Reach-Scale Model of Aquatic Vegetation Quantifies N Fate in a Bedrock-Controlled Karst Agroecosystem Stream

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Supplementary Materials

Table S1. Seasonal average DIN removal rates, DIN vegetation uptake rates, denitrification rates, and regeneration rates for median (minimum–maximum) DIN values across the 47 posterior solutions for the calibrated model.

Year	Winter	Spring	Summer	Fall
	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)
Average Biotic DIN Removal (mgN m-2 h-1)				
2000	0.62 (8.71 × 10^{-3} - 4.27)	11.40 (4.71 - 23.87)	6.94 (4.31 - 21.27)	6.01 (4.50 - 13.70)
2001	0.35 (4.86 × 10^{-3} - 4.24)	9.77 (2.87 - 24.31)	16.15 (11.30 - 30.42)	2.65 (1.56 - 8.87)
2002	0.57 (6.69 × 10^{-3} - 4.25)	2.18 (8.50 × 10^{-2} - 11.80)	3.80 (1.57 - 17.51)	2.07 (0.81 - 5.72)
2003	0.37 (1.73 × 10^{-3} - 3.27)	3.46 (7.96 × 10^{-2} - 12.41)	7.28 (3.62 - 20.94)	1.34 (5.72 × 10^{-2} - 7.07)
Average Vegetation DIN Uptake (mgN m-2 h-1)				
2000	0.61 (4.79 × 10^{-3} - 4.24)	6.62 (2.13 - 18.98)	3.49 (1.53 - 16.92)	2.42 (1.04 - 8.66)
2001	0.34 (2.33 × 10^{-3} - 4.20)	7.00 (1.78 - 20.65)	7.31 (3.68 - 20.88)	1.50 (0.51 - 7.66)
2002	0.53 (2.42 × 10^{-3} - 4.17)	2.06 (6.35 × 10^{-2} - 11.44)	2.41 (0.75 - 15.84)	1.31 (0.35 - 4.75)
2003	0.36 (6.71 × 10^{-4} - 3.21)	2.72 (4.77 × 10^{-2} - 12.10)	4.64 (1.57 - 17.55)	1.29 (3.03 × 10^{-2} - 6.86)
Average Total DIN Denitrification (mgN m-2 h-1)				
2000	1.27 × 10^{-2} (1.13 × 10^{-3} - 8.32 × 10^{-2})	3.69 (0.61 - 9.79)	3.65 (0.17 - 5.97)	3.75 (0.30 - 6.04)
2001	9.89 × 10^{-3} (3.66 × 10^{-4} - 7.66 × 10^{-2})	2.45 (0.28 - 10.21)	8.88 (0.13 - 13.96)	1.16 (8.83 × 10^{-2} - 1.81)
2002	1.50 × 10^{-2} (7.28 × 10^{-4} - 0.13)	6.58 × 10^{-2} (7.04 × 10^{-3} - 0.82)	1.17 (0.11 - 2.46)	0.72 (1.63 × 10^{-2} - 1.66)
2003	6.64 × 10^{-3} (2.08 × 10^{-4} - 6.07 × 10^{-2})	0.14 (4.17 × 10^{-3} - 2.66)	2.74 (0.16 - 6.69)	5.16 × 10^{-2} (7.22 × 10^{-3} - 0.43)
Average DIN Regeneration (mgN m-2 h-1)				
2000	0.24 (9.85 × 10^{-3} - 1.79)	4.73 (1.06 - 14.70)	4.25 (2.04 - 18.26)	2.67 (1.30 - 10.46)
2001	0.19 (4.51 × 10^{-3} - 1.98)	3.23 (0.53 - 13.56)	6.44 (2.79 - 21.57)	1.14 (0.42 - 5.55)
2002	0.29 (6.59 × 10^{-4} - 2.26)	0.54 (1.05 × 10^{-2} - 4.79)	2.52 (0.62 - 16.13)	0.47 (0.12 - 2.74)
2003	0.16 (1.43 × 10^{-4} - 1.20)	0.94 (5.80 × 10^{-3} - 5.75)	2.71 (0.77 - 12.78)	0.75 (1.89 × 10^{-2} - 5.20)

Table S2. Seasonal average DIN assimilation and DIN denitrification rates in each biotic pool for median (minimum–maximum) DIN values across all 47 posterior solutions for the calibrated model.

Year	Winter	Spring	Summer	Fall
	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)
Average Algal DIN Assimilation (mgN m-2 h-1)				
2000	0.60 (1.97×10^{-3} - 4.24)	2.80 (6.37×10^{-3} - 15.42)	0.29 (2.17×10^{-3} - 14.16)	0.24 (1.98×10^{-3} - 6.55)
2001	0.34 (8.74×10^{-4} - 4.20)	3.13 (6.08×10^{-3} - 17.11)	0.95 (2.85×10^{-3} - 15.26)	0.90 (3.64×10^{-3} - 6.96)
2002	0.53 (5.35×10^{-5} - 4.17)	1.81 (3.11×10^{-3} - 11.00)	0.57 (3.15×10^{-3} - 14.58)	0.58 (1.13×10^{-3} - 3.98)
2003	0.36 (2.33×10^{-7} - 3.21)	2.27 (2.65×10^{-7} - 11.92)	1.88 (4.48×10^{-3} - 14.86)	1.24 (4.81×10^{-3} - 6.85)
Average Duckweed DIN Assimilation (mgN m-2 h-1)				
2000	1.08×10^{-3} (4.70×10^{-5} – 0.02)	3.27 (6.52×10^{-2} - 7.92)	2.67 (5.32×10^{-2} - 6.38)	1.63 (2.89×10^{-6} - 4.42)
2001	5.95×10^{-4} (2.72×10^{-5} – 0.01)	2.78 (2.86×10^{-3} - 7.44)	5.49 (2.62×10^{-3} - 11.15)	0.64 (2.95×10^{-5} - 1.35)
2002	9.89×10^{-4} (3.74×10^{-5} – 0.03)	6.04×10^{-2} (1.09×10^{-4} - 0.86)	1.16 (2.39×10^{-5} - 3.26)	0.61 (1.82×10^{-5} - 1.45)
2003	3.15×10^{-4} (3×10^{-5} - 2.9×10^{-3})	0.12 (6.16×10^{-4} - 2.88)	2.53 (2.27×10^{-4} - 4.69)	5.55×10^{-3} (4.31×10^{-5} - 0.38)
Average Algal DIN Denitrification (mgN m-2 h-1)				
2000	2.21×10^{-3} (7.63×10^{-6} – 0.04)	7.97×10^{-3} (1.07×10^{-5} - 0.19)	8.48×10^{-4} (4.49×10^{-6} – 0.07)	1.13×10^{-3} (5.85×10^{-6} – 0.06)
2001	1.34×10^{-3} (8.15×10^{-6} – 0.04)	9.38×10^{-3} (1.27×10^{-5} - 0.22)	3.04×10^{-3} (7.33×10^{-6} - 0.15)	2.48×10^{-3} (8.05×10^{-6} – 0.07)
2002	1.78×10^{-3} (4.99×10^{-7} – 0.04)	5.05×10^{-3} (8.96×10^{-6} - 0.10)	1.93×10^{-3} (4.42×10^{-6} – 0.09)	1.77×10^{-3} (7.64×10^{-6} – 0.04)
2003	1.19×10^{-3} (3.44×10^{-8} – 0.03)	5.55×10^{-3} (1.38×10^{-9} - 0.13)	4.82×10^{-3} (9.59×10^{-6} - 0.15)	3.45×10^{-3} (8.72×10^{-6} -0.09)
Average Organic Matter DIN Denitrification (mgN m-2 h-1)				
2000	6.15×10^{-3} (2.83×10^{-8} – 0.05)	6.54×10^{-2} (5.83×10^{-6} - 0.80)	2.59×10^{-2} (6.27×10^{-5} - 0.52)	2.74×10^{-2} (2.48×10^{-4} - 0.51)
2001	4.86×10^{-3} (1.86×10^{-10} – 0.04)	5.65×10^{-2} (2.15×10^{-10} - 0.54)	6.30×10^{-2} (1.55×10^{-7} - 0.59)	1.78×10^{-2} (3.95×10^{-7} - 0.23)
2002	8.10×10^{-3} (7.31×10^{-8} – 0.08)	1.17×10^{-2} (2.10×10^{-10} - 0.10)	3.23×10^{-2} (4.41×10^{-4} - 0.53)	8.62×10^{-3} (2.03×10^{-10} - 0.18)
2003	3.42×10^{-3} (1.87×10^{-10} – 0.03)	1.49×10^{-2} (2.29×10^{-10} - 0.21)	3.35×10^{-2} (1.76×10^{-10} - 0.32)	1.95×10^{-2} (1.88×10^{-10} - 0.21)
Average Duckweed DIN Denitrification (mgN m-2 h-1)				
2000	8.18×10^{-4} (3.07×10^{-5} – 0.01)	3.60 (3.22×10^{-2} - 9.72)	3.61 (3.76×10^{-2} - 5.94)	3.74 (3.58×10^{-6} - 6.00)
2001	5.6×10^{-4} (2×10^{-5} - 7.5×10^{-3})	2.27 (1.24×10^{-3} - 10.15)	8.86 (1.43×10^{-3} - 13.90)	1.13 (2.81×10^{-5} - 1.78)
2002	1.11×10^{-3} (3.18×10^{-5} – 0.03)	2.52×10^{-2} (5.28×10^{-5} - 0.79)	1.09 (1.88×10^{-5} - 2.42)	0.71 (2.05×10^{-5} - 1.64)
2003	3.14×10^{-4} (2×10^{-5} – 2×10^{-3})	5.68×10^{-2} (3.06×10^{-4} - 2.63)	2.64 (1.20×10^{-4} - 6.67)	7.11×10^{-3} (4.10×10^{-5} - 0.41)