

Comparison of simulated change in annual production for phytoplankton, periphyton, macrophytes, zooplankton, benthic invertebrates, and fish for CASM parameterizations using the geometric mean values of EC₅₀ (toxicity scenario 1), the 90th centile (toxicity scenario 2) and the 10th centile (toxicity scenario 3) of the EC₅₀ values.

Table 1. Estimated percent decreases ^a in total annual production of phytoplankton (264 g C m ⁻²) for a generic 2 nd -3 rd order Midwestern stream.					
Exposure (days) ^b	Atrazine concentration (µg/L)				
	20	30	50	90	170
1	0.3 ^c (0.2 – 1.2) ^d	0.1 (0.1 – 1.1)	1.5 (1.5 – 7.5)	12.5 (7.0 – 12.5)	13.8 (8.2 – 14.1)
3	0.9 (0.6 - 2.6)	0.4 (0.3 - 2.1)	1.6 (1.8 - 12.3)	21.9 (12.3 - 21.9)	24.2 (14.8 - 24.8)
5	2.3 (1.3 – 3.9)	1.0 (0.4 – 2.7)	1.5 (1.8 – 14.1)	25.9 (14.8 – 25.9)	28.5 (17.8 – 29.2)
10	1.2 (0.8 – 2.9)	1.1 (2.2 – 0.8)	1.8 (0.9 – 14.4)	29.3 (16.5 – 29.3)	32.0 (19.5 – 32.7)
20	2.1 (0 – 3.9)	0.2 (1.5 – 1.6)	2.0 (1.0 – 14.6)	30.0 (17.4 – 30.0)	33.0 (21.3 – 33.9)
60	2.5 (0.3 – 4.3)	0.1 (1.2 – 1.9)	2.8 (1.8 – 13.1)	24.8 (15.9 – 24.8)	33.3 (21.4 – 33.9)
130	2.5 (0.3 – 4.3)	0.1 (1.2 – 1.9)	7.9 (9.6 – 0.1)	22.7 (2.9 – 23.9)	33.3 (21.4 – 33.9)
260	2.5 (0.3 – 4.3)	0.1 (1.2 – 1.9)	9.5 (11.3 – 1.7)	27.2 (7.6 – 28.4)	33.3 (21.4 – 33.9)
^a Based on the mean values of 100 Monte Carlo simulations using the Comprehensive Aquatic Systems Model (CASM)					
^b Consecutive days of constant exposure beginning on model day 105 (April 15)					
^c Results using the geometric mean values of EC ₅₀ assigned to modeled populations (Toxicity Scenario 1)					
^d Results using the 90 th and 10 th percentile estimates of the geometric mean of the EC ₅₀ values (Toxicity Scenarios 3 and 2)					

Table 2. Estimated percent decreases ^a in total annual production of periphyton (5,124 g C m ⁻²) for a generic 2 nd -3 rd order Midwestern stream.					
	Atrazine concentration (µg/L)				
Exposure (days) ^b	20	30	50	90	170
1	0.1 ^c (0.1 – 0) ^d	0.1 (0.1 – 0)	0.1 (0.1 – 2.7)	3.8 (1.3 – 3.8)	3.8 (1.4 – 3.7)
3	0 (0.1 – 0.2)	0.2 (0.2 – 0)	0.5 (0.5 – 5.4)	7.8 (3.5 – 7.9)	7.6 (3.4 – 7.2)
5	0.1 (0.2 – 0.1)	0.4 (0.6 – 0.3)	1.2 (1.1 – 7.2)	10.5 (5.2 – 10.6)	10.0 (5.1 – 9.5)
10	0.2 (0.3 – 0.3)	0.6 (0.9 – 0.5)	2.1 (1.9 – 9.5)	14.7 (8.0 – 14.8)	13.5 (7.6 – 12.4)
20	0.1 (0.3 – 0.2)	0.8 (1.1 – 0.7)	2.8 (2.6 – 10.8)	16.7 (9.7 – 16.9)	14.7 (8.9 – 12.4)
60	0.1 (0.7 – 0)	1.4 (1.8 – 1.4)	4.3 (4.1 – 12.4)	19.2 (11.9 – 19.5)	14.4 (10.1 – 7.4)
130	0.3 (0.8 – 0.2)	1.7 (2.1 – 1.7)	5.0 (4.9 – 13.5)	21.7 (13.3 – 22.0)	12.8 (10.2 – 2.5)
260	0.5 (1.0 – 0.4)	2.0 (2.4 – 2.0)	5.5 (5.4 – 14.0)	22.3 (13.8 – 22.6)	13.0 (10.7 – 5.5)
^a Based on the mean values of 100 Monte Carlo simulations using the Comprehensive Aquatic Systems Model (CASM)					
^b Consecutive days of constant exposure beginning on model day 105 (April 15)					
^c Results using the geometric mean values of EC ₅₀ assigned to modeled populations (Toxicity Scenario 1)					
^d Results using the 90 th and 10 th percentile estimates of the geometric mean of the EC ₅₀ values (Toxicity Scenarios 3 and 2)					

Table 3. Estimated percent decreases ^a in total annual production of macrophytes (8,478 g C m ⁻²) for a generic 2 nd -3 rd order Midwestern stream.					
	Atrazine concentration (µg/L)				
Exposure (days) ^b	20	30	50	90	170
1	0 ^c (0 – 0) ^d	0.3 (0.3 – 0.3)	0.2 (0.2 – 0.4)	1.4 (-0.4 ^e – 1.0)	0.6 (0.8 – 0.6)
3	0 (0 – 0)	1.0 (1.0 – 1.0)	0.7 (0.7 – 0)	2.4 (0.5 – 1.3)	2.9 (2.8 – 2.9)
5	0 (0 – 0)	1.5 (1.5 – 1.5)	1.2 (1.2 – 0.7)	2.8 (0.4 – 1.1)	5.3 (4.5 – 5.3)
10	0.2 (0.2 – 0.2)	2.7 (2.7 – 2.7)	2.4 (2.4 – 2.6)	2.8 (0.3 – 0)	10.5 (8.2 – 10.5)
20	0.2 (0.1 – 0.2)	4.0 (3.9 – 4.0)	3.7 (3.7 – 5.0)	2.0 (1.3 – 2.2)	17.5 (12.6 – 17.6)
60	0.2 (0.1 – 0.2)	5.5 (5.5 – 5.5)	5.6 (5.5 – 8.4)	0.3 (3.4 – 5.5)	27.7 (18.1 – 28.0)
130	0.2 (0.1 – 0.2)	6.0 (5.9 – 6.0)	6.1 (6.1 – 9.4)	0.3 (4.0 – 6.5)	29.9 (18.3 – 30.4)
260	0.2 (0.1 – 0.2)	6.1 (6.1 – 6.1)	6.2 (6.2 – 9.6)	0.4 (4.1 – 6.7)	27.2 (15.2 – 27.5)
^a Based on the mean values of 100 Monte Carlo simulations using the Comprehensive Aquatic Systems Model (CASM)					
^b Consecutive days of constant exposure beginning on model day 105 (April 15)					
^c Results using the geometric mean values of EC ₅₀ assigned to modeled populations (Toxicity Scenario 1)					
^d Results using the 90 th and 10 th percentile estimates of the geometric mean of the EC ₅₀ values (Toxicity Scenarios 3 and 2)					
^e Values in italics indicate percent increase in total annual production					

Table 4. Estimated percent decreases ^a in total annual production of zooplankton (19 g C m ⁻²) for a generic 2 nd -3 rd order Midwestern stream.					
	Atrazine concentration (µg/L)				
Exposure (days) ^b	20	30	50	90	170
1	0.2 ^c (0.2 – 1.6) ^d	0.1 (0.1 – 1.5)	2.2 (2.3 – 8.0)	12.4 (6.7 – 12.4)	13.2 (7.3 – 13.4)
3	0.8 (0.5 – 3.3)	0.3 (0.1 – 2.8)	2.9 (3.1 – 13.9)	23.4 (11.6 – 23.4)	25.2 (13.0 – 25.6)
5	2.1 (1.0 – 4.7)	0.8 (0.2 – 3.5)	3.0 (3.3 – 16.4)	29.3 (14.1 – 29.3)	31.8 (16.0 – 32.6)
10	0.8 (1.5 – 3.9)	<i>1.44^e</i> (2.9 – 1.6)	<i>0.3</i> (0.7 – 17.5)	36.1 (15.9 – 36.1)	39.4 (17.2 – 40.6)
20	2.3 (0.5 – 5.2)	<i>0.4</i> (2.02 – 2.7)	<i>0.5</i> (0.7 – 18.1)	39.0 (17.3 – 38.9)	43.5 (19.7 – 44.8)
60	3.3 (0.5 – 6.3)	0.5 (1.2 – 3.4)	<i>2.1</i> (0.8 – 15.9)	34.3 (14.5 – 34.2)	43.3 (19.8 – 44.9)
130	3.3 (0.5 – 6.3)	0.5 (1.2 – 3.4)	<i>3.0</i> (2.1 – 13.6)	24.2 (10.6 – 24.9)	43.3 (19.8 – 44.9)
260	3.3 (0.5 – 6.3)	0.5 (1.2 – 3.4)	<i>2.8</i> (1.9 – 13.8)	24.6 (11.2 – 25.5)	43.3 (19.8 – 44.9)
^a Based on the mean values of 100 Monte Carlo simulations using the Comprehensive Aquatic Systems Model (CASM)					
^b Consecutive days of constant exposure beginning on model day 105 (April 15)					
^c Results using the geometric mean values of EC ₅₀ assigned to modeled populations (Toxicity Scenario 1)					
^d Results using the 90 th and 10 th percentile estimates of the geometric mean of the EC ₅₀ values (Toxicity Scenarios 3 and 2)					
^e Values in italics indicate percent increase in total annual production					

Table 5. Estimated percent decrease^a in total annual production of benthic invertebrates (371 g C m⁻²) for a generic 2nd-3rd order Midwestern stream.

Exposure (days) ^b	Atrazine concentration (µg/L)				
	20	30	50	90	170
1	0.1 (0.1 – 0)	0.4 (0.4 – 0.2)	0.3 (0.3 – 1.5)	1.6 (0.8 – 1.8)	2.6 (1.4 – 2.6)
3	0 (0 – 0.1 ^c)	0.7 (0.7 – 0.5)	1.0 (1.0 – 3.5)	3.5 (2.1 – 4.1)	6.1 (3.8 – 5.9)
5	0 (0.1 – 0.2)	1.1 (1.2 – 1.0)	1.7 (1.7 – 4.9)	4.9 (3.2 – 5.8)	8.9 (5.9 – 8.5)
10	0 (0.3 – 0.1)	1.9 (2.1 – 1.8)	3.1 (2.9 – 7.5)	7.5 (5.4 – 9.1)	13.9 (9.7 – 13.4)
20	0.1 (0.3 – 0.1)	2.8 (2.9 – 2.7)	4.3 (4.2 – 9.8)	9.3 (7.2 – 11.8)	19.2 (13.2 – 18.0)
60	0.3 (0.6 – 0.1)	4.3 (4.5 – 4.2)	6.6 (6.5 – 13.3)	12.7 (10.2 – 16.2)	26.2 (17.5 – 22.5)
130	0.4 (0.7 – 0.3)	4.9 (5.2 – 4.9)	7.9 (8.0 – 15.6)	17.7 (12.9 – 21.4)	28.1 (17.9 – 23.8)
260	0.6 (0.9 – 0.5)	5.2 (5.4 – 5.1)	8.3 (8.5 – 16.1)	18.5 (13.5 – 22.1)	31.3 (19.7 – 33.4)

^aBased on the mean values of 100 Monte Carlo simulations using the Comprehensive Aquatic Systems Model (CASM)

^bConsecutive days of constant exposure beginning on model day 105 (April 15)

^cResults using the geometric mean values of EC₅₀ assigned to modeled populations (Toxicity Scenario 1)

^dResults using the 90th and 10th percentile estimates of the geometric mean of the EC₅₀ values (Toxicity Scenarios 3 and 2)

^eValues in italics indicate percent increase in total annual production

Table 6. Estimated percent decrease ^a in total annual production of fish (392 g C m ⁻²) for a generic 2 nd -3 rd order Midwestern stream.					
Exposure (days) ^b	Atrazine concentration (µg/L)				
	20	30	50	90	170
1	0.1 (0.1 – 0.1)	0.1 (0.1 – 0.2)	0.5 (0.5 – 1.5)	2.0 (1.1 – 2.1)	2.4 (1.4 – 2.4)
3	0 (0 – 0.1)	0.3 (0.3 – 0.3)	0.9 (0.9 – 2.9)	4.2 (2.3 – 4.4)	5.1 (2.9 – 5.2)
5	0.1 (0.1 – 0.2)	0.5 (0.5 – 0.6)	1.3 (1.3 – 3.8)	5.6 (3.0 – 5.8)	6.9 (4.1 – 7.1)
10	0.1 (0 – 0.2)	0.7 (0.6 – 0.8)	1.6 (1.7 – 5.1)	7.5 (4.2 – 7.9)	9.7 (5.7 – 10.0)
20	0.2 (0.1 – 0.3)	1.0 (1.0 – 1.2)	2.1 (2.1 – 6.0)	8.6 (5.1 – 9.2)	12.1 (7.4 – 12.6)
60	0.3 (0.3 – 0.5)	1.8 (1.8 – 1.9)	3.1 (3.2 – 7.4)	9.8 (6.3 – 10.8)	15.7 (10.0 – 16.9)
130	0.4 (0.4 – 0.5)	2.1 (2.1 – 2.2)	3.8 (3.9 – 8.6)	11.8 (7.6 – 13.1)	18.4 (11.5 – 23.3)
260	0.5 (0.5 – 0.6)	2.3 (2.3 – 2.4)	4.1 (4.3 – 8.9)	12.2 (7.9 – 13.5)	21.2 (13.6 – 27.9)
^a Based on the mean values of 100 Monte Carlo simulations using the Comprehensive Aquatic Systems Model (CASM)					
^b Consecutive days of constant exposure beginning on model day 105 (April 15)					
^c Results using the geometric mean values of EC ₅₀ assigned to modeled populations (Toxicity Scenario 1)					
^d Results using the 90 th and 10 th percentile estimates of the geometric mean of the EC ₅₀ values (Toxicity Scenarios 3 and 2)					