

APPENDIX II

CONTENTS:

DEM Water Quality Monitoring Programs:

- **Benthic Macroinvertebrate Sampling**
 - **Fisheries Studies**
 - **Lakes Assessment**
- **Effluent Toxicity Testing**

A-II.1 BENTHIC MACROINVERTEBRATES

Benthic macroinvertebrates, or benthos, are organisms, mostly aquatic insect larvae, that live in and on the bottom substrates of rivers and streams. The use of benthos data has proven to be a reliable monitoring tool as benthic macroinvertebrates are sensitive to subtle changes in water quality. Since many taxa in a community have life cycles of six months to one year, the effects of short term pollution (such as a spill) will generally not be overcome until the following generation appears. The benthic community also integrates the effects of a wide array of potential pollutant mixtures.

Criteria have been developed to assign bioclassifications ranging from Poor to Excellent to each benthic sample based on the number of taxa present in the intolerant groups Ephemeroptera, Plecoptera and Trichoptera (EPT S). Likewise, ratings can be assigned with a "biotic index". This index summarizes tolerance data for all taxa in each collection. The two rankings are given equal weight in final site classification. Higher taxa richness values are associated with better water quality. These bioclassifications primarily reflect the influence of chemical pollutants. The major physical pollutant, sediment, is poorly assessed by a taxa richness analysis. Different criteria have been developed for different ecoregions (mountains, piedmont and coastal) within North Carolina.

Classification Criteria by Ecoregion*

A. EPT taxa richness values

	10-sample Qualitative Samples			4-sample EPT samples		
	Mountains	Piedmont	Coastal	Mountains	Piedmont	Coastal
Excellent	>41	>31	>27	>35	>27	>23
Good	32-41	24-31	21-27	28-35	21-27	18-23
Good-Fair	22-31	16-23	14-20	19-27	14-20	12-17
Fair	12-21	8-15	7-13	11-18	7-13	6-11
Poor	0-11	0-7	0-6	0-10	0-6	0-5

B. Biotic Index Values (Range = 0-10)

	Mountains	Piedmont/Coastal
Excellent	<4.18	<5.24
Good	4.17-5.09	5.25-5.95
Good-Fair	5.10-5.91	5.96-6.67
Fair	5.92-7.05	6.68-7.70
Poor	>7.05	>7.71

*These criteria apply to flowing water systems only. Biotic index criteria are only used for full-scale (10-sample) qualitative samples

Table 1, below, presents a summary of benthic macroinvertebrate samples collected in the French Broad River Basin.

Table 1. Benthic macroinvertebrate collections in the French Broad River Basin, 1983-1992.
(Note: Site locations are shown on the subbasin maps in Chapter 4)

FBR 01		Old/New DEM #	Index #	Date	S/EPTS	B/BIEPT	Bioclass
Site							
French Broad R, SR 1129, Rosman, Trans.	A/B-1	6-(1)	07/92	108/51	3.74/2.50	Excellent	
	08/90		98/43	3.73/2.63	Excellent		
	03/89		107/57	3.35/2.40	Excellent		
	08/88		96/48	3.99/3.02	Excellent		
	07/86		102/50	3.92/2.79	Excellent		
	08/84		89/38	4.09/2.99	Good		
	08/84		84/32	3.99/2.98	Good		
	08/90		83/45	2.58/1.97	Excellent		
	05/90		96/55	2.55/1.71	Excellent		
	08/90		51/15	5.92/3.31	Fair		
W Fk French Broad R, ab trout farms, off NC 281, Transylvania	81/B-2	6-2	08/90	72/33	4.82/2.64	Good-Fair	
	05/90		78/32	4.84/3.65	Good		
W Fk French Broad R, be trout farms, SR 1306, Transylvania	82/B-3	6-2	08/90	97/44	4.41/2.85	Good	
	03/89		-/27	-/3.54	Good-Fair		
W Fk French Broad R, NC 281, Transylvania	83/B-4	6-2	02/92	99/53	3.03/1.94	Excellent	
			05/87	-/49	-/2.49	Excellent	
			10/84	94/42	3.81/2.61	Good	
			07/92	87/46	3.53/2.31	Excellent	
W Fk French Broad R, NC 64, ab M-B Industry, Transylvania	59/B-6	6-2	02/92	110/57	3.28/2.27	Excellent	
			03/89	87/50	3.07/2.31	Excellent	
W Fk French Broad R, be M-B Industry, Transyl.	-/B-7	6-2	02/92	79/45	3.28/2.15	Excellent	
			03/89	-/44	-/2.56	Good	
Parker Cr, SR 1310, Transylvania	60/B-8	6-2-4	03/89	-/38	-/2.77	Good	
N Flat Cr, SR 1319, Transylvania	-/B-9	6-2-10-1	03/89	-/45	-/1.98	Excellent	
N Fk French Broad R, NC 215, Transylvania	54/B-10	6-3	03/89	-/36	-/2.83	Good	
N Fk French Broad R, SR 1324, Transylvania	55/B-11	6-3	07/92	85/42	3.28/2.30	Excellent	
N Fk French Broad R, SR 1322, Transylvania	56/B-12	6-3	03/89	89/44	3.39/2.49	Excellent	
Tucker Cr, SR 1325, Transylvania	57/B-13	6-3-10	03/89	-/35	-/2.69	Good-Fair	
M Fk French Broad R, NC 178, Transylvania	62/B-14	6-5	03/89	-/35	-/1.75	Good	
E Fk French Broad R, SR 1105, Transylvania	63/B-15	6-6	03/89	-/51	-/1.96	Excellent	
E Fk French Broad R, SR 1007, Transylvania	64/B-16	6-6	03/89	107/54	2.77/2.08	Excellent	
Glady Fk, SR 1105, Transylvania	28/B-17	6-6-7	05/87	-/29	-/2.88	Good-Fair	
Galloway Cr, US 64, ab landfill, Transyl.	30/B-18	6-8	05/87	-/16	-/2.61	Fair	
Galloway Cr, US 64, be landfill, Transyl.	31/B-19	6-8	05/87	-/10	-/3.00	Poor	
Catheys Cr, SR 1338, Transylvania	23/B-20	6-16-(.5)	03/89	-/58	-/2.02	Excellent	
			05/87	-/49	-/1.79	Excellent	
Norton Cr, US 64, Transylvania	29/B-21	6-28-2	05/87	-/14	-/4.82	Fair	
Williamson Cr, SR 1541, Transylvania	27/B-22	6-32	05/87	-/44	-/2.42	Good	
Little R NC 276, Transylvania	24/B-23	6-38-(1)	05/87	-/38	-/3.02	Good	
Little R, nr Cedar Mt, ab High Falls, off SR 1536, Transylvania	B/B-24	6-38-(1)	08/87	83/19	6.33/4.69	Fair.	
			08/85	82/22	5.83/4.59	Fair	
Little R, nr Cedar Mt, be High Falls, Trans.	-/B-25	6-38-(1)	07/89	81/32	4.55/3.72	Good	
Little R, SR 1533, Transylvania	-/B-26	6-38-(1)	07/92	-/26	-/4.15	Good-Fair	
Laurel Cr, SR 1536, Transylvania	25/B-27	6-38-17	05/87	-/44	-/2.10	Good	
Crab Cr, SR 1532, Transylvania	26/B-28	6-38-23	05/87	-/38	-/2.94	Good	
FBR 02		Old/New DEM #	Index #	Date	S/EPTS	B/BIEPT	Bioclass
Site							
French Broad R, SR 1503 @ Blantyre, Trans.	C/B-1	6-(27)	07/86	57/21	5.76/4.28	Fair	
			08/83	55/20	5.85/4.43	Fair	
Gash Cr, SR 1322 Henderson	1/B-2	6-41	09/86	19/7	6.09/4.45	Fair	
Gash Cr, US 64, Henderson	1/B-3	6-41	09/86	21/1	8.07/5.77	Poor	
Gash Cr, SR 1203, Henderson	1/B-4	6-41	09/86	26/1	8.31/6.22	Poor	
Gash Cr, SR 1205, Henderson	1/B-5	6-41	09/86	40/5	7.58/5.94	Poor	
Mud Cr, SR 1508 ab WWTP, Henderson	2/B-6	6-55	07/92	-/10	-/5.52	Poor	
			09/85	51/9	7.18/5.80	Poor	
Mud Cr, SR 1508 be WWTP, Henderson	3/B-7	6-55	07/92	-/7	-/6.36	Poor	
			09/85	26/4	7.20/5.04	Poor	

FBR 02 Continued

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIEPT	Bioclass
Bat Fork, SR 1807, Henderson	65/B-8	6-55-8-1	04/89	-/2	-/2.55	Poor
Bat Fork, US 176, Henderson	66/B-9	6-55-8-1	04/89	44/6	7.60/5.98	Poor
Bat Fork, SR 1809, Henderson	67/B-10	6-55-8-1	04/89	19/2	8.61/1.29	Poor
Bat Fork, SR 1803, Henderson	68/B-11	6-55-8-1	04/89	25/4	7.73/6.65	Poor
Bat Fork, SR 1779, Henderson	69/B-12	6-55-8-1	04/89	-/2	-/7.64	Poor
Clear Cr SR 1513, Henderson	-/B-13	6-55-11-(5)	07/92	-/9	-/5.28	Poor
Cane Cr, SR 1006 nr Fletcher, Henderson	-/B-14	6-57-(9)	07/92	-/27	-/4.05	Good-Fair
French Broad R, NC 280, nr Skyland, Buncombe	R/B-15	6-(66.5)	07/92	86/41	4.97/4.08	Good
			07/90	80/34	5.23/3.88	Good
			08/87	80/30	5.35/4.12	Good-Fair
French Broad R, SR 1348, nr Asheville Buncombe	E/B-16	6-(67.5)	07/92	73/32	5.13/4.22	Good-Fair
			08/87	71/24	5.11/3.87	Good-Fair
			08/85	53/19	5.55/4.28	Good-Fair
			08/83	56/19	5.97/4.39	Fair
French Broad R, SR 1634, nr Alexander Buncombe	S/B-17	6-(67.5)	07/92	54/20	5.96/4.58	Fair
			07/90	61/19	5.61/4.10	Good-Fair
			08/87	68/26	5.55/4.01	Good-Fair
Dingle Cr, US 25, Buncombe	32/B-18	6-71	02/87	-/10	-/5.52	Poor
Dingle Cr, US 25, Buncombe	33/B-19	6-71	02/87	-/2	-/4.34	Poor
Dingle Cr, Blue Ridge Pkwy, Buncombe	34/B-20	6-71	02/87	-/14	-/3.03	Fair
Dingle Cr, Blue Ridge Pkwy, Buncombe	35/B-21	6-71	02/87	-/16	-/2.12	Good-Fair
Hominy Cr, SR 1141, Luther, Buncombe	-/B-22	6-76	01/89	-/18	-/3.19	Good-Fair
Hominy Cr, NC 151 @ Candler, Buncombe	-/B-23	6-76	07/92	-/28	-/3.31	Good
Hominy Cr, NC 112 ab Enka Lake, Buncombe	-/B-24	6-76	07/92	-/11	-/3.94	Fair
Hominy Cr, Sr 3412 @ Sand Hill, Buncombe	-/B-25	6-76	07/92	-/8	-/3.58	Poor
S Hominy Cr, NC 151 @ Candler, Buncombe	-/B-26	6-76-5	07/92	-/20	-/3.21	Good-Fair
Swannanoa R, SR 2500 @ Black Mt., Bun.	39/B-27	6-78	10/87	56/19	5.61/4.45	Fair
Swannanoa R, SR 2727 @ Swannanoa, Bun.	38/B-28	6-78	10/87	50/18	5.14/4.00	Good-Fair
Swannanoa R, SR 2416 @ Warren Wilson Buncombe	37/B-29	6-78	10/87	60/22	5.01/3.91	Good-Fair
			07/87	73/33	5.13/3.96	Good-Fair
Swannanoa R, NC 81/240 @ River Rd, Bun.	36/B-30	6-78	03/88	70/24	5.87/4.14	Fair
			10/87	68/24	5.81/4.24	Good-Fair
			07/87	76/29	5.51/4.32	Good-Fair
Swannanoa R, NC 81 be 240, River Rd, Bun.	36/B-31		03/88	56/18	6.26/4.39	Fair
Swannanoa R, US 25 nr Biltmore, Buncombe	D/B-32	6-78	07/92	72/27	5.65/4.38	Good-Fair
			07/89	60/15	6.30/4.50	Fair
			03/88	47/8	7.02/5.96	Poor
			10/87	54/17	6.34/4.87	Fair
			08/85	41/9	7.38/4.99	Poor
Flat Cr, nr Hwy 9 ab Big Piney Cr, Buncombe	-/B-33	6-78-6-(1)	12/91	-/35	-/1.54	Excellent
Big Slaty Br, nr Hwy 9, ab Slaty Br, Bun.	-/B-34	6-78-6-2	12/91	-/34	-/1.50	Excellent
Slaty Br, (Little Slaty Br), nr Hwy 9 ab Big Piney Cr, Buncombe	-/B-35	6-78-6-3	12/91	-/37	-/1.54	Excellent
Big Piney Cr, nr Hwy 9 nr Montreat, Bun.	-/B-36	6-78-6-5	12/91	-/32	-/1.37	Excellent
Wolfpit Br, nr High Top Colony Rd, Bun.	-/B-37	6-78-10-(1)	12/91	-/26	-/1.35	Excellent
N Fk Swannanoa R, SR 2576 ab Grovestone, Buncombe	46/B-38	6-78-11-(13)	10/87	-/14	-/3.85	Fair
N Fk Swannanoa, Hwy 70, be Grovestone, Buncombe	45/B-39	6-78-11-(13)	10/87	-/12	4.46	Fair
Laurel Br, nr mouth, Buncombe	-/B-40	6-78-11-16	02/92	58/32	2.79/1.67	Excellent
Beetree Cr, SR 2427, Buncombe	5/B-41	6-78-15-(1)	03/86	72/39	3.56/2.83	Excellent
Beetree Cr, SR 2429, Buncombe	44/B-42	6-78-15-(1)	10/87	-/15	-/3.01	Good-Fair
Beetree Cr, SR 2416, Buncombe	43/B-43	6-78-15-(1)	10/87	-/19	-/3.72	Good-Fair
Bull Cr, SR 2408, Buncombe	42/B-44	6-78-18	10/87	-/27	-/3.47	Good
Christian Cr, SR 2838, Buncombe	41/B-45	6-78-19	10/87	-/17	-/4.53	Good-Fair
Sweeten Cr, NC 25A, Buncombe	40/B-46	6-78-24	10/87	-/1	-/5.50	Poor
Newfound Cr, SR 1296, Buncombe	51/B-47	6-84	06/89	74/38	3.88/3.14	Excellent
			06/88	94/39	4.13/3.30	Excellent
Newfound Cr, SR 1297, Buncombe	52/B-48	6-84	06/89	56/16	6.53/4.53	Fair
Newfound Cr, SR 1378, Buncombe	6/B-49	6-84	06/88	62/17	6.45/4.81	Fair
			04/86	50/126	7.73/4.77	Poor
Newfound Cr, SR 1622, Buncombe	7/B-50	6-84	07/89	59/17	7.05/5.36	Fair

FBR 02 Continued

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIEPT	Bioclass
			06/89	53/8	7.50/5.63	Poor
			04/89	47/7	7.21/5.65	Poor
			02/89	40/3	7.96/6.77	Poor
			06/88	65/13	7.23/5.66	Poor
			04/86	43/10	6.65/5.20	Poor
Reems Cr, NC 251, Buncombe	-/B-51	6-87-(10)	07/92	-/20	-/3.37	Good-Fair
Flat Cr, Hwy 70, Buncombe	47/B-52	6-88	10/87	-/15	-/4.02	Fair
Flat Cr, SR 1741, Buncombe	8/B-53	6-88	04/86	75/24	4.91/3.49	Good-Fair
Sandymush Cr, SR 1104, Madison	-/B-54	6-92-(9)	07/92	-/36	-/4.06	Excellent

FBR 03

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIEPT	Bioclass
Davidson R, NC 276 @ campground, Trans.	-/B-1	6-34-(15.5)	07/92	-/45	-/1.82	Excellent
Bolyston Cr, SR 1314, Henderson	-/B-2	6-52	07/92	-/26	-/4.65	Good-Fair
Mills R, SR 1337 @ Mills River, Henderson	F/B-3	6-54-(1)	07/92	89/52	3.08/2.23	Excellent
			07/90	105/51	3.52/2.34	Excellent
			08/88	84/37	3.91/2.69	Excellent
			07/86	90/48	3.51/2.72	Excellent
			08/84	91/45	3.59/2.74	Excellent
Mills R, SR 1353, Henderson	4/B-4	6-54-(5)	07/92	81/35	4.07/3.07	Good
N Fk Mills R, SR 1341, Henderson	-/B-5	6-54-2-(9)	09/85	91/37	3.76/2.55	Excellent
Bradley Cr, FR 1206, Transylvania	-/B-6	6-54-3-17	04/91	-/55	-/1.58	Excellent
Bradley Cr, FR 1206 ab State Rock Cr, Hen.	-/B-7	6-54-3-17	04/91	-/47	-/1.82	Excellent
Bradley Cr, FR 1206 ab Yellow Gap Cr, Hen.	-/B-8	6-54-3-17	07/91	-/38	-/1.52	Excellent
			04/91	-/60	-/1.60	Excellent

FBR 04

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIEPT	Bioclass
French Broad R, NC 213 at Marshall, Madison	G/B-1	6-(67.5)	07/92	67/25	5.23/4.42	Good-Fair
			07/90	49/18	5.34/4.53	Good-Fair
			08/88	71/22	5.82/4.56	Fair
			07/86	79/31	5.39/3.85	Good-Fair
			08/85	62/18	5.58/4.28	Good-Fair
			08/84	41/16	5.18/4.04	Good-Fair
			08/83	54/19	5.54/4.22	Good-Fair
Ivy Cr (R), SR 2150, Buncombe	-/B-2	6-96-(0.5)	07/92	-/38	-/3.35	Excellent
Little Ivy Cr, SR 1610, Madison	-/B-3	6-96-10	07/92	-/34	-/3.26	Good
Ivy Cr (R), NC 25/70 Bus., Madison	-/B-4	6-99-(11.7)	07/92	87/36	4.61/3.61	Good
Hunter Cr, nr Hunter Cr R nr Marshall, Madison	-/B-5	6-106-2-(1)	12/91	-/30	-/1.65	Excellent
Big Laurel Cr, NC 208, Madison	-/B-6	6-112	08/92	-/38	-/3.00	Excellent
Shelton Laurel Cr, NC 208/212, Madison	85/B-7	6-112-26	08/92	-/32	-/2.90	Good
			05/90	-/44	-/2.55	Excellent
Hickory Fk (Hickey Cr), SR 1310, Madison	84/B-8	6-112-26-7	05/90	-/43	-/1.90	Excellent
W Pr Hickory Fk (W Pr Hickey Cr), SR 1310, Madison	86/B-9	6-112-26-7-1	05/90	-/38	-/1.62	Excellent
E Pr Hickory Fk (Little Pr E Pr Hickey Cr), FR 465, Madison	87/B-10	6-112-26-7-2	05/90	-/32	-/1.35	Excellent
Spring Cr, NC 209, Madison	-/B-11	6-118-27	08/92	-/26	-/2.75	Good-Fair

FBR 05

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIEPT	Bioclass
Pigeon R, off NC 215, nr Woodrow, Haywood	-/B-1	5-(1)	07/84	87/37	4.49/3.11	Good
Pigeon R, NC 215 at Canton, Haywood	H/B-2	5-(1)	08/92	84/37	4.39/3.33	Good
			08/88	86/33	5.01/3.67	Good-Fair
			02/88	87/35	4.47/3.54	Good
			07/86	80/38	4.61/3.63	Good
			07/84	83/32	4.14/2.55	Good
			08/83	86/29	5.07/3.55	Good-Fair
W Fk Pigeon R, Burnett Siding, Haywood	80/B-3	5-2	07/91	-/42	-/1.82	Excellent
			05/90	-/49	-/1.83	Excellent
UT W Fk Pigeon R, nr NC 215, Haywood	77/B-4	5-2	05/90	-/34	-/1.26	Excellent
Tom Cr, nr NC 215, Haywood	-/B-5	5-2-5	12/91	-/35	-/1.52	Excellent
			07/91	-/39	-/1.13	Excellent

FBR 05 Continued

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIPT	Bioclass
M Pr W Fk Pigeon R, at mouth, Haywood	79/B-6	5-2-7	07/91	-/39	-/1.55	Excellent
			04/91	-/42	-/1.40	Excellent
			05/90	-/42	-/1.70	Excellent
R Pr M Pr W Fk Pigeon R, Haywood	78/B-7	5-2-7-7	07/91	-/34	-/1.65	Excellent
			04/91	-/42	-/1.37	Excellent
			05/90	-/36	-/1.50	Excellent
UT Little E Fk Pigeon R, nr Shining Rock, Hay.	-/B-8	5-2-12-(0.5)	04/91	-/38	-/1.45	Excellent
Little E Fk Pigeon R, SR 1129 ab camp, Haywood	-/B-9	5-2-12-(5.5)	04/91	-/51	-/1.50	Excellent
E Fk Pigeon R, US 276, nr Cruso, Haywood Pigeon R, SR 1642 at Clyde, Haywood	-/B-10 I/B-11	5-3-(6.5) 5-(7)	07/84	87/39	3.93/2.39	Excellent
			08/92	63/16	6.70/4.27	Fair
			09/89	47/7	6.70/4.39	Fair
			08/88	31/4	7.83/5.19	Poor
			02/88	51/12	6.82/4.52	Fair
			07/86	34/2	8.23/3.59	Poor
			02/88	53/16	6.13/3.97	Fair
Pigeon R, at Crabtree Cr nr Crabtree, Haywd	48/B-12	5-(7)	08/88	49/14	5.96/3.88	Fair
Pigeon R, SR 1338 nr Hepco nr Fines Cr, Haywood	49/B-13	5-(7)	02/88	46/24	4.82/3.76	Good-Fair
Pigeon R, at Counterfeit Br, Haywood	-/B-14	5-(7)	04/92	94/43	4.26/2.77	Good
			03/92	77/41	4.02/2.85	Good
Pigeon R, at Hurricane Cr, Haywood	-/B-15	5-(7)	04/92	74/28	5.69/4.42	Good-Fair
			03/92	74/30	5.52/3.68	Good-Fair
Pigeon R, I-40, at Waterville, Haywood	L/B-16	5-(7)	07/90	57/22	4.52/3.75	Good-Fair
			07/89	62/28	5.02/3.96	Good-Fair
			08/88	67/24	4.74/3.41	Good
			08/87	58/25	4.84/3.55	Good-Fair
			07/86	67/28	4.72/3.72	Good
			08/85	59/18	5.71/3.77	Fair
			08/84	68/30	4.66/3.21	Good
			08/83	67/24	5.30/3.39	Good-Fair
			08/92	-/27	-/3.36	Good-Fair
			08/88	42/11	6.07/4.87	Fair
Richland Cr, SR 1184 at Waynesville, Haywood	J/B-17	5-16-(1)	08/85	28/8	6.42/4.36	Fair
			08/83	43/9	7.15/3.70	Poor
			08/92	-/17	-/3.52	Fair
Richland Cr, Bus. 23 ab Dayco, Haywood	-/B-18	5-16-(1)	08/92	-/17	-/3.52	Fair
Hyatt Cr, SR 1159, Haywood	13/B-19	5-16-6	04/84	41/17	5.44/3.68	Good-Fair
Hyatt Cr, SR 1159, Haywood	13/B-20	5-16-6	04/84	30/10	6.20/3.82	Fair
Rocky Br, SR 1219, Haywood	-/B-21	5-16-7-9	12/91	-/35	-/1.38	Excellent
Richland Cr, SR 1519, Haywood	-/B-22	5-16-(16)	08/92	-/14	-/4.47	Fair
Jonathan Cr, SR 1306, Haywood	-/B-23	5-26-(7)	08/92	-/42	-/2.06	Excellent
Jonathan Cr, SR 1322, Haywood	-/B-24	5-26-(7)	08/92	-/33	-/3.28	Good
Jonathan Cr, SR 1350, Haywood	-/B-25	5-26-(7)	08/92	-/23	-/3.72	Good-Fair
Fines Cr, SR 1355 nr I 40, Haywood	-/B-26	5-32	08/92	-/19	-/3.74	Good-Fair
Cataloochee Cr, SR 1395 (Gov. Rd), Haywood	K/B-27	5-41	08/92	84/42	3.10/2.10	Excellent
			07/91	80/48	2.59/1.88	Excellent
			10/90	86/47	2.60/1.73	Excellent
			07/90	95/51	2.99/1.74	Excellent
			04/90	86/56	2.19/1.82	Excellent
			01/90	85/51	2.21/1.80	Excellent
			07/89	101/53	2.86/1.77	Excellent
			07/86	102/47	3.38/1.95	Excellent
			08/84	96/42	3.16/1.72	Excellent
			01/90	-/45	-/1.52	Excellent
Cataloochee Cr, nr SR 1395 ab Palmer Cr, Hay.	-/B-28	5-41	01/90	-/45	-/1.52	Excellent
UT Rough Br, nr SR 1395, Haywood	-/B-29	5-41-1	04/91	-/47	-/1.66	Excellent
Palmer Cr, nr SR 1395, Haywood	-/B-30	5-41-2	04/91	-/46	-/1.51	Excellent
Pretty Hollow Cr, nr SR 1395, Haywood	-/B-31	5-41-2-4	04/91	-/47	-/1.46	Excellent
Lower Double Br, ab Cataloochee Cr nr Gov. Rd., Haywood	74/B-32	5-41-6	10/90	63/37	2.64/1.48	Excellent
			07/90	54/31	2.81/1.73	Excellent
			04/90	57/36	2.09/1.41	Excellent
			01/90	57/36	1.84/1.31	Excellent
			01/90	-/40	-/1.95	Excellent
Little Cataloochee Cr, SR 1397, Haywood	75/B-33	5-41-10	01/90	-/40	-/1.95	Excellent
Cold Springs Cr, Gov't. Rd nr cmpg, Haywood	-/B-34	5-45	04/92	84/48	2.75/1.98	Excellent
			03/92	78/45	2.73/1.71	Excellent

FBR 06

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIPT	Bioclass			
Nolichucky R, SR 1321 nr Poplar, Mitchell	P/B-1	7	07/92	88/42	4.14/3.37	Good			
			07/90	83/38	4.31/3.27	Good			
			08/88	93/35	4.86/3.81	Good			
			07/86	84/37	4.86/3.57	Good			
			08/85	72/28	4.63/3.36	Good			
			08/84	68/31	4.47/3.73	Good			
			08/83	78/34	4.55/3.86	Good			
			02/89	59/35	4.01/2.68	Good			
			07/92	99/41	4.13/3.01	Good			
			08/89	93/34	4.28/3.48	Good			
North Toe R, NC 80 be Brushy Cr, Avery North Toe R, US 19E at Ingalls, Avery	-/B-2 M/B-3	7-2-(0.5) 7-2-(0.5)	02/89	59/35	4.01/2.68	Good			
			07/92	99/41	4.13/3.01	Good			
			08/89	93/34	4.28/3.48	Good			
			02/89	58/29	4.45/3.14	Good			
			08/88	-/34	-/2.83	Good			
			08/87	92/38	4.58/3.23	Good			
			09/85	85/35	4.78/3.33	Good			
			08/84	84/36	4.15/2.93	Good			
			09/85	75/29	3.67/2.27	Good			
			02/89	-/27	-/2.36	Good-Fair			
Jones Cr, SR-1100, Avery Brushy Cr, SR 1101 ab landfill, Avery Brushy Cr, SR 1101 be landfill, Avery North Toe R, SR 1162 at Penland, Mitchell	21/B-4 70/B-5 71/B-6 N/B-7	7-2-24 7-2-29 7-2-29 7-2-(38.5)	02/89	-/27	-/2.36	Good-Fair			
			02/89	-/24	-/3.40	Good-Fair			
			07/92	78/23	5.14/2.98	Good-Fair			
			08/89	63/24	5.49/3.27	Good-Fair			
			08/88	-/10	-/2.88	Poor			
			08/87	62/20	5.97/3.68	Fair			
			07/86	70/22	5.89/3.59	Fair			
			09/85	46/12	6.20/3.67	Fair			
			08/84	63/22	5.36/3.27	Good-Fair			
			09/85	77/32	4.94/3.64	Good-Fair			
North Toe R, SR 1121 ab Feldspar, Mitchell North Toe R, NC 226 be Feldspar, Mitchell North Toe R, SR-1551, Mitchell North Toe R be Indusmin, Mitchell North Toe R, SR 1314 at Loafers Glory, Yancey Little Bear Cr, nr NC 226 ab IMC Corp, Mitch. Little Bear Cr, be IMC Corp., Mitchell Crabtree Cr, SR 1002, Mitchell South Toe R ab NC 80 bridge, Yancey	15/B-8 16/B-9 17/B-10 18/B-11 -/B-12 20/B-13 20/B-14 -/B-15 88/B-16	7-2-(38.5) 7-2-(38.5) 7-2-(38.5) 7-2-(38.5) 7-2-(38.5) 7-2-46-1 7-2-46-1 7-2-48 7-2-52-(1)	09/85	77/32	4.94/3.64	Good-Fair			
			09/85	62/23	5.40/4.01	Good-Fair			
			08/85	61/17	6.29/3.85	Fair			
			09/85	50/18	5.70/3.45	Fair			
			07/92	92/40	4.65/3.87	Good			
			09/85	31/8	4.74/2.76	Fair			
			09/85	9/2	7.59/4.29	Poor			
			07/92	-/32	-/2.06	Good			
			01/91	-/51	-/2.01	Excellent			
			06/90	-/41	-/2.05	Excellent			
South Toe R be NC 80 bridge, Yancey South Toe R, SR 1167 at Celso, Yancey	89/B-17 O/B-18	7-2-52-(1) 7-2-52-(1)	01/91	-/44	-/1.70	Good			
			06/90	-/46	-/2.12	Excellent			
			07/92	102/48	3.43/2.44	Excellent			
			08/88	113/48	4.02/2.73	Excellent			
			08/85	99/42	3.85/2.96	Excellent			
			08/83	100/41	4.12/2.92	Good			
			07/92	-/44	-/2.73	Excellent			
			Big Rock Cr, NC-197, Mitchell	-/B-19	7-2-64	07/92	94/49	4.37/3.44	Excellent
						08/89	81/37	4.57/3.84	Good
						08/87	77/34	4.71/3.75	Good
08/85	62/23	5.23/3.65				Good-Fair			
08/83	70/27	5.35/4.05				Good-Fair			
07/92	-/26	-/3.50				Good-Fair			

FBR 07

Site	Old/New DEM #	Index #	Date	S/EPTS	BI/BIPT	Bioclass
Cane R, SR 1417 nr 19W at Sioux (nr Ramseytown), Yancey	Q/B-1	7-3	07/92	94/49	4.37/3.44	Excellent
			08/89	81/37	4.57/3.84	Good
			08/87	77/34	4.71/3.75	Good
			08/85	62/23	5.23/3.65	Good-Fair
			08/83	70/27	5.35/4.05	Good-Fair
Bald Mt Cr, SR 1408, Yancey	-/B-2-	7-3-32	07/92	-/26	-/3.50	Good-Fair

A-II.2 FISHERIES

To the public, the condition of the fishery is one of the most meaningful indicators of water quality. Fish occupy the upper levels of the aquatic food web and are both directly and indirectly affected by chemical and physical changes in the environment. Water quality conditions that significantly affect lower levels of the food web will affect the abundance, species composition, and condition of the fish population.

A-II.2.1 Fish Community Structure Methods

The North Carolina Index of Biotic Integrity (NCIBI) is a modification of Karr's IBI (1981) which was developed as a method for assessing a streams biological integrity by examining the structure and health of its fish community. The index incorporates information about species richness and composition, trophic composition, fish abundance and fish condition. The NCIBI summarizes the effects of all classes of factors influencing aquatic faunal communities (water quality, energy source, habitat quality, flow regime, and biotic interactions). While any change in a fish community can be caused by many factors, certain aspects of the community are generally more responsive to specific influences. Species composition measurements reflect habitat quality effects. Information on trophic composition reflects the effect of biotic interactions and energy supply. Fish abundance and condition information indicates additional water quality effects. It should be noted, however, that these responses may overlap. For example, a change in fish abundance may be due to decreased energy supply or a decline in habitat quality, not necessarily a change in water quality.

The assessment of biological integrity using IBI is provided by the cumulative assessment of 12 parameters, or metrics. The values provided by the metrics are converted into scores on a 1, 3, 5 scale. A score of 5 represents conditions expected for undisturbed streams in the area, while a score of 1 indicates that the conditions vary greatly from those expected in undisturbed streams of the region. The scores for each metric are summed to attain the overall IBI score.

Each metric is designed to contribute unique information to the overall assessment. A discussion of each metric is presented below; some metrics have been grouped together.

1. The total number of species and individuals supported by streams of a given size in a given region decrease with environmental degradation.
2. Darters are sensitive to environmental degradation particularly as a result of their specific reproductive and habitat requirements. Darter habitats are degraded as a result of channelization, siltation, and reduced oxygen levels. Collection of fewer than expected darter species can indicate that some habitat degradation is occurring.
3. Sunfish species are used because they are particularly responsive to degradation of pool habitats and to other aspects of habitat degradation like quality of instream cover.
4. Sucker species are intolerant of habitat and chemical degradation and, because they are long lived, provide a multiyear integrated perspective.
5. Intolerant species are those which are most effected by environmental perturbations and therefore should have disappeared, at least as viable populations, by the time a stream is degraded to a fair rating.
6. Tolerant species are those which are often present in a stream in moderate numbers, but as the stream degrades they tend to dominate.
7. The three trophic composition metrics, proportion of omnivores, insectivores, and piscivores, are used to measure the divergence from expected production and consumption patterns in the fish community that can result from environmental degradation. The main cause for a shift in the trophic composition of the fish community (a greater proportion of omnivores and few insectivores) is nutrient enrichment.

8. The proportion of fish with disease, tumors, fin damage, and skeletal anomalies increases as a stream is degraded. The length distribution metric measures the amount of reproduction which is occurring in the community by looking at the number of age groups, determined by length range, present for each species.

A field methodology for fish collections to be used for NC IBI is included in the standard operating procedures of the NC Division of Environmental Management (NCDEM, 1989). A representative section of stream, 600 feet in length, is selected, measured, and blocked at the upstream and downstream ends with small mesh nets. The stream is then sampled with one or two backpack electrofishing units depending upon stream width. After collection, the fish are examined for sores, lesions, fin damage, and skeletal anomalies and preserved in 10% formalin. Once preserved the fish are identified to species, length recorded, and batch weighed by species.

Streams with larger watersheds or drainage areas can be expected to support more fish species and a larger number of fish. Figures 1 and 2 represent the relative number of species and number of fish that can be expected in the North Carolina river basins. Table 2 presents a summary of fish community assessment data from 1980 to 1993 for each sampling location in the basin.

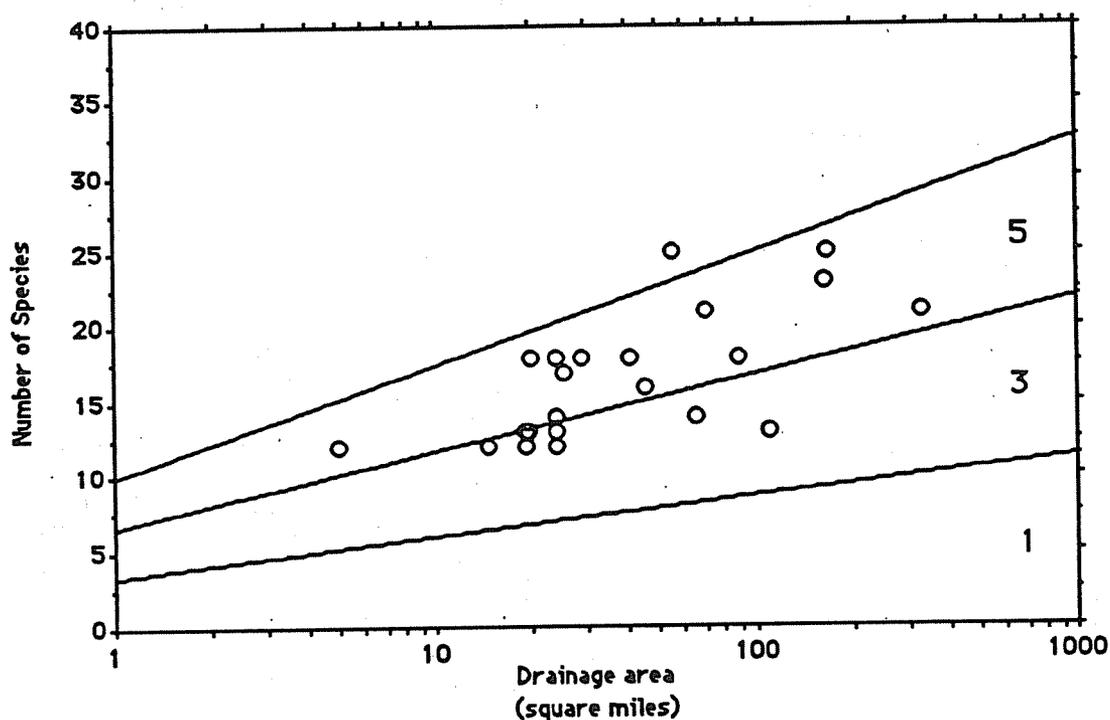


Figure 1. Expectations of the Number of Species based upon Drainage Area Size

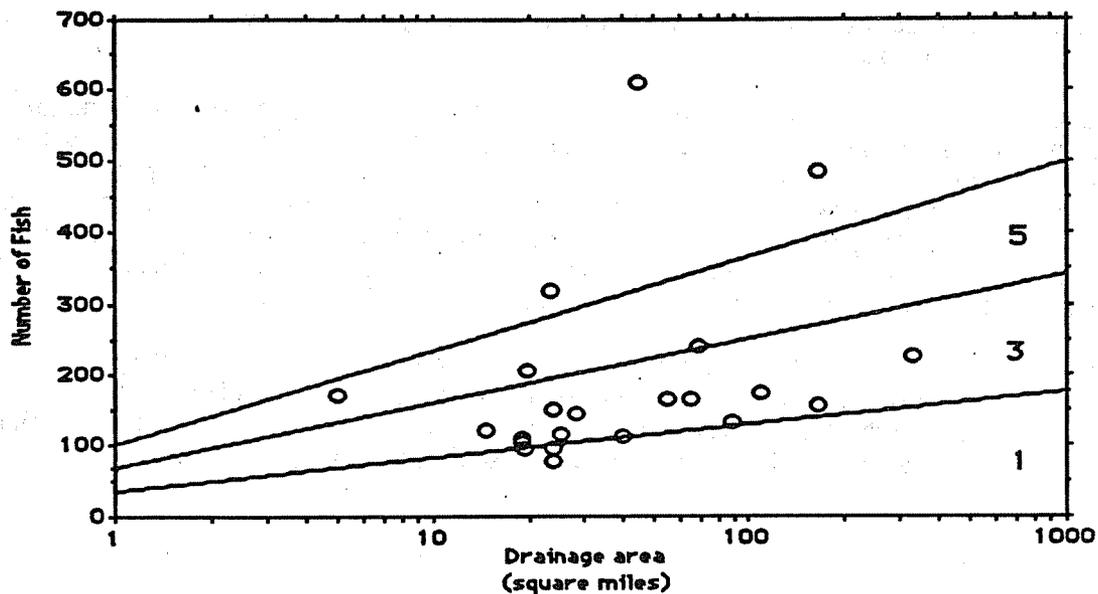


Figure 2. Expectations of the Number of Fish based upon Drainage Area Size

Table 2. Fish Community Assessment Ratings for the French Broad Basin (Note: locations are shown on the subbasin maps in Chapter 4)

Subbasin 02

Site	Stream	Location	Drainage Area(mi ²)	Date	County	NCIBI Score	NCIBI Rating	Collector
F-1	Flat Cr	SR-1742	25	800825	Buncombe	50	Good	NCWRC
F-2	Swannanoa R.	SR-2500	20	871021	Buncombe	52	Good	NCDEM
F-3	Swannanoa R.	SR-2727	60.4	871021	Buncombe	50	Good	NCDEM
F-4	Swannanoa R.	SR-2416	81	871020	Buncombe	56	Excellent-Good	NCDEM
F-5	Swannanoa R.	NC-81	102	871020	Buncombe	54	Excellent-Good	NCDEM
F-6	Swannanoa R.	NC-25	130	871020	Buncombe	50	Good	NCDEM
F-6	Swannanoa R.	NC-25	130	930628	Buncombe	46	Good-Fair	NCDEM
F-7	Sandymush Cr.	SR-1607	45	800820	Buncombe	46	Good-Fair	NCWRC
F-7	Sandymush Cr.	SR-1607	45	931116	Buncombe	52	Good	NCDEM
F-8	Cane Creek	NC-25	82	930926	Buncombe	50	Good	ROHDE
F-9	Hominy Creek	NC-151	30	930723	Buncombe	50	Good	NCDEM
F-10	South Hominy Cr	NC-151	38	930723	Buncombe	46	Good-Fair	NCDEM
F-11	Reems Creek	NC-251	36	931117	Buncombe	56	Excellent-Good	NCDEM

Subbasin 04

Site	Stream	Location	Drainage Area(mi ²)	Date	County	NCIBI Score	NCIBI Rating	Collector
F-14	Spring Cr	Hot Springs	72	800920	Madison	54	Excellent-Good	UNCC
F-15	Shelton Laurel Cr	NC-208	35	920724	Madison	54	Excellent-Good	NCDEM
F-16	Ivy R	US-25/70	161	931116	Madison	52	Good	NCDEM
F-17	Big Ivy Cr	SR-2150	63	931117	Buncombe	58	Excellent	NCDEM

Subbasin 05

Site	Stream	Location	Drainage Area(mi ²)	Date	County	NCIBI Score	NCIBI Rating	Collector
F-18	Pigeon River	RM-65.5	133	870723	Haywood	52	Good	EA
F-19	Pigeon River	RM-64.5	133	870718	Haywood	52	Good	EA
F-20	Pigeon River	RM-63	136	870717	Haywood	36	Fair-Poor	EA
F-21	Pigeon River	RM-59	162	870716	Haywood	36	Fair-Poor	EA
F-22	Pigeon River	RM-52.3	243	870721	Haywood	38	Fair-Poor	EA
F-23	Pigeon River	RM-48.2	278	870721	Haywood	14	Very Poor	EA
F-24	Pigeon River	RM-42.6	381	870719	Haywood	30	Poor	EA
F-25	Richland Creek	US-23	13	920723	Haywood	46	Good-Fair	NCDEM
F-26	Richland Creek	SR-1519	68	870717	Haywood	48	Good	EA
F-27	Jonathan Creek	NC-276	65	931116	Haywood	50	Good	NCDEM

Subbasin 06

Site	Stream	Location	Drainage Area(mi ²)	Date	County	NCIBI Score	NCIBI Rating	Collector
F-28	South Toe R	SR-1168	43	930723	Yancey	48	Good	ROHDE
F-29	South Toe R	SR-1169/1167	43	930721	Yancey	54	Excellent-Good	ROHDE
F-30	South Toe R	SR-1169/1152	54	930721	Yancey	50	Good	ROHDE
F-31	South Toe R	SR-1201	56	930906	Yancey	58	Excellent	ROHDE
F-32	South Toe R	SR-1152/1169	57	930723	Yancey	58	Excellent	ROHDE
F-33	South Toe R	SR-1309	84	930905	Yancey	58	Excellent	ROHDE
F-34	South Toe R	SR-1305	85	930905	Yancey	54	Excellent-Good	ROHDE
F-35	North Toe R	NC-80	180	930718	Yancey	52	Good	ROHDE
F-36	North Toe R	SR-1177	268	921003	Mitchell	52	Good	ROHDE
F-37	North Toe R	SR-1187	268	930720	Mitchell	54	Excellent-Good	ROHDE
F-38	North Toe R	SR-1336	326	921003	Yancey	56	Excellent-Good	ROHDE
F-39	North Toe R	NC-197	442	930722	Mitchell	52	Good	ROHDE

Subbasin 07

Site	Stream	Location	Drainage Area(mi ²)	Date	County	NCIBI Score	NCIBI Rating	Collector
F-40	Cane River	SR-1411	138	930719	Yancey	54	Excellent-Good	ROHDE
F-41	Cane River	SR-1417	157	921002	Yancey	54	Excellent-Good	ROHDE
F-42	Cane River	US-19W	157	930904	Yancey	52	Good	ROHDE
F-43	Cane River	SR-1343	158	930904	Yancey	56	Excellent-Good	ROHDE

A-II.2.2 Fish Tissue

Since fish spend their entire lives in the aquatic environment, they incorporate chemicals from this environment into their body tissues. Therefore, by analyzing fish tissue, determinations about what chemicals are in the water can be made. Once contaminants reach surface waters, they may be available for bioaccumulation either directly or through aquatic food webs and may accumulate in fish and shellfish tissues. Thus results from fish tissue monitoring can serve as an important indicator of further contamination of sediments and surface water. Fish tissue analysis results are also used as indicators for human health concerns and fish and wildlife health concerns, and the presence and concentrations of various chemicals in the ecosystem. Contamination of aquatic resources, including freshwater, estuarine, and marine fish and shellfish species have been documented for heavy metals, pesticides, and other complex organic compounds.

In evaluating fish tissue analysis results, several different types of criteria are used. Currently human health concerns related to fish consumption are screened by comparing results with Federal Food and Drug Administration (FDA) action levels. The FDA levels were developed to protect humans from the chronic effects of toxic substances consumed in foodstuffs and thus employ a

"safe level" approach to fish tissue consumption. A list of fish tissue parameters accompanied by their FDA criteria are presented below. Individual parameters which appear to be of potential human health concern are evaluated by the N.C. Division of Epidemiology by request of the Water Quality Section.

Metals

	<u>FDA</u>		<u>FDA</u>
Cadmium	None	Chromium	None
Nickel	None	Lead	None
Copper	None	Arsenic	None
Mercury	1.0 mg/kg	Selenium	None

Synthetic Organics

	<u>FDA</u>		<u>FDA</u>
Aldrin	0.3 mg/kg	o,p DDD	5.0 mg/kg
Dieldrin	0.3 mg/kg	p,p DDD	5.0 mg/kg
Endrin	0.3 mg/kg	o,p DDE	5.0 mg/kg
Methoxychlor	None	p,p DDE	5.0 mg/kg
Alpha BHC	None	o,p DDT	5.0 mg/kg
Gamma BHC	None	p,p DDT	5.0 mg/kg
PCB-1254	2.0 mg/kg	cis-chlordane	3.0 mg/kg
Endosulfan I	None	trans-chlordane	3.0 mg/kg
Endosulfan II	None	Hexachlorobenzene	None

The USEPA is currently developing screening values for target analytes which are formulated from a risk assessment procedure. The EPA screening value for a particular analyte is the concentration of that analyte in edible fish tissue that is associated with a maximum limit of acceptable health risk to the general population or subpopulation of concern.

A-II.3 LAKES ASSESSMENT PROGRAM

Lakes are valued for the multiple benefits they provide to the public, including recreational boating, fishing, drinking water, and aesthetic enjoyment. The North Carolina Lake Assessment Program seeks to protect these waters through monitoring, pollution prevention and control, and restoration activities. Assessments have been made at all publicly accessible lakes, at lakes which supply domestic drinking water, and lakes (public or private) where water quality problems have been observed. Data are used to determine each lake's trophic status—a relative measure of nutrient enrichment and productivity, and whether the lake's uses have been threatened or impaired by pollution.

Tables presented in each subbasin summarize data used to determine the trophic status and use support status of each lake. These determinations are based on information from the most recent summertime sampling (date listed). The most recent North Carolina Trophic State Index (NCTSI) value is shown, followed by the descriptive trophic state classification (O=oligotrophic, M=mesotrophic, E=eutrophic, H=hypereutrophic, D=dystrophic).

Numerical indices are often used to evaluate the trophic status of lakes. An index was developed specifically for North Carolina lakes as part of the state's original Clean Lakes Classification Survey (NRCD 1982). The North Carolina Trophic State Index (NCTSI) is based on total phosphorus (TP in mg/l), total organic nitrogen (TON in mg/l), Secchi depth (SD in inches), and chlorophyll-a (CHL in µg/l). Lakewide means for these parameters are integrated to produce a NCTSI score for each lake, using the following equations:

$$\text{TON score} = \frac{\text{Log(TON)} + (0.45)}{0.24} \times 0.90$$

$$\text{TP score} = \frac{\text{Log(TP)} + (1.55)}{0.35} \times 0.92$$

$$\text{SD score} = \frac{\text{Log(SD)} - (1.73)}{0.35} \times -0.82$$

$$\text{CHL score} = \frac{\text{Log(CHL)} - (1.00)}{0.43} \times 0.83$$

$$\text{NCTSI} = \text{TON score} + \text{TP score} + \text{SD score} + \text{CHL score}$$

In general, NCTSI scores relate to trophic classifications as follows: less than -2.0 is oligotrophic; -2.0 to 0.0 is mesotrophic; 0.0 to 5.0 is eutrophic; and greater than 5.0 is hypereutrophic. When scores border between classes, best professional judgment is used to assign an appropriate classification. NCTSI scores are also skewed by the highly colored water typical of dystrophic lakes. These acidic, "black-water" lakes are scattered throughout the coastal plain, often located in swampy areas or overlying peat deposits.

A-II.4 Effluent Toxicity Testing

Effluent toxicity testing is required on a quarterly basis for major NPDES dischargers and any discharger containing complex (industrial) wastewater. DEM's Aquatic Toxicology Unit maintains a compliance summary for all facilities required to perform toxicity tests and provides a monthly update of this information to the regional offices and DEM administration.

Table 3. NPDES Discharge Facilities Required to Conduct Effluent Toxicity Testing

Subbasin 01

Facility	NPDES#	Receiving Stream	County	Flow(MGD)	IWC(%)
Dupont-Brevard	NC0000337/001	Little River	Transylvania	2.0000	14.66
Ecusta Division	NC0000078/001	French Broad River	Transylvania	27.5000	21.05
MB Industries	NC0000311/001	W Fk French Broad	Transylvania	0.0430	0.17

Subbasin 02

Facility	NPDES#	Receiving Stream	County	Flow(MGD)	IWC(%)
BASF	NC0000299/001	Hominy Cr.	Buncombe	4.0	21.2
Bon Worth, Inc.	NC0037176/001	Allen Br.	Henderson	0.006	3.7
Brevard WWTP	NC0060534/001	Fr. Broad River	Transylvan.	2.5	2.40
Buncombe Co. MSD	NC0024911/001	Fr. Broad River	Buncombe	40.0	11.7
Carol. Water Serv.-Bent Cr.	NC0036684/001	Wesley Cr.	Buncombe	0.1	28.0
Cedars Of Clear Creek	NC0067245/001	Cherry Branch	Henderson	0.018	27.0
CP&L-Asheville Ash Pond	NC0000396/001	Fr. Broad River	Buncombe	1.9	0.77
Cranston Print Works	NC0000094/001	Fr. Broad River	Henderson	4.0	1.85
Etowah WWTP	NC0071323/001	Gash Cr.	Henderson	0.125	71.0
GE Lighting Systems	NC0077771/001	Bat Fork Cr.	Henderson	0.3	61.0
General Electric	NC0000507/001	Bat Fork Cr.	Henderson	0.5	72.1
Hampton Inn	NC0062880/001	Allen Branch	Henderson	Ceased Discharge	
Henderson Co. Schools	NC0066681/001	UT Mill Pond	Henderson	0.009	13.0
Hendersonville WWTP	NC0025534/001	Mud Cr.	Henderson	3.2	11.01
Holiday Inn-Henderson	NC0034231/001	Allen Branch	Henderson	Ceased Discharge	
Kyocera Ind. Ceramics	NC0057878/001	UT Mud Cr.	Henderson	NA	43.0
Wedgfield Acres MHP	NC0062634/001	UT Pond Br.	Buncombe	0.025	100.0

Subbasin 04

Facility	NPDES#	Receiving Stream	County	Flow(MGD)	IWC(%)
Marshall WWTP	NC0021733/001	French Broad River	Madison	0.4000	0.12

Subbasin 05

Facility	NPDES#	Receiving Stream	County	Flow(MGD)	IWC(%)
Champion Paper-Canton	NC0000272/001	Pigeon River	Haywood	48.5000	100.00
Maggie Valley WWTP	NC0056561/001	Jonathan Cr.	Haywood	1.0000	6.30
Mt. Pisgah Lodge/Recreation Area	NC0072729/001	UT Pisgah Cr.	Haywood	0.0320	25.00
Waynesville WWTP	NC0025321/001	Pigeon River	Haywood	6.0000	8.91

Subbasin 06

<u>Facility</u>	<u>NPDES#</u>	<u>Receiving Stream</u>	<u>County</u>	<u>Flow(MGD)</u>	<u>IWC(%)</u>
Bakersville WWTP	NC0025461/001	Cane Cr.	Mitchell	0.0750	3.12
Feldspar Corp.	NC0000353/001	North Toe River	Mitchell	3.5000	11.18
K-T Feldspar	NC0000400/001	North Toe River	Mitchell	1.7300	5.73
Ledbetter Oil Co- Rain. Pantry #5	NC0076911/001	White Oak Cr.	Avery	0.0045	1.90
Spruce Pine WWTP	NC0021423/001	North Toe River	Mitchell	0.6000	2.06
Unimin Corp-Mica Operations	NC0000361/001	North Toe River	Avery	2.1600	10.00
Unimin Corp-Quartz Operations	NC0000175/001	North Toe River	Mitchell	3.6100	11.00

Subbasin 07

<u>Facility</u>	<u>NPDES#</u>	<u>Receiving Stream</u>	<u>County</u>	<u>Flow(MGD)</u>	<u>IWC(%)</u>
Burnsville WWTP	NC0020290/001	Cane River	Yancey	0.8000	6.13