Appendix 3B

Biological Assessment Macroinvertebrate and Fish Site Sample Results

Tar River Subbasin HUC 03020103

The full report is available on the DWQ Environmental Sciences Section website: http://portal.ncdenr.org/web/wq/ess/reports. 2010 NC DWQ TAR-PAMLICO RIVER BASIN PLAN Appendix 3B

Waterbo	dy	Locati	ion	Station	n ID		Date	Bioclassification
TAR I	र	US 64	BUS	OB9	90	0	6/27/07	Good
County	Subbasin	8 digit HUC	Latitude	Longitude	AUI	Number	Lev	/el IV Ecoregion
EDGECOMBE	3	03020103	355338	773200	28	8-(80)	Southeastern F	loodplains and Low Terraces
					0		<i>.</i>	
Stream Classifica		Drainage Area (mi2	2) Elev	ation (ft)	Strea	am Width	(m)	Stream Depth (m)
VVS-IV, INSVV,	CA	2207.9		10		30		0.75
	Fo	rested/Wetland	Urban	I	Agricul	ture	о	ther (describe)
Visible Landuse	(%)	50	0		0			50
Unstream NPI	DES Discharge	ers (>1MGD or <1M	IGD and withir	n 1 mile)	NF		nher	Volume (MGD)
	Frank	din County WWTP				NC00693	11	3.0
	(NC00250	54	3.5
	Tar Riv		.). 			NC00202	31	1.4
	Tar River Red	ional WWTP (Rock)	(/ (Mount)			NC00202	17	21.0
	Tai River Rey	IONAL WWITE (NOCK)				NC00303		21.0
Water Quality Param	eters	·				Site Pho	otograph	
Temperature (°C)		30.2						and the second sec
Dissolved Oxygen (mg	g/L)	3.4	- 3 M					- The second
Specific Conductance	(µS/cm)	132	a stand	-				
pH (s.u.)		7.4						
Water Clarity		clear/tannic	of the se		a di	and		a fill while
Water Clarity		clear/tarinic		Mar and Mar			Sector Sector	
					24			Barne College College
Habitat Assessment	Scores (max)							Contraction of the
Channel Modification ((15)	15		a name	00			
Instream Habitat (20)	(-)	8	Station .		-	No.	A COLORADO AND A COLO	Statement of the local division of the local
Bottom Substrate (15)		7						
Pool Variety (10)		6		and the second	Sec. 1			
Left Bank Stability (10))	9					1-	
Right Bank Stability (1) ()	9						
Light Penetration (10)	•)	2				÷.		
Left Riparian Score (5))	2				-		
Right Riparian Score (, 5)	4			-			
Total Habitat Score (3) 100)	62	Substra	ate			70% sand, 30%	6 silt
Comula Data	,	Commis ID	ст			DI		Discloselfication
06/27/07		10224	92	27		5.8	<u>ЕРТЫ</u> 47	Good
06/28/05		9658	79	29		4 9	4.1	Excellent
08/06/02		8900	77	27		5.9	4.7	Good
08/19/97		7453	79	28		5.4	4.6	Excellent
07/20/92		5899	81	29		5.8	4.8	Good
07/12/90 5358			69	28		5.4	4.6	Excellent
07/11/88		4592	80	21		5.6	4.7	Good
07/06/87		4142	81	23		5.8	4.9	Good
07/11/86		3790	92	27		6.1	4.9	Good
05/12/86		3757	92	27		6.0	5.0	Good
07/24/85		3622	73	23		5.8	5.1	Good

Taxonomic Analysis

07/25/83

3100

A diverse macroinvertebrate community was found in the Tar River at this location (92 Total Taxa). The 27 EPT taxa collected in 2007 are very close to the average EPT found here across all samples since 1983. Mayflies characteristic of this site include *Tricorythodes, Isonychia, Caenis,*

27

5.8

4.5

Good

78

INACCATTERTIUM EXIGUUM, IN. Integrum, IN. modestum and Stenacron Interpunctatum. One stonetty, Acroneuria abnorms, occurred in each collection taken here. Caddisflies found most often include Brachycentrus numerosus, Hydropsyche incommoda, H. rossi, Nectopsyche exquisita and Cheumatopsyche. The riffle beetle, Stenelmis, was diverse and included the following species recorded: S. antennalis, S. fuscata, S. lignicola and S. xylonastis. Rare taxa collected here in 2007 include the mayfly Leptohyphes dolani, (found at only one other site in the Tar basin in 2007) and the dragonfly Didymops transversa (only 2007 Tar basin record).

Data Analysis

This site has been sampled 12 times since 1983. The macroinvertebrate community residing here has remained diverse and pollution intolerant. Since 1990, in years of lower flows (but not extreme drought as in 2002 and 2007), Excellent bioclassifications have resulted, likely due to less pollutant runoff from urban areas of Tarboro (and possibly Rocky Mount, approximately 15 miles upstream). Considerable amounts of effluent are discharged into the Tar River upstream of US 64 Bus. The high water quality tributaries of Swift and Fishing Creeks, that enter the Tar River above this sampling location, help to dilute upstream point sources.

Waterbody		Locat	ion	Station	ID	Date Bioclassification					
TAR	R	NC 4	42	OB89	9 (06/27/07	Excellent				
County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Le	vel IV Ecoregion				
EDGECOMBE	3	03020103	354725	773305	28-(80)	Southeastern	Floodplains and Low Terraces				
						I					
Stream Classifica	ation I	Drainage Area (mi2	2) Elev	vation (ft)	Stream Wid	th (m)	Stream Depth (m)				
WS-IV, NSW,	CA	2435.4		5	30		0.6				
	Fo	rested/Wetland	Urban		Agriculture	c	Other (describe)				
Visible Landuse	(%)	100	0		0		0				
Linstroam NBI	DES Discharge	ore (>1MGD or <1)	IGD and within	n 1 milo)		umbor	Volumo (MGD)				
	Frank	klin County WWTP		i i iiiie)	NC006						
	(NC002	5054	3.5				
	Tar Riv	ver WRF (Louisburg	1)		NC0020)231	1.4				
	Tar River Reg	ional WWTP (Rock)	v Mount)		NC0030)317	21.0				
	T	arborro WWTP	,,		NC0020)605	5.0				
Water Quality Param	/ater Quality Parameters Site Photograph										
		28.8		22 3							
Dissolved Oxygen (m	a/L)	22					-F.80				
Specific Conductance	(uS/cm)	142		144			No.				
pH (s u)	(μθ/οπ)	7.3		States.			and the second				
				224	-		The second second				
Water Clarity		clear			and the second						
Habitat Assessment	Scores (max)		Restored.	A Est	and the second		40				
Channel Modification	(15)	15				Stephine.					
Instream Habitat (20)	(-)	13			5 32.1						
Bottom Substrate (15))	7		and the second							
Pool Variety (10)		6	1000								
Left Bank Stability (10))	9	a Philases								
Right Bank Stability (1	10)	9									
Light Penetration (10)		2									
Left Riparian Score (5	5)	5									
Right Riparian Score	(5)	3					- Markensey				
Total Habitat Score (100) 69 Substrate						80% sand, 20	% silt				
Sample Date	•	Sample ID	ST	EPT	BI	EPT BI	Bioclassification				
06/28/07		10204	68	26	5.1	4.5	Excellent				
06/27/07		10223	27	27	4.4	4.4	Excellent				
06/28/05		9659	80	30	4.9	4.2	Excellent				
08/06/02		8919	24	24	4.5	4.5	Excellent				
08/19/97		7455	26	26	4.6	4.6	Excellent				

Taxonomic Analysis

07/20/92

5898

A large number of EPT taxa are regularly collected here (24-30). Characteristic of this site are mayflies, such as: *Baetis intercalaris, Pseudocloeon ephippiatum, Isonychia, Maccaffertium exiguum, M. integrum, M. modestum* and *Tricorythodes*; the stoneflies: *Acroneuria abnormis, Neoperla* and *Pteronarcys dorsata*; and the caddisflies: *Brachycentrus numerosus, Cheumatopsyche, Chimarra, H. incommoda, H. venularis, Oecetis persimilis,* and *Nectopsyche exquisita*. This site had the only occurance of the midge *Robackia claviger* in 2007 in the Tar basin. The unusual mayfly *Homoeoneuria* was collected here for the first time in 2007. The next closest *Homoeoneuria* population to NC 42 is located 200 miles west in Rowan County. The rarely collected snail, *Gillia altilis* was found here in 2007 (only one other database record of this species-from the Neuse River watershed).

26

4.2

4.2

Excellent

26

Data Analysis

A diverse, stable and pollution intolerant aquatic population resides in this section of the Tar River. EPT BI ranges from 4.2-4.6 in the samples 1992 to

2007, suggesting that no downstream degradation of water quality exists from either the urban areas of Tarboro or its WWTP, located approximately six miles upstream. The second sample in 2007 was collected for part of a quality control procedure.

Waterbo	dy		Locati	on		Sta	tion II)		Date		Bioclassification
TAR	R		SR 15	565		O	3119	9	06	6/26/07	7	Good-Fair
County	Subb	asin 8	diait HUC	Latit	tude	Lonait	ude	AUN	lumber		Lev	el IV Ecoregion
PITT	5	(03020103	353	409	7708	58	28-	(99.5)	Mid At	antic Flo	podplains and low Terraces
Stream Classifica	ation	Draina	age Area (mi2	2)	Elev	ation (ft)		Strea	am Width	(m)	Stream Depth (m)	
B, NSW			2875.8	<u> </u>	sea	a level			25			4
		Foreste	d/Wetland		Urban 4		Aaricult	ure		Ot	her (describe)	
Visible Landuse	(%)	1	100		0		-	0				0
Upstream NPDES Dischargers (>1N			1MGD or <1N	IGD and	d within	1 mile)		NP	DES Nur	nber		Volume (MGD)
·		Franklin Co	ounty WWTP			,			NC00693	11		3.0
		Oxford	d WWTP						NC00250	54		3.5
	RF (Louisburg)					NC00202	31		1.4		
	WWTP (Rocky	/ Mount)				NC00303	17		21.0		
	ro WWTP					NC0020605			5.0			
Greenville WWTP								1	NC 00239	31		17.5
Water Quality Param	eters								Site Pho	otograph		
Temperature (°C)			27.7									
Dissolved Oxygen (mg	g/L)		4.5									
Specific Conductance	(µS/cm)		134									
pH (s.u.)			6.6			Ŀ-						
Water Clarity		slightl	ly turbid			Lan.						All and a second
Habitat Assessment	Scores ((max)					-	Min.				
Channel Modification	(15)		15			-			No.			and the second second
Instream Habitat (20)			13							-	-	A REAL PROPERTY OF
Bottom Substrate (15))		7				(lan				Sec. 1	and the second sec
Pool Variety (10)			10									
Left Bank Stability (10))		9									
Right Bank Stability (1	0)		10		-2-							
Light Penetration (10) 2			2									- The second
Left Riparian Score (5) 4			4									
Right Riparian Score (5)					_							
Total Habitat Score (100)	74 Substrate						70% sand, 20% silt, 10% detritus				
Sample Date	•	Sam	ple ID	S	т	EP1			BI	EPT	BI	Bioclassification

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
06/26/07	10220	55	8	7.6	6.5	Good-Fair
08/08/02	8921	43	9	7.9	7.1	Not Rated
08/21/97	7460	67	13	7.4	5.4	Not Rated
06/22/92	5865	57	10	7.4	6.3	Good
07/12/89	4990	66	16	6.9	5.9	Good-Fair
07/10/86	3788	70	8	7.8	6.9	Good-Fair
11/19/85	3704	53	10	7.5	5.9	Good-Fair
07/23/84	3262	74	15	7.1	6.0	Fair

Taxonomic Analysis

A long data record exists for this site (1984-2007). EPT numbers are low here, compared with upstream sites along the main stem Tar River. The pollution tolerant mayfly, *Callibaetis*, was only collected here, among main stem Tar River sites. The chironomid *Cricotopus sylvestris* (tolerance value = 10) was very abundant here but not collected at upstream sites suggesting some degradation in water quality. The estuarine crustaceans (*Cassidinidea lunifrons, Cyathura polita*) and the phantom midge (*Chaoborus punctipennis*), a lentic species, were only collected here. Oligochaetes and leeches were more abundant here than upstream.

Data Analysis

This stretch of the Tar River is nine miles below the Greenville WWTP and 11 miles below Greenville. The Biotic Index has been as low as 6.9 (1989) and as high as 7.9 (1986, 2002), averaging 7.5 and suggesting that a tolerant benthic community resides in this stretch of the Tar River. The combination of the natural, physical changes in the lower Tar River, a moderate urban influence from the City of Greenville and the impacts of the Greenville WWTP, result in a decline of over 70% of the EPT fauna at the point where the Tar River flows under SR 1565, when compared with upstream sites.



Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
06/27/07	10222	82	24	5.9	4.8	Good
08/19/97	7454	84	24	6.0	4.8	Good
07/20/92	5905	64	14	6.1	5.7	Not Rated

Taxonomic Analysis

The macroinvertebrate community in Town Creek at SR 1601 differs little among the three samples collected here. Mayfly and caddisfly taxa found in multiple years include Acerpenna pygmaea, Maccaffertium modestum, M. exiguum, Stenacron interpunctatum, Triaenodes ignitus, Nectopsyche exquisita, Chimarra, Cheumatopsyche and Brachycentrus numerosus. Stoneflies had not been collected here until 2007 when Perlesta and Neoperla were found in low numbers. This is likely the result of sampling earlier in the year.

Data Analysis

Town Creek at SR 1601 contains a diverse and relatively pollution sensitive macroinvertebrate community. This stream rated Good in 2007 and in 1997. The site was not sampled in 2002 likely due to the drought. In June 2007, water levels were low, but sampling was still possible. By July or August 2007, it is reasonable to assume that flows would not have permitted sampling here. A stable, diverse and pollution intolerant macroinvertebrate community resides in this lower section of Town Creek.

Waterboo	dy			Location		Date		Station ID	E	Bioclassif	ication
COKEY S	SWP		S	SR 1135		05/09/	07	OF10		Not Ra	ated
County	Subba	sin 8	3 digit HUC	Latitude	Longi	itude	AL	J Number	L	evel IV E.	coregion
EDGECOMBE	3		03020103	35.89000	-77.7	575	28-83-3a		Rolling Coastal Plain		astal Plain
Stroom Classifian	tion	Draina	ao Aroo (mi2)	Elovatio	n (ft)	Stroom	Width	(m) A.	orago Donth	(m)	Poforonoo Sito
		Dialita	14.2	50 Elevatio	ii (ii)	Stream	3				No.
0,11077			14.2	50			5		0.5		NU
		Fores	ted/Wetland	Rural Re	sidential		Agricu	ulture	C	Other (de	scribe)
Visible Landuse	(%)		90	1	0		0)		0	
	acharac	o /. 1M) and within 4 m					.	Ve	
Opstream NPDES DI	and within 1 h	niie)		Volume (MGD)							
			NOTE								
Water Quality Param	neters							Site Pho	tograph		
Temperature (°C)			18.9		- TANK	4	100	STATISTICS.	1 Berner	1912	
Dissolved Oxygen (mg	g/L)		4.8					1121	1	1.33	
Specific Conductance	e (µS/cm)		105				201	The second			Sec. A
pH (s.u.)			6.1		- As a				15		
	_			3 U	1	Tres	A		Le Boat		CHER YOU
Water Clarity	S	lightly t	urbid, became		1	Cone.	24		1 Aug	a state	
	V		iu	A CONTRACT			14	1 - 1 - M	AND THE REAL		
Habitat Assessment	Scores (max)						The sea to the	×		
Channel Modification	(15)		15	150	10 M	140	Les 1	K - + -	are at the	and the second	
Instream Habitat (20)			18	1.4	Calles.		-			a cont	The states
Bottom Substrate (15))		4	7 1 1 A		R. Ess				a cent	the standard
Pool Variety (10)			6	A CONT	aver a	-					£
Left Bank Stability (10))		10	and the second	-		1			64	
Right Bank Stability (1	10)		10	Con Law				-			
Light Penetration (10)			10	States 1					5		
Left Riparian Score (5	5)		5	Tel Denne	100						
Right Riparian Score	(5)		5								
Total Habitat Score ((100)		83	Subs	strate	Soft muck,	silt, and	Isand			
Sample Date	2		Sample	חו	Sne	cies Total		NCIRI		Rio	classification
05/09/07			2007-5	i0	Cpc	20				2.0	Not Rated
04/02/97			97-08			15					Not Rated
Most Abundant Spe	ecies	E	astern Mosqui	tofish		Exotic S	Species	Green	Sunfish and F	Redear Su	Infish

Species Change Since Last Cycle

Losses -- Redbreast Sunfish and Largemouth Bass. Gains -- Yellow Bullhead, Tadpole Madtom, Mud Sunfish, Bluespotted Sunfish, Green Sunfish, Redear Sunfish, and Swamp Darter.

Data Analysis

Watershed -- tributary to Town Creek; drains eastern Nash and western Edgecombe counties including a portion of the southern area of the City of Rocky Mount; site is just upstream of the NC Natural Heritage Program's Cokey Swamp Significant Natural Heritage Area. Habitat -- natural channel with very good floodplain forest; narrow flow within the channel, some macrophytes; coarse woody debris; low dissolved oxygen and percent saturation; very low flow. 2007 -- a diverse coastal plain community, including 7 species of sunfish and 3 species of darters; Eastern Mosquitofish constituted 40% of the fauna. 1997 & 2007 -- 22 species known from the site, including 9 species of sunfish and 3 species of darters; dominant species in 1997 was Bluegill (38%), Eastern Mosquitofish constituted only 3% of the fauna then; no Bluespotted Sunfish collected in 1997, but was abundant in 2007. This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterbo	dy	Locati	ion	Statio	on ID		Date	Bioclassification
COKEY	SWP	NC 4	43	OB	571	02	2/08/07	Moderate
County	Subbasin	8 digit HUC	Latitude	Longituc	le AUN	Number	L	evel IV Ecoregion
EDGECOMBE	3	3020103	355344	774427	28	-83-3	F	Rolling Coastal Plain
Stream Classifica	tion	Drainage Area (mi2	2) Elev	ation (ft)	Strea	am Width	(m)	Stream Depth (m)
C; NSW		26.3		50		10		0.5
Forested/		rested/Wetland	Urban		Agricul	ture		Other (describe)
Visible Landuse (%)		50	0		50			0
Upstream NPI	ers (>1MGD or <1M	IGD and withir	n 1 mile)	NF	DES Nur	nber	Volume (MGD)	
		none						
Water Quality Param	eters					Site Pho	tograph	
Temperature (°C) Dissolved Oxygen (mg Specific Conductance pH (s.u.)	g/L) (µS/cm)	4.2 15.8 73 6.5		X				
Water Clarity		clear			2.1.	AD		AL - De
Habitat Assessment	Scores (max)				17	N.M.	-	
Channel Modification ((5)	5		State of the	145	C IS	- Alle	
Instream Habitat (20)		13			Stor 2	X		State -
Bottom Substrate (15)		7						A Partie
Pool Variety (10)		6	An	-2.49				and the state of the
Left Bank Stability (7)		9		100		-	She and	The second second
Right Bank Stability (7)		9		70				
Light Penetration (10)		10	Sale	一個		22		- East
Left Riparian Score (5)		4						
Right Riparian Score (1	1 1/2						
Total Habitat Score (100)	64	Substra	ate Mo	stly sand w	ith a sma	Il amount of si	lt

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/08/07	10141	62	7	7.1	5.7	Moderate
02/12/02	8674	41	3	7.6	6.4	Severe

Taxonomic Analysis

Four more EPT taxa, which had not been previously collected, were collected in 2007 than in 2002. Those four included *Eurylophella doris*, *Maccaffertium modestum*, *Isoperla transmarina* and *Ptilostomis*. Abundant taxa included the stonefly, *Isoperla transmarina*; the caddisfly, *Cheumatopsyche*; the beetle, *Peltodytes*; and the midges, *Orthocladius oliveri* and *Tribelos jucundum*.

Data Analysis

Cokey Swamp drains agricultural areas as well as urban areas near the towns of Sharpsburg and Rocky Mount. However, slightly better conditions were noted in 2007. There was an increase in EPT taxa richness from three in 2002 to seven in 2007 and a decrease in EPT Biotic Index from 6.40 in 2002 to 5.68 in 2007.



Bynums Mill Creek contained very low numbers of EPT taxa in 2007 (only 13 individual EPT specimens). All of these taxa were rare (one or two specimens) with the exception of the caddisfly *Ironoquia punctatissima* (eight individuals). Chironomids were the dominant macroinvertebrates here totaling 21 taxa. Abundant chironomids included species known to be very tolerant of aquatic pollution such as *Chironomus, Kiefferiulus* and *Polypedilum illinoense*.

Data Analysis

A high Biotic Index and low EPT numbers characterize this waterbody. Though it rated Moderate in 2007 than 2002, degraded water quality continues to be a problem here as habitat problems can be ruled out (habitat scored 90 out of 100 in 2007). The 2002 Tar Basinwide report cited the Macclesfield WWTP (located approximately two miles upstream of SR 1120) as the potential source of increased nutrients that encouraged a filamentous algae bloom seen here during sampling in that year. No bloom was witnessed in 2007. Decreased flow was seen here in 2007, as was evidence of beaver activity.



Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/07/07	10138	71	9	7.3	6.6	Moderate
02/11/02	8672	44	5	7.5	6.4	Moderate
05/05/93	6168	71	10	7.3	5.7	Not Rated
02/16/93	6106	62	9	7.1	5.6	Not Rated
08/12/92	5974	31	1	8.3	9.8	Not Rated
05/06/92	5847	62	9	7.2	5.4	Not Rated
02/20/92	5788	83	15	6.9	5.4	Not Rated

Taxonomic Analysis

Nine EPT taxa were found in 2007, an increase of four from 2002 and equaling the February 1993 effort. Abundant EPT taxa included the mayfly *Caenis* and the hydropsychid caddisfly *Cheumatopsyche*. The presence of this caddisfly suggests that this site had some flow in summer and fall 2006, as Cheumatopsyche requires nearly year around flow for its life cycle. It was absent in 2002. A large number of mollusks were found including abundant freshwater mussels (*Elliptio* sp). A rarely collected dragonfly, *Ladona deplanata* was captured. It is only the forth record in NC and the first this species has been seen in the Tar River watershed.

Data Analysis

This site has been sampled seven times since 1992. Four of these samples were taken in what is now the swamp stream sampling time frame (February and March). Habitat here scored well, suggesting that the Moderate bioclassification is due more to water quality. The aquatic macroinvertebrate data is representative of a moderately stressed benthic community.

Waterboo	dy	Locatio	on	Statio	n ID		Date		Bioclassification
CONETO	E CR	SR 15	510	OB	75	02	2/06/07		Moderate
County	Subbasin	8 digit HUC	Latitude	Longitude	e AUN	lumber		Leve	I IV Ecoregion
EDGECOMBE	3	03020103	355232	772338	28-87	7-(0.5)b		Mid-Atlantic Flatwoods	
Stream Classifica	tion	Drainage Area (mi2) Elev	vation (ft)	Stream Widt		(m)	(m) Stream Depth (m	
C; NSW		12		52		5			0.3
Forest		rested/Wetland	Urban	1	Agricult	Agriculture		Oth	er (describe)
Visible Landuse (%)		100	0		0				0
Upstream NPDES Dischargers		ers (>1MGD or <1M	GD and withir	n 1 mile)	NP	DES Nun	nber		Volume (MGD)
		none							
Water Quality Parame	eters					Site Pho	tograph		
Temperature (°C) Dissolved Oxygen (mg Specific Conductance pH (s.u.) Water Clarity Habitat Assessment S Channel Modification (Instream Habitat (20) Bottom Substrate (15) Pool Variety (10) Left Bank Stability (7) Right Bank Stability (7) Light Penetration (10) Left Riparian Score (5)	/L) (μS/cm) Scores (max) 5)	4 14.7 77 5.1 slightly turbid 5 8 7 4 8 7 4 8 5 9 5 5							
Right Riparian Score (5)		53	Substra			sand with	some s	silt	
Sample Date	,	Sample ID	ST	FPT		RI	FPT BI	1	Bioclassification

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/06/07	10134	40	3	7.1	6.4	Moderate
02/22/02	8679	47	2	7.5	7.4	Severe

Taxonomic Analysis

Two Trichoptera taxa were present in both 2002 and 2007: *Cheumatopsyche* and *Ironoquia punctatissima*. No mayflies have been collected by BAU from the site. In 2007 a single specimen of *Prostoia* was collected, thereby increasing EPT Richness by one between 2002 and 2007. Chironomidae were the dominant group at the site for the two sampling events, with 43 to 45 percent of the total taxa composed of midge taxa.

Data Analysis

Conetoe Creek is a tributary to Tar River. The site is 8 miles east of downtown Tarboro NC. The better bioclassification in 2007 over 2002 is due to a lower pH measurement (5.1 and 6.3 respectively) and an additional EPT taxon in 2007 over 2002 (see the BAU criteria for information on swamp classifications). Monthly measurements of pH for the period of February 2002 through December 2006 at an ambient monitoring station (O6205000 at SR 1409/Pitt County) 9.3 stream miles downstream of the benthic site indicate that such temporal differences in pH are normal for area sites. The three lowest pH values for the ambient station for that period were recorded in April and May of 2003 and December of 2005 (pH values of 5.0, 5.5, and 5.2 respectively) and the three highest in December 2004 and March and May of 2005 (7.7, 7.9, and 7.6 respectively); no trend is indicated for pH at the ambient station. Therefore, the difference in bioclassifications between 2002 and 2007 are likely due to artifacts (i.e. the presence/absence of a single EPT specimen and pH measurements, both of which include an element of chance) rather than any real change in water quality.

Waterboo	dy			Location		Date	Station I	D	Bioclass	ification	
CONETO	E CR		S	R 1510		05/09/07	OF52		Not R	ated	
County	Subba	ncin		Latituda	Long	itudo				Ecorogian	
EDGECOMBE		ISIN		25.975956	77.20	2424	28.87 (0.5)h		Mid Atlanti	Ecoregion Elatwoods	
EDGECOMBE	3		03020103	35.675650	-11.38	13434	20-07-(0.5)0		Mid-Aliantic Flatwoods		
Stream Classifica	tion	Draina	age Area (mi2)	Elevatio	on (ft)	Stream Wi	dth (m)	Average D	epth (m)	Reference Site	
C,NSW			12	45		5	No				
		Fore	stad/Watland	l Iri	han	٨٥	riculture		Other (d	ascriba)	
Visible Landuse	(%)	1016	100		0	~9					
	(/0)		100	, i i i i i i i i i i i i i i i i i i i	0		0		0		
Upstream NPDES Di	scharge	rs (>1N	AGD or <1MGE	and within 1 r	nile)		NPDES	Number	v	olume (MGD)	
	J	-	None		-1			-			
Water Quality Param	neters						Sit	e Photograph	1		
Temperature (°C)			15.8		in the	A FF	THE A	44-11/			
Dissolved Oxvgen (m	a/L)		6.5				1	12 Mar	11/2		
Specific Conductance	e (µS/cm)		82				E.S. Barrier	2.363	1 mars		
, pH (s.u.)	· · · ·		5.8			al le sell		En PY	ないの言語	and the	
				The state		11/1		ENT AN IN	1 1 T		
Water Clarity	S	Slightly	turbid, stained	1 Act	1 may	111	John De			和此人们	
Habitat Assessment	Scores ((max)			-	1 -	AL	Non-ward	and the second		
Channel Modification	(15)		10		-	- Carter		I CAR		A DECEMBER	
Instream Habitat (20)	(-)		13			Ser.		-	E STA		
Bottom Substrate (15))		7		100			-		and the second	
Pool Variety (10)			6	27(5)	9. S. S.	and the second				1	
Left Bank Stability (10))		9			and the second s			and the	And the second second	
Right Bank Stability (1	10)		9	1000	100	1000	100	Contraction of the		and the second second	
Light Penetration (10)	1		10		Contraction of the second		100		-	2 Company	
Left Riparian Score (5	5)		5	Same day		-	1 600	14 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	the second second	- Verent	
Right Riparian Score	(5)		5								
Total Habitat Score ((100)		74	Sub	strate	Sand					
Sample Date	•		Sample	ID	Spe	cies Total		NCIBI	Bio	oclassification	
05/09/07			2007-4	7		18				Not Rated	
Most Abundant Spe	ecies	(Golden Shiner a	and Bluespotted	Sunfish	Exotic Spec	ies	reen Sunfish			
Species Change Sin	ce Last (Cycle	N/A								
Data Analysis											

This is the first fish community sample collected at this site. **Watershed** -- tributary to the Tar River; drains rural southeastern Edgecombe County; site is just upstream of the NC Natural Heritage Program's Conetoe Creek Bottomland Forest Significant Natural Heritage Area. **Habitat** -- channelized a long time ago; straight channel; macrophytes; mature trees providing the canopy, especially along the left shoreline; maintenance road on the right shoreline; wide riparian zones; very little coarse woody debris within the channel (removed during maintenance of channel); specific conductance relatively low. **2007** - coastal plain fauna, but rather sparse (n = 98 fish); 18 species present, including 8 species of sunfish; Pirate Perch and American Eel were also common. This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterbody		Locati	Station ID		Date		Bioclassification	
CONETO	ECR	NC 4	12	O	B73	02	2/06/07	Moderate
County	Subbasin	8 digit HUC	Latitude	Longitu	Ide AU N	le AU Number		vel IV Ecoregion
EDGECOMBE	3	03020103	355006	77244	9 28-8	7-(0.5)c	Southeastern F	loodplains and Low Terraces
Stream Classification		Drainage Area (mi2) Elev	vation (ft)	Strea	Stream Width (m)		Stream Depth (m)
C; NSW		27		46		9		0.7
	Fo	rested/Wetland	Urban		Agricult		Ot	ther (describe)
Visible Landuse ((%)	100	0		0			0
Upstream NPD	ES Discharge	ers (>1MGD or <1M	GD and withir	n 1 mile)	NP	DES Nur	nber	Volume (MGD)
•	¥	none		,				
Water Quality Parame	eters					Site Pho	tograph	
Water Quality Parameters Temperature (°C) Dissolved Oxygen (mg/L) Specific Conductance (µS/cm) pH (s.u.) Water Clarity Slight Habitat Assessment Scores (max) Channel Modification (5) Instream Habitat (20) Bottom Substrate (15) Pool Variety (10) Left Bank Stability (7) Right Penetration (10)		4.6 14.4 94 5.2 slightly turbid 5 6 7 4 9 9 9 10 5				NA ANY		
Right Riparian Score (5) Total Habitat Score (100)		3 58	Substra	ate			sand, with some	e silt

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/06/07	10136	48	4	7.3	6.0	Moderate
02/22/02	8690	53	1	7.2	7.8	Moderate

Taxonomic Analysis

The four EPT taxa collected in 2007 were *Maccaffertium modestum, Isoperla transmarina, Cheumatopsyche,* and *Ptilostomis*. In 2002 the only EPT taxon collected was *Ironoquia punctatissima*. Each of the three EPT taxa collected in 2007 have a lower tolerance value than the Ironoquia collected in 2002, resulting in a lower EPT BI in 2007. Though abundant in 2002, *Elliptio complanata* was not observed at the site in 2007. Overall, mollusks declined from from five taxa in 2002 to a single taxon in 2007 (*Pidisium*, which was common in both years). Chironomids were dominant in both years; 40% and 38% of all taxa were midge taxa in 2002 and 2007 respectively.

Data Analysis

Conetoe Creek is a tributary to Tar River. The site is 8 miles ESE of downtown Tarboro NC. Though EPT richness was higher and the EPT BI was markedly lower in 2007 than in 2002, the NCBI was similar between the two sampling events.



Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/06/07	10135	42	3	7.0	6.2	Moderate
03/01/04	9357	46	4	7.0	6.1	Moderate
02/11/02	8673	36	2	7.7	6.4	Severe

Taxonomic Analysis

The same two Trichoptera taxa have been present at each of the three sampling events in 2002, 2004, and 2007: *Cheumatopsyche* and *Ironoquia punctatissima*. During the most recent two sampling events a rather ubiquitous mayfly, *Maccaffertium modestum*, has been collected. The only stonefly collected at the site, *Taeniopteryx*, was present in only the 2004 sample. Chironomids make up much of the taxa present at the site, though less so for the latest sampling event (44%, 48%, and 29% of the taxa in 2002, 2004, and 2007 respectively). Odonates are also fairly well represented (five, six, and six taxa in 2002, 2004, and 2007 respectively). *Physella* was noted as being abundant for 2002 in the prior basinwide report; the snails were not collected in 2007.

Data Analysis

Crisp Creek is a tributary to Conetoe Creek. The site is about 9 miles ESE of Tarboro NC. A single downed tree that traversed the width of the stream provided a small amount of habitat heterogeneity to the straight sand-bottom channel. The better bioclassification from 2002 to 2004 and 2007 is due to the markedly lower NCBI values and better habitat scores for the latter two sampling events.

Waterbody			Location			Date	Station ID	Bioclassification	
CRISP	CR		ę	SR 1527		05/09/07	OF53	N	lot Rated
County	Subb	basin	8 digit HUC	Latitude	Long	itude	AU Number		vel IV Ecoregion
EDGECOMBE	3	3	03020103	35.838656	-77.38	31202	28-87-1	Mid-	Atlantic Flatwoods
Stream Classifica	ation	Drai	nage Area (mi2) Elevatio	on (ft)	Stream Wi	dth (m)	Average Depth (I	m) Reference Site
C,NSW			17.4	40		6		0.2	No
		-		11					
Visible Landuse								Ot	15 (loggod)
VISIBle Lanuuse	(70)		70		0		15		15 (logged)
Upstream NPDES Di	ischarg	ers (>1	MGD or <1MG	D and within 1 r	nile)		NPDES Nur	mber	Volume (MGD)
			None						
Water Quality Param	neters						Site P	hotograph	
Tomporature (°C)			16.5				1962	- AND THE ARE	
Dissolved Oxygon (m	a/L)		10.5 5.4			× 19174	的是不 12-1	1 - 1	100 BAL 18 PM
Specific Conductance	'9/⊏) > (uS/cm)	132	1.1	BI CO	The last		1 A A A A	
nH (s u)	ς (μο/οπ	1)	6.0	1.86				i A.C.	and the second
pri (3.u.)			0.0				194-12 - 1/		
Water Clarity		Cloar	clightly stained	St. Bar	the V	and the	and the second		
Water Clarity		Cieai,	Signity stamed	100	tal P de	15-			and a subject
Habitat Assessment	Scores	(max)			M. H		N PAL	The set	
Channel Modification	(15)		5					10.00	AND STREET
Instream Habitat (20)	(-)		8		10.00		destination of the	The part	and the second second
Bottom Substrate (15)		7	- Car	and the second s	NOT THE OWNER	and the second second		
Pool Variety (10)	,		2	4				ALL PROPERTY	
Left Bank Stability (10))		8		Sec. 14		Contra da	Abreat	
Right Bank Stability (*	10)		8	10 m		and the second	. Sector	and the second	Section 2.
Light Penetration (10))		10	and the			A CONTRACT	ALC: NO.	CONTRACTOR OF THE OWNER
Left Riparian Score (5	5)		5	a second	5 52	NI SAI	A DE CASI		
Right Riparian Score	(5)		4						
Total Habitat Score	(100)		57	Sub	strate	Sand			
Sample Date	Ð		Sample	e ID	Spe	cies Total	NC	IBI	Bioclassification
05/09/07	-		2007-	48		14			Not Rated
Most Abundant Sp	ecies		Swallowtail Shi Darter	ner and Tessella	ited	Exotic Spec	i es Gree	en Sunfish	
Species Change Sin	ce Last	Cycle	N/A						
Data Analysis									

This is the first fish community sample collected at this site. **Watershed** -- tributary to Conetoe Creek; drains rural southeastern Edgecombe and southwestern Martin counties. **Habitat** -- straight channel; channelized, but mature trees providing a canopy; stable banks, but entrenched; very shallow and of uniform depth; sandy runs, several species of macrophytes; little woody debris in the channel; specific conductance slightly elevated; low concentration and saturation of dissolved oxygen; very low flow. **2007** -- coastal plain fauna, but rather sparse (n = 80) and low diversity for a stream of its size; 14 species present, including 4 species of sunfish; American Eel was also common, but 8 of the 14 species were represented by only 1 or 2 fish/species; lowest percentage of tolerant fish of any site in the Tar River basin in 2007; Eastern Mosquitofish absent. This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterbo	Locati	ion	Station ID		Date		Bioclassification	
BALLAHAC	K CAN	NC 4	42	OE	368	02	2/06/07	Severe
County	Subbasin	8 digit HUC	Latitude	Longitude AL		Number	Le	vel IV Ecoregion
EDGECOMBE	3	3020103	354903	772714	4 28-	87-1.2	Southeastern	Floodplains and Low Terraces
Stream Classifica	Drainage Area (mi2	2) Eleva	ation (ft)	Strea	Stream Width (m)		Stream Depth (m)	
C; NSW		8.7		40		5		0.2
	Fo	rested/Wetland	Urban		Agricul	ture	C	ther (describe)
Visible Landuse	(%)	0	100		0			0
Upstream NPI	DES Discharge	ers (>1MGD or <1M	IGD and within	1 mile)	NF	PDES Nur	nber	Volume (MGD)
•		none		,				
Water Quality Param	eters					Site Pho	otograph	
Temperature (°C)		7.4	t			100	ALL ALL	
Dissolved Oxygen (mg	g/L)	12.6	12	140	ALL T	- Ver	1 martin	
Specific Conductance	(µS/cm)	179		King	Hall		1	A CALL
pH (s.u.)		5.4	300		AN M		P	
Water Clarity		clear		Cal W				
Habitat Assessment	Scores (max)			BLO ADD	12 Long	the state		TRUE CARA
Channel Modification	(5)	5						
Instream Habitat (20)		7					14	1997 A COMPANY
Bottom Substrate (15)		7	× 200-					
Pool Variety (10)		2			Parties.			
Left Bank Stability (7)		4	-		- Aller and a		Marrie and	
Right Bank Stability (7	<i>'</i>)	4	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Alter The	- Series	20		
Light Penetration (10)		7	and the second second	All -		-	AN AN	and the second second
Left Riparian Score (5)	3	and the second	and the second				
Right Riparian Score (5)	0	A CONTRACTOR	Selle State	and the second	1000	and the second	
Total Habitat Score (100)	39	Substra	ite			sand and s	ilt

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/06/07	10137	19	1	8.0	6.2	Severe
02/22/02	8680	27	2	8.3	8.9	Severe

Taxonomic Analysis

Callibaetis was common in 2002 but not collected in 2007, thereby lowering the EPT abundance from two in 2002 to one in 2007. That one EPT taxa was a single individual Cheumatopsyche. Midges were the dominant taxa collected and included Cricotopus bicinctus, Conchapelopia, and Dicrotendipes neomodestus.

Data Analysis

Ballahack Canal is a highly channelized tributary of Conetoe Creek. Located in the town of Conetoe, it has rated Severe since 2002. This site had a very low habitat score (39) due to the straight channel, lack of instream habitat, homogenous substrate (sand/silt), lack of pools, eroding banks, open canopy and little riparian buffer zone. In addition to the low habitat score, algal mats were abundant and the conductivity was elevated (179 umhos/cm).

Waterbody			Location			Date	S	tation ID	Bioclassification		
BALLAHACK		IAL		NC 42		05/09/0	7	OF54		Not Rated	
County	Subb	asin	8 diait HUC	Latitude	Lona	itude	AUN	lumber	L	evel IV E	coregion
EDGECOMBE	3	3	03020103	35.817232	-77.4	5367	28-	87-1.2	SE Flo	odplains &	& Low Terraces
			I								
Stream Classifica	ation	Draiı	nage Area (mi2)	Elevatio	on (ft)	Stream	Width (n	1) A'	verage Depth	(m)	Reference Site
C,NSW			8.7	35			5		0.4		No
		For	ostod/Motland	Pural Pa	cidontial		Agricult	uro		Othor (do	scribo)
Visible Landuse	(%)	FUI	25				Agricult 30	ure	15 (Whiteh	urst Farm	s - tractor supply)
	(/0)		20		0		00			alot i alli	
Upstream NPDES Di	ischarge	ers (>1	MGD or <1MGD	and within 1 m	nile)		N	PDES Numl	ber	Vo	lume (MGD)
			None								
Water Quality Param	neters							Site Ph	otograph		
Temperature (°C)			17.7				1 31				学校でである
Dissolved Oxygen (m	a/L)		6.0			7.1		T-K-		1	
Specific Conductance	e (µS/cm	n)	215				まま		Sec. 12	- All	
pH (s.u.)	ŭ	,	5.7			A second	BAL S	North Col		-	
					2		11.1			國建國	
Water Clarity		Clear, greenis	but with a sh tinge	100	-	Į.				to tak	
Habitat Assessment	Scores	(max)								A POP	Contraction of the second
Channel Modification	(15)		5	10						TRUE	
Instream Habitat (20)			8			Contraction of the second		- united	Ked and	and the second	at .
Bottom Substrate (15	5)		4					- MUL		and the second second	
Pool Variety (10)			7		Praces -					1.20	
Left Bank Stability (10	D)		4		-					13	
Right Bank Stability (10)		4							- And	All the
Light Penetration (10))		6	1000				- An - 1		The second	
Left Riparian Score (5	5)		2		and an				A STATUS	1	10-10-m
Right Riparian Score	(5)		1								
Total Habitat Score	(100)		41	Subs	strate	Sand, silt, a	nd muck				
Sample Date	е		Sample	ID	Spe	cies Total		NCIB	1	Bio	classification
05/09/07			2007-49	9		13					Not Rated
Most Abundant Sp	ecies		Bluespotted Sur	fish		Exotic S	pecies	Redea	r Sunfish		
Species Change Sin	ce Last	Cycle	N/A								

Data Analysis

This is the first fish community sample collected at this site. **Watershed** -- tributary to Conetoe Creek; drains southeastern Edgecombe County; site is within the community of Conetoe. **Habitat** -- straight, channelized, first 300 ft. were affected by commercial enterprise (stormwater runoff from maintenance yard, rip/rap banks, industrial debris, etc.), poor canopy; second 300 ft. with good canopy; sandy runs; greatest specific conductance of any fish community site in the Tar River basin in 2007. **2007** -- no darters or intolerant species collected; Bluespotted Sunfish found within the snags and rip/rap; Bluespotted Sunfish and the American Eel constituted two-thirds of all the fish; only site from which the Lake Chubsucker was collected. This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterbody			L	ocation		Date	Date Station ID		Bioclassification			
TYSON	CR		S	R 1255		05/10/	07	OF57		Not Ra	ted	
County	Subb	asin	8 digit HUC	Latitude	Long	itude		AU Number	L	.evel IV Ec	oregion	
PITT	5		03020103	35.68693	-77.50	05072		28-88	R	Rolling Coastal Plain		
Stream Classifica	tion	Drain	nage Area (mi2)	Elevatio	n (ft)	Stream	n Wic	ith (m) A	verage Depth	ı (m)	Reference Site	
WS-IV,NSW			17.9	45			6		0.3		No	
		For	ested/Wetland	Rural Re	sidential		Δa	riculture	(Other (des	cribe)	
Visible Landuse	(%)		99	1	Staoritia		, .g.	0		0		
								-		-		
Upstream NPDES Di	ischarge	ers (>1	MGD or <1MGD	and within 1 m	nile)			NPDES Num	ber	Vol	ume (MGD)	
			None									
Water Quality Param	neters							Site Ph	otograph			
Temperature (°C)			21.8		and the	NA	12			and a		
Dissolved Oxvaen (m	a/L)		7.4			NIZ.	10	1 The		fra.		
Specific Conductance	e (µS/cm)	84		1	\mathbb{R}^{3}	No.	A. 1978台		1 24	1/201	
pH (s.u.)	,	,	5.8		21	14	3	1. ale		ALP	A REAL PLAN AND AND	
	_				No I		4	- Alle	10	N.		
Water Clarity		Clear,	tannin stained				24	ALA	1. 2. 2.	JU, Car		
Habitat Assassment	L	(max)		7435	212/6 Ja	M AL	12	al al lace	wand Barris		-	
		(max)	45			4.14	Table	The state		150	a and the	
Channel Woolfication	(15)		15		Cons"	Coche.		A I Darm			and the second	
Rottom Substrate (15)	`		17	100			-100	store and includes	100		1-2-2-	
Pool Variety (10))		10		and the	and the second	Same of the local division of the local divi	CARACTER CHINES	No. of Street,	-		
Left Bank Stability (10)))		10		20 m	-		and the second second		inter and		
Right Bank Stability (1	2) 10)		10	and the second se		and the second	- Zo		-			
Light Penetration (10)			10	Sec. 1		And Address of	12-1	and the second second			and a second	
Left Riparian Score (5	5)		5	1990 at 1995		1	The lot					
Right Riparian Score	, (5)		5									
Total Habitat Score	(100)		95	Subs	trate	Sand and	grave	1				
				-								
Sample Date	9		Sample I	D	Spe	cies Total		NCIE	31	Bioc	lassification	
05/10/07			2007-54			15				N	lot Rated	
Most Abundant Spe	ecies		American Eel			Exotic	Speci	ies Green	Sunfish and F	Redear Sur	nfish	
Species Change Sin	ce Last	Cycle	N/A			•						

Data Analysis

This is the first fish community sample collected at this site. **Watershed** -- tributary to the Tar River; drains rural southwestern Pitt County. **Habitat** -- natural channel; very good riparian and instream habitats; gravel and log riffles; runs, pools, macrophytes, coarse woody debris; cypress bottomland forest; low specific conductance for a coastal plain stream. **2007** -- a diverse, coastal plain community; the piscivorous American Eel comprised almost 50% of all the fish; one intolerant species (Sawcheek Darter) collected. This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterboo	dy			Location		Date		Station ID	E	Bioclassi	fication
PARKER	CR			NC 33		05/10/0)7	OF31		Not R	ated
County	Subb	asin	8 digit HUC	Latitude	Long	gitude	AU	Number	L	evel IV E	Ecoregion
PITT	5	j	03020103	35.63388889	-77.36	388889		28-95	Mid-Atlantic	Floodpla	ains & Low Terraces
Stroom Classifica	tion	Drai	(mi2)	Elovatic	(f+)	Stroom	Width (() A	varago Denth	(m)	Poforonco Sito
C:NSW	tion	Dian	nage Area (mi∠) 5 9	20	n (ii)	Stream	6		0 4	(m)	No
0,1000			0.0	2.0			U		0.4		NO
		For	ested/Wetland	Urb	ban		Agricu	lture		Other (de	escribe)
Visible Landuse	(%)		25	(5		25)		50 (turf	farm)
Unstroom NDDES Di	iccharg	are (51		and within 1 r	mila)				har	V	aluma (MGD)
Opstream NFDES Di	Scharge	915 (21	None		nne)			NFDE3 Num	bei		
			1101.0								
Water Quality Param	eters							Site Ph	otograph		
Temperature (°C)			20.6		Contraction of the	331	ANTHE	and the	the state		
Dissolved Oxygen (me	g/L)		9.0	184	-				11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1		
Specific Conductance	⊧ (μS/cm	1)	140			NAME OF A	1		Trans.		
pH (s.u.)			6.4	100	a start of	CO ROM	1	No. Car	No.		a surest
	[3	A STATE			ALL C	Sel .	-0-15	and all the
Water Clarity		Clear,	not stained				A.		The second	-	
Habitat Assessment	Scores	(max)		and the second		No. of Street, or other	No. 1		AND BY		e and
Channel Modification	(15)	\··· ,	7		State of	S. BACO	-	A state of the sta	and a state of the		A CONTRACTOR
Instream Habitat (20)	(10)		18		STREET.					1	and the second se
Bottom Substrate (15))		7	11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				the start of the s	and the second		Contraction of the second
Pool Variety (10)	,		4	1	1			Street and	Contraction in the	\$: main	e the
Left Bank Stability (10))		5		7	1000		-	THEY	178	のないので
Right Bank Stability (1	10)		9	and the				Peter -		-	Alt rate
Light Penetration (10)	1		7					and the second	1 and -	in the second	Series Sur
Left Riparian Score (5	;)		2			25-1	and the	Strike -		The seal	to the the
Right Riparian Score	(5)		5								
Total Habitat Score ((100)		64	Sub	strate	Sand					
Sample Date	•		Sample	ID	Spe	ecies Total		NCIB	81	Bio	oclassification
05/10/07			2007-5	3		24					Not Rated
04/16/02			2002-1	9		15					Not Rated
			American Fel	adhragat Cunfi	ah and	7					
Most Abundant Spe	ecies		Bluegill	leopreast Surms	sh, and	Exotic S	pecies	Green	Sunfish and F	Redear S	unfish
		I									
			Loses	Satinfin Shiner	and Gold	en Shiner. G	Bains \	White Catfish,	Yellow Bullhe	ad, Brow	n Bullhead, Tadpole
Species Change Sine	ce Last	Cycle	Madtom,	Chain Pickerel,	Eastern I	Mudminnow,	Mud Su	infish, Flier, G	reen Sunfish,	Redear S	Sunfish, and Black
Deta Analysia			Ciappic.								
Watershed tributan	v to the	Tar Riv	ver drains centra	Pitt County in	cluding th	e northern n	art of the	City of Green	wille one sma		S permitted facility
in the watershed and	its disch	harge is	s unlimited. Hab	itat channeliz	ed with 50	0% open can	opy; sew	ver right-of-wa	y along the lef	t riparian	zone; runs with
several species of ma	crophyte	es prov	/iding instream s	tructure and hat	bitat; bank	ks more stabl	e and ve	egetated in 20	07 than in 200	2; habita	t score in 2002 was
39. 2007 coastal pl	ain spec	cies; ve	ery diverse and a	bundant commu	unity for s	uch a small s	stream; 9	9 species of su	unfish and 4 sp	pecies of	catfish present;
of any site in the Tar	isn, pick River ba	iereis, a Isin in 2	and Creek Chub 2007 2002 & 20	SUCKER; NO INTOIR	erant spec	cies collected	i; thira hi including	ignest catch ra	ite (18.0 fish/1 if sunfish: mor	UU Secor	and fish in 2007
than in 2002: species	lost and	1 daine	d between 2002	and 2007 were	primarily	uncommon s	necies (1-5 fish/specie	es): no intolera	nt species	s known from the

site. This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterbody		Locati	Station ID			Date	Bioclassification	
Hardee	Cr	NC 3	33	OB1	12	02	2/14/07	Natural
County	Subbasin	8 digit HUC	digit HUC Latitude Longitude AU Number		Lev	Level IV Ecoregion		
Pitt	Pitt 5		353541	771923	2	8-97	Mid-	Atlantic Flatwoods
Stream Classifica	tion [Drainage Area (mi2) Elev	vation (ft)	Strea	am Width (m)		Stream Depth (m)
C; NSW		9.2		25		4		0.5
	Foi	ested/Wetland	Urban		Agricult	ture	O	ther (describe)
Visible Landuse	(%)	20	60		0			20
Upstream NPD	ES Discharge	ers (>1MGD or <1M	GD and withir	n 1 mile)	NP	DES Nur	nber	Volume (MGD)
·		None.		· · · ·				
Water Quality Parame	eters					Site Pho	tograph	
Temperature (°C) Dissolved Oxygen (mg Specific Conductance pH (s.u.) Water Clarity Habitat Assessment 3 Channel Modification (Instream Habitat (20) Bottom Substrate (15) Pool Variety (10) Left Bank Stability (7) Right Bank Stability (7) Light Penetration (10)	9 9.4 123 6.3 slightly turbid 15 15 5 5 10 10 10 9							
Right Riparian Score (4) Total Habitat Score (1)	3 3 75	Substra	ate			Silt and sand	d.	

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/14/07	10128	59	8	6.5	5.2	Natural
02/19/02	8688	59	7	6.7	5.4	Natural

Taxonomic Analysis

In terms of total taxa richness and EPT taxa richness, the 2007 invertebrate community is essentially unchanged from the 2002 sample. However, the BI and EPTBI both decreased in 2007 and EPT abundance increased (64 in 2007, 49 in 2002). Tolerant taxa present in 2002 but absent in 2007 include the chironomids *Orthocladius robacki*, *Clinotanypus pinguis*, *Micropsectra* sp, and the oligochaetes *Nais* sp., *Slavina appendiculata*, and *Stylaria lacustris*. *Indeed*, overall oligochaete diversity decreased from five in 2002 to only two in 2007. The reduction of tolerant taxa and decrease in BI, EPTBI and increase in EPT abundance suggest slightly improved physical conditions at this location for 2007.

Data Analysis

Total taxa richness metrics have been unchanged at this location from 2002 to 2007. However, the BI, EPTBI, EPT species richness, and EPT abundance all demonstrated slight improvements in 2007. Landuse upstream of this location is largely suburban with some remnant areas of forest. Typical of catchments where point sources are absent and where nonpoint pollution is the largest potential stressor, reduced runoff usually engenders improvements in water chemistry. 2007 invertebrate community data support this hypothesis and is likely related to the drought.

Waterbody			L	ocation		Date	Station I	D I	Bioclassification		
CANNON	SWP		U	S 264		05/10/07	OF56		Not Rated		
County	Subba	nsin 8	B digit HUC	Latitude	Longi	itude	AU Number	L	_evel IV Ecoregion		
PITT	5		03020103	35.625572	-77.27	6981	28-99-1-1	Mid-Atlanti	c Floodplains & Low Terraces		
Stream Classifica	tion	Draina	ge Area (mi2)	Elevatio	n (ft)	Stream W	idth (m)	Average Depth	n (m) Reference Site		
C,NSW			3.6	20		5		0.4	No		
		Fores	ted/Wetland	Rural Res	sidential	A	ariculture		Other (describe)		
Visible Landuse	(%)		25	15	5		60		0		
Upstream NPDES Dischargers (>1MGD or <1MGD a				and within 1 m	nile)		NPDES I	Number	Volume (MGD)		
			None					-			
Water Quality Param	eters						Sit	e Photograph			
Temperature (°C)			19.0	43		1			a all Kilon		
Dissolved Oxygen (mg	g/L)		7.9	and the owner where the party is not	1.1.1	- dib-		Contraction of the	State of the second second		
Specific Conductance	(µS/cm)		160		-		MUES	and the second			
pH (s.u.)			6.2	The Case		and the second second	100	A CONTRACTOR	Contraction of the second		
Water Clarity	C	Clear, no	t stained		-						
Habitat Assessment	Scores ((max)		and at							
Channel Modification	(15)		5			States -	A BAR				
Instream Habitat (20)			13		-		- The star	So. Cart	A CONTRACTOR		
Bottom Substrate (15))		7	and the second		A Street	Sec.	Street, St			
Pool Variety (10)			4		Sec. 1		and the second s	1000	and the second		
Left Bank Stability (10))		2			一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一	5 A.				
Right Bank Stability (1	10)		2	A LAND		The Party of			and an Arrister		
Light Penetration (10)			0	Shi and	1.0			-			
Left Riparian Score (5	5)		1			A CONTRACTOR		1			
Right Riparian Score	(5)		1								
Total Habitat Score ((100)		35	Subs	trate	Sand					
Sample Date)		Sample I	D	Spe	cies Total		NCIBI	Bioclassification		
05/10/07			2007-52			16			Not Rated		
Most Abundant Spe	ecies	E	astern Mosquito	fish (n = 650, 7	'8%)	Exotic Spe	cies N	one			
opecies change Sin		Sycie	IV/A								

Data Analysis

This is the first fish community sample collected at this site. **Watershed** -- small tributary to Moyes (Broad) Run (a tributary to the Tar River); drains central Pitt County; rural, agricultural watershed. **Habitat** -- channelized with one 90 degree bend; 100% open canopy; severe bank erosion on right bank at the bend; macrophytes abundant and provided instream habitats; low flow; smallest watershed assessed in 2007. **2007** -- very productive and diverse coastal plain stream; second greatest catch rate (29.7 fish/100 seconds shocking time) of any stream in the Tar River basin in 2007; intolerant species absent; high percentage (82%) of tolerant fish (Eastern Mosquitofish, Redbreast Sunfish, and Yellow Bullhead). This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterbody		Locati	Location		Station ID		Date	Bioclassification	
GRINDLE	ECR	US 2	64	OB1	11	06	6/25/07	Good-Fair	
County	Subbasin	8 digit HUC	Latitude	Longitude	AUN	Number	Lev	Level IV Ecoregion	
PITT	5	03020103	353728	771314	28	-100b	Mid-	Atlantic Flatwoods	
Stream Classification Drainag		Drainage Area (mi2) Elev	vation (ft)	Strea	am Width	(m)	Stream Depth (m)	
C, NSW		74.0		5		5		0.2	
	Fo	rested/Wetland	Urban		Agricult	ture	Ot	ther (describe)	
Visible Landuse	(%)	25	0		75			0	
Upstream NPI	DES Discharg	ers (>1MGD or <1N	IGD and withir	n 1 mile)	NF	DES Nur	nber	Volume (MGD)	
		none							
Water Quality Param	eters		_			Site Pho	otograph		
Temperature (°C)		28.7				1	BURE		
Dissolved Oxygen (mg	g/L)	5.6					PET	3.6	
Specific Conductance	(µS/cm)	149				State In	the sect of the		
pH (s.u.)		8.8	7				Ser		
Water Clarity		clear							
Habitat Assessment	Scores (max)						Gin 2394	Contraction of the	
Channel Modification ((15)	5	1.5			and the states	and the second second	and the second second	
Instream Habitat (20)		13					and a second		
Bottom Substrate (15)		7					THE CALOR IS		
Pool Variety (10)		0		/ contract			and the second second	ALC: NOTE	
Left Bank Stability (10)	2	-				· ···································	And Andreas	
Right Bank Stability (1	0)	9				1	Att - Walt		
Light Penetration (8)		4							
Left Riparian Score (5)	0				-			
Right Riparian Score (5)	2				-126			
Total Habitat Score (100)	42	Substra	ate			100% sand, trace	of silt	

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
06/25/07	10221	82	17	6.8	5.9	Good-Fair
08/07/02	8920	52	12	6.5	4.9	Good-Fair
08/20/97	7457	67	13	6.7	5.6	Good-Fair
07/21/92	5908	10	10	5.2	5.2	Fair

Taxonomic Analysis

Stoneflies have never been collected from this channelized sandy bottom stream. The number of mayflies and caddisflies increased from 12 in 2002 to 17 in 2007. Many of the more common taxa are found in all four samples collected here from 1992 to 2007. Several taxa that are less frequently encountered in the Tar River watershed occur here. These include: the mayfly *Pseudocloeon frondale*, the caddisflies *Oecetis* sp A, *O.* sp C, *Oxyethira* and the beetles *Hydrochus* and *Tropisternus collaris*.

Data Analysis

The Grindle Creek watershed is highly agricultural. Overall habitat scores are consistently low here, and nutrients entering the stream are high. Abundant filamentous algae and macrophytes clog the channel (see photo). Due to its channelized nature, year-round flow persists, which increases the numbers of aquatic macroinvertebrates. This increase however, is mitigated by higher numbers of pollution tolerant taxa (e.g. many of the 25 chironomid taxa collected in 2007).

Waterbody		Locatio	Location				Date	Bioclassification
Chicod	Cr	SR 17	77	OB	107	02	2/14/07	Natural
County	Subbasin	8 digit HUC	Latitude	Longitud	1UA et	Number	Lev	vel IV Ecoregion
Pitt	5	03020103	353244	771238	28	3-101	Mid-/	Atlantic Flatwoods
Stream Classifica	Stream Classification Dra		Elevation (ft)		Strea	Stream Width (m)		Stream Depth (m)
C; NSW		21.6		26	T	5		0.4
	Fo	rested/Wetland	Urban		Agricul	ture	01	ther (describe)
Visible Landuse	(%)	80	0		20			0
Upstream NPC	DES Discharge	ers (>1MGD or <1M(GD and within	ו 1 mile)	NF	PDES Nur	nber	Volume (MGD)
		none						
Water Quality Parame	eters				•	Site Pho	otograph	
Temperature (°C)		9.4		A 9 8 .	A Part	YNAF	ALT	二 有 化利润
Dissolved Oxygen (mg	J/L)	7.94	100	4.55	180 40	ALL I		A STORNARD
Specific Conductance	(µS/cm)	95	1.1.5	AND THE	A TRO	STREN AD	A LAND THE Y	1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
pH (s.u.)		5.47		SA CON	non n		11 10 1 5	
Water Clarity		slightly turbid		XX	1/2		12 be	JAL MA
Habitat Assessment	Scores (max)		Q. 1/2 .	4	A LONG	Contraction of the second	K AL	
Channel Modification ((5)	15	180	Kess	and the second	Store L	the second second	
Instream Habitat (20)		14			1000			ALL
Bottom Substrate (15)		6	SLE	1	10	11 1010 B		
Pool Variety (10)		5		THE W	Part -	Contraction of the second	Contraction of the	
Riffle Habitat (16)		0	NO A			the second	The second	C AND
Left Bank Stability (7)		10	4		7.	-		
Right Bank Stability (7))	10			A		STORE BA	
Light Penetration (10)		9			and the second	-		The states the
Left Riparian Score (5))	5	1 march		TOUR STREET	12	The second	Contraction of the
Right Riparian Score (5)	5	1000	and the second		A STATE OF		
Total Habitat Score (1	100)	79	Substra	ate			Sand and si	lt

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/14/07	10127	70	9	7.0	5.9	Natural
03/12/02	8701	43	2	7.6	7.5	Severe

Taxonomic Analysis

Relative to the 2002 sample, all metrics drastically improved in 2007 resulting in a Natural bioclassification. In addition to BI, EPTBI, EPT and total taxa richness, EPT abundance also improved from four in 2002 to 47 in 2007. EPT taxa present in 2007 for the first time included the mayflies *Caenis* sp., *Pseudocloeon frondale*, *Mccaffertium modestum*, *Stenacron interpunctatum*, the stonefly *Perlesta* sp., and the caddisflies *Ceraclea resurgens*, and *Cheumatopsyche* sp. Although chironomid taxa increased from 10 in 2002 to 21 in 2007 many of the most pollution tolerant chironomids present in 2002 were absent in 2007 and included *Ablabesmyia peleensis*, *Hydrobaenus* sp., and *Procladius* sp. This fact helped keep the BI suppressed despite the doubling of chironomid diversity.

Data Analysis

The profound improvement in the invertebrate community seen in 2007 is likely the result of lowered inputs of nonpoint pollution due to drought conditions in this agricultural watershed. Indeed, the 2007 pH (5.4) was the lowest ever observed at this location and three previous pH measurements between 1997 and 2002 ranged from 6.7-6.5. This indicates decreased runoff from agricultural sources and supports the large improvement seen in the invertebrate community. In addition to the 2007 and 2002 samples, this site has also been sampled twice in 1997 and twice in 1993 to ascertain summer flows and determine proper collection methodology. None of these samples (including 2002) have ever produced total taxa richness values (previous high was 56), EPT taxa richness values (previous high was five), or EPT abundances (previous high was 32) comparable to levels measured in 2007. These data indicate improved physical and chemical conditions in the segment of Chicod Creek in 2007.

Waterbody		Locati	Location		ID	Date	Bioclassification
WHICHAR	D BR	SR 1	521	OB12	20 02	2/13/07	Moderate
County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Lev	el IV Ecoregion
PITT	5	03020103	354202	772034	28-100-2	Mid-	Atlantic Flatwoods
Stream Classifica	Stream Classification Drainage) Elevation (ft)		Stream Width	ı (m)	Stream Depth (m)
C; NSW		4.3		38	5		0.2
	F (V)	Forested/Wetland	Urban		Agriculture	Ot	ther (describe)
Visible Landuse	(%)	60	20		20		0
Upstream NPI	gers (>1MGD or <1M	IGD and within	n 1 mile)	NPDES Nu	nber	Volume (MGD)	
		none					
Water Quality Param	eters				Site Pho	otograph	
Temperature (°C)		10.5	里村(22)				
Dissolved Oxygen (mg	g/L)	9.6	1000	S AND	Stal Martin		
Specific Conductance	(µS/cm)	149	-	175	ANE / Delle		NE SALE DELL
pH (s.u.)		6.3	and the second second	1 Sam	A start	A Color	
Water Clarity		Clear			- And		KAP1/-
Habitat Assessment	Scores (max	<)	- 34	and the	and the second second		and the second
Channel Modification	(5)	5	Service States	FRA Ches	and the		
Instream Habitat (20)	()	13					
Bottom Substrate (15)	1	7				a	
Pool Variety (10)		2		1000			C. S. C.
Left Bank Stability (7)		7	and the second second	- Service - Serv			
Right Bank Stability (7	<i>.</i>)	9	100		and the second	The second	
Light Penetration (10)		7	207	-	and the second	11	16.1
Left Riparian Score (5)	2	123		275.3	TR. 2.44.1.1	- 1 - 1
Right Riparian Score ((5)	2					
Total Habitat Score (100)	54	Substra	ate		Sand	

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/13/07	10126	61	11	6.7	5.7	Moderate
02/12/02	8675	45	6	7.0	5.8	Moderate
02/08/01	8392	41	7	6.9	5.5	Not Rated

Taxonomic Analysis

The 2007 sample produced a record high EPT taxa richness. EPT present for the first time in 2007 include the mayflies *Caenis* sp., *Pseudocloeon frondale*, and the caddisflies *Hydropsyche betteni* and *Triaenodes ignitus*. In addition, the BI set a record low for 2007 as several tolerant taxa collected in 2001 and 2002 were absent in 2007 and included the chironomids *Orthocladius oliveri*, *Tanytarsus* sp. 2, and the low dissolved oxygen-indicating gastrod *Physella* sp.

Data Analysis

The Whichard Branch watershed is a mix of agriculture, suburban, and forest uses. As would be expected in a watershed where non-point inputs are the largest potential stressor, the record 2007 drought has resulted in reduced pollutant runoff. The improved invertebrate metrics for 2007 invertebrate data support this conclusion as do the water chemistry data. The 2007 conductivity levels were the lowest ever measured at this location (149 µS/cm), while the 2001 and 2002 conductivity levels were 156 µS/cm and 165 µS/cm respectively.

Waterbody Location				ocation		Date	Date Station ID			Bioclassification		
WHICHAR	D BR	2	S	R 1521		05/10/0)7	OF55		Not R	ated	
County	Subb	asin	8 digit HUC	Latitude	Lona	itude		AU Number		Level IV E	Ecoregion	
PITT	5		03020103	35.700922	-77.34	42795		28-100-2	Ν	Mid-Atlantic Flatwoods		
					-							
Stream Classifica	tion	Draiı	nage Area (mi2)	Elevatio	n (ft)	Stream	Wid	lth (m)	Average Dept	:h (m)	Reference Site	
С			4.4	35			6		0.3		No	
		For	ested/Wetland	Rural Re	sidential		۸aı	riculture		Other (de	ecribe)	
Visible Landuse	(%)	101	70	1	5		лу	15		0	.301150/	
	(,,,,				-					-		
Upstream NPDES Di	ischarge	ers (>1	MGD or <1MGD	and within 1 m	nile)			NPDES Nu	mber	V	olume (MGD)	
			None									
Water Quality Param	neters							Site F	Photograph			
Temperature (°C)			17.9		1	direct of			N CH		目的研究的目标	
Dissolved Oxvgen (m	a/L)		7.5		100	Je him		1. 1. 1. 1. 1. 1.	State of the second	AL V	· · · · · · · · · · · · · · · · · · ·	
Specific Conductance	e (µS/cm	ı)	168			A LAND					下了18月1日。	
pH (s.u.)		,	6.2	E (-		- 18		L. F.			Jele 15	
	-								A BAT	San San		
Water Clarity		Clear,	not stained					- DADAG	A A A A			
Habitat Assessment	Scores	(max)			100	N. Com	No.				State Rest	
Channel Modification	(15)	. ,	10			N.C.C.	Я.,		1000		2 6 900	
Instream Habitat (20)	()		13		1	1	3		- Andrew	100		
Bottom Substrate (15)		7	a strand	A State	Sec. 1		Charas.			A state	
Pool Variety (10)	,		4	A Contractor		34		- and	-		and the	
Left Bank Stability (10))		7	2						and the second		
Right Bank Stability (1	10)		7			6			and the second s	4.4		
Light Penetration (10)			10	and and	and the second			-	T. S.C.	-		
Left Riparian Score (5	5)		4			11/2-				1		
Right Riparian Score	(5)		5									
Total Habitat Score	(100)		67	Subs	strate	Sand						
Sample Date	•		Sample I	D	Spe	cies Total		NC	IBI	Bio	oclassification	
05/10/07			2007-51		•	19		-			Not Rated	
Most Abundant Spe	ecies		Swallowtail Shine	r		Exotic S	peci	es Red	ear Sunfish	-		
Species Change Sin	ce Last	Cycle	N/A									

Data Analysis

This is the first fish community sample collected at this site. **Watershed** -- small tributary to Grindle Creek; drains rural northern Pitt County. **Habitat** -- straight; very old chanellization with a mature tree canopy; deeply entrenched; side snags; very shallow runs; field drain pipes discharging to the creek; low flow; specific conductance elevated. **2007** -- for its size, a diverse and abundant coastal plain community; intolerant species absent; four species of catfish present. This site is not rated because the appropriate NCIBI metrics and criteria have yet to be developed for coastal plain streams.

Waterbody		Locati	Location		Station ID		Date	Bioclassification
Tranters	s Cr	SR 15	SR 1552 C		26	02	2/13/07	Moderate
County	Subbasin	8 digit HUC	Latitude	Longitude	e AUN	lumber	Lev	el IV Ecoregion
Edgecombe	6	03020103	354340	771030	030 28-103 Mid Atlantic Flatwoods			
Stream Classifica	Drainage Area (mi2) Elev	vation (ft)	Strea	am Width	(m)	Stream Depth (m)	
C; Sw, NSW	1	111.4		27		100		0.6
Visible Lenduse	Fo	rested/Wetland	Urban		Agricult	ture	Ot	ther (describe)
VISIBle Landuse	(%)	00			20			0
Upstream NPD	ES Discharg	ers (>1MGD or <1N	IGD and withir	n 1 mile)	NP	DES Nur	nber	Volume (MGD)
		none						
Water Quality Parame	eters					Site Pho	tograph	
Temperature (°C) Dissolved Oxygen (mg Specific Conductance	ı/L) (μS/cm)	6 10.7 136		D		44		
pH (s.u.)		5.6	The state	is War		- and	1 K - Alla	AND LOS TO
Water Clarity		Clear		No.	all the second		(July	
Habitat Assessment	Scores (max)			And Contraction	-	the start	State -	
Channel Modification (5)	15	S. Mary	2 64	and the second	1 200	1	BARY STREET
Instream Habitat (20)		16		in .		1-1	ĸ	the state
Bottom Substrate (15)		6			-	1		- Alexander
Pool Variety (10)		5		10.22				
Left Bank Stability (7)		10					- 19 A.	
Right Bank Stability (7))	10		2		LAN CA	and they	
Light Penetration (10)		10	- 10	-	and P			
Left Riparian Score (5)		5			Ser -	1		
Right Riparian Score (5)	5		10 5		5	1 - Charles	
Total Habitat Score (1	100)	82	Substra	ate			silt and sand	b

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/13/07	10124	60	6	7.44	4.48	Moderate
02/12/02	8676	40	3	7.80	9.20	Moderate

Taxonomic Analysis

The 2007 sample had many more overall taxa and twice the number of EPT taxa than did the 2002 sample. The BI actually decreased in 2007 even though the 2007 sample had 24 chironomid taxa versus only six collected in 2002. The additional chironomid taxa were balanced out by the addition of three new EPT taxa and the overall lowering of the BI can be seen by the substantial reduction in the EPTBI. EPT taxa collected here for the first time include the mayflies *Caenis* sp., *Stenacron interpunctatum*, the stonefly *Taeniopteryx* sp., and the caddisflies *Ceraclea resurgens*, and *Ptilostomis* and *Pti*

Data Analysis

The substantial increase in the total taxa and EPT taxa, coupled with a somewhat lowered BI and drastically lessened EPTBI suggests slightly improved conditions in the Tranters Creek watershed in 2007. The Tranters Creek catchment is a combination of agriculture and forest with no dischargers. As a result, non-point pollution is the largest potential stressor here and the 2007 drought may have induced a slight improvement in the invertebrate community as a result of decreased runoff. This hypothesis is supported by the water chemistry data. The 2002 sample had a higher pH (6.3) and higher conductivity (184 µS/cm) than did the 2007 sample which produced a lower pH (5.6) and lower conductivity (136 µS/cm).

Waterbody		Locatio	Location			Date		Bioclassification
Flat Sv	Flat Swp		SR 1157		21	02/13/07		Moderate
County	Subbasin	8 digit HUC	Latitude	Longitude	AU I	Number	Lev	vel IV Ecoregion
Martin	6	03020103	354654	771525	28-	103-2b	Mid-	Atlantic Flatwoods
Stream Classifica	tion [Drainage Area (mi2)	Elev	ation (ft)	Strea	am Width	(m)	Stream Depth (m)
C; Sw, NSW	1	20.3		24		8		0.6
	For	rested/Wetland	Urban		Agricul	ture	O	ther (describe)
Visible Landuse	(%)	100	0		0			0
Upstream NPD	ES Discharge	ers (>1MGD or <1M	GD and within	n 1 mile)	NF	DES Nun	nber	Volume (MGD)
		Robersonville			N	C0026042	001	1.8
Water Quality Parame	eters					Site Pho	tograph	
Temperature (°C) Dissolved Oxygen (mg Specific Conductance pH (s.u.) Water Clarity Habitat Assessment S Channel Modification (Instream Habitat (20) Bottom Substrate (15) Pool Variety (10) Riffle Habitat (16) Left Bank Stability (7) Right Bank Stability (7) Light Penetration (10) Left Riparian Score (5)	/L) (μS/cm) Scores (max) 5)	7.5 11 161 6.1 slightly turbid 5 10 3 4 3 10 10 9 5		A				
Right Riparian Score (Total Habitat Score (1	5) 1 00)	5 61	Substra	ate			Silt and sand	d.

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/13/07	10125	53	2	7.7	6.8	Moderate
03/12/02	8702	49	1	7.9	6.2	Moderate

Taxonomic Analysis

Most community metrics have been remarkably stable at this location between sample events. However, the BI did decrease slightly in 2007 relative to 2002 and was due to a reduction in oligochaete taxa (three in 2002, zero in 2007) as well as a reduction in several tolerant chironomids that were common or abundant in 2002 but absent in 2007 and included *Cricotopus bicinctus*, *Chironomus* sp., *Hydrobaenus* sp. The small increase in EPTBI measured in 2007 was the result of the addition of *Caenis* sp and an increase in abundance of *Cheumatopsyche* sp from Rare in 2002 to Abundant in 2007.

Data Analysis

The reduction in several very tolerant taxa and corresponding decrease in BI suggest slightly improved conditions along this segment of Flat Swamp for 2007. Considering that this location is below the Robersonville WWTP, these results are surprising given that decreased flows due to drought tend to concentrate effluent and therefore usually depress invertebrate community metrics. Analysis of toxicity testing data for the five years prior to the 3/12/2002 sample show that the Robersonville WWTP had seven failing tests includindg one in Febuary 2002 and one in March 2002 both of which were just prior to sampling. Conversely, from April 2002 to November 2007 there has been only one failing toxicity test. The improvement in toxicity results may explain the slight improvement in the invertebrate community. However, reduced non-point runoff from the large amount of agriculture in this watershed may also be contributing to slightly improved metrics for 2007.



Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/13/07	10152	58	7	7.1	6.2	Moderate
02/26/02	8681	27	4	6.5	6.1	Moderate

Taxonomic Analysis

Although the EPTBI remains essentially identical from 2002, the 2007 sample did result in a large increase in overall EPT taxa. EPT collected here for the first time in 2007 include five species of mayflies (there were no mayfly taxa collected in 2002) and included *Acerpenna pygmaea*, *Caenis* sp., *Leptophlebia* sp., *Maccaffertium modestum*, and *Stenacron interpunctatum*. The stonefly *Perlesta* sp., and the caddisfly *Cheumatopsyche* sp. were also collected here for the first time in 2007. The caddisflies *Ptilostomis* sp., and *Ironoquia punctatissima* were present in 2002 but were absent in 2007 and may be the result of reduced edge habitat due to drought-induced low water levels. The increase in the BI was the result of an increase in chironomid taxa up from only five in 2002 to 22 in 2007.

Data Analysis

The Horsepen Swamp watershed is a mix of agriculture and forest and there are no NPDES dischargers present. As such, non-point inputs are likely the greatest potential stressor in this system. However, unlike many swamp sites characterized by non-point sources that were sampled in the lower Tar during the 2007 drought, the biotic index worsened slightly here. The increase in the biotic index was primarily due to a large increase in the diversity and abundance of chironomid taxa. The large increase in chironomid taxa is somewhat contradicted by the increase in EPT taxa. These data suggest that overall there has been little change in water quality at this location through time. This conclusion is supported by the water chemistry data as the 2002 sample had a pH of 6.0 (57 µS/cm in 2007) and a conductivity of 94 (76 µS/cm in 2007).

Waterbody		Locat	Location			Date		Bioclassification	
Old Ford Swp		US [·]	US 17		OB124		2/12/07	Moderate	
County	Subbasin	8 digit HUC	Latitude	Longitud	AU Number		Level IV Ecoregion		
Beaufort	6	03020103	353751	770348	28-1	28-103-14-1		Mid Atlantic Flatwoods	
Stream Classification		Drainage Area (mi2	2) Elev	vation (ft)	Stream Width		(m)	Stream Depth (m)	
C; SW, NSW		23.6		18		100		0.3	
Visible Landuse (%)		Forested/Wetland 90	Urban 0		Agricul 10	Agriculture 10		Other (describe) 0	
Upstream NPE	DES Dischar	gers (>1MGD or <1M	IGD and withir	n 1 mile)	NF	PDES Nur	nber	Volume (MGD)	
		none				N/A		N/A	
Water Quality Parame	eters					Site Pho	otograph		
Temperature (°C) Dissolved Oxygen (mg Specific Conductance pH (s.u.) Water Clarity	/L) (μS/cm)	5.9 10.7 59 4.9 Slightly Turbid	f.			X			
Habitat Assessment	Scores (max	<)	Self-		11.3	111			
Channel Modification (Instream Habitat (20) Bottom Substrate (15) Pool Variety (10) Left Bank Stability (7)	5)	15 18 3 2 10							
Right Bank Stability (7 Light Penetration (10) Left Riparian Score (5))	10 10 5			M	N			
Right Riparian Score (5)	5	0.1.1						
Total Habitat Score (*	100)	78	Substra	ate			silt		
Sample Date		Sample ID	ST	EPT		BI	EPT BI	Bioclassification	
(12/12/07		10150	43	5		12	68	Moderate	

Taxonomic Analysis

02/19/02

8689

Nearly all of the difference in the invertebrate community between the 2002 and 2007 samples were the result of additional chironomid taxa (16 in 2007, 7 in 2002) and oligochaete taxa (1 in 2002, and 4 in 2007). EPT species richness, EPT abundance (17 in 2002 and 18 in 2007), and EPTBI were essentially the same between years. Pollution tolerant taxa present in the 2007 sample but absent in 2002 include the chironomids *Kiefferulus* sp., *Nanocladius crassicornus*, *Polypedilum illinoense*, *Polypedilum tritum*, *Paratanytarsus dissimilis*, *Paratendipes* sp., *Procladius* sp., *Stictochironomus* sp., and *Tribelos jucundum* and the oligochaetes *Cambarinicola* sp. and *Spirosperma nikolskyi*. The addition of these taxa explains the large increase in BI and the lowered bioclassification for

4

6.7

6.4

Natural

29

Data Analysis

The large increase in chironomids and oligochaetes seen in 2007 resulted in an increase in the BI. This increase in BI was enough to lower the bioclassification from Natural to Moderatre. The addition of several tolerant chironomids and oligochaetes in 2007 but absent in 2002 suggest that some aspect of water chemistry along this segment of Old Ford Swamp has deteriorated since 2002. Although most of this watershed is agriculture (with some forest) and would therefore be expected to improve during a drought due to reduced pollution runoff, it is possible that the reduction in higher pH agricultural runoff and subsequent concentration of low pH swamp water is the reason for the depressed invertebrate community in 2007. Indeed, the 4.9 pH meausred in 2007 is much lower than the 5.7 value measured in 2002. Moreover, conductivity was lower in 2007 (59 µS/cm) versus (94 µS/cm) in 2002 further supporting this hypothesis. Values of pH approaching 4.0 have been shown to adversely impact invertebrate communities and this may explain the decline seen in 2007. Indeed, the 4.9 pH was the lowest measured in all of the Tar Basin in 2007.

Waterbody		Location		Station ID		Date		Bioclassification	
Lathams Cr		SR 1410		OB123		02/12/07		Natural	
County Subb	asin 8 di	git HUC	Latitude	Longitu	ıde AU I	Number	Level IV Ecoregion		
Beaufort 6	30	20103	353918	77054	1 28-1	28-103-14-2		Mid Atlantic Flatwoods	
Stream Classification	Drainag	e Area (mi2)	Elevation (ft)		Strea	Stream Width (m)		i) Stream Depth (m)	
C; Sw, NSW		6.4	25			4		0.5	
	Forested/\	ed/Wetland Urban			Agriculture		Other (describe)		
Visible Landuse (%)	100)	0	0				0	
Upstream NPDES Dis	IGD or <1M	GD and withir	NF	NPDES Number		Volume (MGD)			
•	е		N/A			N/A			
Water Quality Parameters						Site Pho	tograph		
Temperature (°C)		6.6				7 M D	·周州港市(1		
Dissolved Oxygen (mg/L)		11.3		NO.					
Specific Conductance (µS/cm))	64			的是山口	1111			
pH (s.u.)		5.2							
Water Clarity	Clea	ar	N	X					
Habitat Assessment Scores (max)									
Channel Modification (5)		15	Lel	SE					
Instream Habitat (20)		16	to the loss	W.	Re- Land	Statistics of	and the second second		
Bottom Substrate (15)		4			With Street Street		414	AN HIS STOR	
Pool Variety (10)		3	5.4	1-5	- Lil			in the second of the	
Left Bank Stability (7)		10		- + Sh	88	i it ia			
Right Bank Stability (7)		10	also a	- deally	CALL !		1		
Light Penetration (10)		10				-			
Left Riparian Score (5)		5	Contraction of the						
Right Riparian Score (5)		5				-	の中国では	and the second	
Total Habitat Score (100)		78	Substra	ate			Silt.		

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
02/12/07	10151	59	10	6.8	6.4	Natural
02/26/02	8682	48	7	6.9	6.6	Natural

Taxonomic Analysis

Every community metric evaluated in 2007 improved from 2002 levels. EPT taxa present in 2007 but not collected in 2002 include the mayflies *Leptophlebia bradleyi*, *Pseudocloeon frondale*, and *Stenacron interpunctatum* and the caddisflies *Ceraclea resurgens* and *Cheumatopsyche* sp. Tolerant taxa present in 2002 but absent from 2007 included the chironomids *Cricotopus bicinctus*, *C/O Sp* 7, *Natarsia* sp., and *Polypedilum illinoense*.

Data Analysis

While most of the increase in total taxa richness was due to additional chironomid taxa in 2007 (22 versus 15 in 2002) many of these taxa were rare and many of the most tolerant chironomids that were present in 2002 were absent in 2007. This, combined with the increased in EPT taxa richness helped lower the BI and EPTBI respectively for 2007 and indicates a more intolerant community here in 2007 relative to the 2002 sample. While much of the Lathams Creek watershed is forest, there are some agricultural inputs. THe 2007 drought likely reduced the agricultural non-point impacts and therefore helped improved invertebrate community metrics. Water chemistry supports this assertion as conductivity was 64 µS/cm in 2007 and was nearly twice as high (115 µS/cm) in 2002. In addition, the pH in 2007 was much lower (5.2) versus 6.2 measured in 2002 indicating a reduction in higher pH agricultural runoff.