

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
CEDAR CR	SR 1109	OB4	06/26/12	Good-Fair

County	Subbasin	8 digit HUC	Latitude	Longitude
Franklin	1	03020101	36.059722	-78.354167

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Northern Outer Piedmont	40.2	5	0.3

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	0	0	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
Franklin County Public Utilities	NC0069311	3.0

Water Quality Parameters

Temperature (°C)	27.0
Dissolved Oxygen (mg/L)	6.4
Specific Conductance (µS/cm)	300
pH (s.u.)	7.4

Water Clarity	Slightly turbid, milky.
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	11
Bottom Substrate (15)	3
Pool Variety (10)	8
Riffle Habitat (16)	5
Bank Erosion (7)	3
Bank Vegetation (7)	3
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	58

Site Photograph



Substrate	Sand, gravel, silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/26/12	11368	EPT	18	18	4.85	4.85	Good-Fair
06/26/07	10195	EPT	21	21	4.89	4.89	Good
07/22/02	8863	EPT	15	15	5.03	5.03	Good-Fair
07/28/97	7384	EPT	14	14	4.61	4.61	Good-Fair

Data Analysis

This location is below the Franklin County Public Utilities WWTP and specific conductance data has been correspondingly high with measurements of 300 µS/cm in 2002, 282 µS/cm in 2007, and 455 µS/cm in 2012. Interestingly, the only Good bioclassification at this location (2007) coincided with the lowest specific conductance measurement. The 2012 sample was more consistent with the two samples taken in 1997 and 2002. Overall, conditions at this location are stable but likely adversely influenced by the upstream major discharger. Taxa consistently collected at this location include many facultative EPT taxa such as the mayflies *Centropilum spp* , *Maccaffertium modestum* , *Isonychia spp* , as well as the caddisflies *Cheumatopsyche spp* , *Nectopsyche exquisita* , and *Triaenodes ignitus* .

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
FISHING CR	SR 1643	OB10	06/26/12	Good

County	Subbasin	8 digit HUC	Latitude	Longitude
Granville	1	03020101	36.223056	-78.575833

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Northern Outer Piedmont	48.0	15	0.3

	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
Visible Landuse (%)	100	0	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
Oxford WWTP	NC0025054	3.5

Water Quality Parameters

Temperature (°C)	23.1
Dissolved Oxygen (mg/L)	5.8
Specific Conductance (µS/cm)	486
pH (s.u.)	7.2

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	20
Bottom Substrate (15)	12
Pool Variety (10)	10
Riffle Habitat (16)	12
Bank Erosion (7)	7
Bank Vegetation (7)	5
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	88

Site Photograph



Substrate	Cobble, boulder, sand, gravel and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/26/12	11367	Full Scale	80	20	5.58	4.98	Good
06/25/07	10194	Full Scale	59	19	5.71	5.35	Good-Fair
03/23/06	9820	Full Scale	79	23	5.52	4.29	Good
07/22/02	8812	Full Scale	62	16	5.49	4.96	Good-Fair
05/18/99	7855	EPT	11	11	5.23	5.23	Fair
07/21/97	7376	Full Scale	61	18	5.60	5.07	Good-Fair
07/27/92	5918	Full Scale	79	18	5.90	5.27	Good-Fair
09/19/90	5454	EPT	11	11	5.38	5.38	Fair

Data Analysis

The two Fair bioclassifications (1990 and 1999) notwithstanding, this segment of Fishing Creek generally oscillates between Good-Fair and Good. Aside from the first ever collection (in 2012) of the long-lived and generally intolerant stonefly *Acroneuria abnormis* , this taxa, and all other long-lived stonefly taxa, have always been absent at this location. This suggests some degree of deleterious impact. The close proximity of the Oxford WWTP, and correspondingly high specific conductance (176 µS/cm in 1999, 139 µS/cm in 2002, 339 µS/cm in 2007, and 486 µS/cm in 2012), along with upstream non-point influences associated with nearby municipal areas are likely sources.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody		Location		Station ID	Date	Bioclassification
SANDY CR		SR 1405		OB35	06/27/12	Good
County	Subbasin	8 digit HUC	Latitude		Longitude	
Nash	2	03020101	36.126944		-78.024722	
Level IV Ecoregion		Drainage Area (mi2)	Stream Width (m)		Stream Depth (m)	
Northern Outer Piedmont		121.0	11		0.5	
Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)	
	100	0	0	0		
Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)			NPDES Number		Volume (MGD)	
None			N/A		N/A	

Water Quality Parameters

Temperature (°C)	9.0
Dissolved Oxygen (mg/L)	11.2
Specific Conductance (µS/cm)	72
pH (s.u.)	6.7

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	17
Bottom Substrate (15)	11
Pool Variety (10)	3
Riffle Habitat (16)	10
Bank Erosion (7)	7
Bank Vegetation (7)	7
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	77

Site Photograph



Substrate	Cobble, gravel, sand, boulder and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/27/12	11392	EPT	25	25	4.56	4.56	Good
06/26/07	10196	Full Scale	71	22	4.79	3.82	Good
03/23/06	9819	Full Scale	89	36	4.98	3.80	Excellent
04/21/03	9109	Full Scale	84	32	5.17	4.46	Excellent
06/10/02	8788	Full Scale	61	21	5.06	3.86	Good

Data Analysis

Over the period of record for this station, bioclassifications and community metrics have remained generally consistent and indicative of favorable water quality conditions. This conclusion is supported by the specific conductance which has been generally low and has ranged between 57 µS/cm (2003) and 95 µS/cm (2012). Furthermore, numerous pollution intolerant invertebrate taxa have consistently been collected at this location and include the long-lived stoneflies *Acroneuria abnormis* , *Paragnetina fumosa* , *Pteronarcys dorsata* , and the caddisflies *Brachycentrus nigrosoma* , *B. numerosus* , *Micrasema wataga* , *Neophylax fuscus* and *N. oligius* .

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
TAR R	NC 97	OB58	07/19/12	Good-Fair

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	2	03020101	35.954167	-77.787222

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Rolling Coastal Plain	933	35	0.4

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	80	0	0	0	20 (road, RR, park)

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
Oxford WWTP	NC0025054	3.5
Louisburg WWTP	NC0020231	1.37
Franklin County WWTP	NC0069311	3

Water Quality Parameters

Temperature (°C)	30.9
Dissolved Oxygen (mg/L)	4.2
Specific Conductance (µS/cm)	100
pH (s.u.)	6.7

Water Clarity	clear
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Site Photograph (from June 2006)



Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	14
Bottom Substrate (15)	8
Pool Variety (10)	10
Riffle Habitat (16)	7
Bank Erosion (7)	5
Bank Vegetation (7)	6
Light Penetration (10)	5
Left Riparian Score (5)	4
Right Riparian Score (5)	4
Total Habitat Score (100)	68

Substrate	gravel (35%), sand (25%), boulder (20%), silt, cobble, bedrock
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
07/19/12	11394	Full Scale	77	15	5.72	4.88	Good-Fair
06/27/07	10201	Full Scale	72	21	5.93	5.09	Good-Fair
07/24/02	8916	Full Scale	89	24	6.11	5.17	Good-Fair
07/22/97	7381	Full Scale	71	26	5.78	4.80	Good
07/23/92	5913	Full Scale	79	24	5.67	4.82	Good-Fair
07/12/90	5359	Full Scale	77	23	5.42	4.61	Good
07/08/87	4121	EPT	17	17	5.05	5.05	Good-Fair
07/06/87	4141	Full Scale	63	18	5.71	5.09	Good-Fair

Data Analysis

The site is within the city limits of Rocky Mount, roughly 1 kilometer NNW of downtown. The headwaters of Tar River are west of Oxford. Catchment landcover is roughly half forest, one-quarter cultivation, one-tenth developed, and one-tenth grassland/herbaceous (using 2006 NLCD data). The BAB has data for 11 sampling events at the site going back to August 1983. The collection in 2012 resulted in the lowest number of EPT taxa among all BAB sampling events at the site (including the less intensive EPT sampling event in July 1987). However, the BI value for 2012 is in the lower half of the range of all Full Scale BI values at the site. The 2012 bioclassification of Good-Fair is consistent with most of the prior sampling events; the exceptions are from 1990 and 1997 when the site received bioclassifications of Good.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
TAR R	SR 1252	OB63	06/28/12	Good

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	2	03020101	35.940556	-77.655556

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	1000	30	0.4

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	100	0	0	0	0

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
Oxford WWTP	NC0025054	3.5
Louisburg WWTP	NC0020231	1.37
Franklin County WWTP	NC0069311	3
Tar River Regional WWTP	NC0030317	21

Water Quality Parameters

Temperature (°C)	26.8
Dissolved Oxygen (mg/L)	---
Specific Conductance (µS/cm)	171
pH (s.u.)	6.0

Water Clarity	clear
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	14
Bottom Substrate (15)	3
Pool Variety (10)	6
Riffle Habitat (16)	4
Bank Erosion (7)	5
Bank Vegetation (7)	5
Light Penetration (10)	2
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	54

Site Photograph



Substrate	sand (70%), silt (20%), gravel (10%)
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/28/12	11393	Full Scale	83	26	5.38	4.32	Good
06/27/07	10203	Full Scale	63	23	5.55	4.56	Good
08/01/02	8897	Full Scale	79	19	5.77	4.68	Good-Fair
07/22/97	7379	Full Scale	68	26	5.44	4.49	Good
03/02/88	4499	Full Scale	66	14	7.04	5.82	Fair

Data Analysis

This site is midway between Rocky Mount and Tarboro. The headwaters of Tar River are west of Oxford. Catchment landcover is roughly half forest, one-quarter cultivation, one-tenth developed, and one-tenth grassland/herbaceous (using 2006 NLCD data). EPT Richness in 2012 was as high as it has ever been among all BAB sampling events at the site, and the BI is at the lowest level among all events. Both metric values are indicative of better water quality in 2012 over 2002 and 2007.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
WHITE OAK SWP	SR 1428	OB67	02/07/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	2	03020101	36.004444	-77.620278

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	19.5	5	0.3

	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
Visible Landuse (%)	100	0	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	4.0
Dissolved Oxygen (mg/L)	11.5
Specific Conductance (µS/cm)	76
pH (s.u.)	5.7

Water Clarity	clear/tannic
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	10
Bottom Substrate (15)	7
Pool Variety (10)	6
Riffle Habitat (16)	0
Bank Erosion (7)	7
Bank Vegetation (7)	7
Light Penetration (10)	10
Left Riparian Score (5)	4
Right Riparian Score (5)	5
Total Habitat Score (100)	61

Site Photograph



Substrate	Sand, silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/07/12	11322	Swamp	35	8	6.69	5.01	Moderate
02/05/07	10133	Swamp	51	8	6.29	5.70	Moderate
02/11/02	8670	Swamp	40	7	6.58	5.65	Moderate
05/03/88	4540	EPT	11	11	5.08	5.08	Not Rated

Data Analysis

Aside from the 1988 EPT spring sample which was not rated, this site has always received a Moderate bioclassification (using winter swamp methods) with all community metrics remaining largely similar between sampling events. Taxa consistently collected at this location include the pollution intolerant stoneflies *Prostoia spp* , *Clioperla clio* , and *Isoperla transmarina* (Group), as well as the caddisfly *Cheumatopsyche spp* and the mayfly *Maccaffertium modestum* . Based on the available biological data, conditions at this location appear generally stable.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
BYNUMS MILL CR	SR 1120	OB70	02/06/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.766667	-77.641389

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Rolling Coastal Plain	15.5	10	0.5

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	100	0	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	7.7
Dissolved Oxygen (mg/L)	0.0
Specific Conductance (µS/cm)	83
pH (s.u.)	5.1

Water Clarity	slightly turbid/tannic
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Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	12
Bottom Substrate (15)	10
Pool Variety (10)	6
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	10
Light Penetration (10)	9
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	82

Site Photograph



Substrate	Sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/06/12	11317	Swamp	37	3	8.24	7.26	Moderate
02/07/07	10139	Swamp	58	6	7.81	6.83	Moderate
02/11/02	8671	Swamp	36	2	7.62	6.50	Severe
08/16/93	6324	Swamp	29	2	8.40	7.02	Not Rated
05/05/93	6169	Swamp	49	2	7.94	7.35	Not Rated
02/16/93	6105	Swamp	51	3	7.92	7.94	Not Rated
08/12/92	5975	Swamp	31	2	8.67	8.60	Not Rated
05/06/92	5846	Swamp	44	1	8.12	4.60	Not Rated
02/19/92	5785	Swamp	48	4	7.82	6.63	Not Rated

Data Analysis

Since the first bioclassification was assigned here in 2002, the site has consistently rated Moderate. Facultative taxa consistently collected at this station since 2007 include the mayflies *Callibaetis spp* , *Caenis spp* , and the caddisfly *Isonychia punctatissima* . Although the bioclassification in 2012 was unchanged from the previous collection in 2007, the invertebrate community metrics for the 2012 sample did decline from 2007 levels. Despite this decline, the 2012 data are still within the general ranged established at this location over its total sample history. Although the decline in 2012 metrics may suggest a slight decline in water quality from 2007, the specific conductance data do not support this assertion as this parameter was 84 µS/cm in 2002, 77 µS/cm in 2007, and 82 µS/cm in 2012. The Macclesfield WWTP is located approximately two miles upstream of this location.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
COKEY SWP	NC 43	OB71	01/06/12	Severe

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.895556	-77.740833

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Rolling Coastal Plain	27.1	5	1.0

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	90	10	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	6.4
Dissolved Oxygen (mg/L)	6.5
Specific Conductance (µS/cm)	98
pH (s.u.)	5.7

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	7
Instream Habitat (20)	13
Bottom Substrate (15)	4
Pool Variety (10)	4
Riffle Habitat (16)	0
Bank Erosion (7)	6
Bank Vegetation (7)	7
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	58

Site Photograph



Substrate	Sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
01/06/12	11316	Swamp	27	1	6.93	4.80	Severe
02/08/07	10141	Swamp	62	7	6.47	5.82	Moderate
02/12/02	8674	Swamp	41	3	7.09	6.60	Severe

Data Analysis

Aside from the single Moderate bioclassification, this segment of Cokey Swamp typically receives Severe bioclassifications with generally consistent specific conductance readings over that time (113 µS/cm in 2002, 73 µS/cm in 2007, and 98 µS/cm in 2012). Pollution tolerant taxa collected here on each sampling event include the dragonfly *Ischnura* spp, the beetles *Neoporus* spp, *Peltodytes* spp, and the chironomids *Orthocladus oliveri*, *Polypedilum illinoense* Gr, and *Thienemannimyia* Gr. The lack of permitted NPDES dischargers in this catchment suggest that the unfavorable bioclassifications are likely the result of non-point pollution sources.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
CONETOE CR	SR 1510	OB75	02/07/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.875556	-77.393889

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	14.6	5	0.7

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	80	0	20	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	8.0
Dissolved Oxygen (mg/L)	5.8
Specific Conductance (µS/cm)	106
pH (s.u.)	5.1

Water Clarity	Turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	8
Bottom Substrate (15)	7
Pool Variety (10)	4
Riffle Habitat (16)	0
Bank Erosion (7)	8
Bank Vegetation (7)	8
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	2
Total Habitat Score (100)	57

Site Photograph



Substrate	Sand, silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/07/12	11319	Swamp	35	3	7.05	5.23	Moderate
02/06/07	10134	Swamp	41	3	6.80	6.34	Moderate
02/22/02	8679	Swamp	47	2	7.27	6.68	Severe

Data Analysis

Since 2002, the two most recent samples have resulted in consistent community metrics and bioclassifications. The most significant difference in the community from the 2002 collection to the 2007 and 2012 collections include the absence in 2007 and 2012 of the highly tolerant, and low-dissolved oxygen adapted gastropod *Physa spp* . This taxon was abundant in 2002. In addition, several taxa of pollution tolerant leeches and flatworms were also collected in 2002 but absent in both of the subsequent collections. These data suggest that conditions at this location have improved and stabilized since 2002.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
CONETOE CR	US 64A	OB77	02/07/12	Not Rated

County	Subbasin	8 digit HUC	Latitude	Longitude
Pitt	3	03020103	35.808056	-77.447222

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	59.9	12	0.6

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	30	10	60	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

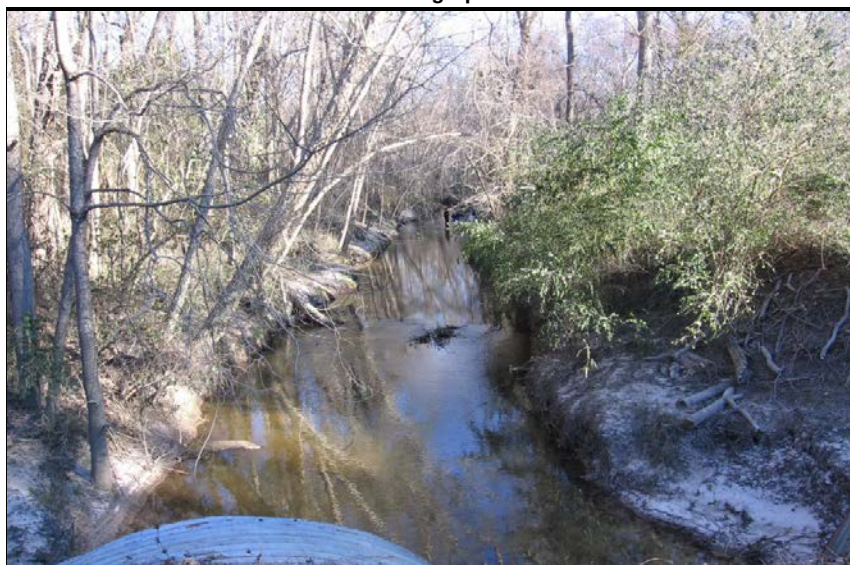
Temperature (°C)	9.3
Dissolved Oxygen (mg/L)	7.1
Specific Conductance (µS/cm)	130
pH (s.u.)	5.5

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	10
Bottom Substrate (15)	13
Pool Variety (10)	4
Riffle Habitat (16)	0
Bank Erosion (7)	8
Bank Vegetation (7)	8
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	65

Site Photograph



Substrate	Silt and sand.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/07/12	11321	Swamp	38	7	6.33	6.07	Not Rated

Data Analysis

This site serves as a replacement for the Conetoe Creek NC 42 (Station ID OB73) historic basinwide location. The station had to be moved to the present location in 2012 due to a hostile landowner at the NC 42 site. The 2002 and 2007 swamp samples obtained at the NC 42 location both resulted in Moderate bioclassifications. EPT diversity at NC 42 in 2002 was one (1) and four (4) in 2007 with biotic indices of 7.2 and 7.3 respectively. The sample obtained at the current location resulted in a significant increase in EPT taxa (7) and a significant reduction in biotic index (6.3). The US 64A station is approximately 3.8 miles downstream of the NC 42 site and is also below the confluence of Crisp Creek. The improvement in metrics at this location relative to the metrics measured at NC 42 suggest more favorable conditions and may be the result of the improved flow associated with the larger drainage area. However, water quality (in addition to improved flows) also appears more favorable at this location and is supported by the presence of numerous intolerant taxa not collected at any of the NC 42 samples and include the stoneflies *Allocapnia spp*, *Taeniopteryx spp*, and the caddisflies *Ceraclea resurgens* and *Hydroptila spp*. The 2012 sample, although Not Rated due to a lack of sufficient data for assigning swamp bioclassifications in this ecoregion, nonetheless has a less pollution tolerant community relative to the NC 42 location. Going forward, this location will serve as the permanent replacement for Station OB73.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
CRISP CR	SR 1527	OB78	02/07/12	Severe

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.838611	-77.381667

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	18.7	5	0.3

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	75	0	0	0	25 old clearcut

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	4.2
Dissolved Oxygen (mg/L)	15.5
Specific Conductance (µS/cm)	106
pH (s.u.)	5.4

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	10
Bottom Substrate (15)	7
Pool Variety (10)	5
Riffle Habitat (16)	0
Bank Erosion (7)	8
Bank Vegetation (7)	8
Light Penetration (10)	10
Left Riparian Score (5)	2
Right Riparian Score (5)	5
Total Habitat Score (100)	60

Site Photograph



Substrate	Sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/07/12	11320	Swamp	29	2	7.85	5.85	Severe
02/06/07	10135	Swamp	43	3	6.53	6.41	Moderate
03/01/04	9357	Swamp	46	4	7.23	6.21	Moderate
02/11/02	8673	Swamp	36	2	7.67	6.61	Severe

Data Analysis

After two Moderate bioclassifications in 2004 and 2007, the 2012 collection reverted back to Severe which was consistent with the collection obtained here in 2002. Relative to the 2007 and 2004 samples, the 2012 collection lacked flow dependent taxa such as the caddisflies *Cheumatopsyche spp* and the mayfly *Maccaffertium modestum* . Both of these taxa were abundant from the 2004 and 2007 samples. The absence of these taxa suggest flows may have been reduced in 2012 relative to 2007 and 2004 and therefore the reduction in bioclassification may have been more related to flow than any change in water quality. This is supported by the largely stable specific conductance over the monitoring period (124 µS/cm in 2002, 101 µS/cm n 2004, 106 µS/cm in 2007, and 137 in 2012). However, further monitoring in this watershed is warranted to confirm that the drop in bioclassificaiton in 2012 was more related to flow than water quality.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
OTTER CR	SR 1614	OB86	02/06/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.726667	-77.596944

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Rolling Coastal Plain	20.0	6	0.6

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	90	10	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	8.8
Dissolved Oxygen (mg/L)	6.5
Specific Conductance (µS/cm)	94
pH (s.u.)	6.3

Water Clarity	slightly turbid/tannic
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Site Photograph



Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	12
Bottom Substrate (15)	7
Pool Variety (10)	6
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	10
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	77

Substrate	Silt, sand.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/06/12	11318	Swamp	36	3	7.20	4.03	Moderate
02/07/07	10138	Swamp	70	9	7.05	6.30	Moderate
02/11/02	8672	Swamp	44	5	7.05	6.08	Moderate
05/05/93	6168	Swamp	71	10	7.07	4.98	Not Rated
02/16/93	6106	Swamp	62	9	6.94	5.45	Not Rated
08/12/92	5974	Swamp	31	1	8.64	9.20	Not Rated
05/06/92	5847	Swamp	62	9	6.85	5.11	Not Rated
02/20/92	5788	Swamp	83	15	6.83	5.38	Not Rated

Data Analysis

Aside from the Not Rated samples obtained between 1992-1993, this waterbody has continually produced Moderate bioclassifications from 2002-2012 and the biotic index (BI) has been extremely stable over that period. Although the EPT richness declined in 2012 from the 2007 sample, the EPTBI actually dropped between those two collections. Overall, the biological data suggest stable conditions at this location since the onset of routine winter swamp sampling in 2002. This is supported by the stable specific conductance measured over this timeframe at 109 µS/cm in 2002, 84 µS/cm in 2007, and 94 µS/cm in 2012.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
TAR R	NC 42	OB89	06/26/12	Good-Fair

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.790354	-77.550685

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	2450.0	35	0.6

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	70	30	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	25.2
Dissolved Oxygen (mg/L)	4.9
Specific Conductance (µS/cm)	125
pH (s.u.)	6.4

Water Clarity	slightly turbid/tannic
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	11
Bottom Substrate (15)	3
Pool Variety (10)	4
Riffle Habitat (16)	0
Bank Erosion (7)	3
Bank Vegetation (7)	7
Light Penetration (10)	2
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	45

Site Photograph



Substrate	Sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/26/12	11383	EPT	17	17	4.19	4.19	Good-Fair
06/28/07	10204	Full Scale	68	26	5.10	4.32	Excellent
06/27/07	10223	EPT	27	27	4.34	4.34	Excellent
06/28/05	9659	Full Scale	80	30	4.83	4.01	Excellent
08/06/02	8919	EPT	24	24	4.51	4.51	Excellent
08/19/97	7455	EPT	26	26	4.47	4.47	Excellent
07/20/92	5898	EPT	26	26	4.16	4.16	Excellent

Data Analysis

Although there are no major dischargers located within one mile of this station, there are four major dischargers (total combined discharge of approximately 30 MGD) located far upstream in Person, Franklin, and Nash counties. Up until the 2012 sample, this site has always received an Excellent bioclassification and has maintained a stable specific conductance with readings of 173 µS/cm (2002), 129 µS/cm (2005), 142 µS/cm (2007) and 125 µS/cm (2012). Although the EPT diversity in 2012 declined significantly from previous EPT samples, the EPTBI in 2012 was actually the 2nd lowest on record for this location. The maintenance of the low EPTBI suggests that water quality may not have changed as drastically as the bioclassification indicates and this is supported by the 2012 specific conductance (which was the lowest measured at this location). An analysis of the benthos community present in 2012 relative to previous EPT samples suggests that a lack of suitable edge habitat was partially responsible for the decline in EPT diversity. For example, the edge dwelling mayfly *Caenis spp* and the edge caddisflies, *Oecetis persimilis*, *Trienodes ignitus*, and *T. perna/helo* were all absent in 2012 but consistently found in previous sampling years. Continued monitoring is necessary to rule out any possible water quality change.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
TAR R	US 64 BUS	OB90	06/26/12	Good

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.893889	-77.533333

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	2220.0	40	0.2

	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
Visible Landuse (%)	0	100	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	28.3
Dissolved Oxygen (mg/L)	7.2
Specific Conductance (µS/cm)	129
pH (s.u.)	6.9

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	13
Bottom Substrate (15)	7
Pool Variety (10)	6
Riffle Habitat (16)	0
Bank Erosion (7)	3
Bank Vegetation (7)	7
Light Penetration (10)	2
Left Riparian Score (5)	3
Right Riparian Score (5)	2
Total Habitat Score (100)	58

Site Photograph



Substrate	Sand, silt, trace of gravel.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/26/12	11385	Full Scale	54	19	5.27	4.06	Good
06/27/07	10224	Full Scale	92	27	5.63	4.33	Good
06/28/05	9658	Full Scale	79	29	4.83	3.94	Excellent
08/06/02	8900	Full Scale	77	27	5.79	4.78	Good
08/19/97	7453	Full Scale	79	28	5.31	4.51	Excellent
07/20/92	5899	Full Scale	81	29	5.63	4.60	Excellent
07/12/90	5358	Full Scale	69	28	5.34	4.56	Excellent
07/11/88	4592	Full Scale	80	21	5.47	4.54	Good
07/06/87	4142	Full Scale	81	23	5.76	4.73	Good

Data Analysis

Although there are no major dischargers within one mile or less of this site, there are four major dischargers (combined discharge of approximately 30 MGD) located upstream in Franklin, Person, and Nash Counties. However, as can be seen by the long record of benthos data, the significant dilution associated with this very large waterbody is attenuating the discharger effects. In addition to the five Good bioclassifications and the four Excellent ratings listed above, there were four additional Good bioclassifications attained at this location from 1983, 1985, and two samples in 1986. In short, water quality has been stable at this location for over 30 years. Recent conductivity measurements support this assertion with values measured at 164 µS/cm (2002), 123 µS/cm (2005), 132 µS/cm (2007) and 129 µS/cm (2012). Intolerant and facultative taxa consistently collected here over the period of record include the mayflies *Isonychia spp* , *Tricorythodes spp* , the long lived stoneflies *Acroneuria abnormis* , *Pteronarcys dorsata* , *Pteronarcys spp* , and the caddisflies *Brachycentrus numerosus* , *Hydropsyche incommoda* and *Neureclipsis spp* .

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
TOWN CR	SR 1601	OB91	06/26/12	Good-Fair

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	3	03020103	35.791667	-77.558333

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	198.0	7	0.6

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	20	50	30	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	25.3
Dissolved Oxygen (mg/L)	5.2
Specific Conductance (µS/cm)	108
pH (s.u.)	6.4

Water Clarity	slightly turbid/tannic
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Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	15
Bottom Substrate (15)	7
Pool Variety (10)	6
Riffle Habitat (16)	0
Bank Erosion (7)	3
Bank Vegetation (7)	10
Light Penetration (10)	10
Left Riparian Score (5)	4
Right Riparian Score (5)	5
Total Habitat Score (100)	75

Site Photograph



Substrate	Sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/26/12	11384	Full Scale	49	10	5.99	5.26	Good-Fair
06/27/07	10222	Full Scale	82	24	5.82	4.77	Good
08/19/97	7454	Full Scale	84	24	5.80	4.63	Good
07/20/92	5905	Full Scale	64	14	6.09	5.56	Not Rated

Data Analysis

The 2012 collection declined in bioclassification from the previous two samples obtained in 1997 and 2007. However, analysis of the macroinvertebrate data clearly demonstrate that numerous edge dwelling taxa were absent in 2012 but were collected in 1997 and 2007. These taxa include the caddisflies *Brachycentrus numerosus*, *Nectopsyche exquisita*, *Oecetis persimilis*, *Triaenodes ignitus*, and *Pycnopsyche* spp. These data suggest that the decline in bioclassification measured in 2012 was mostly attributable to the reduction in favorable edge habitat. This could have been the result of low flows. Indeed, the 2012 collection lacked several flow-related caddisflies that were collected in 1997 and 2007 and included *Hydropsyche rossi/venularis* and *Chimarra* spp. In short, the 2012 bioclassification decline was most likely the result of unfavorable habitat conditions relative to previous samples. This conclusion is supported by the specific conductance data which was 111 in 2007 and 108 in 2012.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
BEECH SWP	SR 1003	OB94	02/08/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
Halifax	4	03020102	36.153056	-77.567500

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	153.0	10	0.0

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	70	0	30	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	7.2
Dissolved Oxygen (mg/L)	5.3
Specific Conductance (µS/cm)	79
pH (s.u.)	5.8

Water Clarity	slightly turbid/tannic
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Site Photograph



Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	15
Bottom Substrate (15)	7
Pool Variety (10)	6
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	10
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	4
Total Habitat Score (100)	82

Substrate	Sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/08/12	11323	Swamp	25	2	6.42	3.10	Moderate
02/05/07	10131	Swamp	35	3	6.96	5.67	Moderate
02/15/02	8677	Swamp	37	2	7.27	6.70	Moderate

Data Analysis

Although the bioclassification at this location has remained constant since the first collection in 2002, the last two samples demonstrate that there is an increasingly pollution intolerant community present. Indeed, the biotic index (BI) and EPTBI have improved since 2002 with the 2012 sample resulting in the lowest BI and EPTBI measurements on record for this location. Despite identical bioclassifications, the biotic indices suggest a trend of improved conditions at this location since 2002.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification	
DEEP CR	SR 1100	OB96	02/08/12	Moderate	
County	Subbasin	8 digit HUC	Latitude	Longitude	
Halifax	4	03020102	36.073889	-77.440278	
Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)		
Rolling Coastal Plain	42.5	10	0.4		
Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	100	0	0	0	
Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)			NPDES Number	Volume (MGD)	
None			N/A	N/A	

Water Quality Parameters

Temperature (°C)	8.3
Dissolved Oxygen (mg/L)	6.2
Specific Conductance (µS/cm)	111
pH (s.u.)	5.8

Water Clarity	slightly turbid/tannic
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Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	15
Bottom Substrate (15)	4
Pool Variety (10)	10
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	10
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	4
Total Habitat Score (100)	83

Site Photograph



Substrate	Silt and sand.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/08/12	11324	Swamp	25	1	7.11	3.10	Moderate
02/05/07	10132	Swamp	35	0	7.73	0.00	Moderate
02/15/02	8678	Swamp	33	2	8.08	7.95	Moderate

Data Analysis

At this location, Deep Creek has continually received Moderate bioclassifications since monitoring initiated in 2002. Similarly, there has been very little variation in specific conductance (93 µS/cm in 2002, 90 µS/cm in 2007, and 111 µS/cm in 2012) over that time. However, the biotic index data demonstrate a consistent improvement since collections initiated here in 2002. Pollution tolerant taxa present in 2002 and 2007 but absent from the 2012 sample included the chironomids *Ablabesmyia peleensis* and *Glyptotendipes spp*, the crustacean *Crangonyx serratus*, the gastropod *Micromenetus dilatus*, and the planarian *Dugesia tigrina*. Overall, these data suggest modest improvements in the biological community since 2002.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
FISHING CR	SR 1500	OB99	06/26/12	Good

County	Subbasin	8 digit HUC	Latitude	Longitude
Edgecombe	4	03020102	35.974167	-77.540278

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Southeastern Floodplains and Low Terraces	785.0	12	0.5

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	60	0	40	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	28.2
Dissolved Oxygen (mg/L)	6.3
Specific Conductance (µS/cm)	126
pH (s.u.)	6.5

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	15
Bottom Substrate (15)	7
Pool Variety (10)	6
Riffle Habitat (16)	0
Bank Erosion (7)	3
Bank Vegetation (7)	10
Light Penetration (10)	4
Left Riparian Score (5)	4
Right Riparian Score (5)	4
Total Habitat Score (100)	68

Site Photograph



Substrate	Sand, silt, and gravel.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/26/12	11386	EPT	20	20	4.36	4.36	Good
06/28/07	10225	Full Scale	102	31	5.06	3.81	Excellent
08/06/02	8901	EPT	21	21	4.34	4.34	Good
08/18/97	7452	Full Scale	56	28	4.63	4.05	Excellent
07/22/92	5911	EPT	23	23	3.89	3.89	Good

Data Analysis

Bioclassifications have been stable at this location since monitoring inception oscillating between Good and Excellent. Specific conductance has also been consistent at this location with measurements of 106 µS/cm in 2002, 109 µS/cm in 2007 and 126 µS/cm in 2012. Intolerant taxa consistently collected at this location over its monitoring history include the long-lived stoneflies *Acroneuria abnormis*, *Pteronarcys dorsata* and the caddisflies *Brachycentrus numerosus* and *Chimarra spp.* These data suggest stable and favorable water quality at this location.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification	
L FISHING CR	SR 1343	OB103	06/25/12	Good-Fair	
County	Subbasin	8 digit HUC	Latitude	Longitude	
Halifax	4	03020102	36.153889	-77.884722	
Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)		
Rolling Coastal Plain	188.0	7	0.3		
Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	90	0	10	0	
Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)			
None	N/A	N/A			

Water Quality Parameters

Temperature (°C)	26.2
Dissolved Oxygen (mg/L)	5.1
Specific Conductance (µS/cm)	113
pH (s.u.)	6.7

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	14
Bottom Substrate (15)	8
Pool Variety (10)	6
Riffle Habitat (16)	7
Bank Erosion (7)	6
Bank Vegetation (7)	7
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	70

Site Photograph



Substrate	Cobble, sand, gravel, silt and boulder.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/25/12	11382	Full Scale	58	17	5.81	4.68	Good-Fair
06/29/07	10228	Full Scale	94	27	5.07	3.87	Good
08/05/02	8899	Full Scale	86	23	5.42	4.12	Good

Data Analysis

The 2012 sample declined one full bioclassification from the previous two collections. Total diversity (ST) and EPT diversity dropped significantly from both prior samples and both the BI and EPTBI increased. Intolerant taxa collected previously but absent in 2012 included the mayfly *Baetisca carolina* , *Brachycercus spp* , *Serratella serratoides* , *Hexagenia spp* , the stoneflies *Leuctra spp* , *Paragnetina fumosa* , and the caddisflies *Micrasema wataga* , *Phylocentropus spp* , and *Brachycentrus numerosus* . Although specific conductance has been consistent on the three individual days where it has been previously measured (111 µS/cm in 2002, 99 µS/cm in 2007, 113 µS/cm in 2012) the sizeable and consistent decline in the temporally integrative benthic macroinvertebrate metrics in 2012 suggest a decline in water quality at this location.

BENTHIC MACROINVERTEBRATE SAMPLE

Analyst: Victor Holland

Waterbody	Location	Station ID	Date	Bioclassification
CHICOD CR	SR 1777	OB107	02/27/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
PITT	5	03020103	35.545556	-77.210556

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	22.4	12	1.0

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	80	10	10	0	

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
none	----	----

Water Quality Parameters

Temperature (°C)	8.9
Dissolved Oxygen (mg/L)	11.5
Specific Conductance (µS/cm)	96
pH (s.u.)	5.8

Water Clarity	tannin stained
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Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	20
Bottom Substrate (15)	4
Pool Variety (10)	8
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	7
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	84

Site Photograph



Substrate	Mostly silt, sand, and detritus
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/27/12	11315	Swamp	33	1	6.50	6.70	Moderate
02/14/07	10127	Swamp	70	9	6.92	6.37	Natural
03/12/02	8701	Swamp	43	2	7.22	6.50	Severe
07/15/97	7355	Swamp	45	4	7.02	6.20	Not Rated
03/25/97	7265	Full Scale	56	5	6.91	5.79	Fair
06/29/93	6254	Swamp	31	4	6.56	5.97	Not Rated
03/24/93	6135	Full Scale	35	4	6.76	5.27	Poor

Data Analysis

This site received a Moderate bioclassification in 2012. The drastic change in the total richness (33) and EPT richness (1) in 2012 compared to in 2007 (total S=70 and EPTS=9) suggests impacts from nonpoint source pollutants in this mostly agricultural catchment. Drought conditions leading to decreased nonpoint source pollutants could explain the Natural bioclassification observed in 2007. This water quality decline observed in 2012 suggests more pollutants entering this swamp as a result of recent increased precipitation. The NCBI (6.50) and total richness are most similar to samples collected in 1993. EPT taxa that were abundant or common in 2007 that were not observed in 2012 included, the mayflies, *Stenacron interpunctatum* and *Caenis spp.*, the stonefly, *Perlesta spp.*, and the caddisflies, *Ptilostomis spp.* and *Ceraclea resurgens*. The only EPT taxa collected in 2012 was the caddisfly, *Isonychia punctitissima*. Conductivity (95 µS/cm versus 96 µS/cm) and habitat scores (79 versus 84) were similar between the 2007 and 2012 sampling dates, respectively.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
GRINDLE CR	US 264	OB111	06/27/12	Good-Fair

County	Subbasin	8 digit HUC	Latitude	Longitude
Pitt	5	03020103	35.624444	-77.220556

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	75.3	8	0.2

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	25	0	75	0	0

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	28.7
Dissolved Oxygen (mg/L)	5.6
Specific Conductance (µS/cm)	149
pH (s.u.)	8.8

Water Clarity	clear
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	13
Bottom Substrate (15)	7
Pool Variety (10)	0
Riffle Habitat (16)	0
Bank Erosion (7)	2
Bank Vegetation (7)	9
Light Penetration (10)	4
Left Riparian Score (5)	0
Right Riparian Score (5)	2
Total Habitat Score (100)	42

Site Photograph



Substrate	Sand, silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/27/12	11387	Full Scale	63	9	6.48	5.33	Good-Fair
06/25/07	10221	Full Scale	82	17	6.72	5.94	Good-Fair
08/07/02	8920	Full Scale	52	12	6.37	5.14	Good-Fair
08/20/97	7457	Full Scale	67	13	6.67	5.60	Fair
07/21/92	5908	EPT	10	10	5.46	5.46	Fair

Data Analysis

Since the 1992 and 1997 samples, the benthic macroinvertebrate data suggest that conditions have improved at this location and have been relatively consistent since 1997. Indeed, the last three collections have resulted in Good-Fair bioclassifications. Over this same period, specific conductance has been equally consistent at 122 µS/cm (2002), 149 µS/cm (2007) and 145 µS/cm (2012). However, the 2012 sample resulted in the fewest number of EPT ever collected at this site. While evaluating the decline in the EPT metric alone may suggest a nascent decline in water quality, the BI and EPTBI were well within the range for these metrics since 2002 and therefore do not strongly suggest a decline in water quality. Additional monitoring is strongly recommended at this site.

BENTHIC MACROINVERTEBRATE SAMPLE

Analyst: Victor Holland

Waterbody	Location	Station ID	Date	Bioclassification
HARDEE CR	NC 33	OB112	02/27/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
PITT	5	03020103	35.594722	-77.323056

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	9.2	8	0.5

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	40	40	0	0	10

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	----	----

Water Quality Parameters

Temperature (°C)	10.0
Dissolved Oxygen (mg/L)	12.0
Specific Conductance (µS/cm)	120
pH (s.u.)	5.9

Water Clarity	tannin stained
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Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	14
Bottom Substrate (15)	13
Pool Variety (10)	8
Riffle Habitat (16)	0
Bank Erosion (7)	6
Bank Vegetation (7)	6
Light Penetration (10)	9
Left Riparian Score (5)	4
Right Riparian Score (5)	5
Total Habitat Score (100)	80

Site Photograph



Substrate	Mostly gravel, sand, silt, and detritus
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/27/12	11325	Swamp	46	7	6.58	5.38	Moderate
02/14/07	10128	Swamp	59	8	6.25	5.25	Natural
02/19/02	8688	Swamp	59	7	6.38	4.98	Natural

Data Analysis

The bioclassification dropped to Moderate in 2012 due to the total taxa richness decrease from 59 in 2002 and 2007 to 46 in 2012. EPT taxa richness remained similar throughout all three years of sampling this swamp. In addition, the EPT abundance dropped from 64 in 2007 to 45 in 2012 more closely resembling the abundance (49) observed in 2002. The NCBI and EPTBI remained close, though both were slightly higher in 2012 suggesting a more tolerant benthic fauna. The specific conductance has remained similar from 143 µS/cm in 2002 to 120 µS/cm in 2012. Increased precipitation following the recent extended drought conditions in this mostly suburban catchment could be leading to more runoff and nonpoint source pollution inputs to this swamp.

BENTHIC MACROINVERTEBRATE SAMPLE

Analyst: Victor Holland

Waterbody	Location	Station ID	Date	Bioclassification
WHICHARD BR	SR 1521	OB120	02/28/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
PITT	5	03020103	35.700556	-77.342778

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	4.3	6	0.2

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	60	20	20	0	

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
none	----	----

Water Quality Parameters

Temperature (°C)	10.4
Dissolved Oxygen (mg/L)	9.4
Specific Conductance (µS/cm)	146
pH (s.u.)	5.7

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	10
Bottom Substrate (15)	7
Pool Variety (10)	4
Riffle Habitat (16)	0
Bank Erosion (7)	2
Bank Vegetation (7)	5
Light Penetration (10)	10
Left Riparian Score (5)	4
Right Riparian Score (5)	2
Total Habitat Score (100)	49

Site Photograph



Substrate	Mostly sand with some gravel, silt, and detritus present
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/28/12	11326	Swamp	60	8	6.88	5.51	Moderate
02/13/07	10126	Swamp	61	11	6.56	5.61	Moderate
02/12/02	8675	Swamp	45	6	7.13	5.94	Moderate
02/08/01	8392	Full Scale	41	7	6.83	5.75	Not Rated

Data Analysis

Surrounding visible land use is mostly forest with some residential and agricultural areas. Relative to the 2012 collection, the 2007 benthic macroinvertebrate sample suggested slight water quality improvements. EPT richness (11) was highest and the NCBI (6.56) was lowest in 2007 compared to 2012 (EPTS = 8 and NCBI = 6.88) and 2001-2002. This was most likely due to drought conditions leading to a lack of nonpoint source inputs that year. Water quality parameters appear to be returning to conditions observed in 2001 and 2002, however; conductivity was the lowest (146 µS/cm) in 2012 compared to all previous samples collected. The two winter stoneflies, *Taeniopteryx spp.* and *Isoperla spp.* and the mayfly, *Acerpenna pygmaea* were collected in 2007 but absent in 2012.

BENTHIC MACROINVERTEBRATE SAMPLE

Analyst: Victor Holland

Waterbody	Location	Station ID	Date	Bioclassification
HORSEPEN SWP	SR 1001	OB122	02/28/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
BEAUFORT	6	03020103	35.676389	-77.159444

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	10.0	6	0.2

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	100	0	0	0	

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	----	----

Water Quality Parameters

Temperature (°C)	11.1
Dissolved Oxygen (mg/L)	9.2
Specific Conductance (µS/cm)	66
pH (s.u.)	5.9

Water Clarity

clear/tannic

Site Photograph



Habitat Assessment Scores (max)

Channel Modification (5)	10
Instream Habitat (20)	15
Bottom Substrate (15)	7
Pool Variety (10)	10
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	5
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	77

Substrate

Mostly sand, silt, and coarse particulate organic matter

Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/28/12	11327	Swamp	30	2	6.43	4.00	Moderate
02/13/07	10152	Swamp	58	7	6.57	6.11	Moderate
02/26/02	8681	Swamp	27	4	6.54	5.46	Moderate

Data Analysis

Landuse upstream from SR 1001 is a mix of forest and agricultural lands. Horesepen Creek received a bioclassification of Moderate for the third basinwide cycle since 2002. Despite some variability in the total taxa and EPT taxa richness during each cycle, it does appear that overall there is little change in water quality at this sampling station. Further support for this includes little variability in the NCBI (average NCBI = $6.5 \pm .07$), specific conductance (66 µS/cm in 2012, 76 µS/cm in 2007, and 94 µS/cm in 2002), dissolved oxygen (8 mg/L in 2002, 9.3 mg/L in 2007, and 9.2 mg/L in 2012), and the pH (6.0 in 2002, 5.7 in 2007, and 5.9 in 2012). Note the lower pH and presence of five mayfly taxa in 2007 could indicate a reduction in higher pH agricultural runoff associated with drought conditions during that time. No mayfly taxa were collected from this site in 2002 or in 2012.

BENTHIC MACROINVERTEBRATE SAMPLE

Analyst: Victor Holland

Waterbody	Location	Station ID	Date	Bioclassification
LATHAM CR	SR 1410	OB123	02/28/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
BEAUFORT	6	03020103	35.655000	-77.094722

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	6.4	4-5, Braided	0.2

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	100	0	0	0	

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	----	----

Water Quality Parameters

Temperature (°C)	13.2
Dissolved Oxygen (mg/L)	6.1
Specific Conductance (µS/cm)	74
pH (s.u.)	5.5

Water Clarity

tannin stained

Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	15
Bottom Substrate (15)	7
Pool Variety (10)	10
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	7
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	84

Site Photograph



Substrate

Mostly detritus, silt, and sand

Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/28/12	11328	Swamp	38	5	7.17	4.96	Moderate
02/12/07	10151	Swamp	59	10	6.31	6.25	Natural
02/26/02	8682	Swamp	48	7	6.52	6.42	Natural

Data Analysis

The lowest total taxa and EPT richness and highest NCBI was observed in this reach since benthic sampling began in 2002. However, EPT taxa collected including the mayfly, *Leptophlebia spp.* and the caddisflies, *Ironoquia punctitissima*, *Platycentropus spp.*, *Polycentropus spp.*, and *Ptilostomus spp.* coupled with the lower EPTBI, suggests a mostly facultative to intolerant EPT fauna. Six mayfly taxa were observed in 2007 and only one in 2012. Only 13 midge taxa were collected in 2012 compared to in 2007. Despite the mostly forested visible landuse upstream, there are agricultural lands within this catchment. Most of the midges that were common or abundant in 2012 are tolerant of some nonpoint source pollutants such as *Chironomus spp.*, *Orthocladius oliveri*, and the various *Polypedilum* species. Chironomus larvae were common in 2012 and have been absent in the past at this station. Crustacean richness remains high at the site dominated by *Caecidotea* and *Lirceus spp.* The higher total and EPT richness and lower NCBI observed in 2007 could be attributed to drought conditions limiting nonpoint source pollution inputs associated with less precipitation events. More precipitation events in 2011-2012 likely increased nonpoint source runoff leading to a more tolerant benthic fauna. However, low water levels, flows, and dissolved oxygen (6.1 mg/L) were observed in 2012 at the time of sampling and this could limit some preferred habitats and conditions for macroinvertebrates in this swamp.

BENTHIC MACROINVERTEBRATE SAMPLE

Analyst: Victor Holland

Waterbody	Location	Station ID	Date	Bioclassification
TRANTERS CR	SR 1552	OB126	02/29/12	Moderate

County	Subbasin	8 digit HUC	Latitude	Longitude
EDGEcombe	6	03020103	35.727778	-77.175000

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Mid-Atlantic Flatwoods	109.0	25	0.5

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	100	0	0	0	

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	----	----

Water Quality Parameters

Temperature (°C)	10.8
Dissolved Oxygen (mg/L)	---
Specific Conductance (µS/cm)	123
pH (s.u.)	5.9

Water Clarity

tannin stained

Site Photograph



Habitat Assessment Scores (max)

Channel Modification (5)	15
Instream Habitat (20)	15
Bottom Substrate (15)	7
Pool Variety (10)	10
Riffle Habitat (16)	0
Bank Erosion (7)	10
Bank Vegetation (7)	7
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	84

Substrate

Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
02/29/12	11329	Swamp	36	2	7.38	3.10	Moderate
02/13/07	10124	Swamp	60	6	7.13	6.34	Moderate
02/12/02	8676	Swamp	40	3	7.40	8.65	Moderate

Data Analysis

This swamp station continues to receive a Moderate bioclassification based on benthic macroinvertebrates. However, the total taxa richness and EPT richness were reduced by near half from 2007 to 2012. The caddisflies, *Platycentropus spp.* and *Polycentropus spp.* were the only EPT taxa collected in 2012. In addition to sweep net and log wash sampling, few invertebrate taxa were observed by all field staff throughout this sampling reach during visual investigations. EPT taxa abundant or common in 2007 and absent in 2012 included, the mayfly *Caenis spp.*, the winter stonefly, *Taeniopteryx spp.*, and the caddisfly *Ceraclea resurgens*. *Chironomus spp.* were extremely abundant in 2012 and were absent during the two previous sampling cycles. This genera and other tolerant midge taxa such as *Polypedilum spp.* and *Kiefferulus spp.* were common and are typically indicators of organic pollution or low dissolved oxygen conditions in the stream. A mentum deformity analysis is conducted when at least 20 *Chironomus spp.* are collected from a sampling reach to assess organic loading or potential sediment toxicity. Thirty *Chironomus* larvae were present in the sample. Two taxonomists analyzed the larvae to assess mentum deformity rates and severity. This analysis resulted in a average toxic score of 46 with a 24% deformity rate. Some natural organic loading is expected in swamp streams, however, this deformity rate and toxic score exceed rates and scores typical of deformities due solely to natural loading. Further benthic and toxicity analyses are recommended at this Tranters Creek station to investigate any new point or nonpoint pollution sources upstream.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
FISHING CR	SR 1609	OB179	06/25/12	Fair

County	Subbasin	8 digit HUC	Latitude	Longitude
Warren	0	03020102	36.338950	-78.129117

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Northern Outer Piedmont	75.8	6	0.4

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	100	0	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
Town of Warrenton WWTP	NC0020834	2.0

Water Quality Parameters

Temperature (°C)	22.5
Dissolved Oxygen (mg/L)	4.5
Specific Conductance (µS/cm)	159
pH (s.u.)	6.0

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	15
Bottom Substrate (15)	3
Pool Variety (10)	8
Riffle Habitat (16)	7
Bank Erosion (7)	6
Bank Vegetation (7)	7
Light Penetration (10)	10
Left Riparian Score (5)	5
Right Riparian Score (5)	5
Total Habitat Score (100)	71

Site Photograph



Substrate	Sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/25/12	11381	EPT	13	13	5.77	5.77	Fair

Data Analysis

This new location on Fishing Creek replaces the historic basinsite at SR 1600 (Station ID OB100). The SR 1600 location had significant beaver impacts in 2012 and therefore the site was moved. The new location on SR 1609 is approximately 2.7 miles downstream from the historic site. Although this location is further downstream of the Warrenton WWTP than the station on SR 1600, the conductivity was higher here in 2012 (159 µS/cm) than at the SR 1600 station in 2007 (116 µS/cm). In addition, the dissolved oxygen at this location was very low (4.5 mg/l) compared to 7.1 mg/l at SR 1600 in 2007. The 2012 sample produced a Fair bioclassification which was a decline from Good-Fair in 2007 (which was a decline from Good in 1997). Habitat differences between the SR 1609 and the SR 1600 location were not an issue as the score (71) was slightly improved here relative to the habitat score (66) observed at SR 1600. Based on the available data, physical and chemical conditions in this segment of Fishing Creek appear to have declined since 2007. This was either the result of worsening discharge conditions at the Warrenton WWTP, worsening conditions in the watershed as a whole, or from some unknown source of impact associated with Possum Quarter Creek. The Possum Quarter Creek confluence is upstream of this location but was downstream of the historic location on SR 1600. Additional monitoring in this watershed is warranted.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
TAR R	SR 1139	OB180	06/26/12	Fair

County	Subbasin	8 digit HUC	Latitude	Longitude
Granville	1	03020101	36.274360	-78.692060

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Northern Outer Piedmont	86.5	10	0.3

Visible Landuse (%)	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
	90	10	0	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
None	N/A	N/A

Water Quality Parameters

Temperature (°C)	22.1
Dissolved Oxygen (mg/L)	4.1
Specific Conductance (µS/cm)	94
pH (s.u.)	6.4

Water Clarity	slightly turbid
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	16
Bottom Substrate (15)	11
Pool Variety (10)	10
Riffle Habitat (16)	4
Bank Erosion (7)	5
Bank Vegetation (7)	5
Light Penetration (10)	7
Left Riparian Score (5)	4
Right Riparian Score (5)	4
Total Habitat Score (100)	71

Site Photograph



Substrate	Boulder, cobble, gravel, sand and silt.
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/26/12	11366	EPT	12	12	5.04	5.04	Fair

Data Analysis

This site replaces the Tar River SR 1150 (Station ID OB25) historic basinsite location. In 2012, significant bridge construction was ongoing at SR 1150 and therefore the site was moved due to access problems. The SR 1139 location is approximately 1.7 miles downstream of the SR 1150 station. The 2012 collection at SR 1139 resulted in a Fair bioclassification which was a decline from two samples at SR 1150 in 2007 (both Good-Fair) and one sample in 1997 (Good-Fair). However, the 1992 sample at SR 1150 was also Fair. Taxa absent from the 2012 Fair collection but typically present at the 2007 and 1997 Good-Fair collections include the edge dwelling caddisflies *Trienodes ignitus*, *Nectopsyche exquisita*, and *Oecetis persimilis*. These data suggest that the decline in bioclassification seen in 2012 was most likely the result of a reduction in edge habitat from previous years. However, the dissolved oxygen in 2012 was low (4.1 mg/l) and the conductivity was somewhat elevated (94.2 µS/cm). Therefore, unfavorable physical and chemical conditions cannot be ruled out as a possible factor influencing the decline in the benthic macroinvertebrate community from previous samples. Additional monitoring in this watershed is recommended.

BENTHIC MACROINVERTEBRATE SAMPLE

Waterbody	Location	Station ID	Date	Bioclassification
TAR R	SR 1611	OB185	06/27/12	Good

County	Subbasin	8 digit HUC	Latitude	Longitude
Franklin	0	03020101	35.941010	-78.202980

Level IV Ecoregion	Drainage Area (mi2)	Stream Width (m)	Stream Depth (m)
Northern Outer Piedmont	633.1	25	0.4

	Forested/Wetland	Residential	Agriculture	Road	Other (describe)
Visible Landuse (%)	80	10	10	0	

Upstream NPDES Dischargers (>=1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
Oxford WWTP	NC0025054	3.5
Franklin County WWTP	NC0069311	3.0
Louisburg WWTP	NC0020231	1.37

Water Quality Parameters

Temperature (°C)	25.5
Dissolved Oxygen (mg/L)	7.0
Specific Conductance (µS/cm)	142
pH (s.u.)	6.3

Water Clarity	clear
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Habitat Assessment Scores (max)

Channel Modification (5)	5
Instream Habitat (20)	15
Bottom Substrate (15)	3
Pool Variety (10)	10
Riffle Habitat (16)	10
Bank Erosion (7)	3
Bank Vegetation (7)	5
Light Penetration (10)	2
Left Riparian Score (5)	5
Right Riparian Score (5)	3
Total Habitat Score (100)	61

Site Photograph



Substrate	Mostly gravel and sand
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Sample Date	Sample ID	Method	ST	EPT	BI	EPT BI	Bioclassification
06/27/12	11391	Full Scale	77	22	5.44	4.58	Good
06/27/07	10199	Full Scale	68	25	4.70	3.97	Good
07/23/02	8917	Full Scale	68	26	5.11	4.60	Good
08/27/97	7462	Full Scale	73	23	5.05	4.45	Good

Data Analysis

This site on the Tar River is approximately 2.4 stream miles downstream of SR 1609, the sampling site in previous basinwide cycles. The sampling site was temporarily moved to SR 1611 due to insufficient habitat caused by low flow conditions at SR 1609. The benthic community has changed somewhat from previous years. Stoneflies, particularly *Acroneturia* and *Pteronarcys*, are completely absent for the first time since this basinwide site was sampled. Additionally, the addition of multiple genera (5 genera) of Chironomidae never previously recorded from this area as well as the loss of all stonefly species, is reflected in the increase of the Biotic Index. While low flow conditions have negatively affect the benthos, the general decrease in EPT richness over time and the highest ever recorded BI at this site suggest potentially worsening water quality.