Nutrient Reduction Strategy meeting presentation 04-21-14

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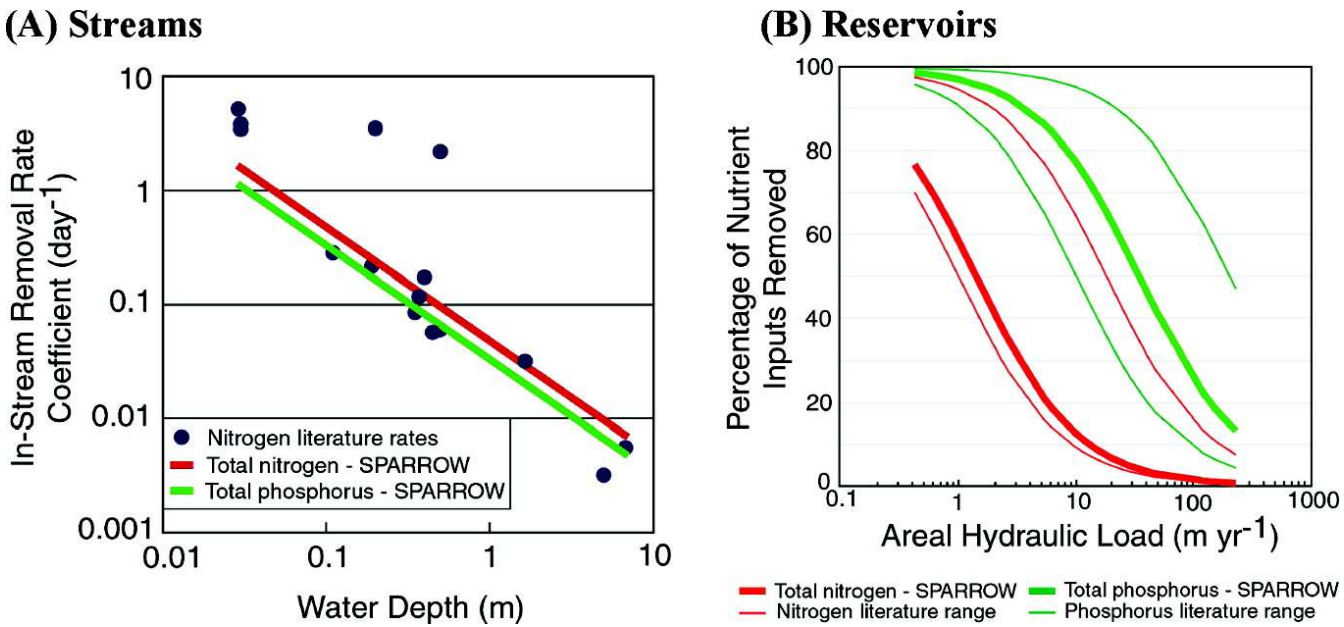
MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Science – Data and Models

- Convergence of models (USGS and USDA)
- Show improved understanding of sources and transport
- Removal curves more realistic

- Data from long term stations
- Two critical measurements
  - Hermann
  - St. Louis “regional” watershed



Model estimates of the removal of total nitrogen and total phosphorus in: (a) streams; (b) reservoirs.

Published in: Richard B. Alexander; Richard A. Smith; Gregory E. Schwarz; Elizabeth W. Boyer; Jacqueline V. Nolan; John W. Brakebill; *Environ. Sci. Technol.* **2008,** 42, 822-830.
DOI: 10.1021/es0716103
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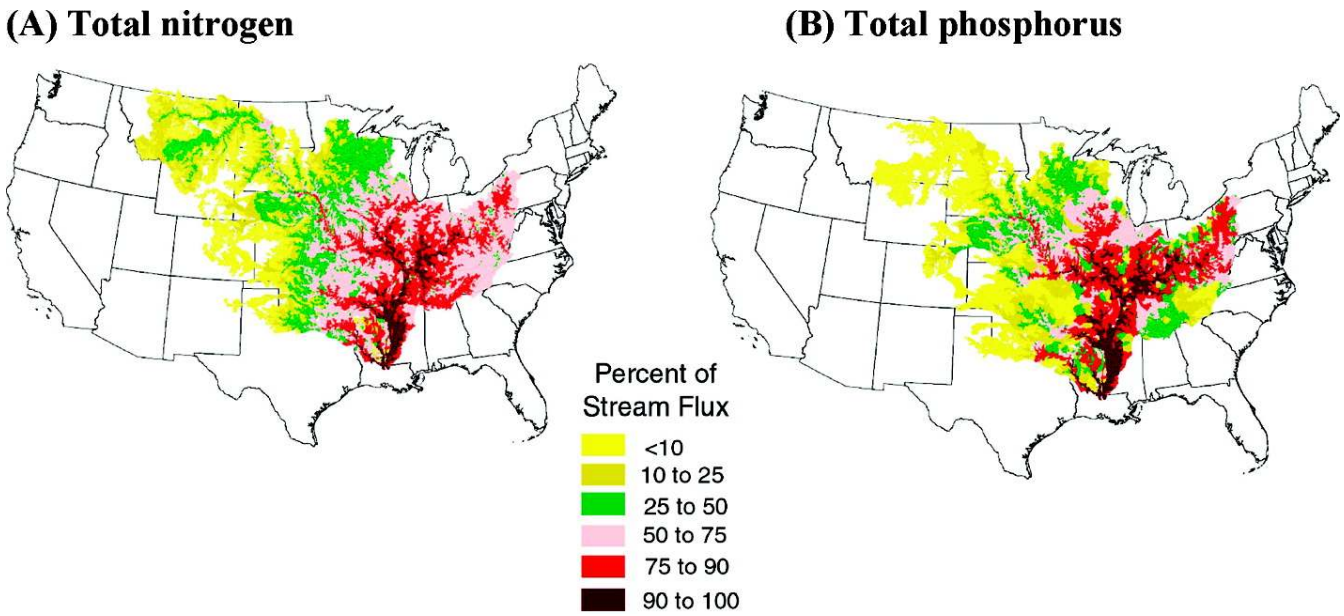

Percentage of stream nutrient load delivered to the Gulf of Mexico from the incremental drainage of MARB reaches: (a) total nitrogen; (b) total phosphorus.

Published in: Richard B. Alexander; Richard A. Smith; Gregory E. Schwarz; Elizabeth W. Boyer; Jacqueline V. Nolan; John W. Brakebill; *Environ. Sci. Technol.* **2008,** 42, 822-830.
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		Flow-Normalized Nitrogen Flux											
Station	Outflow	Thebes	Grafton	Hermann	Local			Hermann			Hermann cut		
Area (km^2)	2914514	1847180	443665	1353269	50246	1.72		1353269	46.43		629419	21.60	
Flow-normalized Nitrogen Flux (10^6 kg/yr)													
	Outflow	Thebes	Grafton	Hermann	Local	Local %	Mult	Hermann	Hermann %	Mult.	Herm.cut	Hrm.cut %	Mult
1980	818.5	496.3	342.0	94.9	59.4	7.26	4.22	94.9	11.59	0.25	94.90	11.59	0.54
1981	854.1	501.0	345.3	96.0	59.7	6.99	4.06	96.0	11.24	0.24	96.00	11.24	0.52
1982	884.5	505.3	347.3	97.3	60.7	6.86	3.99	97.3	11.00	0.24	97.30	11.00	0.51
1983	902.4	513.5	349.0	98.8	65.7	7.28	4.23	98.8	10.95	0.24	98.80	10.95	0.51
1984	907.7	519.0	349.7	100.5	68.8	7.58	4.41	100.5	11.07	0.24	100.50	11.07	0.51
1985	909.9	523.3	349.9	101.7	71.7	7.88	4.58	101.7	11.18	0.24	101.70	11.18	0.52
1986	910.8	526.6	351.1	102.5	73.0	8.01	4.66	102.5	11.25	0.24	102.50	11.25	0.52
1987	909.2	530.0	351.8	103.5	74.7	8.22	4.78	103.5	11.38	0.25	103.50	11.38	0.53
1988	904.0	533.9	352.8	104.2	76.9	8.51	4.95	104.2	11.53	0.25	104.20	11.53	0.53
1989	893.4	536.8	354.1	105.2	77.5	8.67	5.04	105.2	11.78	0.25	105.20	11.78	0.55
1990	879.9	537.9	354.3	106.6	77.0	8.75	5.09	106.6	12.12	0.26	106.60	12.12	0.56
1991	868.1	537.7	354.5	107.7	75.5	8.70	5.06	107.7	12.41	0.27	107.70	12.41	0.57
1992	858.9	537.4	354.9	108.4	74.1	8.63	5.02	108.4	12.62	0.27	108.40	12.62	0.58
1993	855.4	536.5	356.0	108.7	71.8	8.39	4.88	108.7	12.71	0.27	108.70	12.71	0.59
1994	858.1	533.4	359.2	108.4	65.8	7.67	4.46	108.4	12.63	0.27	108.40	12.63	0.58
1995	862.2	528.5	363.4	108.1	57.1	6.62	3.85	108.1	12.54	0.27	108.10	12.54	0.58
1996	865.3	521.6	367.5	107.9	46.2	5.34	3.10	107.9	12.47	0.27	107.90	12.47	0.58
1997	862.2	513.3	370.2	108.0	35.1	4.07	2.37	108.0	12.53	0.27	108.00	12.53	0.58
1998	860.4	506.4	372.8	108.5	25.1	2.92	1.70	108.5	12.61	0.27	108.50	12.61	0.58
1999	855.0	501.8	375.7	109.6	16.5	1.93	1.12	109.6	12.82	0.28	109.60	12.82	0.59
2000	852.2	500.4	378.2	111.1	11.1	1.30	0.76	111.1	13.04	0.28	111.10	13.04	0.60
2001	851.8	501.7	379.3	112.7	9.7	1.14	0.66	112.7	13.23	0.28	112.70	13.23	0.61
2002	853.7	505.1	379.1	114.2	11.8	1.38	0.80	114.2	13.38	0.29	114.20	13.38	0.62
2003	857.3	507.8	378.0	115.2	14.6	1.70	0.99	115.2	13.44	0.29	115.20	13.44	0.62
2004	860.9	509.8	375.8	116.4	17.6	2.04	1.19	116.4	13.52	0.29	116.40	13.52	0.63
2005	863.3	511.1	373.3	117.9	19.9	2.31	1.34	117.9	13.66	0.29	117.90	13.66	0.63
2006	866.7	512.5	371.9	119.9	20.7	2.39	1.39	119.9	13.83	0.30	119.90	13.83	0.64
2007	874.8	515.8	371.9	122.9	21.0	2.40	1.40	122.9	14.05	0.30	122.90	14.05	0.65
2008	890.4	521.6	373.8	127.1	20.7	2.32	1.35	127.1	14.27	0.31	127.10	14.27	0.66
2009	911.9	529.6	376.6	132.0	21.0	2.30	1.34	132.0	14.48	0.31	132.00	14.48	0.67
2010	937.0	535.9	381.3	137.2	17.4	1.86	1.08	137.2	14.64	0.32	137.20	14.64	0.68

Science Interpretation

- Upland soil loss reduction
- Tile drainage increasing
- Stream bank erosion (Storm size)
- Urban actions in STL area
- Uncertainties
  - Increase as basin size decreases
  - Detailed sources
  - Areas without good data

Science – Still to Come

- Move into smaller basins
- Look for commonalities in models
- Examine differences in models
- Create or accept “best results”
- Work back toward causes (general)

Groups reports

- Agriculture
- On-site and Decentralized Waste Water
- Municipal and Industrial Waste Water
- Urban NPS/Stormwater
- Other Strategies

Strategy text

- Edited the comments received. Thank you!
- Working on rest of introductory material
- Planned distribution of entire introductory section in about two weeks
- Staff working on some actions
- Potential to add summaries only for some others? Your thoughts please. (Individual actions?)

Other Ideas or Comments?

- Comments?
- Questions?
- Ideas?
- Random thoughts?

References

- White, M. J., et al., 2014 - Journal of Soil and Water Conservation v.69, No. 1 pp. 26-40.
- Murphy, J. C., et al., 2013 - USGS Scientific Investigations Report 2013-5169.
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- Robertson, D. M., and D. A. Saad, 2013 – Journal of Environmental Quality, v. 42, pp1422-1440.