

Mussel Calculations Based Off "Mussel Restoration in Susquehanna Riverdraft"

	Nitrogen		Nitrogen	Phosphorus		Phosphorus	Phosphorus
	Moderate Amount (Today)	Avg from Surveys (6.9,4.26)	Pre Dam (very conservative)	Moderate Amount (Today)	Avg from Surveys (6.9,4.26)	Pre Dam (very conservative)	Pre Dam (very conservative)
	2.8 mussels/m2	5.6 mussels/m2	10 mussels/m2	2.8 mussels/m2	5.6 mussels/m2	10 mussels/m2	10 mussels/m2
<u>River Area - width* 1mi</u>	<u># of Mussels/mi</u>	<u># of Mussels/mi</u>	<u># of Mussels/mi</u>	<u># of Mussels/mi</u>	<u># of Mussels/mi</u>	<u># of Mussels/mi</u>	<u># of Mussels/mi</u>
0.5 mi wide - 1,295,245 m2	3,626,686.00	7,253,372.00	12,952,450.00	3,626,686.00	7,253,372.00	12,952,450.00	12,952,450.00
0.75 mi wide - 1,941,661 m2	5,436,650.80	10,873,301.60	19,416,610.00	5,436,650.80	10,873,301.60	19,416,610.00	19,416,610.00
1 mi wide - 2,588,881 m2	7,248,866.80	14,497,733.60	25,888,810.00	7,248,866.80	14,497,733.60	25,888,810.00	25,888,810.00
Average	5,437,401.20	10,874,802.40	19,419,290.00	5,437,401.20	10,874,802.40	19,419,290.00	19,419,290.00

<u>River Area - width* 1mi</u>	<u>N lb Reduction/mi/yr</u>	<u>N lb Reduction/mi/yr</u>	<u>N lb Reduction/mi/yr</u>	<u>P lb Reduction/mi/yr</u>	<u>P lb Reduction/mi/yr</u>	<u>P lb Reduction/mi/yr</u>
0.5 mi wide - 1,295,245 m2	5,440.03	10,880.06	19,428.68	2,176.01	4,352.02	7,771.47
0.75 mi wide - 1,941,661 m2	8,154.98	16,309.95	29,124.92	3,261.99	6,523.98	11,649.97
1 mi wide - 2,588,881 m2	10,873.30	21,746.60	38,833.22	4,349.32	8,698.64	15,533.29
Average	8,156.10	16,312.20	29,128.94	3,262.44	6,524.88	11,651.57

How many miles of "restoration"?	<u>Avg N lb Reduction/yr</u>	<u>Avg N lb Reduction/yr</u>	<u>Avg N lb Reduction/yr</u>	<u>Avg P lb Reduction/yr</u>	<u>Avg P lb Reduction/yr</u>	<u>Avg P lb Reduction/yr</u>
10	81,561.02	163,122.04	291,289.35	32,624.41	65,248.81	116,515.74
20	163,122.04	326,244.07	582,578.70	65,248.81	130,497.63	233,031.48
30	244,683.05	489,366.11	873,868.05	97,873.22	195,746.44	349,547.22
50	407,805.09	815,610.18	1,456,446.75	163,122.04	326,244.07	582,578.70
75	611,707.64	1,223,415.27	2,184,670.13	244,683.05	489,366.11	873,868.05
100	815,610.18	1,631,220.36	2,912,893.50	326,244.07	652,488.14	1,165,157.40

Per River mile...since dam was built

How much in reductions have we missed out on? (10 mussel/m2- 2.6 mussel/m2 = 7.4) very conservative	N	P
	$((7.4 * 1,941,661) * 0.0015) * 95 \text{ yrs}$	$((7.4 * 1,941,661) * 0.0006) * 95 \text{ yrs}$
	2,047,481.52	818,992.61

N Rate
0.0015 lbs N/mussel annually
P Rate
0.0006 lbs P/mussel annually

The data below comes at the end of the report based from the DuPage River data....

To extrapolate denitrification from the DuPage River to the Susquehanna River

- Mussel-mediated denitrification = denitrification rate x mussel density x river area
- Mussel-mediated denitrification = 0.0897 g/m²/day (Hoellein et al. 2017)

0.0897 g/m²/day x 2.7 mussels/m² x 1,295,245 m² x (1 kg/1,000 g) = 313.7 Kg/day per river mile
313.7 Kg/day x 2.2 pounds/Kg x 365 days/year = 251,901 pounds of N per year per river mile

How many river miles?			
10		2,519,010.00	lbs/yr
20		5,038,020.00	lbs/yr
30		7,557,030.00	lbs/yr
50		12,595,050.00	lbs/yr
75		18,892,575.00	lbs/yr
100		25,190,100.00	lbs/yr