

**Table S1.** Watershed area and descriptive statistics summarized for the total nitrogen (TN) gage stations used in the analysis. SD = standard deviation. Reproduced from Mengistu et al. (In review).

<b>Watershed ID/ Gage Station</b>	<b>Area (km<sup>2</sup>)</b>	<b>Average TN (mg L<sup>-1</sup>)</b>	<b>SD TN (mg L<sup>-1</sup>)</b>	<b>Sample size</b>
5267000	30124	0.84	0.22	36
5280000	6780	4.97	2.54	77
5287890	217	1.48	0.87	121
5288500	50101	1.43	0.61	25
5294000	2162	2.42	1.43	44
5317000	3322	25.90	19.44	52
5319500	2118	10.21	4.81	146
5320270	333	8.86	4.93	99
5330000	42128	6.05	3.16	46
5331580	52048	3.55	1.77	98
5333500	4023	0.48	0.17	96
5338500	2453	1.13	0.40	35
5340500	16051	0.76	0.27	98
5369500	23442	1.42	0.36	289
5379500	1664	2.63	0.52	187
5382000	5338	1.40	0.44	251
5388250	1983	5.68	2.40	106
5405000	1572	2.09	0.57	107
5407000	27286	1.54	0.45	114
5412500	4019	7.33	3.04	121
5420680	894	6.11	3.70	73
5422000	6041	6.71	3.12	154
5424057	1166	5.05	1.07	34
5425500	2485	3.04	0.72	68
5426000	1978	3.44	0.98	55
5427570	6837	3.10	0.73	25
5430175	1331	4.93	1.54	34
5430500	8651	3.95	1.13	128
5431486	487	8.26	2.64	39
5434500	2675	5.85	1.19	107
5443500	22668	5.61	1.72	51
5446500	24715	5.57	1.33	51
5449500	1102	7.77	3.74	53
5451210	572	10.36	7.28	104
5453100	7228	7.63	3.61	35

5455100	520	7.40	4.56	132
5458000	768	8.45	5.63	55
5458900	2194	7.50	3.88	181
5464220	769	10.58	4.21	56
5465500	14942	6.78	2.68	132
5471500	4197	7.77	4.80	96
5474000	11145	7.49	3.70	61
5481650	15133	7.39	3.35	87
5484500	8831	8.85	4.48	94
5486000	903	5.64	3.35	155
5490600	37051	4.38	2.80	38
5495000	1024	1.51	1.41	36
5500000	1558	1.54	1.38	119
5514500	2396	1.63	1.16	59
5518000	4615	2.39	1.29	148
5520500	5935	2.53	1.51	84
5525500	1151	8.56	5.42	74
5526000	5264	7.88	5.43	33
5527500	13286	3.61	1.98	55
5527800	313	3.55	1.98	39
5531500	303	7.96	3.15	164
5532500	1631	6.07	2.18	123
5536195	192	5.85	2.00	126
5543500	21383	5.80	1.45	67
5548280	488	3.95	1.23	57
5550000	3572	2.61	0.92	56
5551000	4005	3.26	0.88	54
5551700	178	3.69	1.72	55
5552500	6774	3.98	1.82	59
5568800	163	9.34	3.76	29
5570910	617	6.06	4.15	63
5572000	1417	7.52	4.44	119
5583000	13167	5.61	2.60	86
5584500	1676	5.40	3.35	131
5585000	3318	4.53	2.74	55
5591200	1232	7.26	4.11	53
5591700	284	7.47	4.57	49
5592000	2713	4.61	2.22	53
5592100	3408	4.14	2.20	52
5592500	5006	3.50	1.84	52
5592800	390	1.54	0.94	52

5592900	45	1.38	0.89	51
5594100	11260	2.02	1.11	51
5595730	235	1.96	1.38	52
5599500	5597	1.44	0.54	52
7014500	3844	0.37	0.22	117
7018100	1912	0.41	0.24	55

**Table S2.** Static landscape variables considered in study

<b>Variable classes</b>	<b>Variable in Manuscript</b>	<b>Description</b>	<b>Unit</b>
<i>Response variables</i>	TN	Total nitrogen concentration (mg/L)	mg L <sup>-1</sup>
<i>Landscape variables</i>	Watershed area	Area of a watershed	km <sup>2</sup>
	Watershed perimeter	Perimeter of a watershed	Km
	Cultivated	Watershed area covered by crops	Percent
	Forest	Watershed area covered by forest	Percent
	Developed	Watershed area covered by developed surfaces	Percent
	Grassland	Watershed area covered by grassland	Percent
	Pasture	Watershed area covered by pasture	Percent
	Open water	Watershed area covered by open water	Percent
	Barren	Watershed area covered by barren land	Percent
	Wetland area (NLCD)	Total area of NLCD wetland in a watershed	km <sup>2</sup>
	Average impervious	Average percent impervious value across all impervious grid cells	Percent
	Percent impervious	Watershed area covered by impervious surfaces	Percent
	Artificial drainage	Watershed agriculture under artificial drainage	Percent
<i>Hydrology and climate variables</i>	Discharge	Average discharge on day of TN sampling at the watershed outlet	m <sup>3</sup> s <sup>-1</sup>
	2YR24HR precip	Precipitation for a two year, 24-hr event	Mm
	Max precip	Annual average maximum precipitation	Mm
	Mean precip	Annual average mean precipitation	Mm
<i>Nutrient input variables</i>	Total N input	Total nitrogen input to the watersheds	kg ha <sup>-1</sup> yr <sup>-1</sup>
	Total P input	Total phosphorus input to the watersheds	
<i>General NWI wetland variables</i>	Wetland (NWI)	Watershed area covered by NWI wetlands	Percent
	Wetland count	Number of wetlands in a watershed	Number
	Wetland density	Number of wetlands per unit watershed area	Number km <sup>-2</sup>
	Non-riparian wetlands	Non-riparian wetlands in a watershed	Percent

	Riparian wetlands	Riparian wetlands in a watershed	Percent
<i>Wetland drainage area variables</i>	WD imperviousness	Average proportion of wetland drainage areas with impervious surfaces	Percent
	WD agriculture impact	Average proportion of wetland drainage areas with agricultural land cover	Percent
	Wetland drainage area	Average wetland drainage area within a watershed	km <sup>2</sup>
	Watershed wetland drainage	Percent of the watershed draining to wetlands	Percent
<i>Wetland flowpath to stream variables</i>	FP type: overland	Overland flowpath from wetland to stream	Percent of flowpaths
	FP type: shallow	Shallow subsurface flowpath from wetland to stream	Percent of flowpaths
	FP type: shallow and deep	Shallow and deep subsurface flowpath from wetland to stream	Percent of flowpaths
	FP type: riparian	Riparian flowpath from wetland to stream	Percent of flowpaths
	FP frequency: low	Flowpath from wetland to stream with excessively drained soils = low frequency connections	Percent
	FP frequency: medium	Flowpath from wetland to stream with well drained soil = medium frequency connections	Percent
	FP frequency: high	Flowpath from wetland to stream with poorly drained soil = high frequency connections	Percent
	FP magnitude: overland	Magnitude of overland flowpath from wetland to stream	Hours
	FP magnitude: shallow	Magnitude of shallow subsurface flowpath from wetland to stream	Days
	FP slope	Slope of flowpath from wetland to stream	m m <sup>-1</sup>
	FP length	Length of flowpath from wetland to stream	M
	FP Manning	Average Manning's roughness coefficient along the flowpath from wetland to stream	Dimensionless
	FP maximum porosity	Maximum effective porosity along the wetland to stream flowpath	Dimensionless
	FP minimum permeability	Minimum permeability along the wetland to stream flowpath	m d <sup>-1</sup>

FP with levees	Levees present along wetland to stream flowpath	Percent of flowpaths
FP without levees	No levees present along wetland to stream flowpath	Percent of flowpaths
FP with canals	Canals present along wetland to stream flowpath	Percent of flowpaths
FP without canals	No canals present along wetland to stream flowpath	Percent of flowpaths
FP agricultural impact	Watershed drainage area with agriculture present along wetland to stream flowpath	Percent

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