculpins. Brook trout biomass was estimated at 42.07 kg/ha well in excess of the density needed to qualify for Class A wild trout management. Wild brook trout ranged from 25 to 249 mm and the angler expectation rating was excellent. Because of its infertile nature and limited physical habitat statewide angling regulations were adequate to protect and manage the fishery in Fisher Run. The DEP classification of CWF, however, did not provide sufficient water quality protection. Fisher Run should be upgraded to HQ-CWF because of its Class A wild trout population.

Scotch Run

Scotch Run is a 12.2 km long tributary to Catawissa Creek. The stream flows across a narrow valley between Nescopeck Mountain to the north and McCauley Mountain to the south. The valley widens somewhat at Mifflin Cross Roads near the division between Sections 01 and 02. The Scotch Run drainage is generally forested upstream from Mifflin Cross Roads, although some residential development is present in the headwaters of the stream. Downstream from Mifflin

Cross Roads, the mountain slopes are forested but small farms are common on the valley floor. The forested lands along Nescopeck Mountain are primarily within SGL # 58.

This survey included sampling at a single station in Section 01 (RM 5.10) and two stations in Section 02 (RM 1.30 and RM 0.00). All three sampling stations were previously examined by Daniels et al. (1976c). Additionally, Graff (1966) sampled water chemistries at RM 0.00.

Section 01

Section 01 of Scotch Run extended 4.0 km from the headwaters downstream to the first bridge upstream from Mifflin Creek Road. Access to the section was good, as 71% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 5 mg/l and pH was 6.6. Water chemistry values recorded during this survey were very similar to those documented by Daniels et al. (1976c).

Three species of fish were present: brook trout, brown trout, and white suckers. Brook trout and white suckers were also found during the 1976 survey, but brown trout were found for the first time in 1997. Conversely, pumpkinseeds and blacknose dace were present in 1976 but absent in 1997. The pumpkinseeds found in 1976 had originated from local farm ponds and would not have been likely to maintain populations in Scotch Run. The reason for the disappearance of blacknose dace was unknown.

Wild trout biomass in Section 01 of Scotch Run was estimated at 2.98 kg/ha (Class D), with brook trout comprising 2.93 kg/ha and brown trout comprising 0.05 kg/ha of the total. Wild brook trout ranged from 25 to 199 mm, and the single wild brown trout measured between 75 and 99 mm. The angler expectation rating was poor, and there were few opportunities to improve the fishery. Wild trout populations were probably limited by a combination of seasonally low flows and restricted physical habitat, and the section was too narrow to qualify for adult trout stocking. The DEP classification of CWF provided sufficient water quality protection for Section 01.

Although wild brook trout density in Section 01 of Scotch Run was quite low during the 1997 survey the brook trout population appeared to have improved since 1976. The 1976 survey captured only 4 brook trout at RM 5.10 while the 1997 survey captured 21.

Section 02

Section 02 extended 8.2 km from the first bridge upstream from Mifflin Creek Road downstream to the mouth. Access to the section was good as 57% of its length was within 300 m of a road. Water chemistry values recorded at two stations (RM 1.30 and RM 0.00) indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 8 mg/l at both stations, and pH ranged from 6.8 to 7.0. Water chemistry values recorded during this survey were similar to those documented by Daniels et al. (1976c) and Graff (1966).

Eight species of fish were present during this survey. Brook trout, brown trout, blacknose dace, creek chubs, white suckers, and pumpkinseeds were also found during the 1976 survey, but longnose dace and bluegills were documented for the first time in 1997. Conversely, rainbow trout and golden shiners were present in 1976 but absent in 1997. Rainbow trout were absent because the PFBC did not stock this species in Scotch Run during the 1997 season. Golden shiners had probably been found previously as a result of bait bucket introductions and would not have been likely to maintain populations in the stream.

Brook and brown trout were the gamefish species captured in Section 02 of Scotch Run. All of the brown trout were judged to be hatchery fish and so were excluded from further analysis. Wild brook trout biomass was estimated at 4.39 kg/ha (Class D) with fish ranging from 50 to 224 mm. The angler expectation rating for wild trout was poor, but angling opportunities in this section were enhanced through the statewide adult trout stocking program. Inclusion of Section 02 in the trout stocking program was appropriate because of its low density wild trout population and good recreational use potential. The DEP classification of CWF provided sufficient water quality protection for the section.

It was difficult to compare adult wild trout populations in Section 02 of Scotch Run between the 1976 and 1997 surveys because many of the adult trout captured in 1976 were fish that had been stocked by a co-operative nursery. Nevertheless, the number of fingerling brook trout present in the section was much higher in 1997 than in 1976. This survey captured 91 fingerling brook trout while the 1976 survey did not capture any fingerlings. It remains to be seen, however, if these fingerlings will contribute to the adult wild trout population in Section 02 of Scotch Run during the coming years.

Furnace Run

Furnace Run is a small, high gradient tributary to Catawissa Creek. Furnace Run originates on Catawissa Mountain and its drainage is almost entirely forested. The majority of the drainage is contained within SGL # 58. Access to the stream was fair as 34% of its length was within 300 m of a road. Water chemistry values indicated an infertile, acidic system that was vulnerable to the effects of acid precipitation. Total alkalinity was 2 mg/l and pH was 6.4.

Brook trout was the only fish species present in Furnace Run. Brook trout biomass was estimated at 44.99 kg/ha well in excess of the density needed to qualify for Class A wild trout management. Wild brook trout ranged from 25 to 224 mm, and the angler expectation rating was excellent. Because of its infertile nature and limited physical habitat, statewide angling regulations were adequate to protect and manage the fishery in Furnace Run. The DEP classification of CWF, however, did not provide sufficient water quality protection. Furnace Run should be upgraded to HQ-CWF because of its Class A wild trout population.

Water Quality Trends

We documented 12 Class A wild trout sections in the Catawissa Creek basin during this work. Buffering capacity in 11 of these 12 sections was at or below the critical level established by Johnson (1983). Should acidification proceed much further, a substantial portion of the basin's wild trout resources would be lost to acid precipitation. Recent evidence, however, indicated that the Clean Air Act amendments of 1990 have reduced atmospheric deposition in the Eastern United States (Lynch et al. 1996) offering hope that the trend toward acidification in headwater streams can be reversed. Similarly, evidence collected during this and previous work in the Catawissa basin indicated that the effects of AMD have diminished with time.

Comparisons between historical and current water chemistry data for the Audenried Tunnel demonstrated that the quality of this discharge has improved through the years. Gannett et al. (1974) took 10 water chemistry samples from the Audenried discharge between 1969 and 1970, while the DEP took 9 water chemistry samples from the Audenried discharge between 1996 and 1997 (I. Nasilowski, DEP. Personal communication 1997). All water quality parameters that were analyzed during both examinations were improved during the 1996/1997 sampling period. For example, the <u>highest</u> pH recorded during 1969/1970 was 3.5, while the <u>lowest</u> pH recorded during 1996/1997 was 3.8.

The quality of the Audenried discharge varied with its flow, so comparisons between historical and current water quality data were made at similar flow levels (Table 18). At all similar flow levels, pH was higher and iron concentrations were substantially lower during the 1996/1997 samples. Iron concentrations in the Audenried discharge had generally declined by a factor of six. Additionally, alkalinity consistently measured 0.0 mg/l in 1969/1970. During 1996/1997, alkalinity was $\geq$ 3.8 mg/l in 6 of the 9 measurements. Historical data for Aluminum and Manganese were scarce, as Aluminum was only measured once and Manganese was only measured twice in the 1969/1970 samples. Nevertheless, at comparable flow levels the concentration of these two metals in the Audenried discharge was much lower in 1996/1997.

The quality of the Audenried discharge has improved over the last 25 years, but current water chemistry data demonstrated that the discharge remained lethal to fish life. Values for pH during the 1996/1997 samples never exceeded 4.1 and aluminum concentrations were $\geq$ 6.45 mg/l. Fish populations are generally exterminated when pH drops below 5.0 (Krester et al. 1983). At low pH values, aluminum concentrations $\geq$ 0.2 mg/l can cause mortality in brook trout when exposure to low pH/high aluminum waters lasts for more than one day (Gagen and Sharpe 1987). Although the discharge was lethal to fish life its quality should continue to improve in the coming years.

AMD is formed when iron pyrite that is closely associated with coal is disturbed and exposed during mining. The exposed pyrite reacts with air and water to form sulfuric acid and iron hydroxide. Thus, AMD naturally abates through time as the supply of iron pyrite is depleted. This was probably the case in the Lackawanna River (405A) which has recovered from AMD pollution to support a Class A wild brown trout fishery. This process also explained the improvement in the quality of the discharge from the Audenried Tunnel as iron concentrations in the discharge have declined substantially from historical levels.

The improvements in the quality of the Audenried discharge were reflected in the water quality of Catawissa Creek (Table 19). The pH values we obtained for Catawissa Creek in 1997 were the highest ever recorded. Improvements in pH were particularly evident downstream from RM 24.00 where the 1997 pH values were at least 2.0 standard units higher than those recorded during the preceding surveys. Additionally, with a single exception, the pH at all sites on Catawissa Creek during any given survey was higher than that recorded during the previous survey. This suggested a trend toward water quality improvement that has been evident since 1966. The single exception was at RM 21.24 where pH decreased from 4.4 in 1957 to 3.8 in 1966.

Similar to Catawissa Creek, water quality in Tomhicken Creek has improved through the years (Table 19). The pH values we obtained for Tomhicken Creek during this survey were the highest ever recorded, and pH values exhibited a trend toward water quality improvement since 1966. Unfortunately, data for Tomhicken Creek were much more scarce than for Catawissa Creek, and we did not have any historical data for the Oneida Tunnel discharges. It was likely, however, that water quality in these discharges improved through time in the same way that water quality improved in the Audenried discharge. Water quality data obtained from the Oneida # 1 and # 3 Tunnels during the 1996/1997 sampling period (I. Nasilowski, DEP. Personal communication 1997) indicated that the quality of these discharges was better than the quality of the Audenried discharge.

The improvements in water quality we observed in Catawissa and Tomhicken Creeks during this survey were primarily related to improvements in the quality of AMD discharges to these streams. Other factors, however, may have contributed to the improved water quality. These factors included STP discharges to Tomhicken Creek, drought conditions throughout the survey period, and the addition of limestone sand to Catawissa and Tomhicken Creeks by the Catawissa Creek Restoration Association (CCRA). STP discharges have the potential to alleviate acidic conditions if the discharges are more alkaline than the receiving waters. This was certainly the case with the Can Do Industrial Park STP, where alkalinity values as high as 370 mg/l have been recorded (J. Holmes, DEP. Personal communication 1997). Unfortunately, the quality of this discharge is quite variable, and low alkalinity discharges are also possible. In addition to the Industrial Park discharge the Eagle Rock Village development operates an STP which discharges to Tomhicken Creek. This discharge is located near the upstream end of Section 02.

The drought which affected northeastern Pennsylvania during the summer of 1997 likely contributed to the improved water quality we observed in Catawissa and Tomhicken Creeks. Drought conditions influence water chemistry values by increasing the relative contribution of groundwater to stream flow. Groundwater is generally less acidic than stormwater runoff. Consequently, streams affected by drought may exhibit higher alkalinity and pH values than they would during periods of average rainfall. Furthermore, streams affected by drought can give the appearance of acceptable water quality while they remain vulnerable to toxic episodes during periods of heavy rain and/or snowmelt. This phenomenon, in combination with variations in the quality of STP discharges to Tomhicken Creek, may explain why fish populations were severely depressed in the lower portions of Catawissa and Tomhicken Creeks even though water quality in these areas was not particularly stressful at the time of our survey. Total alkalinity in the lower portions of Catawissa and Tomhicken Creeks ranged from 1 to 7 mg/l, while pH ranged from 6.6 to 6.7.

Based on the water chemistry values we obtained during the summer of 1997 it appeared that the limestone sand placed in Catawissa Creek by the CCRA had little, if any, effect on this stream's water quality. We evaluated the effectiveness of the treatment by comparing water chemistry values at each station located downstream from a limestone sand site with the station located immediately upstream from it (Table 20). If the sand were having an effect the downstream stations should have exhibited higher alkalinity and pH values than the upstream stations. Yet, in spite of the addition of limestone sand and several tributary streams with good water quality, water chemistry values at the downstream stations were not much different from the upstream stations. Total alkalinity remained at 0 mg/l between stations while, at most, pH increased by 0.3 standard units. The only substantial improvement in water quality occurred between RM 26.28 and RM 23.99, where pH increased from 4.6 to 5.8, and total alkalinity increased from 0 to 2 mg/l. This improvement was directly related to the addition of relatively fertile water from Little Catawissa Creek and Dark Run. There were no limestone sand sites between RM 26.28 and RM 23.99.

One potential reason that the limestone sand had little effect on the pH and alkalinity of Catawissa Creek was that the application rate may have been too low. The CCRA applied 700 tons of limestone sand to the Catawissa Creek basin in 1997 (E. Wytovich, CCRA. Personal communication 1998). Based on a formula for limestone sand application that was recently developed by the state of West Virginia, however, the Catawissa Creek basin would require an initial dosage of 9,786 tons of sand, followed by an annual dosage of 4,893 tons. This figure was probably overestimated because it took into account the entire drainage basin, whereas mining activities were limited to the upper portion of the Catawissa watershed. Nevertheless, if the figure were halved it would still be substantially higher than the rate that was actually used.

There were other potential reasons for the ineffectiveness of the limestone sand treatment. The summer drought resulted in lower than normal flows, thus limiting the sand's distribution throughout the stream during high flow events. The sand may also have been more effective at neutralizing the acidity of Catawissa Creek shortly after it was applied than it was at the time of our survey. Finally, the sand may have had effects that we were unable to measure with our water chemistry data, including local increases in pH and alkalinity and reduction of instream metals. Nevertheless, to promote effective biological restoration in Catawissa Creek the limestone sand treatment must provide more than local, short term benefits to water quality.

In addition to Catawissa Creek, the CCRA placed limestone sand in Tomhicken and Sugarloaf Creeks. It was possible that the sand was more effective here because the volume of water that needed to be treated in these streams was not as great as it was in Catawissa Creek, and the quality of the Oneida # 1 and # 3 Tunnel discharges was better than that of the Audenried Tunnel discharge. Unfortunately, we were unable to assess the effectiveness of the treatment in these streams. The stations we sampled on Tomhicken Creek were located in areas that did not permit comparisons of water chemistry values upstream and downstream from limestone sand sites. On Sugarloaf Creek, we only sampled at a single station.

The preferred method to eliminate AMD is to backfill strip pits and re-route surface drainage. This practice prevents surface waters from entering the deep mines and coming into contact with the sulfates that create AMD. Backfilling and re-routing of surface waters has been attempted to some extent in the Catawissa Creek basin, but much work remains to be done (K. Laslow, DEP. Personal communication 1997). Additional backfilling is planned for the Tomhicken watershed in the near future, and the CCRA is planning to install supplemental alkalinity producing systems on Sugarloaf and Catawissa Creeks (E. Wytovich, CCRA. Personal communication 1997). These measures, in combination with the continued depletion of iron pyrite from the basin's deep mines, should succeed in restoring fish populations to the affected streams. Catawissa and Tomhicken Creeks, in particular, have the potential to support substantial recreational fisheries.

MANAGEMENT RECOMMENDATIONS

1) The Pennsylvania Fish and Boat Commission should manage the following streams with statewide angling regulations under the wild trout waters option:

Messers Run (Section 02)	Little Crooked Run
Negro Hollow	Raccoon Creek
Davis Run	Crooked Run
Rattling Run	Klingermans Run
Little Catawissa Creek (Section 01)	Fisher Run
Trexler Run	Furnace Run

These streams all supported Class A wild trout populations.

2) The Pennsylvania Fish and Boat Commission should manage Messers Run (Section 01) and Long Hollow with statewide angling regulations under the Natural Yield Option with no stocking. These streams supported Class B wild trout populations.

3) The Pennsylvania Fish and Boat Commission should manage Dark Run, Tomhicken Creek (Section 01), Scotch Run (Section 01) and Messers Run (Section 03) with statewide angling regulations under the Natural Yield Option. These streams supported sparse wild trout populations but did not qualify for the trout stocking program because of their narrow widths.

4) The Pennsylvania Fish and Boat Commission should manage Section 01 of Beaver Run as a warmwater stream. Seasonally warm water temperatures precluded the development of a wild trout population, and the section was too narrow to qualify for trout stocking.

5) The Pennsylvania Fish and Boat Commission should continue to stock Section 02 of Beaver and Scotch Runs with adult trout under the Optimum Yield 2 - Rural program.

6) The Pennsylvania Fish and Boat Commission should change the trout stocking classification for Section 02 of Little Catawissa Creek from Optimum Yield 2 - Rural to Optimum Yield 2 - Suburban. The 1990 human population density for this section was 40 persons/km^2.

7) The Pennsylvania Fish and Boat Commission should not actively manage Hunkydory Creek and Little Catawissa Creek (Section 03) because these streams were entirely closed to public access.

8) The Pennsylvania Fish and Boat Commission should not actively manage Catawissa Creek (all sections), Stony Run, Tomhicken Creek (Section 02), Little Tomhicken Creek, Sugarloaf Creek, and Cranberry Run because water quality in these streams was degraded to the point that they could not support viable fisheries.

9) The Pennsylvania Fish and Boat Commission should stock Mine Gap Run with fingerling brook trout if unallocated fish become available through the production system. Water quality in Mine Gap Run was suitable for the development of a brook trout population but fish were absent.

10) The Pennsylvania Fish and Boat Commission should survey Stranger Hollow during the 1998 field season to complete the inventory of the Catawissa Creek basin.

11) The Pennsylvania Department of Environmental Protection should pursue backfilling of strip pits and re-routing of surface waters in the Catawissa Creek basin as budgetary and manpower limitations permit. The reclamation of this watershed would likely allow the development of substantial recreational fisheries in Catawissa and Tomhicken Creeks, with a potential gain of 24.5 miles of wild trout water.

12) The Pennsylvania Department of Environmental Protection should upgrade the Chapter 93 water quality classifications of the following streams from coldwater fishery to high quality coldwater fishery:

Rattling Run
Trexler Run
Little Crooked Run
Raccoon Creek
Crooked Run
Klingermans Run
Long Hollow
Fisher Run
Furnace Run

LITERATURE CITED

Bielo, R. 1957a. Little Catawissa Creek stream width measurement. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Bielo, R. 1957b. Tomhicken Creek stream survey. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Bielo, R. and A. Lech. 1957. Catawissa Creek stream survey. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Cooper, E.L. 1983. Fishes of Pennsylvania. The Pennsylvania State University Press. University Park, PA.

Copeland, T. 1992. Long Hollow (405E) management report. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D. 1965. Little Catawissa Creek stream survey. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D. 1971. Memo to R. Hesser, aquatic biologist. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D. 1976. Catawissa Creek unpublished data. Pennsylvania Fish and Boat Commission files, Sweet Valley, PA.

Daniels, D., L. Jackson, R. Moase, and Moser. 1976a. Little Catawissa Creek stream examination report. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D., L. Jackson, R. Moase, and Moser. 1976b. Beaver Run stream examination report. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D., R. Moase, and Weaver. 1977c. Scotch Run stream examination report. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D. 1985a. Little Catawissa Creek (405E) management report for Sections 01 and 02. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D. 1985b. Trexler Run (405E) management report. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Daniels, D. 1988. Beaver Run management report Section 01 and Section 02. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Gagen, C.J. and W.E. Sharpe. Influence of acid runoff episodes on survival and net sodium balance of brook trout (*Salvelinus fontinalis*) confined in a mountain stream. In Ecophysiology of acid stress in aquatic organisms (ed. H. Witters and O. Vanderborght), pp 219-230. Belgian Royal Zoological Society.

Gannett, Fleming, Corddry, and Carpenter, Inc. 1974. Mine drainage abatement measures for the Jeansville Basin. Prepared for the Pennsylvania Department of Environmental Protection, Harrisburg, PA.

Graff, D. 1966. Memo to J. Miller, fishery biologist. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Graff, D. 1967. Preimpoundment survey of Little Catawissa Creek. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Hesser, R., D. Daniels, R. Hoopes, and L. Loucks. 1971. Little Catawissa Creek stream survey. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Johnson, F.W. 1983. Trends of alkalinity and pH in Pennsylvania's low order stocked mountain trout streams, and potential economic implications. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Krester, W.A., J.R. Colquhoun, and M.H. Pfeiffer. 1983. Acid rain and the Adirondack sportfishery. Reprinted from The Conservationist, March-April, 1983.

Lech, A. 1939a. Stream survey of Little Catawissa Creek. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Lech, A. 1939b. Impoundment survey on Little Catawissa Creek. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Lech, A. 1939c. Stream survey of Trexler Run. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Lynch, J.A., V.C. Bowersox, and J.W. Grimm. 1996. Trends in precipitation chemistry in the United States, 1983-94: an analysis of the effects in 1995 of Phase I of the Clean Air Act Amendments of 1990, Title IV. United States Geological Survey open-file report 96-0346.

Marcinko, M., R. Lorson, and R. Hoopes. 1986. Procedures for stream and river inventory information input. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Moase, R.E., T. Copeland, and T. Gensel. 1993. Spring Brook basin (405A) management report. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Pennsylvania Department of Environmental Protection. 1991. Little Catawissa Creek special protection evaluation report. Pennsylvania Department of Environmental Protection, Harrisburg, PA.

Pennsylvania Fish and Boat Commission. 1987. Management of trout fisheries in Pennsylvania waters. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada Bulletin 191.

Robins, C.R., and six co-authors. 1991. A list of common and scientific names of fishes from the United States and Canada, 5th ed. American Fisheries Society Special Publication #20. Bethesda, MD.

Shoemaker, M.E. 1932. Stream survey of Trexler Run. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Young, L. 1990. Messers Run stream survey. Pennsylvania Fish and Boat Commission files, 450 Robinson Lane, Bellefonte, PA.

Table 1. Named streams and reservoirs of the Catawissa Creek basin (405E) listed in hierarchial order.

- Hunkydory Creek
  - Reservoir # 8
- *Catawissa Creek Section 01
  - Unnamed Tributary
    - Mount Pleasant Reservoir
  - *Messers Run Section 01
  - *Messers Run Section 02
    - Lofty Reservoir
  - *Messers Run Section 03
    - Blue Head Reservoir
      - *Negro Hollow
  - *Davis Run
    - Pumping Station Dam
- *Catawissa Creek Section 02
  - *Rattling Run
  - *Dark Run
  - *Little Catawissa Creek Section 01
  - *Little Catawissa Creek Section 02
    - Unnamed Tributary
      - Ringtown Reservoir
    - *Trexler Run
  - Little Catawissa Creek Section 03
    - *Stony Run
  - *Tomhicken Creek Section 01
    - *Little Tomhicken Creek
  - *Tomhicken Creek Section 02
    - *Sugarloaf Creek
    - *Little Crooked Run
    - *Raccoon Creek
- *Catawissa Creek Section 03
  - *Crooked Run
  - *Cranberry Run
  - *Klingermans Run
  - Stranger Hollow
  - Long Hollow
  - *Beaver Run Section 01
  - *Beaver Run Section 02
  - *Mine Gap Run
  - *Fisher Run
  - *Scotch Run Section 01
  - *Scotch Run Section 02
  - *Furnace Run
- *Catawissa Creek Section 04

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* Surveyed in 1997

Table 2. Section limits for streams in the Catawissa Creek basin (405E).

Stream (Section Number)	Section Limits: Upstream	Section Limits: Downstream
Catawissa Creek (01)	Conf Hunkydory Ck and UNT	SR 924 Bridge
Catawissa Creek (02)	SR 924 Bridge	Conf Tomhicken Ck
Catawissa Creek (03)	Conf Tomhicken Ck	T 403
Catawissa Creek (04)	T 403	Mouth
Messers Run (01)	Headwaters	Lofty Rs
Messers Run (02)	Lofty Rs	Blue Head Rs
Messers Run (03)	Blue Head Rs	Mouth
Little Catawissa Creek (01)	Headwaters	T 431
Little Catawissa Creek (02)	T 431	T 435
Little Catawissa Creek (03)	T 435	Mouth
Tomhicken Creek (01)	Headwaters	Conf Little Tomhicken Ck
Tomhicken Creek (02)	Conf Little Tomhicken Ck	Mouth
Beaver Run (01)	Headwaters	Moyers Farm (RM 3.20)
Beaver Run (02)	Moyers Farm (RM 3.20)	Mouth
Scotch Run (01)	Headwaters	1st bdg upst Mifflin Ck Rd
Scotch Run (02)	1st bdg upst Mifflin Ck Rd	Mouth

All other streams in the Catawissa Creek basin are considered to be a single section extending from the headwaters downstream to the mouth.

Table 3. Physical and social data for stream sections in the Catawissa Creek Basin (405E).

Stream (Section)	Length (km)	Width (m)	Gradient (m/km)	USGS Quadrangle(s)	Proximity to roads: % of Section within 100 m	300 m	500 m	1990 Human Population Density (# Persons/km^2)
Catawissa Creek (01)	17.2	8.1	12.6	K36, K37, L36	6	21	34	195
Catawissa Creek (02)	12.6	16.0	3.8	K36, L36	63	93	98	27
Catawissa Creek (03)	25.0	22.7	2.9	K35, K36	46	77	90	18
Catawissa Creek (04)	11.0	23.6	2.3	K34, K35	83	100	100	52
Hunkydory Creek (01)	2.3	NA	5.2	K37	70	90	100	238
Messers Run (01)	2.1	2.3	36.7	K37, L37	0	0	0	54
Messers Run (02)	4.2	3.3	20.0	L37	18	95	100	31
Messers Run (03)	1.2	5.8	16.0	K37, L37	16	23	31	20
Negro Hollow (01)	1.7	2.8	64.8	L37	0	51	78	31
Davis Run (01)	1.7	2.8	52.3	L36	6	31	48	20
Rattling Run (01)	2.9	3.0	33.0	L36	25	42	56	20
Dark Run (01)	6.6	3.3	13.5	K36, L36	33	66	95	40
Ltl Catawissa Creek (01)	3.4	3.0	20.8	L35	0	100	100	30
Ltl Catawissa Creek (02)	8.5	5.3	5.6	L35, L36	29	66	81	40
Ltl Catawissa Creek (03)	4.6	6.2	7.7	K36, L36	21	40	66	31
Trexler Run (01)	4.8	3.7	12.6	L35	64	89	100	23
Stony Run (01)	3.4	1.7	47.5	K35, K36, L35, L36	9	35	50	40
Tomhicken Creek (01)	7.4	4.3	22.6	K36, K37	34	56	83	160
Tomhicken Creek (02)	9.7	7.8	12.4	K36	41	93	100	22
Ltl Tomhicken Creek (01)	1.6	1.4	58.8	K36	91	100	100	21
Sugarloaf Creek (01)	3.9	3.6	24.2	K36, K37	84	100	100	164
Ltl Crooked Run (01)	2.7	1.8	57.4	K36	40	59	71	22
Raccoon Creek (01)	5.1	2.2	19.9	K36	43	99	100	27

Continued on next page.

Table 3. Continued.

Stream (Section)	Length (km)	Width (m)	Gradient (m/km)	USGS Quadrangle(s)	Proximity to roads: % of Section within 100 m	300 m	500 m	1990 Human Population Density (# Persons/km^2)
Crooked Run (01)	7.0	2.9	39.3	K35, K36	22	49	65	22
Cranberry Run (01)	3.1	2.7	86.8	K35	10	15	19	10
Klingermans Run (01)	3.9	3.1	66.1	K35	24	29	43	9
Stranger Hollow (01)	1.6		137.0	K35	0	0	0	10
Long Hollow (01)[1]	3.9	3.2	62.7	K35	8	14	20	8
Beaver Run (01)	5.3	3.1	10.0	K35, K36	28	66	100	10
Beaver Run (02)	5.2	4.0	15.0	K35	25	60	85	10
Mine Gap Run (01)	3.0	2.0	69.2	K35	72	80	90	9
Fisher Run (01)	4.6	3.1	49.6	K34, K35	12	43	57	30
Scotch Run (01)	4.0	2.2	4.3	K35, K36	24	71	100	10
Scotch Run (02)	8.2	5.1	26.7	K35	23	57	90	16
Furnace Run (01)	2.3	3.0	34.5	K34, K35	8	34	68	30

1. Copeland (1992).

NA = Not Available. USGS Quadrangles: K34 = Catawissa; K35 = Shumans; K36 = Nuremburg; K37 = Conyngham; L35 = Ashland; L36 = Shenandoah; L37 = Delano.

Table 4. Station number, river mile, downstream limit, length electrofished, and voltage for stations sampled during 1997 on Catawissa Creek and in the basins of streams tributary to Section 01 of Catawissa Creek (405E).

Stream	Station Number	River Mile	Downstream Limit	Length (m)	Volts
Catawissa Creek	0101	36.95	Pvt road bridge dnst conf UNT	150	550 AC
	0102	33.43	T 818 bridge	150	100 AC
	0103	30.96	Nursery upst SR 924 bridge	150	125 AC
	0201	28.68	T 812 bridge	150	125 AC
	0202	26.28	SR 339 brdge @ Union/E Union Twp Border	150	125 AC
	0203	23.99	T 453 bridge	150	200 AC
	0301	21.24	SR 339 bridge dnst conf Tomhicken Ck	150	125 AC
	0302	17.57	T 620 bridge	150	150 AC
	0303	14.36	T 367 bridge	150	200 AC
	0304	12.95	300 m dnst SR 339 bridge in Shumans	150	200 AC
	0305	9.66	SR 339 bridge upst conf Mine Gap Rn	150	150 AC
	0306	8.52	T 413 bridge	150	150 AC
	0401	5.67	Old road x-ing dnst Mainville	150	150 AC
	0402	2.97	Where SR 2018 nears stream @ BM 560	150	150 AC
	0403	1.41	Hollingshead covered bridge	150	150 AC
Messers Run	0101	3.94	200 m upst Lofty Rs	120	125 AC
	0201	1.85	1.5 km upst Blue Head Rs	303	300 AC
	0301	0.50	400 m dnst Blue Head Rs	300	300 AC
Negro Hollow	0101	0.28	550 m upst Blue Head Rs	300	400 AC
Davis Run	0101	0.33	Pumping Station Dam inlet	300	600 DC

Table 5. Station number, river mile, downstream limit, length electrofished, and voltage for stations sampled during 1997 in the basins of streams tributary to Section 02 of Catawissa Creek (405E).

Stream	Station Number	River Mile	Downstream Limit	Length (m)	Volts
Rattling Run	0101	0.57	SR 339 bridge	300	400 DC
Dark Run	0101	2.66	T 792 bridge	300	300 DC
	0102	1.71	T 798 bridge	150	300 DC
Ltl Catawissa Creek	0101	8.90	Old road x-ing upst Sch/Col Co Line	300	400 DC
	0201	5.40	First UNT dnst SR 4036	170	200 AC
	0202	3.85	300 m upst T 851 bridge	150	200 AC
	0203	2.90	T 435 bridge	330	200 AC
Trexler Run	0101	0.80	Upstream crossing of T 788	300	400 DC
Stony Run	0101	1.14	Railroad crossing	150	800 DC
Tomhicken Creek	0101	8.45	SR 924 bridge	---	— —
	0102	6.03	Confluence with Little Tomhicken Creek	300	200 DC
	0201	4.89	SR 1005 bridge dnst Eagle Rock STP	150	150 AC
	0202	3.19	T 806 bridge	150	150 AC
	0203	1.44	SR 4033 bridge	150	150 AC
Ltl Tomhicken Creek	0101	0.52	Upstream from SR 1005 bridge	130	400 DC
Sugarloaf Creek	0101	0.19	Private road bridge	150	400 DC
Little Crooked Run	0101	0.51	Private road bridge	307	600 DC
Raccoon Creek	0101	0.95	SR 1005 bridge	300	400 DC

Table 6. Station number, river mile, downstream limit, length electrofished, and voltage for stations sampled during 1997 in the basins of streams tributary to Section 03 of Catawissa Creek (405E).

Stream	Station Number	River Mile	Downstream Limit	Length (m)	Volts
Crooked Run	0101	2.75	Approx 370 m dnst railroad crossing	300	600 DC
	0102	0.81	Zion Grove hatchery	90	700 DC
Cranberry Run	0101	0.57	Railroad crossing	150	900 DC
Klingermans Run	0101	0.93	Railroad crossing	300	NR DC
Long Hollow[1]	0101	0.00	Mouth	300	350 DC
Beaver Run	0101	4.03	150 m dnst SR 2026 bridge	150	400 DC
	0201	0.45	SR 339 bridge	150	250 AC
Mine Gap Run	0101	0.61	Where stream first nears PGC road	120	600 DC
Fisher Run	0101	0.49	300 m dnst T 468	300	600 DC
Scotch Run	0101	5.10	Private road bridge	300	400 DC
	0201	1.30	PGC road crossing	240	250 AC
	0202	0.00	SR 339 bridge at mouth	300	250 AC
Furnace Run	0101	0.15	Railroad crossing	300	900 DC

1. Copeland (1992)   NR = Not Recorded.

Table 7. Physical-chemical data collected at sampling stations located on Catawissa Creek and in the basins of streams tributary to Section 01 of Catawissa Creek (405E) during 1997.

Stream	River Mile	Date	Time (24 hour)	Air Temp. (°C)	Water Temp. (°C)	pH	T.Alk (mg/l)	T.Hard (mg/l)	Spec. Cond. (umhos)
Catawissa Creek	36.95	7/28	1130	31	17.3	5.2	0	16	68
	33.43	7/28	1005	27	14.0	4.3	0	97	277
	30.96	7/28	1300	33	16.8	4.6	0	*	259
	28.68	7/28	1400	31	19.5	4.7	0	78	229
	26.28	7/28	1450	31	19.9	4.6	0	72	212
	23.99	7/29	1030	24	18.8	5.8	2	*	157
	21.24	7/29	1120	27	20.1	6.1	1	48	157
	17.57	7/29	1300	26	22.7	6.2	1	46	148
	14.36	7/29	1400	27	25.2	6.4	1	49	142
	12.95	7/30	1055	25	17.5	6.4	1	40	138
	9.66	7/30	0950	18	18.2	6.4	1	41	136
	8.52	7/30	1145	25	19.4	6.6	1	45	136
	5.67	7/30	1310	26	21.7	6.7	3	38	129
	2.97	7/30	1425	26	22.9	6.7	3	40	129
	1.41	7/31	1030	25	20.2	6.7	2	40	126
Messers Run	3.94	7/23	1540	24	15.1	6.3	3	47	223
	1.85	7/22	1455	22	16.8	6.6	4	18	71
	0.50	7/23	1620	23	16.5	6.6	5	13	45
Negro Hollow	0.28	7/22	1220	23	14.2	6.6	4	7	20
Davis Run	0.33	6/25	1430	28	15.6	6.6	4	6	27

T.Alk = Total Alkalinity; T.Hard = Total Hardness; Spec. Cond. = Specific Conductance.
* = Total Hardness > 150 mg/l.

Table 8. Physical-chemical data collected at sampling stations located in the basins of streams tributary to Section 02 of Catawissa Creek (405E) during 1997.

Stream	River Mile	Date	Time (24 hour)	Air Temp. (°C)	Water Temp. (°C)	pH	T.Alk (mg/l)	T.Hard (mg/l)	Spec. Cond. (umhos)
Rattling Run	0.57	6/19	1131	22	13.2	6.6	5	22	81
Dark Run	2.66	6/19	1335	29	17.5	7.0	16	34	118
	1.71	6/20	1115	27	17.2	7.4	28	NS	171
Ltl Catawissa Creek	8.90	6/26	1300	28	19.8	6.4	2	16	80
	5.40	6/27	1240	28	21.0	6.8	10	28	86
	3.85	6/27	1100	24	18.4	7.0	13	22	76
	2.90	6/30	1110	27	17.1	7.0	13	24	80
Trexler Run	0.80	6/30	1310	28	16.3	6.6	10	15	43
Stony Run	1.14	7/01	1300	26	14.4	6.0	0	0	19
Tomhicken Creek	8.45	7/08	1140	32	18.5	7.0	31	39	211
	6.03	7/08	1540	29	17.8	7.4	42	52	308
	4.89	7/25	1115	24	14.9	6.6	2	30	149
	3.19	7/25	1300	26	15.7	6.6	6	30	145
	1.44	7/25	1345	27	16.3	6.6	7	32	134
Ltl Tomhicken Creek	0.52	7/08	1320	30	15.5	4.4	0	22	107
Sugarloaf Creek	0.19	7/11	1135	24	20.3	5.0	0	*	117
Little Crooked Run	0.51	7/09	1225	30	15.3	6.6	4	6	32
Raccoon Creek	0.95	7/11	1300	28	16.8	7.0	20	36	129

T.Alk = Total Alkalinity; T.Hard = Total Hardness; Spec. Cond. = Specific Conductance.
NS = Not Sampled. * = Total Hardness > 150 mg/l.

Table 9. Physical-chemical data collected at sampling stations located in the basins of streams tributary to Section 03 of Catawissa Creek (405E) during 1997.

Stream	River Mile	Date	Time (24 hour)	Air Temp. (°C)	Water Temp. (°C)	pH	T.Alk (mg/l)	T.Hard (mg/l)	Spec. Cond. (umhos)
Crooked Run	2.75	6/25	1135	34	14.3	5.8	3	5	21
	0.81	6/25	1000	28	15.8	6.6	5	10	32
Cranberry Run	0.57	6/24	1325	19	13.3	5.8	0	4	22
Klingermans Run	0.93	6/23	1255	31	13.4	6.0	1	2	20
Long Hollow[1]	0.00	6/26	1200	25	13.0	7.0	4	4	22
Beaver Run	4.03	6/16	1240	25	22.0	7.0	16	24	60
	0.45	6/16	1330	28	16.0	7.0	14	22	57
Mine Gap Run	0.61	6/23	1100	29	14.4	6.6	4	8	30
Fisher Run	0.49	6/23	0935	26	14.4	6.4	4	6	25
Scotch Run	5.10	6/18	1345	25	15.1	6.6	5	23	67
	1.30	6/17	1350	24	14.7	7.0	8	15	51
	0.00	6/19	0945	25	15.0	6.8	8	18	64
Furnace Run	0.15	6/16	1100	31	13.0	6.4	2	2	19

T.Alk = Total Alkalinity; T.Hard = Total Hardness; Spec. Cond. = Specific Conductance.
1. Copeland (1992)

Table 10. Scientific and common names of fish species captured in the Catawissa Creek basin (405E) during 1997, with abbreviations used in the following tables.

Scientific name	Common name	Abbreviation
Oncorhynchus mykiss	Rainbow trout	RT
Salmo trutta	Brown trout	BT
None	Palomino trout	PRT
Salvelinus fontinalis	Brook trout	ST
Salmo trutta x Salvelinus fontinalis	Tiger trout	TT
Exoglossum maxillingua	Cutlips minnow	CLM
Notemigonus crysoleucas	Golden shiner	GS
Luxilus cornutus	Common shiner	CS
Pimephales promelas	Fathead minnow	FHM
Rhinichthys atratulus	Blacknose dace	BND
Rhinichthys cataractae	Longnose dace	LND
Semotilus atromaculatus	Creek chub	CKC
Semotilus corporalis	Fallfish	FF
Catostomus commersoni	White sucker	WS
Hypentelium nigricans	Northern hog sucker	NHS
Noturus insignis	Margined madtom	MM
Lepomis cyanellus	Green sunfish	GSF
Lepomis gibbosus	Pumpkinseed	PPS
Lepomis macrochirus	Bluegill	BG
Micropterus salmoides	Largemouth bass	LMB
Etheostoma olmstedi	Tessellated darter	TD
Cottus sp.	Sculpins	SC

Total species: 22

Table 11. Scientific and common names of fish species captured during historical surveys in the Catawissa Creek basin (405E) but absent during the 1997 work.

Scientific name	Common name
Cyprinus carpio	Common carp
Pimephales notatus	Bluntnose minnow
Nocomis micropogon	River chub
Ameiurus nebulosus	Brown bullhead
Ameiurus catus	White catfish
Ictalurus punctatus	Channel catfish
Perca flavescens	Yellow perch

Table 12. Fish species captured in Catawissa Creek and in the basins of streams tributary to Section 01 of Catawissa Creek (405E) during 1997.

Stream	River Mile	SPECIES								Total Species
		BT	ST	BND	CKC	WS	LMB	TD	SC	
Catawissa Creek	36.95		X							1
	33.43									0
	30.96									0
	28.68									0
	26.28									0
	23.99				X	X				2
	21.24									0
	17.57				X		X			2
	14.36									0
	12.95				X					1
	9.66				X					1
	8.52				X					1
	5.67	X		X	X	X				4
	2.97				X					1
	1.41				X					1
Messers Run	3.94		X	X						2
	1.85	X	X	X						3
	0.50	X	X	X		X		X	X	6
Negro Hollow	0.28		X						X	2
Davis Run	0.33	X	X	X	X			X	X	6

Table 13. Fish species captured in the basins of streams tributary to Section 02 of Catawissa Creek (405E) during 1997.

Stream	River Mile	BT	PRT	ST	CLM	CS	BND	LND	CKC	FF	WS	MM	GSF	PPS	BG	LMB	TD	SC	Total Species
Rattling Run	0.57			X			X											X	3
Dark Run	2.66	X		X			X		X		X			X	X	X			8
	1.71			X			X		X		X			X	X				6
Ltl Catawissa Ck	8.90			X			X		X										3
	5.40	X		X	X		X	X	X	X	X		X				X		10
	3.85	X			X	X	X	X	X		X	X							8
	2.90	X		X	X	X	X	X	X		X	X							9
Trexler Run	0.80	X		X			X		X		X			X		X			7
Stony Run	1.14																		0
Tomhicken Ck	6.03			X			X		X						X				4
	4.89			X									X	X					3
	3.19																		0
	1.44		X	X			X		X										4
Ltl Tomhicken Ck	0.52																		0
Sugarloaf Creek	0.19																		0
Ltl Crooked Run	0.51			X															1
Raccoon Creek	0.95			X			X		X		X		X			X		X	7

Table 14. Fish species captured in the basins of streams tributary to Section 03 of Catawissa Creek (405E) during 1997.

Stream	River Mile	SPECIES																Total Species
		RT	BT	ST	TT	GS	FHM	BND	LND	CKC	WS	NHS	MM	PPS	BG	TD	SC	
Crooked Run	2.75			X														1
	0.81	X	X	X	X													4
Cranberry Run	0.57																	0
Klingermans Run	0.93			X														1
Long Hollow[1]	0.00		X	X														2
Beaver Run	4.03					X	X	X	X	X	X		X	X	X	X	X	11
	0.45	X		X				X	X	X	X	X		X			X	9
Mine Gap Run	0.61																	0
Fisher Run	0.49			X				X									X	3
Scotch Run	5.10		X	X							X							3
	1.30		X	X				X	X	X	X			X	X			8
	0.00		X	X				X		X	X			X				6
Furnace Run	0.15			X														1

[1] Copeland (1992)

Table 15. Length-frequency distribution ((M+C)-R) of wild trout captured in the Catawissa Creek basin (405E) in 1997.

Stream	River Mile	Species	Length Group (mm) 25	50	75	100	125	150	175	200	225	250	275	300	325
Catawissa Creek	36.95	Brook	--	1	--	--	--	1	--	--	--	--	--	--	--
	5.67	Brown	--	--	1	--	--	--	--	--	--	--	--	--	--
Messers Run	3.94	Brook	1	15	2	3	11	4	--	1	--	--	--	--	--
	1.85	Brook	8	143	5	26	24	16	13	4	1	1	--	--	--
		Brown	--	3	--	--	--	--	--	--	--	--	--	--	--
	0.50	Brook	--	102	20	--	13	13	8	3	--	--	--	--	--
		Brown	--	21	1	--	--	--	1	1	--	1	--	--	--
Negro Hollow	0.28	Brook	10	126	38	62	36	17	6	1	1	--	--	--	--
Davis Run	0.33	Brook	--	57	2	1	7	8	11	2	1	--	--	--	--
		Brown	4	3	1	1	3	7	1	1	2	--	2	2	--
Rattling Run	0.57	Brook	19	49	--	18	53	32	19	6	--	--	--	--	--
Dark Run	2.66	Brook	--	9	2	--	1	2	7	4	1	--	--	--	--
	1.71	Brook	--	1	1	--	--	--	--	--	--	--	--	--	--
Ltl Catawissa Creek	8.90	Brook	11	71	--	21	25	15	5	2	--	--	--	--	--
	5.40	Brown	--	1	--	--	--	--	--	--	--	1	1	--	--
	3.85	Brown	--	1	1	--	--	--	--	--	2	--	--	--	--
	2.90	Brook	--	1	--	--	--	--	--	1	--	--	--	--	--
		Brown	--	65	32	--	--	1	5	7	1	2	--	--	--
Trexler Run	0.80	Brook	--	38	11	--	--	4	5	2	1	--	--	--	--
		Brown	4	31	--	1	3	10	2	7	5	4	--	2	1

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Table 15. Continued.

Stream	River Mile	Species	Length Group (mm) 25	50	75	100	125	150	175	200	225	250	275	300	325
Tomhicken Creek	6.03	Brook	1	40	11	--	--	--	--	6	6	3	--	--	--
	4.89	Brook	--	--	--	--	--	--	1	--	--	1	--	--	--
	1.44	Brook	--	--	1	--	--	--	--	1	2	--	--	--	--
Little Crooked Run	0.51	Brook	29	68	1	27	44	23	5	--	--	--	--	--	--
Raccoon Creek	0.95	Brook	--	12	69	--	--	2	4	14	11	2	1	--	--
Crooked Run	2.75	Brook	41	168	--	24	55	24	19	4	--	--	--	--	--
Klingermans Run	0.93	Brook	23	21	1	14	44	20	7	1	--	--	--	--	--
Stranger Hollow															
Long Hollow[1]	0.00	Brook	22	34	85	29	11	3	2	--	--	--	--	--	--
Fisher Run	0.49	Brook	26	97	--	11	25	16	13	5	1	--	--	--	--
Scotch Run	5.10	Brook	1	7	1	4	5	2	1	--	--	--	--	--	--
		Brown	--	--	1	--	--	--	--	--	--	--	--	--	--
	1.30	Brook	--	72	15	--	1	2	1	--	--	--	--	--	--
	0.00	Brook	--	4	--	--	--	--	1	2	--	--	--	--	--
Furnace Run	0.15	Brook	81	59	--	26	46	23	10	2	--	--	--	--	--

[1] Copeland (1992).

Table 16. Estimated population abundance and biomass of trout from the Catawissa Creek basin (405E), 1997.

Stream (Section)	Species	Number/Kilometer <175 mm	Number/Kilometer ≥175 mm	Number/Hectare <175 mm	Number/Hectare ≥175 mm	Kilograms per Hectare <175 mm	Kilograms per Hectare ≥175 mm	Kilograms per Hectare Total
Messers Run (01)	Brook	300	8	1,800	50	24.55	4.45	29.00
Messers Run (02)	Brook	1,146	68	3,474	207	22.87	15.52	38.39
	Brown	10	0	30	0	0.09	0.00	0.09
							Total:	38.48
Messers Run (03)	Brook	715	40	1,430	80	9.33	5.44	14.77
	Brown	73	9	147	21	0.47	2.26	2.73
							Total:	17.50
Negro Hollow (01)	Brook	1,950	32	7,315	120	47.29	8.48	55.77
Davis Run (01)	Brook	563	50	2,111	188	10.46	13.03	23.49
	Brown	71	27	269	101	6.10	18.71	24.81
							Total:	48.30
Rattling Run (01)	Brook	819	94	2,729	314	35.30	21.34	56.64
Dark Run (01)	Brook	30	20	105	76	0.98	5.87	6.85
Ltl Catawissa Ck (01)	Brook	799	23	2,997	88	24.81	6.04	30.85
Ltl Catawissa Ck (02)	Brook	1	1	1	1	0.00	0.11	0.11
	Brown	197	25	230	31	0.98	3.99	4.97
							Total:	5.08
Trexler Run (01)	Brook	254	27	820	86	4.45	6.74	11.19
	Brown	100	70	323	226	5.72	33.94	39.66
							Total:	50.85

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Table 16. Continued.

Stream (Section)	Species	Number/Kilometer <175 mm	Number/Kilometer ≥175 mm	Number/Hectare <175 mm	Number/Hectare ≥175 mm	Kilograms per Hectare <175 mm	Kilograms per Hectare ≥175 mm	Kilograms per Hectare Total
Tomhicken Creek (01)	Brook	343	55	793	127	2.51	15.63	18.14
Tomhicken Creek (02)	Brook	2	11	3	14	0.02	1.65	1.67
Ltl Crooked Run (01)	Brook	869	20	4,444	100	46.64	6.10	52.74
Raccoon Creek (01)	Brook	335	120	1,434	515	8.85	56.70	65.55
Crooked Run (0101)[1]	Brook	2,215	100	11,076	500	74.12	32.36	106.48
Klingermans Run (01)	Brook	464	27	1,547	89	27.36	5.73	33.09
Long Hollow (1)[2]	Brook	1,019	7	3,056	20	22.55	1.12	23.67
Fisher Run (01)	Brook	1,140	78	3,798	261	23.49	18.58	42.07
Scotch Run (01)	Brook	66	3	166	8	2.42	0.51	2.93
	Brown	3	0	8	0	0.05	0.00	0.05
							Total:	2.98
Scotch Run (02)	Brook	480	7	942	13	3.40	0.99	4.39
Furnace Run (01)	Brook	1,506	46	5,020	152	35.10	9.89	44.99

1. No estimate was attempted at Station 0102 of Crooked Run because it wasn't possible to separate the wild trout from the trout stocked by the Zion Grove Hatchery.
2. Copeland (1992).

Table 17. Pennsylvania Fish and Boat Commission (PFBC) and current Pennsylvania Department of Environmental Protection (DEP) classifications, recommended DEP classification upgrades, recommended PFBC management programs, and angler expectation ratings for stream sections in the Catawissa Creek basin (405E).

Stream (Section)	Classification PFBC	DEP	Recommended DEP Upgrade	Recommended Management Program	Angler Expectation Rating
Catawissa Creek (01)	D U3	CWF	None	Polluted/No Fishery	Poor
Catawissa Creek (02)	D R2	CWF/TSF	None	Polluted/No Fishery	Poor
Catawissa Creek (03)	DR1S	TSF	None	Polluted/No Fishery	Poor
Catawissa Creek (04)	DS1S	TSF	None	Polluted/No Fishery	Poor
Hunkydory Creek (01)	U	CWF	None	Closed to Fishing	NS
Messers Run (01)	B S4	HQ-CWF	None	Wild Trout Waters	Poor
Messers Run (02)	A R4	HQ-CWF	None	Wild Trout Waters	Excellent
Messers Run (03)	B R3	HQ-CWF	None	Natural Yield	Good
Negro Hollow (01)	A R4	HQ-CWF	None	Wild Trout Waters	Good
Davis Run (01)	A R4	HQ-CWF	None	Wild Trout Waters	Excellent
Rattling Run (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Excellent
Dark Run (01)	D S4	CWF	None	Natural Yield	Poor
Little Catawissa Creek (01)	A R4	HQ-CWF	None	Wild Trout Waters	Poor
Little Catawissa Creek (02)	DGS3	CWF	None	Optimum Yield 2 - Suburban	Poor
Little Catawissa Creek (03)	D R3	CWF	None	Closed to Fishing	NS
Trexler Run (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Excellent
Stony Run (01)	D S3	CWF	None	Polluted/No Fishery	Poor
Tomhicken Creek (01)	C U3	CWF	None	Natural Yield	Good
Tomhicken Creek (02)	D R3	CWF	None	Natural Yield	Poor
Little Tomhicken Creek (01)	D R4	CWF	None	Polluted/No Fishery	Poor
Sugarloaf Creek (01)	D U4	CWF	None	Polluted/No Fishery	Poor
Little Crooked Run (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Poor

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Table 17. Continued.

Stream (Section)	Classification PFBC	Classification DEP	Recommended DEP Upgrade	Recommended Management Program	Angler Expectation Rating
Raccoon Creek (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Excellent
Crooked Run (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Excellent
Cranberry Run (01)	D R4	CWF	None	Polluted/No Fishery	Poor
Klingermans Run (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Poor
Stranger Hollow (01)	R	CWF	None	Natural Yield	NS
Long Hollow (01)[1]	BGR4	CWF	HQ-CWF	Natural Yield	Poor
Beaver Run (01)	D R4	CWF	None	Warmwater Management	Poor
Beaver Run (02)	DGR3	CWF	None	Optimum Yield 2 - Rural	Poor
Mine Gap Run (01)	D R4	CWF	None	Polluted/No Fishery	Poor
Fisher Run (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Excellent
Scotch Run (01)	D R3	CWF	None	Natural Yield	Poor
Scotch Run (02)	DGR3	CWF	None	Optimum Yield 2 - Rural	Poor
Furnace Run (01)	A R4	CWF	HQ-CWF	Wild Trout Waters	Excellent

1. Copeland (1992).

NS = Not Sampled.

Table 18. Comparison of water chemistry data taken at similar discharge levels from the Audenried Tunnel by Gannett et al in 1969/1970 and the DEP in 1996/1997. Values from the 1996/1997 sampling period are highlighted.

Date	Volume (gpm)	pH	Alkalinity (mg/l)	Iron (mg/l)	Aluminum (mg/l)	Manganese (mg/l)
07/09/70	5,069	3.3	0.0	6.8	NS	NS
11/25/69	6,180	3.3	0.0	5.4	NS	NS
09/30/96	4,726	3.8	0.0	0.8	8.7	2.6
05/31/97	5,360	4.0	3.8	0.7	7.9	2.2
06/11/70	7,847	3.3	0.0	3.9	17.9	6.7
12/12/69	9,792	3.2	0.0	4.5	NS	8.1
04/29/97	8,861	4.1	4.8	0.6	7.0	2.0
03/29/97	9,647	4.1	5.0	0.6	7.0	2.0
05/15/70	13,125	3.4	0.0	3.3	NS	NS
11/26/96	12,576	4.1	6.6	1.3	7.8	2.0
02/24/70	17,083	3.4	0.0	3.9	NS	NS
12/27/96	16,977	4.1	5.0	0.4	6.4	1.6

NS = Not Sampled.

Table 19. Comparison between historical and current water chemistry data from Catawissa and Tomhicken Creeks (405E).

Stream	River Mile	Year	Total Alkalinity (mg/l)	pH (standard units)
Catawissa Ck	33.43	1957	NS	3.2
		1966	0	3.5
		1997	0	4.3
Catawissa Ck	30.96	1957[1]	NS	3.2
		1966[2]	0	3.5
		1997	0	4.6
Catawissa Ck	26.28	1957	NS	3.2
		1966	0	3.6
		1976	0	3.8
		1997	0	4.6
Catawissa Ck	23.99	1957	NS	3.4
		1966	NS	3.6
		1997	2	5.8
Catawissa Ck	21.24	1957	NS	4.4
		1966	NS	3.8
		1997	1	6.1
Catawissa Ck	8.52	1966	NS	4.0
		1997	1	6.6
Catawissa Ck	5.67	1966[3]	NS	4.1
		1976[3]	2	4.7
		1997	3	6.7
Tomhicken Ck	4.89	1957	NS	3.4
		1966	0	4.5
		1997	2	6.6
Tomhicken Ck	1.44	1957[4]	NS	4.4
		1997	7	6.6

1. This sample is from RM 30.19.
2. This sample is from RM 30.55.
3. These samples are from RM 6.80.
4. This sample is from RM 0.00.

NS = Not Sampled.

Table 20. Comparison of water chemistry data obtained from sites influenced by the addition of limestone sand to Catawissa Creek (405E).

River Mile	pH	Total Alkalinity (mg/l)	Total Hardness (mg/l)	Specific Conductance (umhos)
36.95	5.2	0	16	68
33.43	4.3	0	97	277
30.96	4.6	0	>150	259
28.68	4.7	0	78	229
26.28	4.6	0	72	212
23.99	5.8	2	>150	157

Between RM 36.95 and RM 33.43: 2 limestone sand sites, 2 AMD discharges, Messers Run, and 1 unnamed tributary.

Between RM 33.43 and RM 30.96: 1 limestone sand site and one unnamed tributary.

Between RM 30.96 and RM 28.68: 1 limestone sand site and Davis Run.

Between RM 28.68 and RM 26.28: 2 limestone sand sites and Rattling Run.

Between RM 26.68 and RM 23.99: 0 limestone sand sites, 1 unnamed tributary, Dark Run, and Little Catawissa Creek.

Figure 1. Location map for the Catawissa Creek basin.

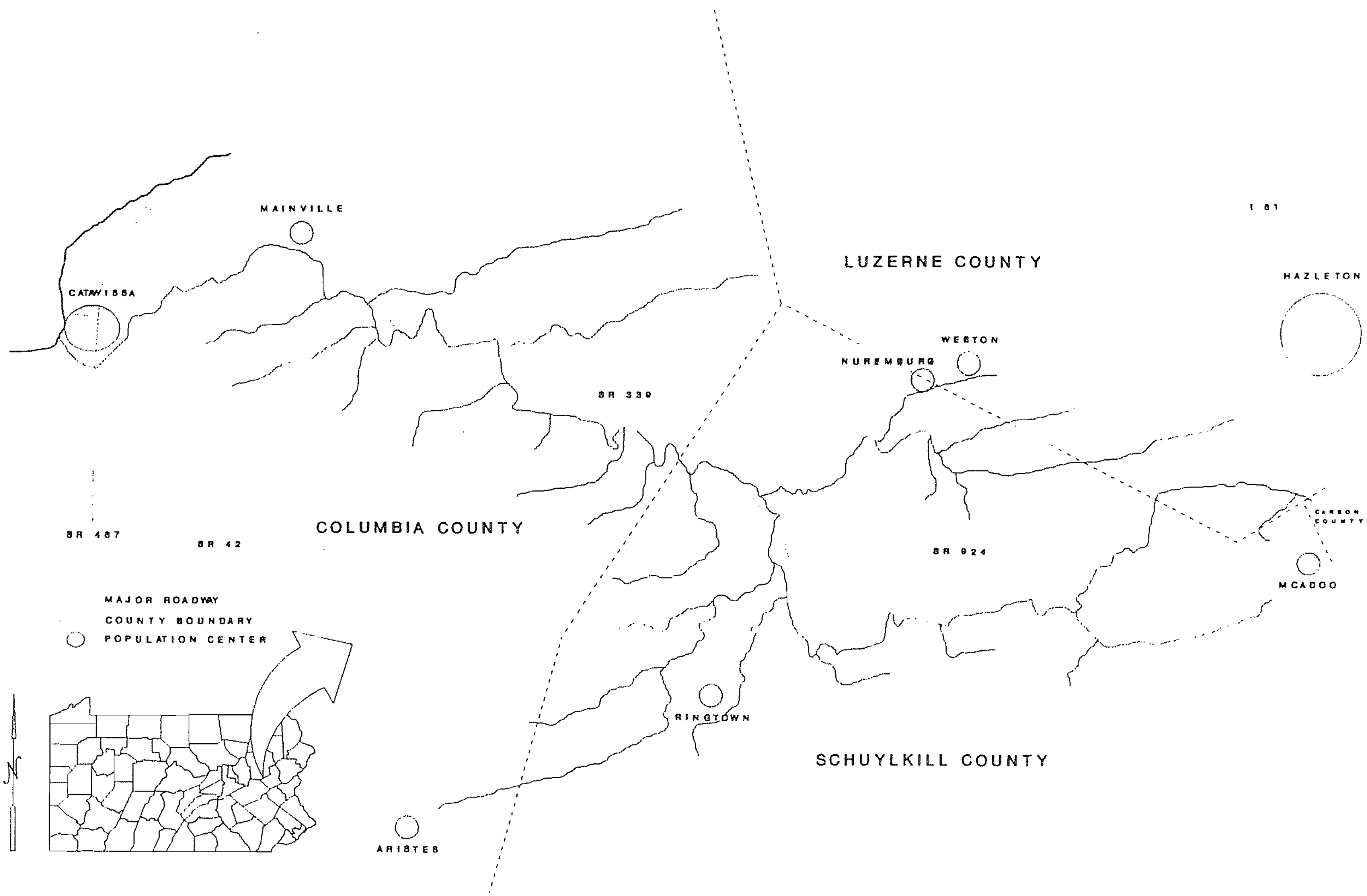

Figure 2. Location of mining activities and State Game Lands in the Catawissa Creek basin.

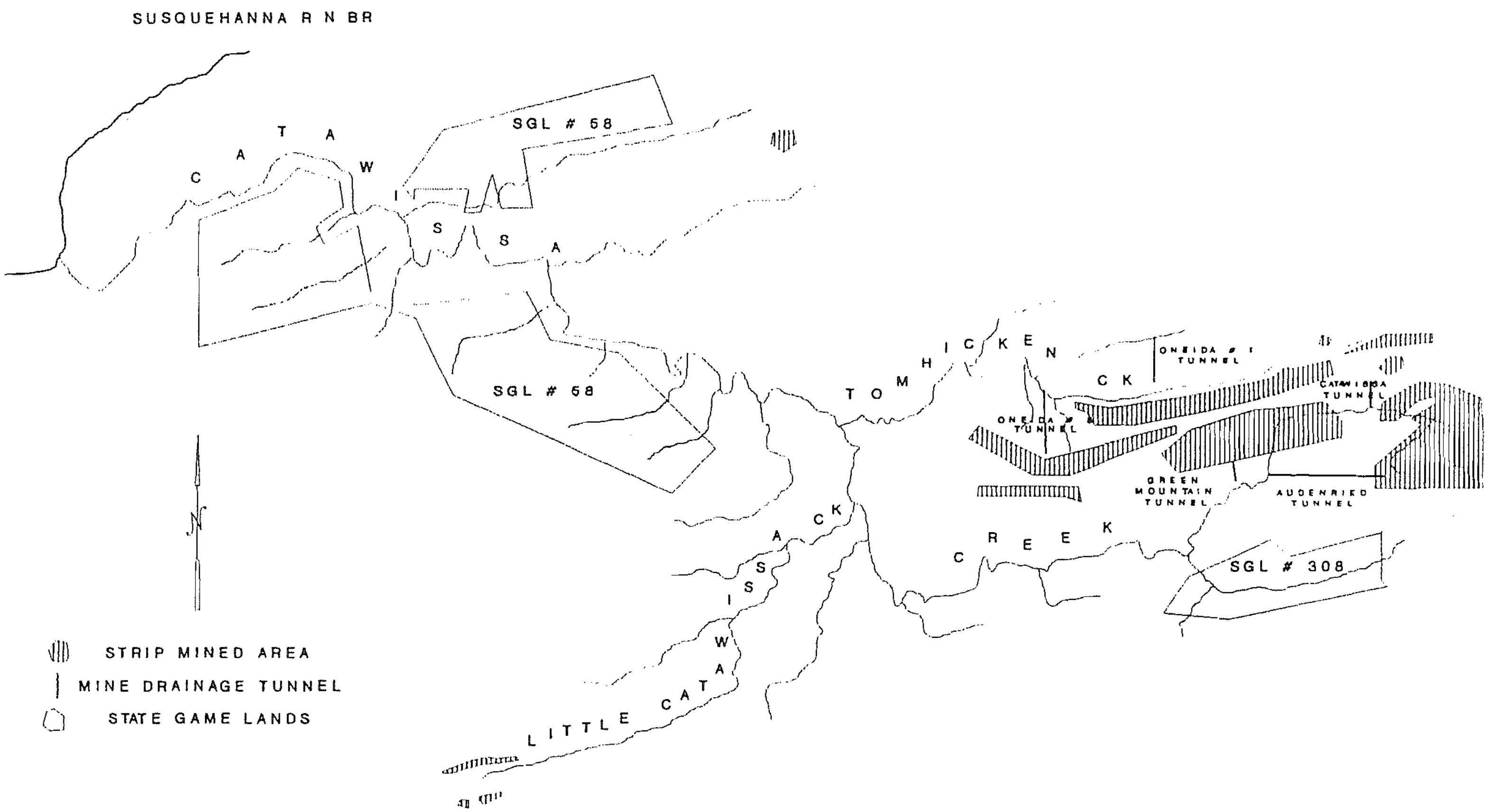

Figure 3. Location of 1997 sampling sites in the Catawissa Creek basin.