APPENDIX M
SUPPLEMENTAL AQUATIC RQ TABLES

Exposures in the Aquatic Habitat
Direct Effects to Aquatic-Phase CRLF

Because the AW is a terrestrial organism given its designated critical habitat as well as its prey base, the aquatic assessment does not include direct or indirect effects to the whipsnake.

Direct effects to the aquatic-phase CRLF are based on peak EECs in the standard pond and the lowest acute toxicity value for freshwater fish. Separate RQs were calculated for the acid/salts (runoff +drift) and the esters (runoff +drift and drift only). In addition, risks to the aquatic-phase CRLF were estimated for direct applications to water. In order to assess direct chronic risks to the CRLF, 60-day EECs and the lowest acid/salts chronic toxicity value for freshwater fish were used. Due to the unlikelihood of long-term exposures, chronic risks of esters were not estimated.

Table M.1. Acute and chronic RQs for freshwater fish based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	60-day EEC (µg/L)	Acute RQ	Chronic RQ
Orchard Uses							
Nut Orchards, Pistachios	CA Almond wirrig STD (10-Feb)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.69	11.10	<0.01	<0.01
Filberts	CA Almond wirrig STD (10-Feb)	G	4 apps @ 0.5 lb a.e./acre[3] (30-day interval)	4.06	3.38	<0.01	<0.01
Grapes	CA Grapes STD (1-Mar)	G	1 app @ 1.36 lb a.e./acre	4.52	3.59	<0.01	<0.01
Grapes	CA Wine Grapes RLF (1-Mar)	G	1 app @ 1.36 lb a.e./acre	2.94	2.34	<0.01	<0.01
Blueberries	CA Wine Grapes RLF (5-Mar)	G	1 post-emergence app @ 1.4 lb a.e./acre and 1 post-harvest app @ 1.4 lb a.e./acre	3.15	2.58	<0.01	<0.01
Stone and Pome Fruits	CA Fruit wirrig STD (1-Mar)	G	2 apps @ 2 lb a.e./acre (75-day interval)	6.98	5.30	<0.01	<0.01
Citrus[2]	CA citrus STD	G	1 app @ 0.1 lb a.e./acre	0.08	0.07	<0.01	<0.01
		A		0.32	0.24	<0.01	<0.01
Agricultural – Food Crop Uses							
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.0 lb a.e./acre March 15, 1 app @ 0.5 lb a.e./acre April 29 1 app @ 1.5 lb a.e./acre August 15 (pre-harvest)	9.41	7.40	<0.01	<0.01
		A	1 app @ 1.0 lb a.e./acre March 15,	12.17	9.84	<0.01	<0.01

Table M.1. Acute and chronic RQs for freshwater fish based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	60-day EEC (µg/L)	Acute RQ	Chronic RQ
			1 app @ 0.5 lb a.e./acre April 29 1 app @ 1.5 lb a.e./acre August 15 (pre-harvest)				
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre March 15; 1 app @ 0.5 lb a.e./acre April 29	7.41	6.00	<0.01	<0.01
		A	1 app @ 1 lb a.e./acre on March 15; and 1 app @ 0.5 lb a.e./acre on April 29	9.57	8.00	<0.01	<0.01
Potatoes	CA Potato RLF (1-Apr)	G	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.1190	0.0867	<0.01	<0.01
		A	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.4175	0.3044	<0.01	<0.01
Sugarcane	CA Sugarbeet wirrig OP (20-Jan)	G	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	25.85	21.02	0.01	<0.01
		A	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	33.31	27.40	0.01	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.25 lb a.e./acre and 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	21.39	17.19	0.01	<0.01
		A	1 post-emergence app @ 1.25 lb a.e./acre and 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	23.43	18.85	0.01	<0.01
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.0 lb a.e./acre	17.00	13.66	<0.01	<0.01
		A	1 post-emergence app @ 1.0 lb a.e./acre	18.61	14.96	<0.01	<0.01
Hops	OR hops STD (10-Apr)	G	3 apps @ 0.5 lb a.e./acre (30-day interval)	1.73	1.33	<0.01	<0.01
		A	3 apps @ 0.5 lb a.e./acre (30-day interval)	4.62	3.69	<0.01	<0.01
Asparagus	CA Row Crop RLF (1-Apr)	G	2 apps @ 2 lb a.e./acre (30-day interval)	12.62	10.85	<0.01	<0.01
		A	2 apps @ 2 lb a.e./acre (30-day interval)	20.14	16.87	<0.01	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	2 apps @ 2 lb a.e./acre (30-day interval)	2.16	1.69	<0.01	<0.01
		A	2 apps @ 2 lb a.e./acre (30-day interval)	10.70	8.32	<0.01	<0.01
Agricultural – Non-food Crop Uses							
Established Grass Pastures,	CA Rangeland Hay RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.021	10.520	<0.01	<0.01

Table M.1. Acute and chronic RQs for freshwater fish based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	60-day EEC (µg/L)	Acute RQ	Chronic RQ
Rangeland, Perennial Grassland Not in Agricultural Production							
Non-agricultural Uses							
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	39.02	32.24	0.01	<0.01
		A	1 app @ 4 lb a.e./acre	46.66	38.62	0.01	<0.01
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	15.92	13.42	<0.01	<0.01
		A	1 app @ 4 lb a.e./acre	24.98	21.03	0.01	<0.01
Ornamental Turf	CA Turf RLF (1-Mar)	G	2 apps @ 1.5 lb a.e./acre (21-day interval)	5.55	4.61	<0.01	<0.01
		A	2 apps @ 1.5 lb a.e./acre (21-day interval)	12.96	10.81	<0.01	<0.01
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (21-day interval)	6.17	5.28	<0.01	<0.01
		A	2 apps @ 2 lb a.e./acre (21-day interval)	14.87	12.06	<0.01	<0.01

*,+LOC exceedances (acute RQ ≥ 0.05; chronic RQ ≥ 1.0) are bolded. Acute RQ = use-specific peak EEC / 24.15 mg a.e./L (E006387). Chronic RQ = use-specific 60-day EEC / 14.2 mg a.e./L (MRID 417677-01). The most sensitive 2,4-D acid and salt toxicity values were bridged for all use scenarios to calculate RQs.

[1]G = ground application. A = aerial application.

[2] Although only IPE is labeled for citrus use, EFED is modeling exposure to acid as it is expected that most aquatic exposure will be to the acid, not 2,4-D IPE.

Table M.2. Acute RQs for freshwater fish based on EECs for runoff and drift used to represent 2,4-D ester uses[1]

Master Label Use Category (2-EHE, BEE, IPE[3])	PRZM/EXAMS Scenario (first app date)	Method[2]	Application Rate	Peak EEC (µg/L)	Acute RQ
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 0.1 lb a.e./acre	0.0554	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.2768	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	2.7036	0.01
		A	1 app @ 1.5 lb a.e./acre	4.6609	0.02
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	1.8026	0.01
		A	1 app @ 1 lb a.e./acre	3.1072	0.01
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0390	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.1939	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	3.3244	0.01
		A	1 app @ 1.25 lb a.e./acre	5.0928	0.02
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	1.33	<0.01
		A	1 post-emergence app @ 0.5 lb a.e./acre	2.04	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	1 app @ 2 lb a.e./acre	1.103	<0.01
		A	1 app @ 2 lb a.e./acre	5.504	0.02
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	2 app @ 2 lb a.e./acre	1.27	<0.01
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	6.3698	0.02
		A	1 app @ 4 lb a.e./acre	11.128	0.04
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	7.1353	0.03
		A	1 app @ 4 lb a.e./acre	13.249	**0.05***
Ornamental Turf	CA Turf RLF (1-Mar)	G	1app @ 1.5 a.e./acre	0.83	<0.01
		A	1app @ 1.5 a.e./acre	4.14	0.02
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1076	<0.01
		A	1 app @ 2 lb a.e./acre	5.5147	0.02

*LOC exceedances (acute RQ $\geq$ 0.05) are bolded. Acute RQ = use-specific peak EEC / 0.26 mg a.e./L (MRID 439307-01, 439103-01). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs.

[1]Chronic EECs are not modeled in this scenario because the hydrolysis soil slurry data indicate that dissipation in a non-sterile water body will occur at all PHs and therefore long-term exposures are unlikely.

[2]G = ground application. A = aerial application. All applications are liquid unless otherwise specified.

[3]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form.

Table M.3. Acute RQs for freshwater fish based on EECs for drift only used to represent 2,4-D ester uses[1]

Master Label Use Category[2] (2-EHE, BEE, IPE[3])	PRZM/EXAMS Scenario (first app date)	Method[4]	Application Rate[5]	Peak EEC (µg/L)	Acute RQ
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 0.1 lb a.e./acre	0.055	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.28	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	0.825	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.2	0.02
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	0.55	<0.01
		A	1 app @ 1 lb a.e./acre	2.8	0.01
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0385	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.196	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	0.6875	<0.01
		A	1 app @ 1.25 lb a.e./acre	3.5	0.01
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	0.28	<0.01
		A	1 post-emergence app @ 0.5 lb a.e./acre	1.4	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
		A	1 app @ 2 lb a.e./acre	5.6	0.02
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	2.2	0.01
		A	1 app @ 4 lb a.e./acre	11.2	0.04
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	2.2	0.01
		A	1 app @ 4 lb a.e./acre	11.2	0.04
Ornamental Turf	CA Turf RLF (1-Mar)	G	1app @ 1.5 a.e./acre	0.83	<0.01
		A	1app @ 1.5 a.e./acre	4.2	0.02
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
		A	1 app @ 2 lb a.e./acre	5.6	0.02

*LOC exceedances (acute RQ $\geq$ 0.05) are bolded. Acute RQ = use-specific peak EEC / 0.26 mg a.e./L (MRID 439307-01, 439103-01). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs**.**

[1]Chronic EECs are not modeled in this scenario because the hydrolysis soil slurry data indicate that dissipation in a nonsterile water body will occur at all PHs and therefore long-term exposures are unlikely.

[3]IPE labeled for citrus use only. 2-EHE and BEE not labeled for citrus use.

[4]G = ground application. A = aerial application.

[5]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form.

Table M.4. Acute and Chronic RQs for freshwater fish based on EECs for direct application to water to represent 2,4-D acid, salt, and ester uses

Master Label Use Category	Model Scenario	Method[1]	Application Rate	Peak EEC (µg/L)	60-day EEC (µg/L)	Acute RQ	Chronic RQ
Rice (acid and salts)	Direct water applications	G & A	1 app @ 1.5 lb a.e./acre	1486[2]	N/A	**0.06***	0.11
Aquatic Weed Control (surface application or subsurface injection) (acid and salts)	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[3]	2610	**0.17***	0.18
Aquatic Weed Control (surface application or subsurface injection) (esters only)	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[3]	2610	**15.38***	NA[4]
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	483	0.03	0.03
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	483	**2.9***	NA[4]
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	966	**0.06***	0.07
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	966	**5.7***	NA[4]

*,+LOC exceedances (acute RQ $\geq$ 0.05; chronic RQ $\geq$ 1.0) are bolded. Acute RQ (acid and salts) = use-specific peak EEC / 24.15 mg a.e./L (E006387). Chronic RQ (acid and salts) = use-specific 60-day EEC / 14.2 mg a.e./L (MRID 417677-01). Acute RQ (esters) = use-specific peak EEC / 0.26 mg a.e./L (MRID 439307-01, 439103-01).

[1]G = ground application. A = aerial application.

[2]Rice Model - the maximum water surface concentration is used to determine both acute and chronic toxicity.

[3]Aquatic weed control-peak water concentration: 4000 µg/L , 21-day average water concentration: 3417 µg/L, and 60-day average water concentration: 2610 µg/L. For ester direct application scenarios, 2,4-D acid input parameters were used to determine EEC. All other runoff and drift application scenarios used 2,4-D ester input parameters to determine EEC.

[4]Chronic EECs are not modeled in this scenario because the hydrolysis soil slurry data indicate that dissipation in a non-sterile water body will occur at all PHs and therefore long-term exposures are unlikely.

Indirect Effects to Aquatic-Phase CRLF via Reduction in Prey (non-vascular aquatic plants, aquatic invertebrates, fish, and frogs)

Non-vascular Aquatic Plants

Indirect effects of 2,4-D to the aquatic-phase CRLF (tadpoles) via reduction in non-vascular aquatic plants in its diet are based on peak EECs from the standard pond and the lowest toxicity value (EC_{50}) for aquatic non-vascular plants.

Table M.5. RQs for non-vascular plants based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	RQ
Orchard Uses					
Nut Orchards, Pistachios	CA Almond wirrig STD (10-Feb)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.69	<0.01
Filberts	CA Almond wirrig STD (10-Feb)	G	4 apps @ 0.5 lb a.e./acre[3] (30-day interval)	4.06	<0.01
Grapes	CA Grapes STD (1-Mar)	G	1 app @ 1.36 lb a.e./acre	4.52	<0.01
Grapes	CA Wine Grapes RLF (1-Mar)	G	1 app @ 1.36 lb a.e./acre	2.94	<0.01
Blueberries	CA Wine Grapes RLF (3-Mar)	G	1 post-emergence app @ 1.4 lb a.e./acre and 1 post-harvest app @ 1.4 lb a.e./acre	3.15	<0.01
Stone and Pome Fruits	CA Fruit wirrig STD (1-Mar)	G	2 apps @ 2 lb a.e./acre (75-day interval)	6.98	<0.01
Citrus[2]	CA Citrus STD	G	1 app @ 0.1 lb a.e./acre	0.08	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.32	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.0 lb a.e./acre March 15, 1 app @ 0.5 lb a.e./acre April 29, 1 app @ 1.5 lb a.e./acre August 15 (pre harvest)	9.41	<0.01
		A	1 app @ 1.0 lb a.e./acre March 15, 1 app @ 0.5 lb a.e./acre April 29, 1 app @ 1.5 lb a.e./acre August 15 (pre harvest)	12.17	<0.01
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre on March 15; 1app @ 0.5 lb a.e./acre on April 29	7.41	<0.01

Table M.5. RQs for non-vascular plants based on EECs for runoff and drift used to represent 2,4-D acid and salt uses					
Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	**PRZM/EXAMS Scenario (first app date)**	**Method[1]**	**Application Rate (interval between applications)**	**Peak EEC (µg/L)**	**RQ**
		A	1 app @ 1 lb a.e./acre on March 15; 1app @ 0.5 lb a.e./acre on April 29	9.57	<0.01
Potatoes	CA Potato RLF (1-Apr)	G	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.1190	<0.01
		A	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.4175	<0.01
Sugarcane	CA Sugarbeet wirrig OP (20-Jan)	G	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	25.85	0.01
		A	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	33.31	0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.25 lb a.e./acre; 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	21.39	0.01
		A	1 post-emergence app @ 1.25 lb a.e./acre; 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	23.43	0.01
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.0 lb a.e./acre	17.00	<0.01
		A	1 post-emergence app @ 1.0 lb a.e./acre	18.61	<0.01
Asparagus	CA Row Crop RLF (1-Apr)	G	2 apps @ 2 lb a.e./acre (30-day interval)	12.62	<0.01
		A	2 apps @ 2 lb a.e./acre (30-day interval)	20.14	0.01
Hops	OR hops STD (10-Apr)	G	3 apps @ 0.5 lb a.e./acre (30-day interval)	1.73	<0.01
		A	3 apps @ 0.5 lb a.e./acre (30-day interval)	4.62	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	2 apps @ 2 lb a.e./acre (30-day interval)	2.16	<0.01
		A	2 apps @ 2 lb a.e./acre (30-day interval)	10.70	<0.01
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.021	<0.01
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	39.02	0.01
		A	1 app @ 4 lb a.e./acre	46.66	0.01
Forestry, Tree	CA Forestry RLF	G	1 app @ 4 lb a.e./acre	15.92	<0.01

Table M.5. RQs for non-vascular plants based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	RQ
and Brush Control	(1-Mar)	A	1 app @ 4 lb a.e./acre	24.98	0.01
Ornamental Turf	CA Turf RLF (1-Mar)	G	2 apps @ 1.5 lb a.e./acre (21-day interval)	5.55	<0.01
		A	2 apps @ 1.5 lb a.e./acre (21-day interval)	12.96	<0.01
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (21-day interval)	6.17	<0.01
		A	2 apps @ 2 lb a.e./acre (21-day interval)	14.87	<0.01

*LOC exceedances (acute RQ $\geq$ 1.0) are bolded. Acute RQ = use-specific peak EEC / 3.88 mg a.e./L (MRID 415059-03). The most sensitive 2,4-D acid and salt toxicity values were bridged for all use scenarios to calculate RQs.

[1]G = ground application. A = aerial application.

[2]Although only IPE is labeled for citrus use, EFED is modeling exposure to acid as it is expected that most aquatic exposure will be to the acid, not 2,4-D IPE.

Table M.6. RQs for non-vascular plants based on EECs for runoff and drift used to represent 2,4-D ester uses

Master Label Use Category (2-EHE, BEE, IPE[1])	PRZM/EXAMS Scenario (first app date)	Method[2]	Application Rate[3]	Peak EEC (µg/L)	RQ
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 0.1 lb a.e./acre	0.0554	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.2768	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	2.7036	0.04
		A	1 app @ 1.5 lb a.e./acre	4.6609	0.07
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	1.8026	0.05
		A	1 app @ 1 lb a.e./acre	3.1072	0.03
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0390	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.1939	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	3.3244	0.05
		A	1 app @ 1.25 lb a.e./acre	5.0928	0.08
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	1.33	0.02
		A	1 post-emergence app @ 0.5 lb a.e./acre	2.04	0.03
Fallowland and Crop	CA Row Crop RLF	G	1 app @ 2 lb a.e./acre	1.103	0.02

Table M.6. RQs for non-vascular plants based on EECs for runoff and drift used to represent 2,4-D ester uses

Master Label Use Category (2-EHE, BEE, IPE[1])	PRZM/EXAMS Scenario (first app date)	Method[2]	Application Rate[3]	Peak EEC (µg/L)	RQ
Stubble	(1-Aug)	A	1 app @ 2 lb a.e./acre	5.504	0.08
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.27	0.02
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	6.3698	0.10
		A	1 app @ 4 lb a.e./acre	11.128	0.17
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	7.1353	0.11
		A	1 app @ 4 lb a.e./acre	13.249	0.20
Ornamental Turf	CA Turf RLF (1-Mar)	G	1 app @ 1.5 lb a.e./acre	0.83	0.01
		A	1 app @ 1.5 lb a.e./acre	4.14	0.06
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1076	0.02
		A	1 app @ 2 lb a.e./acre	5.5147	0.08

* = LOC exceedances (RQ ≥ 1.0) are bolded. RQ = use-specific peak EEC / 0.066 mg a.e./L (MRID 417352-04). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs.
[1]IPE labeled for citrus use only. 2-EHE and BEE not labeled for citrus use.
[2]G = ground application. A = aerial application.
[3]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form.

Table M.7. RQs for non-vascular plants based on EECs for drift only used to represent 2,4-D ester uses

Master Label Use Category[1] (2-EHE, BEE, IPE[1])	PRZM/EXAMS Scenario (first app date)	Method[2]	Application Rate[3]	Peak EEC (µg/L)	RQ
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 0.1 lb a.e./acre	0.055	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.28	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	0.825	0.01
		A	1 app @ 1.5 lb a.e./acre	4.2	0.06
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	0.55	0.01
		A	1 app @ 1 lb a.e./acre	2.8	0.04
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0385	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.196	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	0.6875	0.01
		A	1 app @ 1.25 lb a.e./acre	3.5	0.05
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	0.28	<0.01
		A	1 post-emergence app @ 0.5 lb a.e./acre	1.4	0.02
Fallowland and Crop	CA Row Crop RLF	G	1 app @ 2 lb a.e./acre	1.1	0.02

Table M.7. RQs for non-vascular plants based on EECs for drift only used to represent 2,4-D ester uses					
Master Label Use Category[1] (2-EHE, BEE, IPE[1])	**PRZM/EXAMS Scenario (first app date)**	**Method[2]**	**Application Rate[3]**	**Peak EEC (µg/L)**	**RQ**
Stubble	(1-Aug)	A	1 app @ 2 lb a.e./acre	5.6	0.08
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	0.02
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	2.2	0.03
		A	1 app @ 4 lb a.e./acre	11.2	0.17
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	2.2	0.03
		A	1 app @ 4 lb a.e./acre	11.2	0.17
Ornamental Turf	CA Turf RLF (1-Mar)	G	1 app @ 1.5 lb a.e./acre	0.83	0.01
		A	1 app @ 1.5 lb a.e./acre	4.2	0.06
Grass Grown for Seed an Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	0.02
		A	1 app @ 2 lb a.e./acre	5.6	0.08

*LOC exceedances (RQ ≥ 1.0) are bolded. RQ = use-specific peak EEC / 0.066 mg a.e./L (MRID 417352-04). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs**.**

[1]IPE labeled for citrus use only. 2-EHE and BEE not labeled for citrus use.

[2]G = ground application. A = aerial application.

[3]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form

Table M.8. RQs for non-vascular plants based on EECs for direct application to water to represent 2,4-D acid, salt, and ester uses					
Master Label Use Category[1]	**Model Scenario**	**Method[1]**	**Application Rate**	**Peak EEC (µg/L)**	**RQ**
Rice (acid and salts)	Direct water applications	G & A	1 app @ 1.5 lb a.e./acre	1486	0.38
Aquatic Weed Control (surface application or subsurface injection for submersed weeds) (acid and salts)	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[2]	**1.03***
Aquatic Weed Control (surface application or subsurface injection for submersed weeds) (esters only)	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[2]	**60.61***
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	0.19

Table M.8. RQs for non-vascular plants based on EECs for direct application to water to represent 2,4-D acid, salt, and ester uses

Master Label Use Category[1]	Model Scenario	Method[1]	Application Rate	Peak EEC (µg/L)	RQ
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	**11.21***
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	0.38
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	**22.42***

*LOC exceedances (RQ $\geq$ 1.0) are bolded. RQ (acid and amine salts) = use-specific peak EEC / 3.88 mg a.e/L (MRID 415059-03). RQ (esters) = use-specific peak EEC / 0.066 mg a.e/L (MRID 417352-04).
[1]G = ground application. A = aerial application.
[2]Aquatic weed control-peak water concentration: 4000 µg/L , 21-day average water concentration: 3417 µg/L, and 60-day average water concentration: 2610 µg/L. For ester direct application scenarios, 2,4-D acid input parameters were used to determine EEC. All other runoff and drift application scenarios used 2,4-D ester input parameters to determine EEC.

Aquatic Invertebrates

Indirect acute effects to the aquatic-phase CRLF via effects to prey (invertebrates) in aquatic habitats are based on peak EECs in the standard pond and the lowest acute toxicity value for freshwater invertebrates. Separate RQs were calculated for the acid/salts (runoff and drift) and the esters (runoff and drift and drift only). In addition, indirect risks to the aquatic-phase CRLF were estimated for direct applications to water. For chronic risks, 21-day EECs and the lowest chronic toxicity value for invertebrates were used to derive RQs for acid/salt uses. Due to the unlikelihood of long-term exposures, chronic risks of exposure to esters were not estimated.

Table M.9. Acute and chronic RQs for freshwater invertebrates based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	21-day EEC (µg/L)	Acute RQ	Chronic RQ
Orchard Uses							
Nut Orchards, Pistachios	CA Almond wirrig STD (10-Feb)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.69	12.71	<0.01	<0.01
Filberts	CA Almond wirrig STD	G	4 apps @ 0.5 lb a.e./acre[3] (30-day interval)	4.06	3.77	<0.01	<0.01

Table M.9. Acute and chronic RQs for freshwater invertebrates based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	21-day EEC (µg/L)	Acute RQ	Chronic RQ
	(10-Feb)						
Grapes	CA Grapes STD (1-Mar)	G	1 app @ 1.36 lb a.e/acre	4.52	4.16	<0.01	<0.01
Grapes	CA Wine Grapes RLF (1-Mar)	G	1 app @ 1.36 lb a.e./acre	2.94	2.70	<0.01	<0.01
Blueberries	CA Wine Grapes RLF (5-Mar)	G	1 post-emergence app @ 1.4 lb a.e./acre and 1 post-harvest app @ 1.4 lb a.e./acre	3.15	2.93	<0.01	<0.01
Stone and Pome Fruits	CA Fruit wirrig STD (1-Mar)	G	2 apps @ 2 lb a.e./acre (75-day interval)	6.98	6.35	<0.01	<0.01
Citrus[2]	CA citrus STD	G	1 app @ 0.1 lb a.e./acre	0.08	0.08	<0.01	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.32	0.28	<0.01	<0.01
Agricultural – Food Crop Uses							
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.0 lb a.e./acre March 15, 1 app @ 0.5 lb a.e./acre April 29, 1 app @ 1.5 lb a.e./acre August 15 (pre harvest)	9.41	8.60	<0.01	<0.01
		A	1 app @ 1.0 lb a.e./acre March 15, 1 app @ 0.5 lb a.e./acre April 29, 1 app @ 1.5 lb a.e./acre August 15 (pre harvest)	12.17	11.13	<0.01	<0.01
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre March 15; 1 app @ 0.5 lb a.e./acre April 29	7.41	6.90	<0.01	<0.01
		A	1 app @ 1 lb a.e./acre March 15; 1 app @ 0.5 lb a.e./acre April 29	9.57	8.91	<0.01	<0.01
Potatoes	CA Potato RLF (1-Apr)	G	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.1190	0.1083	<0.01	<0.01
		A	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.4175	0.3788	<0.01	<0.01
Sugarcane	CA Sugarbeet wirrig OP (20-Jan)	G	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	25.85	24.25	<0.01	<0.01
		A	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	33.31	31.28	<0.01	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.25 lb a.e./acre and 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	21.39	19.89	<0.01	<0.01
		A	1 post-emergence app @ 1.25 lb a.e./acre and 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	23.43	21.82	<0.01	<0.01
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.0 lb a.e./acre	17.00	15.82	<0.01	<0.01
		A	1 post-emergence app @ 1.0 lb a.e./acre	18.61	17.33	<0.01	<0.01
Hops	OR hops STD (10-Apr)	G	3 apps @ 0.5 lb a.e./acre (30-day interval)	1.73	1.55	<0.01	<0.01

Table M.9. Acute and chronic RQs for freshwater invertebrates based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	21-day EEC (µg/L)	Acute RQ	Chronic RQ
		A	3 apps @ 0.5 lb a.e./acre (30-day interval)	4.62	4.19	<0.01	<0.01
Asparagus	CA Row Crop RLF (1-Apr)	G	2 apps @ 2 lb a.e./acre (30-day interval)	12.62	11.77	<0.01	<0.01
		A	2 apps @ 2 lb a.e./acre (30-day interval)	20.14	18.51	<0.01	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	2 apps @ 2 lb a.e./acre (30-day interval)	2.16	1.95	<0.01	<0.01
		A	2 apps @ 2 lb a.e./acre (30-day interval)	10.7	9.7	<0.01	<0.01
Agricultural – Non-food Crop Uses							
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.021	12.099	<0.01	<0.01
Non-agricultural Uses							
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	39.02	36.54	<0.01	<0.01
		A	1 app @ 4 lb a.e./acre	46.66	43.76	<0.01	<0.01
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	15.92	14.99	<0.01	<0.01
		A	1 app @ 4 lb a.e./acre	24.98	23.49	<0.01	<0.01
Ornamental Turf	CA Turf RLF (1-Mar)	G	2 apps @ 1.5 lb a.e./acre (21-day interval)	5.55	5.17	<0.01	<0.01
		A	2 apps @ 1.5 lb a.e./acre (21-day interval)	12.96	12.12	<0.01	<0.01
Grass Grown for Seed	CA Turf RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (21-day interval)	6.17	5.72	<0.01	<0.01
		A	2 apps @ 2 lb a.e./acre (21-day interval)	14.87	13.81	<0.01	<0.01

*,+ = LOC exceedances (acute RQ ≥ 0.05; chronic RQ ≥ 1.0) are bolded. Acute RQ = use-specific peak EEC / 25 mg a.e./L (MRID 411583-01). Chronic RQ = use-specific 60-day EEC / 16.05 mg a.e./L (MRID 420183-03). The most sensitive 2,4-D acid and salt toxicity values were bridged for all use scenarios to calculate RQs.

[1]G = ground application. A = aerial application.

[2]Although only IPE is labeled for citrus use, EFED is modeling exposure to acid as it is expected that most aquatic exposure will be to the acid, not 2,4-D IPE.

Table M.10. Acute RQs for freshwater invertebrates based on EECs for runoff and drift used to represent 2,4-D ester uses[1]

Master Label Use Category (2-EHE, BEE, IPE[2])	PRZM/EXAMS Scenario (first app date)	Method[3]	Application Rate[4]	Peak EEC (µg/L)	Acute RQ
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 0.1 lb a.e./acre	0.0554	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.2768	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	2.7036	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.6609	<0.01
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	1.8026	<0.01
		A	1 app @ 1 lb a.e./acre	3.1072	<0.01
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0390	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.1939	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	3.3244	<0.01
		A	1 app @ 1.25 lb a.e./acre	5.0928	<0.01
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	1.33	<0.01
		A	1 post-emergence app @ 0.5 lb a.e./acre	2.04	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	1 app @ 2 lb a.e./acre	1.103	<0.01
		A	1 app @ 2 lb a.e./acre	5.504	<0.01
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.27	<0.01
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	6.3698	<0.01
		A	1 app @ 4 lb a.e./acre	11.128	0.01
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	7.1353	<0.01
		A	1 app @ 4 lb a.e./acre	13.249	0.01
Ornamental Turf	CA Turf RLF (1-Mar)	G	1 app @ 1.5 lb a.e./acre	0.83	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.14	<0.01
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1076	<0.01
		A	1 app @ 2 lb a.e./acre	5.5147	<0.01

*LOC exceedances (acute RQ $\geq$ 0.05) are bolded. Acute RQ = use-specific peak EEC / 2.2 mg a.e./L (MRID 439306-01). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs.

[1]Chronic EECs are not modeled in this scenario because the hydrolysis soil slurry data indicate that dissipation in a non-sterile water body will occur at all PHs and therefore long-term exposures are unlikely.

[2]IPE labeled for citrus use only. 2-EHE and BEE not labeled for citrus use.

[3]G = ground application. A = aerial application.

[4]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form.

Table M.11. Acute RQs for freshwater invertebrates based on EECs for drift only used to represent 2,4-D ester uses[1]

Master Label Use Category (2-EHE, BEE, IPE[2])	PRZM/EXAMS Scenario (first app date)	Method[3]	Application Rate[4]	Peak EEC (µg/L)	Acute RQ
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 0.1 lb a.e./acre	0.055	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.28	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	0.825	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.2	<0.01
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	0.55	<0.01
		A	1 app @ 1 lb a.e./acre	2.8	<0.01
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0385	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.196	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	0.6875	<0.01
		A	1 app @ 1.25 lb a.e./acre	3.5	<0.01
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	0.28	<0.01
		A	1 post-emergence app @ 0.5 lb a.e./acre	1.4	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
		A	1 app @ 2 lb a.e./acre	5.6	<0.01
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
Non-agricultural – Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	2.2	<0.01
		A	1 app @ 4 lb a.e./acre	11.2	0.01
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	2.2	<0.01
		A	1 app @ 4 lb a.e./acre	11.2	0.01
Ornamental Turf	CA Turf RLF (1-Mar)	G	1 app @ 1.5 lb a.e./acre	0.83	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.2	<0.01
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
		A	1 app @ 2 lb a.e./acre	5.6	<0.01

* = LOC exceedances (acute RQ $\geq$ 0.05) are bolded. Acute RQ = use-specific peak EEC / 2.2 mg a.e./L (MRID 439306-01). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs**.**

[1]Chronic EECs are not modeled in this scenario because the hydrolysis soil slurry data indicate that dissipation in a nonsterile water body will occur at all PHs and therefore long-term exposures are unlikely.

[2]IPE labeled for citrus use only. 2-EHE and BEE not labeled for citrus use.

[3]G = ground application. A = aerial application.

[4]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form.

Table M.11. Acute and chronic RQs for freshwater invertebrates based on EECs for direct application to water to represent 2,4-D acid, salt, and ester uses

Master Label Use Category	Model Scenario	Method[1]	Application Rate	Peak EEC (µg/L)	21-day EEC (µg/L)	Acute RQ	Chronic RQ
Rice Model (acid and salts)	Direct water applications	G & A	1 app @ 1.5 lb a.e./acre	1486[2]	N/A	**0.06***	0.09
Aquatic Weed Control (surface application or subsurface injection) (acid and salts)	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[3]	3417	**0.16***	0.21
Aquatic Weed Control (surface application or subsurface injection) (esters only)	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[3]	3417	**1.82***	NA[4]
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	632	0.03	0.04
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	632	**0.34***	NA[4]
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	1264	**0.05***	0.07
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	1264	**0.67***	NA[4]

*,+LOC exceedances (acute RQ $\geq$ 0.05; chronic RQ $\geq$ 1.0) are bolded. Acute RQ (acid and salts) = use-specific peak EEC / 25 mg a.e./L (MRID 411583-01). Chronic RQ (acid and salts) = use-specific 21-day EEC / 16.05 mg a.e./L (MRID 420183-03). Acute RQ (esters) = use-specific peak EEC / 2.2 mg a.e./L (MRID 439306-01).

[1]G = ground application. A = aerial application.

[2]Rice Model - the maximum water surface concentration is used to determine both acute and chronic toxicity.

[3]Aquatic weed control-peak water concentration: 4000 µg/L , 21-day average water concentration: 3417 µg/L, and 60-day average water concentration: 2610 µg/L. For ester direct application scenarios, 2,4-D acid input parameters were used to determine EEC. All other runoff and drift application scenarios used 2,4-D ester input parameters to determine EEC.

[4]Chronic EECs are not modeled in this scenario because the hydrolysis soil slurry data indicate that dissipation in a non-sterile water body will occur at all PHs and therefore long-term exposures are unlikely.

Fish and Frogs

Fish and frogs also represent potential prey items of adult aquatic-phase CRLFs. RQs associated with acute and chronic direct toxicity to the CRLF (**Tables M.9.** through **M.11.**) are used to assess potential indirect effects to the CRLF based on a reduction in freshwater fish and frogs as food items.

Indirect Effects to CRLF via Reduction in Habitat and/or Primary Productivity (Freshwater Aquatic Plants)

Indirect effects to the CRLF via direct toxicity to aquatic plants are estimated using the most sensitive non-vascular and vascular plant toxicity endpoints. Because there are no obligate relationships between the CRLF and any aquatic plant species, the most sensitive EC_{50} values, rather than NOAEC values, were used to derive RQs.

Table M.12. RQs for vascular plants based on EECs for runoff and drift used to represent 2,4-D acid and salt uses

Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	PRZM/EXAMS Scenario (first app date)	Method[1]	Application Rate (interval between applications)	Peak EEC (µg/L)	RQ
Orchard Uses					
Nut Orchards, Pistachios	CA Almond wirrig STD (10-Feb)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.69	**1.05***
Filberts	CA Almond wirrig STD (10-Feb)	G	4 apps @ 0.5 lb a.e./acre[3] (30-day interval)	3.46	0.26
Grapes	CA Grapes STD (1-Mar)	G	1 app @ 1.36 lb a.e./acre	4.52	0.35
Grapes	CA Wine Grapes RLF (1-Mar)	G	1 app @ 1.36 lb a.e./acre	2.94	0.22
Blueberries	CA Wine Grapes RLF (5-Mar)	G	1 post-emergence app @ 1.4 lb a.e./acre; 1 post-harvest app @ 1.4 lb a.e./acre	3.15	0.24
Stone and Pome Fruits	CA Fruit wirrig STD (1-Mar)	G	2 apps @ 2 lb a.e./acre (75-day interval)	6.98	0.53
Citrus[2]	CA citrus STD	G	1 app @ 0.1 lb a.e./acre	0.08	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.32	0.02
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	2 apps @ 1.5 lb a.e./acre March 15, April 29	9.41	0.72
		A	2 apps @ 1.5 lb a.e./acre March 15, April 29	12.17	0.93
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre on March 15; 1 app @ 0.5 lb a.e./acre on April 29	7.41	0.57
		A	1 app @ 1 lb a.e./acre on March 15; 1 app @ 0.5 lb a.e./acre on April 29	9.57	0.73
Potatoes	CA Potato RLF (1-Apr)	G	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.1190	0.01

Table M.12. RQs for vascular plants based on EECs for runoff and drift used to represent 2,4-D acid and salt uses					
Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	**PRZM/EXAMS Scenario (first app date)**	**Method[1]**	**Application Rate (interval between applications)**	**Peak EEC (µg/L)**	**RQ**
		A	2 apps @ 0.07 lb a.e./acre (10-day interval)	0.4175	0.03
Sugarcane	CA Sugarbeet wirrig OP (20-Jan)	G	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	25.85	**1.97***
		A	1 pre-emergence and 1 post-emergence app @ 2 lb a.e./acre	33.31	**2.54***
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.25 lb a.e./acre; 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	21.39	**1.63***
		A	1 post-emergence app @ 1.25 lb a.e./acre; 1 pre-harvest app @ 0.5 lb a.e./acre (90-day interval)	23.43	**1.79***
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 1.0 lb a.e./acre	17.00	**1.30***
		A	1 post-emergence app @ 1.0 lb a.e./acre	18.61	**1.42***
Hops	OR hops STD (10-Apr)	G	3 apps @ 0.5 lb a.e./acre (30-day interval)	1.73	0.13
		A	3 apps @ 0.5 lb a.e./acre (30-day interval)	4.62	0.35
Asparagus	CA Row Crop RLF (1-Apr)	G	2 apps @ 2 lb a.e./acre (30-day interval)	12.62	0.96
		A	2 apps @ 2 lb a.e./acre (30-day interval)	20.14	**1.54***
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	2 apps @ 2 lb a.e./acre (30-day interval)	2.16	0.16
		A	2 apps @ 2 lb a.e./acre (30-day interval)	10.70	0.82
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, and Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (30-day interval)	13.021	0.99
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	39.02	**2.98***
		A	1 app @ 4 lb a.e./acre	46.66	**3.56***
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	15.92	**1.22***
		A	1 app @ 4 lb a.e./acre	24.98	**1.91***
Ornamental Turf	CA Turf RLF (1-Mar)	G	2 apps @ 1.5 lb a.e./acre (21-day interval)	5.55	0.42
		A	2 apps @ 1.5 lb a.e./acre (21-day interval)	12.96	0.98

Table M.12. RQs for vascular plants based on EECs for runoff and drift used to represent 2,4-D acid and salt uses					
Master Label Use Category (Acid, DMA, TIPA, IPA, DEA, Na)	**PRZM/EXAMS Scenario (first app date)**	**Method[1]**	**Application Rate (interval between applications)**	**Peak EEC (µg/L)**	**RQ**
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	2 apps @ 2 lb a.e./acre (21-day interval)	6.17	0.47
		A	2 apps @ 2 lb a.e./acre (21-day interval)	14.87	**1.14***
*LOC exceedances (RQ ≥ 1.0) are bolded. RQ = use-specific peak EEC / 0.0131 mg a.e./L (E74985). The most sensitive 2,4-D acid and salt toxicity values were bridged for all use scenarios to calculate RQs. [1]G = ground application. A = aerial application. [2]Although only IPE is labeled for citrus use, EFED is modeling exposure to acid as it is expected that most aquatic exposure will be to the acid, not 2,4-D IPE.					

Table M.13. RQs for vascular plants based on EECs for runoff and drift used to represent 2,4-D ester uses					
Master Label Use Category (2-EHE, BEE, IPE[1])	**PRZM/EXAMS Scenario (first app date)**	**Method[2]**	**Application Rate[3]**	**Peak EEC (µg/L)**	**Acute RQ**
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 0.1 lb a.e./acre	0.0554	<0.01
		A	1 app @ 0.1 lb a.e./acre	0.2768	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	2.7036	0.01
		A	1 app @ 1.5 lb a.e./acre	4.6609	0.01
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	1.8026	0.01
		A	1 app @ 1 lb a.e./acre	3.1072	0.01
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0390	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.1939	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	3.3244	0.01
		A	1 app @ 1.25 lb a.e./acre	5.0928	0.02
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	1.33	<0.01
		A	1 post-emergence app @ 0.5 lb a.e./acre	2.04	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	1 app @ 2 lb a.e./acre	1.103	<0.01
		A	1 app @ 2 lb a.e./acre	5.504	0.02
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.27	<0.01
Non-agricultural Uses					
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	6.3698	0.02
		A	1 app @ 4 lb a.e./acre	11.128	0.03

Table M.13. RQs for vascular plants based on EECs for runoff and drift used to represent 2,4-D ester uses

Master Label Use Category (2-EHE, BEE, IPE[1])	PRZM/EXAMS Scenario (first app date)	Method[2]	Application Rate[3]	Peak EEC (µg/L)	Acute RQ
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	7.1353	0.02
		A	1 app @ 4 lb a.e./acre	13.249	0.04
Ornamental Turf	CA Turf RLF (1-Mar)	G	1 app @ 1.5 lb a.e./acre	0.83	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.14	0.01
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1076	<0.01
		A	1 app @ 2 lb a.e./acre	5.5147	0.02

*LOC exceedances (RQ ≥ 1.0) are bolded. RQ = use-specific peak EEC / 0.33 mg a.e/L (MRID 417352-03). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs.
[1]IPE labeled for citrus use only. 2-EHE and BEE not labeled for citrus use.
[2]G = ground application. A = aerial application.
[3]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form.

Table M.14. RQs for vascular plants based on EECs for drift only used to represent 2,4-D ester uses

Master Label Use Category (2-EHE, BEE, IPE[1])	PRZM/EXAMS Scenario (first app date)	Method[2]	Application Rate[3]	Peak EEC (µg/L)	RQ
Orchard Uses					
Citrus	CA Citrus STD (1-Mar)	G	1 app @ 1 lb a.e./acre	0.055	<0.01
		A	1 app @ 1 lb a.e./acre	0.28	<0.01
Agricultural – Food Crop Uses					
Field Corn, Popcorn	CA Corn OP (15-Mar)	G	1 app @ 1.5 lb a.e./acre	0.825	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.2	0.01
Sweet Corn	CA Corn OP (15-Mar)	G	1 app @ 1 lb a.e./acre	0.55	<0.01
		A	1 app @ 1 lb a.e./acre	2.8	0.01
Potatoes	CA Potato RLF (1-Apr)	G	1 app @ 0.07 lb a.e./acre	0.0385	<0.01
		A	1 app @ 0.07 lb a.e./acre	0.196	<0.01
Cereal Grains	CA Wheat RLF (10-Feb)	G	1 app @ 1.25 lb a.e./acre	0.6875	<0.01
		A	1 app @ 1.25 lb a.e./acre	3.5	0.01
Grain or Forage Sorghum	CA Wheat RLF (10-Feb)	G	1 post-emergence app @ 0.5 lb a.e./acre	0.28	<0.01
		A	1 post-emergence app @ 0.5 lb a.e./acre	1.4	<0.01
Fallowland and Crop Stubble	CA Row Crop RLF (1-Aug)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
		A	1 app @ 2 lb a.e./acre	5.6	0.02
Agricultural – Non-food Crop Uses					
Established Grass Pastures, Rangeland, Perennial Grassland Not in Agricultural Production	CA Rangeland Hay RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
Non-agricultural Uses					

Table M.14. RQs for vascular plants based on EECs for drift only used to represent 2,4-D ester uses

Master Label Use Category (2-EHE, BEE, IPE[1])	PRZM/EXAMS Scenario (first app date)	Method[2]	Application Rate[3]	Peak EEC (µg/L)	RQ
Non-cropland	CA Right-of-Way RLF (20-Feb)	G	1 app @ 4 lb a.e./acre	2.2	0.01
		A	1 app @ 4 lb a.e./acre	11.2	0.03
Forestry, Tree and Brush Control	CA Forestry RLF (1-Mar)	G	1 app @ 4 lb a.e./acre	2.2	0.01
		A	1 app @ 4 lb a.e./acre	11.2	0.03
Ornamental Turf	CA Turf RLF (1-Mar)	G	1 app @ 1.5 lb a.e./acre	0.83	<0.01
		A	1 app @ 1.5 lb a.e./acre	4.2	0.01
Grass Grown for Seed and Sod	CA Turf RLF (1-Mar)	G	1 app @ 2 lb a.e./acre	1.1	<0.01
		A	1 app @ 2 lb a.e./acre	5.6	0.02

*LOC exceedances (RQ ≥ 1.0) are bolded. RQ = use-specific peak EEC / 0.33 mg a.e./L (MRID 417352-03). The most sensitive 2,4-D ester toxicity values were bridged for all use scenarios to calculate RQs**.**

[1]IPE labeled for citrus use only. 2-EHE and BEE not labeled for citrus use.

[2]G = ground application. A = aerial application.

[3]Esters are not persistent; only one application modeled due to rapid hydrolysis of EHE to the acid form.

Table M.15. RQs for vascular plants based on EECs for direct application to water to represent 2,4-D acid, salt, and ester uses

Master Label Use Category	Model Scenario	Method[1]	Application Rate	Peak EEC (µg/L)	RQ
Rice (acid and salts)	Direct water applications	G & A	1 app @ 1.5 lb a.e./acre	1486	**113***
Aquatic Weed Control (surface application or subsurface injection) (acid and salts	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[2]	**305.34***
Aquatic Weed Control (surface application or subsurface injection) (esters only)	Direct water applications	G & A	10.8 lb a.e./acre-ft (to achieve 4 ppm concentration)	4000[2]	**12.12***
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	**56.49***
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @2 lb a.e./acre (30-day interval)	740	**2.2***
Aquatic Weed Control (acid and salts)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	**112.98***

Table M.15. RQs for vascular plants based on EECs for direct application to water to represent 2,4-D acid, salt, and ester uses

Master Label Use Category	Model Scenario	Method[1]	Application Rate	Peak EEC (µg/L)	RQ
Aquatic Weed Control (esters only)	Direct water applications	G & A	2 app @ 4 lb a.e./ acre (21-day interval)	1480	**4.48***

*LOC exceedances (RQ ≥ 1.0) are bolded. RQ (acid and salts) = use-specific peak EEC / 0.0131 mg a.e./L (E74985). RQ (esters) = use-specific peak EEC / 0.33 mg a.e./L (MRID 417352-03).

[1]G = ground application. A = aerial application.

[2]Aquatic weed control-peak water concentration: 4000 µg/L , 21-day average water concentration: 3417 µg/L, and 60-day average water concentration: 2610 µg/L. For ester direct application scenarios, 2,4-D acid input parameters were used to determine EEC. All other runoff and drift application scenarios used 2,4-D ester input parameters to determine EEC.