CACOOSING CREEK

BERKS COUNTY

WATER QUALITY STANDARDS REVIEW

STREAM DESIGNATION EVALUATION REPORT

Segment: Basin
Stream Code: 01850
Drainage List F

WATER QUALITY MONITORING SECTION (GLW)
DIVISION OF WATER QUALITY STANDARDS
BUREAU OF WATER STANDARDS AND FACILITY REGULATION
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JUNE 2007

INTRODUCTION

The Department determined that the Cacoosing Creek basin was not assigned a "designated use" during the compilation of Chapter 93. Cacoosing Creek is a tributary to Tulpehocken Creek in Berks County. The designated uses listed for the receiving stream segment of Tulpehocken Creek is Cold Water Fishes (CWF) and unnamed tributaries to Tulpehocken Creek in the same segment are designated as Warm Water Fishes (WWF). Reference to Cacoosing Creek was not included in the Chapter 93 listing for this Tulpehocken Creek segment. An evaluation to determine the most appropriate aquatic life use designation for the Cacoosing Creek basin was conducted based on a request from the Department's Southcentral Regional Office (SCRO). This evaluation is based on stream survey work conducted on December 8, 2004. Additional information was obtained from previous Department and Pennsylvania Fish and Boat Commission (PFBC) surveys.

GENERAL WATERSHED DESCRIPTION

The Cacoosing Creek basin is located west of Reading in South Heidelberg, Lower Heidelberg, and Spring Townships; and the Boroughs of Sinking Spring and Wernersville in Berks County (Figure 1). Cacoosing Creek is a limestone creek that drains approximately 21.8 mi^2 and flows for 8.4 miles in a northeasterly direction from its origin in South Heidelberg Township to its mouth at the village of Van Reed's Mill. The surrounding area is characterized by relatively flat topography with some gently rolling hills of low relief. The only named tributary to Cacoosing Creek is Little Cacoosing Creek, which flows for 4.7 miles and drains 7.8 mi^2.

There are significant impacts to the Cacoosing Creek basin from agriculture, residential, industrial and urban land use. There are many newly constructed subdivisions around the Borough of Sinking Spring and the lower portions of the watershed. One significant historic impact to the basin was the E.J. Breneman Sinking Spring Quarry, which ceased quarrying and dewatering operations in November 1992.

WATER QUALITY AND USES

Surface Water

No long-term water quality data were available to allow a direct comparison to water quality criteria. One time grab samples and benthic macroinvertebrate samples were collected from five stations in the Cacoosing Creek basin on November 15, 1995 (Table 1). Since the instantaneous nature of grab samples precludes comparison to applicable water quality criteria, chemical data were used to generally characterize water quality for this study. Biological data collected for this study were used to evaluate the long-term water quality conditions of Cacoosing Creek.

Water Quality. There are twelve permitted discharges (NPDES) in the Cacoosing Creek basin, including two sewage treatment facilities (Sinking Spring and Spring

Township), six industrial facilities and four stormwater discharges. The six industrial facilities include BP Oil, Exxon Mobile Oil, Sun Pipeline, Sunoco Inc., Reading Terminals Corp, and Scranton Altoona Terminals Corp.

There are 40 permitted surface/ground water withdrawals in the Cacoosing Creek Basin. There are 12 permitted public water supply wells in the basin, including nine issued to the Citizens Utility Water Company and two to Will-O-Hill Apartments. All of these public water supply permits cover ground water withdrawals. There are no voluntary local wellhead protection (WHP) programs associated with the permitted ground water withdrawals in the Cacoosing Creek basin.

A historic impact on the local ground water was the above noted Sinking Spring Quarry operation. During active quarrying operations, intruding groundwater was pumped to Cacoosing Creek. After operations ceased in 1992, dewatering stopped and the abandoned quarry filled with water until it reached equilibrium. The resulting lake has a mean elevation of 261.5 feet and, as noted by a 1993 survey report by DEP staff, has restored flow to groundwater springs that had been dry while the quarry was in operation, thus restoring cold groundwater to the stream.

One-time grab samples collected from Cacoosing Creek on November 15, 1995 indicate alkaline waters (pH 7.6 to 7.9) with ample buffering capacity (alkalinity 84.0 to 174.0 mg/l $CaCO_3$, and hardness 118.0 to 204.0 mg/l) (Table 2). Ammonia, nitrate, nitrite, and phosphorus concentrations were elevated at stations located downstream of the Sinking Spring and Spring Township sewage treatment facilities (4CC and 5CC). Fecal coliform concentrations in the mainstem of Cacoosing Creek were fairly low, ranging from 40 to 180 colonies per 100 ml at stations 2CC and 4CC, respectively.

Aquatic Biota

Habitat. Instream habitat conditions were evaluated at the five stations where fish were sampled (Table 3). The habitat evaluation consists of rating twelve habitat parameters to derive a station habitat score. Habitat conditions for Cacoosing Creek stations ranged from "marginal" (stations 3LCC and 4CC) to "sub-optimal" (stations 1CC, 2CC, and 5CC).

Fish. Cacoosing Creek fish populations were sampled during various surveys conducted by DEP and PFBC staff. These electrofishing surveys documented wild brown trout reproduction at several sites (Table 4) as well as the presence of other cold-water species. A migratory species, American eel, was found at several locations (Table 5).

While the Cacoosing Creek fishery was very diverse and dominated by species commonly associated with cold-water habitats (trout, blacknose and longnose dace, white sucker, and mottled sculpin) the Little Cacoosing Creek fishery (3LCC) was dominated by the banded killifish, a warm water species (Table 4).

In an effort to evaluate the impact of the Sinking Spring Quarry and the extent of the existing brown trout population, DEP staff conducted an additional electrofishing survey in Cacoosing Creek on December 8, 2004. For this survey, sampling was conducted at PFBC stations 0101, 0201 and between PFBC station 0302 and the Department's station 4CC. Fifty-meter reaches were sampled at station 0101 and the station between 0302 and 4CC. Approximately 100 meters was sampled at station 0201, both upstream and downstream of US Route 422. Previous PFBC and Department surveys indicated that trout were not found upstream from US Route 422 (Table 4). Wild brown trout adults were found at all three sampling stations, including both upstream and downstream of US Route 422. In addition, wild juvenile brown trout were found at PFBC station 0101 (Table 4), near the headwaters. The occurrences of both wild adult and juvenile brown trout upstream of US Route 422 at stations 0101 and 0201 suggest that current instream conditions have allowed the pre-existing wild trout populations to expand into areas where they had previously been absent. In addition, Cacoosing Creek is capable of supporting other species commonly associated with cold water environs, including blacknose and long nose dace, white sucker, and mottled sculpin. Conversely, Little Cacoosing Creek supports a warm water fishery as indicated by the high abundance of banded killifish, and the low abundance of cold water species.

PUBLIC RESPONSE AND PARTICIPATION SUMMARY

The Cacoosing Creek report and original recommendations (June 2007) to designate the stream as Cold Water Fishes (CWF) and Warm Water Fishes (WWF) for the Little Cacoosing subbasin were made available for public review and comment on DEP's web page. Local municipalities, the Berks County Planning Commission, and the Berks Conservation District were notified of the web report availability by postal mail. No comments were received in response to this web posting.

RECOMMENDATIONS

Review of the available fish data indicates that the mainstem of Cacoosing Creek is capable of supporting a cold-water fishery, and that the Little Cacoosing Creek supports a warm water fishery. Based on applicable regulatory criteria for statewide water uses in 25 Pa Code § 93.4(a), the Department recommends the following: Cacoosing Creek basin (excluding the Little Cacoosing Creek subbasin) from its source to mouth be designated Cold Water Fishes (CWF) and the Little Cacoosing Creek basin from its source to mouth be designated Warm Water Fishes (WWF). Both Cacoosing Creek and Little Cacoosing Creek basins should also be designated Migratory Fishes (MF) as a result of the presence of American eel throughout the basin.

This recommendation adds approximately 4.7 stream miles of WWF and 8.4 miles of CWF waters and 13.1 miles of MF waters to Chapter 93.

REFERENCES

Plafkin, JL, MT Barbour, KD Porter, SK Gross, & RM Hughes. 1989. Rapid Bioassessment Protocols for use in streams and rivers: Benthic Macroinvertebrates and Fish. United States Environmental Protection Agency. EPA/444/4-89-001.

Pennsylvania Department of Environmental Resources, 1993. Aquatic Biological Investigation: Cacoosing Creek. File Information.

Pennsylvania Fish & Boat Commission. 2000. Cacoosing Creek's need for inclusion in DEP's Chapt. 93. File Information.

FIGURE 1

CACOOSING CREEK
BERKS COUNTY

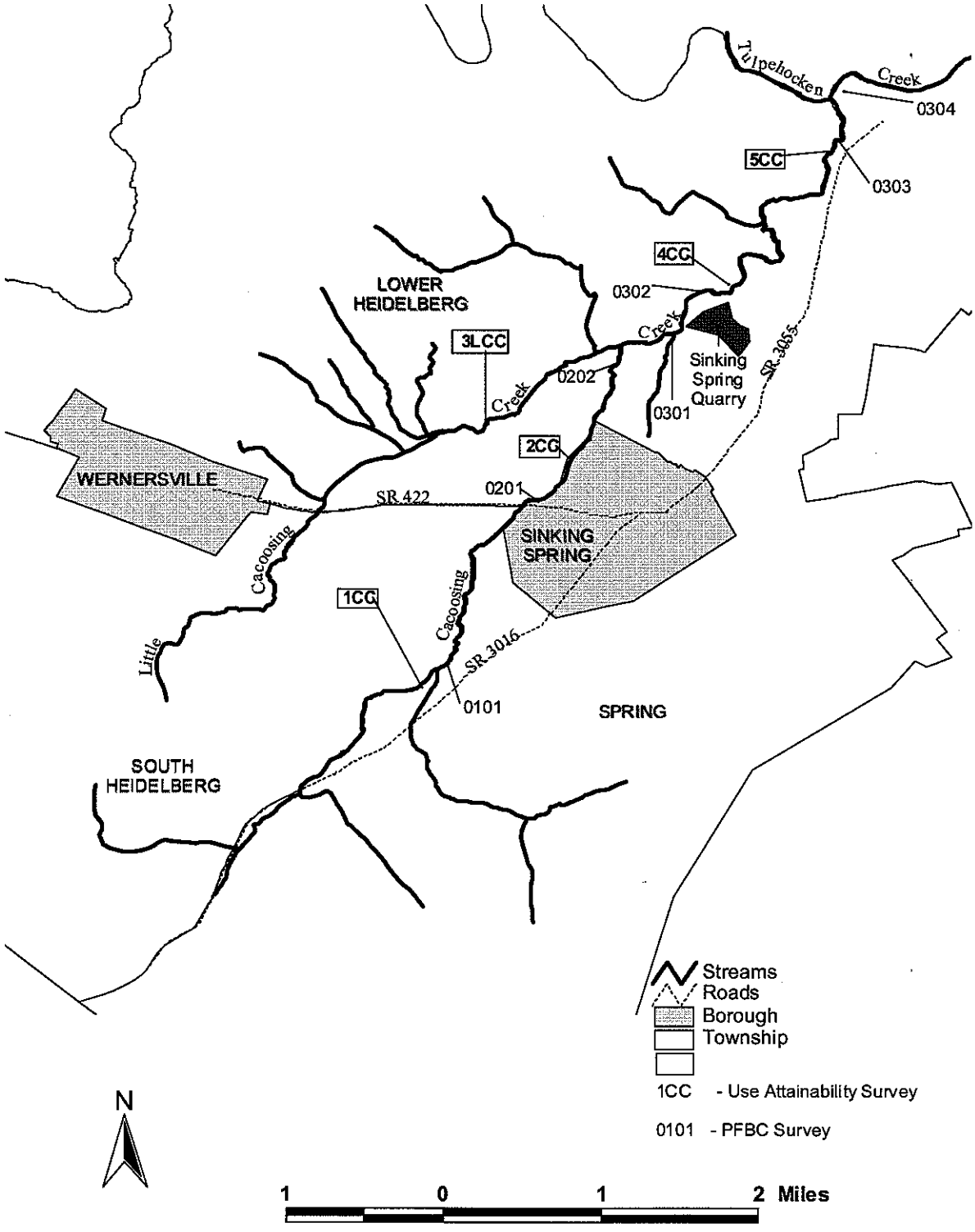

TABLE 1
STATION LOCATIONS
CACOOSING CREEK
BERKS COUNTY

STATION	LOCATION
1CC	Upstream of private drive crossing located 0.5 mile upstream of T381. South Heidelberg Township, Berks County Stream Code 01850 Lat: 40 18 35 Long: 76 02 48 RMI: 6.11
2CC	Downstream of private drive crossing located 0.4 mile downstream of US Route 422 (behind the Dairy Queen in Sinking Spring). Borough of Sinking Spring, Berks County Stream Code 01850 Lat: 40 19 44 Long: 76 01 46 RMI: 4.26
3LCC	Approximately 100 feet upstream of SR3025 crossing (Green Valley Road). Lower Heidelberg Township, Berks County Stream Code 01853 Lat: 40 20 01 Long: 76 02 25 RMI: 1.20
4CC	Adjacent to soccer field in Spring Township Park; approximately 0.2 miles upstream of SR 3023. Spring Township, Berks County Stream Code 01850 Lat: 40 20 50 Long: 76 00 36 RMI: 2.35
5CC	Approximately 50 feet upstream of T495 crossing (Pendergast Road). Spring Township, Berks County Stream Code 01850 Lat: 40 21 35 Long: 75 59 44 RMI: 0.56

CC = Cacoosing Creek
LCC = Little Cacoosing Creek

TABLE 2
WATER CHEMISTRY[1]
CACOOSING CREEK
BERKS COUNTY
NOVEMBER 13, 1995

STATION[2]	1CC	2CC	3LCC	4CC	5CC
Field Parameters					
Temp (°C)	8.1	8.4	8.1	9.1	9.4
pH	7.9	7.7	7.9	7.6	7.7
Cond (µS/cm)	284	361	359	424	489
Laboratory Parameters					
pH	7.9	7.9	8.0	7.8	7.7
Alkalinity	84.0	120.0	146.0	158.0	174.0
Hardness	118.0	167.0	184.0	204.0	189.0
T. Diss. Sol.	230.0	280.0	256.0	312.0	338.0
Susp. Sol.	<2.0	4.0	32.0	64.0	20.0
NH_3-N	<0.02	<0.02	<0.02	0.03	0.14
NO_2-N	0.006	0.006	0.012	0.022	0.060
NO_3-N	2.77	3.47	4.87	4.47	4.96
Total P	0.03	0.03	0.09	0.16	0.22
Ca	37.2	50.4	50.6	59.5	63.3
Mg	10.5	14.7	19.4	16.4	17.6
Cl	19.0	20.0	9.0	20.0	30.0
SO_4	25.0	33.0	27.0	32.0	32.0
As*	<4.0	<4.0	<4.0	<4.0	<4.0
Cd*	<0.2	<0.2	<0.2	<0.2	<0.2
hex Cr*	<10.0	<10.0	<10.0	<10.0	<10.0
Cr*	<50.0	<50.0	<50.0	<50.0	<50.0
Cu*	<10.0	<10.0	<10.0	<10.0	<10.0
Fe*	66.0	44.0	849.0	1610.0	434.0
Pb*	<1.0	<1.0	<1.0	<1.0	<1.0
Mn*	16.0	13.0	27.0	62.0	47.0
Ni*	<25.0	<25.0	<25.0	<25.0	<25.0
Zn*	<10.0	<10.0	<10.0	<10.0	<10.0
Al*	<135.0	<135.0	627.0	1490.0	394.0
fecal Colif/100 ml	50	40	400	180	80

[1] – Except for pH & conductance and indicted otherwise, all values are total concentrations in mg/l

* - Total concentrations in µg/l

[2] Refer to Figure 1 and Table 1 for station locations

TABLE 3
HABITAT ASSESSMENT SUMMARY
CACOOSING CREEK
BERKS COUNTY
NOVEMBER 13, 1995

HABITAT PARAMETER	STATIONS[1]				
	1CC	2CC	3LCC	4CC	5CC
1. instream cover	16	12	10	10	16
2. epifaunal substrate	16	15	15	10	16
3. embeddedness	15	15	16	6	14
4. velocity/depth	15	13	9	11	16
5. channel alterations	15	15	9	16	12
6. sediment deposition	15	15	15	11	15
7. riffle frequency	16	16	13	6	16
8. channel flow status	16	16	13	13	17
9. bank condition	14	16	13	10	14
10. bank vegetative protection	16	16	15	16	17
11. grazing/disruptive pressures	10	14	5	10	11
12. riparian vegetation zone width	10	10	5	5	11
Total Score	174	173	138	124	175
Rating[2]	SUB	SUB	SUB	MAR	SUB

[1] Refer to Figure 1 and Table 1 for station locations
[2] SUB=Suboptimal; MAR=Marginal

TABLE 4
FISHES
CACOOSING CREEK
BERKS COUNTY

SPECIES NAME	STATION[1,2] and DATE[3]																					
	1CC	0101		0201			2CC	3LCC	0202		0301		0302				4CC	5CC	0303			0304
	96	92	04	92	97	04	96	96	94	97	92	94	92	94	97	04	96	96	92	94	97	92
American eel, ***Anguilla rostrata***		R		R					R													X
Brook Trout, ***Salvelinus fontinalis***[4]					R															P	P	
Brown trout, ***Salmo trutta***[4]					R																P	
Brown trout, ***Salmo trutta***[5]			4/ 3	P/ C	P/ P	15 /-			R/P	P/P			R/-	R/-		1/-			R/-	P/-	R/ R	P/-
Rainbow trout, ***Oncorhynchus mykiss***						1									R					P	R	R
Common Carp, ***Cyprinus carpio***				R					R											R		X
Goldfish, ***Carassius auratus***						X																
Cutlips minnow, ***Exoglossum maxillingua***	P		X	P	C	X	P		P	X		C			X	X	R					
Golden shiner, ***Notemigonus crysoleucas***																						X
Common shiner, ***Notropis cornutus***	P	R	X	P	C	X	P		P	X		P			X					R	C	
Spottail shiner, ***N. hudsonius***				R	R		R	P	P		P	P		P	X		R	R	P		P	
Spotfin Shiner, ***Cyprinella spiloptera***																				R		
Bluntnose minnow, ***Pimephales notatus***	P	R													X		P		R		P	
Blacknose dace, ***Rhinichthys atratulus***	A	A	X	A	A	X	P	R	A	X	A	A	P	A	X	X	C		R	C	P	
Longnose dace, ***R. cataractae***	P	A	X	P	P	X	R		A	X	A	A	C	A	X		R		R	P		
Creek chub, ***Semotilus atromaculatus***	A		X	C	C	X	C	R	C	X				P	X		P	R			P	

SPECIES NAME	STATION[1,2] and DATE[3]																					
	1CC	0101		0201			2CC	3LCC	0202		0301		0302				4CC	5CC	0303			0304
	96	92	04	92	97	04	96	96	94	97	92	94	92	94	97	04	96	96	92	94	97	92
White sucker, ***Catostomus commersoni***	A		X	A	A	X	C		A	X	A	A	A	A	X	X	C	C	A	A	A	X
Northern hog sucker, ***Hypentelium nigricans***					P																	
Margined madtom, ***Notorus insignus***		R	X																			
Banded killifish, ***Fundulus diaphanus***								A			A	A	C	A	X		R	R	P	R	P	X
Rock bass, ***Ambloplites rupestris***	R	P	X	R	P	X			P	P		P		P	C	X			R		R	P
Green Sunfish, ***Lepomis cyanellus***				R																		
Redbreast sunfish, ***L. auritus***																						P
Pumpkinseed, ***L. gibbosus***		P		R			R															
Bluegill, ***L. macrochirus***		C		P								R		R								
Largemouth bass, ***Micropterus salmoides***		P		R	R								R						P			
Tessellated darter, ***Ethostoma olmstedi***	P	P		C	C		P	R	C	X	P	C	P	A	X	X	P	P	R		P	X
Greenside darter, ***E. blennioides***	R						R										R	R				
Mottled sculpin, ***Cottus bairdi***					R					P			A	P	X		R	A	A	A	A	
TOTAL TAXA	10	12	8	16	14	10	10	5	12	10	6	10	8	11	13		11	7	12	11	13	10

[1] Refer to Figure 1 for station location

[2] Letters refer to relative abundance: A = Abundant (>100); C = Common (26-100); P = Present (3-25); R = Rare (<3); X = species collected, numbers or relative abundance not recorded

[3] 92 = August 10, 1992; 94 = August 1994; 96 = April 27, 1996; 97 = June 26 and 30, 1997; 04 = December 8, 2004

[4] Hatchery origin

[5] Wild brown trout (adults/fingerlings)