
Final Report

Fairfax County Stream Physical Assessment

Prepared for
**Department of Public Works and
Environmental Services
Fairfax County, Virginia**

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CH2MHILL
Herndon, Virginia

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Executive Summary

Fairfax County is in the process of developing comprehensive management plans for the County's 30 designated watersheds. This report documents results from a data collection effort that involved a County-wide assessment of stream conditions. The purpose of the assessment was to collect information on and document the following:

- Habitat conditions (habitat assessment)
- Impacts on the stream from specific infrastructure and problem areas (infrastructure inventory)
- General stream characteristics
- Geomorphic classification of stream type

A baseline assessment was conducted on approximately 801 miles of streams throughout the County. The assessment results will be incorporated into the watershed planning process to determine appropriate management strategies.

The goals for the stream assessment were achieved through three main activities: data collection, data entry, and data analysis. Data were collected on approximately 801 miles of County streams. The data were entered into a database and digitized incorporation into a GIS-based Stream Assessment Tool. Data analysis placed stream reaches into one of five habitat assessment rating categories. Each stream reach was also placed in one of the five stages of geomorphic condition in the Channel Evolution Model (CEM).

The stream assessments comprised a habitat assessment and an inventory of physical stream features based on protocols developed specifically for this project. The habitat assessment (scoring of various habitat parameters) and the inventory (characterization of physical features such as pipelines, utilities, and buffers) together provide a baseline of overall stream conditions, from which watershed conditions can be inferred.

Habitat assessments were performed in combination with inventory assessments for 1,526 stream reaches totaling 716.8 miles. Inventory assessments alone were performed for an additional 311 reaches totaling 82.6 miles. For 14 additional miles, habitat and inventory assessments could not be performed owing to a number of reasons, including dangerous conditions, the presence of wetlands, and streams that were piped or channelized.

The stream habitat data were used to place each stream into one of five habitat assessment rating categories: excellent, good, fair, poor, or very poor. As shown in Table ES-1, most County streams were rated fair or good. Exhibit 1 (in map pocket) depicts the habitat rating for each reach. In addition, a length-weighted average total habitat score was calculated for each watershed and the corresponding total habitat rating was determined (see Table ES-2).

Table ES-3 summarizes, County-wide and for each watershed, the number of stream reaches in each of the five stages, or geomorphic types, from the CEM. Exhibit 2 (in map pocket) depicts the CEM stage for each stream reach. The large majority of streams are in CEM stage 3, indicating active evolution (i.e., deepening and widening) to a new geomorphic equilibrium and generally unstable channel morphology.

Table ES-4 summarizes the number of inventory points County-wide by impact score. Exhibits 3, 4, 5 and 6 (in map pocket) depict the inventory point locations for the entire County, as follows: Crossings (Exhibit 3), Buffer Deficiency (Exhibit 4), Pipes, Ditches, Dumps, and Utilities (Exhibit 5), and Erosion and Obstructions (Exhibit 6).

The Stream Assessment/Watershed Management Program is being implemented with the overall goal of providing a consistent basis for protecting and restoring the receiving water systems and other natural resources in the County. The stream physical assessment phase of Fairfax County's Watershed Management Program comprised habitat assessments and inventories of physical stream features (e.g., stream crossings, drainage pipes, utility crossings, stream bank erosion, deficient buffers, and stream obstructions); analysis of these data yielded baseline conditions for the streams.

The analysis characterized stream habitat conditions in 30 watersheds and indicated that many of the streams in Fairfax County have fair or good habitat. On the basis of the length-weighted average total habitat score, one watershed (Ryans Dam) was rated to have excellent habitat, six watersheds (Bull Neck Run, High Point, Kane Creek, Nichol Run, Occoquan, and Turkey Run) had good habitat, and two watersheds (Belle Haven and Little Hunting Creek) had poor habitat. The remaining watersheds were rated to have fair habitat.

TABLE ES-1

County-Wide Habitat Rating Summary, Linear Feet and Percent of Stream Length
Fairfax County Stream Physical Assessment

Watershed	Very Poor	Poor	Fair	Good	Excellent	Total					
Accotink Creek	16,826	3.73%	137,770	30.53%	168,024	37.23%	108,371	24.01%	20,335	4.51%	451,325
Belle Haven	2,664	28.44	4,306	45.98	2,396	25.58%	0	0.00%	0	0.00%	9,366
Bull Neck Run	0	0.00%	0	0.00%	6,394	25.25%	11,181	44.15%	7,748	30.60%	25,323
Bull Run	0	0.00%	6,443	9.34%	40,594	58.83%	21,970	31.84%	0	0.00%	69,007
Cameron Run	8,901	3.46%	102,149	39.71%	122,029	47.44%	22,247	8.65%	1,927	0.75%	257,252
Cub Run	6,849	1.74%	70,675	17.95%	124,669	31.66%	149,697	38.02%	41,882	10.64%	393,770
Dead Run	0	0.00%	3,740	11.83%	19,250	60.88%	6,436	20.36%	2,193	6.93%	31,618
Difficult Run	2,090	0.31%	75,778	11.07%	335,862	49.04%	222,963	32.56%	48,132	7.03%	684,825
Dogue Creek	304	0.35%	24,778	28.32%	46,199	52.80%	16,212	18.53%	0	0.00%	87,493
Four Mile Run	0	0.00%	0	0.00%	4,076	100.00%	0	0.00%	0	0.00%	4,076
High Point	0	0.00%	0	0.00%	638	4.02%	15,218	95.98%	0	0.00%	15,856
Horsepen Creek	6,028	6.75%	18,631	20.87%	30,938	34.66%	32,270	36.15%	1,395	1.56%	89,262
Johnny Moore Creek	677	1.09%	9,577	15.42%	37,204	59.92%	14,634	23.57%	0	0.00%	62,092
Kane Creek	0	0.00%	0	0.00%	2,072	5.38%	29,429	76.37%	7,034	18.25%	38,535
Little Hunting Creek	7,737	14.81%	20,433	39.10%	24,083	46.09%	0	0.00%	0	0.00%	52,253
Little Rocky Run	0	0.00%	12,911	18.57%	43,383	62.39%	9,659	13.89%	3,581	5.15%	69,534
Mill Branch	1,065	1.41%	30,518	40.54%	16,276	21.62%	13,480	17.91%	13,937	18.51%	75,276
Nichol Run	0	0.00%	6,683	9.23%	7,215	9.96%	41,175	56.86%	17,338	23.94%	72,412
Occoquan	0	0.00%	0	0.00%	16,876	52.85%	15,053	47.15%	0	0.00%	31,929
Old Mill Branch	0	0.00%	1,586	5.02%	28,116	88.89%	1,927	6.09%	0	0.00%	31,629

TABLE ES-1

County-Wide Habitat Rating Summary, Linear Feet and Percent of Stream Length
Fairfax County Stream Physical Assessment

Watershed	Very Poor	Poor	Fair	Good	Excellent	Total				
Pimmit Run 0	0.00%	5,554	5.82%	44,626	46.80%	43,547	45.67%	1,631	1.71%	95,357
Pohick Creek 12,514	3.41%	102,945	28.08%	197,539	53.88%	53,618	14.63%	0	0.00%	366,615
Pond Branch 6,513	7.25%	20,724	23.06%	42,138	46.88%	20,511	22.82%	0	0.00%	89,885
Popes Head 3,285 Creek	1.25%	43,647	16.66%	140,741	53.71%	69,486	26.52%	4,868	1.86%	262,027
Ryans Dam 0	0.00%	0	0.00%	0	0.00%	9,326	41.47%	13,164	58.53%	22,490
Sandy Run 0	0.00%	4,734	4.40%	88,280	82.07%	14,553	13.53%	0	0.00%	107,567
Scotts Run 0	0.00%	7,938	18.23%	20,840	47.86%	7,101	16.31%	7,664	17.60%	43,543
Sugarland Run 0	0.00%	21,925	16.13%	40,380	29.70%	73,637	54.17%	0	0.00%	135,942
Turkey Run 0	0.00%	1,487	10.07%	4,488	30.37%	0	0.00%	8,801	59.56%	14,777
Wolf Run 3,430	4.04%	8,042	9.46%	59,756	70.31%	13,761	16.19%	0	0.00%	84,989
Grand Total 78,882	2.09%	742,973	19.68%	1,715,080	45.42%	1,037,462	27.47%	201,628	5.34%	3,776,025

TABLE ES-2
 Length-Weighted Total Habitat Scores and Habitat Rating by Watershed
Fairfax County Stream Physical Assessment

Watershed	Length-Weighted Total Habitat Score	Total Habitat Category
Accotink Creek	100	Fair
Belle Haven	71	Poor
Bull Neck Run	128	Good
Bull Run	108	Fair
Cameron Run	92	Fair
Cub Run	110	Fair
Dead Run	103	Fair
Difficult Run	108	Fair
Dogue Creek	96	Fair
Four Mile Run	96	Fair
High Point	124	Good
Horsepen Creek	100	Fair
Johnny Moore Creek	104	Fair
Kane Creek	128	Good
Little Hunting Creek	82	Poor
Little Rocky Run	102	Fair
Mill Branch	106	Fair
Nichol Run	127	Good
Occoquan	117	Good
Old Mill Branch	99	Fair
Pimmit Run	112	Fair
Pohick Creek	95	Fair
Pond Branch	99	Fair
Popes Head Creek	103	Fair
Ryans Dam	145	Excellent
Sandy Run	104	Fair
Scotts Run	108	Fair
Sugarland Run	111	Fair
Turkey Run	124	Good
Wolf Run	99	Fair
County-wide	104	Fair

TABLE ES-3
Channel Evolution Model Stage, County-Wide
Fairfax County Stream Physical Assessment

Watershed	Evolution Stage										Total of Reach Length
	1		2		3		4		5		
	Length (ft)	%	Length (ft)	%	Length (ft)	%	Length (ft)	%	Length (ft)	%	
Accotink Creek		0%	16,057	4%	407,162	91%	23,916	5%	0	0%	447,135
Belle Haven		0%	0	0%	8,477	100%	0	0%	0	0%	8,477
Bull Neck Run		0%	0	0%	37,408	54%	31,599	46%	0	0%	69,007
Bull Run		0%	8,923	35%	16,399	65%	0	0%	0	0%	25,323
Cameron Run		0%	13,273	6%	180,167	75%	45,548	19%	0	0%	238,988
Cub Run		0%	32,274	8%	224,790	59%	118,313	31%	8,165	2%	383,541
Dead Run		0%	0	0%	31,618	100%	0	0%	0	0%	31,618
Difficult Run		0%	77,984	12%	487,764	73%	101,820	15%	4,973	1%	672,542
Dogue Creek		0%	13,335	15%	44,528	49%	32,215	36%	0	0%	90,078
Four Mile Run		0%	0	0%	1,654	41%	2,422	59%	0	0%	4,076
High Point		0%	15,856	100%	0	0%	0	0%	0	0%	15,856
Horsepen Creek		0%	6,163	7%	77,322	93%	0	0%	0	0%	83,485
Johnny Moore Creek		0%	0	0%	60,371	97%	1,720	3%	0	0%	62,092
Kane Creek		0%	24,118	64%	13,861	36%	0	0%	0	0%	37,979
Little Hunting Creek		0%	12,042	23%	22,037	42%	18,174	35%	0	0%	52,253
Little Rocky Run		0%	24,219	34%	34,826	49%	11,586	16%	0	0%	70,631
Mill Branch		0%	16,798	23%	55,675	77%	0	0%	0	0%	72,473
Nichol Run		0%	1,918	3%	64,682	91%	4,467	6%	0	0%	71,067
Occoquan		0%	1,679	6%	21,806	78%	4,368	16%	0	0%	27,853
Old Mill Branch		0%	0	0%	22,874	72%	8,755	28%	0	0%	31,629
Pimmit Run		0%	0	0%	92,439	97%	2,917	3%	0	0%	95,356
Pohick Creek		0%	16,965	5%	264,729	74%	76,533	21%	0	0%	358,226
Pond Branch		0%	0	0%	89,885	100%	0	0%	0	0%	89,885
Popes Head Creek		0%	18,297	7%	159,781	61%	82,003	32%	0	0%	260,081
Ryans Dam		0%	9,326	41%	13,164	59%	0	0%	0	0%	22,490
Sandy Run		0%	0	0%	66,114	65%	35,102	35%	0	0%	101,217
Scotts Run		0%	3,389	8%	38,775	89%	1,379	3%	0	0%	43,543
Sugarland Run		0%	0	0%	82,412	60%	54,492	40%	0	0%	136,904
Turkey Run		0%	0	0%	14,777	100%	0	0%	0	0%	14,777
Wolf Run		0%	1,665	2%	83,324	98%	0	0%	0	0%	84,989
Total		0%	314,282	8%	2,718,822	73%	657,330	18%	13,138	0.4%	3,703,572

TABLE ES-4
Inventory Impact Scores, County-Wide
Fairfax County Stream Physical Assessment

Inventory Type	Impact Score												Total
	0	1	2	3	4	5	6	7	8	9	10	>10	
Deficient Buffers	3	22	271	434	510	689	190	312	73	20	42		2566
Crossings	946	821	669	291	150	90	31	27	9	2	3		3039
Ditches and Pipes	1187	329	265	191	93	123	21	23	21	8	18		2279
Erosion		1	6	22	43	143	95	155	50	13	22		550
Head Cut			4	21	38	19	4	1	1	2	32		122
Obstruction	58	27	82	208	114	114	38	45	44	23	41		794
Utility	19	8	11	46	26	21	22	14	2	2	10	5	186
Total	2213	1208	1308	1213	974	1199	401	577	200	70	168	5	9536

N/A = Not applicable, impact score range was 0 to 10