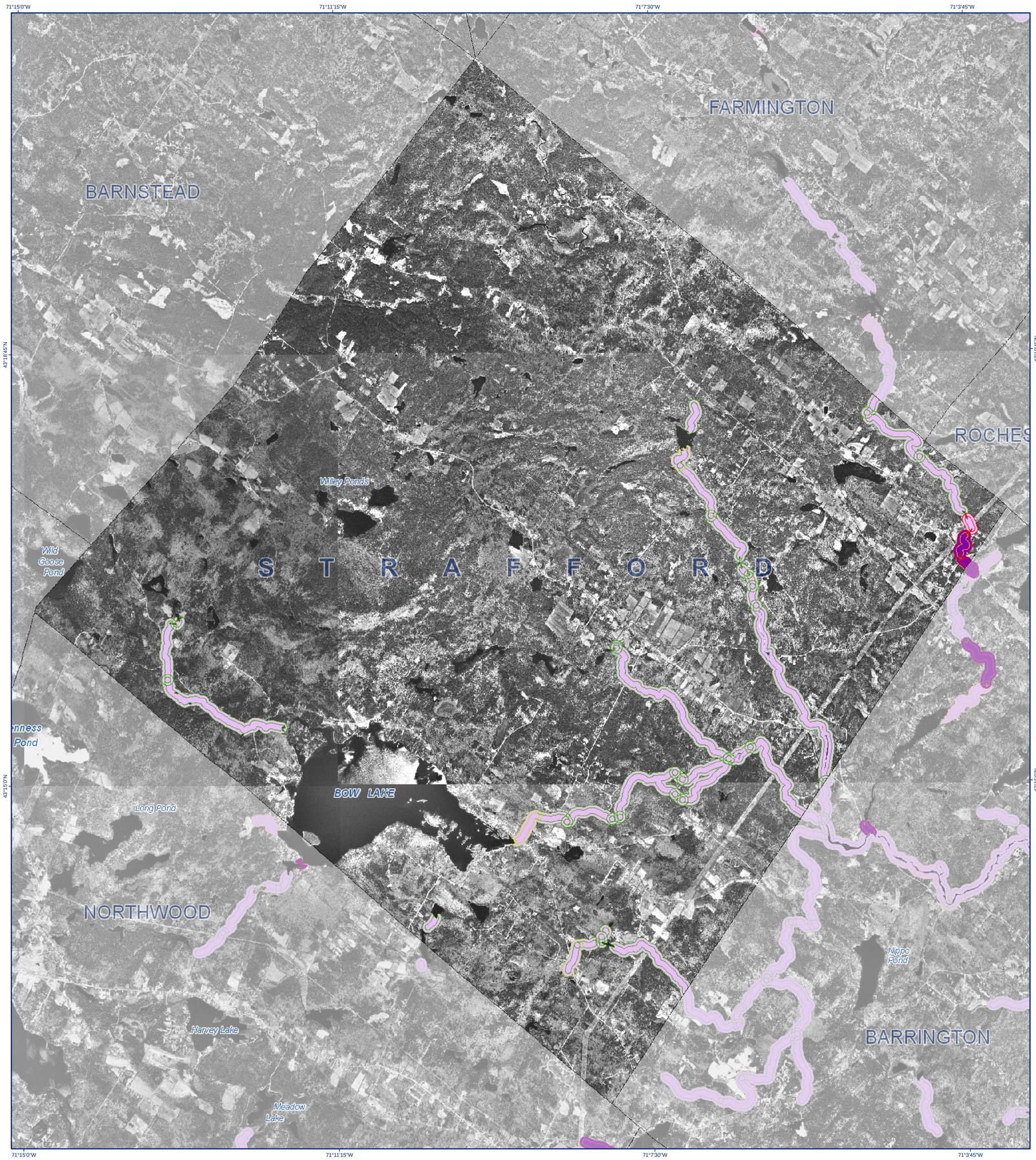
STREAM BUFFER CHARACTERIZATION STUDY

Town of Strafford, NH



Project Description:

The Complex Systems Research Center at the University of New Hampshire conducted a characterization of 2nd order and higher streams within the Piscataqua/Coastal Basin of coastal New Hampshire. Existing GIS and remote sensing data were used to map a suite of anthropogenic factors, including land use, impervious surface coverage, and transportation infrastructure, within standard buffers around each stream segment. These factors were then analyzed to produce a categorical indicator representing the status of each stream.

Processing began using the GRANIT hydrography data to identify perennial streams/rivers of order 2 or higher. Each stream segment was buffered by 150' to support water quality analyses and by 300' to support habitat analyses, and the buffers were then combined with land use data derived from 1998 USGS Digital Orthophotoquads (DOQs). Finally, the buffer/land use composites were categorized based on the degree to which each buffer was impacted by human activity.

Specifically, the buffer categories reflect the percent of land area within each buffer mapped as either developed, transportation, or agriculture, and include:

Category	Decision Rule
Intact	<10% impacted
Mostly Intact	10-25% impacted
Somewhat Modified	25-50% impacted
Altered	>50% impacted

The buffer characterizations are depicted on the map and summarized by town in the tables below. The map also displays the 300' buffers based on the degree of imperviousness in 2005, and the townwide conservation lands data. Impervious surface coverage by town for 1990, 2000, and 2005, as well as conservation lands acreage by town, are also reported.

Stream Buffer Characterization
- Intact
- Mostly Intact
- Somewhat Modified
- Altered

Percent Impervious by 300-ft Buffer Segment
- Less Than 10%
- Greater Than 10%

Conservation Lands
- Level 1, 2, or 2A

150-ft Buffer Stream Characterization Data Summary

Town Name	Total Acres	Land Area		Surface Water Area		150' Buffer Area		Percent of Town Buffer Acreage Categorized as:			
		Acres	% of Town	Acres	% of Town	Acres	% of Town	Intact	Mostly Intact	Somewhat Modified	Altered
Alton	53231	40629	76.3	12602	23.7	0	0.0	0.0	0.0	0.0	0.0
Barrington	31117	29719	95.5	1399	4.5	1580	5.3	4.2	0.8	0.3	0.0
Brentwood	10863	10741	98.9	122	1.1	481	4.5	2.2	2.1	0.0	0.1
Brookfield	14880	14593	98.1	287	1.9	323	2.2	2.2	0.0	0.0	0.0
Candia	19557	19340	98.9	217	1.1	489	2.5	2.1	0.2	0.2	0.0
Chester	16718	16618	99.4	100	0.6	579	3.5	2.4	0.9	0.2	0.0
Danville	7569	7439	98.3	131	1.7	51	0.7	0.3	0.4	0.0	0.0
Deerfield	33348	32584	97.7	764	2.3	1038	3.2	2.5	0.5	0.2	0.0
Derry	23226	22680	97.7	545	2.3	0	0.0	0.0	0.0	0.0	0.0
Dover	18592	17100	92.0	1492	8.0	1086	6.3	2.3	2.0	1.3	0.7
Durham	15852	14305	90.2	1548	9.8	690	4.8	1.2	1.7	1.5	0.4
East Kingston	6381	6318	99.0	63	1.0	209	3.3	2.3	0.7	0.4	0.0
Epping	16776	16470	98.2	306	1.8	1011	6.1	3.7	1.8	0.6	0.0
Exeter	12813	12553	98.0	260	2.0	931	7.4	3.7	1.8	1.2	0.6
Farmington	23640	23218	98.2	422	1.8	773	3.3	1.6	1.1	0.3	0.3
Fremont	11142	11035	99.0	108	1.0	565	5.1	2.2	1.7	1.0	0.2
Greenland	8524	6781	79.5	1743	20.5	329	4.9	2.1	2.2	0.2	0.3
Hampstead	9014	8543	94.8	471	5.2	0	0.0	0.0	0.0	0.0	0.0
Hampton	9073	8287	91.3	786	8.7	966	11.7	9.8	0.7	0.7	0.4
Hampton Falls	8078	7719	95.6	359	4.4	774	10.0	8.9	1.0	0.2	0.0
Kensington	7668	7635	99.6	32	0.4	370	4.9	3.2	0.7	0.7	0.2
Kingston	13450	12494	92.9	957	7.1	224	1.8	1.5	0.1	0.1	0.1
Lee	12927	12686	98.1	241	1.9	768	6.1	3.3	1.6	1.2	0.0
Madbury	7799	7400	94.9	400	5.1	387	5.2	3.2	1.9	0.0	0.0
Middleton	11843	11559	97.6	284	2.4	407	3.5	3.0	0.5	0.0	0.1
Milton	21936	21089	96.1	847	3.9	853	4.0	3.0	0.6	0.4	0.0
New Castle	1348	506	37.6	841	62.4	145	28.7	3.3	0.0	0.0	25.3
New Durham	28054	26345	93.9	1709	6.1	323	1.2	1.1	0.1	0.0	0.0
Newfields	4647	4541	97.7	106	2.3	293	6.5	4.4	1.4	0.4	0.3
Newington	7917	5216	65.9	2700	34.1	178	3.4	0.4	0.5	1.3	1.1
Newmarket	9080	8038	88.5	1043	11.5	458	5.7	2.8	1.2	1.1	0.7
North Hampton	8923	8862	99.3	61	0.7	490	5.5	3.9	1.3	0.1	0.2
Northwood	19357	17974	92.9	1383	7.1	285	1.6	1.4	0.1	0.0	0.0
Nottingham	30997	29882	96.4	1115	3.6	1409	4.7	4.1	0.5	0.0	0.1
Pittsfield	15559	15190	97.6	369	2.4	0	0.0	0.0	0.0	0.0	0.0
Portsmouth	10763	10002	92.9	761	7.1	431	4.3	1.8	0.2	0.5	1.9
Raymond	18944	18459	97.4	485	2.6	1092	5.9	2.6	2.3	0.9	0.1
Rochester	29081	28321	97.4	759	2.6	1569	5.5	1.8	1.8	1.3	0.5
Rollinsford	4843	4682	96.7	161	3.3	296	6.3	3.2	0.0	2.8	0.3
Rye	8406	7998	95.1	408	4.9	554	6.9	4.7	1.1	0.5	0.7
Sandown	9232	8888	96.3	343	3.7	290	3.3	2.6	0.4	0.2	0.0
Seabrook	6161	5664	91.9	497	8.1	721	12.7	10.4	0.5	1.4	0.4
Somersworth	6398	6219	97.2	179	2.8	280	4.5	2.1	0.4	1.3	0.8
South Hampton	5147	5044	98.0	102	2.0	0	0.0	0.0	0.0	0.0	0.0
Strafford	32779	31151	95.0	1628	5.0	691	2.2	2.1	0.0	0.0	0.0
Stratham	9902	9674	97.7	228	2.3	439	4.5	3.1	0.9	0.4	0.1
Wakefield	28717	25264	88.0	3453	12.0	451	1.8	1.2	0.2	0.3	0.0
Wolfeboro	37406	30693	82.1	6713	17.9	0	0.0	0.0	0.0	0.0	0.0
Total	**759673**	**708144**	**93.2**	**51529**	**6.8**	**25279**	**3.6**	**2.3**	**0.7**	**0.4**	**0.2**

Townwide Conservation Lands Data Summary

Town Name	Townwide Conservation Lands		
	Acres	% of Town	% of Land Area
Alton	3766	7.1	9.3
Barrington	2667	8.6	9.0
Brentwood	1387	12.8	12.9
Brookfield	1817	12.2	12.5
Candia	2008	10.3	10.4
Chester	1312	7.8	7.9
Danville	540	7.1	7.3
Deerfield	5582	16.7	17.1
Derry	1118	4.8	4.9
Dover	1529	8.2	8.9
Durham	4321	27.3	30.2
East Kingston	670	10.5	10.6
Epping	1271	7.6	7.7
Exeter	3496	27.3	27.8
Farmington	1242	5.3	5.3
Fremont	181	1.6	1.6
Greenland	893	10.5	13.2
Hampstead	1506	16.7	17.6
Hampton	408	4.5	4.9
Hampton Falls	633	7.8	8.2
Kensington	1549	20.2	20.3
Kingston	1376	10.2	11.0
Lee	2299	17.8	18.1
Madbury	1328	17.0	17.9
Middleton	488	4.1	4.2
Milton	2553	11.6	12.1
New Castle	92	6.8	18.1
New Durham	1751	6.2	6.6
Newfields	753	16.2	16.6
Newington	1307	16.5	25.1
Newmarket	1331	14.7	16.6
North Hampton	709	8.0	8.0
Northwood	2381	12.3	13.2
Nottingham	5860	18.9	19.6
Pittsfield	728	4.7	4.8
Portsmouth	1099	10.2	11.0
Raymond	972	5.1	5.3
Rochester	431	1.5	1.5
Rollinsford	409	8.4	8.7
Rye	1488	17.7	18.6
Sandown	470	5.1	5.3
Seabrook	447	7.3	7.9
Somersworth	221	3.5	3.6
South Hampton	284	5.5	5.6
Strafford	5261	16.1	16.9
Stratham	1023	10.3	10.6
Wakefield	390	1.4	1.5
Wolfeboro	2248	6.0	7.3
Total	**75596**	**10.0**	**10.7**

300-ft Buffer Stream Characterization Data Summary

Town Name	Total Acres	Land Area		Surface Water Area		300' Buffer Area		Percent of Town Buffer Acreage Categorized as:			
		Acres	% of Town	Acres	% of Town	Acres	% of Town	Intact	Mostly Intact	Somewhat Modified	Altered
Alton	53231	40629	76.3	12602	23.7	0	0.0	0.0	0.0	0.0	0.0
Barrington	31117	29719	95.5	1399	4.5	3210	10.8	7.2	2.6	0.8	0.1
Brentwood	10863	10741	98.9	122	1.1	958	8.9	2.2	5.8	0.5	0.4
Brookfield	14880	14593	98.1	287	1.9	647	4.4	4.1	0.3	0.0	0.0
Candia	19557	19340	98.9	217	1.1	1035	5.4	4.2	0.4	0.7	0.0
Chester	16718	16618	99.4	100	0.6	1205	7.3	3.4	2.3	1.5	0.0
Danville	7569	7439	98.3	131	1.7	98	1.3	0.6	0.7	0.0	0.0
Deerfield	33348	32584	97.7	764	2.3	2161	6.6	4.0	1.8	0.9	0.0
Derry	23226	22680	97.7	545	2.3	0	0.0	0.0	0.0	0.0	0.0
Dover	18592	17100	92.0	1492	8.0	2139	12.5	3.0	3.3	4.7	1.5
Durham	15852	14305	90.2	1548	9.8	1377	9.6	1.5	1.7	4.9	1.5
East Kingston	6381	6318	99.0	63	1.0	416	6.6	2.4	2.1	1.2	0.8
Epping	16776	16470	98.2	306	1.8	1980	12.0	4.0	5.3	2.4	0.3
Exeter	12813	12553	98.0	260	2.0	1927	15.3	6.3	2.6	4.2	2.4
Farmington	23640	23218	98.2	422	1.8	1548	6.7	2.5	2.0	1.3	0.8
Fremont	11142	11035	99.0	108	1.0	1127	10.2	5.3	1.6	2.1	1.2
Greenland	8524	6781	79.5	1743	20.5	670	9.9	2.0	5.6	1.6	0.8
Hampstead	9014	8543	94.8	471	5.2	0	0.0	0.0	0.0	0.0	0.0
Hampton	9073	8287	91.3	786	8.7	2242	27.1	21.7	2.4	1.5	1.5
Hampton Falls	8078	7719	95.6	359	4.4	1752	22.7	16.9	4.4	1.3	0.1
Kensington	7668	7635	99.6	32	0.4	815	10.7	6.1	0.8	3.7	0.1
Kingston	13450	12494	92.9	957	7.1	458	3.7	2.7	0.5	0.3	0.1
Lee	12927	12686	98.1	241	1.9	1541	12.1	5.7	2.9	3.0	0.5
Madbury	7799	7400	94.9	400	5.1	745	10.1	3.7	5.0	1.2	0.1
Middleton	11843	11559	97.6	284	2.4	843	7.3	6.2	0.9	0.0	0.2
Milton	21936	21089	96.1	847	3.9	1759	8.3	6.0	0.8	1.3	0.2
New Castle	1348	506	37.6	841	62.4	269	53.2	5.7	0.0	0.0	47.5
New Durham	28054	26345	93.9	1709	6.1	703	2.7	2.5	0.1	0.1	0.0
Newfields	4647	4541	97.7	106	2.3	596	13.1	8.8	0.4	3.3	0.6
Newington	7917	5216	65.9	2700	34.1	364	7.0	0.9	0.8	2.2	3.1
Newmarket	9080	8038	88.5	1041	11.5	934	11.6	3.2	2.9	4.1	1.3
North Hampton	8923	8862	99.3	61	0.7	1028	11.6	5.9	3.3	1.7	0.6
Northwood	19357	17974	92.9	1383	7.1	612	3.4	2.3	0.9	0.2	0.1
Nottingham	30997	29882	96.4	1115	3.6	2928	9.8	6.7	2.6	0.2	0.3
Pittsfield	15559	15190	97.6	369	2.4	0	0.0	0.0	0.0	0.0	0.0
Portsmouth	10763	10002	92.9	761	7.1	858	8.6	3.4	0.4	0.7	4.0
Raymond	18944	18459	97.4	485	2.6	2188	11.9	3.4	3.4	4.4	0.7
Rochester	29081	28321	97.4	759	2.6	3012	10.6	2.4	2.1	4.1	2.0
Rollinsford	4843	4682	96.7	161	3.3	582	12.4	3.1	3.0	3.4	3.0
Rye	8406	7998	95.1	408	4.9	1165	14.6	9.0	1.7	2.5	1.4
Sandown	9232	8888	96.3	343	3.7	599	6.7	4.2	1.7	0.8	0.0
Seabrook	6161	5664	91.9	497	8.1	1697	30.0	24.3	1.5	1.8	2.3
Somersworth	6398	6219	97.2	179	2.8	569	9.1	3.1	1.3	2.4	2.4
South Hampton	5147	5044	98.0	102	2.0	0	0.0	0.0	0.0	0.0	0.0
Strafford	32779	31151	95.0	1628	5.0	1445	4.6	4.3	0.2	0.0	0.1
Stratham	9902	9674	97.7	228	2.3	889	9.2	4.5	2.4	2.0	0.2
Wakefield	28717	25264	88.0	3453	12.0	948	3.8	2.2	0.8	0.6	0.2
Wolfeboro	37406	30693	82.1	6713	17.9	0	0.0	0.0	0.0	0.0	0.0
Total	**759673**	**708144**	**93.2**	**51529**	**6.8**	**52037**	**7.3**	**3.9**	**1.6**	**1.3**	**0.6**

Townwide Impervious Surface Data Summary

Town Name	Townwide Impervious Surface Coverage		
	% of Land Area, **1990**	% of Land Area, **2000**	% of Land Area, **2005**
Alton	2.1	3.0	3.5
Barrington	2.6	4.0	4.7
Brentwood	5.0	7.7	9.5
Brookfield	1.0	1.3	1.4
Candia	2.7	4.1	4.8
Chester	2.5	4.3	5.1
Danville	3.5	6.0	7.2
Deerfield	1.5	2.4	3.0
Derry	8.0	11.3	13.1
Dover	11.0	15.4	18.5
Durham	4.7	7.2	7.7
East Kingston	3.5	5.3	7.0
Epping	4.0	6.5	7.8
Exeter	7.5	11.0	12.4
Farmington	3.0	4.2	4.7
Fremont	3.0	4.9	5.9
Greenland	6.7	10.5	12.5
Hampstead	7.5	11.4	13.7
Hampton	14.2	19.4	20.7
Hampton Falls	4.4	6.9	9.1
Kensington	3.2	5.0	6.2
Kingston	5.2	8.2	9.7
Lee	3.7	5.8	6.6
Madbury	3.4	5.3	5.3
Middleton	1.8	2.5	3.0
Milton	2.8	4.0	4.7
New Castle	21.4	30.6	33.8
New Durham	1.7	2.4	2.8
Newfields	3.1	5.5	6.8
Newington	13.2	18.0	20.2
Newmarket	6.0	8.8	10.2
North Hampton	7.3	10.8	12.4
Northwood	2.4	3.4	4.0
Nottingham	1.5	2.3	2.8
Pittsfield	2.8	3.7	4.6
Portsmouth	21.3	27.3	30.5
Raymond	5.3	8.0	9.3
Rochester	8.5	11.7	13.9
Rollinsford	5.7	8.1	9.3
Rye	7.3	11.0	12.8
Sandown	3.8	6.1	7.9
Seabrook	14.2	21.3	27.2
Somersworth	12.3	16.4	20.2
South Hampton	2.4	3.8	4.8
Strafford	1.4	2.0	2.3
Stratham	6.5	10.1	12.9
Wakefield	3.5	4.8	5.6
Wolfeboro	2.8	4.2	4.6
Total	**4.4**	**6.4**	**7.5**

Map Location:

Map Notes:

1. Stream reaches were identified, attributed, and buffered based on their extent from confluence to confluence. Rules were developed to guide the determination of segments in specific situations, e.g. where confluences existed on one river bank but not on the opposing bank. These procedures occasionally yielded very short stream segments and therefore relatively small buffers.
2. Because only 2nd order and higher perennial streams were analyzed, some discontinuities exist in the input data set and thus in th e buffers.
3. At points of confluence and in other locations where buffers overlapped, the most impacted category was assigned to the overlap area.
4. Data was processed for the Piscataqua/Coastal Basin , which includes all or part of 48 municipalities. Six of these towns -- Alton, Derry, Hampstead, Pittsfield, South Hampton, and Wolfeboro - were not included in the printed map set as they have no streams that extend into the Watershed.
5. Only 300' buffers were analyzed with respect to impervious surface data due to the 30-meter resolution of the source satellite imagery.
6. Conservation lands shown on the map and summarized in the table include only those classified as permanently protected (Level 1, 2, or 2A) in the GRANIT database.

Data Sources:

- **Stream Buffers** were created from 1:24,000-scale New Hampshire National Hydrography Dataset (NHNHD) stream centerlines (2005)
- **Impervious Surface** data was generated from Landsat 5 TM (30m resolution) imagery (1990, 2000, 2005)
- **Land Use** data was created from 1998 USGS Digital Orthophotoquads
- **Conservation Lands** were based on April, 2006 version of GRANIT data layer

Map by:

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University of New Hampshire, Durham
June, 2006

Institute for the Study of Earth, Oceans, and Space
University of New Hampshire

GRANIT

NewHampshire Estuaries Project

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Scale = 1:24,000

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