

# APPENDIX 1-A

## USE SUPPORT RATINGS FOR ALL MONITORED WATERS IN THE NORTH FORK NEW RIVER WATERSHED

DRAFT 2010 IR CATEGORY	INTEGRATED REPORTING CATEGORIES FOR INDIVIDUAL ASSESSMENT UNIT/USE SUPPORT CATEGORY/ PARAMETER ASSESSMENTS. A SINGLE AU CAN HAVE MULTIPLE ASSESSMENTS DEPENDING ON DATA AVAILABLE AND CLASSIFIED USES.
1	All designated uses are monitored and supporting
1b	Designated use was impaired, other management strategy in place and no standards violations for the parameter of interest (POI)
1nc	DWQ have made field determination that parameter in exceedance is due to natural conditions
1r	Assessed as supporting watershed is in restoration effort status
1t	No criteria exceeded but approved TMDL for parameter of interest
2	Some designated uses are monitored and supporting none are impaired Overall only
2b	Designated use was impaired other management strategy in place and no standards violations Overall only
2r	Assessed as supporting watershed is in restoration effort status overall only
2t	No criteria exceeded but approved TMDL for POI Overall only
3a	Instream/monitoring data are inconclusive (DI)
3b	No Data available for assessment
3c	No data or information to make assessment
3n1	Chlorophyll a exceeds TL value and SAC is met-draft
3n2	Chlorophyll a exceeds EL value and SAC is not met first priority for further monitoring-draft
3n3	Chlorophyll a exceeds threshold value and SAC is not met first second priority for further monitoring-draft
3n4	Chlorophyll a not available determine need to collect-draft
3t	No Data available for assessment –AU is in a watershed with an approved TMDL
4b	Designated use impaired other management strategy expected to address impairment
4c	Designated use impaired by something other than pollutant
4cr	Recreation use impaired no instream monitoring data or screening criteria exceeded
4cs	Shellfish harvesting impaired no instream monitoring data- no longer used
4ct	Designated use impaired but water is subject to approved TMDL or under TMDL development
4s	Impaired Aquatic Life with approved TMDL for Aquatic Life POI or category 5 listing
4t	Designated use impaired approved TMDL
5	Designated use impaired because of biological or ambient water quality standards violations and needing a TMDL
5r	Assessed as impaired watershed is in restoration effort status

# NC 2010 Integrated Report

All 13,123 Waters in NC are in Category 5-303(d) List for Mercury due to statewide fish consumption advice for several fish species

AU_Number	AU_Name	AU_Description	LengthArea	AU_Units	Classification
Category	Parameter	Reason for Rating	Use Category	Collection Year	303(d)year
<b>New River Basin</b>		<b>North Fork New River Watershed</b>		<b>0505000101</b>	
<b>New River Basin</b>		<b>Upper New River Subbasin</b>		<b>05050001</b>	
<b>New River Basin</b>		<b>North Fork New River Watershed</b>		<b>0505000101</b>	
⊙ 10-2-21-(4.5)	<b>Big Horse Creek</b>	From SR#1362 to SR#1353 (Tuckerdale)		<b>5.5 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-21-(7)	<b>Big Horse Creek (Horse Creek)</b>	From SR#1353 (Tuckerdale) to North Fork New R		<b>6.5 FW Miles</b>	C:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
1	Ecological/biological Integrity FishCom	Good Bioclassification	Aquatic Life	2008	
⊙ 10-2-14	<b>Big Laurel Creek</b>	From source to North Fork New River		<b>17.5 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
1	Ecological/biological Integrity FishCom	Good Bioclassification	Aquatic Life	2008	
⊙ 10-2-8	<b>Brush Fork</b>	From source to North Fork New River		<b>5.1 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-20	<b>Buffalo Creek</b>	From source to North Fork New River		<b>9.7 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
3a	Ecological/biological Integrity FishCom	Not Rated Bioclassification	Aquatic Life	2008	
⊙ 10-2-27	<b>Helton Creek</b>	From NC-VA State Line to North Fork New River		<b>19.0 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Good Bioclassification	Aquatic Life	2008	
3a	Ecological/biological Integrity FishCom	Not Rated Bioclassification	Aquatic Life	2008	
⊙ 10-2-7	<b>Hoskin Fork</b>	From source to North Fork New River		<b>5.2 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-20-1	<b>Little Buffalo Creek</b>	From source to Buffalo Creek		<b>4.4 FW Miles</b>	C;Tr:+
5	Ecological/biological Integrity Benthos	Fair Bioclassification	Aquatic Life	2008	2000
⊙ 10-2-21-8	<b>Little Horse Creek</b>	From source to Big Horse Creek		<b>10.9 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-23	<b>Little Phoenix Creek</b>	From source to North Fork New River		<b>4.6 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-25	<b>Long Shoals Creek</b>	From source to North Fork New River		<b>2.7 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Not Impaired Bioclassification	Aquatic Life	2008	

# NC 2010 Integrated Report

All 13,123 Waters in NC are in Category 5-303(d) List for Mercury due to statewide fish consumption advice for several fish species

AU_Number	AU_Name	AU_Description	LengthArea	AU_Units	Classification
Category	Parameter	Reason for Rating	Use Category	Collection Year	303(d)year
<b>New River Basin</b>		<b>North Fork New River Watershed</b>			<b>0505000101</b>
⊙ 10-2-21-8-1	<b>Middle Fork Little Horse Creek</b>	From source to Little Horse Creek		<b>4.5 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-28	<b>Millpond Branch</b>	From source to North Fork New River		<b>2.0 FW Miles</b>	C:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2003	
⊙ 10-2-(1)	<b>North Fork New River</b>	From source to Three Top Creek		<b>14.1 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
1	Ecological/biological Integrity FishCom	Good Bioclassification	Aquatic Life	2008	
⊙ 10-2-(12)	<b>North Fork New River</b>	From Three Top Creek to New River		<b>36.5 FW Miles</b>	C:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
1	Fecal Coliform (recreation)	No Criteria Exceeded	Recreation	2008	
1	Water Quality Standards Aquatic Life	No Criteria Exceeded	Aquatic Life	2008	
⊙ 10-2-15	<b>Rich Hill Creek</b>	From source to North Fork New River		<b>4.9 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-10	<b>Roundabout Creek</b>	From source to North Fork New River		<b>4.0 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
⊙ 10-2-13	<b>Three Top Creek</b>	From source to North Fork New River		<b>13.2 FW Miles</b>	C;Tr:+
1	Ecological/biological Integrity Benthos	Good Bioclassification	Aquatic Life	2008	
3a	Ecological/biological Integrity FishCom	Not Rated Bioclassification	Aquatic Life	2008	
<b>New River Basin</b>		<b>South Fork New River Watershed</b>			<b>0505000102</b>
⊙ 10-1-37	<b>Cranberry Creek (Mulberry Creek)</b>	From source to South Fork New River		<b>18.9 FW Miles</b>	B;Tr:+
1	Ecological/biological Integrity Benthos	Excellent Bioclassification	Aquatic Life	2008	
1	Ecological/biological Integrity FishCom	Good Bioclassification	Aquatic Life	2008	
⊙ 10-1-3-(1)	<b>East Fork South Fork New River</b>	From source to Watauga County SR 1524		<b>2.3 FW Miles</b>	WS-IV;Tr:+
5	Ecological/biological Integrity Benthos	Fair Bioclassification	Aquatic Life	2003	2008
⊙ 10-1-3-(8)	<b>East Fork South Fork New River</b>	From .8 mile downstream of Watauga Co SR 1524 to S Fk New River		<b>0.5 FW Miles</b>	WS-IV;CA:+
1	Ecological/biological Integrity Benthos	Good Bioclassification	Aquatic Life	2008	



# APPENDIX 1-B

## BIOLOGICAL (BENTHIC & FISH) SAMPLE SITE DATA SHEETS



STATION ID*	WATERBODY	ASSESSMENT UNIT #	DESCRIPTION	COUNTY	SITE LOCATION	SAMPLE RESULTS
<b>Benthic Sample Sites</b>						
KB117	Ut. L. Phoenix Cr.	10-2-23ut5	Source to L Phoenix Cr.	Ashe	Old NC 16	08 - Not Rated 07 - Not Rated
KB118*	Ut. L. Phoenix Cr.	10-2-23ut6	Source to L Phoenix Cr.	Ashe	SR 1649	07 - Not Impaired
KB119*	Brush Fk.	10-2-8	From source to North Fork New River	Ashe	NC 88	08 - Excellent
KB120*	Roundabout Cr.	10-2-10	From source to North Fork New River	Ashe	SR 1308	08 - Excellent
KB121*	M. Fk. Little Horse Cr.	10-2-21-8-1	From source to Little Horse Cr.	Ashe	SR 1334	08 - Excellent
KB122*	Big Horse Cr.	10-2-21-(4.5)	From SR 1362 to SR 1353 (Tuckerdale)	Ashe	SR 1362	08 - Excellent
KB123*	Long Shoals Cr.	10-2-25	From source to North Fork New River	Ashe	SR 1574	08 - Not Impaired
KB125*	L. Phoenix Cr.	10-2-23	From source to North Fork New River	Ashe	SR 1513	08 - Excellent
KB127*	N. Fk. New R.	10-2-(12)	From Three Top Creek to New River	Ashe	SR 1549	08 - Excellent
KB129*	Ut. Mill Cr.	10-1-18ut4	Source to Mill Cr.	Ashe	SR 1111	07 - Not Impaired
KB134*	Buffalo Cr.	10-2-20	From source to North Fork New River	Ashe	NC 194-88	08 - Excellent
KB135*	N. Fk. New R.	10-2-(12)	From Three Top Creek to New River	Ashe	Old NC 16	08 - Excellent
KB136*	Helton Cr.	10-2-27	From NC-VA State Line to North Fork New River	Ashe	SR 1526	08 - Excellent
KB137*	Helton Cr.	10-2-27	From NC-VA State Line to North Fork New River	Ashe	SR 1370	08 - Excellent
KB138*	Three Top Cr.	10-2-13	From source to North Fork New River	Ashe	SR 1100	09 - Excellent 08 - Good
KB141*	N. Fk. New R.	10-2-(1)	From source to Three Top Creek	Ashe	SR 1118	08 - Excellent
KB23	N. Fk. New R.	10-2-(12)	From Three Top Creek to New River	Ashe	SR 1100	08 - Excellent 03 - Excellent
KB25	Helton Cr.	10-2-27	From NC-VA State Line to North Fork New River	Ashe	SR 1536	08 - Excellent 03 - Excellent
KB26	Hoskin Fk.	10-2-7	From source to North Fork New River	Ashe	NC 88	08 - Excellent 03 - Excellent
KB27	N. Fk. New R.	10-2-(12)	From Three Top Creek to New River	Ashe	SR 1644	08 - Excellent 03 - Excellent
KB30	Big Laurel Cr.	10-2-14	From source to North Fork New River	Ashe	NC 88	08 - Excellent 03 - Excellent
KB31	Buffalo Cr.	10-2-20	From source to North Fork New River	Ashe	NC 194-88	08 - Excellent 03 - Excellent
KB32	L. Buffalo Cr.	10-2-20-1	From source to Buffalo Creek	Ashe	SR 1153	08 - Fair 03 - Poor
KB33	Big Horse Cr. (Horse Cr.)	10-2-21-(7)	From SR#1353 (Tuckerdale) to North Fork New R	Ashe	NC 194	08 - Excellent 03 - Excellent
KB63	L. Horse Cr.	10-2-21-8	From source to Big Horse Creek	Ashe	SR 1334	08 - Excellent 03 - Good
KB86*	Rich Hill Cr.	10-2-15	From source to North Fork New River	Ashe	NC 88	08 - Excellent
<b>Fish Community Sample Sites</b>						
KF21*	Buffalo Cr.	10-2-20	From source to North Fork New River	Ashe	NC 88/194	08 - Not Rated
KF2	Cranberry Cr.	10-1-37	From source to South Fork New River	Ashe	SR 1600	08 - Good 98 - Excellent
KF16*	Grassy Cr.	10-3	From North Carolina-Virginia State	Ashe	SR 1549	08 - Good-Fair
KF1	Big Horse Cr.	10-2-21-(7)	From SR#1353 (Tuckerdale) to North Fork New R	Ashe	SR 1350	08 - Good 98 - Good

\* New station location; therefore, no data from the previous cycle.

STATION ID*	WATERBODY	ASSESSMENT UNIT #	DESCRIPTION	COUNTY	SITE LOCATION	SAMPLE RESULTS
KF22*	Big Laurel Cr.	10-2-14	From source to North Fork New River	Ashe	NC 88	08 - Good
KF5	Helton Cr.	10-2-27	From NC-VA State Line to North Fork New River	Ashe	SR 1536	08 - Not Rated 98 - Good
KF10	N. Fk. New R.	10-2-(1)	From source to Three Top Creek	Ashe	SR 1119	08 - Good 98 - Good
KF23*	Three Top Cr.	10-2-13	From source to North Fork New River	Ashe	SR 1123	08 - Not Rated

\* New station location; therefore, no data from the previous cycle.



**FISH COMMUNITY SAMPLE**

Waterbody	Location	Date	Station ID	Bioclassification
N FK NEW R	SR 1119	05/21/08	KF10	Good

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.407098	-81.681014	10-2-(1)	Southern Crystalline Ridges & Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Average Depth (m)	Reference Site
C;Tr,+	23.9	3118	9	0.5	No

Visible Landuse (%)	Forested/Wetland	Rural Residential	Agriculture	Other (describe)
	60	5	35	0

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

**Water Quality Parameters**

Temperature (°C)	11.2
Dissolved Oxygen (mg/L)	10.2
Specific Conductance (µS/cm)	59
pH (s.u.)	6.5

Water Clarity	Clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	18
Bottom Substrate (15)	8
Pool Variety (10)	4
Riffle Habitat (16)	16
Left Bank Stability (7)	4
Right Bank Stability (7)	4
Light Penetration (10)	4
Left Riparian Score (5)	5
Right Riparian Score (5)	3
<b>Total Habitat Score (100)</b>	<b>71</b>

**Site Photograph**



Substrate	cobble, gravel, sand, boulder.
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Sample Date	Sample ID	Species Total	NCIBI	Bioclassification
05/21/08	2008-46	15	48	Good
06/29/98	98-56	14	50	Good

Most Abundant Species	Western Blacknose Dace.	Exotic Species	Brown Trout.
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Species Change Since Last Cycle	Gains -- Bluehead Chub, Bigmouth Chub. Losses -- Rosyface Shiner.
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**Data Analysis**

**Watershed** -- located along the rural west-central edge of the New River basin where Watauga and Ashe Counties meet; this catchment drains the North Fork New River's headwaters plus the main tributaries of Pine Mountain Branch, Brush Fork, and Hoskin Fork. **Habitats** -- primarily riffles and runs with some chutes that were holding trout, and a few silt bottom pools; the reach is mostly sunlit because of the vegetation type along the banks and in the riparian corridor (majority of shrubs and grasses vs. trees); substrates exhibited moderate to high embeddedness. **2008** -- a diverse and abundant population of cool and cold water fish species were present, including three intolerant taxa (New River Shiner, Tonguetied Minnow, and Kanawha Darter); more than twice the total abundance was collected than in 1998 (1368 vs. 552); Western Blacknose Dace (n=553) represented 40% of the sample. **1998-2008** -- very similar species compositions were observed and nearly identical NCIBI metrics were calculated for both monitoring years, indicating that water quality in this headwater catchment has remained good over a ten year period.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
N FK NEW R	SR 1100	KB23	07/31/08	Excellent

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.430000	-81.620833	10-2-(12)	Southern Crystalline Ridges and Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C:+	62	2845	13	0.3

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

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

**Water Quality Parameters**

Temperature (°C)	20.3
Dissolved Oxygen (mg/L)	7.6
Specific Conductance (µS/cm)	61
pH (s.u.)	6.5

Water Clarity	clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	18
Bottom Substrate (15)	12
Pool Variety (10)	5
Riffle Habitat (16)	15
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	7
Left Riparian Score (5)	3
Right Riparian Score (5)	2
<b>Total Habitat Score (100)</b>	<b>81</b>

**Site Photograph**



Substrate	mix of boulder, cobble, gravel
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
07/31/08	10517	119	57	3.67	2.73	Excellent
08/19/03	9222	81	44	3.96	3.51	Excellent
08/17/98	7710	96	52	4.05	3.23	Excellent
07/29/93	6296	102	50	3.95	3.01	Excellent

**Taxonomic Analysis**

The greatest number of EPT taxa collected at the site occurred in 2008. A few EPT taxa were collected for the first time, including: *Acroneuria carolinensis*, *Hydroptila*, and *Nectopsyche exquisita*.

**Data Analysis**

The site is 8.2 miles west of Jefferson. This is the site furthest upstream of the three basinwide sites on North Fork New River. The site has consistently received classifications of Excellent following each summer sampling event (a Good was received after a non-summer sampling event in March 1989). No indications of impact are exhibited by the benthic community.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
N FK NEW R	SR 1644	KB27	08/20/08	Excellent

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.485556	-81.493889	10-2-(12)	New River Plateau

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C:+	144	2630	18	0.3

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

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
United Chemi-Con, Inc.	NC0000019	1.018

**Water Quality Parameters**

Temperature (°C)	24.1
Dissolved Oxygen (mg/L)	8.4
Specific Conductance (µS/cm)	80
pH (s.u.)	8.0

Water Clarity	clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	4
Instream Habitat (20)	12
Bottom Substrate (15)	12
Pool Variety (10)	4
Riffle Habitat (16)	15
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	2
Left Riparian Score (5)	2
Right Riparian Score (5)	0
<b>Total Habitat Score (100)</b>	<b>65</b>

**Site Photograph**



Substrate	mix of cobble, gravel, sand; some boulder, silt
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
08/20/08	10541	99	49	3.93	3.31	Excellent
08/21/03	9234	72	45	3.66	3.31	Excellent
08/19/98	7719	87	50	3.77	2.91	Excellent
07/28/93	6294	93	46	4.00	2.94	Excellent

**Taxonomic Analysis**

EPT Richness at the site has shown very little change for the four summer sampling events between 1993 and 2008. *Helicopsyche paralimnella* has been recorded for the first time from the site; this is only one of five sites in the state so far at which the species has been found by BAU, though undoubtedly more sites will be found.

**Data Analysis**

The site is 4.6 miles NNW of Jefferson and is directly upstream of the mouth of Big Horse Creek. The town of West Jefferson is almost entirely included in the catchment above the site.

Consistently high EPT Richness and low NCBI values have resulted in classifications of Excellent for each sampling event between 1993 and 2008. The healthy benthic community indicates an absence of stressors at the site.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
N FK NEW R	OLD NC 16	KB135	08/20/08	Excellent

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.503889	-81.390278	10-2-(12)	New River Plateau

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C:+	277	2525	33	0.3

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

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
United Chemi-Con, Inc.	NC0000019	1.018

**Water Quality Parameters**

Temperature (°C)	22.2
Dissolved Oxygen (mg/L)	8.4
Specific Conductance (µS/cm)	73
pH (s.u.)	7.4

Water Clarity	clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	18
Bottom Substrate (15)	10
Pool Variety (10)	5
Riffle Habitat (16)	5
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	1
Left Riparian Score (5)	5
Right Riparian Score (5)	2
<b>Total Habitat Score (100)</b>	<b>65</b>

**Site Photograph**



<b>Substrate</b>	primarily cobble and gravel; some sand, silt, boulder
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
08/20/08	10539	108	55	4.08	3.07	Excellent

**Taxonomic Analysis**

There is little difference between this new basinwide site and the former upstream basinwide site in terms of richness within the major groups; the number of taxa collected within each group at the new site is within the range of taxa collected at the upstream site with the exception of Lepidoptera (one taxon collected at this site; never collected at the former site) and Oligochaeta (only lumbriculids collected at this site in 2008; at least two taxa collected upstream). However, there were a few EPT taxa collected at Old NC 16 that have not been collected at NC 16 over eight sampling events, including (all rare within the sample except as noted): *Acerpenna pygmaea*, *Heterocloeon anoka* (common), *Anthopotamus distinctus*, *Agnatina*, *Hydroptila*, and *Pycnopsyche lepida* group.

**Data Analysis**

The site is 7.4 miles northeast of Jefferson and six stream-miles above the confluence with South Fork New River. This is the furthest downstream site of the three basinwide sites on North Fork New River. The town of West Jefferson is almost entirely included in the catchment above the site. This site replaces the basinwide site at NC 16, which is about two stream-miles upstream of this site, due to difficult access to the river at NC 16.

The four summer sampling events in 1989, 1993, 1998, and 2003 resulted in classifications of Excellent at the former basinwide site. There appears to be little difference in water quality either temporally or longitudinally between sampling events on this lower segment of North Fork New River.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
HOSKIN FK	OFF NC 88 BELOW WILSON BR	KB26	07/31/08	Excellent

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.390480	-81.702190	10-2-7	Southern Crystalline Ridges and Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C;Tr:+	6.7	3125	3	0.3

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

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

**Water Quality Parameters**

Temperature (°C)	17.9
Dissolved Oxygen (mg/L)	8.1
Specific Conductance (µS/cm)	85
pH (s.u.)	7.0

Water Clarity	clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	4
Instream Habitat (20)	19
Bottom Substrate (15)	12
Pool Variety (10)	4
Riffle Habitat (16)	16
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	2
Left Riparian Score (5)	2
Right Riparian Score (5)	2
<b>Total Habitat Score (100)</b>	<b>75</b>

**Site Photograph**



Substrate	mix of cobbole, gravel, boulder; some sand
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
07/31/08	10514	---	38	---	3.18	Excellent
08/19/03	9221	---	37	---	2.92	Excellent
08/17/98	7709	---	35	---	3.59	Good
07/23/93	6299	---	30	---	3.56	Good

**Taxonomic Analysis**

The number of EPT taxa identified from the site has increased with each successive sampling event since 1993. A few taxa were collected for the first time at the site, including: *Ephemera subvaria*, *Serratella deficiens*, *Hexagenia*, *Acroneuria carolinensis*, and *Leucotrichia pictipes*.

**Data Analysis**

The site is about 1.5 miles east of the closest point on the Tennessee Valley Divide and 0.8 stream-miles from the confluence with North Fork New River.

Increasing EPT richness with each successive sampling event since 1993 is suggestive of improving water quality at the site.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
THREE TOP CR	OFF SR 1100 BELOW LONG HOPE CR	KB138	08/21/08	Good

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.410710	-81.619600	10-2-13	Amphibolite Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C;Tr:+	22	2915	8	0.4

Visible Landuse (%)	Forested/Wetland	Urban	Agriculture	Other (describe)
	90	0	0	10 (road)

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

**Water Quality Parameters**

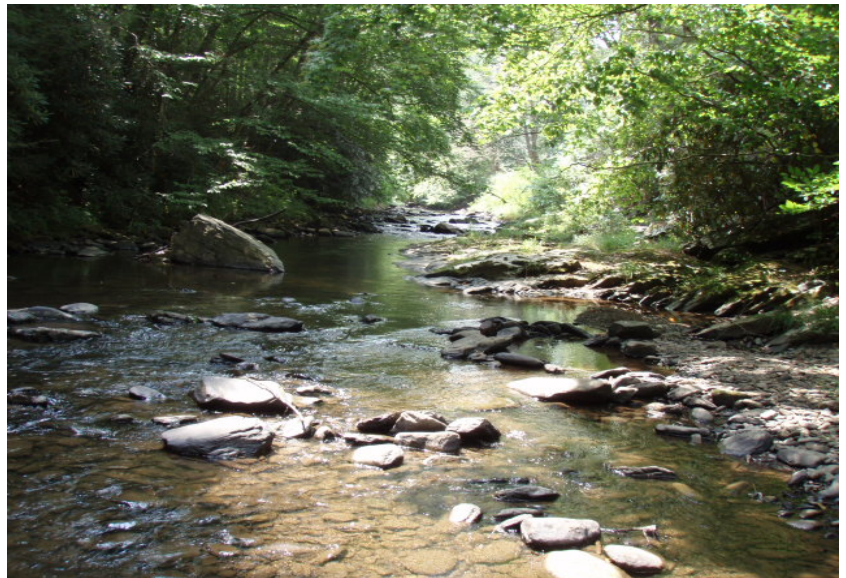
Temperature (°C)	18.8
Dissolved Oxygen (mg/L)	8.2
Specific Conductance (µS/cm)	48
pH (s.u.)	---

Water Clarity	clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	16
Bottom Substrate (15)	12
Pool Variety (10)	10
Riffle Habitat (16)	15
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	2
<b>Total Habitat Score (100)</b>	<b>86</b>

**Site Photograph**



<b>Substrate</b>	mostly cobble and boulder; some gravel, bedrock, sand, silt
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
08/21/08	10545	---	35	---	2.60	Good

**Taxonomic Analysis**

A fairly diverse EPT community exists at the site. There are no historical data for the site, so trends in community composition can not be analyzed. A few taxa were collected here that have not been collected at the former basinwide site downstream, including: *Proclleon*, *Maccaffertium pudicum*, *Diplectrona modestum*, *Ceraclea*, and *Chimarra*.

**Data Analysis**

The site is 8.1 miles west of Jefferson. This new basinwide site is 1.3 stream-miles upstream of the former site at SR 1100. The site was moved to remove the influence of development directly upstream of the old basinwide site, and to locate it in the Amphibolite Mountains ecoregion so that a potential reference site for the ecoregion could be established.

The same number of EPT taxa were recorded for this site in 2008 as were for the former site in 2003. In both cases the additional of a single EPT taxon would have resulted in a classification of Excellent.

**FISH COMMUNITY SAMPLE**

Waterbody	Location	Date	Station ID	Bioclassification
THREE TOP CR	SR 1123	05/20/08	KF23	Not Rated

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.420699	-81.621819	10-2-13	Amphibolite Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Average Depth (m)	Reference Site
C;Tr	23.1	2900	10	0.4	Yes

Visible Landuse (%)	Forested/Wetland	Rural Residential	Agriculture	Other (describe)
	65	15	5	15 (lumber mill)

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

**Water Quality Parameters**

Temperature (°C)	14.4
Dissolved Oxygen (mg/L)	9.5
Specific Conductance (µS/cm)	38
pH (s.u.)	6.4

Water Clarity	Clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	20
Bottom Substrate (15)	12
Pool Variety (10)	6
Riffle Habitat (16)	16
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	7
Left Riparian Score (5)	3
Right Riparian Score (5)	2
<b>Total Habitat Score (100)</b>	<b>85</b>

**Site Photograph**



Substrate	flat cobble, boulder, bedrock, gravel, sand.
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Sample Date	Sample ID	Species Total	NCIBI	Bioclassification
05/20/08	2008-45	15	--	Not Rated

Most Abundant Species	Fantail Darter.	Exotic Species	Rock Bass, Brown Trout.
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Species Change Since Last Cycle	N/A
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**Data Analysis**

New basinwide site. **Watershed** -- a tributary to the North Fork New River that flows north, draining part of west-central Ashe County. **Habitats** -- high quality instream habitats consisting of riffles and runs with deep chutes that were holding trout, and some small side pools; roads on both sides of the stream prevent broad riparian widths, but the stream's banks were very stable, with some Mountain Laurel on the right bank; the tree canopy provides about 50% shading to the stream. **2008** -- a diverse assemblage of cool and cold water fish fauna were collected from the stream, including four species that are considered to be intolerant to pollution (Rock Bass, Tonguetied Minnow, Kanawha Darter, and Appalachia Darter); Fantail Darters represented 36% of the sample and Mottled Sculpin comprised 29%; overall, the fish community of Three Top Creek appears to be healthy, and suggests no obvious water quality issues.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
<b>BIG LAUREL CR</b>	<b>NC 88</b>	<b>KB30</b>	<b>06/19/08</b>	<b>Excellent</b>

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.443056	-81.613611	10-2-14	Southern Crystalline Ridges and Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C;Tr:+	29	2805	8	0.4

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

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

**Water Quality Parameters**

Temperature (°C)	14.1
Dissolved Oxygen (mg/L)	9.3
Specific Conductance (µS/cm)	42
pH (s.u.)	7.1

Water Clarity slightly turbid

**Habitat Assessment Scores (max)**

Channel Modification (5)	4
Instream Habitat (20)	15
Bottom Substrate (15)	13
Pool Variety (10)	4
Riffle Habitat (16)	14
Left Bank Stability (7)	6
Right Bank Stability (7)	6
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	2
<b>Total Habitat Score (100)</b>	<b>76</b>

**Site Photograph**



Substrate mix of cobble, gravel, sand; some boulder, silt

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
06/19/08	10468	---	53	---	2.62	Excellent
08/19/03	9225	---	38	---	2.92	Excellent
07/17/98	7712	---	40	---	3.49	Excellent
07/29/93	6298	---	48	---	3.29	Excellent

**Taxonomic Analysis**

The greatest number of EPT taxa collected from the site occurred in 2008. Taxa collected for the first time included: *Eurylophella verisimilis*, *Ephemera*, *Anthopotamus distinctus*, *Brachycentrus appalachia*, *Ceratopsyche slossonae*, *Oecetis persimilis*, and *Triaenodes ignitus*.

**Data Analysis**

The site is near the confluence with North Fork New River and about eight miles west of Jefferson.

The highest EPT richness and the lowest EPT BI values were recorded for the site in 2008. Each time the site has been sampled it has received a classification of Excellent. The benthic community does not exhibit signs of impact.

NEW RIVER BASIN: NORTH FORK NEW RIVER WATERSHED (HUC 0505000101)

APPENDICES



**FISH COMMUNITY SAMPLE**

Waterbody	Location	Date	Station ID	Bioclassification
<b>BIG LAUREL CR</b>	<b>NC 88</b>	<b>05/20/08</b>	<b>KF 22</b>	<b>Good</b>

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.443095	-81.613795	10-2-14	Southern Crystalline Ridges & Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Average Depth (m)	Reference Site
C;Tr	29	2835	10	0.8	Yes

Visible Landuse (%)	Forested/Wetland	Rural Residential	Agriculture	Other (describe)
	85	10	5	0

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

**Water Quality Parameters**

Temperature (°C)	13.8
Dissolved Oxygen (mg/L)	9.9
Specific Conductance (µS/cm)	42
pH (s.u.)	6.4

Water Clarity	Turbid
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**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	16
Bottom Substrate (15)	8
Pool Variety (10)	8
Riffle Habitat (16)	10
Left Bank Stability (7)	5
Right Bank Stability (7)	5
Light Penetration (10)	5
Left Riparian Score (5)	5
Right Riparian Score (5)	4
<b>Total Habitat Score (100)</b>	<b>71</b>

**Site Photograph**



Substrate	sand, gravel, cobble, boulder.
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Sample Date	Sample ID	Species Total	NCIBI	Bioclassification
05/20/08	2008-44	19	52	Good

Most Abundant Species	Mountain Redbelly Dace.	Exotic Species	Rock Bass, Brown Trout.
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Species Change Since Last Cycle	N/A
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**Data Analysis**

New basinwide site. **Watershed** -- a tributary to the North Fork New River that drains the northwestern-most edge of Ashe County. **Habitats** -- good instream habitat qualities in this large mountain stream, consisting primarily of runs and some riffles; moderate to high embeddedness of substrates; good bank stabilities and vegetated riparian widths, but shading is limited to the stream's edges. **2008** -- a highly diverse and trophically balanced population of mostly cool and cold water fish species was collected, including seven taxa that are considered intolerant to pollution (Rock Bass, Tonguetied Minnow, New River Shiner, Rosyface Shiner, Kanawha Minnow, Kanawha Darter, and Appalachia Darter); Mountain Redbelly Dace represented 47% of the sample (n=350); two Hellbenders (one adult and one young-of-year) were also collected, suggesting high quality water.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
<b>BUFFALO CR</b>	<b>NC 88/194 ABOVE LITTLE BUFFALO CREEK</b>	<b>KB134</b>	<b>08/20/08</b>	<b>Excellent</b>

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.432880	-81.511380	10-2-20	Amphibolite Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C;Tr:+	13	2785	5	0.2

Visible Landuse (%)	Forested/Wetland	Urban	Agriculture	Other (describe)
	70	20	0	10

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

**Water Quality Parameters**

Temperature (°C)	21.6
Dissolved Oxygen (mg/L)	7.0
Specific Conductance (µS/cm)	70
pH (s.u.)	6.7

Water Clarity	clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	4
Instream Habitat (20)	18
Bottom Substrate (15)	14
Pool Variety (10)	5
Riffle Habitat (16)	14
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	6
Left Riparian Score (5)	3
Right Riparian Score (5)	4
<b>Total Habitat Score (100)</b>	<b>82</b>

**Site Photograph**



<b>Substrate</b>	mix of cobble, gravel, boulder; some sand
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
08/20/08	10542	---	39	---	2.51	Excellent

**Taxonomic Analysis**

The EPT portion of the benthic community at the site is diverse. *Baetisca berneri*, a mayfly often collected in the New River basin but uncollected at the prior basinwide site on Buffalo Creek, was abundant at this site. The low EPT BI indicates a community intolerant to the presence of pollutants.

**Data Analysis**

The site is about 2 miles west of Jefferson. The basinwide site for Buffalo Creek was relocated to above the mouth of Little Buffalo Creek to assess conditions in the catchment without the influence of West Jefferson WWTP; the original basinwide site is about 0.4 stream-miles downstream of the present site. At the new location the catchment is mostly forest and pasture with no urban influence.

The high EPT Richness and low EPT BI value indicates a healthy benthic community and the absence of stressors.

NEW RIVER BASIN: NORTH FORK NEW RIVER WATERSHED (HUC 0505000101)

APPENDICES

**FISH COMMUNITY SAMPLE**

Waterbody	Location	Date	Station ID	Bioclassification
<b>BUFFALO CR</b>	<b>NC 88/194</b>	<b>05/19/08</b>	<b>KF 21</b>	<b>Not Rated</b>

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	1	05050001	36.433146	-81.511071	10-2-20	Amphibolite Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Average Depth (m)	Reference Site
C;Tr	12.6	2833	7	0.4	Yes

Visible Landuse (%)	Forested/Wetland	Residential/Commercial	Agriculture	Other (describe)
	50	30	5	15 (road - NC 88 and 194)

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

**Water Quality Parameters**

Temperature (°C)	17.0
Dissolved Oxygen (mg/L)	9.3
Specific Conductance (µS/cm)	62
pH (s.u.)	6.9

Water Clarity	Clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	20
Bottom Substrate (15)	12
Pool Variety (10)	4
Riffle Habitat (16)	16
Left Bank Stability (7)	6
Right Bank Stability (7)	6
Light Penetration (10)	7
Left Riparian Score (5)	4
Right Riparian Score (5)	3
<b>Total Habitat Score (100)</b>	<b>83</b>

**Site Photograph**



Substrate	flat cobble, gravel, boulder.
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Sample Date	Sample ID	Species Total	NCIBI	Bioclassification
05/19/08	2008-42	15	--	Not Rated

Most Abundant Species	Fantail Darter.	Exotic Species	Rock Bass, Bluegill, Saffron Shiner, Rainbow Trout, Brown Trout.
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Species Change Since Last Cycle	N/A
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**Data Analysis**

New basinwide site. **Watershed** -- a tributary to the North Fork New River that drains part of central Ashe County, just to the west of Jefferson. **Habitats** -- high quality instream habitats including swift riffles and runs with a few chutes and a few shallow side pools that were holding trout; good bank stabilities and vegetated riparian widths; the canopy was providing equal amounts of shade and sunlight to the stream; low to moderate embeddedness of substrates; the Buffalo Meadows WWTP (<1MGD, 100% domestic) located 2.8 miles upstream may be contributing to the slightly elevated conductivity. **2008** -- a diverse and fairly trophically balanced mix of mostly cool and cold water fish taxa was collected, including three species that are considered intolerant to pollution (Rock Bass, Kanawha Darter, and Rainbow Trout); Fantail Darters (intermediately tolerant insectivores) represented 59% of the collected sample; overall, this stream is supporting a reasonably healthy fish population and appears to have no obvious water quality issues.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
L BUFFALO CR	OFF SR 1153	KB32	08/21/08	Fair

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.420480	-81.493220	10-2-20-1	New River Plateau

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C;Tr:+	3.0	2865	2	0.2

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

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
West Jefferson WWTP	NC0020451	0.5

**Water Quality Parameters**

Temperature (°C)	18.1
Dissolved Oxygen (mg/L)	8.7
Specific Conductance (µS/cm)	276
pH (s.u.)	---
Water Clarity	clear

**Site Photograph**



**Habitat Assessment Scores (max)**

Channel Modification (5)	3
Instream Habitat (20)	18
Bottom Substrate (15)	9
Pool Variety (10)	4
Riffle Habitat (16)	15
Left Bank Stability (7)	5
Right Bank Stability (7)	7
Light Penetration (10)	2
Left Riparian Score (5)	2
Right Riparian Score (5)	1
<b>Total Habitat Score (100)</b>	<b>66</b>

<b>Substrate</b>	mix of boulder, gravel, cobble; some sand
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
08/21/08	10543	63	13	6.00	5.00	Fair
08/20/03	9228	22	6	6.40	4.11	Poor
08/18/98	7713	39	14	7.07	5.28	Fair
07/13/93	6265	24	0	8.31	---	Poor

**Taxonomic Analysis**

The EPT portion of the benthic community has differed significantly with each sampling event. Even for the two sampling events with similar EPT richness (1998 and 2008) only four taxa were in common. In 2008 four EPT taxa were collected that had not been collected during prior sampling events, and three of those (*Maccaffertium pudicum*, *Hydropsyche betteni*, and *Leucotrichia pictipes*) were abundant in the sample.

**Data Analysis**

The site is one mile west of downtown Jefferson and within 0.9 stream-miles downstream of the West Jefferson WWTP. The stream is on the state's 303(d) list for nutrients and impaired biological integrity.

For the four sampling events since 1993 the lowest NCBI value is shown for 2008, and EPT Richness is close to the high value from 1998. Of the four years that benthic sampling was performed 2008 exhibited the lowest flows for area streams. Dry conditions should increase instream effluent concentrations from the WWTP upstream; the benthic community does not reflect this.

**FISH COMMUNITY SAMPLE**

Waterbody	Location	Date	Station ID	Bioclassification
<b>BIG HORSE CR</b>	<b>SR 1350</b>	<b>05/20/08</b>	<b>KF1</b>	<b>Good</b>

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.487395	-81.500386	10-2-21-(7)	New River Plateau

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Average Depth (m)	Reference Site
C;Tr,+	56.2	2681	13	0.7	No

Visible Landuse (%)	Forested/Wetland	Rural Residential	Agriculture	Other (describe)
	75	10	15	0

Upstream NPDES Dischargers (>1MGD or <1MGD and within 1 mile)	NPDES Number	Volume (MGD)
Town of Lansing WWTP (<1MGD - 1.1 miles upstream)	NC0066028	0.05

**Water Quality Parameters**

Temperature (°C)	12.5
Dissolved Oxygen (mg/L)	9.7
Specific Conductance (µS/cm)	46
pH (s.u.)	6.0

Water Clarity	Slightly turbid
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**Site Photograph**



**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	16
Bottom Substrate (15)	8
Pool Variety (10)	4
Riffle Habitat (16)	5
Left Bank Stability (7)	5
Right Bank Stability (7)	4
Light Penetration (10)	2
Left Riparian Score (5)	5
Right Riparian Score (5)	5
<b>Total Habitat Score (100)</b>	<b>59</b>

Substrate	sand, cobble, boulder, gravel.
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Sample Date	Sample ID	Species Total	NCIBI	Bioclassification
05/20/08	2008-43	15	48	Good
06/29/98	98-57	13	48	Good

<b>Most Abundant Species</b>	Fantail Darter.	<b>Exotic Species</b>	Rock Bass, Smallmouth Bass, Brown Trout.
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<b>Species Change Since Last Cycle</b>	<b>Gains</b> -- White Sucker, Mottled Sculpin, Kanawha Darter, Smallmouth Bass, Kanawha Minnow, Longnose Dace, Brown Trout. <b>Losses</b> -- Rosyside Dace, Bigmouth Chub, Saffron Shiner, New River Shiner, Rosyface Shiner.
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**Data Analysis**

**Watershed** -- a tributary to the North Fork New River that drains a good portion of the northwestern tip of Ashe County; the site is located just southeast of Lansing. **Habitats** -- low quality instream habitats composed of wide and swift sandy runs with some boulder and cobble, few pools, and very few riffles for a mountain stream; the banks were generally healthy except for a 25 foot area on the right bank that was sloughing into the stream; riparian zones vegetated with mostly grasses, shrubs and very few trees; full sun over most of the stream due to its' width and the lack of canopy trees. **2008** -- a diverse and trophically balanced community of cool and cold water fish species was collected, including six intolerant taxa (Rock Bass, Smallmouth Bass, Tonguetied Minnow, Silver Shiner, Kanawha Minnow, and Kanawha Darter); almost three times the total abundance than in 1998 (652 vs. 242). **1998-2008** -- a total of 20 fish species have been collected from this site; in spite of some habitat issues, this stream is supporting a healthy assemblage of fish, and continues to exhibit good water quality.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
<b>BIG HORSE CR</b>	<b>NC 194</b>	<b>KB33</b>	<b>06/10/08</b>	<b>Excellent</b>

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.485556	-81.498611	10-2-21-(7)	New River Plateau

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C:+	56	2635	7	0.4

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

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

**Water Quality Parameters**

Temperature (°C)	17.7
Dissolved Oxygen (mg/L)	8.9
Specific Conductance (µS/cm)	57
pH (s.u.)	7.6

Water Clarity	clear
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**Habitat Assessment Scores (max)**

Channel Modification (5)	4
Instream Habitat (20)	15
Bottom Substrate (15)	13
Pool Variety (10)	4
Riffle Habitat (16)	14
Left Bank Stability (7)	6
Right Bank Stability (7)	6
Light Penetration (10)	7
Left Riparian Score (5)	2
Right Riparian Score (5)	4
<b>Total Habitat Score (100)</b>	<b>75</b>

**Site Photograph**



<b>Substrate</b>	mix of cobble, gravel, boulder; some sand
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Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
06/10/08	10470	123	60	4.33	2.84	Excellent
08/19/03	9226	89	50	3.95	3.42	Excellent
08/18/98	7715	103	56	4.18	3.14	Excellent
07/28/93	6293	129	56	4.10	2.78	Excellent

**Taxonomic Analysis**

A large number of EPT taxa have always been collected from the site; the highest number was in 2008. Many taxa were recorded for the first time, including: *Brachycercus*, *Dannella simplex*, *Ephemerella dorothea*, *Eurylophella aestiva*, *Rhithrogena uhari*, *Ceraclea enodis*, and *Neophylax fuscus*. There were several highly tolerant taxa (i.e. with a tolerance value of 8.0 or greater) either common or abundant that helped to drive the NCBI value up: Corixidae; the midges *Chironomus*, *Polypedilum illinoense* group, *Procladius*, *Thienemannimyia* group; and *Nais*, an oligochaete.

**Data Analysis**

The site is about 4.7 miles NNW of Jefferson and about 0.25 stream-miles above the confluence with North Fork New River. The site has received a classification of Excellent during each summer sampling event since 1993, in most cases driven by high EPT abundance and richness.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
L HORSE CR	SR 1334	KB63	08/21/08	Excellent

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.533056	-81.577778	10-2-21-8	Southern Crystalline Ridges and Mountains

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C;Tr:+	4.4	2940	2	0.2

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

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

**Water Quality Parameters**

Temperature (°C)	17.9
Dissolved Oxygen (mg/L)	8.0
Specific Conductance (µS/cm)	47
pH (s.u.)	---

Water Clarity	clear
---------------	-------

**Habitat Assessment Scores (max)**

Channel Modification (5)	4
Instream Habitat (20)	18
Bottom Substrate (15)	12
Pool Variety (10)	4
Riffle Habitat (16)	15
Left Bank Stability (7)	2
Right Bank Stability (7)	4
Light Penetration (10)	2
Left Riparian Score (5)	0
Right Riparian Score (5)	0
<b>Total Habitat Score (100)</b>	<b>61</b>

**Site Photograph**



Substrate	mix of cobble, boulder, gravel, sand; some silt
-----------	---

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
08/21/08	10544	---	38	---	2.92	Excellent
08/19/03	9227	---	33	---	3.03	Good
08/18/98	7716	---	35	---	3.62	Good

**Taxonomic Analysis**

EPT Richness was higher in 2008 than for previous years, improving the classification for the site from Good to Excellent. *Isogenoides hansonii* was identified from the site for the first time in 2008; this is one of 44 sites from which the BAU has collected the stonefly. Leptocerids have not been collected from the site, reflecting the paucity of root mat habitat.

**Data Analysis**

The site is about 9.7 miles northwest of Jefferson and 3.6 miles south of the Virginia border.

The site attained a classification of Excellent for the first time in 2008. Though the benthic community does not reflect stress, the lack of a riparian zone at the reach sampled is likely limiting the fauna. A canopy over the stream would increase the presence of coldwater stenotherms, root mats provided by trees would diversify benthic habitat, and streamside vegetation would filter pollutants from runoff.

**BENTHIC MACROINVERTEBRATE SAMPLE**

Waterbody	Location	Station ID	Date	Bioclassification
HELTON CR	SR 1536	KB25	08/20/08	Excellent

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.535000	-81.422222	10-2-27	New River Plateau

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Stream Depth (m)
C;Tr:+	44	2575	8	0.3

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

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

**Water Quality Parameters**

Temperature (°C)	16.0
Dissolved Oxygen (mg/L)	8.6
Specific Conductance (µS/cm)	69
pH (s.u.)	5.9

Water Clarity	clear
---------------	-------

**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	19
Bottom Substrate (15)	14
Pool Variety (10)	6
Riffle Habitat (16)	14
Left Bank Stability (7)	7
Right Bank Stability (7)	7
Light Penetration (10)	5
Left Riparian Score (5)	0
Right Riparian Score (5)	5
<b>Total Habitat Score (100)</b>	<b>82</b>

**Site Photograph**



Substrate	mostly boulder, cobble; some gravel, sand
-----------	---

Sample Date	Sample ID	ST	EPT	BI	EPT BI	Bioclassification
08/20/08	10538	---	37	---	2.93	Excellent
08/18/03	9220	---	40	---	3.12	Excellent
08/18/98	7718	---	37	---	3.14	Excellent

**Taxonomic Analysis**

Though abundant and common in the sample in 1998 and 2003 respectively, *Tallaperla* was uncollected in August 2008 in spite of ample leafpacks for habitat. The only leptocerid collected during summer sampling was *Setodes* (rare in the sample) in 1998, reflecting the paucity of root mats at the site. *Glossosoma*, which was abundant in 2003, was uncollected in both 1998 and 2008. Otherwise the EPT portion of the benthic community was similar among the three summer sampling events at the site, primarily with taxa rare at the site dropping in and out.

**Data Analysis**

The site is 8.4 miles NNE of Jefferson, and 1.7 stream-miles from the confluence with North Fork New River. There has been little change in the benthic community among the three summer sampling events, suggesting stable conditions at the site since 1998.



**FISH COMMUNITY SAMPLE**

Waterbody	Location	Date	Station ID	Bioclassification
HELTON CR	SR 1536	05/08/08	KF5	Not Rated

County	Subbasin	8 digit HUC	Latitude	Longitude	AU Number	Level IV Ecoregion
ASHE	2	05050001	36.53472222	-81.42138889	10-2-27	New River Plateau

Stream Classification	Drainage Area (mi2)	Elevation (ft)	Stream Width (m)	Average Depth (m)	Reference Site
C;Tr,+	43.7	2580	10	0.4	Yes

Visible Landuse (%)	Forested/Wetland	Rural Residential	Agriculture	Other (describe)
	95	5	0	0

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

**Water Quality Parameters**

Temperature (°C)	14.9
Dissolved Oxygen (mg/L)	9.7
Specific Conductance (µS/cm)	57
pH (s.u.)	7.4
Water Clarity	Clear

**Site Photograph**



**Habitat Assessment Scores (max)**

Channel Modification (5)	5
Instream Habitat (20)	18
Bottom Substrate (15)	13
Pool Variety (10)	4
Riffle Habitat (16)	15
Left Bank Stability (7)	6
Right Bank Stability (7)	4
Light Penetration (10)	7
Left Riparian Score (5)	5
Right Riparian Score (5)	3
<b>Total Habitat Score (100)</b>	<b>80</b>

<b>Substrate</b>	Cobble, boulder, gravel, and detritus
------------------	---------------------------------------

Sample Date	Sample ID	Species Total	NCIBI	Bioclassification
05/08/08	2008-34	15	---	Not Rated
06/30/98	98-58	15	52	Good

<b>Most Abundant Species</b>	Mountain Redbelly Dace	<b>Exotic Species</b>	Saffron Shiner
------------------------------	------------------------	-----------------------	----------------

<b>Species Change Since Last Cycle</b>	<b>Gains</b> -- Kanawha Minnow, Mottled Sculpin, and Kanawha Darter. <b>Losses</b> -- Bluntnose Minnow, Rainbow Trout, and Rock Bass.
--	---

**Data Analysis**

**Watershed** -- drains southern Grayson County, VA and northern Ashe County; no municipalities within the watershed; tributary to the N Fk New River, site is ~ 2 miles from the creek's confluence with the river. **Habitat** -- runs, riffles, shallow uniform pools, narrow riparian zone on the right; total score in 1998 was 88; bank stability and quality of pools appeared to have declined. **2008** -- Rock Bass+Smallmouth Bass+Trout absent; ~ 60% of the fish were Mountain Redbelly Dace, Bluehead Chub, and Central Stoneroller; Mountain Redbelly Dace were extremely abundant along the stream margins; community is Not Rated pending an evaluation in 2009. **1998 & 2008** -- 18 species known from the site, including the endemic Kanawha Minnow and Kanawha Darter and the nonindigenous Saffron Shiner, Rainbow Trout, and Rock Bass; 2.4 times more fish collected in 2008 than in 1998 (1,388 vs. 581); 10 times more Mountain Redbelly Dace were collected in 2008 than in 1998; species absent in 2008 were represented by 2-4 fish/species in 1998; and fishery is managed by NCWRC as Delayed Harvest Waters, within the reach, eight 230-389 mm TL stocked Brook Trout and Rainbow Trout were collected.



# APPENDIX 1-C

## AMBIENT MONITORING SYSTEMS STATION DATA SHEETS

STATION ID	WATERBODY	AU#	LOCATION	IMPAIRED (BY PARAMETER)	IMPACTED (BY PARAMETER)
K7500000	North Fork New R.	10-2-(12)	SR 1573 at Crumpler	Fecal Coliform (20%)	Turbidity (7%)



**Ambient Monitoring System Station Summaries**

NCDENR, Division of Water Quality  
Basinwide Assessment Report

**Location:** N FORK NEW RIV AT SR 1573 AT CRUMPLER

**Station #:** K7500000

**Hydrologic Unit Code:** 05050001

**Latitude:** 36.50403

**Longitude:** -81.39004

**Stream class:** C +

**Agency:** NCAMBNT

**NC stream index:** 10-2-(12)

**Time period:** 02/01/2005 to 12/17/2009

Field	# results	# ND	EL	Results not meeting EL			Percentiles						
				#	%	%Conf	Min	10th	25th	50th	75th	90th	Max
<b>Field</b>													
D.O. (mg/L)	57	0	<4	0	0		7	8	8.6	9.9	11.4	13.4	14.3
	57	0	<5	0	0		7	8	8.6	9.9	11.4	13.4	14.3
pH (SU)	57	0	<6	0	0		6.8	7.1	7.4	7.6	8	8.2	8.6
	57	0	>9	0	0		6.8	7.1	7.4	7.6	8	8.2	8.6
Spec. conductance (umhos/cm at 25°C)	56	0	N/A				54	58	61	66	72	79	100
Water Temperature (°C)	57	0	>29	0	0		0.8	3.6	7.2	14.3	20.8	24.2	25.6
<b>Other</b>													
TSS (mg/L)	18	4	N/A				6	6.2	6.2	11.5	22.2	262.6	268
Turbidity (NTU)	57	2	>50	4	7		1	1.5	3.1	6.3	13.5	28.2	330
<b>Metals (ug/L)</b>													
Aluminum, total (Al)	8	0	N/A				82	82	262	330	518	610	610
Arsenic, total (As)	8	8	>10	0	0		5	5	5	5	5	5	5
Cadmium, total (Cd)	8	8	>2	0	0		1	1	1.2	2	2	2	2
Chromium, total (Cr)	8	8	>50	0	0		10	10	14	25	25	25	25
Copper, total (Cu)	8	8	>7	0	0		2	2	2	2	2	2	2
Iron, total (Fe)	8	0	>1000	0	0		260	260	478	575	922	1000	1000
Lead, total (Pb)	8	8	>25	0	0		10	10	10	10	10	10	10
Mercury, total (Hg)	6	6	>0.012	0	0		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Nickel, total (Ni)	8	8	>88	0	0		10	10	10	10	10	10	10
Zinc, total (Zn)	8	7	>50	0	0		10	10	10	10	10	33	33
<b>Fecal Coliform Screening(#/100mL)</b>													
<b># results:</b>	<b>Geomean:</b>	<b># &gt; 400:</b>	<b>% &gt; 400:</b>	<b>%Conf:</b>									
55	73.7	11	20										

**Key:**

# result: number of observations

# ND: number of observations reported to be below detection level (non-detect)

EL: Evaluation Level; applicable numeric or narrative water quality standard or action level

Results not meeting EL: number and percentages of observations not meeting evaluation level

%Conf : States the percent statistical confidence that the actual percentage of exceedances is at least 10% (20% for Fecal Coliform)

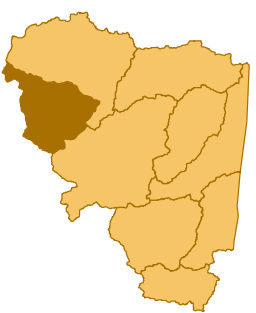
Stations with less than 10 results for a given parameter were not evaluated for statistical confidence



# APPENDIX 1-D

## 12-DIGIT SUBWATERSHED MAPS

# Three Top Creek Subwatershed (050500010101)



**Legend**

- 12-Digit HUCs
- County Boundary
- Municipalities
- Conservation Land
- Major Roads
- Hydrology

**2010 Use Support**

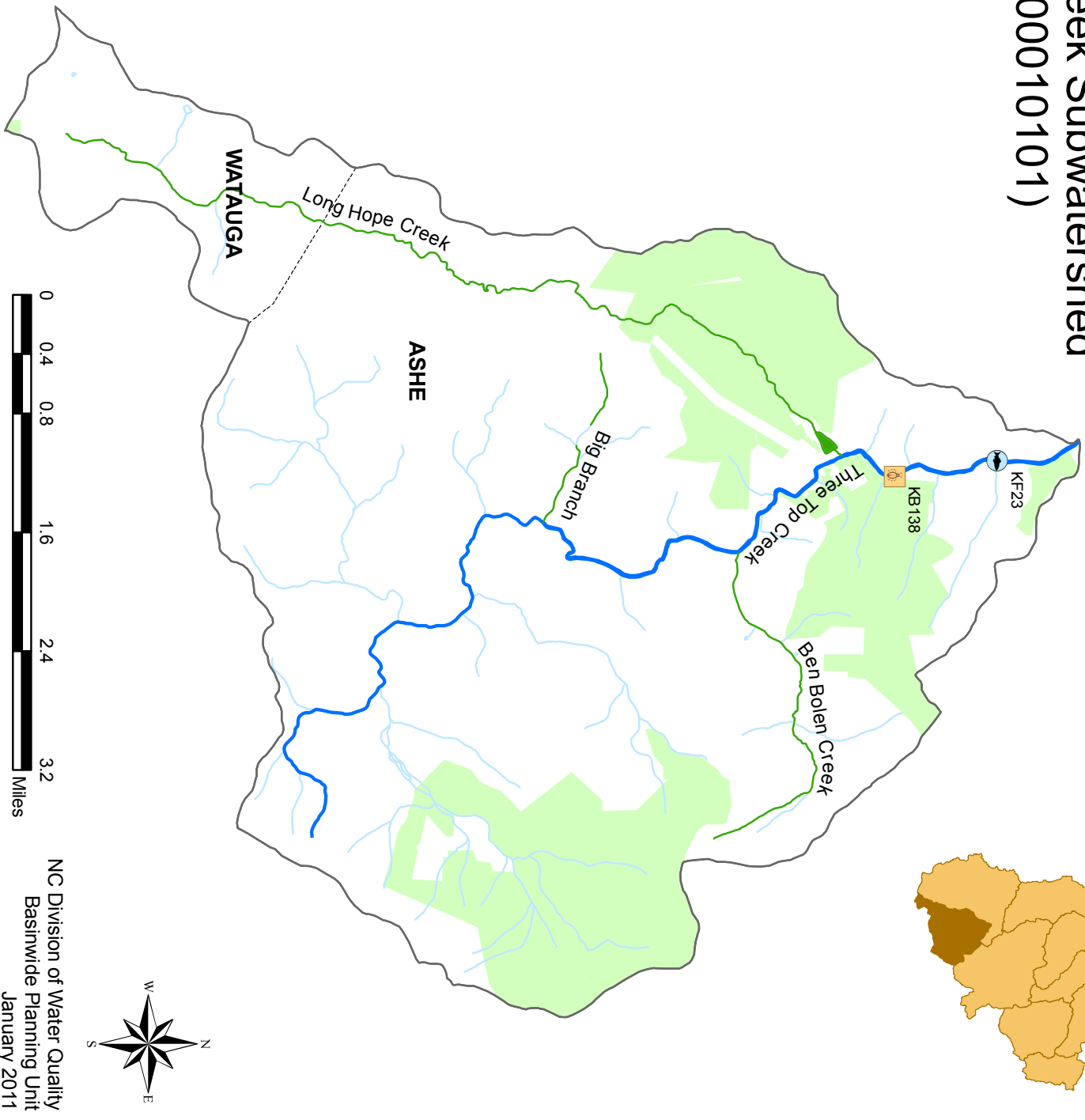
- Supporting
- No or Inconclusive Data
- Impaired

**Monitoring Stations**

- Random Ambient Stations
- Ambient
- Fish Community
- Benthos
- USGS Gages

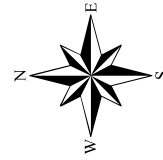
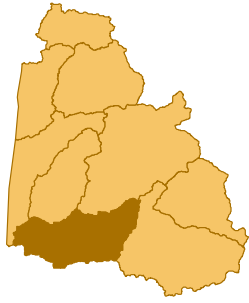
**Permits**

- NPDES Discharge (Minor)
- NPDES Discharge (Major)
- NPDES Non-Discharge (Minor)
- Animal Operation (Cattle)
- Stormwater

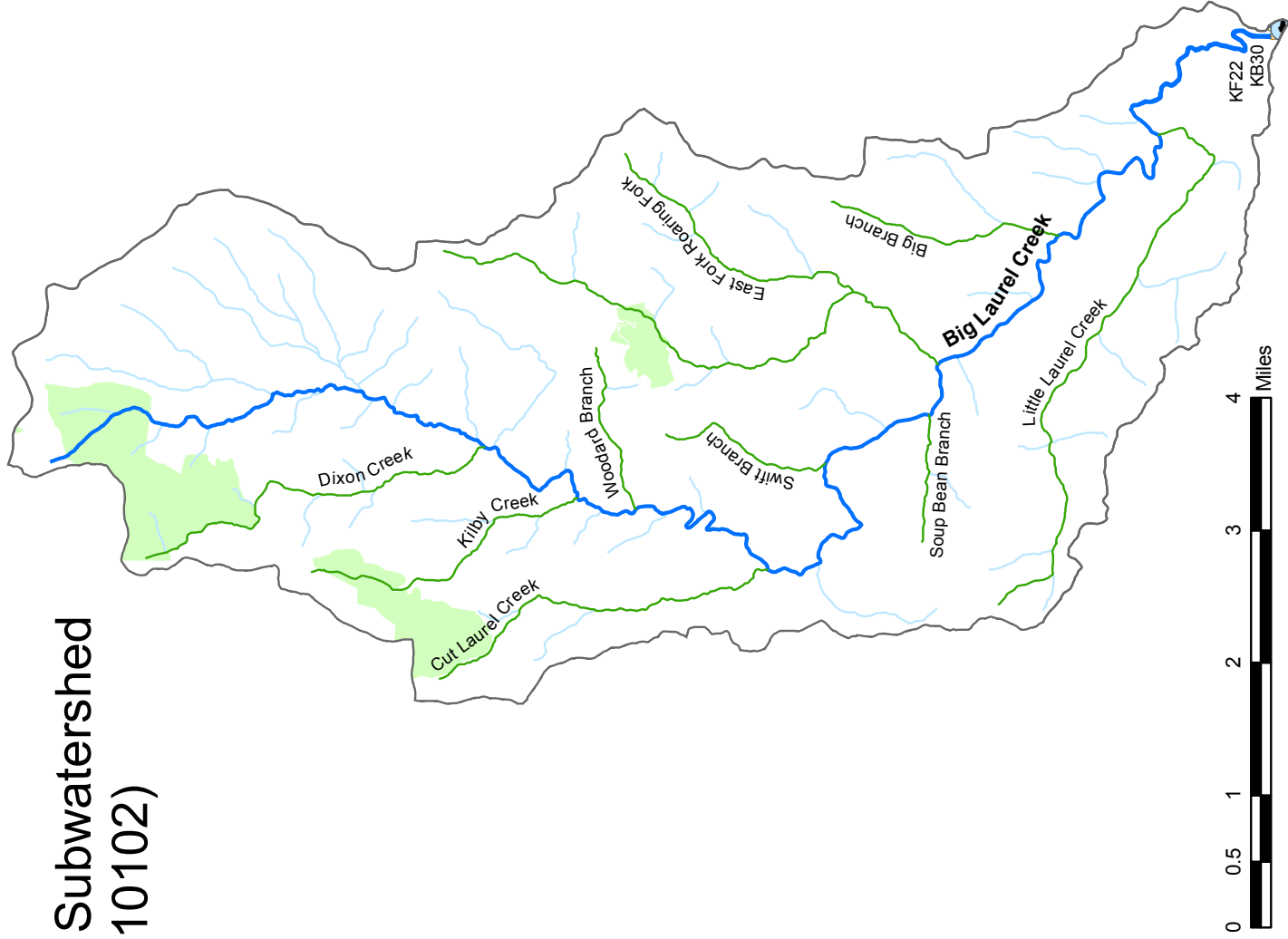




# Big Laurel Creek Subwatershed (050500010102)



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Basinwide Planning Unit  
January 2011



Legend	
	12-Digit HUCs
	County Boundary
	Municipalities
	Conservation Land
	Major Roads
	Hydrology
2010 Use Support	
	Supporting
	No or Inconclusive Data
	Impaired
Monitoring Stations	
	Random Ambient Stations
	Ambient
	Fish Community
	Benthos
	USGS Gages
Permits	
	NPDES Discharge (Minor)
	NPDES Discharge (Major)
	NPDES Non-Discharge (Minor)
	Animal Operation (Cattle)
	Stormwater

# Headwaters North Fork New River Subwatershed (050500010103)



**Legend**

- 12-Digit HUCs
- County Boundary
- Municipalities
- Conservation Land
- Major Roads
- Hydrology

**2010 Use Support**

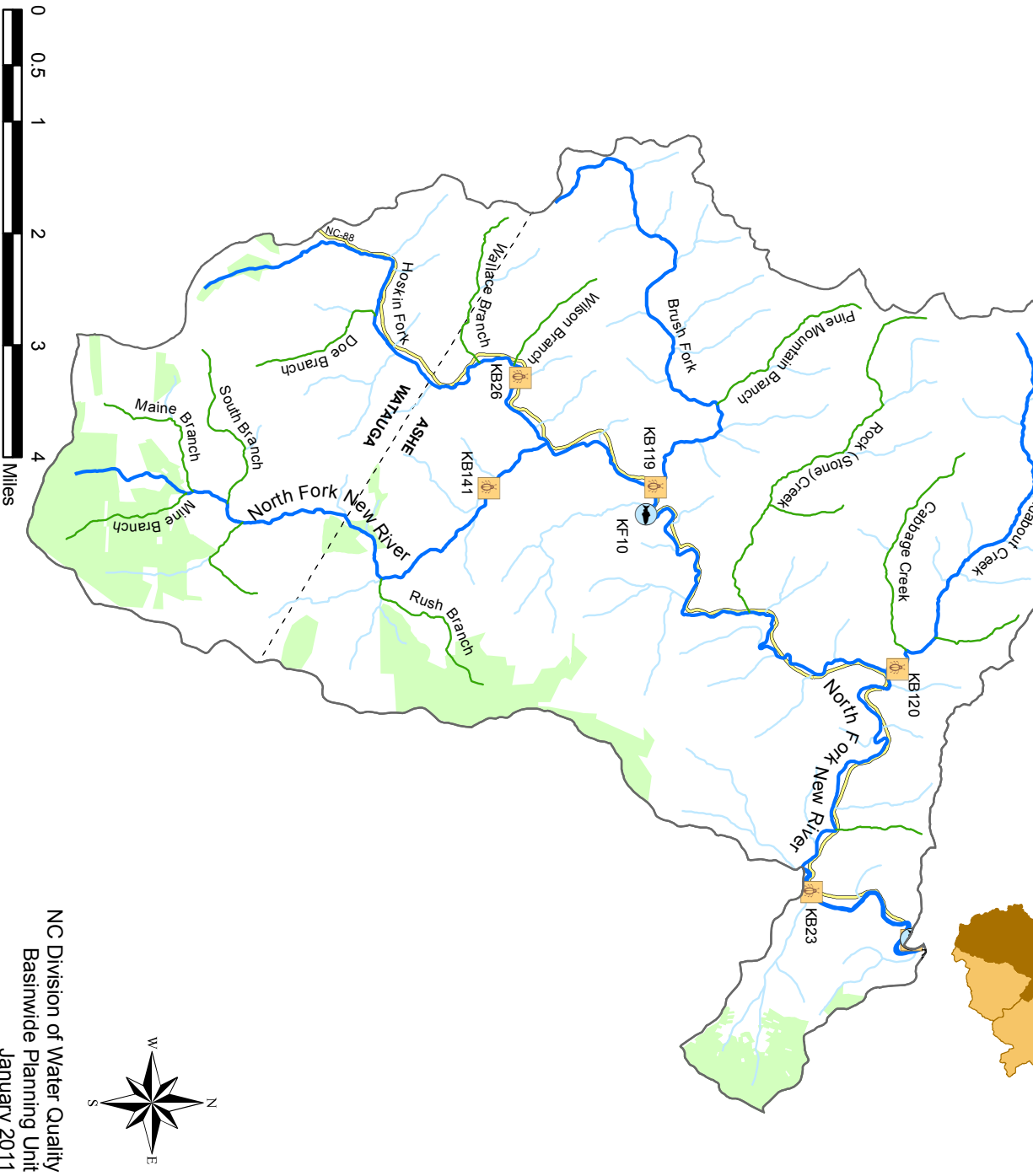
- Supporting
- No or Inconclusive Data
- Impaired

**Monitoring Stations**

- Random Ambient Stations
- Ambient
- Fish Community
- Benthos
- USGS Gages

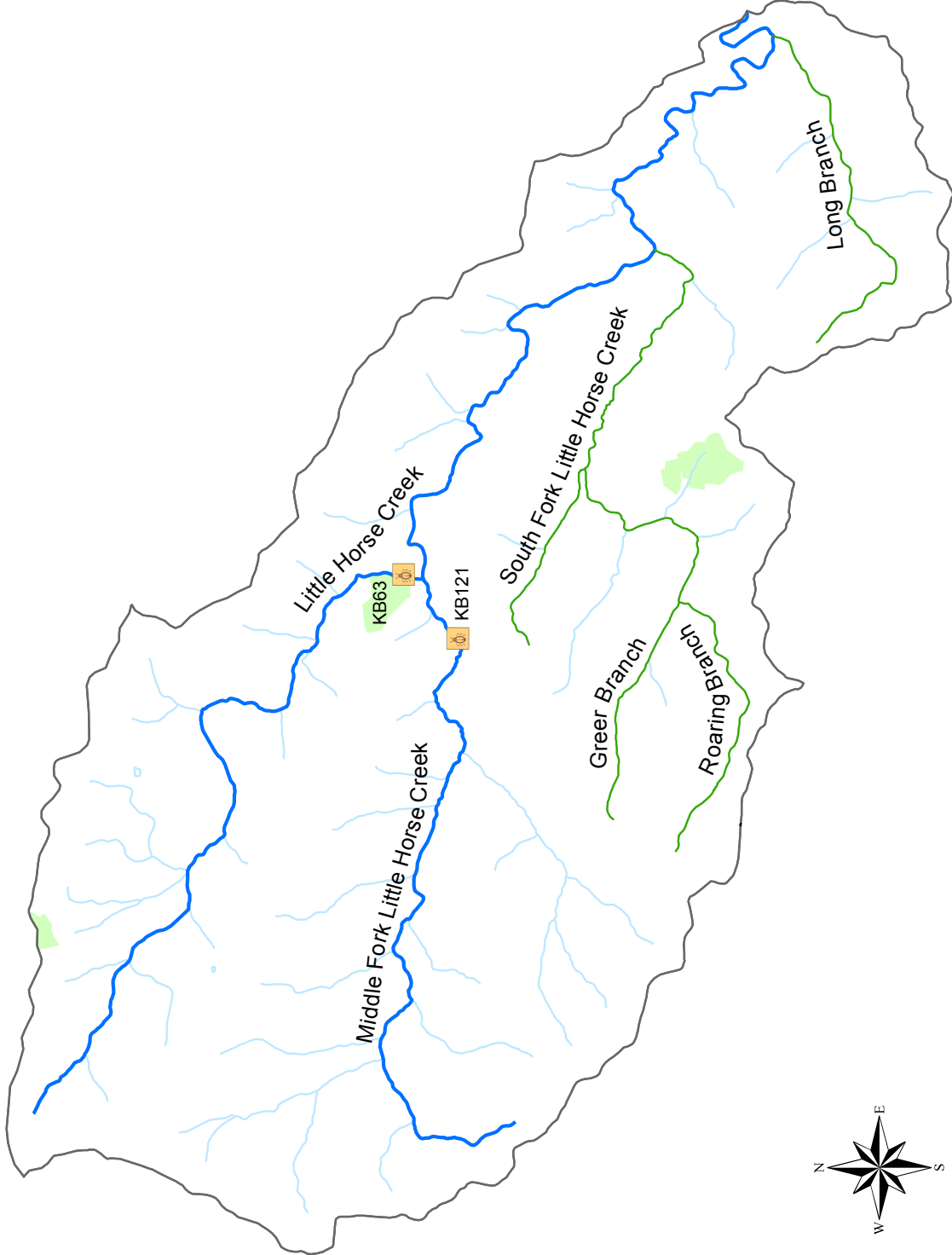
**Permits**

- NPDES Discharge (Minor)
- NPDES Discharge (Major)
- NPDES Non-Discharge (Minor)
- Animal Operation (Cattle)
- Stormwater



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January 2011

# Little Horse Creek Subwatershed (050500010104)



**Legend**

- 12-Digit HUCs
- County Boundary
- Municipalities
- Conservation Land
- Major Roads
- Hydrology

**2010 Use Support**

- Supporting
- No or Inconclusive Data
- Impaired

**Monitoring Stations**

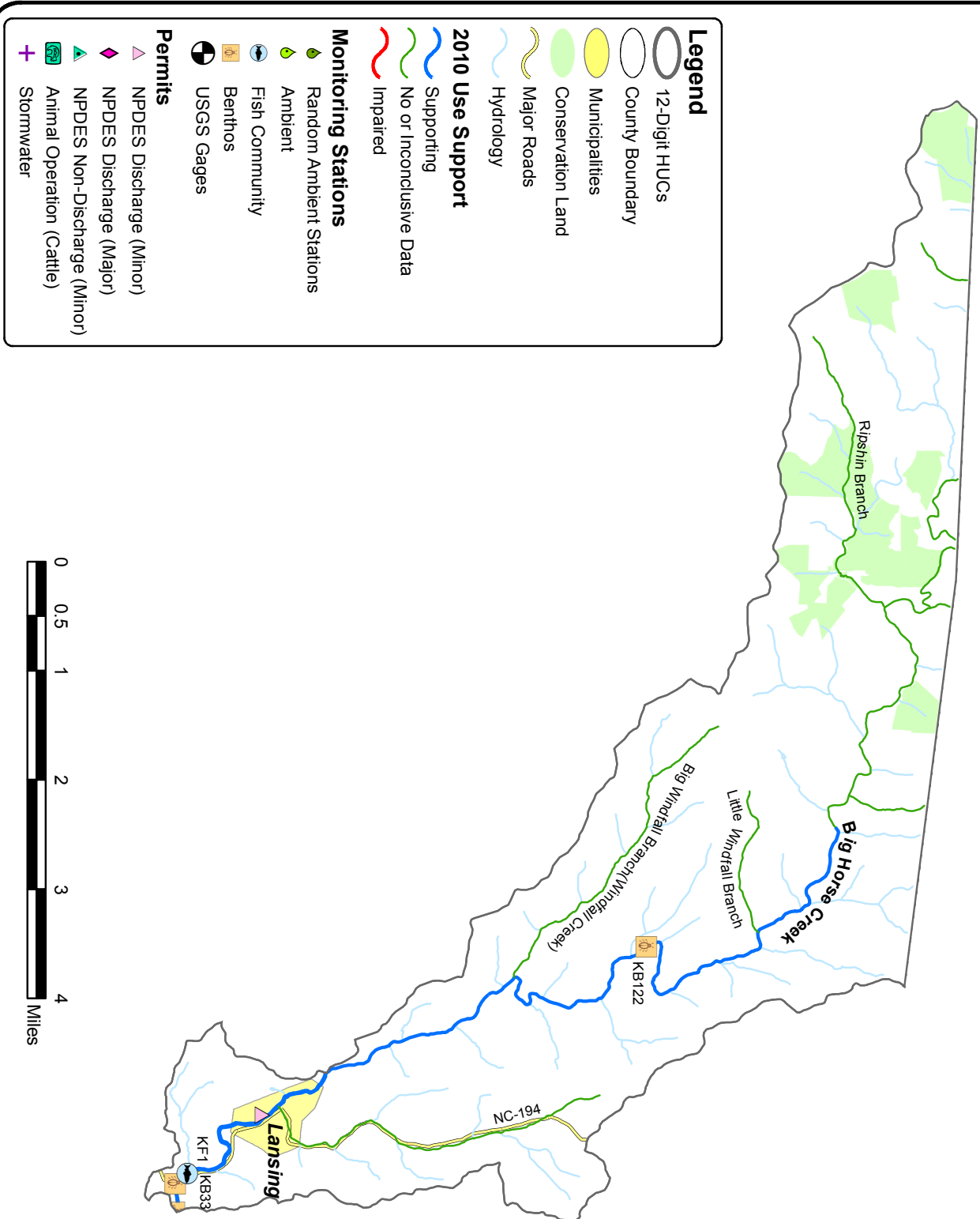
- Random Ambient Stations
- Ambient
- Fish Community
- Benthos
- USGS Gages

**Permits**

- NPDES Discharge (Minor)
- NPDES Discharge (Major)
- NPDES Non-Discharge (Minor)
- Animal Operation (Cattle)
- Stormwater

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Basinwide Planning Unit  
January 2011

# Big Horse Creek Subwatershed (050500010105)



**Legend**

- 12-Digit HUCs
- County Boundary
- Municipalities
- Conservation Land
- Major Roads
- Hydrology

**2010 Use Support**

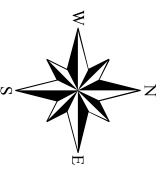
- Supporting
- No or Inconclusive Data
- Impaired

**Monitoring Stations**

- Random Ambient Stations
- Ambient
- Fish Community
- Benthos
- USGS Gages

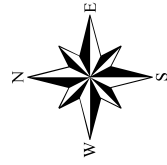
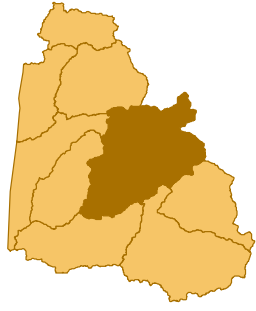
**Permits**

- NPDES Discharge (Minor)
- NPDES Discharge (Major)
- NPDES Non-Discharge (Minor)
- Animal Operation (Cattle)
- Stormwater

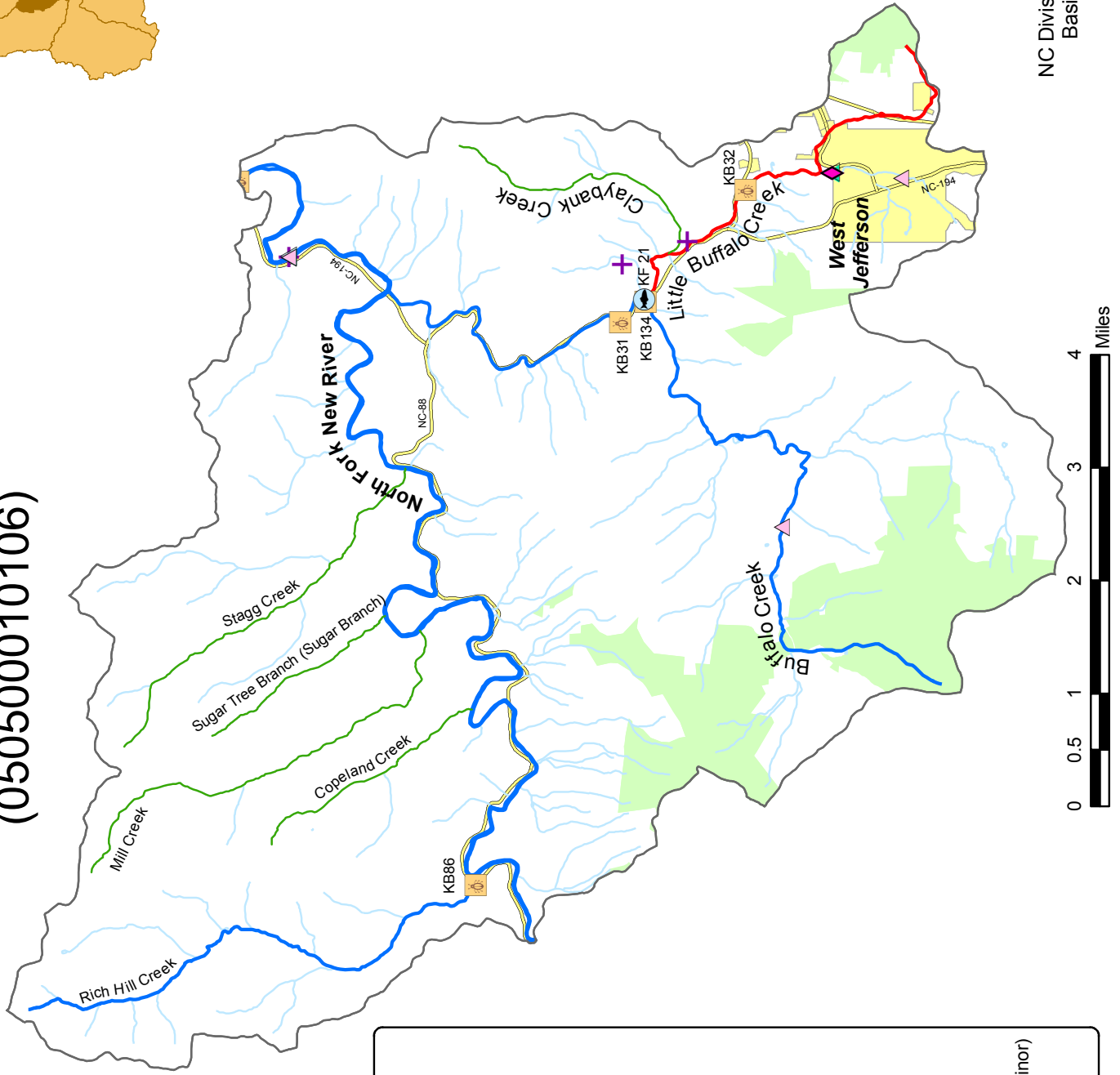


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# Upper North Fork New River Subwatershed (050500010106)



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**Legend**

- 12-Digit HUCs
- County Boundary
- Municipalities
- Conservation Land
- Major Roads
- Hydrology

**2010 Use Support**

- Supporting
- No or Inconclusive Data
- Impaired

**Monitoring Stations**

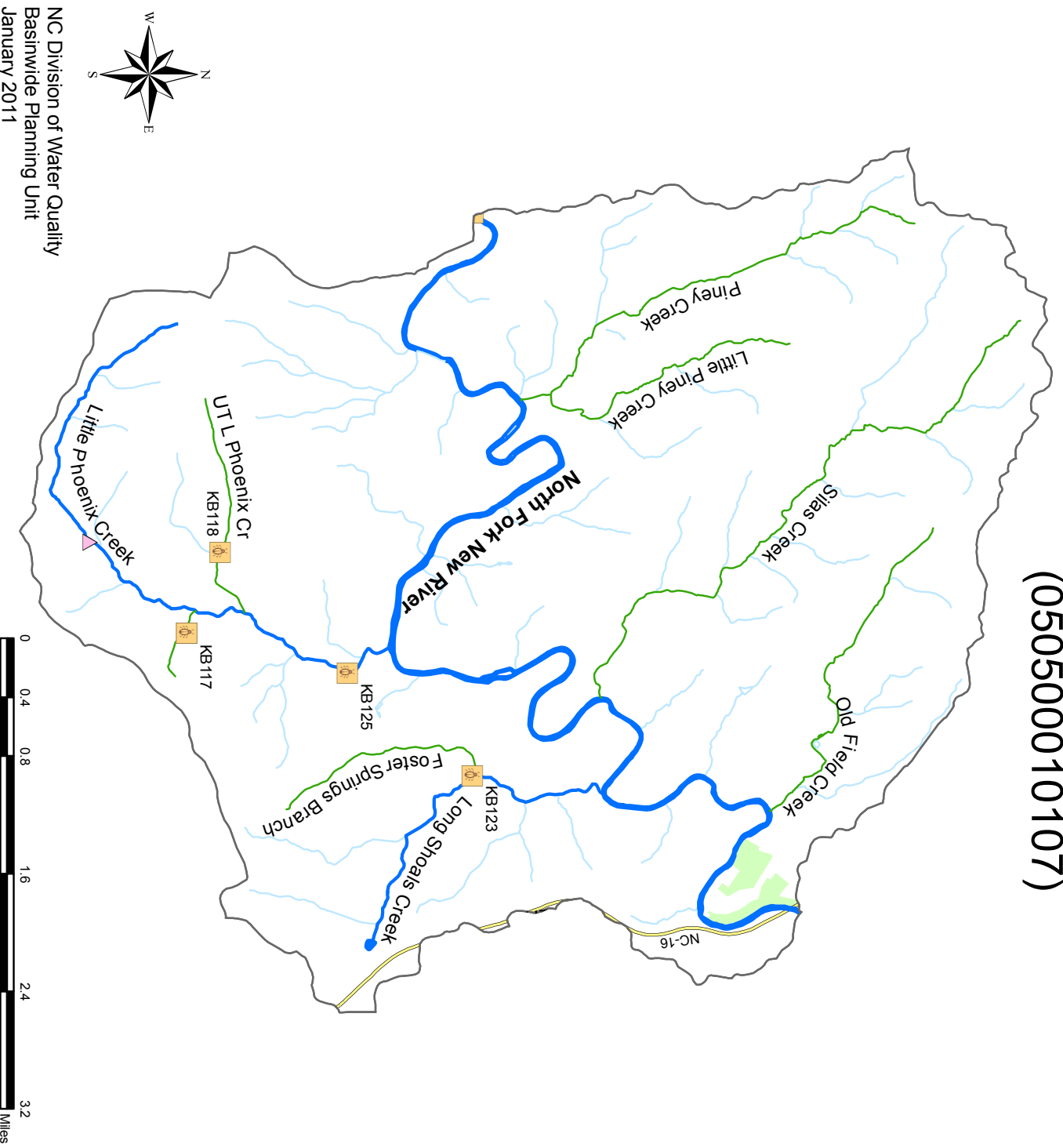
- Random Ambient Stations
- Ambient
- Fish Community
- Benthos
- USGS Gages

**Permits**

- NPDES Discharge (Minor)
- NPDES Discharge (Major)
- NPDES Non-Discharge (Minor)
- Animal Operation (Cattle)
- Stormwater



# Middle North Fork New River Subwatershed (050500010107)



**Legend**

- 12-Digit HUUCs
- County Boundary
- Municipalities
- Conservation Land
- Major Roads
- Hydrology

**2010 Use Support**

- Supporting
- No or Inconclusive Data
- Impaired

**Monitoring Stations**

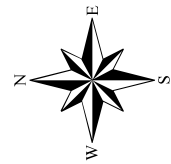
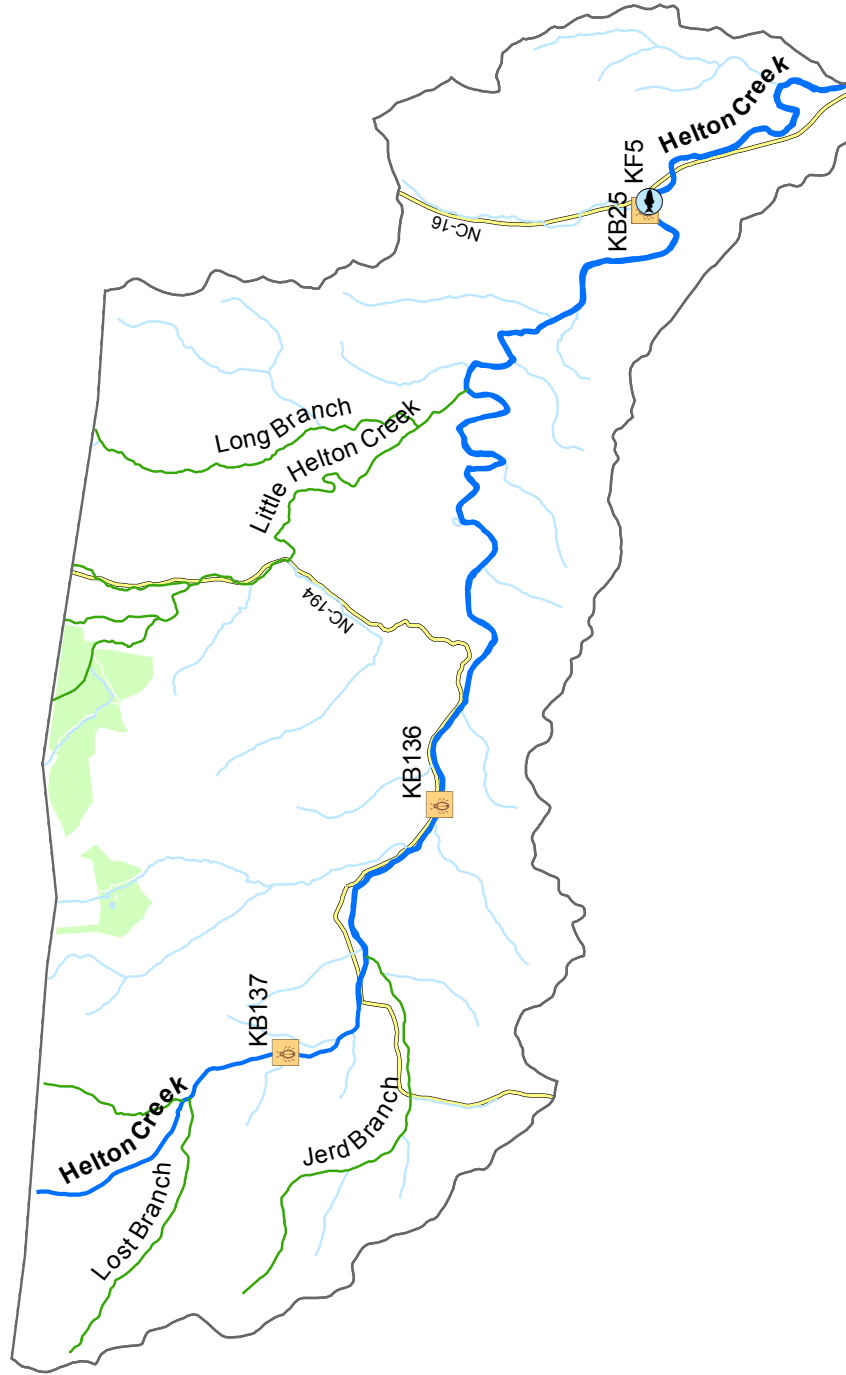
- Random Ambient Stations
- Ambient
- Fish Community
- Benthos
- USGS Gages

**Permits**

- NPDES Discharge (Minor)
- NPDES Discharge (Major)
- NPDES Non-Discharge (Minor)
- Animal Operation (Cattle)
- Stormwater

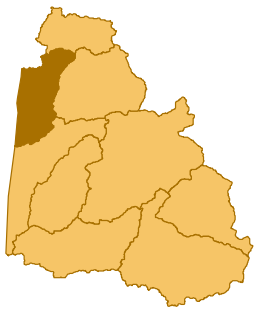
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# Helton Creek Subwatershed (050500010108)

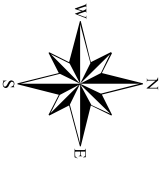
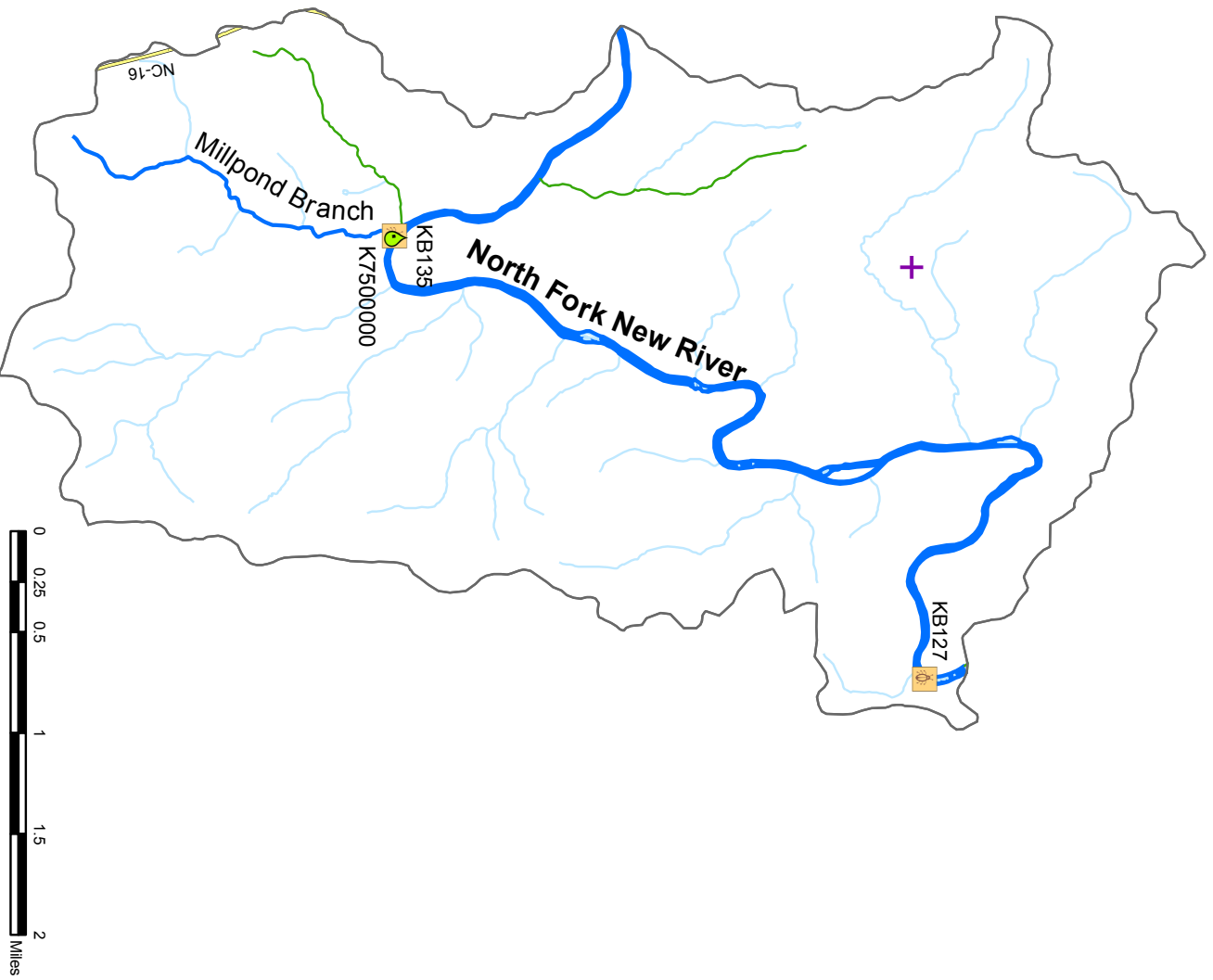


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Basinwide Planning Unit  
January 2011

Legend	
	12-Digit HUCs
	County Boundary
	Municipalities
	Conservation Land
	Major Roads
	Hydrology
2010 Use Support	
	Supporting
	No or Inconclusive Data
	Impaired
Monitoring Stations	
	Random Ambient Stations
	Ambient
	Fish Community
	Benthos
	USGS Gages
Permits	
	NPDES Discharge (Minor)
	NPDES Discharge (Major)
	NPDES Non-Discharge (Minor)
	Animal Operation (Cattle)
	Stormwater



# Lower North Fork New River Subwatershed (050500010109)



NC Division of Water Quality  
Basinwide Planning Unit  
January 2011



Legend	
	12-Digit HUCs
	County Boundary
	Municipalities
	Conservation Land
	Major Roads
	Hydrology
2010 Use Support	
	Supporting
	No or Inconclusive Data
	Impaired
Monitoring Stations	
	Random Ambient Stations
	Ambient
	Fish Community
	Benthos
	USGS Gages
Permits	
	NPDES Discharge (Minor)
	NPDES Discharge (Major)
	NPDES Non-Discharge (Minor)
	Animal Operation (Cattle)
	Stormwater