Dependent Variable:				log10(wq_conc)				
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
local_kg_N	1.49×10^{-8}***	1.67×10^{-8}***	1.81×10^{-8}***	1.88×10^{-8}***	2.06×10^{-8}***	2.31×10^{-8}***	2.47×10^{-8}***	2.64×10^{-8}***
	(3.55×10^{-9})	(3.64×10^{-9})	(3.84×10^{-9})	(3.83×10^{-9})	(3.96×10^{-9})	(5.24×10^{-9})	(6.11×10^{-9})	(6.79×10^{-9})
up_area_1to2y	0.0001							
	(0.0011)							
loc_area_1to2y	0.0003							
	(0.0010)							
local_kg_N × up_area_1to2y	-5.14×10^{-11}							
	(4.42×10^{-11})							
local_kg_N × loc_area_1to2y	-2.73×10^{-11}							
	(3.36×10^{-11})							
up_area_1to3y		0.0005						
		(0.0012)						
loc_area_1to3y		0.0002						
		(0.0011)						
local_kg_N × up_area_1to3y		-7.28×10^{-11}						
		(5.05×10^{-11})						
local_kg_N × loc_area_1to3y		-2.94×10^{-11}						
		(3.75×10^{-11})						
up_area_1to4y			0.0011					
			(0.0013)					
loc_area_1to4y			0.0002					
			(0.0012)					
local_kg_N × up_area_1to4y			-1.11×10^{-10}*					
			(6.16×10^{-11})					
local_kg_N × loc_area_1to4y			-3.48×10^{-11}					
			(4.46×10^{-11})					
up_area_1to5y				0.0011				
				(0.0013)				
loc_area_1to5y				0.0002				
				(0.0012)				
local_kg_N × up_area_1to5y				-1.11×10^{-10}*				
				(6.13×10^{-11})				
local_kg_N × loc_area_1to5y				-3.82×10^{-11}				
				(4.47×10^{-11})				
up_area_1to6y					0.0011			
					(0.0013)			
loc_area_1to6y					0.0004			
					(0.0012)			
local_kg_N × up_area_1to6y					-1.07×10^{-10}*			

2

Dependent Variable:				log10(wq_conc)				
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
upstream_kg_N	-3.03×10^{-9}	-2.69×10^{-9}	-1.92×10^{-10}	1.12×10^{-9}	2.8×10^{-9}	6.08×10^{-9}	7.36×10^{-9}	8.86×10^{-9}
	(6.24×10^{-9})	(6.91×10^{-9})	(7.37×10^{-9})	(7.82×10^{-9})	(8.37×10^{-9})	(9.07×10^{-9})	(1.01×10^{-8})	(1.19×10^{-8})
up_area_1to2y	-0.0003							
	(0.0006)							
loc_area_1to2y	0.0003							
	(0.0005)							
upstream_kg_N × up_area_1to2y	-3.69×10^{-11}							
	(6.62×10^{-11})							
upstream_kg_N × loc_area_1to2y	-1.55×10^{-12}							
	(4.94×10^{-11})							
up_area_1to3y		-0.0001						
		(0.0007)						
loc_area_1to3y		0.0003						
		(0.0006)						
upstream_kg_N × up_area_1to3y		-1.35×10^{-11}						
		(7.45×10^{-11})						
upstream_kg_N × loc_area_1to3y		-3.04×10^{-11}						
		(5.75×10^{-11})						
up_area_1to4y			0.0002					
			(0.0008)					
loc_area_1to4y			0.0004					
			(0.0007)					
upstream_kg_N × up_area_1to4y			-4.15×10^{-11}					
			(1.07×10^{-10})					
upstream_kg_N × loc_area_1to4y			-6.53×10^{-11}					
			(7.38×10^{-11})					
up_area_1to5y				0.0002				
				(0.0008)				
loc_area_1to5y				0.0004				
				(0.0007)				
upstream_kg_N × up_area_1to5y				-5.52×10^{-11}				
				(1.14×10^{-10})				
upstream_kg_N × loc_area_1to5y				-7.09×10^{-11}				
				(7.93×10^{-11})				
up_area_1to6y					0.0002			
					(0.0008)			
loc_area_1to6y					0.0005			
					(0.0007)			
upstream_kg_N × up_area_1to6y					-2.09×10^{-11}			

3

Dependent Variable:				log10(wq_conc)				
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
up_area_1to2y	0.0002							
	(0.0011)							
loc_area_1to2y	8.3×10^{-5}							
	(0.0010)							
up_area_1to2y_x_locN	-5.43×10^{-11}							
	(4.26×10^{-11})							
loc_area_1to2y_x_locN	1.12×10^{-11}							
	(3.01×10^{-11})							
up_area_1to3y		0.0005						
		(0.0012)						
loc_area_1to3y		0.0001						
		(0.0011)						
up_area_1to3y_x_locN		-7.12×10^{-11}						
		(4.84×10^{-11})						
loc_area_1to3y_x_locN		1.13×10^{-11}						
		(3.38×10^{-11})						
up_area_1to4y			0.0010					
			(0.0013)					
loc_area_1to4y			0.0001					
			(0.0012)					
up_area_1to4y_x_locN			$-1.07 \times 10^{-10*}$					
			(5.73×10^{-11})					
loc_area_1to4y_x_locN			1.23×10^{-11}					
			(3.97×10^{-11})					
up_area_1to5y				0.0010				
				(0.0013)				
loc_area_1to5y				0.0002				
				(0.0012)				
up_area_1to5y_x_locN				$-1.06 \times 10^{-10*}$				
				(5.7×10^{-11})				
loc_area_1to5y_x_locN				9.09×10^{-12}				
				(3.98×10^{-11})				
up_area_1to6y					0.0009			
					(0.0014)			
loc_area_1to6y				4	0.0004			
					(0.0012)			
up_area_1to6y_x_locN					$-10 \times 10^{-11*}$			
					(5.77×10^{-11})			
loc_area_1to6y_x_locN					2.98×10^{-12}			

Dependent Variable:					log10(wq_conc)			
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
up_area_1to2y	-0.0003							
	(0.0006)							
loc_area_1to2y	0.0003							
	(0.0005)							
up_area_1to2y_x_upN	-3.49×10^{-11}							
	(7.02×10^{-11})							
loc_area_1to2y_x_upN	-2.14×10^{-11}							
	(2.62×10^{-11})							
up_area_1to3y		-0.0002						
		(0.0007)						
loc_area_1to3y		0.0004						
		(0.0005)						
up_area_1to3y_x_upN		-1.04×10^{-11}						
		(7.73×10^{-11})						
loc_area_1to3y_x_upN		-4.88×10^{-11}						
		(3.19×10^{-11})						
up_area_1to4y			0.0002					
			(0.0008)					
loc_area_1to4y			0.0004					
			(0.0006)					
up_area_1to4y_x_upN			-4.14×10^{-11}					
			(1.06×10^{-10})					
loc_area_1to4y_x_upN			-6.68×10^{-11}					
			(4.31×10^{-11})					
up_area_1to5y				0.0002				
				(0.0008)				
loc_area_1to5y				0.0004				
				(0.0007)				
up_area_1to5y_x_upN				-5.61×10^{-11}				
				(1.11×10^{-10})				
loc_area_1to5y_x_upN				-6.21×10^{-11}				
				(4.42×10^{-11})				
up_area_1to6y					0.0002			
					(0.0008)			
loc_area_1to6y					0.0005			
					(0.0006)			
up_area_1to6y_x_upN					-2.21×10^{-11}			
					(1.07×10^{-10})			
loc_area_1to6y_x_upN					$-7.89 \times 10^{-11*}$			

5

Dependent Variable:				log10(wq_conc)				
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
local_kg_N	1.49×10^{-8}***	1.67×10^{-8}***	1.8×10^{-8}***	1.87×10^{-8}***	2.05×10^{-8}***	2.3×10^{-8}***	2.45×10^{-8}***	2.63×10^{-8}***
	(3.53×10^{-9})	(3.64×10^{-9})	(3.84×10^{-9})	(3.84×10^{-9})	(3.99×10^{-9})	(5.28×10^{-9})	(6.17×10^{-9})	(6.88×10^{-9})
up_area_1to2y_x_locN	-4.83×10^{-11}**							
	(2.16×10^{-11})							
loc_area_1to2y_x_locN	-1.85×10^{-11}							
	(1.22×10^{-11})							
up_area_1to3y_x_locN		-5.72×10^{-11}**						
		(2.46×10^{-11})						
loc_area_1to3y_x_locN		-2.22×10^{-11}*						
		(1.28×10^{-11})						
up_area_1to4y_x_locN			-7.19×10^{-11}**					
			(3.09×10^{-11})					
loc_area_1to4y_x_locN			-2.83×10^{-11}*					
			(1.63×10^{-11})					
up_area_1to5y_x_locN				-7.18×10^{-11}**				
				(3.05×10^{-11})				
loc_area_1to5y_x_locN				-2.97×10^{-11}*				
				(1.64×10^{-11})				
up_area_1to6y_x_locN					-6.95×10^{-11}**			
					(3.09×10^{-11})			
loc_area_1to6y_x_locN					-3.21×10^{-11}**			
					(1.59×10^{-11})			
up_area_1to7y_x_locN						-5.89×10^{-11}*		
						(3.18×10^{-11})		
loc_area_1to7y_x_locN						-3.63×10^{-11}**		
						(1.59×10^{-11})		
up_area_1to8y_x_locN							-6.05×10^{-11}**	
							(2.93×10^{-11})	
loc_area_1to8y_x_locN							-3.4×10^{-11}**	
							(1.5×10^{-11})	
up_area_1to9y_x_locN								-3.64×10^{-11}
								(3.1×10^{-11})
loc_area_1to9y_x_locN								-3.73×10^{-11}**
								(1.54×10^{-11})
Fixed-effects								
wq_month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
huc4-wq_year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
huc8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dependent Variable:				log10(wq_conc)				
Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables								
upstream_kg_N	-3.39×10^{-9}	-3.11×10^{-9}	-7.2×10^{-10}	4.58×10^{-10}	1.89×10^{-9}	5.04×10^{-9}	6.09×10^{-9}	7.51×10^{-9}
	(6.1×10^{-9})	(6.76×10^{-9})	(7.2×10^{-9})	(7.63×10^{-9})	(8.18×10^{-9})	(8.85×10^{-9})	(9.9×10^{-9})	(1.16×10^{-8})
up_area_1to2y_x_upN	-5.85×10^{-11}							
	(5.49×10^{-11})							
loc_area_1to2y_x_upN	7.34×10^{-12}							
	(4.48×10^{-11})							
up_area_1to3y_x_upN		-3.24×10^{-11}						
		(6.06×10^{-11})						
loc_area_1to3y_x_upN		-1.65×10^{-11}						
		(5.22×10^{-11})						
up_area_1to4y_x_upN			-5.23×10^{-11}					
			(8.19×10^{-11})					
loc_area_1to4y_x_upN			-4.03×10^{-11}					
			(6.6×10^{-11})					
up_area_1to5y_x_upN				-6.79×10^{-11}				
				(8.87×10^{-11})				
loc_area_1to5y_x_upN				-4.11×10^{-11}				
				(7.19×10^{-11})				
up_area_1to6y_x_upN					-4.49×10^{-11}			
					(9.09×10^{-11})			
loc_area_1to6y_x_upN					-6.03×10^{-11}			
					(7.63×10^{-11})			
up_area_1to7y_x_upN						-1.09×10^{-10}		
						(9.77×10^{-11})		
loc_area_1to7y_x_upN						-3.79×10^{-11}		
						(7.89×10^{-11})		
up_area_1to8y_x_upN							-1.07×10^{-10}	
							(1.08×10^{-10})	
loc_area_1to8y_x_upN							-4.01×10^{-11}	
							(8.3×10^{-11})	
up_area_1to9y_x_upN								-2.98×10^{-10}
								(1.95×10^{-10})
loc_area_1to9y_x_upN								2.52×10^{-11}
								(9.5×10^{-11})
Fixed-effects				7				
wq_month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
huc4-wq_year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
huc8	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes