

Appendix N

KABAM Input and Output Tables

Tables N1-N16 contain the inputs and outputs generated by KABAM v.1.0 for trifluralin. Parameters related to mammals consuming aquatic animals are not relevant to the CRLF assessment. KABAM was run in default mode, with the exception of body weights and diet compositions related to the CRLF. KABAM was also utilized for the SFGS; however, those tables are not included here. For more information on KABAM, see the user's guide.

Table N-1. Chemical characteristics of Trifluralin.		
Characteristic	Value	Comments/Guidance
Pesticide Name	Trifluralin	Required input
Log K _{OW}	5.27	Required input Enter value from acceptable or supplemental study submitted by registrant or available in scientific literature.
K _{OW}	186209	No input necessary. This value is calculated automatically from the Log K _{OW} value entered above.
K _{OC} (L/kg) OC)	8758	Required input Input value used in PRZM/EXAMS to derive EECs. Follow input parameter guidance for deriving this parameter value (USEPA 2002).
Time to steady state (T _S ; days)	53	No input necessary. This value is calculated automatically from the Log K _{OW} value entered above.
Pore water EEC (µg/L)	0.36	Required input Enter value generated by PRZM/EXAMS benthic file. PRZM/EXAMS EEC represents the freely dissolved concentration of the pesticide in the pore water of the sediment. The appropriate averaging period of the EEC is dependent on the specific pesticide being modeled and is based on the time it takes for the chemical to reach steady state. Select the EEC generated by PRZM/EXAMS which has an averaging period closest to the time to steady state calculated above. In cases where the time to steady state exceeds 365 days, the user should select the EEC representing the average of yearly averages. The peak EEC should not be used.
Water Column EEC (µg/L)	0.87	Required input Enter value generated by PRZM/EXAMS water column file. PRZM/EXAMS EEC represents the freely dissolved concentration of the pesticide in the water column. The appropriate averaging period of the EEC is dependent on the specific pesticide being modeled and is based on the time it takes for the chemical to reach steady state. The averaging period used for the water column EEC should be the same as the one selected for the pore water EEC (discussed above).

Table N-2. Input parameters for rate constants. "calculated" indicates that model will calculate rate constant.

Trophic level	k_1 (L/kg*d)	k_2 (d⁻¹)	k_D (kg-food/kg-org/d)	k_E (d⁻¹)	k_M^* (d⁻¹)
phytoplankton	calculated	calculated	0*	0*	0
zooplankton	calculated	calculated	calculated	calculated	0
benthic invertebrates	calculated	calculated	calculated	calculated	0
filter feeders	calculated	calculated	calculated	calculated	0
small fish	calculated	calculated	calculated	calculated	0
medium fish	calculated	calculated	calculated	calculated	0
large fish	calculated	calculated	calculated	calculated	0

* Default value is 0.

k_1 and k_2 represent the uptake and elimination constants respectively, through respiration.

k_D and k_E represent the uptake and elimination constants, respectively, through diet.

k_M represents the metabolism rate constant.

Table N-3. Mammalian and avian toxicity data for Trifluralin. These are required inputs.

Animal	Measure of effect (units)	Value	Species	If selected species is "other," enter body weight (in kg) here.
Avian	LD ₅₀ (mg/kg-bw)	2000	mallard duck	
	LC ₅₀ (mg/kg-diet)	5000	mallard duck	
	NOAEC (mg/kg-diet)	500	mallard duck	
	Mineau Scaling Factor	1.15	Default value for all species is 1.15 (for chemical specific values, see Mineau et al. 1996).	
Mammalian	LD ₅₀ (mg/kg-bw)	5000	laboratory rat	
	LC ₅₀ (mg/kg-diet)	NA	other	
	Chronic Endpoint	10	laboratory rat	
	units of chronic endpoint*	ppm		

*ppm = mg/kg-diet

Table N-4. Abiotic characteristics of the model aquatic ecosystem.		
Characteristic	Value	Guidance*
Concentration of Particulate Organic Carbon (X_{POC} ; kg OC/ L)	0.00E+00	When using EECs generated by PRZM/EXAMS, use a value of "0" for both POC and DOC.
Concentration of Dissolved Organic Carbon (X_{DOC} ; kg OC/L)	0.00E+00	
Concentration of Dissolved Oxygen (C_{OX} ; mg O ₂ /L)	5.0	Default value is 5.0 mg O ₂ /L when using EECs generated by PRZM/EXAMS.
Water Temperature (T; °C)	15	Value is defined by the average water temperature of the EXAMS pond when using EECs generated by PRZM/EXAMS. Model user should consult output file of EXAMS to define this value.
Concentration of Suspended Solids (C_{SS} ; kg/L)	3.00E-05	Default value is 3.00x10 ⁻⁵ kg/L when using EECs generated by PRZM/EXAMS.
Sediment Organic Carbon (OC; %)	4.0%	Default value is 4.0% when using EECs generated by PRZM/EXAMS.
*When using pesticide concentrations from monitoring data or mesocosm studies, consult Appendix B of the User's Guide for specific guidance on selecting values for these parameters.		

Table N-5. Characteristics of aquatic biota of the model ecosystem.					
Trophic Level	Wet Weight (kg)	% lipids	% NLOM	% Water	Do organisms in trophic level respire some pore water?
sediment*	N/A	0.0%	4.0%	96.0%	N/A
phytoplankton	N/A	2.0%	8.0%	90.0%	no
zooplankton	1.0E-07	3.0%	12.0%	85.0%	no
benthic invertebrates	1.0E-04	3.0%	21.0%	76.0%	yes
filter feeders	1.0E-03	2.0%	13.0%	85.0%	yes
small fish	1.0E-02	4.0%	23.0%	73.0%	yes
medium fish	1.0E-01	4.0%	23.0%	73.0%	yes
large fish	1.0E+00	4.0%	23.0%	73.0%	no
*Note that sediment is not a trophic level. It is included in this table because it is consumed by aquatic organisms of the KABAM foodweb. N/A = not applicable					

Table N-6. Diets of aquatic biota of the model ecosystem.						
Trophic level in diet	Diet for:					
	Zoo plankton	Benthic Invertebrates	Filter Feeder	Small Fish	Medium Fish	Large Fish
sediment*	0.0%	34.0%	34.0%	0.0%	0.0%	0.0%
phytoplankton	100.0%	33.0%	33.0%	0.0%	0.0%	0.0%
zooplankton		33.0%	33.0%	50.0%	0.0%	0.0%
benthic invertebrates			0.0%	50.0%	50.0%	0.0%
filter feeders				0.0%	0.0%	0.0%
small fish					50.0%	0.0%
medium fish						100.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
*Note that sediment is not a trophic level. It is included in this table because it is consumed by aquatic organisms of the KABAM foodweb.						

Table N-7. Identification of mammals and birds feeding on aquatic biota of the model ecosystem.		
Mammal/Bird #	Name	Body weight (kg)
Mammal 1	fog/water shrew	0.018
Mammal 2	rice rat/star-nosed mole	0.085
Mammal 3	small mink	0.45
Mammal 4	large mink	1.8
Mammal 5	small river otter	5
Mammal 6	large river otter	15
Bird 1	small CRLF 1	0.0014
Bird 2	small CRLF 2	0.0014
Bird 3	med CRLF 1	0.037
Bird 4	med CRLF 2	0.037
Bird 5	large CRLF 1	0.238
Bird 6	large CRLF 2	0.238

Table 8. Diets of mammals feeding on aquatic biota of the model ecosystem.						
Trophic level in diet	Diet for:					
	fog/water shrew	rice rat/star-nosed mole	small mink	large mink	small river otter	large river otter
phytoplankton	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
zooplankton	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
benthic invertebrates	100.0%	34.0%	0.0%	0.0%	0.0%	0.0%
filter feeders	0.0%	33.0%	0.0%	0.0%	0.0%	0.0%
small fish	0.0%	33.0%	0.0%	0.0%	0.0%	0.0%
medium fish	0.0%	0.0%	100.0%	100.0%	100.0%	0.0%
large fish	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table N-9. Diets of birds feeding on aquatic biota of the model ecosystem.						
Trophic level in diet	Diet for:					
	small CRLF 1	small CRLF 2	med CRLF 1	med CRLF 2	large CRLF 1	large CRLF 2
phytoplankton	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
zooplankton	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
benthic invertebrates	100.0%	100.0%	100.0%	0.0%	100.0%	0.0%
filter feeders	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
small fish	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
medium fish	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
large fish	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table N-10. Input parameters and calculations relevant to derivation of C _B .							
Parameter	Phyto plankton	Zoo plankton	Benthic Invertebrates	Filter Feeders	Small Fish	Medium Fish	Large Fish
Equation A1							
C _B	0.007201	0.00580018	0.006506	0.004270	0.010571	0.013971	0.02386
C _{BD}	0.000000	0.00031447	0.000806	0.000520	0.003546	0.007350	0.017574
C _{BR}	0.00720055	0.00548571	0.00569992	0.00375017	0.00702544	0.00662171	0.00628996
C _S	0.000126						
C _{WDP}	0.00000036						
C _{WTO}	0.00000087						
k ₁	11168.599	42637.422	3800.064	1697.426	758.212	338.681	151.283
k ₂	1.249435	6.694326	0.546327	0.371243	0.084735	0.037850	0.016907
k _D	0.000000	0.295321	0.104784	0.045844	0.052516	0.037179	0.026320
k _E	0.000000	0.055150	0.013535	0.009009	0.005151	0.004552	0.003518
k _G	0.100000	0.012559	0.003155	0.001991	0.001256	0.000792	0.000500
k _M	0	0	0	0	0	0	0
m ₀	1	1	0.95	0.95	0.95	0.95	1
m _p	0	0	0.05	0.05	0.05	0.05	0
Σ (P _i * C _{Di})	0	0.007200554	0.004333121	0.00433312	0.00615327	0.00853867	0.0139713
Φ	1.00000000						
Equation A2							
X _{POC}	0.00000000						
X _{DOC}	0.00000000						
K _{OW}	186209						
Φ	1.00000000						
Equation A4							
C _S	0.0001						
C _{SOC}	0.0032						
C _{WDP}	0.00000						
K _{OC}	8758						
OC	4%						
Equation A5							
C _{ox}	N/A	5					
E _W	N/A	0.540297436					
G _V	N/A	0.007891472	0.703328201	3.14165167	14.0332425	62.6841919	280
k ₁	11168.59852	42637.42201	3800.064236	1697.42634	758.212497	338.681082	151.283282
K _{OW}	186209						
W _B	N/A	0.0000001	0.0001	0.001	0.01	0.1	1
Equation A6							

K_1	11168.59852	42637.42201	3800.064236	1697.42634	758.212497	338.681082	151.283282
K_2	1.249435133	6.694326178	0.546327267	0.37124336	0.08473486	0.03784967	0.01690683
K_{BW}	8938.918256	6369.188007	6955.655455	4572.27392	8948.05869	8948.05869	8948.05869
K_{OW}	186209						
V_{LB}	0.02	0.03	0.03	0.02	0.04	0.04	0.04
V_{NB}	0.08	0.12	0.21	0.13	0.23	0.23	0.23
V_{WB}	0.9	0.85	0.76	0.85	0.73	0.73	0.73
β	0.35	0.035					
Equation A7							
K_G	0.1	0.012559432	0.003154787	0.00199054	0.00125594	0.00079245	0.0005
T	15						
W_B	N/A	0.0000001	0.0001	0.001	0.01	0.1	1
Equation A8							
C_{ox}	N/A	N/A	N/A	5	N/A	N/A	N/A
C_{SS}	N/A	N/A	N/A	3.00E-05	N/A	N/A	N/A
E_D	N/A	0.486413826					
G_D	N/A	6.07E-08	2.15E-05	9.42E-05	1.08E-03	7.64E-03	5.41E-02
G_V	N/A	N/A	N/A	3.14	N/A	N/A	N/A
K_D	0	2.95E-01	1.05E-01	4.58E-02	5.25E-02	3.72E-02	2.63E-02
K_{OW}	186209						
T	N/A	15					
W_B	N/A	0.0000001	0.0001	0.001	0.01	0.1	1
Equation A9							
C_{ox}	N/A	N/A	N/A	5	N/A	N/A	N/A
C_{SS}	N/A	N/A	N/A	3.00E-05	N/A	N/A	N/A
E_D	N/A	0.4864					
G_D	N/A	0.0000	0.0000	0.0000942	0.0011	0.0076	0.0541
G_F	N/A	0.000000	0.000015	0.000066	0.000726	0.004965	0.034777
G_V	N/A	N/A	N/A	3.1417	N/A	N/A	N/A
k_E	0	0.0552	0.0135	0.0090	0.0052	0.0046	0.0035
K_{GB}	N/A	0.2656	0.1840	0.2799	0.1459	0.1885	0.2080
K_{OW}	N/A	186209					
T	N/A	15					
V_{LB}	N/A	0.03	0.03	0.02	0.04	0.04	0.04
V_{LD}	N/A	0.02	0.01650	0.0165	0.03	0.035	0.04
V_{LG}	N/A	0.007966	0.005876	0.005876	0.003571	0.004311	0.004979
V_{NB}	N/A	0.12	0.21	0.13	0.23	0.23	0.23
V_{ND}	N/A	0.08	0.0796	0.0796	0.165	0.22	0.23
V_{NG}	N/A	0.03186	0.02835	0.02835	0.09819	0.13548	0.14315
V_{WR}	N/A	0.85	0.76	0.85	0.73	0.73	0.73

V_{WD}	N/A	0.9	0.9039	0.9039	0.805	0.745	0.73
V_{WG}	N/A	0.9602	0.9658	0.9658	0.8982	0.8602	0.8519
W_B	N/A	0.0000001	0.0001	0.001	0.01	0.1	1
β	N/A	0.035	0.035	0.035	0.035	0.035	0.035
ϵ_L	N/A	0.72	0.75	0.75	0.92	0.92	0.92
ϵ_N	N/A	0.72	0.75	0.75	0.6	0.6	0.6
ϵ_W	N/A	0.25	0.25	0.25	0.25	0.25	0.25
Calculation of BCF values							
C_{BCF}	0.007776859	0.005541194	0.005874051	0.00386129	0.00755664	0.00755664	0.00778481

Table N-11. Estimated concentrations of Trifluralin in ecosystem components.				
Ecosystem Component	Total concentration ($\mu\text{g/kg-ww}$)	Lipid normalized concentration ($\mu\text{g/kg-lipid}$)	Contribution due to diet ($\mu\text{g/kg-ww}$)	Contribution due to respiration ($\mu\text{g/kg-ww}$)
Water (total)*	1	N/A	N/A	N/A
Water (freely dissolved)*	1	N/A	N/A	N/A
Sediment (pore water)*	0	N/A	N/A	N/A
Sediment (in solid)**	126	N/A	N/A	N/A
Phytoplankton	7,201	360028	N/A	7,200.55
Zooplankton	5,800	193339	314.47	5,485.71
Benthic Invertebrates	6,506	216879	806.44	5,699.92
Filter Feeders	4,270	213493	519.69	3,750.17
Small Fish	10,571	264274	3,545.54	7,025.44
Medium Fish	13,971	349283	7,349.59	6,621.71
Large Fish	23,864	596596	17,573.90	6,289.96
* Units: $\mu\text{g/L}$; **Units: $\mu\text{g/kg-dw}$				

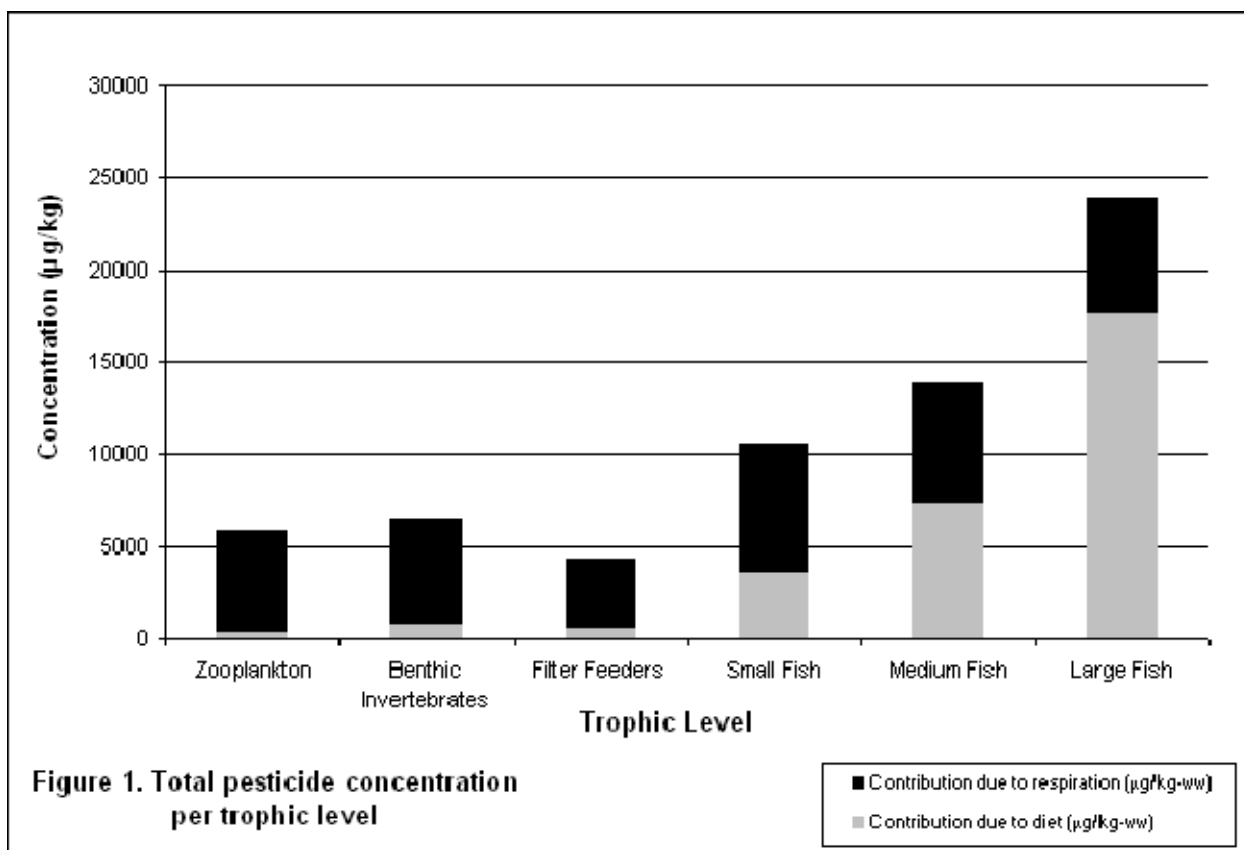


Table N-12. Total BCF and BAF values of Trifluralin in aquatic trophic levels.		
Trophic Level	Total BCF (µg/kg-ww)/(µg/L)	Total BAF (µg/kg-ww)/(µg/L)
Phytoplankton	8939	8276
Zooplankton	6369	6667
Benthic Invertebrates	6752	7479
Filter Feeders	4438	4908
Small Fish	8686	12151
Medium Fish	8686	16059
Large Fish	8948	27430

Table N-13. Lipid-normalized BCF, BAF, BMF and BSAF values of Trifluralin in aquatic trophic levels.

Trophic Level	BCF (µg/kg-lipid)/(µg/L)	BAF (µg/kg-lipid)/(µg/L)	BMF (µg/kg-lipid)/(µg/kg-lipid)	BSAF (µg/kg-lipid)/(µg/kg-OC)
Phytoplankton	446946	413825	N/A	114
Zooplankton	212306	222229	0.54	61
Benthic Invertebrates	225059	249286	1.19	69
Filter Feeders	221913	245395	1.17	68
Small Fish	217145	303764	1.29	84
Medium Fish	217145	401474	1.45	111
Large Fish	223701	685743	1.71	189

Table N-14. Calculation of EECs for mammals and birds consuming fish contaminated by Trifluralin.						
Wildlife Species	Biological Parameters				EECs (pesticide intake)	
	Body Weight (kg)	Dry Food Ingestion Rate (kg-dry food/kg-bw/day)	Wet Food Ingestion Rate (kg-wet food/kg-bw/day)	Drinking Water Intake (L/d)	Dose Based (mg/kg-bw/d)	Dietary Based (ppm)
Mammalian						
fog/water shrew	0.02	0.140	0.585	0.003	3.808	6.51
rice rat/star-nosed mole	0.1	0.107	0.484	0.011	3.440	7.11
small mink	0.5	0.079	0.293	0.048	4.098	13.97
large mink	1.8	0.062	0.229	0.168	3.202	13.97
small river otter	5.0	0.052	0.191	0.421	2.669	13.97
large river otter	15.0	0.042	0.157	1.133	3.750	23.86
Avian						
small CRLF 1	0.0	0.577	2.403	0.001	15.6338	6.51
small CRLF 2	0.0	0.577	2.403	0.001	15.6338	6.51
med CRLF 1	0.0	0.184	0.766	0.006	4.9861	6.51
med CRLF 2	0.0	0.184	0.681	0.006	7.2008	10.57
large CRLF 1	0.2	0.096	0.400	0.023	2.6040	6.51
large CRLF 2	0.2	0.096	0.356	0.023	4.9702	13.97

Table N-15. Calculation of toxicity values for mammals and birds consuming fish contaminated by Trifluralin.

Wildlife Species	Toxicity Values			
	Acute		Chronic	
	Dose Based (mg/kg-bw)	Dietary Based (mg/kg-diet)	Dose Based (mg/kg-bw)	Dietary Based (mg/kg-diet)
Mammalian				
fog/water shrew	10499.51	NA	1.05	10
rice rat/star-nosed mole	7122.50	NA	0.71	10
small mink	4695.52	NA	0.47	10
large mink	3320.24	NA	0.33	10
small river otter	2571.84	NA	0.26	10
large river otter	1954.18	NA	0.20	10
Avian				
small CRLF 1	696.87	5000.00	N/A	500
small CRLF 2	696.87	5000.00	N/A	500
med CRLF 1	1138.84	5000.00	N/A	500
med CRLF 2	1138.84	5000.00	N/A	500
large CRLF 1	1505.63	5000.00	N/A	500
large CRLF 2	1505.63	5000.00	N/A	500

Table N-16. Calculation of RQ values for mammals and birds consuming fish contaminated by Trifluralin.				
Wildlife Species	Acute		Chronic	
	Dose Based	Dietary Based	Dose Based	Dietary Based
Mammalian				
fog/water shrew	0.000	#VALUE!	3.627	0.651
rice rat/star-nosed mole	0.000	#VALUE!	4.830	0.711
small mink	0.001	#VALUE!	8.727	1.397
large mink	0.001	#VALUE!	9.643	1.397
small river otter	0.001	#VALUE!	10.380	1.397
large river otter	0.002	#VALUE!	19.188	2.386
Avian				
small CRLF 1	0.022	0.001	N/A	0.013
small CRLF 2	0.022	0.001	N/A	0.013
med CRLF 1	0.004	0.001	N/A	0.013
med CRLF 2	0.006	0.002	N/A	0.021
large CRLF 1	0.002	0.001	N/A	0.013
large CRLF 2	0.003	0.003	N/A	0.028