

2015 Flow Normalized Trends; Susquehanna River at Towanda

Trend period (Water Year) = 1988-2015

FNC – Flow Normalized Concentration – mg/L, FNC Slope – mg/L/yr

FNF – Flow Normalized Flux – 10⁶ kg/yr, FNF Slope – 10⁶ kg/yr/yr

FNC/FNF alpha level – 0.1

SMK – Seasonal Mann-Kendall for flow trends, alpha level – 0.05

NS – Not significant, UP – Increasing trend, DOWN – Decreasing trend

HL – Highly Likely ≥0.95 and ≤1.00

VL – Very Likely ≥0.90 and <0.95

L – Likely ≥0.66 and <0.90

ALAN – About as Likely as Not >0.33 and <0.66

Towanda Parameter/code	Trend Test	Change	Slope	% Change	Hypothesis Test		Likelihood Test		
					P-value	Trend	Value	Descriptor	Trend
FLOW / 60	SMK	-	-	-	0.658	NS	-	-	-
TN / 600	FNC	-0.586	-0.023	-39	<0.05	Down	0.99	HL	Down
	FNF	-7.20	-0.28	-41	<0.05	Down	0.99	HL	Down
TNO _x / 630	FNC	-0.309	-0.012	-37	<0.05	Down	0.99	HL	Down
	FNF	-3.29	-0.13	-36	<0.05	Down	0.99	HL	Down
TON / 605	FNC	-0.202	-0.0078	-37	<0.05	Down	0.99	HL	Down
	FNF	-3.18	-0.12	-43	<0.05	Down	0.99	HL	Down
TNH ₃ / 610	FNC	-0.02	-0.00077	-34	0.045	Down	0.98	HL	Down
	FNF	-0.33	-0.013	-40	0.17	NS	0.92	VL	Down
DN / 602	FNC	-0.437	-0.017	-36	<0.05	Down	0.99	HL	Down
	FNF	-5.14	-0.2	-37	<0.05	Down	0.99	HL	Down
DNO _x / 631	FNC	-0.309	-0.012	-37	<0.05	Down	0.99	HL	Down
	FNF	-3.26	-0.13	-36	<0.05	Down	0.99	HL	Down
DON / 607	FNC	-0.095	-0.0037	-29	<0.05	Down	0.99	HL	Down
	FNF	-1.59	-0.061	-39	<0.05	Down	0.99	HL	Down
DNH ₃ / 608	FNC	-0.016	-0.00061	-30	0.058	Down	0.97	HL	Down
	FNF	-0.23	-0.0089	-34	0.072	Down	0.97	HL	Down
TP / 665	FNC	-0.034	-0.0013	-39	0.043	Down	0.97	HL	Down
	FNF	-0.24	-0.0091	-19	0.34	N/A	0.82	L	Down
DP / 666	FNC	-0.028	-0.0011	-62	<0.05	Down	0.99	HL	Down
	FNF	-0.29	-0.011	-61	<0.05	Down	0.99	HL	Down
DOP / 671	FNC	0.0002	<0.0001	2	0.93	NS	0.46	ALAN	UP
	FNF	0.03	0.0012	29	0.38	NS	0.81	L	UP
TOC / 680	FNC	-0.491	-0.019	-14	<0.05	Down	0.99	HL	Down
	FNF	-1.10	-0.042	-2.6	0.72	NS	0.64	ALAN	Down
SSC / 80154	FNC	-4.510	-0.17	-11	0.4	NS	0.79	L	Down
	FNF	-257.4	-9.9	-18	0.44	NS	0.79	L	Down

2015 Flow Normalized Trends; Susquehanna River at Danville

Trend period (Water Year) = 1984-2015

FNC – Flow Normalized Concentration – mg/L, FNC Slope – mg/L/yr

FNF – Flow Normalized Flux – 10⁶ kg/yr, FNF Slope – 10⁶ kg/yr/yr

FNC/FNF alpha level – 0.1

SMK – Seasonal Mann-Kendall for flow trends, alpha level – 0.05

NS – Not significant, UP – Increasing trend, DOWN – Decreasing trend

HL – Highly Likely ≥0.95 and ≤1.00

VL – Very Likely ≥0.90 and <0.95

L – Likely ≥0.66 and <0.90

ALAN – About as Likely as Not >0.33 and <0.66

Danville Parameter/code	Trend Test	Change	Slope	% Change	Hypothesis Test		Likelihood Test		
					P-value	Trend	Value	Descriptor	Trend
FLOW / 60	SMK	-	-	-	0.329	NS	-	-	-
TN / 600	FNC	-0.772	-0.026	-47	<0.05	Down	0.99	HL	Down
	FNF	-11.97	-0.4	-44	<0.05	Down	0.99	HL	Down
TNO _x / 630	FNC	-0.305	-0.01	-38	<0.05	Down	0.99	HL	Down
	FNF	-4.21	-0.14	-33	<0.05	Down	0.99	HL	Down
TON / 605	FNC	-0.465	-0.016	-58	<0.05	Down	1.00	HL	Down
	FNF	-8.19	-0.27	-56	0.074	Down	0.97	HL	Down
TNH ₃ / 610	FNC	-0.060	-0.002	-64	<0.05	Down	0.99	HL	Down
	FNF	-0.97	-0.032	-62	<0.05	Down	0.99	HL	Down
DN / 602	FNC	-0.576	-0.019	-44	<0.05	Down	0.99	HL	Down
	FNF	-9.16	-0.31	-43	<0.05	Down	0.99	HL	Down
DNO _x / 631	FNC	-0.322	-0.011	-39	<0.05	Down	0.99	HL	Down
	FNF	-4.57	-0.15	-35	<0.05	Down	0.99	HL	Down
DON / 607	FNC	-0.252	-0.0084	-54	<0.05	Down	0.99	HL	Down
	FNF	-4.50	-0.15	-57	<0.05	Down	0.99	HL	Down
DNH ₃ / 608	FNC	-0.062	-0.0021	-68	<0.05	Down	0.99	HL	Down
	FNF	-0.98	-0.033	-64	<0.05	Down	0.99	HL	Down
TP / 665	FNC	-0.054	-0.0018	-50	<0.05	Down	0.99	HL	Down
	FNF	-0.55	-0.018	-27	0.063	Down	0.97	HL	Down
DP / 666	FNC	-0.021	-0.00069	-62	<0.05	Down	0.99	HL	Down
	FNF	-0.36	-0.012	-63	<0.05	Down	0.99	HL	Down
DOP / 671	FNC	-0.003	-0.00009	-25	0.47	NS	0.76	L	Down
	FNF	-0.03	-0.001	-17	0.95	NS	0.46	ALAN	Down
TOC / 680	FNC	-1.570	-0.052	-34	<0.05	Down	0.99	HL	Down
	FNF	-17.35	-0.58	-24	<0.05	Down	0.99	HL	Down
SSC / 80154	FNC	4.760	0.16	8.9	0.7	NS	0.64	ALAN	UP
	FNF	917.2	31	40	0.45	NS	0.79	L	UP
SSC/TSS Combined*	FNC	-26.2	-0.87	-49	0.07	Down	0.97	HL	Down
	FNF	-1129	-38	-50	0.22	NS	0.90	L	Down

*Due to concern over some SS values a second run was completed with TSS substituted for SSC from 2010-2015, which yielded significantly different results. This finding will be further explored and reported on in the final report.

2015 Flow Normalized Trends; Susquehanna River at Marietta

Trend period (Water Year) = 1986-2015

FNC – Flow Normalized Concentration – mg/L, FNC Slope – mg/L/yr

FNF – Flow Normalized Flux – 10⁶ kg/yr, FNF Slope – 10⁶ kg/yr/yr

FNC/FNF alpha level – 0.1

SMK – Seasonal Mann-Kendall for flow trends, alpha level – 0.05

NS – Not significant, UP – Increasing trend, DOWN – Decreasing trend

HL – Highly Likely ≥0.95 and ≤1.00

VL – Very Likely ≥0.90 and <0.95

L – Likely ≥0.66 and <0.90

ALAN – About as Likely as Not >0.33 and <0.66

Marietta Parameter/code	Trend Test	Change	Slope	% Change	Hypothesis Test		Likelihood Test		
					P-value	Trend	Value	Descriptor	Trend
FLOW / 60	SMK	-	-	-	0.323	NS	-	-	-
TN / 600	FNC	-0.674	-0.024	-37	<0.05	Down	0.99	HL	Down
	FNF	-27.89	-1	-38	<0.05	Down	0.99	HL	Down
TNO _x / 630	FNC	-0.298	-0.011	-27	0.07	Down	0.97	HL	Down
	FNF	-11.90	-0.43	-28	0.058	Down	0.97	HL	Down
TON / 605	FNC	-0.305	-0.011	-46	<0.05	Down	0.99	HL	Down
	FNF	-14.52	-0.52	-49	<0.05	Down	0.99	HL	Down
TNH ₃ / 610	FNC	-0.030	-0.0011	-46	<0.05	Down	0.99	HL	Down
	FNF	-1.25	-0.045	-47	<0.05	Down	0.99	HL	Down
DN / 602	FNC	-0.507	-0.018	-33	<0.05	Down	0.99	HL	Down
	FNF	-19.12	-0.68	-33	<0.05	Down	0.99	HL	Down
DNO _x / 631	FNC	-0.293	-0.01	-27	<0.05	Down	0.99	HL	Down
	FNF	-12.18	-0.43	-28	<0.05	Down	0.99	HL	Down
DON / 607	FNC	-0.171	-0.0061	-45	<0.05	Down	0.99	HL	Down
	FNF	-5.88	-0.21	-46	<0.05	Down	0.99	HL	Down
DNH ₃ / 608	FNC	-0.030	-0.0011	-49	<0.05	Down	0.99	HL	Down
	FNF	-1.19	-0.042	-48	<0.05	Down	0.99	HL	Down
TP / 665	FNC	-0.041	-0.0015	-42	<0.05	Down	0.99	HL	Down
	FNF	-1.34	-0.048	-30	<0.05	Down	0.99	HL	Down
DP / 666	FNC	-0.021	-0.00073	-54	<0.05	Down	0.99	HL	Down
	FNF	-0.71	-0.025	-53	<0.05	Down	0.99	HL	Down
DOP / 671	FNC	0.005	0.00019	71	0.11	NS	0.95	VL	UP
	FNF	0.23	0.0081	96	<0.05	Down	1.00	HL	UP
TOC / 680	FNC	-0.069	-0.0025	-1.9	0.8	NS	0.61	ALAN	Down
	FNF	2.51	0.09	1.8	0.98	NS	0.51	ALAN	UP
SSC / 80154	FNC	-17.00	-0.61	-35	<0.05	Down	1.00	HL	Down
	FNF	-1405	-50	-35	0.15	NS	0.93	VL	Down

2015 Flow Normalized Trends; West Branch Susquehanna River at Lewisburg

Trend period (Water Year) = 1984-2015

FNC – Flow Normalized Concentration – mg/L, FNC Slope – mg/L/yr

FNF – Flow Normalized Flux – 10⁶ kg/yr, FNF Slope – 10⁶ kg/yr/yr

FNC/FNF alpha level – 0.1

SMK – Seasonal Mann-Kendall for flow trends, alpha level – 0.05

NS – Not significant, UP – Increasing trend, DOWN – Decreasing trend

HL – Highly Likely ≥0.95 and ≤1.00

VL – Very Likely ≥0.90 and <0.95

L – Likely ≥0.66 and <0.90

ALAN – About as Likely as Not >0.33 and <0.66

Lewisburg Parameter/code	Trend Test	Change	Slope	% Change	Hypothesis Test		Likelihood Test		
					P-value	Trend	Value	Descriptor	Trend
FLOW / 60	SMK	-	-	-	0.866	NS	-	-	-
TN / 600	FNC	-0.590	-0.02	-45	<0.05	Down	0.99	HL	Down
	FNF	-5.42	-0.18	-42	<0.05	Down	0.99	HL	Down
TNOx / 630	FNC	-0.224	-0.0075	-31	<0.05	Down	0.99	HL	Down
	FNF	-1.70	-0.056	-26	<0.05	Down	0.99	HL	Down
TON / 605	FNC	-0.358	-0.012	-66	<0.05	Down	0.99	HL	Down
	FNF	-3.76	-0.13	-59	0.059	Down	0.97	HL	Down
TNH ₃ / 610	FNC	-0.033	-0.0011	-57	<0.05	Down	0.99	HL	Down
	FNF	-0.26	-0.0087	-49	<0.05	Down	0.99	HL	Down
DN / 602	FNC	-0.444	-0.015	-40	<0.05	Down	0.99	HL	Down
	FNF	-4.11	-0.14	-39	<0.05	Down	0.99	HL	Down
DNOx / 631	FNC	-0.230	-0.0077	-31	<0.05	Down	0.99	HL	Down
	FNF	-1.84	-0.061	-27	<0.05	Down	0.99	HL	Down
DON / 607	FNC	-0.231	-0.0077	-64	<0.05	Down	0.99	HL	Down
	FNF	-2.37	-0.079	-65	<0.05	Down	0.99	HL	Down
DNH ₃ / 608	FNC	-0.025	-0.00084	-50	<0.05	Down	0.99	HL	Down
	FNF	-0.21	-0.007	-45	<0.05	Down	0.99	HL	Down
TP / 665	FNC	-0.041	-0.0014	-67	<0.025	Down	0.99	HL	Down
	FNF	-0.24	-0.0081	-40	0.057	Down	0.97	HL	Down
DP / 666	FNC	-0.030	-0.001	-83	<0.05	Down	0.99	HL	Down
	FNF	-0.26	-0.0087	-82	<0.05	Down	0.99	HL	Down
DOP / 671	FNC	-0.010	-0.00033	-65	<0.05	Down	0.99	HL	Down
	FNF	-0.03	-0.0012	-42	0.1	NS	0.95	VL	Down
TOC / 680	FNC	-0.498	-0.017	-22	<0.05	Down	0.99	HL	Down
	FNF	-0.07	-0.0023	-0.3	1.0	NS	0.51	ALAN	Down
SSC / 80154	FNC	-5.440	-0.18	-27	0.21	NS	0.89	L	Down
	FNF	-82.0	-2.7	-16	0.69	NS	0.66	L	Down

2015 Flow Normalized Trends; Juniata River at Newport

Trend period (Water Year) = 1984-2015

FNC – Flow Normalized Concentration – mg/L, FNC Slope – mg/L/yr

FNF – Flow Normalized Flux – 10⁶ kg/yr, FNF Slope – 10⁶ kg/yr/yr

FNC/FNF alpha level – 0.1

SMK – Seasonal Mann-Kendall for flow trends, alpha level – 0.05

NS – Not significant, UP – Increasing trend, DOWN – Decreasing trend

HL – Highly Likely ≥0.95 and ≤1.00

VL – Very Likely ≥0.90 and <0.95

L – Likely ≥0.66 and <0.90

ALAN – About as Likely as Not >0.33 and <0.66

Newport Parameter/code	Trend Test	Change	Slope	% Change	Hypothesis Test		Likelihood Test		
					P-value	Trend	Value	Descriptor	Trend
FLOW / 60	SMK	-	-	-	0.531	NS	-	-	-
TN / 600	FNC	-0.446	-0.015	-23	<0.05	Down	0.99	HL	Down
	FNF	-2.30	-0.077	-27	<0.05	Down	0.99	HL	Down
TNO _x / 630	FNC	-0.093	-0.0031	-7.7	0.2	NS	0.91	VL	Down
	FNF	-0.85	-0.028	-16	<0.05	Down	0.99	HL	Down
TON / 605	FNC	-0.346	-0.012	-51	<0.05	Down	0.99	HL	Down
	FNF	-1.56	-0.052	-47	<0.05	Down	0.97	HL	Down
TNH ₃ / 610	FNC	-0.031	-0.001	-51	<0.05	Down	0.99	HL	Down
	FNF	-0.13	-0.0045	-49	<0.05	Down	0.99	HL	Down
DN / 602	FNC	-0.284	-0.0095	-17	<0.05	Down	0.99	HL	Down
	FNF	-1.57	-0.052	-22	<0.05	Down	0.99	HL	Down
DNO _x / 631	FNC	-0.034	-0.0011	-3	0.64	NS	0.69	L	Down
	FNF	-0.55	-0.018	-11	0.051	Down	0.97	HL	Down
DON / 607	FNC	-0.217	-0.0072	-49	<0.05	Down	0.99	HL	Down
	FNF	-0.96	-0.032	-51	<0.05	Down	0.99	HL	Down
DNH ₃ / 608	FNC	-0.019	-0.00063	-38	0.072	Down	0.97	HL	Down
	FNF	-0.09	-0.0031	-38	0.2	NS	0.90	L	Down
TP / 665	FNC	-0.064	-0.0021	-62	<0.05	Down	0.99	HL	Down
	FNF	-0.24	-0.0079	-47	<0.05	Down	0.99	HL	Down
DP / 666	FNC	-0.042	-0.0014	-69	<0.05	Down	0.99	HL	Down
	FNF	-0.13	-0.0043	-60	<0.05	Down	0.99	HL	Down
DOP / 671	FNC	-0.029	-0.00097	-66	0.04	Down	0.98	HL	Down
	FNF	-0.07	-0.0022	-49	0.07	Down	0.97	HL	Down
TOC / 680	FNC	-1.800	-0.06	-38	0.051	Down	0.98	HL	Down
	FNF	-7.46	-0.25	-35	0.081	Down	0.96	HL	Down
SSC / 80154	FNC	-15.50	-0.52	-45	0.053	Down	0.97	HL	Down
	FNF	-138.9	-4.6	-39	0.28	NS	0.86	L	Down

2015 Flow Normalized Trends; Conestoga River at Conestoga

Trend period (Water Year) = 1984-2015

FNC – Flow Normalized Concentration – mg/L, FNC Slope – mg/L/yr

FNF – Flow Normalized Flux – 10⁶ kg/yr, FNF Slope – 10⁶ kg/yr/yr

FNC/FNF alpha level – 0.1

SMK – Seasonal Mann-Kendall for flow trends, alpha level – 0.05

NS – Not significant, UP – Increasing trend, DOWN – Decreasing trend

HL – Highly Likely ≥0.95 and ≤1.00

VL – Very Likely ≥0.90 and <0.95

L – Likely ≥0.66 and <0.90

ALAN – About as Likely as Not >0.33 and <0.66

Conestoga Parameter/code	Trend Test	Change	Slope	% Change	Hypothesis Test		Likelihood Test		
					P-value	Trend	Value	Descriptor	Trend
FLOW / 60	SMK	-	-	-	0.074	NS	-	-	-
TN / 600	FNC	-2.300	-0.077	-27	<0.05	Down	0.99	HL	Down
	FNF	-1.87	-0.062	-34	<0.05	Down	0.99	HL	Down
TNOx / 630	FNC	-1.170	-0.039	-17	<0.05	Down	0.99	HL	Down
	FNF	-0.80	-0.027	-20	<0.05	Down	0.99	HL	Down
TON / 605	FNC	-0.844	-0.028	-61	<0.05	Down	0.99	HL	Down
	FNF	-0.89	-0.03	-66	0.061	Down	0.97	HL	Down
TNH ₃ / 610	FNC	-0.329	-0.011	-83	<0.05	Down	0.99	HL	Down
	FNF	-0.26	-0.0086	-80	<0.05	Down	0.99	HL	Down
DN / 602	FNC	-1.600	-0.053	-21	<0.05	Down	0.97	HL	Down
	FNF	-1.16	-0.039	-25	<0.05	Down	0.99	HL	Down
DNOx / 631	FNC	-1.060	-0.035	-16	<0.05	Down	0.99	HL	Down
	FNF	-0.73	-0.024	-19	<0.05	Down	0.99	HL	Down
DON / 607	FNC	-0.345	-0.011	-44	<0.05	Down	0.99	HL	Down
	FNF	-0.26	-0.0085	-48	<0.05	Down	0.99	HL	Down
DNH ₃ / 608	FNC	-0.309	-0.01	-83	<0.05	Down	0.99	HL	Down
	FNF	-0.24	-0.0082	-80	<0.05	Down	0.99	HL	Down
TP / 665	FNC	-0.338	-0.011	-62	<0.05	Down	0.99	HL	Down
	FNF	-0.24	-0.0079	-56	0.07	Down	0.97	HL	Down
DP / 666	FNC	-0.186	-0.0062	-54	<0.05	Down	0.99	HL	Down
	FNF	-0.08	-0.0026	-41	<0.05	Down	0.99	HL	Down
DOP / 671	FNC	-0.192	-0.0064	-58	<0.05	Down	1.00	HL	Down
	FNF	-0.06	-0.0021	-38	0.086	Down	0.96	HL	Down
TOC / 680	FNC	-5.650	-0.19	-65	<0.05	Down	0.99	HL	Down
	FNF	-3.94	-0.13	-60	<0.05	Down	0.99	HL	Down
SSC / 80154	FNC	-100.0	-3.3	-79	0.12	NS	0.95	VL	Down
	FNF	-193	-6.4	-78	0.19	NS	0.91	VL	Down