Table 1. Land-use distributions for subbasins at the HUC14 scale in the BBLEH watershed for 1986, 1995, 2002, and 2007 land-use years.

[--, not available]

Watershed segment	HUC14	Drainage area, in square kilometers	Land use, in percent of subbasin (HUC14) area						
			Agriculture	Barren land	Forest	Impervious urban	Non-residential urban	Residential urban	Water + Wetlands
1986									
North	02040301020010	22.1	6.9	0.4	26.8	--	2.8	9.1	54.1
North	02040301020020	28.1	4.4	0.9	23.9	--	9.3	37.8	23.7
North	02040301020030	15.8	4.7	2.6	21.4	--	5.1	30.5	35.7
North	02040301020040	12.5	12.9	4.7	40.3	--	4.4	8.3	29.4
North	02040301020050	20.5	4.0	1.3	27.5	--	17.5	34.1	15.6
North	02040301030010	13.0	5.9	0.6	35.3	--	3.2	2.6	52.4
North	02040301030020	14.6	4.3	0.8	48.4	--	6.4	8.4	31.7
North	02040301030030	19.6	10.1	0.2	40.5	--	3.7	17.4	28.1
North	02040301030040	20.2	1.1	2.5	38.6	--	10.1	32.8	14.9
North	02040301030050	12.4	0.1	1.2	42.8	--	16.2	20.0	19.6
North	02040301040010	20.4	0.8	0.9	16.9	--	10.2	53.5	17.8
North	02040301040020	19.7	0.3	2.1	30.3	--	19.4	28.7	19.2
North	02040301040030	6.8	0.0	0.0	1.3	--	17.4	66.2	15.2
North	02040301050010	15.6	2.9	1.1	51.2	--	10.9	25.6	8.3
North	02040301050020	21.9	1.8	1.5	29.3	--	8.5	41.6	17.3
North	02040301050030	8.2	0.0	0.0	11.7	--	5.5	17.2	65.6
North	02040301050040	33.0	0.4	1.1	14.3	--	7.7	45.2	31.3
North	02040301050050	7.5	0.0	0.8	0.8	--	14.2	61.6	22.7
North	02040301060010	19.6	13.1	0.4	44.3	--	2.1	9.7	30.4
North	02040301060020	25.0	0.5	0.7	66.7	--	2.2	10.2	19.7
North	02040301060030	19.4	6.5	0.3	44.9	--	3.1	9.7	35.5

North	02040301060040	15.2	3.6	0.0	53.2	--	1.6	2.1	39.5
North	02040301060050	20.5	5.4	1.4	50.6	--	4.1	10.2	28.3
North	02040301060060	17.3	4.7	17.9	45.7	--	3.4	4.8	23.5
North	02040301060070	17.8	3.3	18.4	54.3	--	3.6	12.2	8.3
North	02040301060080	21.2	5.9	7.3	45.6	--	10.7	20.1	10.5
North	02040301070010	31.3	10.2	0.2	50.2	--	1.8	2.9	34.6
North	02040301070020	15.7	5.1	1.9	61.2	--	6.1	0.6	25.1
North	02040301070030	26.0	0.7	7.6	47.1	--	9.1	4.0	31.5
North	02040301070040	12.9	3.7	8.1	56.4	--	3.4	16.2	12.2
North	02040301070050	14.6	0.4	0.7	77.1	--	7.0	0.0	14.8
North	02040301070060	14.4	1.9	2.4	66.7	--	1.1	3.9	23.9
North	02040301070070	13.0	0.9	26.6	39.7	--	0.8	2.5	29.4
North	02040301070080	17.1	0.4	2.1	33.5	--	40.7	2.9	20.4
North	02040301070090	18.5	0.4	5.0	45.4	--	3.9	22.5	22.7
North	02040301080010	14.2	0.1	9.4	58.0	--	0.9	0.1	31.5
North	02040301080020	14.1	2.1	0.0	52.4	--	6.5	24.6	14.3
North	02040301080030	19.3	0.5	0.2	71.0	--	2.6	15.9	9.8
North	02040301080040	17.6	0.0	2.9	62.2	--	7.3	20.8	6.9
North	02040301080050	24.1	0.1	2.3	44.7	--	9.4	33.1	10.4
North	02040301080060	13.2	0.2	1.7	25.8	--	24.4	29.6	18.2
North	02040301080070	24.8	0.3	1.8	64.1	--	3.2	8.8	21.8
North	02040301080080	17.4	5.6	1.6	34.9	--	21.6	33.2	3.0
North	02040301080090	25.4	0.1	9.9	18.4	--	13.0	48.9	9.8
Central	02040301090010	18.7	0.6	0.0	85.9	--	0.3	0.2	13.1
Central	02040301090020	24.3	0.6	2.7	81.3	--	0.2	0.1	15.1
Central	02040301090030	23.6	0.0	0.2	75.7	--	4.3	1.1	18.6
Central	02040301090040	32.4	0.7	5.5	72.7	--	0.1	0.8	20.2
Central	02040301090050	20.6	0.4	7.4	62.6	--	1.9	2.1	25.5
Central	02040301090060	21.8	0.6	2.8	43.9	--	7.2	16.3	29.2
Central	02040301100010	20.6	0.4	1.4	22.6	--	5.4	23.8	46.4

Central	02040301100020	12.6	3.2	0.0	14.4	--	3.8	26.9	51.7
Central	02040301100030	8.2	0.0	1.1	0.4	--	5.5	13.6	79.4
Central	02040301110010	22.3	0.0	0.6	87.2	--	0.1	0.0	12.1
Central	02040301110020	18.7	0.0	1.8	56.3	--	4.0	19.8	18.1
Central	02040301110030	25.7	0.1	0.9	49.4	--	6.1	13.0	30.5
Central	02040301110040	19.4	0.3	2.7	76.7	--	0.6	1.1	18.5
Central	02040301110050	14.0	0.0	0.9	58.3	--	5.6	3.4	31.7
Central	02040301120010	23.1	0.5	1.2	55.9	--	5.6	15.9	20.9
Central	02040301120020	37.3	0.3	0.8	10.7	--	2.5	6.6	79.1
Central	02040301120030	8.3	0.0	0.6	1.1	--	6.3	31.8	60.2
South	02040301130010	21.4	1.8	2.8	75.5	--	4.2	9.3	6.3
South	02040301130020	26.8	0.0	3.2	76.2	--	2.4	9.0	9.2
South	02040301130030	37.1	0.4	1.2	12.2	--	8.0	13.1	65.1
South	02040301130040	21.6	0.3	1.8	69.3	--	1.7	3.2	23.7
South	02040301130050	41.0	0.5	1.3	78.0	--	0.7	0.1	19.4
South	02040301130060	23.9	1.7	2.1	50.6	--	3.7	6.3	35.5
South	02040301130070	12.8	0.3	0.4	16.6	--	1.2	1.5	79.9
South	02040301130080	6.2	0.0	0.0	1.9	--	15.2	47.6	35.4
South	02040301140010	12.7	0.0	0.1	89.8	--	0.7	0.0	9.4
South	02040301140020	13.1	0.2	0.8	83.6	--	1.7	1.1	12.6
South	02040301140030	15.5	1.4	2.3	50.1	--	7.6	20.3	18.2
South	02040301140040	17.9	0.6	0.3	20.3	--	2.7	8.6	67.4
South	02040301140050	15.3	0.0	0.4	5.1	--	2.8	14.4	77.3
South	02040301140060	8.4	0.0	2.3	0.2	--	5.9	20.0	71.6
South	02040301910010	1.1	0.0	36.7	0.0	--	11.3	51.1	0.8
South	02040301910020	3.0	0.0	22.9	0.1	--	11.6	63.1	2.2
South	02040301910030	5.3	0.0	24.2	0.0	--	7.1	12.6	56.2
South	02040301920010	2.6	0.0	22.6	1.2	--	3.1	55.6	17.5
South	02040301920020	3.0	0.0	19.6	1.0	--	12.4	63.6	3.3
South	02040301920030	2.9	0.0	22.5	0.0	--	8.9	59.1	9.5

1995									
North	02040301020010	22.1	6.4	0.6	26.0	--	3.4	9.8	53.8
North	02040301020020	28.1	3.8	0.8	21.7	--	9.6	41.6	22.6
North	02040301020030	15.8	4.2	1.3	19.1	--	5.3	36.0	34.1
North	02040301020040	12.5	12.9	3.5	41.4	--	4.4	9.0	28.8
North	02040301020050	20.5	4.0	0.9	25.4	--	16.9	37.6	15.3
North	02040301030010	13.0	5.6	0.8	35.5	--	2.6	3.1	52.3
North	02040301030020	14.6	4.1	0.7	45.4	--	7.1	11.5	31.3
North	02040301030030	19.6	7.3	0.9	36.3	--	3.4	24.6	27.4
North	02040301030040	20.2	0.8	2.1	32.5	--	10.5	39.4	14.7
North	02040301030050	12.4	0.1	1.1	35.8	--	22.9	20.9	19.2
North	02040301040010	20.4	0.1	1.1	12.0	--	10.7	59.2	17.0
North	02040301040020	19.7	0.2	3.0	24.6	--	23.2	30.1	18.9
North	02040301040030	6.8	0.0	0.4	1.1	--	17.3	66.6	14.6
North	02040301050010	15.6	2.1	2.5	38.9	--	14.8	33.7	7.9
North	02040301050020	21.9	1.2	2.2	22.0	--	9.6	48.2	16.7
North	02040301050030	8.2	0.0	0.0	11.0	--	5.3	19.6	64.1
North	02040301050040	33.0	0.2	0.4	12.1	--	8.0	49.0	30.3
North	02040301050050	7.5	0.0	0.8	0.8	--	13.8	61.8	22.7
North	02040301060010	19.6	8.5	1.0	40.0	--	3.2	17.5	29.9
North	02040301060020	25.0	0.6	0.4	62.6	--	2.4	14.7	19.3
North	02040301060030	19.4	5.2	0.5	40.2	--	3.2	16.0	34.8
North	02040301060040	15.2	2.2	0.0	54.8	--	1.1	2.4	39.5
North	02040301060050	20.5	4.5	1.0	48.0	--	3.4	15.1	28.0
North	02040301060060	17.3	4.0	14.8	46.3	--	2.7	6.5	25.8
North	02040301060070	17.8	2.5	14.8	54.2	--	4.8	15.3	8.4
North	02040301060080	21.2	4.5	6.6	39.5	--	13.1	26.0	10.3
North	02040301070010	31.3	8.5	0.7	49.5	--	1.8	4.9	34.6
North	02040301070020	15.7	5.0	1.9	61.6	--	5.6	0.8	25.1
North	02040301070030	26.0	0.8	5.9	47.6	--	9.2	4.7	31.8

North	02040301070040	12.9	4.1	9.5	51.3	--	3.9	19.1	12.2
North	02040301070050	14.6	0.4	0.1	77.7	--	6.9	0.1	14.8
North	02040301070060	14.4	1.5	2.2	66.7	--	1.6	4.0	23.9
North	02040301070070	13.0	0.2	19.6	47.1	--	1.0	2.6	29.4
North	02040301070080	17.1	0.4	1.8	33.1	--	41.2	2.9	20.5
North	02040301070090	18.5	0.3	2.0	42.9	--	5.3	26.8	22.7
North	02040301080010	14.2	0.1	8.4	59.0	--	0.9	0.1	31.5
North	02040301080020	14.1	2.3	1.1	50.3	--	6.5	25.5	14.3
North	02040301080030	19.3	0.5	0.2	66.6	--	2.9	20.0	9.8
North	02040301080040	17.6	0.0	0.7	50.0	--	7.5	34.8	7.0
North	02040301080050	24.1	0.1	2.0	42.0	--	11.0	34.8	10.1
North	02040301080060	13.2	0.1	1.7	23.7	--	25.9	30.3	18.3
North	02040301080070	24.8	0.3	1.9	63.1	--	3.1	9.7	21.9
North	02040301080080	17.4	3.4	1.7	25.9	--	22.3	43.8	2.8
North	02040301080090	25.4	0.1	10.2	15.5	--	14.0	50.8	9.4
Central	02040301090010	18.7	0.6	0.0	85.9	--	0.4	0.0	13.1
Central	02040301090020	24.3	0.5	2.5	81.6	--	0.2	0.1	15.2
Central	02040301090030	23.6	0.0	0.9	75.4	--	4.0	1.2	18.6
Central	02040301090040	32.4	0.7	5.1	72.9	--	0.1	1.0	20.2
Central	02040301090050	20.6	0.6	7.6	61.7	--	1.8	2.5	25.7
Central	02040301090060	21.8	0.4	2.6	38.2	--	8.3	21.7	28.8
Central	02040301100010	20.6	0.3	0.6	19.5	--	6.0	27.9	45.7
Central	02040301100020	12.6	2.6	0.0	12.5	--	3.9	29.8	51.2
Central	02040301100030	8.2	0.0	1.0	0.4	--	5.5	13.7	79.4
Central	02040301110010	22.3	0.0	0.6	87.1	--	0.2	0.0	12.2
Central	02040301110020	18.7	0.0	1.8	55.1	--	4.5	20.6	18.0
Central	02040301110030	25.7	0.1	0.9	49.0	--	5.7	13.9	30.4
Central	02040301110040	19.4	0.2	2.2	76.4	--	0.8	1.9	18.5
Central	02040301110050	14.0	0.0	0.6	59.6	--	4.0	4.1	31.7
Central	02040301120010	23.1	0.3	0.4	52.7	--	6.2	19.9	20.5

Central	02040301120020	37.3	0.1	0.7	9.3	--	3.0	7.9	78.9
Central	02040301120030	8.3	0.0	0.4	1.0	--	6.2	32.8	59.7
South	02040301130010	21.4	0.7	3.1	71.0	--	4.4	14.1	6.6
South	02040301130020	26.8	0.0	2.6	72.2	--	2.3	13.7	9.2
South	02040301130030	37.1	0.2	1.2	10.7	--	8.9	14.1	65.0
South	02040301130040	21.6	0.1	2.1	67.9	--	2.3	4.1	23.5
South	02040301130050	41.0	0.5	0.3	79.1	--	0.7	0.1	19.4
South	02040301130060	23.9	1.1	1.7	49.8	--	4.3	7.5	35.5
South	02040301130070	12.8	0.0	0.7	16.0	--	1.6	1.7	79.9
South	02040301130080	6.2	0.0	0.0	1.3	--	15.2	48.5	35.0
South	02040301140010	12.7	0.0	0.1	89.9	--	0.7	0.0	9.4
South	02040301140020	13.1	0.0	1.4	81.9	--	1.9	2.1	12.6
South	02040301140030	15.5	0.4	3.1	44.7	--	8.7	25.0	18.1
South	02040301140040	17.9	0.2	0.3	18.3	--	3.0	10.9	67.3
South	02040301140050	15.3	0.0	0.4	4.0	--	2.9	15.6	77.1
South	02040301140060	8.4	0.0	1.7	0.2	--	5.9	20.4	71.8
South	02040301910010	1.1	0.0	37.5	0.0	--	10.2	51.0	1.3
South	02040301910020	3.0	0.0	22.5	0.1	--	12.2	63.3	1.9
South	02040301910030	5.3	0.0	23.2	0.0	--	7.3	12.5	57.0
South	02040301920010	2.6	0.0	19.9	0.8	--	3.0	58.8	17.5
South	02040301920020	3.0	0.0	18.8	0.8	--	12.5	63.8	4.1
South	02040301920030	2.9	0.0	15.9	0.0	--	9.0	59.2	15.8
2002									
North	02040301020010	22.1	6.6	1.0	24.4	0.1	3.6	11.4	52.8
North	02040301020020	28.1	3.9	1.4	18.6	1.2	8.7	45.5	20.8
North	02040301020030	15.8	4.4	0.3	17.7	0.5	5.5	38.6	33.0
North	02040301020040	12.5	10.4	4.1	33.6	0.0	6.3	18.5	27.1
North	02040301020050	20.5	2.9	1.3	22.8	1.0	16.1	41.1	14.7
North	02040301030010	13.0	5.7	0.5	35.0	0.9	2.0	3.9	51.9
North	02040301030020	14.6	2.8	4.2	42.2	1.6	6.6	11.9	30.7

North	02040301030030	19.6	5.6	2.5	28.2	0.5	4.0	32.6	26.7
North	02040301030040	20.2	0.8	1.6	27.6	0.0	12.1	43.4	14.4
North	02040301030050	12.4	0.2	2.2	30.5	0.2	24.5	23.4	18.9
North	02040301040010	20.4	0.0	0.2	7.6	1.0	12.4	63.5	15.3
North	02040301040020	19.7	0.0	1.9	22.6	2.9	22.7	30.9	19.1
North	02040301040030	6.8	0.0	0.1	1.0	0.0	17.9	67.0	14.1
North	02040301050010	15.6	0.7	1.1	34.4	1.5	13.7	41.0	7.6
North	02040301050020	21.9	1.1	1.0	16.9	0.8	9.2	54.8	16.3
North	02040301050030	8.2	0.0	0.0	10.5	0.0	5.6	20.3	63.5
North	02040301050040	33.0	0.1	0.5	11.0	0.6	7.5	50.2	30.1
North	02040301050050	7.5	0.0	0.7	0.2	0.2	14.6	60.3	24.0
North	02040301060010	19.6	7.9	0.3	36.1	0.7	3.3	23.0	28.8
North	02040301060020	25.0	0.8	1.0	55.5	0.0	1.4	22.6	18.7
North	02040301060030	19.4	4.3	0.1	33.7	0.0	3.9	24.9	33.1
North	02040301060040	15.2	2.1	0.1	53.8	0.0	1.2	3.4	39.4
North	02040301060050	20.5	3.8	4.0	33.0	0.0	6.9	23.9	28.3
North	02040301060060	17.3	3.6	12.6	44.0	0.0	6.2	7.8	25.9
North	02040301060070	17.8	2.4	9.6	38.3	0.0	10.3	30.9	8.5
North	02040301060080	21.2	3.0	6.7	34.9	0.2	13.1	32.0	10.2
North	02040301070010	31.3	4.6	0.5	52.0	0.0	1.8	6.6	34.5
North	02040301070020	15.7	4.1	1.4	63.0	0.0	5.4	1.0	25.1
North	02040301070030	26.0	0.6	5.9	45.6	0.0	9.9	5.5	32.5
North	02040301070040	12.9	3.3	7.7	45.6	0.0	6.8	24.3	12.2
North	02040301070050	14.6	0.2	0.1	78.4	0.0	6.5	0.1	14.7
North	02040301070060	14.4	1.1	1.4	66.8	0.0	2.8	3.9	24.0
North	02040301070070	13.0	0.3	12.0	54.6	0.0	1.2	2.5	29.5
North	02040301070080	17.1	0.2	1.3	33.8	0.2	40.8	2.8	20.9
North	02040301070090	18.5	0.4	2.2	39.4	0.2	5.9	29.3	22.6
North	02040301080010	14.2	0.0	6.2	61.8	0.0	0.5	0.1	31.4
North	02040301080020	14.1	0.2	0.2	53.8	0.0	4.7	26.9	14.3

North	02040301080030	19.3	0.4	0.1	64.0	0.0	3.1	22.7	9.7
North	02040301080040	17.6	0.0	0.0	50.8	0.8	6.5	34.8	7.1
North	02040301080050	24.1	0.0	1.2	40.4	0.9	10.7	36.8	10.0
North	02040301080060	13.2	0.2	0.4	23.1	2.5	23.0	32.2	18.5
North	02040301080070	24.8	0.1	1.1	63.7	1.0	2.3	9.8	22.0
North	02040301080080	17.4	2.0	1.3	19.4	1.4	20.8	52.4	2.8
North	02040301080090	25.4	0.0	10.1	14.6	0.4	14.3	52.4	8.1
Central	02040301090010	18.7	0.0	0.0	86.5	0.0	0.4	0.0	13.1
Central	02040301090020	24.3	0.0	0.9	83.7	0.0	0.1	0.1	15.2
Central	02040301090030	23.6	0.0	0.3	74.9	1.3	3.3	1.7	18.6
Central	02040301090040	32.4	0.7	3.1	74.3	0.0	0.2	1.1	20.5
Central	02040301090050	20.6	0.5	5.3	63.3	0.3	1.8	2.5	26.2
Central	02040301090060	21.8	0.3	1.8	36.1	1.2	8.6	23.6	28.5
Central	02040301100010	20.6	0.4	0.6	14.8	0.0	6.4	33.5	44.3
Central	02040301100020	12.6	2.0	0.2	10.2	0.0	4.1	32.3	51.2
Central	02040301100030	8.2	0.0	1.4	0.4	0.1	5.7	14.0	78.4
Central	02040301110010	22.3	0.0	0.6	87.1	0.0	0.1	0.0	12.1
Central	02040301110020	18.7	0.0	1.3	55.0	0.4	4.6	20.8	17.9
Central	02040301110030	25.7	0.0	0.9	47.7	1.1	5.3	14.7	30.3
Central	02040301110040	19.4	0.2	1.9	76.4	0.0	1.0	1.9	18.6
Central	02040301110050	14.0	0.0	0.8	57.4	0.9	4.6	4.5	31.8
Central	02040301120010	23.1	0.2	4.3	42.6	0.8	7.1	24.9	20.2
Central	02040301120020	37.3	0.1	1.0	7.5	0.0	3.0	9.5	78.9
Central	02040301120030	8.3	0.0	1.1	0.8	0.0	6.2	32.2	59.8
South	02040301130010	21.4	0.7	2.8	59.8	1.4	4.8	23.8	6.6
South	02040301130020	26.8	0.0	1.6	67.2	0.1	3.0	18.9	9.2
South	02040301130030	37.1	0.3	1.1	9.0	1.1	8.4	15.4	64.7
South	02040301130040	21.6	0.0	2.2	64.7	0.8	2.5	6.1	23.6
South	02040301130050	41.0	0.2	0.2	80.1	0.0	0.1	0.1	19.2
South	02040301130060	23.9	1.3	2.5	47.4	1.3	3.7	8.2	35.6

South	02040301130070	12.8	0.1	1.4	13.6	0.0	2.0	2.9	80.0
South	02040301130080	6.2	0.0	0.4	1.4	1.1	14.9	46.9	35.3
South	02040301140010	12.7	0.0	0.0	90.2	0.4	0.0	0.0	9.4
South	02040301140020	13.1	0.0	2.3	77.5	0.9	3.8	2.8	12.6
South	02040301140030	15.5	0.4	3.2	39.0	0.0	8.6	31.1	17.7
South	02040301140040	17.9	0.3	0.1	16.0	0.0	4.7	11.7	67.1
South	02040301140050	15.3	0.1	0.2	2.5	0.0	3.3	17.2	76.7
South	02040301140060	8.4	0.0	1.6	0.4	0.0	4.8	20.7	72.5
South	02040301910010	1.1	0.0	36.5	0.0	0.0	9.3	54.0	0.2
South	02040301910020	3.0	0.0	22.1	0.0	0.0	13.4	62.8	1.6
South	02040301910030	5.3	0.0	20.5	0.0	0.0	7.1	13.4	59.0
South	02040301920010	2.6	0.0	14.7	0.8	0.0	6.3	54.0	24.2
South	02040301920020	3.0	0.0	15.5	0.0	0.0	12.4	63.9	8.2
South	02040301920030	2.9	0.0	12.4	0.0	0.0	8.9	59.3	19.5
2007									
North	02040301020010	22.1	6.8	0.6	23.0	0.2	3.9	12.8	52.7
North	02040301020020	28.1	3.8	0.5	16.8	1.7	9.0	47.7	20.3
North	02040301020030	15.8	4.3	0.2	15.7	0.7	6.9	39.8	32.5
North	02040301020040	12.5	10.1	3.7	32.3	0.0	6.8	20.3	26.8
North	02040301020050	20.5	2.4	1.0	19.9	1.2	17.1	43.8	14.5
North	02040301030010	13.0	5.7	0.6	34.1	0.9	2.7	4.3	51.7
North	02040301030020	14.6	2.6	4.0	36.2	1.6	7.8	17.4	30.5
North	02040301030030	19.6	2.7	2.5	23.0	0.5	5.8	39.1	26.4
North	02040301030040	20.2	0.8	0.9	24.4	0.0	14.0	45.6	14.3
North	02040301030050	12.4	0.1	1.8	24.4	0.3	26.7	28.2	18.6
North	02040301040010	20.4	0.0	0.2	6.8	1.4	12.4	64.2	15.1
North	02040301040020	19.7	0.0	1.5	19.0	3.4	24.8	32.1	19.1
North	02040301040030	6.8	0.0	0.2	0.8	0.0	18.3	66.5	14.2
North	02040301050010	15.6	0.1	1.4	28.7	1.8	16.1	44.7	7.2
North	02040301050020	21.9	1.0	0.9	14.7	0.9	10.2	56.0	16.3

North	02040301050030	8.2	0.0	0.0	10.0	0.0	6.1	20.6	63.3
North	02040301050040	33.0	0.0	0.4	10.5	0.7	8.1	50.4	29.9
North	02040301050050	7.5	0.0	0.6	0.3	0.2	14.9	60.1	24.0
North	02040301060010	19.6	7.6	0.4	33.8	0.8	3.7	25.2	28.5
North	02040301060020	25.0	0.9	0.6	53.1	0.0	1.8	25.0	18.6
North	02040301060030	19.4	3.5	1.8	29.3	0.0	4.5	28.2	32.6
North	02040301060040	15.2	2.2	0.0	52.4	0.0	1.4	4.6	39.4
North	02040301060050	20.5	3.9	0.7	28.4	0.0	7.1	31.9	27.9
North	02040301060060	17.3	3.6	10.8	41.6	0.0	7.1	10.2	26.8
North	02040301060070	17.8	2.2	6.0	32.4	0.0	11.9	38.9	8.5
North	02040301060080	21.2	1.7	7.3	30.8	0.3	14.2	35.5	10.2
North	02040301070010	31.3	4.4	0.6	51.2	0.0	2.2	7.1	34.5
North	02040301070020	15.7	3.4	0.9	62.9	0.0	6.3	1.2	25.1
North	02040301070030	26.0	0.6	5.5	43.5	0.0	12.0	5.9	32.5
North	02040301070040	12.9	2.1	9.6	41.1	0.0	7.2	27.5	12.5
North	02040301070050	14.6	1.3	0.0	75.8	0.0	7.8	0.1	14.9
North	02040301070060	14.4	1.1	2.5	63.5	0.0	4.4	4.4	24.0
North	02040301070070	13.0	0.3	12.1	54.4	0.0	1.4	2.3	29.6
North	02040301070080	17.1	0.8	2.5	30.9	0.2	42.0	2.8	20.9
North	02040301070090	18.5	0.4	2.1	38.0	0.2	6.2	30.3	22.7
North	02040301080010	14.2	0.0	5.8	61.6	0.0	0.6	0.1	31.9
North	02040301080020	14.1	0.2	0.1	51.5	0.0	5.5	28.5	14.3
North	02040301080030	19.3	0.4	0.3	63.2	0.0	3.7	22.7	9.7
North	02040301080040	17.6	0.0	0.0	50.8	0.8	6.4	35.0	7.1
North	02040301080050	24.1	0.0	0.9	39.3	1.1	11.0	37.5	10.1
North	02040301080060	13.2	0.2	1.1	21.8	3.4	22.7	32.2	18.5
North	02040301080070	24.8	0.1	1.7	62.6	1.1	2.6	9.9	22.0
North	02040301080080	17.4	1.8	0.4	15.3	1.6	21.9	56.2	2.8
North	02040301080090	25.4	0.0	8.2	13.9	0.4	16.0	53.1	8.4
Central	02040301090010	18.7	0.0	0.0	86.5	0.0	0.4	0.0	13.1

Central	02040301090020	24.3	0.0	1.4	83.1	0.0	0.2	0.1	15.2
Central	02040301090030	23.6	0.0	0.2	74.7	1.3	3.3	1.8	18.6
Central	02040301090040	32.4	0.8	3.5	73.4	0.0	0.3	1.2	20.9
Central	02040301090050	20.6	0.6	4.5	62.9	0.4	2.1	2.4	27.3
Central	02040301090060	21.8	0.2	1.4	33.0	1.1	9.7	26.2	28.4
Central	02040301100010	20.6	0.4	0.6	11.7	0.0	7.5	36.0	43.8
Central	02040301100020	12.6	2.5	1.0	8.5	0.0	3.7	32.7	51.5
Central	02040301100030	8.2	0.0	0.7	0.2	0.1	5.6	14.3	79.1
Central	02040301110010	22.3	0.0	0.5	87.1	0.0	0.1	0.1	12.2
Central	02040301110020	18.7	0.0	1.2	54.7	0.6	4.6	21.1	17.9
Central	02040301110030	25.7	0.0	0.6	47.0	1.1	5.7	15.4	30.2
Central	02040301110040	19.4	0.4	1.7	75.6	0.0	1.4	2.0	18.8
Central	02040301110050	14.0	0.0	0.4	56.4	1.2	5.4	4.8	32.0
Central	02040301120010	23.1	0.3	2.9	34.0	0.8	9.5	32.4	20.1
Central	02040301120020	37.3	0.2	0.4	6.6	0.0	3.3	10.7	78.8
Central	02040301120030	8.3	0.0	0.4	0.3	0.0	6.6	32.3	60.4
South	02040301130010	21.4	0.3	3.1	47.1	1.5	7.1	34.0	6.9
South	02040301130020	26.8	0.2	2.5	64.6	0.1	3.7	19.6	9.3
South	02040301130030	37.1	0.2	0.8	6.9	1.6	9.2	16.8	64.5
South	02040301130040	21.6	0.0	2.9	62.0	0.8	3.2	7.4	23.5
South	02040301130050	41.0	0.1	0.1	80.1	0.0	0.1	0.1	19.4
South	02040301130060	23.9	1.2	4.2	43.2	1.4	4.8	9.5	35.7
South	02040301130070	12.8	0.1	1.8	12.4	0.0	2.0	3.6	80.1
South	02040301130080	6.2	0.0	0.3	0.7	1.2	14.6	47.5	35.8
South	02040301140010	12.7	0.1	0.0	90.0	0.4	0.2	0.0	9.4
South	02040301140020	13.1	0.0	1.8	74.3	1.0	5.9	4.2	12.8
South	02040301140030	15.5	0.3	2.5	30.8	0.0	9.6	39.5	17.3
South	02040301140040	17.9	0.3	0.5	13.3	0.0	5.4	13.6	66.9
South	02040301140050	15.3	0.1	0.1	2.5	0.0	3.4	17.2	76.7
South	02040301140060	8.4	0.0	1.2	0.4	0.0	4.2	21.5	72.8

South	02040301910010	1.1	0.0	24.2	0.0	0.0	6.6	57.0	12.2
South	02040301910020	3.0	0.0	16.0	0.0	0.0	12.6	64.2	7.2
South	02040301910030	5.3	0.0	16.0	0.0	0.0	8.2	13.2	62.5
South	02040301920010	2.6	0.0	10.0	0.8	0.0	6.2	53.8	29.1
South	02040301920020	3.0	0.0	14.9	0.0	0.0	12.1	63.9	9.0
South	02040301920030	2.9	0.0	10.5	0.0	0.0	9.0	57.9	22.6

Table 2. Land-use distributions for segments of the Barnegat Bay-Little Egg Harbor watershed.

[--, not available]

			Land use, in percent of segment area						
Year	Watershed segment	Segment area, in square kilometers	Agriculture	Barren land	Forest	Impervious urban	Non-residential urban	Residential urban	Wetlands + water
1986	North	801.4	3.2	3.4	41.8	--	8.1	20.3	23.3
1995	North	801.4	2.6	3.0	39.0	--	8.7	23.7	23.0
2002	North	801.4	2.1	2.5	36.2	0.5	8.9	27.1	22.6
2007	North	801.4	1.9	2.3	33.9	0.6	9.8	28.9	22.6
1986	Central	351.6	0.4	2.0	53.7	--	3.2	8.7	32.0
1995	Central	351.6	0.4	1.8	52.7	--	3.3	10.0	31.9
2002	Central	351.6	0.3	1.6	51.5	0.4	3.4	11.1	31.8
2007	Central	351.6	0.3	1.4	50.1	0.4	3.8	12.2	31.9
1986	South	291.6	0.5	2.9	47.0	--	4.0	10.8	34.8
1995	South	291.6	0.3	2.6	45.5	--	4.3	12.5	34.8
2002	South	291.6	0.3	2.5	42.9	0.5	4.4	14.5	34.9
2007	South	291.6	0.2	2.4	40.1	0.6	5.1	16.4	35.2
1986	Watershed	1444.6	2.0	2.9	45.7	--	6.1	15.6	27.7
1995	Watershed	1444.6	1.6	2.6	43.6	--	6.5	18.1	27.5
2002	Watershed	1444.6	1.3	2.3	41.3	0.5	6.7	20.7	27.3
2007	Watershed	1444.6	1.2	2.1	39.1	0.5	7.4	22.3	27.4

Table 3. Continuous streamflow-gaging stations and baseflow indices for six streams in the Barnegat Bay-Little Egg Harbor watershed, N.J.

USGS Station ID	Station name	Period of record	Baseflow index values		
			BFI[1]	PART	Average
01408120	North Branch Metedeconk River near Lakewood, NJ	10/01/1972 to present	0.618	0.719	0.669
01408150	South Branch Metedeconk River near Lakewood, NJ	06/12/1992 to 03/31/1999	0.575	0.719	0.647
01408500	Toms River near Toms River, NJ	10/02/1928 to present	0.736	0.867	0.802
01409000	Cedar Creek at Lanoka Harbor, NJ	07/07/1932 to 09/30/1958 10-01-1970 to 09-30-1971 09-12-2003 to present	0.721	0.851	0.786
01409095	Oyster Creek near Brookville, NJ	07/02/1965 to 01/16/1985	0.857	0.936	0.897
01409280	Westecunk Creek at Stafford Forge, NJ	10/01/1973 to 10-12-1988 07-08-2003 to present	0.852	0.837	0.845

[1]as determined by the Institute of Hydrology procedure

Table 4. Multiple linear regression coefficients for relating land use to base-flow concentrations of total nitrogen and total phosphorus.

[--, not included in the linear regression model]

Land use	Total nitrogen	Natural log total phosphorus
Intercept	0.7369	-5.3217
Agriculture	0.0658	0.1115
Forest	-0.0055	--
[1]Total urban	0.0048	0.0196
Wetlands	--	0.0259
Multiple R^2	0.653	0.771

[1]Impervious, nonresidential, and residential urban

Table 5. Percent imperviousness values used to calculate runoff nutrient loads.

Land use	Percent imperviousness
Agriculture	2
Barren land	2
Forest	2
Impervious urban	95
Residential urban	31
Non-residential urban	60
Water	0
Wetlands	2

Table 6. Stations from which water-quality data collected during runoff conditions were used to calculate EMCs.

[LDR, Lower Delaware River; A, Baker and Esralew, 2010; TN, total nitrogen; TP, total phosphorus; --, not available; BB-LEH, Barnegat Bay-Little Egg Harbor; B, Baker and Hunchak-Kariouk, 2006]

USGS Station ID	USGS Station Name	Watershed	Range of sampling dates	Water-quality Investigation	Number of sampling events	Parameter
01482890[1]	Alloway Creek near Watsons Corner NJ	LDR	09/27/03-03/16/07	A	8	TN, TP
0146452750[1]	Blacks Creek near Chesterfield	LDR	10/27/03-03/17/07	A	6	TN, TP
01411955	Gravelly Run at Laurel Lake NJ	LDR	10/27/03-03/16/07	A	8	TN, TP
01467327	SB Big Timber Creek trib at Grenloch NJ	LDR	10/27/03-03/16/07	A	7	TN, TP
01467148	Cooper River at Route 561 at Haddonfield NJ	LDR	11/19/03-03/16/07	A	8	TN,TP
01466500[2]	McDonalds Branch in Byrne State Forest NJ	LDR	11/12/81-08/05/09	--	--	TP
01408620	Davenport Branch near Dover Forge NJ	BB-LEH	09/22/94-03/01/99	B	16	TN
01408728	Long Swamp Creek at Toms River NJ	BB-LEH	07/15/94-08/20/99	B	19	TN
01408600	Wrangle Brook near Toms River NJ	BB-LEH	07/15/94-08/20/99	B	19	TN
01408500[2]	Toms River near Toms River NJ	BB-LEH	11/11/82-09/01/09	--	--	TP

[1]Data from this station were used for calculation of the EMC for agriculture only.

[2]Water-quality data were retrieved from the USGS database NWIS, and are not from specific water-quality investigations

Table 9. Land-use distributions for nine water-quality sampling sites used in the development of EMCs.

[--, not available]

USGS Station ID	Year	Land use, in percent of drainage basin								
		Agriculture	Barren land	Forest	Impervious urban	Non-residential urban	Residential urban	Urban	Water	Wetlands
01482890[1]	2002	76.6	1.1	8.2	--	--	--	7.5	0.3	6.2
0146452750[1]	2002	55.4	0.2	14.1	--	--	--	10.0	1.6	18.6
01411955	2002	5.7	0.0	79.1	0.0	0.9	0.1	--	0.0	14.2
01467148	2002	1.4	1.7	17.8	0.7	22.7	44.5	--	1.1	10.1
01467327	2002	4.0	0.2	14.6	0.4	19.3	53.4	--	1.5	6.6
01408620	1995	0.5	0.2	66.6	--	2.9	20.0	--	1.2	8.6
01408728	1995	3.5	1.8	25.8	--	22.5	43.8	--	0.5	2.0
01408600	1995	0.7	3.5	49.4	--	6.9	22.4	--	1.9	15.2
01408500	1995	3.4	4.4	50.2	--	6.6	10.8	--	1.3	23.4
01466500	2002	0.0	0.9	87.8	0	0.0	0.0	--	0.0	11.3

[1]Land-use percentages from these sites are from Baker and Esralew, 2010 which did not distinguish among urban sub-categories.

Table 8. Comparison of calculated and measured total nitrogen event-mean concentration values for six water-quality sampling sites.

[EMC, event-mean concentration]

USGS Station ID	Calculated EMC (mg/L)	Measured EMC (mg/L)	Percent difference
01467327	0.836	0.879	4.8
01408620	0.467	0.371	-25.9
01411955	0.343	0.363	5.5
01467148	0.836	0.857	2.5
01408728	0.755	0.827	8.8
01408600	0.571	0.816	30.0
Mean	0.623	0.686	4.3
R^2	--	--	0.76

Table 9. Comparison of calculated and measured total phosphorus event-mean concentration values for five water-quality sampling sites.

[EMC, event-mean concentration]

USGS Station ID	Calculated EMC (mg/L)	Measured EMC (mg/L)	Percent difference
01467327	0.064	0.076	15.9
01408620	0.012	0.009	-42.7
01411955	0.012	0.025	51.4
01467148	0.057	0.058	3.2
01408500	0.028	0.021	-32.5
Mean	0.038	0.035	3.3
R^2	--	--	0.90

Table 10. Event-mean concentrations used to calculate runoff nutrient loads for each land-use category for year-round, growing, and nongrowing seasons.

[mg/L; milligrams per liter]

Land use	Percent impervious	Total nitrogen, in mg/L	Total phosphorus, in mg/L
All seasons/Annual			
Residential urban	31	0.956	0.105
Non-residential urban	60	1.142	0.025
Impervious urban	95	1.142	0.025
Agriculture	2	5.581	0.789
Forest	2	0.220	0.011
Water	0	0.933	0.020
Wetland	2	1.117	0.021
Barren land	2	0.220	0.011
Growing season			
Residential urban	31	1.050	0.135
Non-residential urban	60	1.250	0.030
Impervious urban	95	1.250	0.030
Agriculture	2	5.583	1.131
Forest	2	0.200	0.011
Water	0	0.970	0.024
Wetland	2	1.325	0.023
Barren land	2	0.200	0.011
Non-growing season			
Residential urban	31	0.825	0.063
Non-residential urban	60	0.990	0.019
Impervious urban	95	0.990	0.019
Agriculture	2	5.573	0.312
Forest	2	0.248	0.013
Water	0	0.897	0.016
Wetland	2	0.825	0.019
Barren land	2	0.248	0.013

Table 11. Accuracy assessment of turf mapping.

Mapped data	Reference data		Row total
	Turf	Not turf	
Turf	100	30	130
Not turf	19	361	380
Column total	119	391	510

Overall accuracy = 461/510 = 90.4%
Kappa = 0.75, considered borderline excellent

Table 12. Summary statistics for total nitrogen (1980-2011) and total phosphorus data (1991-2011) compiled for the Barnegat Bay-Little Egg Harbor watershed.

[TN, total nitrogen; TP, total phosphorus]

Segment	Parameter	Number of water-quality sampling stations	Number of analyses	Minimum	Maximum	Mean	Median
North	TN	34	848	0.13	5.29	0.84	0.79
Central	TN	9	171	0.06	1.56	0.26	0.23
South	TN	7	81	0.12	1.50	0.41	0.31
North	TP	63	667	< 0.002	0.66	--	0.030
Central	TP	11	117	< 0.004	0.06	--	< 0.010
South	TP	8	33	< 0.004	0.16	--	< 0.015

Table 14. Annual and seasonal base-flow, runoff, and total nutrient loads by watershed segment for total nitrogen and total phosphorus, 1989-2011.

[kg, kilograms; A, all/annual; G, growing; NG, nongrowing]

				Total nitrogen			Total phosphorus		
Year	Season	Segment	Precipitation, in inches	Baseflow load, in kg	Runoff load, in kg	Total load, in kg	Baseflow load, in kg	Runoff load, in kg	Total load, in kg
1989	A	North	53.83	410,000	107,000	517,000	14,600	7,320	22,000
1989	A	Central	53.83	111,000	24,900	136,000	4,500	1,380	5,880
1989	A	South	53.83	102,000	24,200	126,000	4,440	1,380	5,810
1990	A	North	43.18	346,000	85,600	432,000	12,400	5,880	18,200
1990	A	Central	43.18	93,500	20,000	114,000	3,800	1,110	4,910
1990	A	South	43.18	86,300	19,400	106,000	3,750	1,100	4,850
1991	A	North	45.14	337,000	96,400	433,000	11,800	6,680	18,500
1991	A	Central	45.14	92,600	22,000	115,000	3,760	1,260	5,020
1991	A	South	45.14	84,300	21,600	106,000	3,640	1,250	4,900
1992	A	North	42.94	306,000	91,700	398,000	10,700	6,360	17,100
1992	A	Central	42.94	84,100	21,000	105,000	3,410	1,200	4,620
1992	A	South	42.94	76,500	20,500	97,000	3,310	1,190	4,500
1993	A	North	42.35	339,000	90,500	430,000	11,900	6,270	18,200
1993	A	Central	42.35	93,300	20,700	114,000	3,790	1,190	4,980
1993	A	South	42.35	85,000	20,200	105,000	3,680	1,170	4,850
1994	A	North	46.50	370,000	99,300	469,000	13,000	6,880	19,900
1994	A	Central	46.50	102,000	22,700	124,000	4,120	1,300	5,430
1994	A	South	46.50	92,600	22,200	115,000	4,000	1,290	5,290
1995	A	North	37.66	266,000	80,400	346,000	9,330	5,580	14,900
1995	A	Central	37.66	73,100	18,400	91,500	2,970	1,060	4,020
1995	A	South	37.66	66,600	18,000	84,500	2,880	1,040	3,920
1996	A	North	56.26	424,000	120,000	544,000	14,900	8,330	23,200
1996	A	Central	56.26	117,000	27,400	144,000	4,730	1,580	6,310
1996	A	South	56.26	106,000	26,900	133,000	4,590	1,560	6,150
1997	A	North	46.14	360,000	98,500	459,000	12,600	6,830	19,500
1997	A	Central	46.14	99,100	22,500	122,000	4,020	1,290	5,310
1997	A	South	46.14	90,200	22,000	112,000	3,900	1,280	5,180
1998	A	North	45.56	388,000	97,300	485,000	13,600	6,740	20,300
1998	A	Central	45.56	107,000	22,200	129,000	4,330	1,280	5,600
1998	A	South	45.56	97,000	21,700	119,000	4,200	1,260	5,460
1999	A	North	45.82	338,000	106,000	444,000	11,900	7,360	19,200
1999	A	Central	45.82	94,400	24,200	119,000	3,740	1,400	5,140
1999	A	South	45.82	88,600	24,400	113,000	3,730	1,450	5,180
2000	A	North	47.39	347,000	110,000	457,000	12,200	7,610	19,800
2000	A	Central	47.39	96,900	25,000	122,000	3,840	1,440	5,280
2000	A	South	47.39	91,000	25,300	116,000	3,830	1,500	5,330
2001	A	North	34.58	278,000	80,300	358,000	9,760	5,560	15,300
2001	A	Central	34.58	77,600	18,200	95,900	3,080	1,050	4,130
2001	A	South	34.58	72,900	18,400	91,400	3,070	1,090	4,160
2002	A	North	48.07	323,000	112,000	435,000	11,300	7,720	19,100
2002	A	Central	48.07	90,200	25,300	116,000	3,580	1,460	5,040

2002	A	South	48.07	84,600	25,600	110,000	3,570	1,520	5,080
2003	A	North	53.72	421,000	125,000	546,000	14,800	8,640	23,400
2003	A	Central	53.72	118,000	28,300	146,000	4,660	1,640	6,290
2003	A	South	53.72	110,000	28,600	139,000	4,650	1,690	6,340
2004	A	North	46.82	362,000	109,000	470,000	12,700	7,520	20,200
2004	A	Central	46.82	101,000	24,700	126,000	4,010	1,420	5,430
2004	A	South	46.82	94,800	25,000	120,000	4,000	1,480	5,480
2005	A	North	48.40	379,000	119,000	498,000	13,400	8,190	21,600
2005	A	Central	48.40	107,000	27,300	135,000	4,280	1,590	5,880
2005	A	South	48.40	101,000	28,200	129,000	4,230	1,690	5,910
2006	A	North	51.47	401,000	127,000	528,000	14,200	8,710	22,900
2006	A	Central	51.47	114,000	29,000	143,000	4,540	1,690	6,240
2006	A	South	51.47	107,000	30,000	137,000	4,480	1,800	6,280
2007	A	North	44.51	370,000	110,000	480,000	13,100	7,530	20,600
2007	A	Central	44.51	105,000	25,100	130,000	4,180	1,460	5,650
2007	A	South	44.51	98,600	25,900	124,000	4,120	1,550	5,680
2008	A	North	47.57	328,000	117,000	445,000	11,600	8,050	19,700
2008	A	Central	47.57	92,900	26,800	120,000	3,710	1,570	5,280
2008	A	South	47.57	87,400	27,700	115,000	3,660	1,660	5,320
2009	A	North	59.92	417,000	148,000	565,000	14,800	10,100	24,900
2009	A	Central	59.92	118,000	33,700	152,000	4,720	1,970	6,690
2009	A	South	59.92	111,000	34,900	146,000	4,650	2,090	6,740
2010	A	North	43.23	419,000	107,000	526,000	14,900	7,320	22,200
2010	A	Central	43.23	119,000	24,400	143,000	4,740	1,420	6,160
2010	A	South	43.23	112,000	25,200	137,000	4,670	1,510	6,180
2011	A	North	57.32	461,000	141,000	602,000	16,300	9,700	26,000
2011	A	Central	57.32	130,000	32,300	163,000	5,210	1,880	7,090
2011	A	South	57.32	123,000	33,400	156,000	5,140	2,000	7,140
1989	G	North	37.44	243,000	80,900	324,000	8,670	6,540	15,200
1989	G	Central	37.44	65,500	19,000	84,600	2,660	1,190	3,860
1989	G	South	37.44	60,500	18,500	79,000	2,630	1,200	3,820
1990	G	North	28.78	205,000	62,200	267,000	7,310	5,030	12,300
1990	G	Central	28.78	55,200	14,600	69,900	2,250	915	3,160
1990	G	South	28.78	51,000	14,200	65,300	2,210	920	3,130
1991	G	North	26.10	176,000	60,900	237,000	6,180	4,950	11,100
1991	G	Central	26.10	48,400	14,000	62,400	1,960	909	2,870
1991	G	South	26.10	44,100	13,700	57,800	1,910	901	2,810
1992	G	North	26.53	160,000	61,900	221,000	5,590	5,040	10,600
1992	G	Central	26.53	43,900	14,200	58,100	1,780	926	2,710
1992	G	South	26.53	39,900	14,000	53,900	1,730	920	2,650
1993	G	North	22.85	184,000	53,300	238,000	6,480	4,340	10,800
1993	G	Central	22.85	50,700	12,300	63,000	2,060	796	2,850
1993	G	South	22.85	46,200	12,000	58,200	2,000	789	2,790
1994	G	North	22.67	192,000	52,900	245,000	6,730	4,300	11,000
1994	G	Central	22.67	52,800	12,200	65,000	2,140	791	2,930
1994	G	South	22.67	48,000	11,900	60,000	2,080	784	2,860
1995	G	North	22.57	132,000	52,700	185,000	4,640	4,280	8,930
1995	G	Central	22.57	36,400	12,100	48,500	1,480	785	2,260
1995	G	South	22.57	33,100	11,900	45,000	1,430	781	2,210
1996	G	North	35.33	226,000	82,400	308,000	7,910	6,700	14,600

1996	G	Central	35.33	62,000	19,000	81,000	2,520	1,230	3,750
1996	G	South	35.33	56,400	18,600	75,000	2,440	1,220	3,670
1997	G	North	25.91	183,000	60,500	244,000	6,430	4,910	11,300
1997	G	Central	25.91	50,400	13,900	64,300	2,040	903	2,950
1997	G	South	25.91	45,900	13,600	59,500	1,980	897	2,880
1998	G	North	24.85	209,000	58,000	267,000	7,340	4,710	12,100
1998	G	Central	24.85	57,600	13,300	70,900	2,340	866	3,200
1998	G	South	24.85	52,400	13,100	65,400	2,260	858	3,120
1999	G	North	25.48	169,000	64,700	234,000	5,940	5,230	11,200
1999	G	Central	25.48	47,200	14,800	62,000	1,870	966	2,840
1999	G	South	25.48	44,300	15,000	59,300	1,870	1,010	2,870
2000	G	North	30.86	202,000	78,400	280,000	7,090	6,340	13,400
2000	G	Central	30.86	56,400	17,900	74,300	2,240	1,170	3,400
2000	G	South	30.86	52,900	18,100	71,100	2,230	1,220	3,450
2001	G	North	18.96	141,000	48,200	190,000	4,970	3,900	8,860
2001	G	Central	18.96	39,500	11,000	50,500	1,570	718	2,280
2001	G	South	18.96	37,100	11,100	48,200	1,560	749	2,310
2002	G	North	28.46	170,000	72,300	242,000	5,960	5,840	11,800
2002	G	Central	28.46	47,400	16,500	63,900	1,880	1,080	2,960
2002	G	South	28.46	44,500	16,700	61,200	1,880	1,130	3,000
2003	G	North	33.62	233,000	85,400	318,000	8,190	6,900	15,100
2003	G	Central	33.62	65,100	19,500	84,600	2,580	1,280	3,860
2003	G	South	33.62	61,100	19,800	80,900	2,580	1,330	3,900
2004	G	North	30.16	206,000	76,700	282,000	7,230	6,200	13,400
2004	G	Central	30.16	57,500	17,500	75,000	2,280	1,140	3,420
2004	G	South	30.16	53,900	17,700	71,700	2,280	1,190	3,470
2005	G	North	29.82	208,000	80,500	289,000	7,370	6,440	13,800
2005	G	Central	29.82	59,000	18,500	77,400	2,360	1,230	3,580
2005	G	South	29.82	55,500	19,200	74,600	2,320	1,310	3,630
2006	G	North	33.43	214,000	90,300	304,000	7,570	7,220	14,800
2006	G	Central	33.43	60,600	20,700	81,300	2,420	1,370	3,790
2006	G	South	33.43	57,000	21,500	78,400	2,380	1,460	3,840
2007	G	North	26.09	198,000	70,400	268,000	7,000	5,640	12,600
2007	G	Central	26.09	56,000	16,100	72,200	2,240	1,070	3,300
2007	G	South	26.09	52,700	16,800	69,400	2,210	1,140	3,350
2008	G	North	23.75	157,000	64,100	221,000	5,570	5,130	10,700
2008	G	Central	23.75	44,500	14,700	59,200	1,780	977	2,760
2008	G	South	23.75	41,900	15,300	57,100	1,750	1,040	2,790
2009	G	North	39.95	246,000	108,000	354,000	8,720	8,640	17,400
2009	G	Central	39.95	69,700	24,700	94,500	2,780	1,640	4,420
2009	G	South	39.95	65,600	25,700	91,300	2,750	1,750	4,500
2010	G	North	18.81	183,000	50,800	234,000	6,500	4,070	10,600
2010	G	Central	18.81	52,000	11,600	63,600	2,080	773	2,850
2010	G	South	18.81	48,900	12,100	61,000	2,040	821	2,860
2011	G	North	38.05	275,000	103,000	378,000	9,740	8,220	18,000
2011	G	Central	38.05	77,900	23,600	101,000	3,110	1,560	4,670
2011	G	South	38.05	73,300	24,400	97,800	3,070	1,660	4,730
1989	NG	North	16.39	143,000	28,400	171,000	5,090	1,370	6,460
1989	NG	Central	16.39	38,500	6,530	45,000	1,570	289	1,850
1989	NG	South	16.39	35,500	6,310	41,800	1,540	282	1,820

1990	NG	North	14.40	135,000	25,000	160,000	4,840	1,200	6,030
1990	NG	Central	14.40	36,500	5,740	42,300	1,480	255	1,740
1990	NG	South	14.40	33,800	5,540	39,300	1,460	248	1,710
1991	NG	North	19.04	163,000	35,400	199,000	5,720	1,740	7,460
1991	NG	Central	19.04	44,900	7,990	52,900	1,820	364	2,180
1991	NG	South	19.04	40,800	7,780	48,600	1,770	354	2,120
1992	NG	North	16.41	135,000	30,500	165,000	4,730	1,500	6,230
1992	NG	Central	16.41	37,100	6,880	44,000	1,500	313	1,820
1992	NG	South	16.41	33,800	6,700	40,500	1,460	306	1,760
1993	NG	North	19.50	169,000	36,200	205,000	5,920	1,780	7,700
1993	NG	Central	19.50	46,400	8,180	54,600	1,880	373	2,250
1993	NG	South	19.50	42,200	7,960	50,200	1,820	363	2,190
1994	NG	North	23.83	195,000	44,300	239,000	6,840	2,180	9,020
1994	NG	Central	23.83	53,600	10,000	63,600	2,170	455	2,630
1994	NG	South	23.83	48,800	9,730	58,500	2,110	446	2,550
1995	NG	North	15.09	133,000	28,100	161,000	4,660	1,380	6,040
1995	NG	Central	15.09	36,500	6,330	42,900	1,480	288	1,770
1995	NG	South	15.09	33,200	6,160	39,400	1,440	281	1,720
1996	NG	North	20.94	196,000	38,900	235,000	6,890	1,910	8,800
1996	NG	Central	20.94	54,000	8,780	62,800	2,200	400	2,600
1996	NG	South	20.94	49,100	8,550	57,700	2,130	390	2,520
1997	NG	North	20.22	177,000	37,600	215,000	6,220	1,850	8,060
1997	NG	Central	20.22	48,700	8,480	57,200	1,980	386	2,360
1997	NG	South	20.22	44,300	8,260	52,600	1,920	378	2,300
1998	NG	North	20.71	179,000	38,500	218,000	6,280	1,890	8,170
1998	NG	Central	20.71	49,200	8,690	57,900	2,000	396	2,400
1998	NG	South	20.71	44,800	8,460	53,300	1,940	386	2,320
1999	NG	North	20.34	169,000	41,000	210,000	5,950	2,030	7,980
1999	NG	Central	20.34	47,300	9,230	56,500	1,880	420	2,300
1999	NG	South	20.34	44,400	9,280	53,700	1,870	424	2,300
2000	NG	North	16.53	142,000	33,300	175,000	4,980	1,650	6,630
2000	NG	Central	16.53	39,600	7,500	47,100	1,570	342	1,910
2000	NG	South	16.53	37,200	7,540	44,700	1,570	348	1,910
2001	NG	North	15.62	137,000	31,500	169,000	4,820	1,560	6,380
2001	NG	Central	15.62	38,400	7,090	45,400	1,520	322	1,840
2001	NG	South	15.62	36,000	7,130	43,100	1,510	328	1,840
2002	NG	North	19.61	152,000	39,500	192,000	5,340	1,960	7,300
2002	NG	Central	19.61	42,500	8,900	51,400	1,690	407	2,090
2002	NG	South	19.61	39,800	8,940	48,800	1,680	411	2,090
2003	NG	North	20.10	185,000	40,600	225,000	6,500	2,000	8,500
2003	NG	Central	20.10	51,700	9,130	60,800	2,050	416	2,460
2003	NG	South	20.10	48,500	9,170	57,700	2,040	421	2,470
2004	NG	North	16.67	162,000	33,600	195,000	5,670	1,670	7,340
2004	NG	Central	16.67	45,100	7,570	52,700	1,790	346	2,130
2004	NG	South	16.67	42,400	7,610	50,000	1,780	349	2,130
2005	NG	North	18.57	175,000	39,800	215,000	6,210	1,960	8,160
2005	NG	Central	18.57	49,700	9,000	58,700	1,980	411	2,400
2005	NG	South	18.57	46,700	9,250	56,000	1,950	427	2,380
2006	NG	North	18.05	197,000	38,600	236,000	6,990	1,900	8,880
2006	NG	Central	18.05	55,900	8,750	64,600	2,230	400	2,630

2006	NG	South	18.05	52,600	9,000	61,600	2,200	416	2,620
2007	NG	North	18.42	169,000	39,400	208,000	5,980	1,940	7,930
2007	NG	Central	18.42	47,900	8,940	56,800	1,910	406	2,320
2007	NG	South	18.42	45,000	9,180	54,200	1,890	422	2,310
2008	NG	North	23.82	176,000	51,000	227,000	6,250	2,500	8,750
2008	NG	Central	23.82	50,000	11,500	61,500	1,990	528	2,520
2008	NG	South	23.82	47,000	11,900	58,900	1,970	548	2,520
2009	NG	North	19.97	186,000	42,700	229,000	6,600	2,100	8,700
2009	NG	Central	19.97	52,800	9,690	62,500	2,100	441	2,550
2009	NG	South	19.97	49,600	9,960	59,600	2,080	458	2,530
2010	NG	North	24.42	216,000	52,300	268,000	7,660	2,570	10,200
2010	NG	Central	24.42	61,200	11,800	73,000	2,440	541	2,990
2010	NG	South	24.42	57,600	12,200	69,700	2,410	563	2,970
2011	NG	North	19.27	176,000	41,300	217,000	6,250	2,030	8,270
2011	NG	Central	19.27	50,000	9,340	59,300	1,990	428	2,420
2011	NG	South	19.27	47,000	9,610	56,600	1,970	443	2,410

Table 15. Annual and seasonal base-flow, runoff, and total nutrient loads for the Barnegat Bay-Little Egg Harbor watershed for total nitrogen and total phosphorus, 1989-2011.

[kg, kilograms; A, all/annual; G, growing; NG, nongrowing]

			Total nitrogen			Total phosphorus		
Year	Season	Precipitation, in inches	Baseflow load, in kg	Runoff load, in kg	Total load, in kg	Baseflow load, in kg	Runoff load, in kg	Total load, in kg
1989	A	53.83	623,000	156,000	779,000	23,600	10,100	33,700
1990	A	43.18	526,000	125,000	651,000	19,900	8,090	28,000
1991	A	45.14	514,000	140,000	654,000	19,200	9,200	28,400
1992	A	42.94	467,000	133,000	600,000	17,500	8,750	26,200
1993	A	42.35	518,000	131,000	649,000	19,400	8,630	28,000
1994	A	46.50	564,000	144,000	709,000	21,100	9,470	30,600
1995	A	37.66	405,000	117,000	522,000	15,200	7,670	22,800
1996	A	56.26	647,000	174,000	821,000	24,200	11,500	35,700
1997	A	46.14	549,000	143,000	693,000	20,600	9,410	30,000
1998	A	45.56	591,000	141,000	733,000	22,100	9,290	31,400
1999	A	45.82	521,000	155,000	676,000	19,300	10,200	29,500
2000	A	47.39	535,000	160,000	695,000	19,900	10,600	30,400
2001	A	34.58	429,000	117,000	546,000	15,900	7,700	23,600
2002	A	48.07	498,000	163,000	660,000	18,500	10,700	29,200
2003	A	53.72	649,000	182,000	830,000	24,100	12,000	36,100
2004	A	46.82	558,000	158,000	716,000	20,700	10,400	31,100
2005	A	48.40	587,000	175,000	762,000	21,900	11,500	33,400
2006	A	51.47	622,000	186,000	808,000	23,200	12,200	35,500
2007	A	44.51	573,000	161,000	734,000	21,400	10,600	32,000
2008	A	47.57	508,000	172,000	680,000	19,000	11,300	30,300
2009	A	59.92	646,000	216,000	863,000	24,200	14,200	38,400
2010	A	43.23	649,000	156,000	806,000	24,300	10,200	34,500
2011	A	57.32	714,000	207,000	921,000	26,700	13,600	40,200
1989	G	37.44	369,000	118,000	487,000	14,000	8,940	22,900
1990	G	28.78	311,000	91,100	402,000	11,800	6,870	18,600
1991	G	26.10	269,000	88,600	357,000	10,100	6,760	16,800
1992	G	26.53	243,000	90,100	333,000	9,100	6,880	16,000
1993	G	22.85	281,000	77,600	359,000	10,500	5,920	16,500
1994	G	22.67	293,000	77,000	370,000	10,900	5,870	16,800
1995	G	22.57	202,000	76,700	278,000	7,550	5,850	13,400
1996	G	35.33	344,000	120,000	464,000	12,900	9,160	22,000
1997	G	25.91	280,000	88,000	368,000	10,500	6,710	17,200
1998	G	24.85	319,000	84,400	404,000	11,900	6,440	18,400

1999	G	25.48	261,000	94,500	355,000	9,670	7,200	16,900
2000	G	30.86	311,000	114,000	426,000	11,600	8,730	20,300
2001	G	18.96	218,000	70,300	288,000	8,090	5,360	13,500
2002	G	28.46	262,000	106,000	367,000	9,710	8,050	17,800
2003	G	33.62	359,000	125,000	484,000	13,300	9,510	22,900
2004	G	30.16	317,000	112,000	429,000	11,800	8,530	20,300
2005	G	29.82	322,000	118,000	441,000	12,000	8,980	21,000
2006	G	33.43	331,000	132,000	464,000	12,400	10,100	22,400
2007	G	26.09	306,000	103,000	410,000	11,400	7,850	19,300
2008	G	23.75	243,000	94,100	338,000	9,100	7,150	16,200
2009	G	39.95	381,000	158,000	540,000	14,200	12,000	26,300
2010	G	18.81	284,000	74,500	359,000	10,600	5,660	16,300
2011	G	38.05	426,000	151,000	577,000	15,900	11,400	27,400
1989	NG	16.39	217,000	41,200	258,000	8,200	1,940	10,100
1990	NG	14.40	206,000	36,200	242,000	7,780	1,700	9,480
1991	NG	19.04	249,000	51,200	300,000	9,310	2,460	11,800
1992	NG	16.41	206,000	44,100	250,000	7,690	2,120	9,810
1993	NG	19.50	257,000	52,400	310,000	9,620	2,510	12,100
1994	NG	23.83	297,000	64,100	361,000	11,100	3,080	14,200
1995	NG	15.09	203,000	40,600	243,000	7,580	1,950	9,530
1996	NG	20.94	300,000	56,300	356,000	11,200	2,700	13,900
1997	NG	20.22	270,000	54,300	325,000	10,100	2,610	12,700
1998	NG	20.71	273,000	55,700	329,000	10,200	2,670	12,900
1999	NG	20.34	261,000	59,500	321,000	9,700	2,870	12,600
2000	NG	16.53	219,000	48,400	267,000	8,120	2,340	10,500
2001	NG	15.62	212,000	45,700	257,000	7,860	2,210	10,100
2002	NG	19.61	234,000	57,400	292,000	8,700	2,780	11,500
2003	NG	20.10	285,000	58,900	344,000	10,600	2,840	13,400
2004	NG	16.67	249,000	48,800	298,000	9,250	2,360	11,600
2005	NG	18.57	272,000	58,000	330,000	10,100	2,790	12,900
2006	NG	18.05	305,000	56,400	362,000	11,400	2,710	14,100
2007	NG	18.42	262,000	57,500	319,000	9,780	2,770	12,600
2008	NG	23.82	273,000	74,400	348,000	10,200	3,580	13,800
2009	NG	19.97	289,000	62,400	351,000	10,800	3,000	13,800
2010	NG	24.42	335,000	76,300	411,000	12,500	3,670	16,200
2011	NG	19.27	273,000	60,200	333,000	10,200	2,900	13,100

Table 16. Turf distribution within the Barnegat Bay-Little Egg harbor watershed, based on 2007 land use.

[HUC14, Hydrologic Unit Code-14]

HUC14	Drainage basin area, in square kilometers	Percent developed	Percent turf	Outlier
		North segment		
02040301020010	22.1	25.2	5.5	
02040301020020	28.1	60.2	17.2	
02040301020030	15.8	50.4	16.0	
02040301020040	12.5	41.4	10.7	
02040301020050	20.5	63.1	17.4	
02040301030010	13.0	14.5	5.3	
02040301030020	14.6	34.7	8.9	
02040301030030	19.6	50.1	15.5	
02040301030040	20.2	60.1	16.7	
02040301030050	12.4	55.5	10.4	
02040301040010	20.4	72.1	21.1	
02040301040020	19.7	59.0	9.7	
02040301040030	6.8	73.8	16.3	
02040301050010	15.6	63.1	17.0	
02040301050020	21.9	66.3	17.4	
02040301050030	8.2	25.7	4.1	
02040301050040	33.0	54.8	14.7	
02040301050050	7.5	67.6	2.7	*
02040301060010	19.6	38.1	10.1	
02040301060020	25.0	28.8	9.0	
02040301060030	19.4	38.7	13.0	
02040301060040	15.2	8.9	2.1	
02040301060050	20.5	44.8	15.2	
02040301060060	17.3	33.0	6.6	
02040301060070	17.8	59.8	17.0	
02040301060080	21.2	58.1	13.7	
02040301070010	31.3	14.5	4.0	
02040301070020	15.7	12.4	4.7	
02040301070030	26.0	25.0	7.7	
02040301070040	12.9	47.8	12.2	
02040301070050	14.6	10.0	2.9	
02040301070060	14.4	13.1	1.8	
02040301070070	13.0	16.9	1.1	
02040301070080	17.1	49.1	23.7	*
02040301070090	18.5	37.6	10.8	
02040301080010	14.2	7.1	0.5	
02040301080020	14.1	35.4	9.7	
02040301080030	19.3	27.5	6.1	
02040301080040	17.6	38.8	11.6	
02040301080050	24.1	47.2	14.7	
02040301080060	13.2	55.8	13.7	
02040301080070	24.8	14.6	4.1	
02040301080080	17.4	79.0	27.0	

02040301080090	25.4	71.8	16.9	
		Central segment		
02040301090010	18.7	0.5	0.0	
02040301090020	24.3	1.8	0.0	
02040301090030	23.6	6.8	1.2	
02040301090040	32.4	6.1	0.7	
02040301090050	20.6	10.4	1.5	
02040301090060	21.8	37.9	11.5	
02040301100010	20.6	42.4	10.0	
02040301100020	12.6	37.4	7.1	
02040301100030	8.2	17.1	1.3	*
02040301110010	22.3	0.8	0.2	
02040301110020	18.7	24.7	5.2	
02040301110030	25.7	21.9	4.1	
02040301110040	19.4	6.1	1.5	
02040301110050	14.0	12.1	1.6	
02040301120010	23.1	45.3	11.6	
02040301120020	37.3	14.3	3.2	
02040301120030	8.3	36.5	1.2	*
		South segment		
02040301130010	21.4	45.1	11.9	
02040301130020	26.8	24.5	5.8	
02040301130030	37.1	27.6	3.7	
02040301130040	21.6	14.8	2.5	
02040301130050	41.0	0.5	0.0	
02040301130060	23.9	22.5	2.7	
02040301130070	12.8	7.8	0.8	
02040301130080	6.2	35.8	2.0	*
02040301140010	12.7	0.7	0.1	
02040301140020	13.1	15.1	3.6	
02040301140030	15.5	58.1	11.7	
02040301140040	17.9	21.5	4.4	
02040301140050	15.3	21.2	3.8	
02040301140060	8.4	12.9	0.7	*
02040301910010	1.1	39.4	2.1	*
02040301910020	3.0	70.9	0.5	*
02040301910030	5.3	20.0	0.2	*
02040301920010	2.6	56.6	0.8	*
02040301920020	3.0	18.8	0.3	*
02040301920030	2.9	21.3	1.1	*

*Outlier; excluded from further analysis

Table 17. Multiple linear regression coefficients for relating percent of developed- non-turf, and developed- turf land in the Barnegat Bay-Little Egg Harbor watershed for 2007 to concentrations of total nitrogen and total phosphorus.

[N, nitrogen; P, phosphorus; concentrations are as milligrams per liter as N or as P]

Nutrient	Regression coefficient			Multiple r^2	Concentration scenarios		
	Intercept	Percent developed-non-turf	Percent developed- turf		100 percent undeveloped	100 percent developed- non-turf	100 percent developed- turf
Total nitrogen	0.449	0.0076	0.0135	0.58	0.45	1.20	1.80
Total phosphorus	0.0180	0.0003	0.0012	0.47	0.018	0.048	0.138

Table 18. Percent undeveloped, developed- turf, and developed- non-turf land (2007), and calculated concentrations of total nitrogen and total phosphorus, by watershed and watershed segment.

[N, nitrogen; P, phosphorus; mg/L, milligrams per liter]

	Land-use, in percent of segment			Total nitrogen (mg/L as N)		Total phosphorus (mg/L as P)	
Segment	Undeveloped	Developed-non-turf	Developed-turf	Calculated from regression	Average of estimated HUC-14 concentrations	Calculated from regression	Average of estimated HUC-14 concentrations
North	59.6	29.8	10.6	0.83	0.85	0.040	0.041
Central	82.1	13.9	4.0	0.61	0.56	0.027	0.024
South	79.1	17.0	4.0	0.64	0.61	0.028	0.029
Watershed	67.8	24.2	8.0	0.75	0.75	0.035	0.035