

Appendix A  
*Hyalella azteca*  
Toxicity Tests

Table A1-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 5/28/07 examining the toxicity of piperonyl butoxide (PBO).

Treatment	Survival (%) <sup>1</sup>		Weight (mg/individual) <sup>1</sup>	
	mean	se	mean	se
DIEPAMHR	90	7.1	0.033	0.003
DIEPAMHR + 5 ppb PBO	90	7.1	0.040	0.006
DIEPAMHR + 10 ppb PBO	100	0.0	0.034	0.002
DIEPAMHR + 15 ppb PBO	100	0.0	0.044	0.005
DIEPAMHR + 20 ppb PBO	100	0.0	0.037	0.003
DIEPAMHR + 25 ppb PBO	98	2.5	0.039	0.005
DIEPAMHR + 50 ppb PBO	98	2.5	0.025	0.004
DIEPAMHR + 100 ppb PBO	98	2.5	0.021	0.001

**Weight PMSD = 41.4%**

**Weight NOEC = 100 ppb**

**Weight EC25 = 42.4 ppb**

1. Highlighted areas indicate a significant reduction in survival or weight compared to the DIEPAMHR control.

Table A2-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 01/13/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 01/12/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	96	4.2	100	0.0	NS
Low EC Control (Dilute DIEPAMHR)	100	0.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	100	0.0	96	4.2	NS
Old River at mouth of Holland Cut (915)	96	4.2	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704) <sup>3</sup>	100	0.0	91	5.3	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	96	4.2	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	100	0.0	100	0.0	NS
Suisun Bay off Chipps Island (508) <sup>3</sup>	100	0.0	96	4.2	NS
Middle of Broad Slough, West end (804) <sup>3</sup>	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	13.3	13.9
Two-way ANOVA	13.9	14.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	0.069	0.006	0.043	0.004	NS
Low EC Control (Dilute DIEPAMHR)	0.067	0.007	0.055	0.007	NS
Old River, western arm at railroad bridge (902)	0.118	0.009	0.107	0.014	NS
Old River at mouth of Holland Cut (915)	0.125	0.006	0.124	0.014	NS
San Joaquin River between Hog and Turner Cuts (910)	0.128	0.011	0.137	0.014	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	0.106	0.005	0.102	0.009	NS
Sacramento R. across from Sherman Lake (704) <sup>3</sup>	0.119	0.008	0.100	0.023	NS
Montezuma Slough at Nurse Slough (609)	0.137	0.008	0.107	0.004	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.109	0.005	0.119	0.014	NS
Suisun Bay off Chipps Island (508) <sup>3</sup>	0.118	0.016	0.101	0.011	NS
Middle of Broad Slough, West end (804) <sup>3</sup>	0.109	0.008	0.098	0.011	NS

	MSD	PMSD
One-way ANOVA	0.041	59.6
Two-way ANOVA	0.054	77.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the Low EC control @ 125 uS/cm

Table A2-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/12/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Old River, western arm at railroad bridge (902)	405	10.7	6.3	11.3	0.14	0.000
Old River at mouth of Holland Cut (915)	324	9.8	6.2	10.4	0.38	0.000
San Joaquin River between Hog and Turner Cuts (910)	249	10.4	6.6	11.1	0.27	0.000
Sacramento River at tip of Grand Island (711)	125	10.2	6.6	11.4	0.12	0.000
Sacramento R. across from Sherman Lake (704)	154	10.5	7.1	10.5	0.10	0.000
Montezuma Slough at Nurse Slough (609)	856	11.3	6.1	8.6	0.19	0.000
Suisun Bay, East of middle point (504)	186	10.9	6.3	9.9	0.14	0.000
Suisun Bay off Chipps Island (508)	157	10.3	6.5	10.3	0.09	0.000
Middle of Broad Slough, West end (804)	186	10.9	6.6	9.6	0.16	0.000

Table A2-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 1/13/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/12/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (µS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	392	21.3	23.9	6.5	8.7	7.47	8.10	92	58	-
Low EC Control	175	23.1	24.1	6.3	8.6	7.29	7.90	92	58	-
Old River, western arm at railroad bridge (902)	412	20.8	24.2	7.3	8.6	7.60	7.96	94	58	0.004
Old River at mouth of Holland Cut (915)	348	20.6	24.2	6.6	10.0	7.49	8.32	72	51	0.013
San Joaquin River between Hog and Turner Cuts (910)	237	20.9	24.3	6.8	11.2	7.42	8.91	56	46	0.010
Sacramento River at tip of Grand Island (711)	124	21.2	23.8	6.5	11.3	7.41	8.92	52	48	0.005
Sacramento R. across from Sherman Lake (704)	168	21.5	24.0	6.6	12.1	7.50	8.98	60	61	0.005
Montezuma Slough at Nurse Slough (609)	901	21.8	24.2	7.6	11.6	7.48	8.78	128	71	0.006
Suisun Bay, East of middle point (504)	205	21.8	24.0	6.9	12.6	7.48	9.08	56	55	0.006
Suisun Bay off Chipps Island (508)	163	23.0	23.7	6.7	11.9	7.50	8.92	56	60	0.003
Middle of Broad Slough, West end (804)	204	22.8	23.6	6.5	11.3	7.46	8.62	56	50	0.005
DIEPAMHR + 100 ppb PBO	399	21.7	24.7	6.0	8.3	7.44	8.05	-	-	-
Low EC Control + 100 ppb PBO	182	23.4	24.8	6.0	8.5	7.40	8.01	-	-	-
Old River, western arm at railroad bridge (902) + 100 ppb PBO	414	22.7	24.5	6.6	10.4	7.50	8.37	-	-	-
Old River at mouth of Holland Cut (915) + 100 ppb PBO	347	22.7	24.7	6.8	12.6	7.50	9.04	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	239	23.3	24.6	6.7	12.8	7.53	9.19	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	128	21.5	24.7	5.8	12.1	7.44	9.13	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	175	21.5	24.8	6.2	13.1	7.51	9.18	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	932	21.7	24.6	7.3	12.5	7.59	8.88	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	215	22.0	24.5	6.3	13.1	7.53	9.17	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	167.3	22.8	24.7	6.4	14.4	7.59	9.50	-	-	-
Middle of Broad Slough, West end (804) + 100 ppb PBO	219	22.6	24.6	6.2	12.7	7.45	9.10	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A3-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 01/25/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/24/06.

Treatment	Survival (%) <sup>1</sup>	
	Unmanipulated	
	mean	se
Lab Control (DIEPAMHR)	100	0.0
Suisun Bay off Chipps Island (508)	100	0.0
Sacramento R. across from Sherman Lake (704)	96	4.0
Sacramento River at tip of Grand Island (711)	98	2.2
Middle of Broad Slough, West end (804)	96	4.0
Old River, western arm at railroad bridge (902)	92	5.8
San Joaquin River between Hog and Turner Cuts (910)	98	2.0
Old River at mouth of Holland Cut (915)	100	0.0

	MSD	PMSD
One-way ANOVA	- <sup>2</sup>	- <sup>2</sup>

Treatment	Weight (mg/Surviving individual) <sup>1</sup>	
	Unmanipulated	
	mean	se
Lab Control (DIEPAMHR)	0.066	0.005
Suisun Bay off Chipps Island (508)	0.106	0.004
Sacramento R. across from Sherman Lake (704)	0.080	0.003
Sacramento River at tip of Grand Island (711)	0.097	0.009
Middle of Broad Slough, West end (804)	0.114	0.010
Old River, western arm at railroad bridge (902)	0.107	0.005
San Joaquin River between Hog and Turner Cuts (910)	0.101	0.008
Old River at mouth of Holland Cut (915)	0.101	0.004

	MSD	PMSD
One-way ANOVA	- <sup>2</sup>	- <sup>2</sup>

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Data were analyzed using USEPA standard statistical protocols.
2. Survival and weight were compared to the control using Kruskal-Wallis tests, and calculations of MSDs were not possible.

Table A3-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 01/24/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Suisun Bay off Chipps Island (508)	168.4	9.7	6.6	12.3	0.09	0.000
Sacramento R. across from Sherman Lake (704)	147.8	9.5	6.6	12.0	0.09	0.000
Sacramento River at tip of Grand Island (711)	135.0	9.7	7.1	10.3	0.09	0.000
Middle of Broad Slough, West end (804)	192.2	9.7	6.9	18.3	0.10	0.000
Old River, western arm at railroad bridge (902)	268.5	10.3	7.3	8.7	0.12	0.000
San Joaquin River between Hog and Turner Cuts (910)	215.4	10.5	6.8	8.3	0.42	0.000
Old River at mouth of Holland Cut (915)	351.4	10.2	6.8	8.8	0.12	0.000

Table A3-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 01/25/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/24/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
Lab Control (DIEPAMHR)	352.9	22.0	24.8	7.8	8.3	7.89	7.98	104	58	-
Suisun Bay off Chipps Island (508)	146.0	22.4	24.4	7.9	11.7	7.74	8.92	56	54	0.003
Sacramento R. across from Sherman Lake (704)	158.2	22.2	24.3	8.1	11.5	7.93	8.90	64	56	0.004
Sacramento River at tip of Grand Island (711)	153.6	22.2	24.3	8.0	10.8	7.80	8.72	44	44	0.003
Middle of Broad Slough, West end (804)	203.2	22.4	24.2	8.0	10.5	7.77	8.65	60	46	0.003
Old River, western arm at railroad bridge (902)	297.7	22.4	24.3	7.9	9.3	7.58	8.16	92	54	0.002
San Joaquin River between Hog and Turner Cuts (910)	320.8	22.0	24.1	8.0	10.7	7.55	8.76	56	46	0.007
Old River at mouth of Holland Cut (915)	354.3	23.3	24.2	7.6	9.1	7.50	8.22	72	50	0.002

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A4-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 01/26/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 01/25/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	99	1.1	99	1.0	NS
High EC Control @ 14.24 mS/cm	96	2.8	97	2.8	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS
San Pablo Bay at Rodeo Flats (323)	94	2.4	51	20.1	S (54%)
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	100	0.0	100	0.0	NS
Napa River at Riverside Blvd. terminus (340)	98	2.0	96	2.4	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	22.5	22.8

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.060	0.004	0.076	0.004	NS
High EC Control @ 14.24 mS/cm	0.070	0.005	0.061	0.004	NS
Montezuma Slough at Nurse Slough (609)	0.132	0.011	0.131	0.008	NS
San Pablo Bay at Rodeo Flats (323)	0.072	0.006	0.065	0.023	NS
Suisun Bay, East of middle point (504)	0.134	0.014	0.142	0.013	NS
Grizzly Bay at Dolphin (602)	0.164	0.009	0.162	0.015	NS
Carquinez Strait, West of Benicia army dock (405)	0.113	0.006	0.092	0.012	NS
Napa River at Riverside Blvd. terminus (340)	0.123	0.010	0.108	0.013	NS

	MSD	PMSD
One-way ANOVA	0.027	45.6
Two-way ANOVA	0.059	97.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using Wilcoxon Rank-Sum tests, and calculations of MSDs were not possible.

Table A4-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 01/25/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Montezuma Slough at Nurse Slough (609)	1068.0	9.9	7.70	9.2	0.13	0.001
San Pablo Bay at Rodeo Flats (323)	13830.0	10.7	7.60	9.9	0.09	0.001
Suisun Bay, East of middle point (504)	264.3	10.1	7.90	10.8	0.11	0.000
Grizzly Bay at Dolphin (602)	442.5	10.2	7.60	10.7	0.11	0.002
Carquinez Strait, West of Benicia army dock (405)	11190.0	10.6	7.50	10.0	0.14	0.001
Napa River at Riverside Blvd. terminus (340)	10270.0	10.7	7.70	9.8	0.10	0.001

Table A4-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 01/26/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/25/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	399	18.4	25.5	7.4	8.3	7.64	7.97	102	58	0.000
High EC Control @ 14.24 mS/cm	14240	18.2	24.2	7.1	8.3	7.43	7.71	-	-	-
Montezuma Slough at Nurse Slough (609)	991	19.2	25.4	6.4	11.8	7.67	8.67	156	75	0.006
San Pablo Bay at Rodeo Flats (323)	13000	18.6	25.4	7.4	12.3	7.69	8.23	1506	75	0.002
Suisun Bay, East of middle point (504)	345	18.5	25.4	7.1	11.5	7.68	8.87	68	60	0.003
Grizzly Bay at Dolphin (602)	461	18.7	25.3	7.5	11.2	7.70	8.71	92	66	0.005
Carquinez Strait, West of Benicia army dock (405)	12785	18.8	25.1	7.6	11.0	7.54	8.25	1272	74	0.001
Napa River ar Riverside Blvd. terminus (340)	10160	19.8	25.2	7.9	9.5	7.63	7.91	1092	78	0.002
DIEPAMHR + 100 ppb PBO	456	17.9	25.3	6.9	8.1	7.64	7.98	-	-	-
High EC Control @ 14.24 mS/cm + 100 ppb PBO	14240	18.2	24.2	7.1	8.3	7.43	7.71	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	1120	20.3	25.0	6.8	9.9	7.83	8.34	-	-	-
San Pablo Bay at Rodeo Flats (323) + 100 ppb PBO	14560	18.2	25.0	7.8	9.0	7.68	7.91	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	365	17.9	25.1	6.0	10.2	7.77	8.85	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	402	17.6	25.1	7.1	9.0	7.85	8.00	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 100 ppb PBO	12285	17.7	25.1	7.3	8.8	7.47	7.53	-	-	-
Napa River ar Riverside Blvd. terminus (340) + 100 ppb PBO	10195	17.7	25.1	7.2	8.2	7.46	7.66	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A5-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 02/08/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/07/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	94	2.4	98	2.0	NS
Low EC Control (Dilute DIEPAMHR)	92	3.8	95	3.1	NS
Sacramento Deep Water Channel (Light 55)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	98	2.0	100	0.0	NS
Middle of Broad Slough, West end (804)	100	0.0	98	2.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	98	2.0	NS
Old River, western arm at railroad bridge (902)	98	2.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	96	2.4	NS
Old River at mouth of Holland Cut (915)	100	0.0	98	2.0	NS

	MSD	PMSD
One-way ANOVA <sup>4</sup>	-	-
Two-way ANOVA	10.3	11.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	0.033	0.006	0.025	0.004	NS
Low EC Control (Dilute DIEPAMHR)	0.023	0.005	0.015	0.002	NS
Sacramento Deep Water Channel (Light 55)	0.042	0.002	0.062	0.004	NS
Sacramento R. across from Sherman Lake (704)	0.038	0.002	0.044	0.004	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	0.048	0.006	0.043	0.007	NS
Middle of Broad Slough, West end (804)	0.041	0.001	0.048	0.007	NS
San Joaquin River, West of Oulton Point (812)	0.033	0.006	0.053	0.006	NS
Old River, western arm at railroad bridge (902)	0.031	0.005	0.048	0.003	NS
San Joaquin River between Hog and Turner Cuts (910)	0.036	0.004	0.054	0.004	NS
Old River at mouth of Holland Cut (915)	0.049	0.003	0.062	0.006	NS

	MSD	PMSD
One-way ANOVA	0.016	49.2
Two-way ANOVA	0.028	114.0

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This low conductivity sample was compared to the low conductivity control.

4. Survival in the unmanipulated samples was compared to the control using Steel's Many-One Rank Test, and calculation of an MSD was not possible.

Table A5-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/07/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Sacramento Deep Water Channel (Light 55)	96	10.6	7.67	13.9	0.12	0.005
Sacramento R. across from Sherman Lake (704)	131	12.5	7.41	13.5	0.10	0.003
Sacramento River at tip of Grand Island (711)	114	10.0	7.50	13.9	0.13	0.003
Middle of Broad Slough, West end (804)	261	10.5	7.95	12.6	0.11	0.003
San Joaquin River, West of Oulton Point (812)	94	10.6	7.59	13.6	0.10	0.003
Old River, western arm at railroad bridge (902)	248	10.7	7.58	10.7	0.07	0.002
San Joaquin River between Hog and Turner Cuts (910)	291	11.5	7.40	12.3	0.23	0.007
Old River at mouth of Holland Cut (915)	296	11.1	7.48	13.3	0.07	0.001

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Table A5-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 02/08/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/07/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
Lab Control (DIEPAMHR)	366.2	16.5	24.6	6.0	8.2	7.6	7.84	108	62	-
Low EC Lab Control (Dilute DIEPAMHR)	121.9	17.1	24.5	6.1	8.3	7.31	7.51	24	18	-
Sacramento Deep Water Channel (Light 55)	183.1	17.5	24.6	6.6	11.0	7.65	8.34	68	70	0.005
Sacramento R. across from Sherman Lake (704)	141.6	17.3	24.6	6.4	10.2	7.52	8.31	52	52	0.003
Sacramento River at tip of Grand Island (711)	124.7	17.2	24.6	6.2	10.7	7.48	8.32	44	48	0.003
Middle of Broad Slough, West end (804)	189.0	17.6	24.6	6.1	10.1	7.46	8.08	50	52	0.003
San Joaquin River, West of Oulton Point (812)	182.8	17.8	24.7	5.8	9.7	7.48	8.03	52	52	0.003
Old River, western arm at railroad bridge (902)	255.1	17.5	24.7	5.9	9.1	7.48	7.93	72	52	0.002
San Joaquin River between Hog and Turner Cuts (910)	303.6	18.7	24.7	6.1	10.2	7.54	8.22	72	54	0.006
Old River at mouth of Holland Cut (915)	307.5	21.5	24.6	6.2	10.9	7.54	8.70	72	56	0.001
Lab Control (DIEPAMHR) + 100 ppb PBO	389.5	23.9	24.5	6.2	8.3	7.55	7.87	-	-	-
Low EC Lab Control (Dilute DIEPAMHR) + 100 ppb PBO	127.0	18.8	24.5	7.0	8.1	7.35	7.61	-	-	-
Sacramento Deep Water Channel (Light 55) + 100 ppb PBO	187.6	17.9	24.7	7.5	10.2	7.72	8.40	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	143.3	18.9	24.6	7.2	10.7	7.62	8.48	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	128.6	19	24.6	6.8	10.1	7.58	8.15	-	-	-
Middle of Broad Slough, West end (804) + 100 ppb PBO	193.1	19.3	24.5	6.5	8.9	7.54	7.96	-	-	-
San Joaquin River, West of Oulton Point (812) + 100 ppb PBO	181.2	18.5	24.5	6.7	9.3	7.56	8.00	-	-	-
Old River, western arm at railroad bridge (902) + 100 ppb PBO	254.3	18.6	24.5	6.4	9.1	7.52	7.91	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	301.5	19	24.6	6.7	9.3	7.57	7.97	-	-	-
Old River at mouth of Holland Cut (915) + 100 ppb PBO	295.0	19	24.6	6.9	9.8	7.61	8.16	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A6-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 02/09/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/08/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	96	2.3	NS
High EC Control	100	0.0	90	4.5	NS
San Pablo Bay at Rodeo Flats (323)	98	2.0	93	6.7	NS
Napa River ar Riverside Blvd. terminus (340)	100	0.0	96	2.4	NS
Carquinez Strait, West of Benicia army dock (405)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504)	98	2.0	96	2.4	NS
Suisun Bay off Chipps Island (508)	100	0.0	92	3.5	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	14.0	14.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.053	0.004	0.027	0.006	NS
High EC Control	0.034	0.004	0.028	0.005	NS
San Pablo Bay at Rodeo Flats (323)	0.058	0.003	0.043	0.006	NS
Napa River ar Riverside Blvd. terminus (340)	0.053	0.006	0.060	0.003	NS
Carquinez Strait, West of Benicia army dock (405)	0.073	0.005	0.086	0.004	NS
Suisun Bay, East of middle point (504)	0.073	0.008	0.079	0.009	NS
Suisun Bay off Chipps Island (508)	0.079	0.006	0.086	0.010	NS
Grizzly Bay at Dolphin (602)	0.090	0.006	0.087	0.003	NS
Montezuma Slough at Nurse Slough (609)	0.084	0.008	0.089	0.003	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	0.035	65.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using Steel's Many-One Rank Test, and calculations of MSDs were not possible.

Table A6-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/08/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
San Pablo Bay at Rodeo Flats (323)	10812	11.6	7.63	10.0	0.10	0.002
Napa River ar Riverside Blvd. terminus (340)	9310	11.4	7.57	9.9	0.15	0.002
Carquinez Strait, West of Benicia army dock (405)	1118	10.9	7.58	10.5	0.11	0.002
Suisun Bay, East of middle point (504)	266	10.9	7.59	10.4	0.10	0.002
Suisun Bay off Chipps Island (508)	157	10.9	7.50	10.5	0.11	0.002
Grizzly Bay at Dolphin (602)	321	10.9	7.65	10.4	0.17	0.004
Montezuma Slough at Nurse Slough (609)	1023	10.9	7.35	9.1	0.17	0.002

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Table A6-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 02/09/06 of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/08/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
Lab Control (DIEPAMHR)	386	22.1	25.0	7.4	8.8	7.68	8.16	108	62	-
High EC Lab Control (DIEPAMHR + Salt Water)	11575	21.9	25.2	7.3	9.2	7.59	7.83	-	-	-
San Pablo Bay at Rodeo Flats (323)	11095	21.8	25.3	7.7	9.2	7.62	7.74	1240	80	0.002
Napa River ar Riverside Blvd. terminus (340)	9905	21.6	25.3	7.8	9.2	7.54	7.76	976	80	0.002
Carquinez Strait, West of Benicia army dock (405)	1418	21.9	25.3	7.2	9.0	7.72	7.93	152	65	0.003
Suisun Bay, East of middle point (504)	268	22.2	25.2	7.2	9.1	7.78	7.99	64	60	0.003
Suisun Bay off Chipps Island (508)	195	21.6	25.2	6.8	9.4	7.67	7.89	56	58	0.003
Grizzly Bay at Dolphin (602)	365	21.7	25.4	7.4	9.1	7.57	7.90	80	65	0.003
Montezuma Slough at Nurse Slough (609)	650	21.7	24.8	7.0	8.7	7.41	7.72	156	76	0.002
Lab Control (DIEPAMHR) + 100 ppb PBO	365	21.0	24.9	7.7	8.8	7.82	8.11	-	-	-
High EC Lab Control (DIEPAMHR + Salt Water) + 100 ppb PBO	10995	21.5	24.9	6.9	9.0	7.38	7.88	-	-	-
San Pablo Bay at Rodeo Flats (323) + 100 ppb PBO	10820	21.8	24.9	8.3	13.5	7.6	8.65	-	-	-
Napa River ar Riverside Blvd. terminus (340) + 100 ppb PBO	9220	21.3	25.0	7.8	11.1	7.55	8.18	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 100 ppb PBO	1531	21.6	25.0	7.7	11.3	7.77	8.64	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	293	21.9	24.9	6.8	10.9	7.8	8.72	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	183	21.9	25.0	7.7	11.8	7.62	8.99	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	342	22.1	25.0	7.2	12.3	7.53	8.93	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	1033	21.7	21.7	7.3	11.4	7.4	8.67	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A7-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 02/22/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/21/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	100	0.0	100	0.0	NS
Sacramento Deep Water Channel (Light 55)	100	0.0	98	2.0	NS
Sacramento River at tip of Grand Island (711)	94	4.0	98	2.0	NS
Middle of Broad Slough, West end (804)	100	0.0	98	2.0	NS
San Joaquin River, West of Oulton Point (812)	98	2.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	100	0.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	98	2.0	98	2.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	8.5	8.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	0.065	0.008	0.048	0.006	NS
Sacramento Deep Water Channel (Light 55)	0.124	0.007	0.097	0.001	NS
Sacramento River at tip of Grand Island (711)	0.083	0.001	0.072	0.004	NS
Middle of Broad Slough, West end (804)	0.088	0.006	0.087	0.003	NS
San Joaquin River, West of Oulton Point (812)	0.101	0.009	0.069	0.008	NS
Old River, western arm at railroad bridge (902)	0.110	0.013	0.069	0.004	NS
San Joaquin River between Hog and Turner Cuts (910)	0.114	0.011	0.095	0.018	NS
Old River at mouth of Holland Cut (915)	0.111	0.013	0.090	0.009	NS

	MSD	PMSD
One-way ANOVA	0.047	71.7
Two-way ANOVA	0.052	80.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A7-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/21/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Sacramento Deep Water Channel (Light 55)	321	11.3	7.78	11.3	0.03	0.000
Sacramento River at tip of Grand Island (711)	141	9.8	7.53	11.5	0.12	0.001
Middle of Broad Slough, West end (804)	164	8.4	7.97	10.2	0.00	0.000
San Joaquin River, West of Oulton Point (812)	156	10.8	7.42	10.2	0.02	0.000
Old River, western arm at railroad bridge (902)	189	10.3	7.65	10.3	0.00	0.000
San Joaquin River between Hog and Turner Cuts (910)	332	11.1	7.36	9.8	0.30	0.001
Old River at mouth of Holland Cut (915)	210	10.6	7.44	10.0	0.00	0.000
Field Dup.: Old River at mouth of Holland Cut (915)	210	10.6	7.44	10.0	0.00	0.000

Table A7-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 02/22/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/21/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
Lab Control (DIEPAMHR)	366	21.8	23.3	6.9	8.6	7.64	8.08	116	58	0.000
Sacramento Deep Water Channel (Light 55)	263	22.2	23.4	7.2	10.1	7.82	7.98	128	138	0.001
Sacramento River at tip of Grand Island (711)	192	21.8	23.5	6.7	10.2	7.62	7.94	64	66	0.005
Middle of Broad Slough, West end (804)	191	21.4	23.5	7.0	9.3	7.53	7.82	60	58	0.000
San Joaquin River, West of Oulton Point (812)	204	21.7	23.3	6.9	9.2	7.50	7.54	64	58	0.000
Old River, western arm at railroad bridge (902)	222	21.5	23.3	6.9	9.2	7.45	7.64	64	56	0.000
San Joaquin River between Hog and Turner Cuts (910)	371	21.5	23.3	7.4	9.8	7.34	7.53	84	59	0.003
Old River at mouth of Holland Cut (915)	263	21.5	23.3	7.7	9.1	7.54	7.56	68	57	0.000
Field Dup.: Old River at mouth of Holland Cut (915)	248	21.4	23.2	7.3	9.1	7.52	7.66	68	55	0.000
Lab Control (DIEPAMHR) + 100 ppb PBO	378	19.7	22.5	7.2	9.3	7.50	7.99	-	-	-
Sacramento Deep Water Channel (Light 55) + 100 ppb PBO	360	19.3	23.0	7.3	8.6	7.89	8.18	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	186	19.3	23.2	6.2	8.8	7.58	8.09	-	-	-
Middle of Broad Slough, West end (804) + 100 ppb PBO	203	19.4	23.2	6.7	8.7	7.51	8.07	-	-	-
San Joaquin River, West of Oulton Point (812) + 100 ppb PBO	201	19.4	23.2	5.9	8.8	7.43	7.93	-	-	-
Old River, western arm at railroad bridge (902) + 100 ppb PBO	217	20.6	23.1	6.6	9.4	7.52	7.71	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	377	20.0	23.2	7.0	9.2	7.53	7.90	-	-	-
Old River at mouth of Holland Cut (915) + 100 ppb PBO	259	19.4	23.2	6.7	9.2	7.51	7.68	-	-	-
Field Dup.: Old River at mouth of Holland Cut (915) + 100 ppb PBO	269	18.7	22.9	6.8	8.7	7.52	7.79	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A8-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 02/23/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/22/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
High EC Control @ 17.30 mS/cm	100	0.0	-	-	-
San Pablo Bat at Rodeo Flats (323) <sup>3</sup>	96	4.4	100	0.0	NS
Napa River ar Riverside Blvd. terminus (340) <sup>3</sup>	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	100	0.0	98	1.8	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	98	2.0	100	0.0	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	96	2.3	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>4</sup>	-	-
Two-way ANOVA	6.7	6.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.087	0.010	0.041	0.006	NS
High EC Control @ 17.30 mS/cm	0.056	0.004	-	-	-
San Pablo Bat at Rodeo Flats (323) <sup>3</sup>	0.083	0.016	0.043	0.013	NS
Napa River ar Riverside Blvd. terminus (340) <sup>3</sup>	0.099	0.011	0.076	0.006	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.110	0.009	0.097	0.011	NS
Suisun Bay, East of middle point (504)	0.109	0.005	0.111	0.011	NS
Suisun Bay off Chipps Island (508)	0.144	0.009	0.117	0.003	NS
Grizzly Bay at Dolphin (602)	0.113	0.012	0.140	0.006	NS
Montezuma Slough at Nurse Slough (609)	0.123	0.016	0.167	0.018	NS
Sacramento R. across from Sherman Lake (704)	0.098	0.003	0.111	0.004	NS

	MSD	PMSD
One-way ANOVA	0.047	53.9
Two-way ANOVA	0.053	61.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. These high conductivity treatments were compared to the high EC control.

4. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A8-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/22/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
San Pablo Bay at Rodeo Flats (323)	16311	10.8	7.83	10.0	0.06	0.001
Napa River at Riverside Blvd. terminus (340)	15151	10.7	7.72	9.4	0.09	0.001
Carquinez Strait, West of Benicia army dock (405)	12074	10.8	7.73	9.7	0.10	0.001
Suisun Bay, East of middle point (504)	2370	11.3	7.78	10.5	0.11	0.001
Suisun Bay off Chipps Island (508)	764	11.3	7.68	10.4	0.10	0.001
Grizzly Bay at Dolphin (602)	4843	10.4	7.66	10.1	0.11	0.001
Montezuma Slough at Nurse Slough (609)	800	10.5	7.54	9.0	0.18	0.001
Sacramento R. across from Sherman Lake (704)	175	9.9	7.92	10.5	0.15	0.002

Table A8-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 02/23/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 02/22/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	375	23.2	23.6	6.1	8.4	7.51	8.25	116	58	-
High EC Control @ 17.30 mS/cm	17930	22.6	24.0	7.3	8.3	7.55	8.01	-	-	-
San Pablo Bat at Rodeo Flats (323)	17110	22.6	24.0	7.0	8.4	7.54	7.91	1968	84	0.002
Napa River ar Riverside Blvd. terminus (340)	15735	22.8	24.2	7.6	8.4	7.60	7.85	1752	86	0.002
Carquinez Strait, West of Benicia army dock (405)	13450	22.4	23.9	7.9	8.2	7.63	7.88	1496	82	0.003
Suisun Bay, East of middle point (504)	2629	22.5	23.8	7.1	8.4	7.68	8.16	276	70	0.006
Suisun Bay off Chipps Island (508)	888	22.3	24.1	7.1	8.4	7.85	8.29	124	72	0.008
Grizzly Bay at Dolphin (602)	4811	22.1	24.1	7.4	8.4	7.56	7.94	520	78	0.004
Montezuma Slough at Nurse Slough (609)	950	22.0	23.9	6.8	8.3	7.81	8.23	136	80	0.013
Sacramento R. across from Sherman Lake (704)	235	22.6	23.0	7.1	8.6	7.93	8.26	72	72	0.012
DIEPAMHR + 100 ppb PBO	364	22.2	23.3	6.6	8.7	7.63	8.25	-	-	-
High EC Control @ 17.30mS/cm + 100 ppb PBO	16765	21.6	23.3	7.6	8.4	7.44	8.02	-	-	-
San Pablo Bat at Rodeo Flats (323) + 100 ppb PBO	16520	21.5	23.2	7.6	8.8	7.49	7.87	-	-	-
Napa River ar Riverside Blvd. terminus (340) + 100 ppb PBO	14965	20.8	23.2	7.8	8.4	7.54	7.89	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 100 ppb PBO	12615	20.8	23.2	7.4	9.0	7.55	8.04	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	2702	21.3	23.4	6.7	8.7	7.58	8.41	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	854	20.3	23.1	6.8	9.8	7.76	8.36	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	4455	22.2	23.1	6.6	9.6	7.47	8.03	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	981	22.0	23.3	6.7	9.1	7.77	8.20	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	225	22.1	23.3	6.8	9.8	7.90	8.37	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A9-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 3/08/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/07/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	90	5.8	S (90%)
Low EC Control (Dilute DIEPAMHR)	98	2.0	-	-	NA
Sacramento R. Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	100	0.0	100	0.0	NS
Broad Slough, West End (804) <sup>3</sup>	100	0.0	96	3.7	NS
SJR @ West of Oulton Point (812) <sup>3</sup>	100	0.0	100	0.0	NS
Old River @ Holland Cut (902)	100	0.0	100	0.0	NS
SJR @ Hong and Turner Cut (910)	100	0.0	100	0.0	NS
Old River @ RR Bridge, West (915)	100	0.0	97	3.0	NS
Field Duplicate: Broad Slough, West End (804) <sup>3</sup>	100	0.0	97	3.0	NS

	MSD	PMSD
One-way ANOVA <sup>4</sup>	-	-
Two-way ANOVA	7.8	7.8

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.099	0.015	0.064	0.006	NS
Low EC Control (Dilute DIEPAMHR)	0.046	0.006	-	-	NA
Sacramento R. Deep Water Channel, Light 55	0.139	0.017	0.093	0.009	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	0.091	0.004	0.083	0.012	NS
Broad Slough, West End (804) <sup>3</sup>	0.127	0.008	0.107	0.010	NS
SJR @ West of Oulton Point (812) <sup>3</sup>	0.112	0.016	0.118	0.018	NS
Old River @ Holland Cut (902)	0.111	0.008	0.108	0.007	NS
SJR @ Hong and Turner Cut (910)	0.141	0.010	0.114	0.012	NS
Old River @ RR Bridge, West (915)	0.107	0.013	0.112	0.009	NS
Field Duplicate: Broad Slough, West End (804) <sup>3</sup>	0.123	0.011	0.104	0.009	NS

	MSD	PMSD
One-way ANOVA	0.055	55.2
Two-way ANOVA	0.064	64.7

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard statistical protocols.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This low conductivity sample was compared to the Low EC control.

4. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A9-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/07/2006.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Sacramento R. Deep Water Channel, Light 55	250	11.75	7.77	10.22	0.10	0.0012
Sacramento River at tip of Grand Island (711)	149	11.89	7.84	10.75	0.08	0.0011
Broad Slough, West End (804)	160	10.77	7.62	10.34	0.08	0.0006
SJR @ West of Oulton Point (812)	133	10.55	7.46	10.60	0.09	0.0005
Old River @ Holland Cut (902)	218	11.55	7.53	9.84	0.03	0.0002
San Joaquin River between Hog and Turner Cuts (910)	266	11.61	7.47	10.14	0.29	0.0017
Old River @ RR Bridge, West (915)	253	11.91	7.58	10.04	0.04	0.0003
Field Duplicate: Broad Slough, West End (804)	160	10.77	7.62	10.34	0.09	0.0007

Table A9-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 03/08/2006 of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/07/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	381	21.5	24.3	6.3	8.0	7.57	8.09	104	58	-
Low EC Control (Dilute DIEPAMHR)	133	19.0	26.7	7.3	8.6	7.34	8.31	-	-	-
Sacramento R. Deep Water Channel, Light 55	206	21.2	24.3	7.4	13.8	7.75	9.09	412	72	0.0028
Sacramento River at tip of Grand Island (711)	4891	21.3	24.2	7.4	12.2	7.65	8.71	180	42	0.0022
Broad Slough, West End (804)	4835	21.3	24.5	7.1	10.8	7.57	8.34	80	52	0.0021
SJR @ West of Oulton Point (812)	4695	21.3	24.7	7.4	12.4	7.67	8.76	72	50	0.0027
Old River @ Holland Cut (902)	244	21.2	24.6	7.5	10.6	7.00	8.19	56	58	0.0002
San Joaquin River between Hog and Turner Cuts (910)	296	21.0	24.5	7.6	13.0	7.72	9.01	64	48	0.0096
Old River @ RR Bridge, West (915)	281	21.3	24.4	7.5	10.4	7.69	8.27	160	58	0.0011
Field Duplicate: Broad Slough, West End (804)	172	21.2	24.5	7.3	12.5	7.61	8.94	76	52	0.0019
DIEPAMHR + 100 ppb PBO	376	20.9	24.2	6.8	8.1	7.57	8.15	-	-	-
Low EC Control + 100 ppb PBO	218	20.9	24.2	7.6	9.1	7.80	8.04	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 100 ppb PBO	125	21.1	24.2	7.8	9.3	7.65	7.96	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	186	20.6	24.3	7.4	8.4	7.66	7.94	-	-	-
Broad Slough, West End (804) + 100 ppb PBO	161	20.7	24.3	7.6	9.3	7.54	8.09	-	-	-
SJR @ West of Oulton Point (812) + 100 ppb PBO	245	19.7	23.9	7.5	8.3	7.71	8.00	-	-	-
Old River @ Holland Cut (902) + 100 ppb PBO	298	20.6	24.3	7.9	9.5	7.66	8.09	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	285	19.5	24.0	7.9	8.9	7.72	7.95	-	-	-
Old River @ RR Bridge, West (915) + 100 ppb PBO	222	20.7	24.0	9.0	9.5	7.61	7.92	-	-	-
Field Duplicate: Broad Slough, West End (804) + 100 ppb PBO	133	19.0	26.7	7.3	8.6	7.34	8.31	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A10-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 03/08/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/09/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	1.8	100	0.0	NS
San Pablo Bat at Rodeo Flats (323)	100	0.0	100	0.0	NS
Napa River at Vallejo Seawall (340)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504)	98	2.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	98	2.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
Bottle Blank	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	5.4	5.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.102	0.007	0.074	0.003	NS
San Pablo Bat at Rodeo Flats (323)	0.128	0.005	0.114	0.007	NS
Napa River at Vallejo Seawall (340)	0.143	0.006	0.132	0.006	NS
Carquinez Strait, West of Benicia army dock (405)	0.153	0.009	0.137	0.017	NS
Suisun Bay, East of middle point (504)	0.123	0.008	0.119	0.008	NS
Suisun Bay off Chipps Island (508)	0.126	0.013	0.117	0.012	NS
Grizzly Bay at Dolphin (602)	0.152	0.004	0.123	0.010	NS
Montezuma Slough at Nurse Slough (609)	0.154	0.007	0.135	0.005	NS
Sacramento R. across from Sherman Lake (704)	0.134	0.004	0.111	0.006	NS
Bottle Blank	0.094	0.008	-	-	-

	MSD	PMSD
One-way ANOVA	0.036	35.0
Two-way ANOVA	0.043	42.7

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using USEPA standard statistical protocols. Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A10-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/08/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
San Pablo Bay at Rodeo Flats (323)	3670	11.2	7.67	10.4	0.14	0.001
Napa River at Vallejo Seawall (340)	1368	11.0	7.61	10.1	0.15	0.001
Carquinez Strait, West of Benicia army dock (405)	324	10.6	7.70	10.4	0.09	0.001
Suisun Bay, East of middle point (504)	143	10.6	7.66	10.6	0.10	0.001
Suisun Bay off Chipps Island (508)	168	10.4	7.76	10.5	0.09	0.001
Grizzly Bay at Dolphin (602)	154	10.7	7.70	10.6	0.09	0.001
Montezuma Slough at Nurse Slough (609)	837	11.5	7.30	9.8	0.21	0.001
Sacramento R. across from Sherman Lake (704)	178	10.8	7.79	10.5	0.05	0.001

Table A10-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 03/08/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/09/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
Lab Control (DIEPAMHR)	379.7	20.3	25.1	6.7	8.3	7.65	8.05	104	58	-
San Pablo Bat at Rodeo Flats (323)	3767.5	20.1	25.8	7.9	8.5	7.66	7.86	412	72	0.005
Napa River at Vallejo Seawall (340)	1334.5	20.4	25.7	7.6	8.2	7.65	7.84	180	64	0.005
Carquinez Strait, West of Benicia army dock (405)	427.3	20.7	25.7	7.6	8.2	7.67	7.90	80	64	0.004
Suisun Bay, East of middle point (504)	176.9	20.4	25.5	7.7	8.8	7.61	7.98	72	54	0.004
Suisun Bay off Chipps Island (508)	191.5	20.4	25.4	7.5	8.6	7.60	8.10	56	66	0.006
Grizzly Bay at Dolphin (602)	175.0	20.4	25.1	7.7	8.6	7.65	7.89	64	62	0.003
Montezuma Slough at Nurse Slough (609)	876.5	20.6	25.0	7.8	9.5	7.53	8.19	160	66	0.004
Sacramento R. across from Sherman Lake (704)	244.2	20.9	24.9	8.1	8.8	7.82	8.13	76	72	0.002
Bottle Blank	377.3	20.8	25.1	7.3	8.6	7.59	7.94	-	-	-
DIEPAMHR + 100 ppb PBO	359.3	20.8	23.7	6.7	8.9	7.60	8.12	-	-	-
San Pablo Bat at Rodeo Flats (323) + 100 ppb PBO	3514.0	20.0	23.9	8.0	10.9	7.53	8.47	-	-	-
Napa River at Vallejo Seawall (340) + 100 ppb PBO	1297.0	20.1	23.9	7.4	9.5	7.57	8.16	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 100 ppb PBO	412.2	20.8	24.0	7.2	10.1	7.64	8.45	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	168.6	21.1	24.0	7.5	10.3	7.63	8.72	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	173.3	21.1	24.0	7.2	11.8	7.71	8.98	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	170.2	21.8	23.9	7.4	11.4	7.69	8.99	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	828.0	21.3	23.9	7.4	10.9	7.62	8.73	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	209.8	21.5	23.9	7.2	12.6	7.79	9.20	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A11-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 03/20/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/21/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	95	5.0	NS
Sacramento Deep Water Channel (Light 55)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711)	98	2.0	100	0.0	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	98	2.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	96	2.4	100	0.0	NS
Old River at mouth of Holland Cut (915)	98	2.0	100	0.0	NS
Field Dup: San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	9.1	9.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.055	0.007	0.042	0.006	NS
Sacramento Deep Water Channel (Light 55)	0.109	0.014	0.080	0.005	NS
Sacramento R. across from Sherman Lake (704)	0.116	0.010	0.104	0.018	NS
Sacramento River at tip of Grand Island (711)	0.098	0.011	0.083	0.030	NS
Middle of Broad Slough, West end (804)	0.109	0.014	0.105	0.014	NS
San Joaquin River, West of Oulton Point (812)	0.105	0.011	0.109	0.008	NS
Old River, western arm at railroad bridge (902)	0.083	0.022	0.109	0.009	NS
San Joaquin River between Hog and Turner Cuts (910)	0.123	0.010	0.085	0.001	NS
Old River at mouth of Holland Cut (915)	0.093	0.008	0.108	0.001	NS
Field Dup: San Joaquin River between Hog and Turner Cuts (910)	0.140	0.015	0.095	0.032	NS

	MSD	PMSD
One-way ANOVA	0.055	100.3
Two-way ANOVA	0.074	135.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard statistical protocols.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A11-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/20/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Sacramento Deep Water Channel (Light 55)	416	11.4	8.10	10.4	0.07	0.002
Sacramento R. across from Sherman Lake (704)	207	10.8	8.04	10.7	0.07	0.001
Sacramento River at tip of Grand Island (711)	122	10.2	7.69	10.9	0.09	0.001
Middle of Broad Slough, West end (804)	175	10.7	7.94	10.7	0.07	0.001
San Joaquin River, West of Oulton Point (812)	158	10.7	7.66	10.5	0.09	0.001
Old River, western arm at railroad bridge (902)	239	11.5	7.77	10.3	0.03	0.000
San Joaquin River between Hog and Turner Cuts (910)	223	11.5	7.57	10.1	0.23	0.002
Old River at mouth of Holland Cut (915)	319	11.9	7.80	10.5	0.02	0.000
Field Dup: San Joaquin River between Hog and Turner Cuts (910)	223	11.5	7.57	10.1	0.23	0.002

Table A11-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 03/20/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/21/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	387	21.5	24.9	6.6	8.0	7.73	8.13	108	60	-
Sacramento Deep Water Channel (Light 55)	463	21.6	24.9	6.7	8.7	7.96	8.25	132	112	0.006
Sacramento R. across from Sherman Lake (704)	235	21.4	24.9	6.8	9.6	7.91	8.52	88	88	0.007
Sacramento River at tip of Grand Island (711)	152	21.6	24.6	6.6	9.0	7.71	8.02	52	54	0.005
Middle of Broad Slough, West end (804)	201	21.6	24.7	6.9	8.4	7.74	8.03	60	56	0.004
San Joaquin River, West of Oulton Point (812)	196	21.3	24.7	6.6	8.4	7.68	7.98	60	60	0.004
Old River, western arm at railroad bridge (902)	286	21.6	24.7	6.5	8.7	7.65	8.04	68	54	0.002
San Joaquin River between Hog and Turner Cuts (910)	255	21.2	24.6	6.8	8.8	7.66	8.02	60	50	0.012
Old River at mouth of Holland Cut (915)	439	22.0	24.7	6.4	8.3	7.67	7.93	92	62	0.001
Field Dup: San Joaquin River between Hog and Turner Cuts (910)	250	21.5	24.8	6.8	8.6	7.65	8.04	72	48	0.012
DIEPAMHR + 100 ppb PBO	377	20.9	24.2	6.6	8.1	7.74	8.15	-	-	-
Sacramento Deep Water Channel (Light 55) + 100 ppb PBO	443	20.9	24.2	7.1	10.0	8.02	8.78	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	225	21.6	24.2	7.7	11.1	8.07	9.01	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	141	22.1	24.3	7.5	11.1	7.86	9.11	-	-	-
Middle of Broad Slough, West end (804) + 100 ppb PBO	187	21.5	24.2	6.7	9.6	7.75	8.51	-	-	-
San Joaquin River, West of Oulton Point (812) + 100 ppb PBO	178	20.9	24.2	7.0	9.9	7.71	8.57	-	-	-
Old River, western arm at railroad bridge (902) + 100 ppb PBO	261	20.8	24.3	7.2	8.9	7.78	8.12	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	244	20.7	24.2	7.7	9.8	7.78	8.54	-	-	-
Old River at mouth of Holland Cut (915) + 100 ppb PBO	350	20.9	24.2	7.1	9.0	7.73	8.29	-	-	-
Field Dup: San Joaquin R., Hog and Turner Cuts (910) + 100 ppb PBO	237	21.6	24.3	7.0	10.7	7.69	8.89	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A12-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 03/22/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/21/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
High EC Control @ 8000 uS/cm	100	0.0	-	-	NA
San Pablo Bay at Rodeo Flats (323)	100	0.0	97	3.3	NS
Napa River at Riverside Blvd. terminus (340)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	3.1	3.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	0.076	0.004	0.056	0.004	NS
High EC Control @ 8000 uS/cm	0.061	0.003	-	-	-
San Pablo Bay at Rodeo Flats (323)	0.120	0.009	0.084	0.008	NS
Napa River at Riverside Blvd. terminus (340)	0.132	0.006	0.103	0.005	NS
Carquinez Strait, West of Benicia army dock (405)	0.123	0.005	0.114	0.015	NS
Suisun Bay, East of middle point (504)	0.122	0.006	0.078	0.009	S (64%)
Suisun Bay off Chipps Island (508)	0.103	0.009	0.081	0.002	NS
Grizzly Bay at Dolphin (602)	0.124	0.009	0.107	0.003	NS
Montezuma Slough at Nurse Slough (609)	0.141	0.006	0.119	0.008	NS

	MSD	PMSD
One-way ANOVA	0.031	41.1
Two-way ANOVA	0.039	51.4

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard statistical protocols.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A12-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/21/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
San Pablo Bay at Rodeo Flats (323)	8179	11.1	7.66	10.1	0.11	0.001
Napa River at Riverside Blvd. terminus (340)	2679	11.2	7.62	9.9	0.18	0.001
Carquinez Strait, West of Benicia army dock (405)	545	10.9	7.66	10.8	0.05	0.000
Suisun Bay, East of middle point (504)	235	10.8	7.89	10.6	0.06	0.001
Suisun Bay off Chipps Island (508)	138	10.4	7.64	10.8	0.05	0.000
Grizzly Bay at Dolphin (602)	158	10.4	7.84	10.8	0.05	0.001
Montezuma Slough at Nurse Slough (609)	237	10.5	7.70	10.3	0.09	0.001

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Table A12-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 03/22/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 03/21/06.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH				Max pH
DIEPAMHR	401	21	25.1	5.7	8.1	7.52	8.30	108	60	-
High EC Control @ 8000 uS/cm	8150	19.7	25.1	6.3	8.3	7.52	8.25	-	-	-
San Pablo Bay at Rodeo Flats (323)	2941	20.1	25.0	6.1	9.7	7.61	7.95	1232	84	0.001
Napa River ar Riverside Blvd. terminus (340)	697	20.4	25.1	6.4	11.4	7.63	7.69	400	108	0.005
Carquinez Strait, West of Benicia army dock (405)	221	20.2	25.2	7.1	10.3	7.76	7.85	132	68	0.001
Suisun Bay, East of middle point (504)	178	20.7	25.0	6.4	11.0	7.68	7.83	80	70	0.002
Suisun Bay off Chipps Island (508)	188	20.5	25.2	6.7	11.9	7.71	7.82	72	66	0.002
Grizzly Bay at Dolphin (602)	288	20.8	25.3	6.2	10.9	7.67	7.74	96	76	0.002
Montezuma Slough at Nurse Slough (609)	356	21.4	23.5	6.3	8.4	7.57	8.19	92	74	0.003
DIEPAMHR + 100 ppb PBO	10445	20.5	25.1	6.2	9.4	7.48	8.52	-	-	-
San Pablo Bay at Rodeo Flats (323) + 100 ppb PBO	10000	21.1	23.6	6.4	8.6	7.53	8.78	-	-	-
Napa River ar Riverside Blvd. terminus (340) + 100 ppb PBO	3142	21.5	23.7	6.2	8.5	7.61	9.01	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 100 ppb PBO	703	21.2	23.8	6.3	9.4	7.64	9.11	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	215	21.7	23.7	4.4	8.4	7.46	8.89	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	177	21.6	23.8	6.4	9.3	7.65	8.51	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	199	22.1	23.8	6.4	10.4	7.67	8.57	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	285	21.7	23.8	6.2	9.2	7.66	8.12	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A13-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 4/5/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/03/06 - 4/04/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	94	4.0	62	31.2	NS
Low EC Control @ 100 uS/cm	96	2.5	-	-	NA
High EC Control @ 7000 uS/cm	100	0.0	-	-	NA
Sacramento Deep Water Channel (Light 55)	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	98	2.0	77	23.3	NS
Old River, western arm at railroad bridge (902)	88	12.5	97	2.8	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	98	1.8	61	30.8	NS
San Pablo Bay at Rodeo Flats (323) <sup>4</sup>	96	2.6	100	0.0	NS
Napa River at Vallejo Seawall (340)	98	2.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	98	1.8	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	97	3.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	97	3.0	NS
San Joaquin River, West of Oulton Point (812)	62	21.3	100	0.0	NS
Field Dup.: Old River at mouth of Holland Cut (915)	87	13.3	81	19.0	NS
Field Dup.: Napa River at Vallejo Seawall (340)	98	2.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>5</sup>	-	-
Two-way ANOVA	40.9	43.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.060	0.013	0.050	0.026	NS
Low EC Control @ 100 uS/cm	0.061	0.010	-	-	NA
High EC Control @ 7000 uS/cm	0.060	0.003	-	-	NA
Sacramento Deep Water Channel (Light 55)	0.110	0.003	0.093	0.020	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	0.758	0.007	0.066	0.012	NS
Old River, western arm at railroad bridge (902)	0.101	0.019	0.086	0.011	NS
San Joaquin River between Hog and Turner Cuts (910)	0.118	0.008	0.073	0.003	NS
Old River at mouth of Holland Cut (915)	0.110	0.006	0.068	0.017	NS
San Pablo Bay at Rodeo Flats (323) <sup>4</sup>	0.068	0.011	0.093	0.021	NS
Napa River at Vallejo Seawall (340)	0.119	0.008	0.093	0.009	NS
Carquinez Strait, West of Benicia army dock (405)	0.145	0.008	0.117	0.015	NS
Suisun Bay off Chipps Island (508)	0.095	0.010	0.091	0.011	NS
Montezuma Slough at Nurse Slough (609)	0.149	0.010	0.114	0.004	NS
San Joaquin River, West of Oulton Point (812)	0.086	0.006	0.100	0.003	NS
Field Dup.: Old River at mouth of Holland Cut (915)	0.107	0.011	0.097	0.014	NS
Field Dup.: Napa River at Vallejo Seawall (340)	0.127	0.006	0.080	0.012	NS

	MSD	PMSD
One-way ANOVA	0.047	79.5
Two-way ANOVA	0.061	102.2

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the Low EC control @ 100 uS/cm.

4. This high conductivity sample was compared to the High EC control @ 7000 uS/cm.

5. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A13-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/03/06 - 4/04/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Sacramento Deep Water Channel (Light 55)	178	11.8	7.82	10.5	0.04	0.001
Sacramento River at tip of Grand Island (711)	95	10.8	7.64	11.0	0.09	0.001
Old River, western arm at railroad bridge (902)	254	13.2	7.73	9.8	0.02	0.000
San Joaquin River between Hog and Turner Cuts (910)	157	13.1	7.57	9.9	0.23	0.002
Old River at mouth of Holland Cut (915)	200	12.9	7.56	9.7	0.07	0.001
San Pablo Bay at Rodeo Flats (323)	9520	12.1	7.56	9.4	0.11	0.001
Napa River at Vallejo Seawall (340)	838	12.2	7.59	9.1	0.15	0.001
Carquinez Strait, West of Benicia army dock (405)	647	12.0	7.58	10.5	0.09	0.001
Suisun Bay off Chipps Island (508)	155	11.6	7.55	10.2	0.08	0.001
Montezuma Slough at Nurse Slough (609)	607	11.9	7.27	10.1	0.13	0.000
San Joaquin River, West of Oulton Point (812)	221	12.2	7.09	10.3	0.10	0.000
Field Dup.: Old River at mouth of Holland Cut (915)	200	12.9	7.56	9.7	0.02	0.000
Field Dup.: Napa River at Vallejo Seawall (340)	838	12.2	7.59	9.1	0.18	0.001

Table A13-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/05/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/03/06 - 4/04/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	384	21.4	25.2	6.8	8.2	7.59	8.17	112	62	-
Low EC Control @ 100 uS/cm	149	23.3	25.1	6.7	8.5	7.35	7.94	-	-	-
High EC Control @ 7000 uS/cm	7945	21.5	22.4	7.7	9.2	7.43	7.86	-	-	-
Sacramento Deep Water Channel (Light 55)	243	20.4	25.5	7.3	8.9	7.67	8.07	80	80	0.002
Sacramento River at tip of Grand Island (711)	134	20.6	25.7	7.3	8.5	7.56	8.08	52	48	0.006
Old River, western arm at railroad bridge (902)	308	19.7	25.8	7.1	9.5	7.55	8.08	76	56	0.001
San Joaquin River between Hog and Turner Cuts (910)	203	19.9	25.7	7.2	8.2	7.52	8.05	60	54	0.014
Old River at mouth of Holland Cut (915)	289	19.9	25.3	7.1	8.0	7.59	8.23	60	48	0.006
San Pablo Bay at Rodeo Flats (323)	9190	20.2	25.4	7.4	8.4	7.48	7.82	1024	76	0.003
Napa River at Vallejo Seawall (340)	942	23.8	25.4	7.0	8.0	7.61	8.09	140	76	0.009
Carquinez Strait, West of Benicia army dock (405)	1103	22.8	25.4	7.4	8.0	7.57	7.99	152	68	0.004
Suisun Bay off Chipps Island (508)	204	22.1	25.4	7.3	8.1	7.64	8.15	68	56	0.006
Montezuma Slough at Nurse Slough (609)	627	22.2	24.8	7.2	8.5	7.72	8.14	128	78	0.008
San Joaquin River, West of Oulton Point (812)	249	21.4	25.0	7.1	8.8	7.53	8.06	56	50	0.006
Field Dup.: Old River at mouth of Holland Cut (915)	236	20.3	25.0	7.3	9.1	7.73	8.16	76	80	0.001
Field Dup.: Napa River at Vallejo Seawall (340)	1230	20.4	25.5	6.9	8.3	7.78	8.18	112	76	0.013
DIEPAMHR + 100 ppb PBO	370	20.4	24.2	7.4	8.4	7.71	8.19	-	-	-
Sacramento Deep Water Channel (Light 55) + 100 ppb PBO	229	19.5	24.2	7.5	8.4	7.85	8.12	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	137	19.5	24.3	7.3	8.2	7.59	8.09	-	-	-
Old River, western arm at railroad bridge (902) + 100 ppb PBO	349	20.0	24.3	7.3	8.1	7.63	7.87	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	201	20.1	24.3	7.3	8.0	7.54	8.05	-	-	-
Old River at mouth of Holland Cut (915) + 100 ppb PBO	236	20.3	24.2	7.2	8.1	7.54	8.04	-	-	-
San Pablo Bay at Rodeo Flats (323) + 100 ppb PBO	8780	20.5	24.2	7.5	8.1	7.45	7.95	-	-	-
Napa River at Vallejo Seawall (340) + 100 ppb PBO	904	21.0	24.2	7.4	8.1	7.51	8.11	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 100 ppb PBO	1092	21.8	24.2	7.5	8.1	7.64	8.08	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	198	21.6	24.2	7.7	8.2	7.67	8.05	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	663	22.6	24.2	7.5	7.9	7.70	8.20	-	-	-
San Joaquin River, West of Oulton Point (812) + 100 ppb PBO	249	22.6	24.3	6.8	8.1	7.45	8.08	-	-	-
Field Dup.: Old River at mouth of Holland Cut (915) + 100 ppb PBO	235	19.4	24.3	7.7	8.2	7.89	8.05	-	-	-
Field Dup.: Napa River at Vallejo Seawall (340) + 100 ppb PBO	1122	20.8	24.2	7.3	8.1	7.60	8.04	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A14-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 4/06/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/05/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	97	3.3	NS
Suisun Bay, East of middle point (504)	98	2.0	70	29.6	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	94	3.2	NS
Middle of Broad Slough, West end (804)	96	2.4	100	0.0	NS
Field Dup.: Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Trip Blank	98	2.2	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	30.6	30.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.057	0.008	0.043	0.016	NS
Suisun Bay, East of middle point (504)	0.079	0.008	0.043	0.048	NS
Grizzly Bay at Dolphin (602)	0.095	0.008	0.079	0.010	NS
Sacramento R. across from Sherman Lake (704)	0.095	0.003	0.075	0.009	NS
Middle of Broad Slough, West end (804)	0.115	0.016	0.097	0.014	NS
Field Dup.: Grizzly Bay at Dolphin (602)	0.084	0.010	0.093	0.025	NS
Trip Blank	0.071	0.005	0.035	0.005	NS

	MSD	PMSD
One-way ANOVA	0.042	73.2
Two-way ANOVA	0.064	111.4

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A14-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/05/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Suisun Bay, East of middle point (504)	161	11.6	7.66	10.4	0.08	0.001
Grizzly Bay at Dolphin (602)	183	11.7	7.74	10.3	0.06	0.001
Sacramento R. across from Sherman Lake (704)	179	11.3	7.78	10.4	0.07	0.001
Middle of Broad Slough, West end (804)	191	11.9	8.34	11.0	0.07	0.003
Field Dup.: Grizzly Bay at Dolphin (602)	183	11.7	7.74	10.3	0.04	0.000
Trip Blank	339	18.7	8.24	9.6	0.00	0.000

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Table A14-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/06/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/05/06.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH				Max pH
DIEPAMHR	347	20.9	25.0	7.0	8.1	7.70	8.05	112	62	-
Suisun Bay, East of middle point (504)	172	22.3	25.3	7.1	8.6	7.63	7.86	60	60	0.003
Grizzly Bay at Dolphin (602)	192	22.4	25.1	7.1	8.4	7.62	7.92	72	72	0.003
Sacramento R. across from Sherman Lake (704)	202	22.4	25.5	7.0	8.6	7.69	7.95	76	80	0.003
Middle of Broad Slough, West end (804)	175	22.3	25.5	7.0	7.9	7.55	7.88	60	50	0.003
Field Dup.: Grizzly Bay at Dolphin (602)	199	21.5	25.0	7.2	8.6	7.74	7.82	68	72	0.001
Trip Blank	338	22.7	25.5	6.9	8.2	7.64	7.93	104	60	0.000
DIEPAMHR + 100 ppb PBO	344	21.3	24.4	7.5	8.2	7.72	8.04	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	165	22.4	24.6	7.1	8.7	7.69	7.84	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	201	22.8	24.6	7.2	8.5	7.78	8.02	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	203	22.6	24.7	6.8	9.2	7.78	7.80	-	-	-
Middle of Broad Slough, West end (804) + 100 ppb PBO	171	22.7	24.6	7.4	8.3	7.60	7.92	-	-	-
Field Dup.: Grizzly Bay at Dolphin (602) + 100 ppb PBO	200	22.5	24.6	7.2	8.7	7.77	7.85	-	-	-
Trip Blank + 100 ppb PBO	352	22.8	24.6	7.2	8.4	7.67	7.87	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A15-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 4/18/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/17/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.0	100	0.0	NS
Low EC Control @ 100 uS/cm	98	2.2	67	33.3	NS
Sacramento Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	100	0.0	93	3.3	NS
Middle of Broad Slough, West end (804)	92	8.0	78	22.2	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	93	6.7	NS
Old River, western arm at railroad bridge (902)	100	0.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	67	33.3	NS
Old River at mouth of Holland Cut (915)	100	0.0	90	10.0	NS
Field Dup.: San Joaquin River between Hog and Turner Cuts (910)	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA	13.9	14.2
Two-way ANOVA	25.2	25.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.085	0.011	0.056	0.001	NS
Low EC Control @ 100 uS/cm	0.047	0.006	0.037	0.008	NS
Sacramento Deep Water Channel, Light 55	0.102	0.011	0.115	0.007	NS
Field Dup.: San Joaquin River between Hog and Turner Cuts (910)	0.143	0.011	-	-	NA
Sacramento R. across from Sherman Lake (704)	0.109	0.007	0.069	0.012	NS
Sacramento River at tip of Grand Island (711) <sup>3</sup>	0.088	0.014	0.056	0.014	NS
Middle of Broad Slough, West end (804)	0.099	0.023	0.085	0.012	NS
San Joaquin River, West of Oulton Point (812)	0.108	0.019	0.066	0.027	NS
Old River, western arm at railroad bridge (902)	0.146	0.005	0.109	0.004	NS
San Joaquin River between Hog and Turner Cuts (910)	0.151	0.011	0.087	0.033	NS
Old River at mouth of Holland Cut (915)	0.162	0.013	0.077	0.012	Sig (48%)
Field Dup.: San Joaquin River between Hog and Turner Cuts (910)	0.143	0.011	-	-	NA

	MSD	PMSD
One-way ANOVA	0.070	82.2
Two-way ANOVA	0.074	86.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. This low conductivity sample was compared to the low conductivity control.

Table A15-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/17/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento Deep Water Channel, Light 55	499	14.9	7.94	10.0	10.9	0.01	0.000
Sacramento R. across from Sherman Lake (704)	189	13.4	7.69	10.1	128.6	0.08	0.001
Sacramento River at tip of Grand Island (711)	100	11.8	7.75	11.0	32.4	0.07	0.001
Middle of Broad Slough, West end (804)	147	13.4	8.01	9.6	14.5	0.06	0.001
San Joaquin River, West of Oulton Point (812)	143	14.5	7.48	9.1	13.8	0.08	0.001
Old River, western arm at railroad bridge (902)	204	14.6	7.35	7.8	8.5	0.04	0.000
San Joaquin River between Hog and Turner Cuts (910)	176	14.6	7.27	7.6	9.9	0.13	0.001
Old River at mouth of Holland Cut (915)	190	14.6	7.24	7.4	9.6	0.10	0.000
Field Dup.: San Joaquin River between Hog and Turner Cuts (910)	176	14.6	7.27	7.6	9.9	0.12	0.001

Table A15-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/18/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/17/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	366	23.1	24.9	6.2	8.7	7.52	8.03	-	-	-
Low EC Control	124	23.4	25.0	6.5	8.6	7.30	7.81	-	-	-
Sacramento Deep Water Channel, Light 55	489	24.0	24.8	6.6	8.7	7.88	8.23	150	124	0.000
Sacramento R. across from Sherman Lake (704)	179	24.7	25.0	6.4	8.9	7.70	8.05	78	73	0.003
Sacramento River at tip of Grand Island (711)	116	24.9	25.4	6.7	9.4	7.42	7.84	52	47	0.001
Middle of Broad Slough, West end (804)	153	24.9	25.3	6.7	8.7	7.44	8.00	56	48	0.001
San Joaquin River, West of Oulton Point (812)	156	24.9	28.8	6.6	9.2	7.46	7.80	64	48	0.001
Old River, western arm at railroad bridge (902)	216	25.0	28.5	6.7	8.5	7.36	8.03	60	52	0.000
San Joaquin River between Hog and Turner Cuts (910)	191	25.0	29.6	6.8	8.8	7.31	7.86	64	50	0.001
Old River at mouth of Holland Cut (915)	199	25.0	28.5	6.8	8.6	7.36	7.92	60	48	0.001
Field Dup.: San Joaquin River between Hog and Turner Cuts (910)	207	24.4	24.7	6.8	8.6	7.45	7.94	60	50	0.002
DIEPAMHR + 100 ppb PBO	309	24.2	26.7	7.0	8.6	7.83	8.11	-	-	-
Low EC Control + 100 ppb PBO	132	23.9	25.5	6.9	8.8	7.49	7.98	-	-	-
Sacramento Deep Water Channel, Light 55 + 100 ppb PBO	492	23.9	26.4	6.9	8.7	7.99	8.14	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	184	24.2	27.5	6.3	8.7	7.66	8.08	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	112	24.2	25.8	7.2	8.6	7.73	7.84	-	-	-
Middle of Broad Slough, West end (804) + 100 ppb PBO	164	24.3	25.7	7.1	8.7	7.55	8.00	-	-	-
San Joaquin River, West of Oulton Point (812) + 100 ppb PBO	157	23.9	25.2	7.2	9.0	7.57	7.81	-	-	-
Old River, western arm at railroad bridge (902) + 100 ppb PBO	212	23.9	24.1	7.2	8.7	7.47	8.02	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	191	23.6	24.3	7.4	8.5	7.68	7.87	-	-	-
Old River at mouth of Holland Cut (915) + 100 ppb PBO	201.7	23.7	23.9	7.3	8.6	7.60	8.02	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A16-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 4/19/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/18/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	97	3.3	NS
San Pablo Bay at Rodeo Flats (323)	100	0.0	96	4.2	NS
Napa River at Vallejo Seawall (340)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	98	2.0	100	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	97	3.3	NS
Suisun Bay off Chipps Island (508)	82	18.0	86	3.2	NS
Grizzly Bay at Dolphin (602)	100	0.0	97	3.3	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS
Trip Blank	84	16.0	97	3.3	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	39.0	39.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.125	0.009	0.084	0.010	NS
San Pablo Bay at Rodeo Flats (323)	0.168	0.015	0.122	0.023	NS
Napa River at Vallejo Seawall (340)	0.195	0.015	0.180	0.019	NS
Carquinez Strait, West of Benicia army dock (405)	0.139	0.015	0.159	0.012	NS
Suisun Bay, East of middle point (504)	0.162	0.012	0.162	0.012	NS
Suisun Bay off Chipps Island (508)	0.135	0.015	0.085	0.010	NS
Grizzly Bay at Dolphin (602)	0.164	0.024	0.152	0.005	NS
Montezuma Slough at Nurse Slough (609)	0.182	0.023	0.139	0.009	NS
Trip Blank	0.094	0.013	0.080	0.022	NS

	MSD	PMSD
One-way ANOVA	0.086	68.4
Two-way ANOVA	0.086	68.9

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A16-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/18/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
San Pablo Bay at Rodeo Flats (323)	174	13.5	7.76	10.5	70.6	0.20	0.003
Napa River at Vallejo Seawall (340)	642	13.7	7.66	10.0	78.4	0.16	0.002
Carquinez Strait, West of Benicia army dock (405)	163	13.5	7.76	10.5	85.0	0.24	0.003
Suisun Bay, East of middle point (504)	156	12.9	7.76	10.6	83.8	0.17	0.002
Suisun Bay off Chipps Island (508)	157	12.9	7.76	10.4	83.4	0.16	0.002
Grizzly Bay at Dolphin (602)	159	13.1	7.74	10.6	83.5	0.16	0.002
Montezuma Slough at Nurse Slough (609)	305	12.8	7.91	10.2	109.2	0.20	0.003
Trip Blank	-	-	-	-	-	0.01	-

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Table A16-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/19/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/18/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	361	20.0	24.7	7.2	8.1	7.67	8.13	88	60	-
San Pablo Bay at Rodeo Flats (323)	184	22.2	24.9	7.5	8.0	7.68	8.27	60	62	0.018
Napa River at Vallejo Seawall (340)	617	22.3	25.2	7.1	8.6	7.62	7.91	122	82	0.007
Carquinez Strait, West of Benicia army dock (405)	170	22.5	25.0	7.0	8.3	7.59	7.78	68	68	0.007
Suisun Bay, East of middle point (504)	171	22.5	25.0	7.1	8.1	7.61	7.97	60	66	0.008
Suisun Bay off Chipps Island (508)	172	22.7	25.1	7.0	8.1	7.57	7.97	64	66	0.008
Grizzly Bay at Dolphin (602)	186	23.0	25.0	6.8	8.0	7.68	8.07	72	80	0.009
Montezuma Slough at Nurse Slough (609)	288	23.3	25.1	7.1	8.5	7.69	7.95	92	74	0.009
Trip Blank	357	23.2	25.1	7.6	8.7	7.65	7.80	112	62	0.000
DIEPAMHR + 100 ppb PBO	373	23.2	24.6	7.5	8.1	7.75	8.15	-	-	-
San Pablo Bay at Rodeo Flats (323) + 100 ppb PBO	199	23.3	24.5	7.1	8.1	7.66	8.02	-	-	-
Napa River at Vallejo Seawall (340) + 100 ppb PBO	627	23.4	24.5	7.1	8.7	7.62	8.06	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 100 ppb PBO	185	23.6	24.5	7.1	8.1	7.61	8.07	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	178	23.6	24.5	7.1	7.9	7.59	8.21	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	175	24.1	24.6	7.1	8.9	7.58	8.14	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	185	23.6	24.4	7.4	8.1	7.75	8.06	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	316	23.9	24.4	7.0	8.3	7.75	8.13	-	-	-
Trip Blank + 100 ppb PBO	373	24.3	24.4	7.4	8.7	7.75	8.11	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A17-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 5/03/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/01/06 - 5/02/06.

Treatment	Survival (%) <sup>1</sup>	
	Unmanipulated	
	mean	se
DIEPAMHR	98	2.0
Sacramento Deep Water Channel, Light 55	100	0.0
Napa River at Vallejo Seawall (340)	100	0.0
Carquinez Strait, West of Benicia army dock (405)	100	0.0
Suisun Bay off Chipps Island (508)	94	4.1
Sacramento River at tip of Grand Island (711)	94	4.2
Old River, western arm at railroad bridge (902)	100	0.0
San Joaquin River between Hog and Turner Cuts (910)	98	2.2
Old River at mouth of Holland Cut (915)	98	2.2
Field Dup.: Sacramento Deep Water Channel, Light 55	98	2.0

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-

Treatment	Weight (mg/surviving individual) <sup>1</sup>	
	Unmanipulated	
	mean	se
DIEPAMHR	0.071	0.004
Sacramento Deep Water Channel, Light 55	0.099	0.009
Napa River at Vallejo Seawall (340)	0.103	0.005
Carquinez Strait, West of Benicia army dock (405)	0.103	0.008
Suisun Bay off Chipps Island (508)	0.081	0.009
Sacramento River at tip of Grand Island (711)	0.079	0.002
Old River, western arm at railroad bridge (902)	0.113	0.004
San Joaquin River between Hog and Turner Cuts (910)	0.123	0.006
Old River at mouth of Holland Cut (915)	0.089	0.010
Field Dup.: Sacramento Deep Water Channel, Light 55	0.088	0.009

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions showed extremely variable survival and weight, and were excluded from the analysis of this exposure.

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A17-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/01/06 - 5/02/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento Deep Water Channel, Light 55	500	18.5	8.2	10.2	12.2	0.03	0.001
Napa River at Vallejo Seawall (340)	846	17.2	7.83	8.4	53.7	0.07	0.001
Carquinez Strait, West of Benicia army dock (405)	530	17.4	7.93	9.2	66.7	0.06	0.001
Suisun Bay off Chipps Island (508)	135	16.9	7.46	7.6	5.4	0.04	0.000
Sacramento River at tip of Grand Island (711)	106	15.2	7.46	10.4	20.9	0.06	0.000
Old River, western arm at railroad bridge (902)	160	18.8	7.23	8.7	5.8	0.05	0.000
San Joaquin River between Hog and Turner Cuts (910)	141	18.3	7.21	8.6	7.8	0.08	0.000
Old River at mouth of Holland Cut (915)	86	18.2	7.19	8.1	7.2	0.04	0.000
Field Dup.: Sacramento Deep Water Channel, Light 55	500	18.5	8.2	10.2	12.2	0.02	0.001

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Table A17-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 5/03/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/01/06 - 5/02/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	321	22.3	24.7	7.5	8.4	7.86	8.23	110	59	-
Sacramento Deep Water Channel, Light 55	463	22.2	24.6	6.7	8.3	7.97	8.46	140	122	0.004
Napa River at Vallejo Seawall (340)	751	22.4	24.4	6.6	8.4	7.67	8.15	124	68	0.004
Carquinez Strait, West of Benicia army dock (405)	519	22.4	24.3	7.1	8.5	7.67	8.12	100	64	0.004
Suisun Bay off Chipps Island (508)	157	22.5	24.6	7.3	8.4	7.75	8.15	56	58	0.003
Sacramento River at tip of Grand Island (711)	116	22.6	24.8	7.1	8.4	7.71	8.16	52	46	0.004
Old River, western arm at railroad bridge (902)	138	22.6	24.1	6.5	8.5	7.60	7.80	56	40	0.001
San Joaquin River between Hog and Turner Cuts (910)	154	22.5	24.4	6.7	8.4	7.58	8.10	44	40	0.005
Old River at mouth of Holland Cut (915)	147	22.6	24.5	7.2	8.3	7.60	8.14	44	42	0.003
Field Dup.: Sacramento Deep Water Channel, Light 55	465	22.3	24.8	7.0	8.6	8.02	8.36	148	124	0.002

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A18-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 5/04/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/02/06 - 5/03/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	97	3.3	NS
San Pablo Bay at Rodeo Flats (323)	94	4.4	93	3.5	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	76	19.4	93	3.3	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	71	16.3	97	3.0	NS
Montezuma Slough at Nurse Slough (609)	93	7.3	97	3.3	NS
Sacramento R. across from Sherman Lake (704)	85	5.7	83	8.8	NS
Middle of Broad Slough, West end (804) <sup>3</sup>	94	2.4	33	28.5	NS
San Joaquin R., West of Oulton Point (812) <sup>3</sup>	100	0.0	43	29.6	NS
Field Dup.: San Joaquin R., West of Oulton Point (812)	96	2.7	100	0.0	NS

	MSD	PMSD
One-way ANOVA	48.1	48.1
Two-way ANOVA	43.8	43.8

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		100 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.074	0.003	0.089	0.003	NS
San Pablo Bay at Rodeo Flats (323)	0.103	0.007	0.077	0.007	NS
Suisun Bay, East of middle point (504)	0.093	0.007	0.084	0.005	NS
Grizzly Bay at Dolphin (602)	0.109	0.010	0.089	0.004	NS
Montezuma Slough at Nurse Slough (609)	0.132	0.003	0.104	0.008	NS
Sacramento R. across from Sherman Lake (704)	0.096	0.004	0.054	0.006	NS
Middle of Broad Slough, West end (804)	0.094	0.007	0.052	0.012	NS
San Joaquin R., West of Oulton Point (812)	0.108	0.004	0.069	0.029	NS
Field Dup.: San Joaquin R., West of Oulton Point (812)	0.104	0.005	0.096	0.014	NS

	MSD	PMSD
One-way ANOVA	0.031	41.7
Two-way ANOVA	0.037	50.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Some treatments showed lower mean survival due to very low survival in some replicates and high variability in survival between replicates. This pattern may be evidence of pathogen related mortality, and is not a clear indication of toxicity.

Table A18-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/02/06 - 5/03/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
San Pablo Bay at Rodeo Flats (323)	6016	16.5	7.69	8.8	38.0	0.08	0.001
Suisun Bay, East of middle point (504)	149	17.7	7.62	9.1	3.7	0.03	0.000
Grizzly Bay at Dolphin (602)	179	17.7	7.82	9.2	5.6	0.02	0.000
Montezuma Slough at Nurse Slough (609)	502	17.5	7.51	7.2	13.9	0.09	0.001
Sacramento R. across from Sherman Lake (704)	131	17.5	7.62	9.1	4.6	0.04	0.001
Middle of Broad Slough, West end (804)	129	18.0	7.82	8.6	-	0.06	0.001
San Joaquin R., West of Oulton Point (812)	116	17.8	7.58	7.1	4.1	0.08	0.001
Field Dup.: San Joaquin R., West of Oulton Point (812)	116	17.8	7.58	7.1	4.1	0.05	0.001

Table A18-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 5/02/06 - 5/03/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/04/06.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH				Max pH
DIEPAMHR	415	23.4	24.7	6.1	8.3	7.74	8.08	110	59	-
San Pablo Bay at Rodeo Flats (323)	6555	23.3	24.8	7.1	8.3	7.76	7.78	772	70	0.002
Suisun Bay, East of middle point (504)	168	23.4	24.7	6.8	8.1	7.71	7.95	56	56	0.001
Grizzly Bay at Dolphin (602)	196	23.4	24.6	7.0	8.4	7.79	8.01	68	64	0.001
Montezuma Slough at Nurse Slough (609)	501	23.4	24.8	6.6	8.0	7.78	8.03	112	70	0.005
Sacramento R. across from Sherman Lake (704)	178	23.3	24.8	7.1	8.3	7.85	8.01	76	68	0.002
Middle of Broad Slough, West end (804)	152	23.3	24.8	6.8	8.3	7.61	7.82	48	46	0.002
San Joaquin R., West of Oulton Point (812)	142	23.2	24.6	6.4	8.1	7.58	7.89	48	44	0.003
Field Dup.: San Joaquin R., West of Oulton Point (812)	150	23.4	24.7	6.7	8.4	7.61	7.90	52	70	0.002
DIEPAMHR + 100 ppb PBO	334	23.4	24.4	6.7	8.1	7.83	8.07	-	-	-
San Pablo Bay at Rodeo Flats (323) + 100 ppb PBO	6580	23.3	24.4	7.1	8.2	7.67	7.77	-	-	-
Field Dup.: San Joaquin R., West of Oulton Point (812) + 100 ppb PBO	142	23.2	24.4	6.7	8.6	7.61	7.87	-	-	-
Suisun Bay, East of middle point (504) + 100 ppb PBO	175	23.3	24.4	7.1	8.4	7.79	7.96	-	-	-
Grizzly Bay at Dolphin (602) + 100 ppb PBO	201	23.2	24.4	6.9	8.2	7.78	8.05	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	550	23.2	24.4	7.1	8.2	7.89	7.97	-	-	-
Sacramento R. across from Sherman Lake (704) + 100 ppb PBO	184	23.2	24.3	7.1	8.6	7.84	8.06	-	-	-
Middle of Broad Slough, West end (804) + 100 ppb PBO	147	23.2	24.4	6.9	8.3	7.67	7.81	-	-	-
San Joaquin R., West of Oulton Point (812) + 100 ppb PBO	147	23.3	24.3	6.8	8.2	7.71	7.76	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A19-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 5/17/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/15/06 - 5/16/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	96	2.4	73	16.7	NS
High EC DIEPAMHR @ 11.53 mS/cm	98	2.0	89	5.9	NS
Sacramento River at tip of Grand Island (711)	82	6.3	60	14.9	NS
San Joaquin River between Hog and Turner Cuts (910)	96	2.4	67	33.3	NS
Old River at mouth of Holland Cut (915)	98	2.2	80	20.0	NS
Napa River at Riverside Blvd. terminus (340)	100	0.0	91	9.1	NS
Suisun Bay off Chipps Island (508)	85	9.0	90	10.0	NS
Montezuma Slough at Nurse Slough (609)	98	2.0	100	0.0	NS
Sacramento Deep Water Channel, Light 55	92	3.7	93	6.7	NS
San Pablo Bay at Rodeo Flats (323)	98	2.2	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	98	2.0	97	3.3	NS
Old River, western arm at railroad bridge (902)	66	19.1	97	3.3	NS
Field Dup.: Sacramento Deep Water Channel, Light 55	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	51.9	54.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.055	0.010	0.030	0.012	NS
High EC DIEPAMHR @ 11.53 mS/cm	0.073	0.012	0.020	0.006	NS
Sacramento River at tip of Grand Island (711)	0.058	0.007	0.106	0.012	NS
San Joaquin River between Hog and Turner Cuts (910)	0.099	0.008	0.106	0.008	NS
Old River at mouth of Holland Cut (915)	0.116	0.014	0.115	0.014	NS
Napa River at Riverside Blvd. terminus (340)	0.102	0.005	0.111	0.026	NS
Suisun Bay off Chipps Island (508)	0.078	0.010	0.107	0.010	NS
Montezuma Slough at Nurse Slough (609)	0.102	0.008	0.114	0.016	NS
Sacramento Deep Water Channel, Light 55	0.088	0.009	0.130	0.006	NS
San Pablo Bay at Rodeo Flats (323)	0.067	0.011	0.065	0.015	NS
Carquinez Strait, West of Benicia army dock (405)	0.072	0.011	0.133	0.005	NS
Old River, western arm at railroad bridge (902)	0.068	0.011	0.088	0.006	NS
Field Dup.: Sacramento Deep Water Channel, Light 55	0.095	0.008	-	-	NA

	MSD	PMSD
One-way ANOVA	0.054	102.8
Two-way ANOVA	0.063	120.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A19-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/15/06 - 5/16/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento River at tip of Grand Island (711)	96	17.2	7.21	9.4	29.0	0.09	0.000
San Joaquin River between Hog and Turner Cuts (910)	128	20.6	7.16	7.2	8.5	0.14	0.001
Old River at mouth of Holland Cut (915)	126	20.1	7.10	7.8	10.9	0.10	0.000
Napa River at Riverside Blvd. terminus (340)	2368	18.9	7.78	7.9	63.1	0.10	0.002
Suisun Bay off Chipps Island (508)	121	20.7	7.58	7.6	13.4	0.11	0.002
Montezuma Slough at Nurse Slough (609)	318	19.8	7.56	7.8	74.0	0.13	0.002
Sacramento Deep Water Channel, Light 55	534	22.7	8.07	7.7	22.4	0.11	0.005
San Pablo Bay at Rodeo Flats (323)	11500	18.0	7.84	7.7	95.8	0.19	0.003
Carquinez Strait, West of Benicia army dock (405)	230	19.1	7.94	7.6	80.1	0.08	0.002
Old River, western arm at railroad bridge (902)	190	20.6	6.99	7.1	9.3	0.04	0.000
Field Dup.: Sacramento Deep Water Channel, Light 55	534	22.7	8.07	7.7	22.4	0.11	0.005

Table A19-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 5/17/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/15/06 - 5/16/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	325	23.1	24.3	6.5	8.5	7.58	7.82	110	57	-
High EC DIEPAMHR @ 11.53 mS/cm	5773	22.9	24.2	7.6	8.9	7.44	7.78	736	212	-
Sacramento River at tip of Grand Island (711)	186	23.1	24.3	7.2	8.9	7.61	7.81	44	46	0.003
San Joaquin River between Hog and Turner Cuts (910)	152	23.2	24.4	7.0	8.7	7.00	7.72	44	37	0.004
Old River at mouth of Holland Cut (915)	150	23.3	24.5	6.9	8.8	7.45	7.62	36	35	0.002
Napa River at Riverside Blvd. terminus (340)	14123	23.3	24.5	7.0	8.7	7.53	7.62	280	72	0.002
Suisun Bay off Chipps Island (508)	161	23.4	24.4	6.5	8.5	7.48	7.68	52	46	0.003
Montezuma Slough at Nurse Slough (609)	343	23.6	24.6	6.6	8.8	7.59	7.70	72	58	0.003
Sacramento Deep Water Channel, Light 55	543	23.5	24.3	6.8	8.9	7.28	8.04	164	140	0.004
San Pablo Bay at Rodeo Flats (323)	11340	23.7	24.2	6.8	8.6	7.32	7.63	1376	68	0.002
Carquinez Strait, West of Benicia army dock (405)	240	23.8	24.1	6.8	8.9	7.80	7.95	1032	54	0.003
Old River, western arm at railroad bridge (902)	158	23.7	23.8	6.8	8.7	7.66	7.71	44	38	0.001
Field Dup.: Sacramento Deep Water Channel, Light 55	559	23.7	24.5	6.8	8.7	7.81	8.05	168	138	0.004
DIEPAMHR + 50 ppb PBO	2018	24.3	25.8	6.6	8.4	7.51	8.14	-	-	-
High EC DIEPAMHR @ 11.53 mS/cm + 50 ppb PBO	11680	24.3	25.7	7.2	8.9	7.19	8.03	-	-	-
Sacramento River at tip of Grand Island (711) + 50 ppb PBO	135	24.6	25.7	6.8	8.4	7.28	8.05	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 50 ppb PBO	158	24.3	25.6	6.9	8.5	7.60	7.96	-	-	-
Old River at mouth of Holland Cut (915) + 50 ppb PBO	157	24.3	25.7	7.0	8.8	7.47	7.99	-	-	-
Napa River at Riverside Blvd. terminus (340) + 50 ppb PBO	2452	24.4	25.5	7.1	8.7	7.62	7.84	-	-	-
Suisun Bay off Chipps Island (508) + 50 ppb PBO	150	24.4	25.5	7.0	8.5	7.51	8.05	-	-	-
Montezuma Slough at Nurse Slough (609) + 50 ppb PBO	353.85	24.3	25.4	6.9	8.9	7.80	8.07	-	-	-
Sacramento Deep Water Channel, Light 55 + 50 ppb PBO	583	24.7	25.4	6.7	8.5	7.62	8.21	-	-	-
San Pablo Bay at Rodeo Flats (323) + 50 ppb PBO	11810	24.6	25.4	6.8	8.8	7.61	7.85	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 50 ppb PBO	220	24.4	25.3	6.9	8.8	7.55	8.25	-	-	-
Old River, western arm at railroad bridge (902) + 50 ppb PBO	157	24.7	25.3	6.7	8.7	7.47	8.11	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A20-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 5/18/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/17/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	96	2.4	93	3.3	NS
Suisun Bay, East of middle point (504)	92	3.7	100	0.0	NS
Grizzly Bay at Dolphin (602)	96	4.0	97	3.3	NS
Sacramento R. across from Sherman Lake (704)	90	5.5	82	7.8	NS
Middle of Broad Slough, West end (804)	98	2.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	98	1.8	91	5.3	NS
Bottle Blank	98	2.0	-	-	NA

	MSD	PMSD
One-way ANOVA	16.7	17.4
Two-way ANOVA	19.0	19.8

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.054	0.002	0.049	0.006	NS
Suisun Bay, East of middle point (504)	0.099	0.013	0.079	0.007	NS
Grizzly Bay at Dolphin (602)	0.113	0.013	0.119	0.011	NS
Sacramento R. across from Sherman Lake (704)	0.086	0.014	0.069	0.006	NS
Middle of Broad Slough, West end (804)	0.098	0.006	0.076	0.008	NS
San Joaquin River, West of Oulton Point (812)	0.111	0.009	0.067	0.006	NS
Bottle Blank	0.070	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.049	91.2
Two-way ANOVA	0.050	93.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure (  $P < 0.05$  ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A20-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/17/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	123	17.8	7.81	8.8	8.3	0.03	0.001
Grizzly Bay at Dolphin (602)	153	18.5	7.5	8.3	27.2	0.13	0.001
Sacramento R. across from Sherman Lake (704)	107	17.4	7.81	9.6	15.6	0.06	0.001
Middle of Broad Slough, West end (804)	114	20.0	7.61	8.2	29.0	0.05	0.001
San Joaquin River, West of Oulton Point (812)	107	19.5	7.61	8.3	6.4	0.06	0.001
Bottle Blank	294	22.9	7.92	8.3	0.4	0.00	0.000

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Table A20-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 5/18/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/17/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	326	23.2	24.8	6.5	8.3	7.46	8.12	110	57	-
Suisun Bay, East of middle point (504)	148	24.7	26.8	6.4	8.4	7.43	7.93	88	48	0.001
Grizzly Bay at Dolphin (602)	180	23.5	24.7	6.8	8.5	7.49	8.00	52	50	0.006
Sacramento R. across from Sherman Lake (704)	132	23.1	24.5	6.8	8.9	7.45	7.93	46	51	0.002
Middle of Broad Slough, West end (804)	136	23.3	24.4	6.2	8.2	7.36	7.95	38	37	0.002
San Joaquin River, West of Oulton Point (812)	131	23.2	24.4	6.4	8.4	7.44	7.94	42	38	0.002
Bottle Blank	328	23.4	24.7	6.8	8.6	7.45	7.97	98	56	0.000
DIEPAMHR + 50 ppb PBO	324	23.3	24.1	6.5	8.2	7.43	8.13	-	-	-
Suisun Bay, East of middle point (504) + 50 ppb PBO	146	23.3	24.0	6.4	8.5	7.50	7.99	-	-	-
Grizzly Bay at Dolphin (602) + 50 ppb PBO	179	23.3	24.0	6.7	8.4	7.52	8.02	-	-	-
Sacramento R. across from Sherman Lake (704) + 50 ppb PBO	137	23.3	23.9	6.9	8.4	7.54	7.83	-	-	-
Middle of Broad Slough, West end (804) + 50 ppb PBO	137	23.3	24.0	6.2	8.3	7.44	7.87	-	-	-
San Joaquin River, West of Oulton Point (812) + 50 ppb PBO	136	23.2	23.9	6.7	8.3	7.54	7.86	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A21-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 6/1/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/30/06 - 5/31/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	94	2.5	93	6.7	NS
High EC Control @ 12.30 mS/cm	90	3.2	-	-	NA
Sacramento Deep Water Channel, Light 55	98	2.0	91	5.8	NS
Sacramento River at tip of Grand Island (711)	90	3.2	87	3.6	NS
Old River, western arm at railroad bridge (902)	91	4.2	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	89	4.0	94	3.2	NS
Old River at mouth of Holland Cut (915)	90	5.5	83	6.7	NS
San Pablo Bay at Rodeo Flats (323)	96	3.6	100	0.0	NS
Napa River at Vallejo Seawall (340)	94	4.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	100	0.0	97	3.0	NS
Suisun Bay off Chipps Island (508)	80	11.9	80	0.0	NS
Montezuma Slough at Nurse Slough (609)	98	2.2	97	3.3	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	8.2	8.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.066	0.008	0.067	0.006	NS
High EC Control @ 12.30 mS/cm	0.047	0.011	-	-	NA
Sacramento Deep Water Channel, Light 55	0.114	0.011	0.082	0.008	NS
Sacramento River at tip of Grand Island (711)	0.046	0.008	0.058	0.010	NS
Old River, western arm at railroad bridge (902)	0.072	0.006	0.065	0.002	NS
San Joaquin River between Hog and Turner Cuts (910)	0.071	0.005	0.064	0.010	NS
Old River at mouth of Holland Cut (915)	0.082	0.015	0.058	0.013	NS
San Pablo Bay at Rodeo Flats (323)	0.069	0.007	0.052	0.007	NS
Napa River at Vallejo Seawall (340)	0.083	0.006	0.082	0.010	NS
Carquinez Strait, West of Benicia army dock (405)	0.096	0.013	0.075	0.010	NS
Suisun Bay off Chipps Island (508)	0.086	0.017	0.089	0.037	NS
Montezuma Slough at Nurse Slough (609)	0.097	0.008	0.093	0.028	NS

	MSD	PMSD
One-way ANOVA	0.056	84.5
Two-way ANOVA	0.066	100.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A21-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/30/06 - 5/31/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento Deep Water Channel, Light 55	389	19.4	7.89	7.7	26.5	0.11	0.003
Sacramento River at tip of Grand Island (711)	109	17.2	7.53	7.7	21.1	0.14	0.001
Old River, western arm at railroad bridge (902)	186	19.1	6.98	8.1	8.9	0.09	0.000
San Joaquin River between Hog and Turner Cuts (910)	115	18.3	7.37	8.4	10.5	0.14	0.001
Old River at mouth of Holland Cut (915)	123	18.3	7.19	8.9	9.3	0.10	0.001
San Pablo Bay at Rodeo Flats (323)	11660	17.3	7.41	8.4	122.0	0.12	0.001
Napa River at Vallejo Seawall (340)	2875	18.1	7.61	8.6	49.0	0.09	0.001
Carquinez Strait, West of Benicia army dock (405)	249	17.8	7.51	8.1	79.1	0.09	0.001
Suisun Bay off Chipps Island (508)	100	18.2	7.51	7.8	14.2	0.06	0.001
Montezuma Slough at Nurse Slough (609)	591	19.2	7.28	8.5	56.1	0.11	0.001

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Table A21-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 6/01/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/30/06 - 5/31/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	371	22.1	24.0	6.6	8.1	7.69	8.19	102	62	-
High EC Control @ 12.30 mS/cm	11910	23.5	23.8	6.6	8.3	7.56	8.03	-	-	-
Sacramento Deep Water Channel, Light 55	427	24.0	24.1	6.0	8.3	7.85	8.09	126	112	0.006
Sacramento River at tip of Grand Island (711)	141	23.9	24.8	6.1	8.3	7.51	8.05	50	52	0.007
Old River, western arm at railroad bridge (902)	164	23.7	24.1	6.0	8.5	7.44	7.85	40	35	0.003
San Joaquin River between Hog and Turner Cuts (910)	150	23.8	24.2	6.4	8.4	7.34	7.86	40	35	0.005
Old River at mouth of Holland Cut (915)	165	23.7	24.2	6.1	8.6	7.45	7.68	32	34	0.002
San Pablo Bay at Rodeo Flats (323)	11895	23.6	24.1	6.5	8.1	7.36	7.67	1298	62	0.002
Napa River at Vallejo Seawall (340)	3375	23.8	24.3	6.3	8.3	7.54	7.84	382	61	0.003
Carquinez Strait, West of Benicia army dock (405)	283	24.0	24.2	5.9	8.4	7.55	7.91	58	49	0.004
Suisun Bay off Chipps Island (508)	161	23.6	24.1	5.9	8.9	7.58	7.62	45	46	0.001
Montezuma Slough at Nurse Slough (609)	614	23.7	24.2	6.4	8.1	7.55	7.92	92	60	0.004
DIEPAMHR + 50 ppb PBO	366	23.6	24.0	6.2	8.1	7.75	8.19	-	-	-
Sacramento Deep Water Channel, Light 55 + 50 ppb PBO	412	23.2	24.0	6.3	8.3	7.85	8.09	-	-	-
Sacramento River at tip of Grand Island (711) + 50 ppb PBO	137	23.8	23.9	6.0	8.3	7.66	8.05	-	-	-
Old River, western arm at railroad bridge (902) + 50 ppb PBO	162	23.2	24.1	6.3	8.5	7.53	7.85	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 50 ppb PBO	144	23.3	24.2	6.7	8.4	7.63	7.86	-	-	-
Old River at mouth of Holland Cut (915) + 50 ppb PBO	160	22.9	24.2	6.4	8.6	7.49	7.69	-	-	-
San Pablo Bay at Rodeo Flats (323) + 50 ppb PBO	11780	23.2	24.1	6.9	8.1	7.36	7.67	-	-	-
Napa River at Vallejo Seawall (340) + 50 ppb PBO	3305	23.0	24.3	6.0	8.3	7.55	7.89	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 50 ppb PBO	278.6	24.0	24.2	5.9	8.4	7.67	7.91	-	-	-
Suisun Bay off Chipps Island (508) + 50 ppb PBO	156	23.5	24.2	5.7	8.9	7.50	7.61	-	-	-
Montezuma Slough at Nurse Slough (609) + 50 ppb PBO	609	23.6	23.8	6.1	8.1	7.64	7.92	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A22-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 6/02/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/01/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	96	3.7	NS
Suisun Bay, East of middle point (504)	89	6.1	83	8.8	NS
Grizzly Bay at Dolphin (602)	98	2.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	94	4.0	87	6.4	NS
Middle of Broad Slough, West end (804)	92	3.7	83	11.9	NS
San Joaquin River, West of Oulton Point (812)	90	6.3	90	0.0	NS
Field Dup.: Middle of Broad Slough, West end (804)	80	6.1	83	8.8	NS
Bottle Blank	94	4.4	-	-	NA

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	27.3	27.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.057	0.003	0.053	0.008	NS
Suisun Bay, East of middle point (504)	0.055	0.007	0.073	0.012	NS
Grizzly Bay at Dolphin (602)	0.074	0.007	0.067	0.003	NS
Sacramento R. across from Sherman Lake (704)	0.079	0.010	0.070	0.005	NS
Middle of Broad Slough, West end (804)	0.076	0.009	0.065	0.014	NS
San Joaquin River, West of Oulton Point (812)	0.053	0.005	0.063	0.013	NS
Field Dup.: Middle of Broad Slough, West end (804)	0.059	0.009	0.061	0.005	NS
Bottle Blank	0.051	0.010	-	-	NA

	MSD	PMSD
One-way ANOVA	0.041	70.9
Two-way ANOVA	0.043	74.4

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A22-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/01/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	130	18.7	7.4	8.5	19.5	0.04	0.000
Grizzly Bay at Dolphin (602)	183	19.0	7.71	9.6	37.4	0.05	0.001
Sacramento R. across from Sherman Lake (704)	131	18.1	7.28	8.2	12.1	0.07	0.000
Middle of Broad Slough, West end (804)	132	18.1	7.68	8.2	7.3	0.03	0.000
San Joaquin River, West of Oulton Point (812)	110	18.9	7.28	8.6	9.2	0.08	0.001
Field Dup.: Middle of Broad Slough, West end (804)	132	18.1	7.68	8.2	7.1	0.04	0.001
Bottle Blank	355	23	8.14	9.1	0.1	0.00	0.000

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Table A22-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 6/02/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/01/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	375	22.5	24.1	5.6	8.2	7.44	8.14	102	62	-
Suisun Bay, East of middle point (504)	161	22.4	23.7	5.7	8.3	7.34	8.08	46	50	0.002
Grizzly Bay at Dolphin (602)	213	22.2	23.8	5.5	8.4	7.32	7.94	56	52	0.002
Sacramento R. across from Sherman Lake (704)	170	22.6	23.7	5.7	8.2	7.35	8.08	54	54	0.004
Middle of Broad Slough, West end (804)	145	22.4	23.6	5.5	8.3	7.24	7.93	38	40	0.001
San Joaquin River, West of Oulton Point (812)	138	22.7	23.5	5.8	8.2	7.28	7.81	36	36	0.002
Field Dup.: Middle of Broad Slough, West end (804)	165	22.2	23.9	5.7	8.4	7.25	8.00	38	35	0.002
Bottle Blank	371	22.3	23.8	5.4	8.3	7.35	8.17	106	62	0.000
DIEPAMHR + 50 ppb PBO	370	22.7	24.0	5.9	8.3	7.43	8.17	-	-	-
Suisun Bay, East of middle point (504) + 50 ppb PBO	160	22.7	23.4	5.9	8.9	7.33	7.95	-	-	-
Grizzly Bay at Dolphin (602) + 50 ppb PBO	207	23.0	23.3	5.5	8.9	7.32	7.93	-	-	-
Sacramento R. across from Sherman Lake (704) + 50 ppb PBO	172	23.2	23.6	5.2	8.7	7.75	7.99	-	-	-
Middle of Broad Slough, West end (804) + 50 ppb PBO	148	23.2	23.6	5.8	8.6	7.30	7.86	-	-	-
San Joaquin River, West of Oulton Point (812) + 50 ppb PBO	140	23.2	23.2	6.2	8.9	7.30	7.99	-	-	-
Field Dup.: Middle of Broad Slough, West end (804) + 50 ppb PBO	150	22.8	23.6	5.9	8.4	7.24	7.89	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A23-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 6/15/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/13/06 - 6/14/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.0	100	0.0	NS
High EC Control @ 20.00 mS/cm	100	0.0	-	-	NA
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	98	2.0	70	30.0	NS
Sacramento River at tip of Grand Island (711)	88	4.0	87	3.3	NS
Sacramento Deep Water Channel, Light 55	96	4.0	100	0.0	NS
San Pablo Bay at Rodeo Flats (323)	94	2.5	97	3.3	NS
Carquinez Strait, West of Benicia army dock (405)	100	0.0	100	0.0	NS
Napa River at Vallejo Seawall (340)	100	0.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	92	3.5	93	3.3	NS
Montezuma Slough at Nurse Slough (609)	98	2.0	97	3.3	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	94	3.2	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	26.6	27.2

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		50 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.075	0.007	0.084	0.006	NS
High EC Control @ 20.00 mS/cm	0.083	0.003	-	-	NA
San Joaquin River between Hog and Turner Cuts (910)	0.102	0.007	0.124	0.005	NS
Old River at mouth of Holland Cut (915)	0.116	0.004	0.129	0.015	NS
Old River, western arm at railroad bridge (902)	0.104	0.004	0.098	0.008	NS
Sacramento River at tip of Grand Island (711)	0.077	0.010	0.077	0.007	NS
Sacramento Deep Water Channel, Light 55	0.099	0.006	0.158	0.007	NS
San Pablo Bay at Rodeo Flats (323)	0.047	0.007	0.063	0.016	NS
Carquinez Strait, West of Benicia army dock (405)	0.102	0.006	0.127	0.018	NS
Napa River at Vallejo Seawall (340)	0.099	0.008	0.119	0.013	NS
Suisun Bay off Chipps Island (508)	0.080	0.009	0.085	0.018	NS
Montezuma Slough at Nurse Slough (609)	0.094	0.011	0.068	0.030	NS
San Joaquin River, West of Oulton Point (812)	0.069	0.008	0.120	0.012	NS

	MSD	PMSD
One-way ANOVA	0.040	53.7
Two-way ANOVA	0.050	66.6

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A23-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/13/06 - 6/14/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
San Joaquin River between Hog and Turner Cuts (910)	121	20.4	7.61	9.0	7.8	0.10	0.002
Old River at mouth of Holland Cut (915)	173	22.1	7.28	8.1	5.9	0.06	0.000
Old River, western arm at railroad bridge (902)	132	21.7	7.12	10.2	3.3	0.07	0.000
Sacramento River at tip of Grand Island (711)	114	19.0	7.62	7.0	3.0	0.37	0.005
Sacramento Deep Water Channel, Light 55	425	20.7	7.6	7.8	13.8	0.02	0.000
San Pablo Bay at Rodeo Flats (323)	15650	17.9	7.4	8.3	219.7	0.16	0.001
Carquinez Strait, West of Benicia army dock (405)	1544	18.6	7.19	9.0	24.5	0.18	0.001
Napa River at Vallejo Seawall (340)	7580	17.7	7.41	8.2	30.4	0.14	0.001
Suisun Bay off Chipps Island (508)	133	19.4	7.41	8.1	9.2	0.13	0.001
Montezuma Slough at Nurse Slough (609)	188	19.7	7.61	7.2	13.8	0.06	0.001
San Joaquin River, West of Oulton Point (812)	120	21.0	7.81	7.9	4.4	0.08	0.002

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Table A23-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 6/15/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/13/06 - 6/14/06.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH				Max pH
DIEPAMHR	379	24.6	25.2	6.0	8.0	7.78	8.13	108	60	-
High EC Control @ 20.00 mS/cm	10178	24.1	26.1	6.5	8.9	7.54	8.22	-	-	-
San Joaquin River between Hog and Turner Cuts (910)	147	24.8	25.0	5.6	8.7	7.67	8.33	42	32	0.006
Old River at mouth of Holland Cut (915)	196	24.8	25.1	5.8	8.5	7.55	8.25	52	36	0.003
Old River, western arm at railroad bridge (902)	159	24.9	25.0	5.5	8.4	7.52	8.30	40	38	0.004
Sacramento River at tip of Grand Island (711)	139	24.8	24.8	5.6	8.4	7.54	8.33	48	48	0.021
Sacramento Deep Water Channel, Light 55	453	24.7	24.7	6.2	8.2	7.85	8.28	130	113	0.001
San Pablo Bay at Rodeo Flats (323)	18065	24.5	24.6	6.2	8.4	7.49	7.89	2320	77	0.002
Carquinez Strait, West of Benicia army dock (405)	1578	24.6	24.7	6.1	8.7	7.63	8.26	188	54	0.009
Napa River at Vallejo Seawall (340)	7410	24.7	24.7	6.2	8.5	7.56	8.05	876	70	0.004
Suisun Bay off Chipps Island (508)	166	24.7	24.8	5.9	8.1	7.64	8.42	44	48	0.009
Montezuma Slough at Nurse Slough (609)	215	24.5	24.6	6.0	8.8	7.62	8.34	60	52	0.004
San Joaquin River, West of Oulton Point (812)	157	24.4	26.4	5.9	8.8	7.54	8.32	46	39	0.005
DIEPAMHR + 50 ppb PBO	372	24.3	27.1	6.1	8.1	7.76	8.21	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 50 ppb PBO	150	24.2	25.1	6.2	8.6	7.48	8.24	-	-	-
Old River at mouth of Holland Cut (915) + 50 ppb PBO	200	24.1	25.7	6.0	8.3	7.53	8.22	-	-	-
Old River, western arm at railroad bridge (902) + 50 ppb PBO	159	23.8	25.0	5.8	8.6	7.55	8.30	-	-	-
Sacramento River at tip of Grand Island (711) + 50 ppb PBO	144	23.6	25.4	6.2	8.3	7.56	8.30	-	-	-
Sacramento Deep Water Channel, Light 55 + 50 ppb PBO	455	23.5	25.8	6.0	8.4	7.96	8.26	-	-	-
San Pablo Bay at Rodeo Flats (323) + 50 ppb PBO	18545	23.5	25.6	5.9	8.4	7.56	7.85	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 50 ppb PBO	1600	24.0	25.6	6.4	8.3	7.59	8.16	-	-	-
Napa River at Vallejo Seawall (340) + 50 ppb PBO	7485	23.7	25.8	5.9	8.2	7.53	8.05	-	-	-
Suisun Bay off Chipps Island (508) + 50 ppb PBO	176	23.9	25.6	6.2	8.3	7.58	8.23	-	-	-
Montezuma Slough at Nurse Slough (609) + 50 ppb PBO	219	23.6	25.4	5.9	8.2	7.57	8.11	-	-	-
San Joaquin River, West of Oulton Point (812) + 50 ppb PBO	156	23.3	25.9	5.8	8.4	7.52	8.40	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A24-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 6/16/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/15/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	96	2.4	100	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	97	3.3	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	90	4.3	100	0.0	NS
Middle of Broad Slough, West end (804)	94	2.4	100	0.0	NS
Field Dup.:Middle of Broad Slough, West end (804)	98	2.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	11.3	11.8

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.097	0.005	0.082	0.002	NS
Suisun Bay, East of middle point (504)	0.148	0.008	0.112	0.001	NS
Grizzly Bay at Dolphin (602)	0.135	0.012	0.118	0.010	NS
Sacramento R. across from Sherman Lake (704)	0.125	0.009	0.114	0.007	NS
Middle of Broad Slough, West end (804)	0.112	0.006	0.113	0.003	NS
Field Dup.:Middle of Broad Slough, West end (804)	0.109	0.008	0.140	0.012	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	0.041	42.0

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using Kruskal-Wallis tests, and calculations of MSDs were not possible.

Table A24-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/15/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	198	19.1	7.81	7.9	9.9	0.08	0.002
Grizzly Bay at Dolphin (602)	145	19.1	7.64	8.6	13.7	0.04	0.001
Sacramento R. across from Sherman Lake (704)	127	19.1	7.28	7.9	6.7	0.07	0.000
Middle of Broad Slough, West end (804)	119	20.2	7.51	7.7	6.3	0.08	0.001
Field Dup.:Middle of Broad Slough, West end (804)	119	20.2	7.51	7.7	6.0	0.08	0.001

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Table A24-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 6/16/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/15/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPMAHR	364	24.5	25.1	5.4	8.2	7.61	8.06	108	60	-
Suisun Bay, East of middle point (504)	220	24.7	25.1	5.2	8.2	7.39	8.01	54	50	0.004
Grizzly Bay at Dolphin (602)	176	24.6	25.1	5.5	8.7	7.51	7.82	56	48	0.001
Sacramento R. across from Sherman Lake (704)	159	24.6	25.1	5.4	8.2	7.42	7.97	48	48	0.003
Middle of Broad Slough, West end (804)	153	25.0	25.0	5.4	8.4	7.51	7.91	40	40	0.003
Field Dup.:Middle of Broad Slough, West end (804)	150	24.8	25.1	5.3	8.6	7.59	7.80	44	41	0.003
DIEPAMHR + 25 ppb PBO	362	24.7	25.4	6.0	8.1	7.67	8.06	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	221	24.7	25.6	5.6	8.4	7.62	7.91	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	176	24.6	25.3	5.1	8.4	7.48	7.98	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	158	24.6	25.1	5.2	8.4	7.56	7.89	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	150	24.6	25.3	5.2	8.5	7.44	7.89	-	-	-
Field Dup.:Middle of Broad Slough, West end (804) + 25 ppb PBO	156	24.6	25.3	5.1	8.3	7.49	7.93	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A25-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 6/29/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/27/06 - 6/28/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.0	100	0.0	NS
High EC Control @ 21.9 mS/cm	89	3.5	62	4.3	NS
Sacramento River at tip of Grand Island (711)	98	2.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	98	2.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	94	6.1	NS
San Joaquin River between Hog and Turner Cuts (910)	98	1.8	100	0.0	NS
Sacramento Deep Water Channel, Light 55	98	2.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Napa River at Vallejo Seawall (340)	100	0.0	100	0.0	NS
San Pablo Bay at Rodeo Flats (323)	79	6.9	83	3.8	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	97	3.3	NS
Field Dup.: Old River at mouth of Holland Cut (915)	100	0.0	-	-	NA
Field Dup.: Sacramento River at tip of Grand Island (711)	94	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	15.0	15.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.085	0.008	0.108	0.019	NS
High EC Control @ 21.9 mS/cm	0.062	0.003	0.065	0.001	NS
Sacramento River at tip of Grand Island (711)	0.103	0.007	0.102	0.020	NS
Old River, western arm at railroad bridge (902)	0.116	0.008	0.103	0.011	NS
Old River at mouth of Holland Cut (915)	0.127	0.018	0.123	0.011	NS
San Joaquin River between Hog and Turner Cuts (910)	0.120	0.005	0.129	0.013	NS
Sacramento Deep Water Channel, Light 55	0.114	0.006	0.108	0.011	NS
Suisun Bay off Chipps Island (508)	0.128	0.015	0.138	0.008	NS
Napa River at Vallejo Seawall (340)	0.108	0.009	0.104	0.020	NS
San Pablo Bay at Rodeo Flats (323)	0.065	0.006	0.058	0.007	NS
Montezuma Slough at Nurse Slough (609)	0.117	0.015	0.114	0.012	NS
Field Dup.: Old River at mouth of Holland Cut (915)	0.100	0.012	-	-	NA
Field Dup.: Sacramento River at tip of Grand Island (711)	0.086	0.008	-	-	NA

	MSD	PMSD
One-way ANOVA	0.056	66.3
Two-way ANOVA	0.060	70.6

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A25-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/27/06 - 6/28/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento River at tip of Grand Island (711)	130	22.6	7.81	7.8	8.4	0.23	0.007
Old River, western arm at railroad bridge (902)	155	24.7	7.61	7.5	5.6	0.04	0.001
Old River at mouth of Holland Cut (915)	158	25.5	7.42	7.7	7.9	0.03	0.000
San Joaquin River between Hog and Turner Cuts (910)	149	22.7	7.48	7.5	12.2	0.08	0.001
Sacramento Deep Water Channel, Light 55	367	24.3	7.28	7.0	23.2	0.02	0.000
Suisun Bay off Chipps Island (508)	269	21.7	7.66	7.8	21.0	0.00	0.000
Napa River at Vallejo Seawall (340)	11750	20.6	7.39	6.6	89.5	0.08	0.001
San Pablo Bay at Rodeo Flats (323)	20570	19.3	7.58	7.3	75.9	0.08	0.001
Montezuma Slough at Nurse Slough (609)	565	22.8	7.4	6.0	64.7	0.05	0.001
Field Dup.: Old River at mouth of Holland Cut (915)	158	25.5	7.42	7.7	9.1	0.03	0.000
Field Dup.: Sacramento River at tip of Grand Island (711)	130	22.6	7.81	7.8	7.2	0.19	0.005

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Table A25-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 6/29/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/27/06 - 6/28/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	374	24.9	25.5	6.0	8.3	7.49	9.27	108	55	-
High EC Control @ 21.9 mS/cm	21240	24.9	25.5	6.3	8.1	7.58	8.68	-	-	-
Sacramento River at tip of Grand Island (711)	165	24.5	25.4	6.0	8.7	7.65	9.35	52	52	0.022
Old River, western arm at railroad bridge (902)	171	24.7	25.5	6.0	8.8	7.50	8.58	46	34	0.003
Old River at mouth of Holland Cut (915)	186	24.5	25.4	6.2	8.6	7.48	8.32	36	37	0.001
San Joaquin River between Hog and Turner Cuts (910)	174	24.4	25.4	6.1	8.7	7.41	8.08	38	30	0.003
Sacramento Deep Water Channel, Light 55	382	25.0	25.5	5.7	8.8	7.75	8.45	108	92	0.001
Suisun Bay off Chipps Island (508)	274	24.7	25.4	6.1	8.4	7.55	8.46	60	47	0.000
Napa River at Vallejo Seawall (340)	11525	24.8	25.4	6.2	8.4	7.55	8.21	1360	70	0.002
San Pablo Bay at Rodeo Flats (323)	20860	24.9	25.5	6.3	8.8	7.56	8.08	2460	75	0.001
Montezuma Slough at Nurse Slough (609)	579	24.7	25.4	5.5	8.5	7.60	8.48	88	64	0.003
Field Dup.: Old River at mouth of Holland Cut (915)	186	24.7	25.5	6.2	8.5	7.54	8.76	46	36	0.001
Field Dup.: Sacramento River at tip of Grand Island (711)	161	24.7	25.5	6.0	8.7	7.61	8.43	52	53	0.010
DIEPAMHR + 100 ppb PBO	371	25.0	25.5	5.9	8.5	7.63	8.56	-	-	-
High EC Control @ 21.9 mS/cm + 100 ppb PBO	21505	24.8	25.5	7.0	8.4	7.72	8.30	-	-	-
Sacramento River at tip of Grand Island (711) + 100 ppb PBO	160	25.0	25.4	6.2	8.6	7.66	8.67	-	-	-
Old River, western arm at railroad bridge (902) + 100 ppb PBO	172	24.8	25.4	6.2	8.6	7.65	8.38	-	-	-
Old River at mouth of Holland Cut (915) + 100 ppb PBO	182	24.7	25.4	6.3	8.7	7.56	8.22	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 100 ppb PBO	171	24.6	25.4	6.1	8.8	7.39	8.28	-	-	-
Sacramento Deep Water Channel, Light 55 + 100 ppb PBO	374	24.7	25.4	6.1	8.6	7.82	8.59	-	-	-
Suisun Bay off Chipps Island (508) + 100 ppb PBO	267.2	24.7	25.4	6.4	8.7	7.64	8.42	-	-	-
Napa River at Vallejo Seawall (340) + 100 ppb PBO	11390	24.6	25.4	6.5	8.5	7.64	8.17	-	-	-
San Pablo Bay at Rodeo Flats (323) + 100 ppb PBO	20660	24.7	25.4	6.3	8.6	7.57	8.17	-	-	-
Montezuma Slough at Nurse Slough (609) + 100 ppb PBO	566	24.5	25.3	6.0	8.6	7.66	8.53	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A26-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 6/30/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/28/06 - 6/29/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	92	5.8	93	6.7	NS
Carquinez Strait, West of Benicia army dock (405)	98	2.0	100	0.0	NS
Grizzly Bay at Dolphin (602)	98	2.0	97	3.3	NS
Suisun Bay, East of middle point (504)	96	4.4	97	3.3	NS
Sacramento R. across from Sherman Lake (704)	92	5.4	90	0.4	NS
Middle of Broad Slough, West end (804)	90	3.2	90	5.8	NS
San Joaquin River, West of Oulton Point (812)	94	4.0	83	8.8	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	22.7	24.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.054	0.009	0.167	0.018	S (309%)
Carquinez Strait, West of Benicia army dock (405)	0.064	0.010	0.179	0.006	S (280%)
Grizzly Bay at Dolphin (602)	0.053	0.010	0.121	0.026	NS
Suisun Bay, East of middle point (504)	0.067	0.009	0.143	0.020	NS
Sacramento R. across from Sherman Lake (704)	0.038	0.010	0.074	0.009	NS
Middle of Broad Slough, West end (804)	0.134	0.035	0.145	0.038	NS
San Joaquin River, West of Oulton Point (812)	0.187	0.008	0.033	0.011	S (18%)

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	0.090	165.9

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using Kruskal-Wallis tests, and calculations of MSDs were not possible.

Table A26-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/28/06 - 6/29/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Carquinez Strait, West of Benicia army dock (405)	2924	21.1	7.69	7.6	205.7	0.10	0.002
Grizzly Bay at Dolphin (602)	662	20.8	7.41	8.6	120.7	0.02	0.000
Suisun Bay, East of middle point (504)	238	20.1	7.39	8.1	27.6	0.04	0.000
Sacramento R. across from Sherman Lake (704)	142	21.8	7.21	7.3	20.2	0.05	0.000
Middle of Broad Slough, West end (804)	138	22.6	7.61	7.8	8.7	0.00	0.000
San Joaquin River, West of Oulton Point (812)	133	22.9	7.42	7.8	9.7	0.00	0.000

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Table A26-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 6/30/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/28/06 - 6/29/06.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH				Max pH
DIEPAMHR	369	23.6	25.5	6.1	8.4	7.55	8.03	108	55	-
Carquinez Strait, West of Benicia army dock (405)	2478	23.5	25.5	6.2	8.1	7.36	7.85	308	55	0.003
Grizzly Bay at Dolphin (602)	665	23.7	25.4	6.1	8.8	7.50	7.97	96	54	0.001
Suisun Bay, East of middle point (504)	258	23.8	25.5	5.5	8.7	7.24	8.01	56	50	0.002
Sacramento R. across from Sherman Lake (704)	166	24.0	24.0	5.7	8.6	7.42	7.94	50	52	0.002
Middle of Broad Slough, West end (804)	168	23.9	24.2	5.2	8.2	7.51	8.00	42	42	0.000
San Joaquin River, West of Oulton Point (812)	149	23.7	23.7	5.7	8.4	7.54	7.95	40	40	0.000
DIEPAMHR + 50 ppb PBO	372	24.2	24.8	6.4	7.9	7.71	8.05	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 50 ppb PBO	2584	24.7	24.9	6.2	8.1	7.51	7.87	-	-	-
Grizzly Bay at Dolphin (602) + 50 ppb PBO	675	24.7	25.5	6.1	8.1	7.55	8.00	-	-	-
Suisun Bay, East of middle point (504) + 50 ppb PBO	266	24.7	25.7	6.1	8.1	7.58	7.63	-	-	-
Sacramento R. across from Sherman Lake (704) + 50 ppb PBO	180	24.7	25.3	6.0	8.3	7.55	7.99	-	-	-
Middle of Broad Slough, West end (804) + 50 ppb PBO	171	24.6	25.6	5.5	8.4	7.50	7.83	-	-	-
San Joaquin River, West of Oulton Point (812) + 50 ppb PBO	166	24.2	24.6	5.4	8.6	7.47	7.88	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A27-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 07/13/2006 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/2006 - 7/12/2006.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	96	3.7	NS
High EC Control @ 27.50 mS/cm	88	3.7	-	-	NA
Old R. at mouth of Holland Cut (902)	100	0.0	91	5.2	NS
Old R., Western Arm at Railroad Bridge (915)	100	0.0	100	0.0	NS
San Joaquin, Light 21 (910)	100	0.0	100	0.0	NS
Sac.R., at tip of Grand Island (711)	100	0.0	97	3.3	NS
Deep Water Channel @ Light 55	96	2.4	100	0.0	NS
S.P.Bay @ Rodeo Flats (323) <sup>3</sup>	34	5.1	42	6.0	NS
Napa River @ Vallejo Seawall (340) <sup>3</sup>	77	6.9	83	3.3	NS
Carquinez Straight @ Benicia (405)	98	2.0	100	0.0	NS
Suisun Bay @ Chipps Island (508)	98	1.8	97	3.3	NS
Montezuma Slough @ Nurse Slough (609)	96	4.0	93	3.3	NS

	MSD	PMSD
One-way ANOVA <sup>4</sup>	-	-
Two-way ANOVA	17.3	17.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.101	0.002	0.082	0.006	NS
High EC Control @ 27.50 mS/cm	0.028	0.004	-	-	NA
Old R. at mouth of Holland Cut (902)	0.182	0.014	0.143	0.009	NS
Old R., Western Arm at Railroad Bridge (915)	0.134	0.009	0.151	0.004	NS
San Joaquin, Light 21 (910)	0.199	0.013	0.168	0.015	NS
Sac.R., at tip of Grand Island (711)	0.159	0.007	0.141	0.017	NS
Deep Water Channel @ Light 55	0.182	0.013	0.140	0.013	NS
S.P.Bay @ Rodeo Flats (323) <sup>3</sup>	0.132	0.013	0.037	0.010	S (28%)
Napa River @ Vallejo Seawall (340) <sup>3</sup>	0.165	0.025	0.097	0.008	NS
Carquinez Straight @ Benicia (405)	0.146	0.007	0.156	0.002	NS
Suisun Bay @ Chipps Island (508)	0.156	0.009	0.146	0.003	NS
Montezuma Slough @ Nurse Slough (609)	0.175	0.011	0.204	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>4</sup>	-	-
Two-way ANOVA	0.049	48.7

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC control @ 27.50 mS/cm.

4. Survival and weight in the unmanipulated samples were compared to the control using Kruskal-Wallis tests, and calculations of MSDs were not possible.

Table A27-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/2006 - 7/12/2006.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old R. at mouth of Holland Cut (902)	223	24.1	8.18	7.06	5.08	0.04	0.003
Old R., Western Arm at Railroad Bridge (915)	214	24.6	7.29	7.41	6.54	0.02	0.000
San Joaquin, Light 21 (910)	344	24.2	7.08	6.01	12.43	0.20	0.001
Sac.R., at tip of Grand Island (711)	250	22.4	7.52	8.07	9.24	0.09	0.001
Deep Water Channel @ Light 55	413	23.1	7.79	7.24	68.90	0.10	0.003
S.P.Bay @ Rodeo Flats (323)	26420	19.9	7.71	7.71	73.43	0.08	0.001
Napa River @ Vallejo Seawall (340)	18110	19.9	7.58	7.58	25.53	0.04	0.000
Carquinez Straight @ Benicia (405)	9640	20.1	9.64	9.64	82.70	0.08	0.045
Suisun Bay @ Chipps Island (508)	987	22.1	7.57	8.10	15.80	0.00	0.000
Montezuma Slough @ Nurse Slough (609)	714	22.2	7.44	7.60	82.20	0.04	0.000

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Table A27-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 7/13/2006 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/2006 - 7/12/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	378	24.8	25.8	5.3	8.2	7.62	7.92	108	63	-
High EC Control @ 27.50 mS/cm	26670	24.9	25.7	5.8	8.4	7.59	7.96	-	-	-
Old R. at mouth of Holland Cut (902)	189	24.9	25.6	5.4	8.6	7.58	8.10	46	44	0.002
Old R., Western Arm at Railroad Bridge (915)	194	24.8	25.5	5.2	8.2	7.54	8.22	42	40	0.002
San Joaquin, Light 21 (910)	325	24.7	25.6	5.9	8.3	7.58	7.79	72	52	0.006
Sac.R., at tip of Grand Island (711)	175	25.0	25.4	5.7	8.4	7.66	7.94	52	56	0.004
Deep Water Channel @ Light 55	389	24.7	25.6	5.9	8.3	7.86	8.09	108	88	0.006
S.P.Bay @ Rodeo Flats (323)	25700	24.4	25.5	5.6	8.3	7.55	7.62	2800	200	0.001
Napa River @ Vallejo Seawall (340)	17890	24.6	25.5	6.2	8.5	7.60	7.78	1960	160	0.001
Carquinez Straight @ Benicia (405)	9650	24.5	25.5	5.9	8.3	7.48	7.76	1040	120	0.002
Suisun Bay @ Chipps Island (508)	978	24.4	25.4	6.0	8.2	7.64	7.99	122	52	0.000
Montezuma Slough @ Nurse Slough (609)	744	24.6	25.4	6.1	8.2	7.72	8.18	102	70	0.003
DIEPAMHR + 50 ppb PBO	389	24.7	25.4	6.1	8.3	7.70	8.09	-	-	-
Old R. at mouth of Holland Cut (902) + 50 ppb PBO	184	24.5	25.4	6.1	8.4	7.60	8.22	-	-	-
Old R., Western Arm at Railroad Bridge (915) + 50 ppb PBO	193	24.6	25.4	6.0	8.3	7.58	7.93	-	-	-
San Joaquin, Light (910) + 50 ppb PBO	320	24.3	25.3	6.2	8.2	7.64	7.86	-	-	-
Sac.R., at tip of Grand Island (711) + 50 ppb PBO	191	24.4	25.3	6.3	8.4	7.72	8.09	-	-	-
Deep Water Channel @ Light 55 + 50 ppb PBO	383	24.3	25.3	6.4	8.4	7.86	8.24	-	-	-
S.P.Bay @ Rodeo Flats (323) + 50 ppb PBO	25795	24.3	25.2	6.0	8.3	7.59	7.69	-	-	-
Napa River @ Vallejo Seawall (340) + 50 ppb PBO	17590	24.2	25.3	6.5	8.3	7.64	7.80	-	-	-
Carquinez Straight @ Benicia (405) + 50 ppb PBO	9600	24.3	25.2	6.0	8.4	7.53	7.70	-	-	-
Suisun Bay @ Chipps Island (508) + 50 ppb PBO	982.5	24.1	25.3	6.0	8.4	7.62	8.14	-	-	-
Montezuma Slough @ Nurse Slough (609) + 50 ppb PBO	749.5	24.3	25.3	6.2	8.3	7.73	8.20	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A28-1. Survival of *H. azteca* in a Toxicity Identification Evaluation initiated on 7/24/06 examining an ambient water column sample collected at San Pablo Bay at Rodeo Flats (POD site 323) on 7/12/06.<sup>1</sup>

Treatment	Survival (%) <sup>2</sup>									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
DIEPAMHR	100	100	100	100	100	100	100	100	100	100
DIEPAMHR (HA) @ 1436 mg/L	100	100	100	100	100	100	100	100	100	100
DIEPAMHR (HA) + MeOH @ 0.5%	100	100	100	100	100	100	100	100	100	100
DIEPAMHR (HA) + eluate addback @ 3x	100	93	87	53	53	53	53	53	53	53
DIEPAMHR (HA) + 1436 mg/L EDTA	47	0	0	0	-	-	-	-	-	-
DIEPAMHR (HA) + 718 mg/L EDTA	92	68	30	8	-	-	-	-	-	-
DIEPAMHR (HA) + 359 mg/L EDTA	100	100	100	100	-	-	-	-	-	-
DIEPAMHR (HA) + 179.5 mg/L EDTA	100	100	100	100	-	-	-	-	-	-
DIEPAMHR (HA) + 2872 mg/L STS	100	80	49	11	-	-	-	-	-	-
DIEPAMHR (HA) + 1436 mg/L STS	100	82	66	66	-	-	-	-	-	-
DIEPAMHR (HA) + 718 mg/L STS	100	60	47	33	-	-	-	-	-	-
DIEPAMHR (HA) + 359 mg/L STS	100	92	92	28	-	-	-	-	-	-
DIEPAMHR (HA) air stripped	100	100	100	100	100	100	100	100	93	93
DIEPAMHR C8 Blank	100	100	100	100	100	100	100	100	100	100
323	100	100	100	100	100	100	100	92	83	83
323 + 2800 mg/L EDTA	100	0	0	0	-	-	-	-	-	-
323 + 1400 mg/L EDTA	100	20	0	0	-	-	-	-	-	-
323 + 700 mg/L EDTA	93	53	13	0	-	-	-	-	-	-
323 + 350 mg/L EDTA	100	80	80	53	-	-	-	-	-	-
323 + 5600 mg/L STS	100	20	0	0	-	-	-	-	-	-
323 + 2800 mg/L STS	100	7	0	0	-	-	-	-	-	-
323 + 1400 mg/L STS	100	13	13	0	-	-	-	-	-	-
323 + 700 mg/L STS	100	27	0	0	-	-	-	-	-	-
323 air stripped	100	100	100	100	67	67	67	67	53	53
323 C8 Rinsate	100	100	87	58	52	52	52	52	28	22

1. Sample was filtered through a C8 column on 7/21/06.
2. Highlighted areas indicate mean survival less than 50%.
3. EDTA and STS treated samples were only tested through Day 4, because they clearly reduced *Hyalella* survival relative to the untreated sample, indicating that metals were not detected as a cause of toxicity.

Table A29-1. Survival of *H. azteca* in a Toxicity Identification Evaluation initiated on 08/01/06 examining an ambient water column sample collected at San Pablo Bay at Rodeo Flats (POD site 323) on 7/12/06.<sup>1</sup>

Treatment	Survival (%) <sup>2</sup>									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
DIEPAMHR	100	100	100	100	100	100	100	100	100	100
Diluted Seawater @ 2740 mg/L	100	93	93	87	87	87	87	87	87	87
Diluted Seawater + 120 mg/L EDTA	100	100	93	80	73	73	73	73	73	73
Diluted Seawater + 60 mg/L EDTA	100	100	100	100	93	93	93	93	93	93
Diluted Seawater + 30 mg/L EDTA	100	100	100	100	89	89	82	82	82	82
Diluted Seawater + 25 mg/L STS	100	100	100	80	67	67	67	53	53	53
Diluted Seawater + 12.5 mg/L STS	93	93	87	80	80	80	73	73	73	73
Diluted Seawater + 6.25 mg/L STS	100	100	93	80	73	73	67	67	67	67
POD 323	100	92	92	92	92	83	83	83	83	83
POD 323 + 120 mg/L EDTA	100	100	100	87	87	87	87	87	87	87
POD 323 + 60 mg/L EDTA	87	87	80	73	73	73	73	73	73	73
POD 323 + 30 mg/L EDTA	93	93	65	50	50	50	43	43	37	37
POD 323 + 25 mg/L STS	93	93	37	37	37	37	37	37	28	28
POD 323 + 12.5 mg/L STS	100	100	93	80	80	73	73	73	73	73
POD 323 + 6.25 mg/L STS	100	100	93	67	67	60	60	60	60	60
Diluted Seawater @ 20 ppt	20	20	13	7	7	0	0	0	0	0
Diluted Seawater @ 18 ppt	60	53	27	20	20	20	13	13	13	13
Diluted Seawater @ 16 ppt	80	80	73	67	67	53	53	53	53	53
Diluted Seawater @ 14 ppt	93	93	93	87	87	80	80	80	80	80
Diluted Seawater @ 12 ppt	93	93	87	87	87	87	87	87	87	87

1. Sample was filtered through a C8 column on 7/21/06.
2. Highlighted areas indicate mean survival less than 50%.

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Table A30-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 07/14/2006 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/13/2006.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	98	2.0	100	0.0	NS
Grizzly Bay @ Dolphin (602)	98	2.0	100	0.0	NS
Suisun Bay @ Middle Point (504)	84	9.3	97	3.0	NS
Sac. River @ Sherman Lake (704)	100	0.0	97	3.3	NS
Broad Slough, West End (804)	98	2.0	100	0.0	NS
SJR @ West of Oulton Point (812)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	18.8	19.2

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.114	0.006	0.145	0.007	NS
Grizzly Bay @ Dolphin (602)	0.159	0.007	0.166	0.014	NS
Suisun Bay @ Middle Point (504)	0.169	0.021	0.148	0.008	NS
Sac. River @ Sherman Lake (704)	0.192	0.013	0.178	0.010	NS
Broad Slough, West End (804)	0.177	0.005	0.172	0.000	NS
SJR @ West of Oulton Point (812)	0.169	0.004	0.173	0.003	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	0.054	46.9

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using Kruskal-Wallis tests, and calculations of MSDs were not possible.

Table A30-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/13/2006.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Grizzly Bay @ Dolphin (602)	5800	21.1	7.85	8.34	62.10	0.05	0.001
Suisun Bay @ Middle Point (504)	6700	21.3	7.49	7.90	13.87	0.04	0.001
Sac. River @ Sherman Lake (704)	225.4	22.2	7.73	8.10	24.40	0.04	0.001
Broad Slough, West End (804)	229.3	23.6	7.35	7.50	9.41	0.04	0.000
SJR @ West of Oulton Point (812)	145.7	23.3	7.50	7.70	10.27	0.02	0.000

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Table A30-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 07/14/2006 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/13/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	364	24.5	24.8	5.3	8.2	7.46	8.03	108	63	-
Grizzly Bay @ Dolphin (602)	5370	24.0	24.4	5.3	8.3	7.23	7.77	610	80	0.0012
Suisun Bay @ Middle Point (504)	6615	24.4	24.6	4.9	8.8	7.21	7.64	798	91	0.0007
Sac. River @ Sherman Lake (704)	256	24.7	24.7	5.0	8.6	7.32	8.04	56	55	0.0022
Broad Slough, West End (804)	254	24.5	24.9	5.1	8.9	7.40	7.99	56	48	0.0019
SJR @ West of Oulton Point (812)	172	24.4	26.1	5.6	8.6	7.41	7.90	48	49	0.0008
DIEPAMHR + 50 ppb PBO	375	24.3	26.1	5.4	8.3	7.37	8.09	-	-	-
Grizzly Bay @ Dolphin (602) + 50 ppb PBO	5385	24.5	26.3	5.4	8.7	7.24	7.82	-	-	-
Suisun Bay @ Middle Point (504) + 50 ppb PBO	6570	24.8	26.2	5.1	8.6	7.21	7.69	-	-	-
Sac. River @ Sherman Lake (704) + 50 ppb PBO	289	24.6	26.3	5.5	8.6	7.43	8.01	-	-	-
Broad Slough, West End (804) + 50 ppb PBO	254	24.7	26.1	5.1	8.2	7.24	7.97	-	-	-
SJR @ West of Oulton Point (812) + 50 ppb PBO	172	24.7	26.1	5.0	8.3	7.30	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A31-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 07/27/2006 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 07/25/2006 and 07/26/2006.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	98	2.0	97	3.3	NS
Sacramento River Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711)	100	0.0	100	0.0	NS
Old River - Western Arm to Railroad Bridge (902)	100	0.0	100	0.0	NS
San Joaquin River between Hog and Turner Cut (910)	98	2.2	100	0.0	NS
Old River at Holland Cut (915)	98	1.8	93	3.3	NS
Suisun Bay at Chipps Island (508)	90	2.9	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	97	3.3	NS
Broad Slough, West End (804)	100	0.0	100	0.0	NS
Sacramento River, North side across from Sherman Lake (704)	100	0.0	96	3.7	NS
San Joaquin River, West of Oulton Point (812)	96	2.4	100	0.0	NS
Field Duplicate: Old River at Holland Cut (915)	100	0.0	97	3.3	NS

One-way ANOVA<sup>3</sup>  
Two-way ANOVA

MSD	PMSD
-	-
9.4	9.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	0.066	0.005	0.060	0.002	NS
Sacramento River Deep Water Channel, Light 55	0.101	0.005	0.086	0.003	NS
Sacramento River at tip of Grand Island (711)	0.078	0.004	0.070	0.008	NS
Old River - Western Arm to Railroad Bridge (902)	0.084	0.010	0.050	0.004	NS
San Joaquin River between Hog and Turner Cut (910)	0.096	0.008	0.086	0.003	NS
Old River at Holland Cut (915)	0.066	0.002	0.068	0.015	NS
Suisun Bay at Chipps Island (508)	0.070	0.006	0.073	0.010	NS
Montezuma Slough at Nurse Slough (609)	0.103	0.019	0.088	0.015	NS
Broad Slough, West End (804)	0.100	0.007	0.088	0.011	NS
Sacramento River, North side across from Sherman Lake (704)	0.077	0.007	0.077	0.004	NS
San Joaquin River, West of Oulton Point (812)	0.071	0.005	0.084	0.002	NS
Field Duplicate: Old River at Holland Cut (915)	0.086	0.006	0.082	0.003	NS

One-way ANOVA<sup>3</sup>  
Two-way ANOVA

MSD	PMSD
-	-
0.046	69.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in the unmanipulated samples were compared to the control using Kruskal-Wallis tests, and calculations of MSDs were not possible.

Table A31-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 07/25/2006 - 07/26/2006.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC <sup>1</sup> (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento River Deep Water Channel, Light 55	-	28.6	7.89	6.97	13.13	0.00	-
Sacramento River at tip of Grand Island (711)	-	25.0	7.57	7.37	4.73	0.08	-
Old River - Western Arm to Railroad Bridge (902)	-	27.2	7.96	7.61	3.32	0.00	-
San Joaquin River between Hog and Turner Cut (910)	-	28.6	7.19	6.83	5.45	0.07	-
Old River at Holland Cut (915)	-	28.0	7.52	6.35	3.81	0.07	-
Suisun Bay at Chipps Island (508)	6810	24.7	7.78	7.26	10.77	0.00	0.000
Montezuma Slough at Nurse Slough (609)	2323	26.3	6.76	5.13	39.53	0.04	0.000
Broad Slough, West End (804)	263	26.5	6.98	6.54	4.77	0.07	0.000
Sacramento River, North side across from Sherman Lake (704)	279	25.3	7.24	6.85	14.30	0.05	0.000
San Joaquin River, West of Oulton Point (812)	178	26.3	6.96	6.50	8.17	0.07	0.000
Field Duplicate: Old River at Holland Cut (915)	-	28.0	7.52	6.35	3.42	0.10	-

1: Instrument malfunctioned at some sites.

Table A31-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 07/27/2006 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 07/25/2006 - 07/26/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
Lab Control (DIEPAMHR)	359	24.1	26.1	6.5	8.3	7.62	8.09	108	59	-
Sacramento River Deep Water Channel, Light 55	318	24.6	26.0	6.1	8.3	7.70	8.14	96	80	0.000
Sacramento River at tip of Grand Island (711)	146	22.6	24.3	5.7	8.3	7.59	8.07	52	52	0.004
Old River - Western Arm to Railroad Bridge (902)	176	24.4	24.5	5.8	8.2	7.63	8.05	60	38	0.000
San Joaquin River between Hog and Turner Cut (910)	384	24.3	24.4	6.3	8.2	7.59	8.07	92	66	0.004
Old River at Holland Cut (915)	170	24.3	24.6	5.7	8.2	7.66	8.04	52	50	0.004
Suisun Bay at Chipps Island (508)	168	24.3	25.9	5.8	8.3	7.43	8.01	56	58	0.000
Montezuma Slough at Nurse Slough (609)	6200	24.2	26.0	5.9	8.3	7.30	7.78	744	70	0.001
Broad Slough, West End (804)	2223	24.2	24.8	6.4	8.2	7.30	7.79	280	66	0.002
Sacramento River, North side across from Sherman Lake (704)	277	24.2	25.2	5.9	8.2	7.54	8.01	68	52	0.002
San Joaquin River, West of Oulton Point (812)	292	24.2	26.1	6.1	8.2	7.48	8.06	68	56	0.004
Field Duplicate: Old River at Holland Cut (915)	188	24.3	26.2	6.0	8.2	7.43	8.08	60	52	0.006
Lab Control (DIEPAMHR) + 25 ppb PBO	352	23.7	25.1	6.3	8.3	7.65	8.12	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb	238	23.9	25.1	6.3	8.3	7.57	8.21	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	163	23.9	25.3	6.1	8.4	7.58	8.18	-	-	-
Old River - Western Arm to Railroad Bridge (902) + 25 ppb PBO	173	23.9	25.5	6.2	8.2	7.46	8.04	-	-	-
San Joaquin River between Hog and Turner Cut (910) + 25 ppb PBO	375	23.8	25.4	6.3	8.4	7.61	8.05	-	-	-
Old River at Holland Cut (915) + 25 ppb PBO	186	23.8	25.9	6.1	8.3	7.46	8.07	-	-	-
Suisun Bay at Chipps Island (508) + 25 ppb PBO	174	23.8	26.4	6.2	8.3	7.46	8.05	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	6120	23.9	26.2	6.0	8.2	7.37	7.94	-	-	-
Broad Slough, West End (804) + 25 ppb PBO	2182	24.1	26.2	6.5	8.2	7.64	8.10	-	-	-
Sacramento River, North side across from Sherman Lake (704) + 25 ppb PBO	1636	23.9	26.3	6.3	8.3	7.54	8.11	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	282	24.1	26.5	6.3	8.5	7.63	8.10	-	-	-
Field Duplicate: Old River at Holland Cut (915) + 25 ppb PBO	178	24.0	26.5	6.2	8.3	7.56	8.05	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A32-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 07/28/2006 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 07/27/2006.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	100	0.0	90	5.8	NS
High EC Control @ 30.00 mS	0	0.0	0	0.0	NS
Grizzly Bay @ Dolphin(602) <sup>3</sup>	93	6.7	97	3.0	NS
Napa River @ Vallejo Seawall (340) <sup>3</sup>	46	14.9	31	20.7	NS
S.P. Bay @ Rodeo Flats (323) <sup>3</sup>	5	2.8	15	9.8	NS
Carquinez Straight @ Benicia (405) <sup>3</sup>	91	6.5	70	9.8	NS
Suisun Bay @ Middle Point (504)	94	2.4	97	3.3	NS
Bottle Blank	82	7.2	-	-	NA

	MSD	PMSD
One-way ANOVA <sup>4</sup>	-	-
Two-way ANOVA	44.9	44.9

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.056	0.004	0.044	0.003	NS
High EC Control @ 30.00 mS	-	-	-	-	NA
Grizzly Bay @ Dolphin(602) <sup>3</sup>	0.049	0.009	0.056	0.015	NS
Napa River @ Vallejo Seawall (340) <sup>3</sup>	0.031	0.008	0.007	0.015	NS
S.P. Bay @ Rodeo Flats (323) <sup>3</sup>	0.010	0.010	0.003	0.009	NS
Carquinez Straight @ Benicia (405) <sup>3</sup>	0.059	0.002	0.036	0.005	NS
Suisun Bay @ Middle Point (504)	0.077	0.010	0.053	0.011	NS
Bottle Blank	0.035	0.005	-	-	NA

	MSD	PMSD
One-way ANOVA <sup>4</sup>	-	-
Two-way ANOVA	0.042	75.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival and weight in these high conductivity samples could not be evaluated statistically due to 100% mortality in the High EC Control @ 30.00 mS/cm.

4. Survival and weight in the unmanipulated samples were compared to the control using Kruskal-Wallis tests, and calculations of MSDs were not possible.

Table A32-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 07/27/2006.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Grizzly Bay @ Dolphin (602)	11500	22.6	7.94	7.65	200.67	0.12	0.003
Napa River @ Vallejo Seawall (340)	23560	22.2	7.32	6.16	15.20	0.04	0.000
S.P. Bay @ Rodeo Flats (323)	30260	21.9	7.32	6.73	19.77	0.08	0.000
Carquinez Straight @ Benicia (405)	15520	23.1	7.29	6.95	97.40	0.13	0.001
Suisun Bay @ Middle Point (504)	5140	24.6	7.14	6.98	19.97	0.05	0.000
Bottle Blank	289	19.9	8.4	8.70	0.50	0.01	0.001

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Table A32-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 07/28/2006 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 07/27/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	354	22.7	24.2	6.1	8.1	7.60	8.04	108	63	-
High EC Control @ 30.00 mS	30575	22.1	24.2	8.1	8.7	7.86	7.88	-	-	-
Grizzly Bay @ Dolphin(602)	10865	22.8	24.2	6.4	8.3	7.38	7.85	1200	110	0.003
Napa River @ Vallejo Seawall (340)	21540	22.8	24.2	5.8	8.2	7.38	7.70	2400	250	0.001
S.P. Bay @ Rodeo Flats (323)	28295	22.8	24.0	6.1	8.4	7.46	7.73	3450	250	0.001
Carquinez Straight @ Benicia (405)	14460	22.8	24.0	6.5	8.2	7.50	7.76	3400	100	0.003
Suisun Bay @ Middle Point (504)	5070	22.8	24.0	6.4	8.4	7.55	7.81	500	30	0.001
Bottle Blank	393	22.8	24.2	6.3	8.2	7.62	8.16	68	60	0.001
DIEPAMHR + 25 ppb PBO	364	22.8	23.3	6.5	8.3	7.77	8.09	-	-	-
High EC Control @ 30.00 mS + 25 ppb PBO	28890	23.3	23.3	6.8	8.4	7.58	7.88	-	-	-
Grizzly Bay @ Dolphin(602) + 25 ppb PBO	10680	22.8	23.3	6.6	8.4	7.50	7.84	-	-	-
Napa River @ Vallejo Seawall (340) + 25 ppb PBO	21665	22.8	23.7	6.2	8.2	7.49	7.77	-	-	-
S.P. Bay @ Rodeo Flats (323) + 25 ppb PBO	26295	22.8	23.3	6.3	8.5	7.47	7.80	-	-	-
Carquinez Straight @ Benicia (405) + 25 ppb PBO	14235	22.8	23.3	6.2	8.4	7.52	7.81	-	-	-
Suisun Bay @ Middle Point (504) + 25 ppb PBO	5015	22.8	23.2	6.4	8.2	7.49	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A33-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 8/10/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/08/06 - 8/09/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	96	2.4	100	0.0	NS
High EC Control @ 13.85 mS/cm	90	3.2	89	6.4	NS
High EC Control @ 22.7 mS/cm	25	7.2	85	9.8	S (340%)
Sacramento Deep Water Channel, Light 55	98	1.8	100	0.0	NS
Sacramento River at tip of Grand Island (711)	98	2.0	97	3.3	NS
Old River, western arm at railroad bridge (902)	98	2.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	96	2.4	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS
Napa River at Riverside Blvd. terminus (340)	86	4.2	82	7.8	NS
Carquinez Strait, West of Benicia army dock (405)	84	4.0	93	3.3	NS
Field Dup.: Carquinez Strait, West of Benicia army dock (405)	94	4.0	-	-	NA

	MSD	PMSD
One-way ANOVA	15.5	16.2
Two-way ANOVA	18.2	18.9

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.057	0.008	0.038	0.008	NS
High EC Control @ 13.85 mS/cm	0.067	0.006	0.055	0.007	NS
High EC Control @ 22.7 mS/cm	0.037	0.005	0.037	0.003	NS
Sacramento Deep Water Channel, Light 55	0.111	0.005	0.126	0.003	NS
Sacramento River at tip of Grand Island (711)	0.098	0.008	0.069	0.006	NS
Old River, western arm at railroad bridge (902)	0.094	0.007	0.099	0.007	NS
San Joaquin River between Hog and Turner Cuts (910)	0.140	0.008	0.125	0.014	NS
Old River at mouth of Holland Cut (915)	0.071	0.019	0.087	0.018	NS
Suisun Bay off Chipps Island (508)	0.106	0.016	0.107	0.011	NS
Montezuma Slough at Nurse Slough (609)	0.103	0.018	0.153	0.016	NS
Napa River at Riverside Blvd. terminus (340)	0.094	0.033	0.043	0.002	NS
Carquinez Strait, West of Benicia army dock (405)	0.078	0.004	0.083	0.005	NS
Field Dup.: Carquinez Strait, West of Benicia army dock (405)	0.074	0.006	-	-	NA

	MSD	PMSD
One-way ANOVA	0.066	116.0
Two-way ANOVA	0.072	125.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A33-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/08/06 - 8/09/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento Deep Water Channel, Light 55	274	22.0	7.95	7.9	13.7	0.05	0.002
Sacramento River at tip of Grand Island (711)	145	21.1	7.68	8.1	7.7	0.08	0.002
Old River, western arm at railroad bridge (902)	230	22.5	8.45	7.6	4.1	0.02	0.002
San Joaquin River between Hog and Turner Cuts (910)	437	24.9	7.41	5.3	12.9	0.44	0.006
Old River at mouth of Holland Cut (915)	234	24.2	7.58	7.0	4.9	0.06	0.001
Suisun Bay off Chipps Island (508)	4526	21.3	7.62	8.2	11.5	0.08	0.001
Montezuma Slough at Nurse Slough (609)	4200	22.4	7.58	7.8	35.5	0.05	0.001
Napa River at Riverside Blvd. terminus (340)	22700	22.1	7.84	6.3	16.0	0.00	0.000
Carquinez Strait, West of Benicia army dock (405)	13850	22.2	7.84	7.6	45.0	0.05	0.001
Field Dup.: Carquinez Strait, West of Benicia army dock (405)	13850	22.2	7.84	7.6	45.0	0.00	0.000

Table A33-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 8/10/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/08/06 and 8/09/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	335	24.8	25.1	5.8	8.3	7.55	8.10	108	63	-
High EC Control @ 13.85 mS	13560	24.9	24.9	6.6	8.4	7.59	7.82	1560	100	-
High EC Control @ 22.7 mS	22285	24.7	25.0	6.6	8.4	7.55	7.79	2400	180	-
Sacramento Deep Water Channel, Light 55	288	24.8	24.9	5.9	8.3	7.72	8.26	80	76	0.004
Sacramento River at tip of Grand Island (711)	225	25.0	25.0	5.9	8.2	7.64	8.21	54	58	0.006
Old River, western arm at railroad bridge (902)	241	24.9	24.9	6.1	8.4	7.56	8.22	58	52	0.002
San Joaquin River between Hog and Turner Cuts (910)	436	22.8	24.5	5.8	8.5	7.58	7.91	100	71	0.015
Old River at mouth of Holland Cut (915)	239	24.3	24.6	5.9	8.4	7.55	8.00	64	56	0.003
Suisun Bay off Chipps Island (508)	2381	23.6	24.9	6.2	8.4	7.49	7.89	476	72	0.002
Montezuma Slough at Nurse Slough (609)	4023	24.1	24.8	6.2	8.3	7.57	7.89	452	82	0.002
Napa River at Riverside Blvd. terminus (340)	21530	24.4	24.7	5.6	8.2	7.41	7.69	3080	220	0.000
Carquinez Strait, West of Benicia army dock (405)	13005	24.2	24.7	6.4	8.2	7.48	7.80	1480	110	0.001
Field Dup.: Carquinez Strait, West of Benicia army dock (405)	6441	23.7	24.6	6.2	8.4	7.42	7.71	2860	100	0.000
DIEPAMHR + 25 ppb PBO	338	24.7	24.9	5.8	8.4	7.62	8.16	-	-	-
High EC Control @ 22.7 mS + 25 ppb PBO	22270	24.8	24.9	6.2	8.3	7.48	7.84	-	-	-
High EC Control @ 13.85 mS + 25 ppb PBO	13595	24.6	24.9	6.7	8.5	7.57	7.80	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	351	24.7	25.0	6.0	8.5	7.69	8.24	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	166	24.6	25.0	5.6	8.6	7.60	8.10	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	242	24.4	24.9	6.0	8.6	7.56	8.11	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	432	23.8	24.8	6.1	8.6	7.49	7.94	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	240.85	23.5	25.0	6.0	8.6	7.51	7.95	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	4400	23.9	25.0	6.0	8.7	7.26	7.75	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	4032	24.3	25.0	6.1	8.7	7.39	7.83	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	20835	24.0	25.0	6.0	8.2	7.60	7.65	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	12940	24.6	25.0	6.6	8.5	7.47	7.82	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A34-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 08/11/2006 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/10/2006.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.0	97	3.3	NS
High EC Control @ 10.38 mS/cm	100	0.0	87	3.3	NS
Suisun Bay, East of middle point (504)	94	2.4	100	0.0	NS
Grizzly Bay at Dolphin (602)	92	4.1	80	11.5	NS
Sacramento R. across from Sherman Lake (704)	98	2.0	94	3.2	NS
Middle of Broad Slough, West end (804)	100	0.0	93	3.3	NS
San Joaquin River, West of Oulton Point (812)	98	2.0	93	3.5	NS

	MSD	PMSD
One-way ANOVA <sup>3</sup>	-	-
Two-way ANOVA	16.6	17.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.116	0.012	0.069	0.011	NS
High EC Control @ 10.38 mS/cm	0.100	0.004	0.080	0.008	NS
Suisun Bay, East of middle point (504)	0.110	0.010	0.089	0.009	NS
Grizzly Bay at Dolphin (602)	0.059	0.005	0.086	0.008	NS
Sacramento R. across from Sherman Lake (704)	0.135	0.020	0.135	0.007	NS
Middle of Broad Slough, West end (804)	0.171	0.006	0.127	0.003	NS
San Joaquin River, West of Oulton Point (812)	0.124	0.012	0.131	0.012	NS

	MSD	PMSD
One-way ANOVA	0.056	48.6
Two-way ANOVA	0.056	48.6

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. Survival in the unmanipulated samples was compared to the control using a Kruskal-Wallis test, and calculation of an MSD was not possible.

Table A34-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/10/2006.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	10230	21.5	7.84	8.0	31.8	0.06	0.001
Grizzly Bay at Dolphin (602)	10380	22.4	8.14	8.5	12.4	0.03	0.001
Sacramento R. across from Sherman Lake (704)	229	21.9	7.92	8.1	20.8	0.09	0.003
Middle of Broad Slough, West end (804)	340	22.8	8.01	8.0	11.1	0.03	0.001
San Joaquin River, West of Oulton Point (812)	206	24.3	7.88	7.7	8.4	0.05	0.002

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Table A34-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 08/11/2006 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/10/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	309	24.2	26.3	6.1	8.5	7.59	8.10	108	63	-
High EC Control @ 10.38 mS/cm	10090	24.1	26.3	6.4	8.9	7.37	7.94	1200	120	-
Suisun Bay, East of middle point (504)	9685	24.1	26.2	6.4	8.5	7.40	7.81	980	190	0.002
Grizzly Bay at Dolphin (602)	9760	24.1	26.1	6.5	8.8	7.37	7.94	980	110	0.001
Sacramento R. across from Sherman Lake (704)	331	24.1	26.1	6.5	8.6	7.80	8.19	60	60	0.007
Middle of Broad Slough, West end (804)	334	24.1	26.1	6.1	8.5	7.66	8.23	68	36	0.003
San Joaquin River, West of Oulton Point (812)	207	24.3	26.0	6.1	8.4	7.64	7.97	56	58	0.003
DIEPAMHR + 25 ppb PBO	316	24.1	25.4	6.3	8.5	7.56	8.19	-	-	-
High EC Control @ 10.38 mS/cm + 25 ppb PBO	9935	24.1	25.4	6.7	8.8	7.22	7.96	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	9585	24.1	25.2	6.8	8.4	7.33	7.86	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	5245	24.3	25.2	6.8	8.5	7.37	7.96	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	287	24.2	25.2	6.3	8.7	7.67	8.02	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	336	24.1	25.1	6.0	8.5	7.63	8.13	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	186	24.1	25.0	6.2	8.8	7.54	8.06	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A35-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 08/24/2006 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/22/06 - 08/23/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	97	3.3	NS
High EC Control @ 19 mS/cm	65	10.3	44	23.1	NS
Old River at mouth of Holland Cut (915)	98	2.0	93	6.7	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	96	2.4	100	0.0	NS
Sacramento River at tip of Grand Island (711)	98	2.0	43	26.0	S (44%)
Sacramento Deep Water Channel, Light 55	100	0.0	97	3.0	NS
Montezuma Slough at Nurse Slough (609)	98	2.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	98	1.8	97	3.3	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	86	5.1	77	6.7	NS
Grizzly Bay at Dolphin (602)	96	2.8	100	0.0	NS
Napa River at Vallejo Seawall (340) <sup>3</sup>	92	3.7	86	3.0	NS
Field Duplicate: Montezuma Slough at Nurse Slough (609)	92	3.8	-	-	NA

	MSD	PMSD
One-way ANOVA	19.8	19.8
Two-way ANOVA	24.0	24.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.090	0.005	0.076	0.010	NS
High EC Control @ 19 mS/cm	0.036	0.001	0.033	0.001	NS
Old River at mouth of Holland Cut (915)	0.131	0.007	0.126	0.011	NS
San Joaquin River between Hog and Turner Cuts (910)	0.135	0.010	0.128	0.005	NS
Old River, western arm at railroad bridge (902)	0.124	0.016	0.059	0.007	S (48%)
Sacramento River at tip of Grand Island (711)	0.105	0.006	0.039	0.011	S (37%)
Sacramento Deep Water Channel, Light 55	0.138	0.004	0.065	0.014	S (47%)
Montezuma Slough at Nurse Slough (609)	0.106	0.010	0.048	0.006	S (45%)
Suisun Bay off Chipps Island (508)	0.100	0.016	0.064	0.009	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.060	0.005	0.065	0.003	NS
Grizzly Bay at Dolphin (602)	0.105	0.012	0.070	0.014	NS
Napa River at Vallejo Seawall (340) <sup>3</sup>	0.062	0.005	0.048	0.005	NS
Field Duplicate: Montezuma Slough at Nurse Slough (609)	0.134	0.005	-	-	NA

	MSD	PMSD
One-way ANOVA	0.052	58.3
Two-way ANOVA	0.052	57.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the 19 mS/cm High EC control.

Table A35-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/22/2006 - 08/23/2006.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River at mouth of Holland Cut (915)	259	22.0	7.80	7.8	4.0	0.02	0.001
San Joaquin River between Hog and Turner Cuts (910)	409	22.3	7.19	6.1	10.3	0.26	0.002
Old River, western arm at railroad bridge (902)	284	21.5	8.02	8.3	4.1	0.01	0.000
Sacramento River at tip of Grand Island (711)	155	21.8	7.29	7.8	8.0	0.19	0.002
Sacramento Deep Water Channel, Light 55	356	23.9	7.86	7.9	23.4	0.04	0.001
Montezuma Slough at Nurse Slough (609)	5420	20.4	7.42	7.8	74.6	0.10	0.001
Suisun Bay off Chipps Island (508)	3699	19.9	7.45	8.1	23.2	0.08	0.001
Carquinez Strait, West of Benicia army dock (405)	1795	20.3	7.62	7.9	35.0	0.13	0.002
Grizzly Bay at Dolphin (602)	1086	19.5	7.63	8.1	101.5	0.07	0.001
Napa River at Vallejo Seawall (340)	1683	22.7	7.51	6.7	6.2	0.02	0.000
Field Duplicate: Montezuma Slough at Nurse Slough (609)	-	-	-	-	64.8	0.10	-

Table A35-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 08/24/2006 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/22/2006 - 08/23/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	352	23.3	24.1	6.6	8.4	7.58	8.15	106	59	-
High EC Control @ 19 mS/cm	18945	23.2	24.1	6.8	8.3	7.49	8.09	3160	160	-
Old River at mouth of Holland Cut (915)	263	23.1	24.0	6.0	8.6	7.56	8.26	68	58	0.002
San Joaquin River between Hog and Turner Cuts (910)	400	23.1	24.2	6.1	8.5	7.62	8.08	100	74	0.015
Old River, western arm at railroad bridge (902)	283	23.0	24.2	6.1	8.4	7.49	8.35	68	58	0.001
Sacramento River at tip of Grand Island (711)	159	23.0	24.2	5.9	8.4	7.52	8.10	56	64	0.011
Sacramento Deep Water Channel, Light 55	342	23.0	24.3	5.9	8.6	7.67	8.23	104	90	0.003
Montezuma Slough at Nurse Slough (609)	5050	23.0	24.2	6.5	8.4	7.51	7.97	720	85	0.004
Suisun Bay off Chipps Island (508)	3533	22.9	24.1	6.7	8.5	7.52	7.95	396	68	0.003
Carquinez Strait, West of Benicia army dock (405)	17335	22.7	24.2	6.8	8.6	7.43	7.75	3600	180	0.003
Grizzly Bay at Dolphin (602)	9765	22.7	24.3	6.7	8.8	7.46	7.86	1120	120	0.002
Napa River at Vallejo Seawall (340)	15715	22.7	24.2	6.7	8.7	7.75	7.85	3720	260	0.000
Field Duplicate: Montezuma Slough at Nurse Slough (609)	5050	22.9	24.2	6.8	8.4	7.58	8.01	670	85	0.004
DIEPAMHR + 25 ppb PBO	353	22.7	23.7	6.6	8.4	7.62	8.23	-	-	-
High EC Control @ 19 mS/cm + 25 ppb PBO	18465	22.6	23.7	6.7	8.4	7.55	8.06	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	269	22.7	23.6	6.3	8.4	7.65	8.31	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	484	22.8	23.6	6.4	8.4	7.68	8.21	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	286	22.6	23.7	6.3	8.6	7.58	8.34	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	166	22.5	23.6	6.6	8.5	7.69	8.16	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	345	22.6	23.6	6.1	8.5	7.69	8.27	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	2761.5	22.6	23.6	6.9	8.5	7.60	7.92	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	3460	22.4	23.6	6.5	8.5	7.50	8.01	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	17035	22.3	23.6	6.8	8.5	7.49	7.75	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	9585	22.1	23.5	6.9	8.3	7.49	7.93	-	-	-
Napa River at Vallejo Seawall (340) + 25 ppb PBO	15635	22.2	23.6	6.7	8.7	7.75	7.90	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A36-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 08/25/2006 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/23/2006 - 08/24/2006.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Middle of Broad Slough, West end (804)	98	2.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	4.2	4.2
Two-way ANOVA	3.9	3.9

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.139	0.012	0.112	0.002	NS
Suisun Bay, East of middle point (504)	0.182	0.011	0.139	0.012	NS
Middle of Broad Slough, West end (804)	0.158	0.017	0.146	0.014	NS
San Joaquin River, West of Oulton Point (812)	0.155	0.005	0.152	0.023	NS
Sacramento R. across from Sherman Lake (704)	0.153	0.012	0.147	0.031	NS

	MSD	PMSD
One-way ANOVA	0.057	40.9
Two-way ANOVA	0.056	40.4

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A36-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/23/2006 - 08/24/2006.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	5630	20.2	7.65	8.72	25.8	0.11	0.0015
Middle of Broad Slough, West end (804)	312	20.5	7.59	8.04	10.4	0.09	0.0013
San Joaquin River, West of Oulton Point (812)	314	21.0	7.59	8.15	10.6	0.05	0.0008
Sacramento R. across from Sherman Lake (704)	598	20.5	7.63	8.46	31.5	0.16	0.0025

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Table A36-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 08/25/2006 of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 08/23/2006 - 08/24/2006.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	361	23.9	23.9	6.4	8.6	7.51	8.02	106	59	-
Suisun Bay, East of middle point (504)	5305	23.8	23.8	6.3	8.5	7.38	7.76	550	70	0.002
Middle of Broad Slough, West end (804)	595	23.8	23.9	6.1	8.5	7.50	7.97	92	60	0.004
San Joaquin River, West of Oulton Point (812)	321	23.8	24.0	5.8	8.5	7.47	7.95	16	62	0.002
Sacramento R. across from Sherman Lake (704)	305	24.0	24.3	6.2	8.6	7.48	7.91	72	62	0.006
DIEPAMHR + 25 ppb BPO	354	23.7	23.8	6.7	8.6	7.51	8.01	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	5250	23.8	23.9	6.5	8.6	7.37	7.76	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	579	23.8	23.9	6.2	8.6	7.54	7.98	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	320	23.9	24.0	6.3	8.6	7.53	7.98	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	310	23.9	24.1	6.1	8.6	7.50	8.00	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A37-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 9/07/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/05/06 - 9/06/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	97	3.0	NS
High EC Control @ 16.33 mS/cm	93	4.4	86	3.2	NS
San Joaquin River, West of Oulton Point (812)	96	2.3	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	98	2.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	98	2.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
Sacramento Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711)	96	2.3	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	94	2.4	85	9.7	NS
Field Dup.: Sacramento Deep Water Channel, Light 55	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	7.8	7.8
Two-way ANOVA	13.2	13.2

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.089	0.007	0.058	0.004	NS
High EC Control @ 16.33 mS/cm	0.058	0.004	0.040	0.007	NS
San Joaquin River, West of Oulton Point (812)	0.095	0.007	0.096	0.018	NS
Sacramento R. across from Sherman Lake (704)	0.105	0.010	0.092	0.005	NS
Old River, western arm at railroad bridge (902)	0.131	0.011	0.088	0.012	NS
San Joaquin River between Hog and Turner Cuts (910)	0.124	0.014	0.098	0.018	NS
Old River at mouth of Holland Cut (915)	0.139	0.014	0.088	0.006	NS
Sacramento Deep Water Channel, Light 55	0.132	0.010	0.112	0.012	NS
Sacramento River at tip of Grand Island (711)	0.090	0.005	0.071	0.009	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.082	0.004	0.056	0.010	NS
Field Dup.: Sacramento Deep Water Channel, Light 55	0.131	0.007	0.099	0.011	NS

	MSD	PMSD
One-way ANOVA	0.053	60.2
Two-way ANOVA	0.053	60.2

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the high EC control.

Table A37-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/05/06 - 9/06/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
San Joaquin River, West of Oulton Point (812)	209	21.1	7.49	7.3	7.1	0.12	0.001
Sacramento R. across from Sherman Lake (704)	5010	21.4	7.54	7.4	11.0	0.17	0.002
Old River, western arm at railroad bridge (902)	293	21.1	8.31	8.0	3.6	0.08	0.006
San Joaquin River between Hog and Turner Cuts (910)	417	21.6	7.17	6.0	11.5	0.00	0.000
Old River at mouth of Holland Cut (915)	264	21.6	7.99	7.1	4.7	0.05	0.002
Sacramento Deep Water Channel, Light 55	338	21.9	7.85	7.3	29.9	0.00	0.000
Sacramento River at tip of Grand Island (711)	164	21.5	7.41	7.4	6.1	0.15	0.002
Carquinez Strait, West of Benicia army dock (405)	15260	18.9	7.66	7.5	60.7	0.16	0.002
Field Dup.: Sacramento Deep Water Channel, Light 55	338	21.9	7.85	7.3	29.9	0.05	0.001

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Table A37-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 9/07/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/05/06 - 9/06/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	362	21.9	24.4	6.7	8.3	7.63	8.10	110	59	-
High EC Control @ 16.33 mS/cm	15965	22.0	24.4	6.6	8.5	7.49	7.98	1900	160	-
San Joaquin River, West of Oulton Point (812)	374	22.0	24.6	6.1	8.5	7.69	7.99	62	64	0.006
Sacramento R. across from Sherman Lake (704)	223	22.0	24.7	6.3	8.5	7.65	8.00	68	67	0.008
Old River, western arm at railroad bridge (902)	285	21.9	24.5	6.3	8.6	7.60	8.51	68	61	0.011
San Joaquin River between Hog and Turner Cuts (910)	384	21.8	24.6	6.4	8.8	7.60	7.81	110	71	0.000
Old River at mouth of Holland Cut (915)	288	21.8	24.5	6.5	8.5	7.61	8.15	72	61	0.003
Sacramento Deep Water Channel, Light 55	339	22.0	24.6	6.5	8.3	7.75	8.11	104	91	0.000
Sacramento River at tip of Grand Island (711)	166	21.9	24.6	6.1	8.4	7.65	7.97	70	68	0.007
Carquinez Strait, West of Benicia army dock (405)	14775	21.7	24.6	6.7	8.2	7.51	7.85	1640	128	0.004
Field Dup.: Sacramento Deep Water Channel, Light 55	343	22.0	24.6	6.3	8.6	7.72	8.14	100	88	0.003
DIEPAMHR + 25 ppb PBO	324	21.9	24.2	6.9	8.4	7.73	8.26	-	-	-
High EC Control @ 16.33 mS/cm + 25 ppb PBO	15635	22.3	23.8	6.6	8.8	7.49	7.99	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	252	22.1	23.9	5.9	8.6	7.63	7.87	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	197	22.1	24.0	6.2	8.7	7.66	7.90	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	285	22.2	23.8	6.2	8.9	7.60	8.51	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	392	22.2	23.7	6.3	8.5	7.58	7.78	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	271	22.2	23.7	6.2	8.4	7.59	8.17	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	341	22.3	23.8	6.4	8.4	7.76	8.14	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	173	22.4	23.8	6.3	8.9	7.63	8.14	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	14815	22.6	23.7	6.8	8.5	7.51	7.78	-	-	-
Field Dup.: Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	342.9	22.5	23.8	6.4	8.5	7.77	8.25	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A38-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 9/08/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/06/06 - 9/07/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
High EC Control @ 13.01 mS/cm	96	2.3	90	10.0	NS
High EC Control @ 19.82 mS/cm	92	4.9	67	28.5	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Middle of Broad Slough, West end (804)	98	2.0	100	0.0	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	100	0.0	96	3.7	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	91	4.6	89	6.4	NS
Bottle Blank	96	2.4	-	-	NA

	MSD	PMSD
One-way ANOVA	12.9	12.9
Two-way ANOVA	29.5	29.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.093	0.010	0.054	0.012	NS
High EC Control @ 13.01 mS/cm	0.054	0.007	0.040	0.005	NS
High EC Control @ 19.82 mS/cm	0.035	0.006	0.029	0.005	NS
Suisun Bay, East of middle point (504)	0.092	0.009	0.124	0.006	NS
Middle of Broad Slough, West end (804)	0.106	0.005	0.120	0.006	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	0.081	0.005	0.127	0.001	NS
Suisun Bay off Chipps Island (508)	0.093	0.009	0.115	0.016	NS
Montezuma Slough at Nurse Slough (609)	0.093	0.020	0.125	0.017	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	0.020	0.005	0.060	0.014	NS
Bottle Blank	0.043	0.008	-	-	NA

	MSD	PMSD
One-way ANOVA	0.054	58.0
Two-way ANOVA	0.053	56.6

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC Control @ 13.01 mS/cm.

4. This high conductivity sample was compared to the High EC Control @ 19.82 mS/cm.

Table A38-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/06/06 - 9/07/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	4346	19.3	7.68	7.6	19.6	0.15	0.002
Middle of Broad Slough, West end (804)	518	20.8	8.00	7.5	8.3	0.10	0.004
Grizzly Bay at Dolphin (602)	12780	18.5	7.64	7.7	122.0	0.18	0.002
Suisun Bay off Chipps Island (508)	1850	19.8	7.60	7.6	14.0	0.13	0.002
Montezuma Slough at Nurse Slough (609)	5001	20.2	7.49	7.4	41.4	0.08	0.001
Napa River at Riverside Blvd. terminus (340)	19140	21.7	7.42	6.3	11.8	0.05	0.000
Bottle Blank	-	-	-	-	-	0.00	-

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Table A38-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 9/08/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/06/06 - 9/07/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	358	22.3	24.0	7.1	8.2	7.53	8.13	110	59	-
High EC Control @ 13.01 mS/cm	12575	22.2	23.8	6.7	8.2	7.55	8.00	1500	140	-
High EC Control @ 19.82 mS/cm	19375	22.3	24.1	7.3	8.5	7.62	8.04	3080	160	-
Suisun Bay, East of middle point (504)	4955	22.4	23.8	6.9	8.7	7.59	8.04	532	74	0.006
Middle of Broad Slough, West end (804)	564	22.3	23.7	6.7	8.5	7.65	8.19	96	70	0.007
Grizzly Bay at Dolphin (602)	12020	22.3	24.0	6.9	8.4	7.55	7.96	1400	140	0.006
Suisun Bay off Chipps Island (508)	1672	22.4	23.9	6.6	8.4	7.61	8.12	210	66	0.007
Montezuma Slough at Nurse Slough (609)	4850	22.2	23.9	7.2	8.3	7.62	8.06	556	82	0.004
Napa River at Riverside Blvd. terminus (340)	18410	22.3	23.7	7.2	8.6	7.86	7.93	3160	280	0.001
Bottle Blank	469	22.4	23.9	7.2	8.6	7.78	8.18	114	59	0.000
DIEPAMHR + 25 ppb PBO	368	22.4	24.0	6.9	8.1	7.70	8.15	-	-	-
High EC Control @ 13.01 mS/cm + 25 ppb PBO	12695	22.4	23.9	7.1	8.5	7.51	8.00	-	-	-
High EC Control @ 19.82 mS/cm + 25 ppb PBO	19080	22.5	23.7	7.4	8.6	7.61	8.05	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	4800	22.5	23.7	7.2	8.4	7.64	8.08	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	576	22.5	23.6	6.9	8.6	7.72	8.17	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	12120	22.5	23.8	7.2	8.6	7.58	7.98	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	9235	22.5	23.7	6.8	8.6	7.70	8.13	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	4837	22.4	23.5	7.3	8.4	7.67	8.01	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	18280	22.5	23.6	7.3	8.5	7.86	7.98	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A39-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 9/21/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/19/06 - 9/20/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	1.8	100	0.0	NS
High EC Control @ 22.13 mS/cm	87	4.0	68	1.1	NS
Napa River at Riverside Blvd. terminus (340) <sup>3</sup>	84	11.7	87	8.8	NS
Old River, western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	97	3.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711)	98	1.8	100	0.0	NS
Sacramento Deep Water Channel, Light 55	98	1.8	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	98	2.0	97	3.3	NS
Middle of Broad Slough, West end (804)	96	2.4	100	0.0	NS
Field Dup.: San Joaquin River, West of Oulton Point (812)	100	0.0	97	3.3	NS

	MSD	PMSD
One-way ANOVA	21.2	21.6
Two-way ANOVA	21.2	21.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.096	0.005	0.084	0.005	NS
High EC Control @ 22.13 mS/cm	0.073	0.003	0.041	0.004	NS
Napa River at Riverside Blvd. terminus (340) <sup>3</sup>	0.086	0.006	0.051	0.011	NS
Old River, western arm at railroad bridge (902)	0.154	0.007	0.124	0.003	NS
Old River at mouth of Holland Cut (915)	0.146	0.011	0.113	0.014	NS
San Joaquin River between Hog and Turner Cuts (910)	0.149	0.008	0.130	0.008	NS
San Joaquin River, West of Oulton Point (812)	0.135	0.008	0.109	0.005	NS
Sacramento River at tip of Grand Island (711)	0.113	0.008	0.102	0.006	NS
Sacramento Deep Water Channel, Light 55	0.125	0.009	0.127	0.007	NS
Sacramento R. across from Sherman Lake (704)	0.120	0.007	0.107	0.003	NS
Middle of Broad Slough, West end (804)	0.144	0.006	0.125	0.006	NS
Field Dup.: San Joaquin River, West of Oulton Point (812)	0.140	0.009	0.134	0.005	NS

	MSD	PMSD
One-way ANOVA	0.041	43.1
Two-way ANOVA	0.041	43.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC Control @ 22.13 mS/cm.

Table A39-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/19/06 - 9/20/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd. terminus (340)	21580	19.8	7.72	6.4	9.9	0.07	0.001
Old River, western arm at railroad bridge (902)	311	20.4	8.72	8.7	3.9	0.04	0.007
Old River at mouth of Holland Cut (915)	304	20.6	8.17	8.0	5.2	0.05	0.003
San Joaquin River between Hog and Turner Cuts (910)	567	20.6	7.47	6.0	13.0	0.23	0.003
San Joaquin River, West of Oulton Point (812)	210	19.9	7.83	7.8	6.5	0.07	0.002
Sacramento River at tip of Grand Island (711)	200	18.1	7.81	8.3	13.1	0.19	0.004
Sacramento Deep Water Channel, Light 55	335	19.6	8.02	8.2	37.6	0.06	0.002
Sacramento R. across from Sherman Lake (704)	182	19.5	7.83	7.9	10.6	0.11	0.003
Middle of Broad Slough, West end (804)	604	20.4	8.10	8.2	10.6	0.06	0.003
Field Dup.: San Joaquin River, West of Oulton Point (812)	210	19.9	7.83	7.8	33.6	0.05	0.001

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Table A39-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 9/21/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/19/06 - 9/20/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	340	21.8	24.6	6.5	8.3	7.51	8.11	108	58	-
High EC Control @ 22.13 mS/cm	21150	22.0	24.6	7.1	8.9	7.56	7.79	2720	180	-
Napa River at Riverside Blvd. terminus (340)	20470	22.1	24.7	6.5	8.7	7.64	7.86	2720	220	0.001
Old River, western arm at railroad bridge (902)	280	21.9	24.6	6.4	8.6	7.82	8.49	68	68	0.005
Old River at mouth of Holland Cut (915)	264	22.0	24.9	6.5	8.9	7.77	8.16	66	67	0.003
San Joaquin River between Hog and Turner Cuts (910)	395	21.7	24.8	6.2	8.6	7.68	8.00	96	76	0.006
San Joaquin River, West of Oulton Point (812)	215	21.8	24.7	6.2	8.6	7.71	8.01	68	72	0.003
Sacramento River at tip of Grand Island (711)	182	21.8	24.7	6.6	8.7	7.70	7.99	62	72	0.009
Sacramento Deep Water Channel, Light 55	328	21.8	24.7	6.5	8.5	7.72	8.03	96	90	0.003
Sacramento R. across from Sherman Lake (704)	194	21.9	24.6	6.6	8.7	7.65	8.01	48	74	0.006
Middle of Broad Slough, West end (804)	567	21.7	24.6	6.4	8.7	7.58	8.00	118	67	0.003
Field Dup.: San Joaquin River, West of Oulton Point (812)	339	21.7	24.6	6.7	8.6	7.70	8.11	102	89	0.003
DIEPAMHR + 25 ppb PBO	345	21.8	24.4	6.8	8.2	7.75	8.14	-	-	-
High EC Control @ 22.13 mS/cm + 25 ppb PBO	20980	21.7	24.3	7.3	8.6	7.43	7.87	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	20360	21.5	24.1	6.6	8.6	7.70	7.79	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	281	21.4	24.1	6.8	8.8	8.01	8.56	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	262	21.6	24.1	6.7	8.6	7.88	8.15	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	406	21.3	24.0	6.8	8.5	7.86	7.97	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	217	21.6	24.0	6.5	8.7	7.77	8.04	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	183	21.2	24.3	6.7	8.7	7.76	8.02	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	328.8	21.4	24.0	6.2	8.4	7.77	8.13	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	196	21.5	24.0	6.5	8.6	7.72	8.02	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	577	21.6	24.0	6.3	8.7	7.61	8.01	-	-	-
Field Dup.: San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	340	21.8	24.0	6.7	8.7	7.77	8.17	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A40-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 9/22/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/21/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	97	3.3	NS
Suisun Bay off Chipps Island (508)	94	2.5	97	3.3	NS
Suisun Bay, East of middle point (504)	96	4.0	97	3.0	NS
Carquinez Strait, West of Benicia army dock (405)	96	2.6	97	3.3	NS
Grizzly Bay at Dolphin (602)	100	0.0	97	3.3	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	97	3.3	NS
Bottle Blank	96	2.3	-	-	NA

	MSD	PMSD
One-way ANOVA	11.2	11.2
Two-way ANOVA	13.6	13.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.064	0.006	0.045	0.004	NS
Suisun Bay off Chipps Island (508)	0.119	0.005	0.065	0.010	S (55%)
Suisun Bay, East of middle point (504)	0.115	0.011	0.054	0.009	S (47%)
Carquinez Strait, West of Benicia army dock (405)	0.101	0.007	0.054	0.009	S (53%)
Grizzly Bay at Dolphin (602)	0.085	0.004	0.067	0.009	NS
Montezuma Slough at Nurse Slough (609)	0.129	0.008	0.095	0.016	NS
Bottle Blank	0.095	0.006	-	-	NA

	MSD	PMSD
One-way ANOVA	0.034	52.6
Two-way ANOVA	0.040	62.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A40-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 09/21/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay off Chipps Island (508)	2725	19.8	7.87	8.0	19.3	0.18	0.004
Suisun Bay, East of middle point (504)	6200	19.5	7.92	7.8	28.8	0.10	0.002
Carquinez Strait, West of Benicia army dock (405)	14500	19.1	7.91	7.8	58.3	0.07	0.001
Grizzly Bay at Dolphin (602)	9160	19.2	8.03	8.2	12.8	0.05	0.001
Montezuma Slough at Nurse Slough (609)	6930	20.0	7.87	7.8	61.0	0.04	0.001
Bottle Blank	-	-	-	-	0.5	0.00	-

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Table A40-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 9/22/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/21/06.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH				Max pH
DIEPAMHR	351	22.4	23.2	6.6	8.3	7.64	8.16	108	58	-
Suisun Bay off Chipps Island (508)	2478	22.5	23.6	6.8	8.3	7.60	7.85	296	68	0.005
Suisun Bay, East of middle point (504)	5630	22.6	23.5	6.5	8.2	7.59	7.88	658	70	0.003
Carquinez Strait, West of Benicia army dock (405)	13520	22.6	23.0	6.7	8.2	7.54	7.77	1560	78	0.001
Grizzly Bay at Dolphin (602)	8615	22.7	23.7	6.6	8.3	7.60	7.91	980	73	0.001
Montezuma Slough at Nurse Slough (609)	6455	22.6	23.2	6.9	8.2	7.75	7.83	750	80	0.001
Bottle Blank	435	22.6	23.1	6.8	8.1	7.79	8.25	110	58	0.000
DIEPAMHR + 25 ppb PBO	358	22.5	22.6	7.0	8.1	7.75	8.17	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	2550	22.6	22.9	7.1	8.0	7.59	8.03	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	5720	22.6	22.7	6.5	8.0	7.54	7.95	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	13190	22.6	22.7	6.7	8.0	7.53	7.76	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	8335	22.5	22.7	7.0	8.0	7.66	7.92	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	6305	22.6	22.7	6.8	8.0	7.76	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A41-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/05/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/03/06 - 10/04/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	96	2.4	100	0.0	NS
Old River, western arm at railroad bridge (902)	94	2.4	93	6.7	NS
Old River at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	94	2.5	97	3.3	NS
Sacramento River at tip of Grand Island (711)	98	2.0	90	5.8	NS
Sacramento Deep Water Channel, Light 55	98	2.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	98	2.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	97	3.3	NS
Grizzly Bay at Dolphin (602)	98	2.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	9.8	10.2
Two-way ANOVA	12.2	12.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.072	0.001	0.065	0.004	NS
Old River, western arm at railroad bridge (902)	0.103	0.005	0.072	0.000	S (71%)
Old River at mouth of Holland Cut (915)	0.101	0.006	0.079	0.004	NS
San Joaquin River between Hog and Turner Cuts (910)	0.109	0.005	0.078	0.003	S (72%)
San Joaquin River, West of Oulton Point (812)	0.083	0.004	0.082	0.005	NS
Sacramento River at tip of Grand Island (711)	0.069	0.002	0.041	0.004	S (55%)
Sacramento Deep Water Channel, Light 55	0.093	0.004	0.077	0.006	NS
Sacramento R. across from Sherman Lake (704)	0.076	0.004	0.096	0.011	NS
Montezuma Slough at Nurse Slough (609)	0.078	0.007	0.105	0.005	NS
Grizzly Bay at Dolphin (602)	0.073	0.003	0.082	0.004	NS

	MSD	PMSD
One-way ANOVA	0.024	33.2
Two-way ANOVA	0.026	35.7

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A41-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/03/06 - 10/04/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River, western arm at railroad bridge (902)	275	18.0	8.2	7.3	2.9	0.20	0.010
Old River at mouth of Holland Cut (915)	244	18.1	7.9	6.8	2.8	0.22	0.006
San Joaquin River between Hog and Turner Cuts (910)	372	18.7	7.5	5.5	9.1	0.26	0.003
San Joaquin River, West of Oulton Point (812)	170	18.0	7.76	6.7	3.9	0.29	0.005
Sacramento River at tip of Grand Island (711)	133	18.0	7.68	6.8	3.2	0.08	0.001
Sacramento Deep Water Channel, Light 55	295	18.2	7.68	6.6	25.5	0.24	0.004
Sacramento R. across from Sherman Lake (704)	278	17.5	7.75	6.8	19.5	0.30	0.005
Montezuma Slough at Nurse Slough (609)	6380	17.0	7.68	7.7	34.9	0.23	0.003
Grizzly Bay at Dolphin (602)	8980	17.0	7.86	7.5	39.9	0.27	0.005

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Table A41-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/05/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/03/06 - 10/04/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	314	22.0	23.3	6.5	8.4	7.64	8.05	108	59	-
Old River, western arm at railroad bridge (902)	231	22.1	23.2	6.4	8.6	7.65	8.06	76	67	0.010
Old River at mouth of Holland Cut (915)	212	22.2	22.9	6.4	8.6	7.35	7.95	72	68	0.009
San Joaquin River between Hog and Turner Cuts (910)	340	22.1	23.7	6.5	8.8	7.61	7.86	96	70	0.009
San Joaquin River, West of Oulton Point (812)	158	22.1	23.5	6.5	8.5	7.64	7.93	60	60	0.011
Sacramento River at tip of Grand Island (711)	123	22.0	23.5	6.4	8.7	7.58	7.87	56	58	0.003
Sacramento Deep Water Channel, Light 55	262	22.0	23.5	6.4	8.9	7.71	8.04	96	84	0.012
Sacramento R. across from Sherman Lake (704)	243	22.0	23.4	6.4	8.6	7.68	7.91	80	66	0.011
Montezuma Slough at Nurse Slough (609)	8040	22.0	23.6	6.8	8.9	7.62	7.78	188	86	0.005
Grizzly Bay at Dolphin (602)	5690	22.0	23.6	6.7	8.5	7.54	7.77	268	76	0.006
DIEPAMHR + 25 ppb PBO	306	22.0	23.2	7.1	8.5	7.74	8.05	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	222	21.9	23.8	6.5	8.8	7.41	8.09	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	218	21.9	23.9	7.2	8.8	7.48	8.05	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	336	21.8	23.9	6.7	8.9	7.42	7.96	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	160	21.7	23.9	6.9	8.6	7.47	8.05	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	125	21.8	23.6	7.2	8.6	7.49	7.88	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	261	21.7	24.0	7.3	8.7	7.71	8.04	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	245	21.5	24.1	7.2	8.6	7.56	8.01	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	5670	21.6	24.0	7.2	8.7	7.49	7.83	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	8180	21.5	23.9	7.3	8.8	7.10	7.80	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A42-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/6/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/4/06 - 10/5/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	84	15.6	100	0.0	NS
High EC Control @ 18.16 mS/cm	88	3.5	68	5.2	NS
High EC Control @ 21.25 mS/cm	64	7.2	57	28.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	85	7.6	89	6.4	NS
Suisun Bay, East of middle point (504)	96	4.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	96	3.7	NS
Middle of Broad Slough, West end (804)	100	0.0	96	3.7	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	75	4.9	41	23.1	NS
Field Dup.: Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	92	3.5	-	-	NA

	MSD	PMSD
One-way ANOVA	35.6	42.1
Two-way ANOVA	36.5	43.2

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.065	0.010	0.054	0.003	NS
High EC Control @ 18.16 mS/cm	0.034	0.003	0.044	0.006	NS
High EC Control @ 21.25 mS/cm	0.031	0.007	0.035	0.003	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.046	0.004	0.050	0.003	NS
Suisun Bay, East of middle point (504)	0.077	0.008	0.057	0.006	NS
Suisun Bay off Chipps Island (508)	0.085	0.002	0.075	0.001	NS
Middle of Broad Slough, West end (804)	0.091	0.006	0.078	0.016	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	0.046	0.004	0.052	0.011	NS
Field Dup.: Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	0.042	0.005	-	-	NA

	MSD	PMSD
One-way ANOVA	0.031	47.3
Two-way ANOVA	0.034	51.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC control at 18.16 mS/cm.

4. This high conductivity sample was compared to the High EC control at 21.25 mS/cm.

Table A42-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/4/06 - 10/05/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Carquinez Strait, West of Benicia army dock (405)	18010	17.1	7.8	7.3	23.9	0.23	0.003
Suisun Bay, East of middle point (504)	4602	17.5	7.88	7.6	13.5	0.00	0.000
Suisun Bay off Chipps Island (508)	1738	18.4	7.91	7.4	15.2	0.24	0.006
Middle of Broad Slough, West end (804)	488	18.2	8.09	7.3	7.6	0.22	0.008
Napa River at Riverside Blvd. terminus (340)	21400	17.8	7.61	5.8	7.5	0.02	0.000
Field Dup.: Napa River at Riverside Blvd. terminus (340)	21400	17.8	7.61	5.8	8.2	0.03	0.000

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Table A42-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/6/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/4/06 - 10/5/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	325	22.3	23.6	7.3	8.3	7.76	8.09	112	59	-
High EC Control @ 18.16 mS/cm	17405	22.2	23.5	7.7	8.7	7.62	7.89	2300	44	-
High EC Control @ 21.25 mS/cm	19735	22.3	23.5	7.8	8.4	7.63	7.95	2700	84	-
Carquinez Strait, West of Benicia army dock (405)	16410	22.3	23.8	7.1	8.8	7.62	7.82	2128	88	0.005
Suisun Bay, East of middle point (504)	4284	22.2	23.5	7.2	8.8	7.60	7.92	592	76	0.000
Suisun Bay off Chipps Island (508)	1733	22.1	23.8	7.3	8.6	7.67	8.05	256	70	0.011
Middle of Broad Slough, West end (804)	478	22.2	23.5	7.0	8.7	7.80	8.18	104	71	0.014
Napa River at Riverside Blvd. terminus (340)	19730	22.2	23.6	7.3	8.9	7.55	7.96	2790	142	0.000
Field Dup.: Napa River at Riverside Blvd. terminus (340)	19555	22.0	23.4	7.5	8.8	7.64	8.00	2780	140	0.000
DIEPAMHR + 25 ppb PBO	323	22.2	23.7	7.2	8.3	7.76	8.17	-	-	-
High EC Control @ 18.16 mS/cm + 25 ppb PBO	17325	22.3	23.7	7.4	8.5	7.58	7.91	-	-	-
High EC Control @ 21.25 mS/cm + 25 ppb PBO	20225	22.3	23.6	7.6	8.6	7.61	7.93	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	16440	22.3	23.7	7.4	8.4	7.62	7.82	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	4395	22.1	23.6	7.2	8.9	7.78	8.03	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	1717	22.2	23.6	7.3	8.3	7.87	8.06	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	524	22.2	23.6	7.2	8.6	7.92	8.14	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	18805	22.1	23.7	7.4	8.5	7.57	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A43-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/19/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/17/06 - 10/18/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	96	3.6	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711)	96	2.4	93	3.3	NS
Old River, western arm at railroad bridge (902)	100	0.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS
Sacramento Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	98	2.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	9.0	9.0
Two-way ANOVA	8.6	8.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.059	0.005	0.062	0.005	NS
Sacramento R. across from Sherman Lake (704)	0.096	0.004	0.099	0.010	NS
San Joaquin River, West of Oulton Point (812)	0.075	0.005	0.088	0.004	NS
Old River at mouth of Holland Cut (915)	0.074	0.004	0.084	0.004	NS
Sacramento River at tip of Grand Island (711)	0.063	0.005	0.067	0.005	NS
Old River, western arm at railroad bridge (902)	0.085	0.006	0.087	0.008	NS
San Joaquin River between Hog and Turner Cuts (910)	0.090	0.005	0.102	0.003	NS
Middle of Broad Slough, West end (804)	0.093	0.004	0.095	0.004	NS
Sacramento Deep Water Channel, Light 55	0.091	0.006	0.080	0.008	NS
Suisun Bay off Chipps Island (508)	0.086	0.007	0.071	0.002	NS

	MSD	PMSD
One-way ANOVA	0.028	47.3
Two-way ANOVA	0.030	50.7

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A43-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/17/06 - 10/18/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. across from Sherman Lake (704)	813	17.8	7.28	8.9	19.5	0.05	0.000
San Joaquin River, West of Oulton Point (812)	191	17.0	7.37	9.1	4.2	0.27	0.002
Old River at mouth of Holland Cut (915)	244	17.5	7.38	8.7	2.5	0.24	0.002
Sacramento River at tip of Grand Island (711)	138	16.9	7.31	8.8	3.7	0.54	0.003
Old River, western arm at railroad bridge (902)	288	17.2	7.55	9.1	2.4	0.24	0.003
San Joaquin River between Hog and Turner Cuts (910)	369	17.3	7.15	7.6	9.9	0.35	0.001
Middle of Broad Slough, West end (804)	2226	17.4	7.57	8.9	15.1	0.29	0.003
Sacramento Deep Water Channel, Light 55	268	17.8	7.36	8.7	32.0	0.29	0.002
Suisun Bay off Chipps Island (508)	3006	16.4	7.93	8.4	12.7	0.05	0.001

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Table A43-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/19/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/17/06 - 10/18/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	346	23.0	23.8	7.0	8.5	7.82	8.20	108	61	-
Sacramento R. across from Sherman Lake (704)	680	23.2	23.7	6.7	8.5	7.75	8.10	124	96	0.003
San Joaquin River, West of Oulton Point (812)	204	23.2	24.0	6.5	8.9	7.58	7.92	64	46	0.009
Old River at mouth of Holland Cut (915)	250	23.2	23.9	6.5	8.6	7.64	7.92	80	71	0.009
Sacramento River at tip of Grand Island (711)	150	23.2	23.9	6.2	8.9	7.57	7.86	56	62	0.014
Old River, western arm at railroad bridge (902)	256	23.2	23.8	6.4	8.8	7.56	8.27	74	73	0.020
San Joaquin River between Hog and Turner Cuts (910)	372	23.2	23.7	6.7	8.7	7.68	7.80	98	76	0.009
Middle of Broad Slough, West end (804)	2558	23.2	23.7	7.1	8.8	7.58	7.77	1680	88	0.007
Sacramento Deep Water Channel, Light 55	295	23.2	23.6	6.4	8.8	7.74	7.95	96	92	0.011
Suisun Bay off Chipps Island (508)	2818	23.2	23.6	6.9	8.8	7.57	7.76	376	82	0.001
DIEPAMHR + 25 ppb PBO	377	23.3	23.8	7.3	8.8	7.75	8.24	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	697	23.4	23.9	6.7	8.4	7.66	8.10	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	211	23.3	24.0	6.7	8.4	7.67	8.13	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	250	23.5	24.0	6.7	8.4	7.63	8.18	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	235	23.3	24.1	6.8	8.5	7.64	8.11	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	261	23.2	24.0	6.6	8.8	7.58	8.13	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	367	23.2	23.9	7.5	8.3	7.63	7.92	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	2458	23.1	24.1	6.9	8.7	7.67	7.88	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	293	23.3	24.1	6.7	8.6	7.78	8.07	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	2662	23.3	24.1	7.1	8.7	7.62	7.88	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A44-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/20/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/05/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
High EC Control @ 21.25 mS/cm	82	9.2	69	7.1	NS
Napa River at Riverside Blvd Terminous (340) <sup>3</sup>	78	7.9	79	0.7	NS

	MSD	PMSD
One-way ANOVA	26.4	26.4
Two-way ANOVA	30.7	30.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.055	0.009	0.054	0.013	NS
High EC Control @ 21.25 mS/cm	0.030	0.002	0.031	0.008	NS
Napa River at Riverside Blvd Terminous (340) <sup>3</sup>	0.028	0.003	0.024	0.005	NS

	MSD	PMSD
One-way ANOVA	0.021	37.6
Two-way ANOVA	0.031	56.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC control @ 21.25 mS/cm.

Table A44-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/05/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd Terminous (340)	21400	17.8	7.61	5.8	7.5	0.02	0.000

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Table A44-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/20/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/05/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	352	21.8	24.2	7.6	8.6	7.99	8.24	112	59	-
High EC Control @ 21.25 mS/cm	20405	22.0	24.3	7.9	8.8	7.63	7.82	2300	44	-
Napa River at Riverside Blvd Terminus (340)	20410	22.0	24.3	7.1	8.9	7.50	8.01	2790	142	0.000
DIEPAMHR + PBO	445	22.0	24.0	7.8	8.5	7.90	8.45	-	-	-
High EC Control @ 21.25 mS/cm + 25 ppb PBO	20370	21.9	24.0	7.8	8.7	7.67	7.92	-	-	-
Napa River at Riverside Blvd Terminus (340) + 25 ppb PBO	20095	21.9	24.0	7.7	8.9	7.65	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A45-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/20/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/18/06 - 10/19/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
High EC Control @ 11.42 mS/cm	100	0.0	90	5.8	NS
High EC Control @ 16.25 mS/cm	86	5.2	86	3.0	NS
High EC Control @ 21.00 mS/cm	72	18.3	68	6.5	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	96	2.5	96	3.7	NS
Suisun Bay, East of middle point (504)	98	2.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	97	3.3	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	96	2.4	100	0.0	NS
Napa River at Riverside Blvd. terminus (340) <sup>5</sup>	80	8.3	62	9.0	NS
Field Dup.: Grizzly Bay at Dolphin (602)	98	2.2	-	-	NA

	MSD	PMSD
One-way ANOVA	32.1	32.1
Two-way ANOVA	22.7	22.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.055	0.003	0.055	0.011	NS
High EC Control @ 11.42 mS/cm	0.048	0.005	0.035	0.002	NS
High EC Control @ 16.25 mS/cm	0.044	0.005	0.053	0.008	NS
High EC Control @ 21.00 mS/cm	0.029	0.010	0.056	0.015	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	0.067	0.008	0.051	0.020	NS
Suisun Bay, East of middle point (504)	0.060	0.006	0.051	0.008	NS
Montezuma Slough at Nurse Slough (609)	0.075	0.010	0.075	0.007	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	0.049	0.009	0.055	0.013	NS
Napa River at Riverside Blvd. terminus (340) <sup>5</sup>	0.043	0.006	0.035	0.007	NS
Field Dup.: Grizzly Bay at Dolphin (602)	0.057	0.008	-	-	NA

	MSD	PMSD
One-way ANOVA	0.034	62.5
Two-way ANOVA	0.046	84.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. This high conductivity sample was compared to the High EC control @ 11.42 mS/cm.
4. This high conductivity sample was compared to the High EC control @ 16.25 mS/cm.
5. This high conductivity sample was compared to the High EC control @ 21.00 mS/cm.

Table A45-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/18/06 - 10/19/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Grizzly Bay at Dolphin (602)	11850	16.1	7.94	8.5	16.7	0.27	0.005
Suisun Bay, East of middle point (504)	6590	16.4	7.92	8.7	1.4	0.26	0.005
Montezuma Slough at Nurse Slough (609)	9220	16.1	7.71	8.4	35.1	0.25	0.003
Carquinez Strait, West of Benicia army dock (405)	17290	16.4	7.85	8.0	19.9	0.29	0.004
Napa River at Riverside Blvd. terminus (340)	22080	16.0	7.59	9.4	5.8	0.08	0.001
Field Dup.: Grizzly Bay at Dolphin (602)	11850	16.1	7.94	8.5	16.7	0.27	0.005

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Table A45-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/20/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/18/06 - 10/19/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	364	22.7	23.6	7.6	8.3	7.80	8.29	104	61	-
High EC Control @11.42 mS/cm	11430	22.7	24.0	7.5	8.9	7.59	7.92	1400	110	-
High EC Control @ 16.25 mS/cm	16355	22.8	23.9	7.8	8.4	7.68	7.95	2040	180	-
High EC Control @ 21.00 mS/cm	20945	22.8	24.0	8.1	8.4	7.75	7.96	1560	140	-
Grizzly Bay at Dolphin (602)	11090	22.7	24.0	7.6	8.5	7.76	7.89	1680	140	0.008
Suisun Bay, East of middle point (504)	5800	22.7	24.0	7.5	8.6	7.81	7.94	1840	110	0.009
Montezuma Slough at Nurse Slough (609)	8440	22.6	23.9	7.8	8.5	7.75	7.81	1220	150	0.005
Carquinez Strait, West of Benicia army dock (405)	15635	22.5	24.2	7.6	8.9	7.64	7.77	2280	110	0.005
Napa River at Riverside Blvd. terminus (340)	20445	22.5	24.3	7.6	8.8	7.71	7.90	3180	240	0.001
Field Dup.: Grizzly Bay at Dolphin (602)	11275	22.4	24.3	7.9	8.9	7.78	8.00	1720	160	0.006
DIEPAMR + 25 ppb PBO	444	23.4	23.4	7.6	8.5	7.85	8.10	-	-	-
High EC Control @11.42 mS/cm + 25 ppb PBO	11535	22.6	24.0	7.5	8.5	7.61	7.90	-	-	-
High EC Control @ 16.25 mS/cm + 25 ppb PBO	15970	24.0	24.0	7.8	8.3	7.73	7.95	-	-	-
High EC Control @ 21.00 mS/cm + 25 ppb PBO	20560	24.1	24.1	8.2	8.4	7.78	7.97	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	11420	24.0	24.0	7.6	8.5	7.77	7.78	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	5450	23.8	23.8	7.7	8.5	7.86	7.87	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	8220	23.9	23.9	7.9	8.8	7.71	7.85	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	15200	24.0	24.0	7.9	8.8	7.70	7.81	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	19950	24.0	24.0	7.7	8.6	7.80	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A46-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/02/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/31/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	98	2.0	97	3.3	NS
Old River, western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	95	5.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	100	0.0	NS
Sacramento Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Sacramento River at tip of Grand Island (711)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	97	3.3	NS
Middle of Broad Slough, West end (804)	98	2.0	100	0.0	NS
Field Dup.: Sacramento River at tip of Grand Island (711)	96	2.4	-	-	NA

	MSD	PMSD
One-way ANOVA	9.4	3.5
Two-way ANOVA	10.2	10.4

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.059	0.003	0.059	0.013	NS
Old River, western arm at railroad bridge (902)	0.082	0.005	0.085	0.006	NS
Old River at mouth of Holland Cut (915)	0.087	0.013	0.082	0.015	NS
San Joaquin River between Hog and Turner Cuts (910)	0.136	0.007	0.108	0.008	NS
San Joaquin River, West of Oulton Point (812)	0.103	0.003	0.090	0.010	NS
Sacramento Deep Water Channel, Light 55	0.081	0.009	0.097	0.007	NS
Sacramento River at tip of Grand Island (711)	0.087	0.005	0.076	0.003	NS
Sacramento R. across from Sherman Lake (704)	0.096	0.004	0.109	0.006	NS
Middle of Broad Slough, West end (804)	0.070	0.005	0.072	0.004	NS
Field Dup.: Sacramento River at tip of Grand Island (711)	0.082	0.005	-	-	NA

	MSD	PMSD
One-way ANOVA	0.031	52.2
Two-way ANOVA	0.038	65.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A46-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/31/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River, western arm at railroad bridge (902)	296	15.7	8.6	8.7	2.2	0.01	0.001
Old River at mouth of Holland Cut (915)	269	15.8	8.68	8.6	2.0	0.02	0.002
San Joaquin River between Hog and Turner Cuts (910)	339	15.0	8.28	7.9	6.0	0.11	0.005
San Joaquin River, West of Oulton Point (812)	258	15.8	8.43	8.4	3.7	0.08	0.005
Sacramento Deep Water Channel, Light 55	181	15.6	8.34	8.3	22.7	0.21	0.012
Sacramento River at tip of Grand Island (711)	156	15.1	8.26	8.4	4.8	0.29	0.013
Sacramento R. across from Sherman Lake (704)	4605	16.3	7.88	8.4	14.3	0.10	0.002
Middle of Broad Slough, West end (804)	5550	16.7	8.52	8.5	9.3	0.08	0.006
Field Dup.: Sacramento River at tip of Grand Island (711)	154	14.8	8.4	8.4	4.7	0.26	0.016

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Table A46-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/2/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/31/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	312	21.8	23.4	6.9	8.6	7.66	7.90	108	58	-
Old River, western arm at railroad bridge (902)	267	22.1	23.7	6.6	8.6	7.68	7.87	76	60	0.000
Old River at mouth of Holland Cut (915)	250	22.0	23.8	6.5	8.9	7.69	7.86	68	42	0.001
San Joaquin River between Hog and Turner Cuts (910)	316	22.3	23.8	6.6	8.7	7.66	7.86	80	64	0.002
San Joaquin River, West of Oulton Point (812)	233	21.8	23.5	6.7	8.9	7.61	7.88	68	62	0.003
Sacramento Deep Water Channel, Light 55	172	21.8	23.7	6.3	8.6	7.61	7.92	60	68	0.007
Sacramento River at tip of Grand Island (711)	155	21.6	23.7	6.3	8.7	7.55	7.91	52	60	0.010
Sacramento R. across from Sherman Lake (704)	4024	22.2	23.3	7.1	8.6	7.64	7.79	496	70	0.002
Middle of Broad Slough, West end (804)	5925	21.9	23.7	6.9	8.7	7.55	7.71	772	76	0.001
Field Dup.: Sacramento River at tip of Grand Island (711)	174	22.0	23.5	6.0	8.5	7.54	7.97	60	60	0.011
DIEPAMHR + 25 ppb PBO	322	22.1	23.4	7.1	8.5	7.72	8.11	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	261	22.2	23.2	6.9	8.7	7.39	7.85	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	249	22.3	23.2	7.0	8.7	7.41	7.89	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	315	22.4	23.0	6.9	8.5	7.59	7.90	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	236	21.9	22.7	6.8	8.7	7.67	8.14	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	169	22.1	22.5	6.5	8.8	7.69	8.18	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	153	21.9	22.6	6.9	8.6	7.57	8.20	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	3981	21.8	22.5	7.0	8.7	7.59	7.95	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	5620	21.5	22.7	7.0	8.8	7.57	7.91	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A47-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/03/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/01/06 - 11/02/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	92	4.1	37	12.0	S (40%)
High EC Control @ 15.42 mS/cm	90	6.2	97	3.3	NS
High EC Control @ 20.92 mS/cm	57	6.6	72	4.0	NS
Suisun Bay off Chipps Island (508)	98	2.0	100	0.0	NS
Suisun Bay, East of middle point (504)	96	2.6	93	3.3	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	88	3.7	93	6.7	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	98	2.0	93	6.7	NS
Montezuma Slough at Nurse Slough (609)	98	2.0	97	3.3	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	63	6.3	70	1.8	NS

	MSD	PMSD
One-way ANOVA	20.3	22.1
Two-way ANOVA	25.7	27.9

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.039	0.002	0.069	0.025	NS
High EC Control @ 15.42 mS/cm	0.036	0.003	0.036	0.003	NS
High EC Control @ 20.92 mS/cm	0.046	0.005	0.034	0.008	NS
Suisun Bay off Chipps Island (508)	0.070	0.005	0.061	0.007	NS
Suisun Bay, East of middle point (504)	0.060	0.007	0.061	0.005	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	0.047	0.005	0.039	0.001	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	0.058	0.002	0.047	0.004	NS
Montezuma Slough at Nurse Slough (609)	0.080	0.003	0.066	0.009	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	0.042	0.006	0.037	0.008	NS

	MSD	PMSD
One-way ANOVA	0.021	54.0
Two-way ANOVA	0.035	88.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC control @ 15.42 mS/cm.

4. These high conductivity samples were compared to the High EC control @ 20.92 mS/cm.

Table A47-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/01/06 - 11/02/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay off Chipps Island (508)	6550	15.1	7.81	8.9	7.1	0.11	0.001
Suisun Bay, East of middle point (504)	10390	15.3	7.73	9.0	5.3	0.09	0.001
Carquinez Strait, West of Benicia army dock (405)	22340	14.3	7.71	8.3	8.2	0.11	0.001
Grizzly Bay at Dolphin (602)	17830	15.0	7.81	8.7	11.7	0.09	0.001
Montezuma Slough at Nurse Slough (609)	10720	15.0	7.72	8.3	20.3	0.04	0.000
Napa River at Riverside Blvd. terminus (340)	24040	15.6	7.43	9.6	5.1	0.09	0.000

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Table A47-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/03/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/01/06 - 11/02/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	337	22.3	23.8	6.6	8.7	7.76	8.11	108	58	-
High EC Control @ 15.42 mS/cm	15260	22.4	24.5	6.8	8.4	7.57	7.72	1940	95	-
High EC Control @ 20.92 mS/cm	21050	22.1	24.6	7.1	8.7	7.66	7.87	2720	105	-
Suisun Bay off Chipps Island (508)	6125	22.5	24.5	6.6	8.6	7.56	7.84	692	74	0.002
Suisun Bay, East of middle point (504)	9830	22.5	24.4	6.8	8.8	7.65	7.82	210	83	0.002
Carquinez Strait, West of Benicia army dock (405)	20125	22.4	22.6	6.4	8.9	7.52	7.83	580	94	0.001
Grizzly Bay at Dolphin (602)	16275	22.3	23.6	6.8	8.6	7.61	7.86	362	100	0.001
Montezuma Slough at Nurse Slough (609)	9970	22.4	24.3	7.0	8.5	7.66	7.91	270	90	0.001
Napa River at Riverside Blvd. terminus (340)	22260	22.4	24.5	6.9	8.5	7.58	8.05	556	134	0.001
DIEPAMHR + 25 ppb PBO	457	22.2	23.5	7.1	8.5	7.91	8.30	-	-	-
High EC Control @ 15.42 mS/cm + 25 ppb PBO	15030	22.1	24.2	7.1	8.7	7.74	7.79	-	-	-
High EC Control @ 20.92 mS/cm + 25 ppb PBO	21440	22.2	24.2	7.0	8.4	7.64	7.86	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	6095	22.2	23.6	7.2	8.6	7.69	7.87	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	9755	22.2	23.7	7.1	8.5	7.63	7.83	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	20960	22.3	23.9	7.0	8.5	7.57	7.89	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	13465	22.2	23.8	7.0	8.3	7.67	7.89	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	12895	22.2	23.6	6.8	8.5	7.59	7.97	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	21715	22.2	23.8	7.3	8.6	7.61	7.98	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A48-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 11/16/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/14/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	92	2.6	98	2.5	NS
DIEPAMHR + organic matter	100	0.0	-	-	NA
Old River, western arm at railroad bridge (902)	95	5.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	95	2.9	93	2.4	NS
San Joaquin River between Hog and Turner Cuts (910)	98	2.5	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	98	2.5	100	0.0	NS
Sacramento River at tip of Grand Island (711)	95	2.9	84	7.1	NS
Sacramento Deep Water Channel, Light 55	90	0.4	92	4.8	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	95	5.0	NS
Middle of Broad Slough, West end (804)	100	0.0	94	5.6	NS

	MSD	PMSD
One-way ANOVA	12.1	12.1
Two-way ANOVA	17.6	17.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.067	0.006	0.054	0.006	NS
DIEPAMHR + organic matter	0.077	0.004	-	-	NA
Old River, western arm at railroad bridge (902)	0.093	0.004	0.079	0.008	NS
Old River at mouth of Holland Cut (915)	0.083	0.007	0.080	0.009	NS
San Joaquin River between Hog and Turner Cuts (910)	0.084	0.005	0.061	0.011	NS
San Joaquin River, West of Oulton Point (812)	0.085	0.002	0.081	0.008	NS
Sacramento River at tip of Grand Island (711)	0.063	0.005	0.069	0.007	NS
Sacramento Deep Water Channel, Light 55	0.076	0.008	0.065	0.003	NS
Sacramento R. across from Sherman Lake (704)	0.070	0.009	0.064	0.008	NS
Middle of Broad Slough, West end (804)	0.075	0.007	0.064	0.008	NS

	MSD	PMSD
One-way ANOVA	0.028	36.2
Two-way ANOVA	0.037	47.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A48-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/14/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River, western arm at railroad bridge (902)	388	14.4	8.06	10.1	2.5	0.03	0.001
Old River at mouth of Holland Cut (915)	409	14.2	7.9	10.2	2.6	0.01	0.000
San Joaquin River between Hog and Turner Cuts (910)	519	14.6	7.74	9.4	7.5	0.06	0.001
San Joaquin River, West of Oulton Point (812)	576	14.6	7.87	10.2	7.4	0.06	0.001
Sacramento River at tip of Grand Island (711)	174	14.2	7.75	9.2	6.6	0.31	0.004
Sacramento Deep Water Channel, Light 55	179	14.1	7.79	9.7	11.6	0.26	0.004
Sacramento R. across from Sherman Lake (704)	5540	15.2	8	10.0	12.9	0.10	0.002
Middle of Broad Slough, West end (804)	5440	15.0	7.95	10.0	10.7	0.08	0.001

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Table A48-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/16/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/14/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	362	23.3	24.0	7.6	8.9	7.75	8.15	100	60	-
DIEPAMHR + organic matter	364	22.9	23.4	7.7	8.7	7.75	8.15	100	60	-
Old River, western arm at railroad bridge (902)	422	23.4	23.9	7.5	8.4	7.75	8.10	78	68	0.002
Old River at mouth of Holland Cut (915)	407	23.3	23.8	7.6	8.3	7.76	8.19	80	63	0.001
San Joaquin River between Hog and Turner Cuts (910)	545	23.3	23.6	7.5	8.3	7.80	8.10	124	95	0.003
San Joaquin River, West of Oulton Point (812)	557	23.3	24.0	7.6	8.8	7.71	8.03	92	60	0.003
Sacramento River at tip of Grand Island (711)	193	23.2	24.1	7.3	8.5	7.70	8.10	62	68	0.018
Sacramento Deep Water Channel, Light 55	198	23.2	23.9	7.6	8.4	7.74	8.13	64	71	0.016
Sacramento R. across from Sherman Lake (704)	5780	23.0	23.9	7.8	8.3	7.73	7.97	618	69	0.004
Middle of Broad Slough, West end (804)	5515	23.2	23.8	7.8	8.4	7.71	8.04	606	70	0.003
DIEPAMHR + 25 ppb PBO	388	23.3	24.0	7.6	8.7	7.74	8.21	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	424	23.4	23.9	7.8	8.6	7.71	8.18	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	433	23.2	23.7	7.3	8.4	7.69	8.14	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	547	23.3	23.7	7.5	8.7	7.81	8.10	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	552	23.4	23.6	7.8	8.6	7.78	8.09	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	201	23.3	24.1	7.3	8.6	7.68	8.08	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	202	23.2	24.0	7.4	8.9	7.75	8.04	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	5715	23.2	23.8	7.9	8.5	7.62	7.91	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	5355	23.2	23.7	7.8	8.7	7.71	7.93	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A49-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/17/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/15/06 - 11/16/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	89	4.5	98	2.5	NS
High EC Control @ 12.0 mS/cm	95	2.9	100	0.0	NS
High EC Control @ 17.0 mS/cm	70	23.5	90	4.1	NS
High EC Control @ 22.0 mS/cm	81	4.6	84	6.9	NS
Suisun Bay off Chippis Island (508)	98	2.5	95	2.9	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	100	0.0	98	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	83	10.8	81	4.1	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	98	2.5	95	5.0	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	100	0.0	95	2.9	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	95	5.0	92	4.8	NS
Trip Blank	93	7.5	-	-	NA

	MSD	PMSD
One-way ANOVA	42.1	47.0
Two-way ANOVA	22.7	25.4

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.052	0.013	0.060	0.012	NS
High EC Control @ 12.0 mS/cm	0.035	0.013	0.050	0.015	NS
High EC Control @ 17.0 mS/cm	0.047	0.009	0.057	0.013	NS
High EC Control @ 22.0 mS/cm	0.049	0.010	0.066	0.018	NS
Suisun Bay off Chippis Island (508)	0.085	0.005	0.059	0.011	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.083	0.020	0.064	0.007	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.017	0.004	0.042	0.007	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	0.053	0.011	0.039	0.004	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	0.069	0.013	0.064	0.008	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	0.052	0.009	0.040	0.004	NS
Trip Blank	0.056	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.054	105.6
Two-way ANOVA	0.059	114.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. These high conductivity samples were compared to the High EC control @ 12.0 mS/cm.

4. These high conductivity samples were compared to the High EC control @ 17.0 mS/cm.

5. This high conductivity sample was compared to the High EC control @ 22.0 mS/cm.

Table A49-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/15/06 - 11/16/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay off Chipps Island (508)	7910	14.4	7.83	10.3	8.0	0.08	0.001
Suisun Bay, East of middle point (504)	12360	14.5	7.86	10.0	8.0	0.09	0.001
Carquinez Strait, West of Benicia army dock (405)	22140	14.8	7.83	9.6	11.8	0.15	0.002
Grizzly Bay at Dolphin (602)	17280	14.5	7.91	9.9	20.5	0.07	0.001
Montezuma Slough at Nurse Slough (609)	11910	14.3	7.67	9.6	27.9	0.09	0.001
Napa River at Riverside Blvd. terminus (340)	18280	14.3	7.41	8.8	4.9	0.02	0.000
Trip Blank	423	14.5	8.38	10.7	0.3	0.00	0.000

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Table A49-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/17/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/15/06 - 11/16/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	372	23.1	24.6	7.5	8.6	7.88	8.16	100	60	-
High EC Control @ 12.0 mS/cm	12475	23.4	24.4	7.8	8.6	7.71	7.81	1380	85	-
High EC Control @ 17.0 mS/cm	17635	23.4	24.5	7.9	8.5	7.74	7.86	2040	95	-
High EC Control @ 22.0 mS/cm	22495	23.4	24.3	7.9	8.3	7.78	7.86	2560	110	-
Suisun Bay off Chipps Island (508)	8465	23.4	24.3	7.7	8.8	7.77	7.95	920	75	0.003
Suisun Bay, East of middle point (504)	12725	23.3	24.5	7.6	8.8	7.72	7.85	1380	90	0.002
Carquinez Strait, West of Benicia army dock (405)	23075	23.2	24.3	7.5	8.7	7.69	7.83	2680	110	0.003
Grizzly Bay at Dolphin (602)	18170	23.2	24.3	7.7	8.5	7.75	7.86	2000	100	0.001
Montezuma Slough at Nurse Slough (609)	12570	23.1	24.3	7.6	8.9	7.64	8.00	1410	94	0.001
Napa River at Riverside Blvd. terminus (340)	17950	23.1	24.2	7.6	8.6	7.58	8.06	140	124	0.000
Trip Blank	487	22.9	24.1	7.7	8.4	7.88	8.22	108	58	0.000
DIEPAMHR	470	23.1	23.6	7.7	8.3	7.90	8.23	-	-	-
High EC Control @ 12.0 mS/cm	12400	23.0	23.6	7.9	8.6	7.77	7.87	-	-	-
High EC Control @ 17.0 mS/cm	17865	23.1	23.6	7.9	8.4	7.74	7.90	-	-	-
High EC Control @ 22.0 mS/cm	23025	22.9	23.7	8.0	8.6	7.78	7.91	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	8395	22.8	23.8	7.8	8.7	7.80	7.98	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	12350	22.8	23.9	7.5	8.7	7.73	7.92	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	23025	22.8	23.9	7.7	8.9	7.76	7.88	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	17710	22.8	24.2	7.6	8.7	7.75	7.89	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	12420	22.8	24.2	7.9	8.9	7.72	7.99	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	17630	22.7	24.2	7.8	8.5	7.75	8.08	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A50-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/30/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/28/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	98	2.5	NS
Old River, western arm at railroad bridge (902)	100	0.0	95	2.9	NS
Old River at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	98	2.5	NS
Sacramento River at tip of Grand Island (711)	81	16.0	83	5.9	NS
Sacramento Deep Water Channel, Light 55	93	7.5	95	2.9	NS
Sacramento R. across from Sherman Lake (704)	98	2.5	95	2.8	NS
Middle of Broad Slough, West end (804)	100	0.0	98	2.5	NS

	MSD	PMSD
One-way ANOVA	28.6	29.3
Two-way ANOVA	24.6	25.2

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.062	0.006	0.047	0.008	NS
Old River, western arm at railroad bridge (902)	0.105	0.008	0.082	0.013	NS
Old River at mouth of Holland Cut (915)	0.095	0.008	0.107	0.008	NS
San Joaquin River between Hog and Turner Cuts (910)	0.087	0.006	0.100	0.010	NS
San Joaquin River, West of Oulton Point (812)	0.083	0.007	0.097	0.011	NS
Sacramento River at tip of Grand Island (711)	0.050	0.008	0.073	0.013	NS
Sacramento Deep Water Channel, Light 55	0.079	0.010	0.092	0.008	NS
Sacramento R. across from Sherman Lake (704)	0.097	0.011	0.107	0.012	NS
Middle of Broad Slough, West end (804)	0.102	0.007	0.091	0.006	NS

	MSD	PMSD
One-way ANOVA	0.038	60.3
Two-way ANOVA	0.041	65.9

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A50-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/28/07.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Old River, western arm at railroad bridge (902)	556	11.5	7.64	10.5	0.08	0.001
Old River at mouth of Holland Cut (915)	461	12.2	7.35	10.3	0.07	0.000
San Joaquin River between Hog and Turner Cuts (910)	426	12.1	7.48	9.2	0.14	0.001
San Joaquin River, West of Oulton Point (812)	695	12.8	7.58	9.9	0.15	0.001
Sacramento River at tip of Grand Island (711)	695	12.8	7.58	9.9	0.38	0.003
Sacramento Deep Water Channel, Light 55	218	11.7	7.60	9.7	0.25	0.002
Sacramento R. across from Sherman Lake (704)	2381	12.7	7.40	9.9	0.19	0.001
Middle of Broad Slough, West end (804)	4674	12.6	7.50	9.9	0.19	0.001

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Table A50-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/30/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/28/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	457	22.1	22.9	7.3	8.9	7.93	8.11	106	61	-
Old River, western arm at railroad bridge (902)	585	22.8	23.1	7.0	8.8	7.85	8.03	96	70	0.004
Old River at mouth of Holland Cut (915)	488	22.6	22.7	7.0	8.9	7.84	8.08	84	72	0.003
San Joaquin River between Hog and Turner Cuts (910)	472	22.2	22.3	7.1	8.8	7.87	8.13	108	92	0.008
San Joaquin River, West of Oulton Point (812)	663	23.2	23.3	6.9	8.8	7.81	8.01	112	82	0.007
Sacramento River at tip of Grand Island (711)	211	22.9	23.2	7.1	8.9	7.80	8.06	68	78	0.019
Sacramento Deep Water Channel, Light 55	238	22.7	22.9	7.2	8.8	7.82	8.17	80	80	0.016
Sacramento R. across from Sherman Lake (704)	4909	22.5	22.8	7.2	8.7	7.76	7.90	496	72	0.006
Middle of Broad Slough, West end (804)	4708	22.5	23.1	7.3	8.8	7.81	7.88	504	80	0.005
DIEPAMHR + 25 ppb PBO	395	22.0	23.3	7.3	8.8	7.93	8.22	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	604	22.1	23.2	7.2	8.9	7.89	8.14	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	478	22.4	23.3	7.1	8.8	7.89	8.17	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	453	22.7	23.3	7.2	8.8	7.93	8.16	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	751	22.3	23.3	7.0	8.9	7.84	8.07	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	217	22.4	23.3	7.1	8.7	7.88	8.12	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	248	23.1	23.4	6.9	8.9	7.90	8.14	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	4908	22.9	23.2	7.2	8.7	7.81	7.89	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	4761	22.6	23.3	7.3	8.8	7.85	7.93	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A51-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 12/01/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/29/06 - 11/30/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	98	2.5	NS
High EC control @ 12.0 mS/cm	98	2.5	100	0.0	NS
High EC control @ 16.5 mS/cm	98	2.5	98	2.5	NS
High EC control @ 22.0 mS/cm	88	5.1	79	3.9	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	100	0.0	98	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	93	2.5	82	2.2	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	100	0.0	98	2.5	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	98	2.5	100	0.0	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	100	0.0	98	2.5	NS

	MSD	PMSD
One-way ANOVA	10.9	10.9
Two-way ANOVA	11.9	11.9

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.060	0.004	0.061	0.002	NS
High EC control @ 12.0 mS/cm	0.073	0.005	0.057	0.004	NS
High EC control @ 16.5 mS/cm	0.053	0.003	0.054	0.005	NS
High EC control @ 22.0 mS/cm	0.045	0.005	0.044	0.002	NS
Suisun Bay off Chipps Island (508)	0.097	0.007	0.108	0.003	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.084	0.007	0.079	0.002	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.047	0.003	0.053	0.007	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	0.062	0.002	0.065	0.004	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	0.089	0.010	0.079	0.003	NS
Napa River at Riverside Blvd. terminus (340) <sup>4</sup>	0.053	0.001	0.052	0.002	NS

	MSD	PMSD
One-way ANOVA	0.026	44.2
Two-way ANOVA	0.024	40.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. These high conductivity samples were compared to the High EC control @ 12.0 mS/cm.

4. These high conductivity samples were compared to the High EC control @ 16.5 mS/cm.

5. This high conductivity sample was compared to the High EC control @ 22.0 mS/cm.

Table A51-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/29/06 - 11/30/06.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Suisun Bay off Chipps Island (508)	8240	11.5	7.52	10.1	0.17	0.001
Suisun Bay, East of middle point (504)	10510	11.4	7.53	10.0	0.14	0.001
Carquinez Strait, West of Benicia army dock (405)	21680	11.5	7.76	9.4	0.18	0.001
Grizzly Bay at Dolphin (602)	16620	11.4	7.77	9.9	0.14	0.001
Montezuma Slough at Nurse Slough (609)	12460	11.8	7.39	8.3	0.25	0.001
Napa River at Riverside Blvd. terminus (340)	16750	12.0	7.86	11.6	0.00	0.000

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Table A51-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 12/01/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/29/06 - 11/30/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	380	23.1	23.5	7.0	8.8	7.87	8.15	106	61	-
High EC control @ 12.0 mS/cm	12645	23.2	24.2	7.2	8.8	7.67	7.78	1460	90	-
High EC control @ 16.5 mS/cm	17990	23.8	24.3	7.2	8.5	7.71	7.85	2080	100	-
High EC control @ 22.0 mS/cm	22830	23.9	24.0	7.3	8.7	7.68	7.84	2600	100	-
Suisun Bay off Chipps Island (508)	8630	23.8	23.9	7.0	8.6	7.76	7.88	940	82	0.005
Suisun Bay, East of middle point (504)	11005	23.6	24.0	7.2	8.7	7.73	7.86	1360	100	0.004
Carquinez Strait, West of Benicia army dock (405)	24010	23.8	24.3	6.9	8.7	7.44	7.76	2720	110	0.003
Grizzly Bay at Dolphin (602)	16645	23.9	24.0	7.4	8.6	7.76	7.91	2080	110	0.004
Montezuma Slough at Nurse Slough (609)	12645	23.5	23.8	7.3	8.4	7.79	7.93	1600	120	0.005
Napa River at Riverside Blvd. terminus (340)	17180	23.8	24.4	7.7	8.9	7.77	7.94	2060	140	0.000
DIEPAMHR + 25 ppb PBO	385	23.3	23.6	6.9	8.5	7.92	8.20	-	-	-
High EC control @ 12.0 mS/cm + 25 ppb PBO	12785	23.8	24.1	7.2	8.7	7.70	7.82	-	-	-
High EC control @ 16.5 mS/cm + 25 ppb PBO	17565	23.7	24.0	7.0	8.4	7.70	7.86	-	-	-
High EC control @ 22.0 mS/cm + 25 ppb PBO	22635	23.7	24.1	7.3	8.7	7.70	7.85	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	8830	23.5	23.9	7.0	8.6	7.76	7.89	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	10895	22.6	24.0	7.4	8.4	7.73	7.81	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	22475	23.8	24.3	7.6	8.6	7.69	7.79	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	17605	23.6	24.4	7.5	8.4	7.78	7.82	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	12710	23.6	24.2	7.5	8.2	7.81	7.85	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	17145	23.5	24.3	7.5	8.6	7.78	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A52-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 12/13/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/12/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	90	10.0	NS
Old River, western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	98	2.5	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	98	2.3	100	0.0	NS
Sacramento River at tip of Grand Island (711)	93	4.8	89	4.5	NS
Sacramento Deep Water Channel, Light 55	98	2.5	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	98	2.5	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	10.2	10.2
Two-way ANOVA	15.9	15.9

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.076	0.004	0.062	0.004	NS
Old River, western arm at railroad bridge (902)	0.117	0.008	0.103	0.007	NS
Old River at mouth of Holland Cut (915)	0.123	0.003	0.113	0.018	NS
San Joaquin River between Hog and Turner Cuts (910)	0.112	0.004	0.099	0.004	NS
San Joaquin River, West of Oulton Point (812)	0.109	0.011	0.097	0.006	NS
Sacramento River at tip of Grand Island (711)	0.073	0.006	0.062	0.009	NS
Sacramento Deep Water Channel, Light 55	0.100	0.008	0.075	0.007	NS
Sacramento R. across from Sherman Lake (704)	0.100	0.006	0.084	0.007	NS
Middle of Broad Slough, West end (804)	0.131	0.004	0.103	0.004	NS

	MSD	PMSD
One-way ANOVA	0.032	41.3
Two-way ANOVA	0.039	51.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A52-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/12/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River, western arm at railroad bridge (902)	723	10.7	7.49	11.6	2.6	0.08	0.000
Old River at mouth of Holland Cut (915)	645	10.6	7.18	12.1	2.9	0.08	0.000
San Joaquin River between Hog and Turner Cuts (910)	297	10.3	7.15	10.9	4.5	0.13	0.000
San Joaquin River, West of Oulton Point (812)	811	10.4	7.41	11.3	4.3	0.13	0.001
Sacramento River at tip of Grand Island (711)	191	10.2	7.41	11.2	4.7	0.34	0.002
Sacramento Deep Water Channel, Light 55	269	10.1	7.49	11.2	9.5	0.19	0.001
Sacramento R. across from Sherman Lake (704)	1833	10.2	7.3	11.1	8.1	0.20	0.001
Middle of Broad Slough, West end (804)	3821	10.7	7.33	11.2	6.3	0.14	0.000

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Table A52-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 12/13/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/12/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	382	22.7	24.7	7.7	8.6	7.91	8.08	104	59	-
Old River, western arm at railroad bridge (902)	755	22.3	24.7	7.6	8.6	7.95	8.08	118	72	0.005
Old River at mouth of Holland Cut (915)	606	22.5	24.4	7.7	8.4	7.88	8.07	104	71	0.004
San Joaquin River between Hog and Turner Cuts (910)	320	22.2	24.5	7.6	8.6	7.89	8.13	82	74	0.008
San Joaquin River, West of Oulton Point (812)	770	22.1	24.5	7.6	8.7	7.85	8.06	118	73	0.007
Sacramento River at tip of Grand Island (711)	205	21.9	24.5	7.2	8.7	7.83	8.13	72	76	0.022
Sacramento Deep Water Channel, Light 55	290	21.9	24.3	7.5	8.8	7.97	8.14	92	100	0.012
Sacramento R. across from Sherman Lake (704)	1896	21.5	24.4	7.6	8.7	7.83	7.98	224	77	0.008
Middle of Broad Slough, West end (804)	3822	21.5	25.5	7.8	8.6	7.77	8.04	396	77	0.007
DIEPAMHR + 25 ppb PBO	376	21.7	24.0	7.7	8.7	7.82	8.11	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	752	21.5	24.2	7.7	8.7	7.93	8.08	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	603	21.4	24.9	7.6	8.8	7.83	8.13	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	348	21.4	25.1	7.7	8.4	7.86	8.08	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	775	21.3	25.3	7.7	8.9	7.81	7.97	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	213	21.2	24.8	7.5	8.4	7.85	8.14	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	290	20.8	24.9	7.7	8.8	7.94	8.13	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	1888	20.6	24.8	7.8	8.8	7.82	8.06	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	3769	20.6	24.7	7.9	8.9	7.80	8.00	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A53-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 12/14/06 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/13/06.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
High EC Control @ 13.0 mS/cm	100	0.0	100	0.0	NS
High EC Control @ 18.0 mS/cm	98	2.5	100	0.0	NS
High EC Control @ 21.5 mS/cm	98	2.5	97	2.8	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504) <sup>4</sup>	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	98	2.5	95	2.9	NS
Grizzly Bay at Dolphin (602) <sup>5</sup>	98	2.5	98	2.5	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	100	0.0	95	2.9	NS
Napa River at Riverside Blvd. terminus (340)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	7.6	7.6
Two-way ANOVA	8.8	8.8

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.066	0.018	0.066	0.013	NS
High EC Control @ 13.0 mS/cm	0.066	0.006	0.051	0.002	NS
High EC Control @ 18.0 mS/cm	0.066	0.006	0.033	0.006	NS
High EC Control @ 21.5 mS/cm	0.055	0.006	0.034	0.007	NS
Suisun Bay off Chipps Island (508)	0.116	0.015	0.086	0.016	NS
Suisun Bay, East of middle point (504) <sup>4</sup>	0.083	0.005	0.054	0.015	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.070	0.007	0.032	0.007	NS
Grizzly Bay at Dolphin (602) <sup>5</sup>	0.071	0.012	0.059	0.003	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	0.092	0.009	0.074	0.008	NS
Napa River at Riverside Blvd. terminus (340)	0.105	0.010	0.102	0.009	NS

	MSD	PMSD
One-way ANOVA	0.049	75.1
Two-way ANOVA	0.052	79.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using USEPA standard single-sample statistical protocols modified for a multiple sample design.

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC control @ 13.0 mS/cm.

4. This high conductivity sample was compared to the High EC control @ 18.0 mS/cm.

5. These high conductivity samples were compared to the High EC control @ 21.5 mS/cm.

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Table A53-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/13/06.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay off Chipps Island (508)	9390	11.0	7.70	11.3	8.1	0.17	0.001
Suisun Bay, East of middle point (504)	17540	11.3	7.79	10.9	11.9	0.17	0.001
Carquinez Strait, West of Benicia army dock (405)	20400	11.5	7.86	10.9	6.9	0.16	0.002
Grizzly Bay at Dolphin (602)	18860	11.6	7.84	10.5	7.9	0.15	0.001
Montezuma Slough at Nurse Slough (609)	12970	11.4	7.48	9.6	17.5	0.20	0.001
Napa River at Riverside Blvd. terminus (340)	6030	12.4	7.65	10.9	10.8	0.05	0.000

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Table A53-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 12/14/06 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/13/06.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	369	23.0	23.7	7.5	8.2	8.00	8.12	104	59	-
High EC Control @ 13.0 mS/cm	13005	23.2	23.6	7.6	8.7	7.70	7.79	1560	110	-
High EC Control @ 18.0 mS/cm	17290	23.3	24.1	7.4	8.4	7.69	7.79	2280	110	-
High EC Control @ 21.5 mS/cm	22380	23.3	23.7	7.3	8.5	7.69	7.84	2500	110	-
Suisun Bay off Chipps Island (508)	9165	23.1	24.5	7.4	8.8	7.77	7.84	1000	82	0.004
Suisun Bay, East of middle point (504)	17870	23.2	23.6	7.3	8.8	7.67	7.83	1920	89	0.003
Carquinez Strait, West of Benicia army dock (405)	20240	23.2	24.8	6.7	8.4	7.66	7.71	2270	92	0.003
Grizzly Bay at Dolphin (602)	19280	23.2	24.3	7.1	8.4	7.70	7.78	2090	91	0.003
Montezuma Slough at Nurse Slough (609)	13420	23.1	24.8	7.5	8.2	7.80	7.91	1480	103	0.005
Napa River at Riverside Blvd. terminus (340)	5995	23.2	24.9	7.6	8.8	7.80	7.99	690	97	0.001
DIEPAMHR + 25 ppb PBO	383	22.8	24.6	7.4	8.6	7.82	8.16	-	-	-
High EC Control @ 13.0 mS/cm + 25 ppb PBO	13015	22.7	24.4	7.7	8.9	7.62	7.85	-	-	-
High EC Control @ 18.0 mS/cm + 25 ppb PBO	18065	23.2	24.5	7.5	8.9	7.67	7.80	-	-	-
High EC Control @ 21.5 mS/cm + 25 ppb PBO	22050	22.9	24.3	7.4	8.5	7.66	7.81	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	9325	22.7	24.3	7.6	8.8	7.79	7.92	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	17835	23.0	24.3	7.2	8.7	7.66	7.81	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	20685	23.0	24.1	7.3	8.5	7.66	7.84	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	18945	22.7	24.4	7.1	8.7	7.69	7.84	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	13205	23.4	24.4	7.5	8.2	7.78	7.93	-	-	-
Napa River at Riverside Blvd. terminus (340) + 25 ppb PBO	6080	23.4	24.2	7.5	8.7	7.91	8.03	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A54-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 1/04/07 examining samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/02/07 - 1/03/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	100	0.0	-	-	NA
DIEPAMHR + organic matter	100	0.0	100	0.0	NS
High EC Control @ 12.0 mS/cm	100	0.0	95	2.8	NS
Middle of Broad Slough (804)	100	0.0	100	0.0	NS
Suisun Bay, off Chipps Island (508)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Napa River @ Riverside Blvd Term. (340)	100	0.0	95	5.0	NS
Grizzly Bay @ Dolphin (602) <sup>3</sup>	98	2.3	95	5.0	NS
Montezuma Slough @ Nurse Slough (609) <sup>3</sup>	98	2.5	100	0.0	NS
Sacramento River N. side, across from Sherman L. (704)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	5.2	5.2
Two-way ANOVA	10.2	10.2

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
Lab Control (DIEPAMHR)	0.062	0.007	-	-	NA
DIEPAMHR + organic matter	0.068	0.008	0.071	0.007	NS
High EC Control @ 12.0 mS/cm	0.035	0.008	0.048	0.002	NS
Middle of Broad Slough (804)	0.088	0.005	0.082	0.003	NS
Suisun Bay, off Chipps Island (508)	0.091	0.002	0.091	0.005	NS
Suisun Bay, East of middle point (504)	0.081	0.014	0.090	0.009	NS
Napa River @ Riverside Blvd Term. (340)	0.092	0.008	0.099	0.006	NS
Grizzly Bay @ Dolphin (602) <sup>3</sup>	0.058	0.009	0.073	0.005	NS
Montezuma Slough @ Nurse Slough (609) <sup>3</sup>	0.064	0.009	0.058	0.007	NS
Sacramento River N. side, across from Sherman L. (704)	0.108	0.011	0.124	0.011	NS

	MSD	PMSD
One-way ANOVA	0.041	60.9
Two-way ANOVA	0.041	59.9

1. Highlighted areas indicate a significant reduction in survival or weight compared to the nutrient addback or High EC control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant, NA: Not applicable.
3. These high conductivity samples were compared to the High EC Control.

Table A54-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/02/07 - 1/03/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Middle of Broad Slough (804)	1240	8.1	7.66	12.1	15.8	0.16	0.001
Suisun Bay, off Chipps Island (508)	3952	8.6	7.45	12.9	13.8	0.19	0.001
Suisun Bay, East of middle point (504)	7580	8.9	7.82	12.1	15.7	0.15	0.001
Napa River @ Riverside Blvd Term. (340)	4826	8.6	7.42	11.8	14.5	0.23	0.001
Grizzly Bay @ Dolphin (602)	11990	9.3	7.46	11.8	22.8	0.17	0.001
Montezuma Slough @ Nurse Slough (609)	12230	8.3	7.48	10.7	34.5	0.25	0.001
Sacramento River N. side, across from Sherman L. (704)	1058	8.6	7.52	11.4	35.3	0.22	0.001

Table A54-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 1/04/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/02/07 - 1/03/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	371	21.6	22.4	7.5	8.9	8.03	8.34	92	60	-
DIEPAMHR + nutrient	417	22.7	22.8	7.4	8.7	7.92	8.08	-	-	-
High EC Control @ 12.0 mS	11945	22.3	22.9	7.5	8.8	7.85	7.99	260	14	-
Middle of Broad Slough (804)	1285	23.3	23.3	7.7	8.8	8.00	8.14	172	74	0.007
Suisun Bay, off Chipps Island (508)	3701	22.7	23.3	7.3	8.5	7.85	7.97	408	78	0.006
Suisun Bay, East of middle point (504)	8230	23.2	23.2	7.7	8.2	7.86	8.00	840	100	0.005
Napa River @ Riverside Blvd Term. (340)	4958	23.1	23.3	7.5	8.4	7.94	8.01	536	92	0.008
Grizzly Bay @ Dolphin (602)	13060	22.7	22.8	7.6	8.9	7.81	7.97	1320	100	0.004
Montezuma Slough @ Nurse Slough (609)	12495	22.4	22.8	7.6	8.9	7.70	8.03	1380	110	0.004
Sacramento River N. side, across from Sherman L. (704)	909	22.7	22.8	7.6	8.9	7.99	8.19	124	72	0.009
DIEPAMHR + 1% nutrient addback + 25 ppb PBO	390	22.0	23.3	7.2	8.6	7.92	8.09	-	-	-
High EC Control @ 12.0 mS + 25 ppb PBO	12025	21.8	23.6	7.6	8.4	7.76	8.01	-	-	-
Middle of Broad Slough (804) + 25 ppb PBO	1202	22.0	22.6	7.5	8.6	7.98	8.08	-	-	-
Suisun Bay, off Chipps Island (508) + 25 ppb PBO	3537	22.0	22.6	7.4	8.7	7.94	8.03	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	8050	21.9	22.6	7.8	8.4	7.80	8.04	-	-	-
Napa River @ Riverside Blvd Term. (340) + 25 ppb PBO	5016	22.0	22.5	7.4	8.9	7.90	8.04	-	-	-
Grizzly Bay @ Dolphin (602) + 25 ppb PBO	12875	21.9	22.6	7.5	8.6	7.78	8.02	-	-	-
Montezuma Slough @ Nurse Slough (609) + 25 ppb PBO	12600	21.8	23.4	7.2	8.4	7.77	8.05	-	-	-
Sacramento River N. side, across from Sherman L. (704) + 25 ppb PBO	823	21.7	22.6	7.0	8.7	7.91	8.18	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured a test initiation.

Table A55-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 1/05/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/03/2007- 1/04/2007.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	-	-	NA
DIEPAMHR + organic matter	95	5.0	88	2.5	NS
High EC Control @ 18.0 mS/cm	92	2.8	97	2.8	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	92	4.8	95	5.0	NS
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
San Joaquin River West of Oulton Pt. (812)	100	0.0	92	5.3	NS
Field Duplicate: Sacramento R. Deep Water Channel, Light 55	100	0.0	-	-	NA
Old River at Holland Cut (915)	98	2.5	100	0.0	NS
Sacramento River Deep Water Channel, Light 55	90	10.0	90	4.1	NS
Sacramento River at Grand Island (711)	79	6.1	75	9.6	NS
Old River, Western arm at railroad bridge (902)	95	2.9	95	3.1	NS

	MSD	PMSD
One-way ANOVA	21.66	22.80
Two-way ANOVA	24.09	25.35

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.082	0.002	-	-	NA
DIEPAMHR + organic matter	0.085	0.009	0.057	0.009	NS
High EC Control @ 18.0 mS/cm	0.053	0.009	0.025	0.001	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.064	0.003	0.045	0.005	NS
San Joaquin River between Hog and Turner Cuts (910)	0.111	0.003	0.063	0.006	S (57%)
San Joaquin River West of Oulton Pt. (812)	0.108	0.006	0.083	0.009	NS
Field Duplicate: Sacramento R. Deep Water Channel, Light 55	0.100	0.007	-	-	NA
Old River at Holland Cut (915)	0.106	0.002	0.090	0.004	NS
Sacramento River Deep Water Channel, Light 55	0.097	0.012	0.083	0.006	NS
Sacramento River at Grand Island (711)	0.088	0.008	0.075	0.004	NS
Old River, Western arm at railroad bridge (902)	0.087	0.003	0.089	0.008	NS

	MSD	PMSD
One-way ANOVA	0.032	38.67
Two-way ANOVA	0.030	40.56

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant, NA: Not applicable.
- This high conductivity sample was compared to the High EC control.

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Table A55-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/03/07 - 1/04/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Carquinez Strait, West of Benicia army dock (405)	17350	8.6	7.46	11.8	10.3	0.140	0.000
San Joaquin River between Hog and Turner Cuts (910)	498	9.0	7.53	11.8	9.3	0.250	0.001
San Joaquin River West of Oulton Pt. (812)	705	8.8	7.66	12.2	12.0	0.130	0.001
Field Duplicate: Sacramento R. Deep Water Channel, Light 55	355	9.3	7.81	12.3	28.8	0.190	0.002
Old River at Holland Cut (915)	721	8.7	7.61	12.2	5.5	0.900	0.006
Sacramento River Deep Water Channel, Light 55	490	8.6	7.85	12.2	28.4	0.200	0.002
Sacramento River at Grand Island (711)	179	8.4	7.46	12.1	14.0	0.360	0.002
Old River, Western arm at railroad bridge (902)	820	8.9	7.51	12.0	4.7	0.070	0.000

Table A55-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 1/05/2007 of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWS) on 1/03/2007-1/04/2007.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	397	22.1	22.7	7.1	8.9	7.92	8.23	92	60	-
DIEPAMHR + nutrient addback	383	21.1	22.6	7.2	8.8	7.85	8.20	-	-	-
High EC Control @ 18.0 mS	19065	21.3	22.3	7.1	8.6	7.58	7.87	204	10	-
Carquinez Strait, West of Benicia army dock (405)	19115	21.5	22.5	6.8	8.9	7.59	7.87	1960	120	0.002
San Joaquin River between Hog and Turner Cuts (910)	519	21.4	22.4	7.1	8.9	7.93	8.10	112	84	0.010
San Joaquin River West of Oulton Pt. (812)	758	21.6	22.4	7.0	8.8	7.78	8.21	112	72	0.008
Field Duplicate: Sacramento R. Deep Water Channel, Light 55	274	22.1	22.4	7.1	8.7	7.98	8.14	88	90	0.011
Old River at Holland Cut (915)	769	22.0	22.6	7.2	8.9	7.85	8.01	112	70	0.036
Sacramento River Deep Water Channel, Light 55	392	21.6	22.6	7.2	8.7	7.96	8.13	96	90	0.010
Sacramento River at Grand Island (711)	232	21.7	22.7	7.0	8.9	7.79	8.10	72	70	0.018
Old River, Western arm at railroad bridge (902)	831	21.2	22.6	7.1	8.8	7.82	8.11	124	72	0.003
DIEPAMHR + nutrient addback + 25 ppb PBO	403	22.1	22.6	7.4	8.7	7.85	8.04	-	-	-
High EC Control @ 18.0 mS + 25 ppb PBO	19000	22.0	22.7	7.1	8.6	7.69	7.83	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	18515	22.3	22.7	6.9	8.7	7.71	7.86	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	540	22.2	22.6	7.3	8.7	8.05	8.12	-	-	-
San Joaquin River West of Oulton Pt. (812) + 25 ppb PBO	749	22.1	22.4	7.2	8.7	7.98	8.06	-	-	-
Old River at Holland Cut (915) + 25 ppb PBO	776	22.5	22.5	7.1	8.9	7.89	8.03	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	288	22.4	22.8	7.1	8.9	7.92	8.11	-	-	-
Sacramento River at Grand Island (711) + 25 ppb PBO	206	22.2	22.7	7.0	8.6	7.86	8.06	-	-	-
Old River, Western arm at railroad bridge (902) + 25 ppb PBO	878	22.1	22.5	7.3	8.7	7.88	8.01	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A56-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 01/18/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/16/07 - 1/17/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	-	-	NA
DIEPAMHR + organic matter	98	2.5	92	2.6	NS
High EC Control @ 11.5 mS/cm	100	0.0	100	0.0	NS
High EC Control @ 16.5 mS/cm	88	7.5	95	3.1	NS
High EC Control @ 24.0 mS/cm	74	6.1	81	9.6	NS
Napa River @ Riverside Blvd. Term. (340)	100	0.0	100	0.0	NS
Suisun Bay, off Chipps Island (508)	100	0.0	95	2.9	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	98	2.5	90	7.1	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	92	8.3	76	7.7	NS
Grizzly Bay @ Dolphin (602) <sup>4</sup>	100	0.0	95	2.9	NS
Montezuma Slough @ Nurse Slough (609) <sup>3</sup>	100	0.0	98	2.5	NS
Trip Blank (827)	98	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA	19.26	19.76
Two-way ANOVA	23.87	24.48

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.063	0.004	-	-	NA
DIEPAMHR + organic matter	0.076	0.005	0.045	0.011	NS
High EC Control @ 11.5 mS/cm	0.052	0.005	0.046	0.004	NS
High EC Control @ 16.5 mS/cm	0.045	0.003	0.050	0.003	NS
High EC Control @ 24.0 mS/cm	0.051	0.002	0.033	0.005	NS
Napa River @ Riverside Blvd. Term. (340)	0.099	0.005	0.079	0.015	NS
Suisun Bay, off Chipps Island (508)	0.091	0.004	0.065	0.005	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.088	0.008	0.040	0.009	S (45%)
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.049	0.006	0.035	0.003	NS
Grizzly Bay @ Dolphin (602) <sup>4</sup>	0.072	0.003	0.059	0.007	NS
Montezuma Slough @ Nurse Slough (609) <sup>3</sup>	0.084	0.005	0.054	0.002	NS
Trip Blank (827)	0.066	0.002	-	-	NA

	MSD	PMSD
One-way ANOVA	0.023	30.72
Two-way ANOVA	0.033	43.61

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant, NA: Not applicable.
3. These high conductivity samples were compared to the High EC control @ 11.5 mS/cm.
4. This high conductivity sample was compared to the High EC control @ 16.5 mS/cm.
5. This high conductivity sample was compared to the High EC control @ 24.0 mS/cm.

Table A56-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/16/07 - 1/17/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total	Unionized
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		Ammonia Nitrogen (mg/L)	Ammonia (mg/L)
Napa River @ Riverside Blvd. Term. (340)	8280	6.5	7.74	11.8	8.0	0.33	0.002
Suisun Bay, off Chipps Island (508)	5540	7.2	7.85	13.0	11.9	0.19	0.002
Suisun Bay, East of middle point (504)	10650	7.2	8.07	12.5	12.8	0.2	0.003
Carquinez Strait, West of Benicia army dock (405)	23560	7.9	8.15	12.0	26.9	0.17	0.003
Grizzly Bay @ Dolphin (602)	16320	7.4	8.08	12.5	22.0	0.21	0.003
Montezuma Slough @ Nurse Slough (609)	11300	6.7	7.82	12.4	29.2	0.26	0.002
Trip Blank (827)	338	13.4	7.91	11.4	0.2	0	0.000

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Table A56-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 1/18/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/16/07- 1/17/07.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH				Max pH
DIEPAMHR	359	22.4	23.5	7.3	8.8	7.92	8.01	106	56	-
DIEPAMHR + organic matter	362	22.5	24.1	7.3	8.6	7.79	8.10	106	56	-
High EC Control @ 11.5 mS/cm	11450	22.5	23.7	7.3	8.8	7.55	7.93	1280	70	-
High EC Control @ 16.5 mS/cm	16655	22.5	24.3	7.3	8.7	7.63	7.90	1890	78	-
High EC Control @ 24.0 mS/cm	23890	22.4	24.2	7.0	8.8	7.65	7.97	2780	89	-
Napa River @ Riverside Blvd. Term. (340)	8345	22.4	24.3	7.5	8.8	7.86	7.91	940	113	0.009
Suisun Bay, off Chipps Island (508)	5660	22.3	24.4	7.6	8.9	7.82	7.97	630	83	0.007
Suisun Bay, East of middle point (504)	10680	22.3	24.3	7.2	8.9	7.68	7.73	1170	87	0.004
Carquinez Strait, West of Benicia army dock (405)	23380	22.3	23.0	7.1	8.8	7.62	7.71	2720	99	0.003
Grizzly Bay @ Dolphin (602)	16690	22.0	23.8	7.4	8.7	7.71	7.79	860	93	0.004
Montezuma Slough @ Nurse Slough (609)	11400	22.6	23.5	7.5	8.6	7.70	7.78	1290	97	0.005
Trip Blank (827)	570	22.5	23.8	7.5	8.8	7.84	8.18	104	59	0.000
DIEPAMHR + organic matter + 25 ppb BBO	359	21.7	24.2	7.3	8.6	7.79	8.07	-	-	-
High EC Control @ 11.5 mS/cm + 25 ppb PBO	11175	22.3	23.4	7.5	8.9	7.57	7.77	-	-	-
High EC Control @ 16.5 mS/cm + 25 ppb PBO	16035	22.2	23.7	7.3	8.8	7.58	7.84	-	-	-
High EC Control @ 24.0 mS/cm + 25 ppb PBO	23130	22.1	23.9	7.2	8.6	7.61	7.88	-	-	-
Napa River @ Riverside Blvd. Term. (340) + 25 ppb PBO	8620	22.0	24.3	7.0	8.7	7.85	8.04	-	-	-
Suisun Bay, off Chipps Island (508) + 25 ppb PBO	5645	22.0	24.2	7.1	8.9	7.83	8.05	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	10735	21.9	24.1	7.3	8.6	7.69	7.75	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	22930	21.8	24.1	7.4	8.4	7.64	7.74	-	-	-
Grizzly Bay @ Dolphin (602) + 25 ppb PBO	16500	21.9	24.2	7.2	8.5	7.73	7.84	-	-	-
Montezuma Slough @ Nurse Slough (609) + 25 ppb PBO	11460	21.7	23.9	7.3	8.9	7.79	7.85	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A57-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 01/19/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/18/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	95	2.9	-	-	NA
DIEPAMHR + organic matter	90	4.1	95	2.9	NS
Sacramento River @ Grand Island (711)	100	0.0	94	3.4	NS
Old River, Western arm at railroad bridge (902)	100	0.0	98	2.3	NS
San Joaquin River between Hog and Turner Cut (910)	100	0.0	100	0.0	NS
Broad Slough, West end (804)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	100	0.0	NS
Old River @ Holland Cut (915)	98	2.5	100	0.0	NS
Sacramento River, across from Sherman Lake (704)	100	0.0	98	2.5	NS
Sacramento River Deep Water Channel, Light 55	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	8.82	9.80
Two-way ANOVA	9.13	9.87

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.042	0.009	-	-	NA
DIEPAMHR + organic matter	0.071	0.005	0.028	0.003	S (39%)
Sacramento River @ Grand Island (711)	0.043	0.005	0.031	0.010	NS
Old River, Western arm at railroad bridge (902)	0.079	0.001	0.048	0.007	NS
San Joaquin River between Hog and Turner Cut (910)	0.083	0.009	0.050	0.004	NS
Broad Slough, West end (804)	0.091	0.007	0.054	0.005	NS
San Joaquin River, West of Oulton Point (812)	0.077	0.008	0.042	0.010	NS
Old River @ Holland Cut (915)	0.084	0.011	0.057	0.012	NS
Sacramento River, across from Sherman Lake (704)	0.102	0.008	0.054	0.011	S (53%)
Sacramento River Deep Water Channel, Light 55	0.082	0.007	0.056	0.013	NS

	MSD	PMSD
One-way ANOVA	0.036	50.36
Two-way ANOVA	0.041	82.85

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant, NA: Not applicable

Table A57-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/18/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Un-ionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento River @ Grand Island (711)	190	6.1	8.00	13.4	9.1	0.18	0.002
Old River, Western arm at railroad bridge (902)	520	5.8	7.95	12.9	7.4	0.11	0.001
San Joaquin River between Hog and Turner Cut (910)	590	6.6	7.91	12.9	6.5	0.21	0.002
Broad Slough, West end (804)	2976	7.2	7.70	12.5	16.6	0.21	0.001
San Joaquin River, West of Oulton Point (812)	464	6.7	8.00	13.1	8.9	0.13	0.002
Old River @ Holland Cut (915)	522	6.6	7.91	12.9	8.5	0.09	0.001
Sacramento River, across from Sherman Lake (704)	1983	7.2	7.80	12.4	18.9	0.21	0.002
Sacramento River Deep Water Channel, Light 55	281	6.4	8.30	13.2	22.5	0.18	0.005

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Table A57-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 1/19/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/18/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	370	22.1	24.2	7.5	8.7	7.71	8.01	106	56	-
DIEPAMHR + organic matter	375	22.3	23.5	7.1	8.6	7.63	7.86	106	56	-
Sacramento River @ Grand Island (711)	219	22.5	24.6	7.3	8.8	7.83	7.88	72	74	0.006
Old River, Western arm at railroad bridge (902)	547	22.5	24.3	7.4	8.7	7.78	7.84	100	76	0.004
San Joaquin River between Hog and Turner Cut (910)	636	22.4	24.8	7.2	8.8	7.75	7.83	128	92	0.007
Broad Slough, West end (804)	3085	22.5	24.9	7.5	8.9	7.70	7.74	344	81	0.005
San Joaquin River, West of Oulton Point (812)	600	22.6	24.6	7.2	8.5	7.78	7.99	96	75	0.006
Old River @ Holland Cut (915)	555	22.6	24.8	7.2	8.6	7.77	7.95	102	73	0.004
Sacramento River, across from Sherman Lake (704)	2036	22.5	24.4	7.3	8.9	7.68	7.73	246	82	0.005
Sacramento River Deep Water Channel, Light 55	360	22.4	24.7	7.3	8.8	7.81	7.90	94	100	0.006
DIEPAMHR + organic matter + 25 ppb PBO	384	22.4	23.5	7.3	8.7	7.68	7.76	-	-	-
Sacramento River @ Grand Island (711) + 25 ppb PBO	217	22.5	24.1	7.3	8.9	7.76	7.83	-	-	-
Old River, Western arm at railroad bridge (902) + 25 ppb PBO	550	22.5	24.2	7.1	8.5	7.72	7.87	-	-	-
San Joaquin River between Hog and Turner Cut (910) + 25 ppb PBO	634	22.5	24.2	7.4	8.7	7.69	7.85	-	-	-
Broad Slough, West end (804) + 25 ppb PBO	2948	22.5	23.5	7.5	8.7	7.62	7.79	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	552	22.4	23.5	7.3	8.7	7.78	8.06	-	-	-
Old River @ Holland Cut (915) + 25 ppb PBO	551	22.5	23.4	7.3	8.8	7.75	7.97	-	-	-
Sacramento River, across from Sherman Lake (704) + 25 ppb PBO	2053	22.3	24.2	7.4	8.7	7.70	7.83	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	360	22.3	24.7	6.9	8.9	7.49	7.93	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A58-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 2/02/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/31/07 - 2/01/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	100	0.0	-	-	NA
DIEPAMHR + organic matter	100	0.0	83	14.4	NS
High EC Control @ 15.0 mS/cm + organic matter	100	0.0	88	2.5	NS
Grizzly Bay @ Dolphin (602) <sup>3</sup>	100	0.0	100	0.0	NS
Old River, Western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Old River @ Holland Cut (915)	100	0.0	98	2.5	NS
San Joaquin River between Hog and Turner Cut (910)	100	0.0	98	2.3	NS
Sacramento River @ Grand Island (711)	90	7.1	77	9.3	NS
Sacramento River Deep Water Channel, Light 55	77	9.4	95	2.8	NS
Sacramento River across from Sherman Lake (704)	100	0.0	93	4.4	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	98	2.3	NS

	MSD	PMSD
One-way ANOVA	17.48	17.48
Two-way ANOVA	25.74	25.74

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.083	0.005	-	-	NA
DIEPAMHR + organic matter	0.107	0.009	0.090	0.010	NS
High EC Control @ 15.0 mS/cm + organic matter	0.097	0.007	0.069	0.009	NS
Grizzly Bay @ Dolphin (602) <sup>3</sup>	0.100	0.005	0.071	0.004	NS
Old River, Western arm at railroad bridge (902)	0.130	0.010	0.090	0.003	NS
Old River @ Holland Cut (915)	0.137	0.009	0.092	0.007	S (68%)
San Joaquin River between Hog and Turner Cut (910)	0.137	0.002	0.097	0.005	S (71%)
Sacramento River @ Grand Island (711)	0.118	0.005	0.103	0.009	NS
Sacramento River Deep Water Channel, Light 55	0.128	0.016	0.090	0.005	NS
Sacramento River across from Sherman Lake (704)	0.092	0.006	0.093	0.003	NS
San Joaquin River, West of Oulton Point (812)	0.086	0.008	0.078	0.004	NS

	MSD	PMSD
One-way ANOVA	0.04	38.72
Two-way ANOVA	0.04	37.22

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant, NA: Not applicable
3. This high conductivity sample was compared to the High EC control.

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Table A58-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/31/07 - 2/01/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Grizzly Bay @ Dolphin (602)	14820	8.9	7.73	11.8	10.3	0.23	0.002
Old River, Western arm at railroad bridge (902)	436	8.1	7.72	12.4	5.3	0.12	0.001
Old River @ Holland Cut (915)	450	8.1	7.68	12.2	5.2	0.13	0.001
San Joaquin River between Hog and Turner Cut (910)	649	8.3	7.80	12.9	4.7	0.19	0.002
Sacramento River @ Grand Island (711)	195	9.2	7.76	12.4	6.5	0.36	0.003
Sacramento River Deep Water Channel, Light 55	295	8.8	7.91	12.3	20.0	0.27	0.003
Sacramento River across from Sherman Lake (704)	2128	8.6	7.79	12.2	18.5	0.3	0.003
San Joaquin River, West of Oulton Point (812)	421	8.2	7.75	12.5	7.5	0.2	0.002

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Table A58-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 2/02/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/31/07 - 2/01/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	354	22.4	24.0	6.7	8.6	7.59	8.05	108	59	-
DIEPAMHR +organic matter	346	22.1	23.0	6.5	8.4	7.58	8.01	108	59	-
High EC Control @ 15.0 mS + organic matter	14260	22.4	24.3	6.8	8.6	7.43	7.74	336	74	-
Grizzly Bay @ Dolphin (602)	14645	22.6	24.6	6.9	8.5	7.55	7.72	332	95	0.004
Old River, Western arm at railroad bridge (902)	497	22.1	23.6	6.6	8.5	7.67	8.00	108	74	0.005
Old River @ Holland Cut (915)	448	22.0	24.6	6.8	8.7	7.60	7.85	100	74	0.004
San Joaquin River between Hog and Turner Cut (910)	601	22.4	24.7	6.6	8.7	7.67	7.88	140	86	0.007
Sacramento River @ Grand Island (711)	199	22.2	24.6	6.8	8.5	7.61	7.95	64	70	0.016
Sacramento River Deep Water Channel, Light 55	283	22.2	23.9	6.5	8.6	7.70	7.97	104	96	0.012
Sacramento River across from Sherman Lake (704)	1991	22.5	23.6	7.0	8.6	7.60	7.89	252	80	0.010
San Joaquin River, West of Oulton Point (812)	399	22.2	24.5	6.7	8.5	7.63	7.97	92	76	0.009
DIEPAMHR + organic matter + 25 ppb PBO	365	22.5	23.2	6.7	8.4	7.53	8.03	-	-	-
High EC Control @ 15.0 mS + organic matter + 25 ppb PBO	14155	22.0	24.0	6.6	8.3	7.44	7.84	-	-	-
Grizzly Bay @ Dolphin (602) + 25 ppb PBO	14225	22.5	23.7	6.7	8.3	7.51	7.75	-	-	-
Old River, Western arm at railroad bridge (902) + 25 ppb PBO	481	22.1	24.2	6.3	8.4	7.62	8.17	-	-	-
Old River @ Holland Cut (915) + 25 ppb PBO	444	22.5	23.8	6.6	8.6	7.67	7.90	-	-	-
San Joaquin River between Hog and Turner Cut (910) + 25 ppb PBO	620	22.1	23.9	6.6	8.6	7.67	7.92	-	-	-
Sacramento River @ Grand Island (711) + 25 ppb PBO	197	22.4	23.9	6.5	8.7	7.66	7.98	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	292	22.4	24.6	6.6	8.4	7.69	7.91	-	-	-
Sacramento River across from Sherman Lake (704) + 25 ppb PBO	2087	22.0	23.3	6.8	8.5	7.56	7.86	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	414	21.8	24.3	6.8	8.4	7.59	7.99	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A59-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 2/07/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/30/07 - 1/31/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>3</sup>
	x	se	x	se	
DIEPAMHR	100	0.0	-	-	NA
DIEPAMHR + organic matter	95	2.9	89	4.5	NS
High EC Control @ 12.0 mS/cm + organic matter	97	2.8	98	2.5	NS
High EC Control @ 24.0 mS/cm + organic matter	88	6.3	63	7.6	S (72%)
Napa River @ Riverside Blvd Terminus (340) <sup>3</sup>	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	100	0.0	-	-	NA
Montezuma Slough @ Nurse Slough (609)	100	0.0	-	-	NA
Broad Slough, West end (804)	100	0.0	-	-	NA
Carquinez Strait, West of Benicia army ferry dock (405) <sup>4</sup>	92	2.8	-	-	NA
Suisun Bay, off Chipps Island (508)	98	2.5	-	-	NA
Field Duplicate: Napa River @ Riverside Blvd Terminus (340) <sup>3</sup>	97	2.8	-	-	NA
Mixed Water: 504 + 508	-	-	100	0.0	NA
Mixed Water: 609 + 504	-	-	100	0.0	NA
Mixed Water: 804 + 405	-	-	100	0.0	NA
Mixed Water: 405 + 804	-	-	84	3.5	NA
Mixed Water: 508 + 609	-	-	87	4.9	NA

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>3</sup>
	x	se	x	se	
DIEPAMHR	0.053	0.003	-	-	NA
DIEPAMHR + organic matter	0.087	0.007	0.057	0.003	NS
High EC Control @ 12.0 mS/cm + organic matter	0.080	0.005	0.043	0.008	NS
High EC Control @ 24.0 mS/cm + organic matter	0.023	0.009	0.006	0.022	NS
Napa River @ Riverside Blvd Terminus (340) <sup>3</sup>	0.061	0.012	0.072	0.005	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.063	0.008	-	-	NA
Montezuma Slough @ Nurse Slough (609)	0.081	0.004	-	-	NA
Broad Slough, West end (804)	0.075	0.006	-	-	NA
Carquinez Strait, West of Benicia army ferry dock (405) <sup>4</sup>	0.049	0.007	-	-	NA
Suisun Bay, off Chipps Island (508)	0.078	0.007	-	-	NA
Field Duplicate: Napa River @ Riverside Blvd Terminus (340) <sup>3</sup>	0.081	0.007	-	-	NA
Mixed Water: 504 + 508	-	-	0.057	0.012	NA
Mixed Water: 609 + 504	-	-	0.084	0.006	NA
Mixed Water: 804 + 405	-	-	0.088	0.003	NA
Mixed Water: 405 + 804	-	-	0.044	0.011	NA
Mixed Water: 508 + 609	-	-	0.080	0.012	NA

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant, NA: Not applicable.
3. These high conductivity samples were compared to the 12.0 mS/cm High EC control.
4. This high conductivity sample was compared to the 24.0 mS/cm High EC control.

Table A59-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/30/07 - 1/31/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River @ Riverside Blvd Terminus (340)	12080	8.0	8.05	13.5	12.9	0.04	0.001
Suisun Bay, East of middle point (504)	10960	8.4	7.7	12.2	9.5	0.22	0.000
Montezuma Slough @ Nurse Slough (609)	5020	8.5	7.58	11.9	31.7	0.20	0.001
Broad Slough, West end (804)	1376	8.2	7.67	12.9	4.4	0.20	0.001
Carquinez Strait, West of Benicia army ferry dock (405)	22830	9.2	7.72	11.2	16.1	0.20	0.001
Suisun Bay, off Chipps Island (508)	4775	8.2	7.71	12.7	11.8	0.20	0.001
Field Duplicate: Napa River @ Riverside Blvd Terminus (340)	-	-	-	-	9.4	0.05	-

Table A59-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 2/07/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 1/30/07 - 1/31/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	339	22.2	24.3	7.6	8.4	7.61	7.94	104	64	-
DIEPAMHR + 1% nutrient addback	339	22.5	24.4	7.2	8.3	7.44	8.04	104	64	-
High EC Control @ 12.0 mS/cm + nutrient addback	11285	22.5	24.5	7.6	8.4	7.49	7.65	1350	70	-
High EC Control @ 24.0 mS/cm + nutrient addback	22915	22.5	24.5	7.7	8.6	7.55	7.66	2740	86	-
Napa River @ Riverside Blvd Terminus (340)	11915	22.5	24.8	7.3	8.6	7.68	7.82	1340	116	0.001
Suisun Bay, East of middle point (504)	10935	22.5	24.7	7.2	8.7	7.60	7.81	1230	90	0.004
Montezuma Slough @ Nurse Slough (609)	4955	22.4	24.4	7.3	8.7	7.66	7.90	560	85	0.005
Broad Slough, West end (804)	1434	22.5	24.8	7.4	8.6	7.69	8.04	188	80	0.008
Carquinez Strait, West of Benicia army ferry dock (405)	23455	22.7	24.5	7.4	8.9	7.45	7.68	2740	103	0.002
Suisun Bay, off Chipps Island (508)	4766	22.9	24.4	7.4	8.3	7.67	7.99	560	87	0.007
Field Duplicate: Napa River @ Riverside Blvd Terminus (340)	11730	22.5	24.6	7.6	8.6	7.74	7.81	1380	115	0.001
DIEPAMHR + 1% nutrient addback + 25 ppb PBO	364	22.8	24.1	7.2	8.7	7.65	8.15	NA	NA	-
High EC Control @ 12.0 mS/cm + nutrient addback + 25 ppb PBO	11500	22.9	24.0	7.7	8.8	7.56	7.67	NA	NA	-
High EC Control @ 24.0 mS/cm + nutrient addback + 25 ppb PBO	22730	22.7	23.9	7.6	8.4	7.53	7.74	NA	NA	-
Napa River @ Riverside Blvd Terminus (340) + 25 ppb PBO	11640	23.2	24.0	7.5	8.9	7.76	7.89	NA	NA	-
Mixed Water (504 + 508) + 25 ppb PBO	8410	23.2	23.6	7.3	8.9	7.60	7.82	NA	NA	-
Mixed Water (609 + 504) + 25 ppb PBO	7219	23.1	23.3	7.1	8.8	7.55	7.92	NA	NA	-
Mixed Water (804 + 405) + 25 ppb PBO	9763	23.0	23.2	7.6	8.1	7.61	8.14	NA	NA	-
Mixed Water (405 + 804) + 25 ppb PBO	15360	23.0	23.2	7.6	8.7	7.57	7.68	NA	NA	-
Mixed Water (508 + 609) + 25 ppb PBO	4723	22.8	23.2	7.4	8.8	7.64	8.01	NA	NA	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A60-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 2/15/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/13/07 - 2/14/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	-	-	NA
DIEPAMHR + organic matter	93	4.8	100	0.0	NS
High EC Control @ 15.95 mS/cm + organic matter	100	0.0	90	7.1	NS
Napa River @ Riverside Blvd terminus (340)	100	0.0	98	2.5	NS
Suisun Bay, off Chipps Island (508)	95	5.0	98	2.5	NS
Grizzly Bay @ Dolphin (602)	100	0.0	100	0.0	NS
Montezuma Slough @ Nurse Slough (609)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	93	4.8	98	2.5	NS
Broad Slough, West End (804)	98	2.5	100	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Bottle Blank	98	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA	14.03	15.17
Two-way ANOVA	14.94	16.15

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.059	0.002	-	-	NA
DIEPAMHR + organic matter	0.053	0.004	0.052	0.005	NS
High EC Control @ 15.95 mS/cm + organic matter	0.061	0.003	0.032	0.006	NS
Napa River @ Riverside Blvd terminus (340)	0.098	0.011	0.063	0.006	S (64%)
Suisun Bay, off Chipps Island (508)	0.091	0.004	0.073	0.008	NS
Grizzly Bay @ Dolphin (602)	0.079	0.004	0.065	0.008	NS
Montezuma Slough @ Nurse Slough (609)	0.083	0.006	0.061	0.005	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.066	0.003	0.054	0.005	NS
Broad Slough, West End (804)	0.079	0.007	0.054	0.006	NS
Suisun Bay, East of middle point (504)	0.074	0.003	0.063	0.014	NS
Bottle Blank	0.045	0.001	-	-	NA

	MSD	PMSD
One-way ANOVA	0.03	48.66
Two-way ANOVA	0.03	59.35

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

3. This high conductivity sample was compared to the High EC control.

Table A60-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/13/07 - 2/14/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River @ Riverside Blvd terminus (340)	334	11.1	7.10	10.2	64.3	0.09	0.000
Suisun Bay, off Chipps Island (508)	921	10.7	7.45	10.8	10.7	0.21	0.001
Grizzly Bay @ Dolphin (602)	8290	10.8	7.77	10.9	16.3	0.20	0.002
Montezuma Slough @ Nurse Slough (609)	3130	11.5	7.47	10.0	23.7	0.20	0.001
Carquinez Strait, West of Benicia army dock (405)	15390	11.1	7.78	10.3	13.2	0.19	0.002
Broad Slough, West End (804)	584	10.8	7.68	11.4	5.9	0.13	0.001
Suisun Bay, East of middle point (504)	1761	10.3	7.65	11.2	11.9	0.22	0.002
Bottle Blank	329	21.2	8.19	9.8	0.3	0.00	0.000

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Table A60-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 2/15/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/13/07- 2/14/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	354	20.8	24.2	7.5	8.3	7.90	8.12	108	59	-
DIEPAMHR + organic matter	358	21.4	24.9	7.4	8.2	7.74	8.03	108	59	-
High EC Control @ 15.95 mS/cm + organic matter	14265	21.3	24.7	7.7	8.9	7.63	7.77	-	-	-
Napa River @ Riverside Blvd terminus (340)	4890	21.3	24.8	7.4	8.5	7.81	8.17	102	57	0.005
Suisun Bay, off Chipps Island (508)	1274	21.3	24.9	7.5	8.5	7.98	8.07	144	81	0.011
Grizzly Bay @ Dolphin (602)	8245	21.4	24.6	7.7	8.3	7.80	7.86	910	88	0.006
Montezuma Slough @ Nurse Slough (609)	3158	21.0	24.7	7.7	8.3	7.91	7.99	370	84	0.008
Carquinez Strait, West of Benicia army dock (405)	15300	21.4	24.8	7.3	8.2	7.67	7.73	1720	94	0.004
Broad Slough, West End (804)	781	21.3	24.6	7.5	8.3	8.04	8.15	112	80	0.009
Suisun Bay, East of middle point (504)	2441	21.4	24.5	7.7	8.4	7.86	7.98	296	88	0.009
Bottle Blank	422	21.6	24.3	7.6	8.4	7.82	8.07	102	58	0.000
DIEPAMHR + organic matter + 25 ppb PBO	495	20.9	24.4	7.7	8.5	7.93	8.12	-	-	-
High EC Control @ 15.95 mS/cm + organic matter + 25 ppb PBO	15450	21.2	24.0	7.5	8.7	7.52	7.78	-	-	-
Napa River @ Riverside Blvd terminus (340) + 25 ppb PBO	5634	21.2	24.1	7.5	8.3	7.62	8.18	-	-	-
Suisun Bay, off Chipps Island (508) + 25 ppb PBO	1203	21.1	24.2	7.5	8.5	7.88	8.16	-	-	-
Grizzly Bay @ Dolphin (602) + 25 ppb PBO	8165	21.1	24.2	7.5	8.4	7.68	7.84	-	-	-
Montezuma Slough @ Nurse Slough (609) + 25 ppb PBO	3231	21.3	24.2	7.6	8.4	7.88	7.96	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	14830	21.4	24.3	7.5	8.5	7.67	7.70	-	-	-
Broad Slough, West End (804) + 25 ppb PBO	672	21.1	24.2	7.5	8.9	8.04	8.13	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	2442	20.7	24.1	7.4	8.6	7.83	8.05	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A61-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 2/16/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/15/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	92	2.7	-	-	NA
DIEPAMHR + organic matter	78	6.3	100	0.0	S (132%)
San Joaquin River between Hog and Turner Cuts (910)	100	0.0	95	2.9	NS
Sacramento River at tip of Grand Island (711)	89	4.5	86	2.2	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	97	2.8	NS
Sacramento River Deep Water Channel, Light 55	98	2.5	100	0.0	NS
Old River, western arm at railroad bridge (902)	98	2.5	98	2.3	NS
Old River at Holland Cut (915)	100	0.0	100	0.0	NS
Sacramento River, North side across from Sherman Lake (704)	98	2.5	93	4.7	NS

	MSD	PMSD
One-way ANOVA	14.8	19.1
Two-way ANOVA	14.4	18.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.048	0.005	-	-	NA
DIEPAMHR + organic matter	0.049	0.007	0.063	0.003	NS
San Joaquin River between Hog and Turner Cuts (910)	0.090	0.006	0.067	0.009	NS
Sacramento River at tip of Grand Island (711)	0.071	0.007	0.042	0.004	NS
San Joaquin River, West of Oulton Point (812)	0.092	0.011	0.061	0.007	NS
Sacramento River Deep Water Channel, Light 55	0.097	0.006	0.040	0.006	S (41%)
Old River, western arm at railroad bridge (902)	0.103	0.006	0.052	0.004	S (50%)
Old River at Holland Cut (915)	0.080	0.001	0.057	0.006	NS
Sacramento River, North side across from Sherman Lake (704)	0.087	0.005	0.069	0.007	NS

	MSD	PMSD
One-way ANOVA	0.031	62.7
Two-way ANOVA	0.033	66.4

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A61-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/15/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
San Joaquin River between Hog and Turner Cuts (910)	702	12.1	7.62	10.5	3.4	0.16	0.001
Sacramento River at tip of Grand Island (711)	121	11.8	7.39	10.1	60.8	0.23	0.001
San Joaquin River, West of Oulton Point (812)	245	11.6	7.51	10.7	9.8	0.16	0.001
Sacramento River Deep Water Channel, Light 55	266	12.4	7.77	10.3	34.8	0.12	0.001
Old River, western arm at railroad bridge (902)	390	11.3	7.49	10.8	3.5	0.05	0.000
Old River at Holland Cut (915)	407	11.5	7.50	10.7	3.7	0.06	0.000
Sacramento River, North side across from Sherman Lake (704)	280	11.9	7.61	10.5	30.3	0.14	0.001

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Table A61-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 2/16/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/15/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	336	19.3	25.0	8.1	8.5	7.76	8.04	108	59	-
DIEPAMHR + organic matter	339	19.3	25.0	7.5	8.4	7.68	8.01	108	59	-
San Joaquin River between Hog and Turner Cuts (910)	673	19.4	25.2	7.5	8.6	7.71	7.91	156	96	0.006
Sacramento River at tip of Grand Island (711)	147	19.4	25.0	7.3	8.6	7.65	7.88	52	46	0.009
San Joaquin River, West of Oulton Point (812)	246	19.3	25.2	7.2	8.9	7.61	7.85	76	79	0.006
Sacramento River Deep Water Channel, Light 55	273	19.4	25.4	7.2	8.6	7.67	7.94	92	95	0.005
Old River, western arm at railroad bridge (902)	377	19.4	25.1	7.3	8.7	7.66	7.85	98	78	0.002
Old River at Holland Cut (915)	399	19.4	25.0	7.1	8.4	7.64	7.99	102	79	0.003
Sacramento River, North side across from Sherman Lake (704)	282	19.3	24.8	7.3	8.1	7.65	7.98	74	70	0.007
DIEPAMHR + organic matter + 25 ppb PBO	332	19.4	24.2	8.1	8.4	7.95	8.21	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	671	19.4	24.6	7.7	8.5	7.80	7.98	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	145	19.4	24.4	7.0	8.6	7.66	7.85	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	244	19.4	24.4	7.3	8.7	7.62	7.77	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	273	19.2	24.5	7.3	8.9	7.74	8.07	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	371	19.2	24.5	7.3	8.9	7.68	7.96	-	-	-
Old River at Holland Cut (915) + 25 ppb PBO	392	19.2	24.6	7.2	8.7	7.67	7.83	-	-	-
Sacramento River, North side across from Sherman Lake (704) + 25 ppb PBO	271	19.2	24.6	7.3	8.9	7.65	7.93	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A62-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 3/01/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/28/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	100	0.0	-	-	NS
DIEPAMHR + organic matter	100	0.0	95	2.8	NS
Napa River at Riverside Blvd Terminus (340)	98	2.5	96	3.8	NS
Old River, Western arm at Railroad Bridge (902)	100	0.0	92	4.8	NS
Old River at mouth of Holland Cut (915)	100	0.0	98	2.5	NS
San Joaquin R., between Hog and Turner Cut (910)	100	0.0	100	0.0	NS
San Joaquin R., West of Oulton Point (812)	100	0.0	95	2.9	NS
Sacramento R. at tip of Grand Island (711)	78	6.4	75	4.4	NS
Sacramento R. Deep Water Channel, Light 55	100	0.0	95	3.1	NS
Sacramento R. North side across from Sherman Lake (704)	100	0.0	98	2.1	NS
Broad Slough, West End (804)	98	2.5	98	2.5	NS

	MSD	PMSD
One-way ANOVA	10.9	10.9
Two-way ANOVA	14.5	14.9

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.072	0.004	-	-	NS
DIEPAMHR + organic matter	0.090	0.008	0.078	0.005	NS
Napa River at Riverside Blvd Terminus (340)	0.136	0.004	0.102	0.011	NS
Old River, Western arm at Railroad Bridge (902)	0.119	0.014	0.094	0.012	NS
Old River at mouth of Holland Cut (915)	0.116	0.010	0.065	0.005	S (56%)
San Joaquin R., between Hog and Turner Cut (910)	0.090	0.004	0.096	0.009	NS
San Joaquin R., West of Oulton Point (812)	0.110	0.019	0.100	0.009	NS
Sacramento R. at tip of Grand Island (711)	0.065	0.010	0.070	0.007	NS
Sacramento R. Deep Water Channel, Light 55	0.087	0.005	0.081	0.008	NS
Sacramento R. North side across from Sherman Lake (704)	0.074	0.006	0.075	0.006	NS
Broad Slough, West End (804)	0.119	0.013	0.094	0.007	NS

	MSD	PMSD
One-way ANOVA	0.049	54.6
Two-way ANOVA	0.050	58.9

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A62-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/28/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd Terminus (340)	217	9.7	7.55	11.8	36.1	0.06	0.000
Old River, Western arm at Railroad Bridge (902)	293	10.4	7.53	11.3	6.7	0.05	0.000
Old River at mouth of Holland Cut (915)	340	10.9	7.17	11.3	5.8	0.10	0.000
San Joaquin R., between Hog and Turner Cut (910)	653	12.0	7.61	9.9	6.9	0.15	0.001
San Joaquin R., West of Oulton Point (812)	242	11.0	7.63	11.3	9.0	0.12	0.001
Sacramento R. at tip of Grand Island (711)	157	9.6	7.49	11.3	27.0	0.14	0.001
Sacramento R. Deep Water Channel, Light 55	336	10.8	7.92	11.5	20.0	0.12	0.002
Sacramento R. North side across from Sherman Lake (704)	192	10.1	7.63	11.9	11.1	0.19	0.001
Broad Slough, West End (804)	296	10.7	7.66	11.6	10.0	0.10	0.001

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Table A62-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 3/01/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 2/28/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	361	23.2	24.0	7.4	8.7	7.77	8.13	108	60	-
DIEPAMHR +organic matter	366	23.2	24.2	7.2	8.5	7.64	8.06	108	60	-
Napa River at Riverside Blvd Terminus (340)	221	23.3	23.4	7.0	8.9	7.53	8.00	80	59	0.003
Old River, Western arm at Railroad Bridge (902)	295	23.1	24.0	7.1	8.8	7.72	7.99	84	73	0.002
Old River at mouth of Holland Cut (915)	327	23.0	23.6	6.9	8.9	7.70	8.01	94	75	0.005
San Joaquin R., between Hog and Turner Cut (910)	661	23.2	23.8	7.0	8.8	7.63	7.98	152	100	0.006
San Joaquin R., West of Oulton Point (812)	238	23.2	24.2	7.1	8.7	7.66	8.04	80	68	0.006
Sacramento R. at tip of Grand Island (711)	136	23.1	24.2	7.1	8.6	7.61	8.14	66	56	0.009
Sacramento R. Deep Water Channel, Light 55	342	23.1	23.8	7.1	8.6	7.93	8.21	114	104	0.009
Sacramento R. North side across from Sherman Lake (704)	188	23.1	23.4	7.1	8.7	7.61	8.18	72	73	0.013
Broad Slough, West End (804)	294	23.2	23.7	7.3	8.8	7.73	8.10	90	72	0.006
DIEPAMHR + 1% nutrient addback + 25 ppb PBO	360	23.0	23.8	7.3	8.5	7.66	8.15	-	-	-
Napa River at Riverside Blvd Terminus (340) + 25 ppb PBO	223	23.1	24.5	6.9	8.5	7.62	8.09	-	-	-
Old River, Western arm at Railroad Bridge (902) + 25 ppb PBO	285	23.1	24.5	7.0	8.7	7.65	8.04	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	336	22.9	24.5	7.0	8.5	7.73	8.11	-	-	-
San Joaquin R., between Hog and Turner Cut (910) + 25 ppb PBO	653	23.2	24.1	7.1	8.6	7.73	8.03	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	229	23.4	23.5	7.1	8.6	7.69	8.14	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	134	23.4	23.9	6.9	8.7	7.53	8.04	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	333	23.1	23.5	7.0	8.7	7.78	8.19	-	-	-
Sacramento R. North side across from Sherman Lake (704) + 25 ppb PBO	187	23.6	24.4	7.0	8.6	7.64	8.06	-	-	-
Broad Slough, West End (804) + 25 ppb PBO	291	24.2	24.2	7.1	8.7	7.71	8.04	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A63-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 3/02/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/01/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	-	-	NS
DIEPAMHR + organic matter	98	2.5	98	2.5	NS
Suisun Bay off Chipps Island (508)	100	0.0	90	7.1	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405)	95	5.0	100	0.0	NS
Grizzly Bay at Dolphin (602)	95	2.9	98	2.5	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	97	2.8	NS

	MSD	PMSD
One-way ANOVA	11.8	12.1
Two-way ANOVA	15.0	15.4

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.053	0.002	-	-	NS
DIEPAMHR + organic matter	0.084	0.005	0.059	0.011	NS
Suisun Bay off Chipps Island (508)	0.101	0.011	0.061	0.006	S (60%)
Suisun Bay, East of middle point (504)	0.088	0.008	0.068	0.000	NS
Carquinez Strait, West of Benicia army dock (405)	0.107	0.006	0.078	0.005	NS
Grizzly Bay at Dolphin (602)	0.085	0.002	0.091	0.002	NS
Montezuma Slough at Nurse Slough (609)	0.077	0.008	0.078	0.004	NS

	MSD	PMSD
One-way ANOVA	0.032	38.2
Two-way ANOVA	0.033	39.0

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A63-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/01/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay off Chipps Island (508)	299	10.6	7.81	11.7	16.0	0.2	0.002
Suisun Bay, East of middle point (504)	484	10.9	7.80	11.0	17.8	0.1	0.002
Carquinez Strait, West of Benicia army dock (405)	5100	10.8	7.81	11.3	25.3	0.2	0.002
Grizzly Bay at Dolphin (602)	1196	10.6	7.81	11.5	34.1	0.2	0.002
Montezuma Slough at Nurse Slough (609)	668	10.2	7.57	11.0	13.2	0.3	0.002

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Table A63-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 3/02/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/01/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	349	23.3	23.5	7.2	8.8	7.70	8.14	108	60	-
DIEPAMHR + organic matter	352	23.1	23.6	7.0	8.5	7.54	8.20	108	60	-
Suisun Bay off Chipps Island (508)	312	23.5	24.1	7.2	8.8	7.68	8.11	80	78	0.011
Suisun Bay, East of middle point (504)	401	23.0	23.4	7.2	8.8	7.69	8.14	88	76	0.009
Carquinez Strait, West of Benicia army dock (405)	4945	23.5	23.8	7.1	8.5	7.59	7.97	544	80	0.008
Grizzly Bay at Dolphin (602)	1183	23.5	23.8	7.1	8.7	7.70	8.10	164	80	0.011
Montezuma Slough at Nurse Slough (609)	631	23.2	23.4	7.2	8.6	7.66	8.01	120	78	0.013
DIEPAMHR + organic matter + 25 ppb PBO	351	23.4	23.5	7.2	8.5	7.57	8.18	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	317	23.1	23.4	7.1	8.7	7.69	8.16	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	405	23.5	23.5	7.0	8.9	7.65	8.02	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	4502	23.3	23.4	7.3	8.8	7.60	7.90	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	1185	23.5	23.9	7.2	8.5	7.72	8.06	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	660	23.3	23.8	6.8	8.8	7.57	8.00	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A64-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 3/15/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/14/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	-	-	NA
DIEPAMHR + organic matter	98	2.5	98	2.5	NS
High EC Control @ 19.0 mS/cm + organic matter	98	2.5	97	2.8	NS
High EC Control @ 11.75 mS/cm + organic matter	98	2.5	95	2.9	NS
Suisun Bay, off Chipps Island (508)	95	2.9	100	0.0	NS
Suisun Bay, East of middle point (504)	98	2.5	98	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	95	5.0	90	0.0	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	98	2.5	98	2.5	NS
Montezuma Slough at Nurse Slough (609)	98	2.5	100	0.0	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS
Napa River at Riverside Blvd terminus (340)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	13.2	13.9
Two-way ANOVA	13.1	13.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.078	0.003	-	-	NA
DIEPAMHR + organic matter	0.091	0.007	0.114	0.008	NS
High EC Control @ 19.0 mS/cm + organic matter	0.059	0.004	0.069	0.004	NS
High EC Control @ 11.75 mS/cm + organic matter	0.068	0.006	0.073	0.003	NS
Suisun Bay, off Chipps Island (508)	0.124	0.008	0.123	0.004	NS
Suisun Bay, East of middle point (504)	0.121	0.008	0.109	0.006	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.085	0.003	0.085	0.004	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	0.142	0.005	0.106	0.008	S (75%)
Montezuma Slough at Nurse Slough (609)	0.149	0.002	0.114	0.002	S (77%)
Middle of Broad Slough, West end (804)	0.139	0.010	0.124	0.003	NS
Napa River at Riverside Blvd terminus (340)	0.162	0.005	0.152	0.015	NS

	MSD	PMSD
One-way ANOVA	0.030	32.8
Two-way ANOVA	0.034	33.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the 19.0 mS/cm High EC control.
4. This high conductivity sample was compared to the 11.75 mS/cm High EC control.

Table A64-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/14/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun bay, off Chipps Island 508	2665	13.5	7.68	10.4	8.5	0.09	0.001
Suisun Bay, East of middle point (504)	7080	13.4	7.73	10.4	10.2	0.09	0.001
Carquinez Strait, West of Benicia army dock (405)	19180	13.7	7.83	10.1	6.9	0.06	0.001
Grizzly Bay at Dolphin (602)	11790	14.0	7.79	9.8	9.9	0.07	0.001
Montezuma Slough at Nurse Slough (609)	1893	15.2	7.45	8.4	43.4	0.11	0.001
Middle of Broad Slough, West end (804)	267	14.2	7.73	10.2	9.2	0.08	0.001
Napa River at Riverside Blvd terminus (340)	410	17.5	7.97	11.5	11.2	0.00	0.000

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Table A64-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 3/15/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/14/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	356	23.1	24.1	7.0	8.7	7.55	7.96	108	62	-
DIEPAMHR + organic matter	362	23.2	24.4	6.8	8.8	7.57	7.92	108	62	-
High EC Control @ 19.0 mS/cm + organic matter	18655	23.3	24.0	7.2	8.6	7.46	7.67	2340	160	-
High EC Control @ 11.75 mS/cm + organic matter	11790	23.3	24.1	7.3	8.9	7.53	7.83	1320	130	-
Suisun Bay, off Chipps Island (508)	2504	22.9	24.3	6.6	8.8	7.60	7.94	296	74	0.003
Suisun Bay, East of middle point (504)	7225	23.2	23.9	6.8	8.6	7.52	7.68	824	76	0.002
Carquinez Strait, West of Benicia army dock (405)	18695	23.2	24.1	6.9	8.8	7.49	7.68	2240	160	0.001
Grizzly Bay at Dolphin (602)	11955	23.2	24.4	7.1	8.7	7.54	8.01	1460	130	0.003
Montezuma Slough at Nurse Slough (609)	1875	22.9	24.3	6.9	8.5	7.67	8.08	256	80	0.003
Middle of Broad Slough, West end (804)	334	23.1	24.3	6.5	8.8	7.56	8.12	72	70	0.001
Napa River at Riverside Blvd terminus (340)	399	23.2	24.4	6.5	8.9	7.83	8.00	112	100	0.000
DIEPAMHR + organic matter + 25 ppb PBO	365	23.1	24.6	6.8	8.3	7.85	7.96	-	-	-
High EC Control @ 19.0 mS/cm + organic matter + 25 ppb PBO	18315	22.8	23.5	7.0	8.1	7.34	7.73	-	-	-
High EC Control @ 11.75 mS/cm + organic matter + 25 ppb PBO	11670	22.8	23.9	7.1	8.6	7.62	7.87	-	-	-
Suisun Bay, off Chipps Island (508) + 25 ppb PBO	2835	22.8	23.9	6.7	8.7	7.60	7.93	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	7115	23.1	24.2	6.6	8.6	7.42	7.70	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	18650	22.8	23.7	6.7	8.2	7.55	7.77	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	12075	23.3	23.9	6.9	8.5	7.48	7.76	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	1932	22.7	24.4	6.8	8.4	7.79	7.80	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	298	23.0	24.5	6.8	8.7	7.79	7.94	-	-	-
Napa River at Riverside Blvd terminus (340) + 25 ppb PBO	424	23.5	23.9	6.8	8.7	7.80	7.97	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A65-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 03/17/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/16/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	-	-	NA
DIEPAMHR + organic matter	100	0.0	98	2.5	NS
Old River, western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	98	2.5	NS
San Joaquin River between Hog and Turner Cut (910)	100	0.0	98	2.3	NS
Sacramento River at tip of Grand Island (711)	100	0.0	98	2.5	NS
Sacramento River Deep Water Channel, Light 55	90	7.1	98	2.5	NS
Sacramento River across from Sherman Lake (704)	100	0.0	100	0.0	NS
San Joaquin River, West of Oulton Point (812)	100	0.0	100	0.0	NS
Field Duplicate: Sacramento River across from Sherman Lake (704)	100	0.0	-	-	NA

	MSD	PMSD
<b>One-way ANOVA</b>	10.8	10.8
<b>Two-way ANOVA</b>	11.4	11.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.077	0.003	-	-	NA
DIEPAMHR + organic matter	0.107	0.008	0.068	0.006	NS
Old River, western arm at railroad bridge (902)	0.114	0.010	0.081	0.004	NS
Old River at mouth of Holland Cut (915)	0.116	0.005	0.089	0.011	NS
San Joaquin River between Hog and Turner Cut (910)	0.101	0.010	0.093	0.004	NS
Sacramento River at tip of Grand Island (711)	0.091	0.007	0.064	0.003	NS
Sacramento River Deep Water Channel, Light 55	0.105	0.013	0.094	0.007	NS
Sacramento River across from Sherman Lake (704)	0.096	0.013	0.086	0.004	NS
San Joaquin River, West of Oulton Point (812)	0.108	0.005	0.095	0.010	NS
Field Duplicate: Sacramento River across from Sherman Lake (704)	0.090	0.005	-	-	NA

	MSD	PMSD
<b>One-way ANOVA</b>	0.042	39.1
<b>Two-way ANOVA</b>	0.042	47.6

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A65-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/16/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River, western arm at railroad bridge (902)	233	16.6	7.46	10.4	5.5	0.00	0.000
Old River at mouth of Holland Cut (915)	245	16.7	7.38	10.2	7.9	0.01	0.000
San Joaquin River between Hog and Turner Cut (910)	456	17.5	7.28	9.4	5.1	0.05	0.000
Sacramento River at tip of Grand Island (711)	167	15.9	7.35	10.7	4.9	0.30	0.002
Sacramento River Deep Water Channel, Light 55	307	17.2	7.73	10.3	15.8	0.08	0.001
Sacramento River across from Sherman Lake (704)	206	15.1	7.59	10.6	8.6	0.12	0.001
San Joaquin River, West of Oulton Point (812)	205	15.3	7.40	10.5	8.4	0.03	0.000
Field Duplicate: Sacramento River across from Sherman Lake (704)	206	15.1	7.59	10.6	10.0	0.13	0.001

Table A65-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 3/17/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/16/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	340	22.4	24.0	7.2	8.5	7.82	7.98	108	60	-
DIEPAMHR + organic matter	355	22.6	23.9	7.0	8.6	7.62	8.11	108	60	-
Old River, western arm at railroad bridge (902)	244	22.8	24.1	7.0	8.7	7.62	7.82	72	76	0.000
Old River at mouth of Holland Cut (915)	245	22.7	23.9	6.9	8.6	7.60	7.79	76	72	0.000
San Joaquin River between Hog and Turner Cut (910)	450	22.8	24.2	6.9	8.7	7.61	7.87	116	86	0.001
Sacramento River at tip of Grand Island (711)	173	22.9	24.2	7.0	8.8	7.63	7.82	60	72	0.010
Sacramento River Deep Water Channel, Light 55	301	22.9	24.2	7.1	8.7	7.82	8.05	76	80	0.004
Sacramento River across from Sherman Lake (704)	199	22.8	24.2	7.0	8.8	7.69	7.95	76	114	0.005
San Joaquin River, West of Oulton Point (812)	210	22.8	23.9	7.1	8.5	7.59	8.03	72	72	0.002
Field Duplicate: Sacramento River across from Sherman Lake (704)	204	22.7	24.5	6.9	8.7	7.71	7.94	72	82	0.006
DIEPAMHR + organic matter + 25 ppb PBO	352	23.0	24.5	7.0	8.5	7.52	8.02	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	241	23.1	24.6	6.9	8.9	7.60	7.99	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	250	22.9	24.1	6.8	8.7	7.58	7.84	-	-	-
San Joaquin River between Hog and Turner Cut (910) + 25 ppb PBO	466	22.9	24.6	6.9	8.5	7.61	7.86	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	173	23.0	24.2	7.0	8.5	7.61	8.08	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	317	23.1	24.0	6.8	8.5	7.72	7.99	-	-	-
Sacramento River across from Sherman Lake (704) + 25 ppb PBO	200	22.9	24.5	7.2	8.3	7.74	8.03	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	212	22.9	24.3	7.0	8.5	7.66	7.94	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A66-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 3/29/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/28/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	93	2.4	-	-	NS
DIEPAMHR + organic matter	98	2.5	95	2.9	NS
High EC Control @ 16.86 mS + organic matter	86	7.0	87	8.2	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	95	2.9	89	4.1	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Grizzly Bay at Dolphin (602)	100	0.0	98	2.5	NS
Middle of Broad Slough, West end (804)	100	0.0	98	2.5	NS
Suisun Bay, East of middle point (504)	100	0.0	98	2.5	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS

	MSD	PMSD
One-way ANOVA	11.6	11.9
Two-way ANOVA	16.1	16.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.048	0.005	-	-	NS
DIEPAMHR + organic matter	0.078	0.003	0.093	0.006	NS
High EC Control @ 16.86 mS + organic matter	0.034	0.002	0.035	0.004	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.055	0.004	0.072	0.009	NS
Suisun Bay off Chipps Island (508)	0.081	0.004	0.089	0.013	NS
Grizzly Bay at Dolphin (602)	0.080	0.003	0.079	0.011	NS
Middle of Broad Slough, West end (804)	0.087	0.009	0.081	0.007	NS
Suisun Bay, East of middle point (504)	0.084	0.007	0.079	0.005	NS
Montezuma Slough at Nurse Slough (609)	0.085	0.008	0.069	0.007	NS

	MSD	PMSD
One-way ANOVA	0.026	33.3
Two-way ANOVA	0.036	46.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the High EC control.

Table A66-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/28/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Carquinez Strait, West of Benicia army dock (405)	14960	14.3	7.74	10.3	12.2	0.12	0.001
Suisun Bay off Chipps Island (508)	833	14.8	7.71	10.3	15.5	0.08	0.001
Grizzly Bay at Dolphin (602)	7240	14.3	7.81	10.6	31.7	0.08	0.001
Middle of Broad Slough, West end (804)	280	14.3	7.54	10.1	9.5	0.05	0.000
Suisun Bay, East of middle point (504)	2454	14.3	7.81	10.4	21.2	0.08	0.001
Montezuma Slough at Nurse Slough (609)	3314	15.4	7.47	8.8	83.5	0.16	0.001

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Table A66-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 3/29/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/28/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	347	23.3	23.5	7.1	8.6	7.69	8.04	116	60	-
DIEPAMHR + organic matter	362	23.2	23.7	6.9	8.4	7.59	8.00	116	60	-
High EC Control @ 16.86 mS + organic matter	15950	23.3	23.8	7.1	8.4	7.59	7.84	-	-	-
Carquinez Strait, West of Benicia army dock (405)	14650	23.2	23.9	7.2	8.4	7.63	7.70	1680	100	0.002
Suisun Bay off Chipps Island (508)	1061	23.3	23.9	7.0	8.7	7.74	8.08	148	72	0.004
Grizzly Bay at Dolphin (602)	3288	23.2	23.8	7.2	8.5	7.66	7.76	736	78	0.002
Middle of Broad Slough, West end (804)	353	23.1	23.8	7.1	8.7	7.33	8.14	80	72	0.003
Suisun Bay, East of middle point (504)	2534	23.2	23.6	7.2	8.5	7.70	7.81	304	72	0.002
Montezuma Slough at Nurse Slough (609)	3047	23.3	23.7	7.1	8.6	7.68	7.75	384	76	0.004
DIEPAMHR + organic matter + 25 ppb PBO	364	23.0	23.2	7.1	8.4	7.74	8.03	-	-	-
High EC Control @ 16.86mS + organic matter + 25 ppb PBO	15880	22.7	23.3	6.9	8.4	7.54	7.80	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	14180	23.3	23.3	7.3	8.4	7.67	7.81	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	1052	23.0	23.3	7.0	8.7	7.75	8.14	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	6290	23.1	23.4	7.2	8.5	7.63	7.80	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	356	23.3	23.4	7.1	8.4	7.71	8.19	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	2551	23.3	23.9	7.1	8.6	7.64	7.89	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	3092	23.5	23.8	7.1	8.7	7.66	7.78	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A67-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 03/30/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/28/07 - 3/29/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	93	4.4	-	-	NA
DIEPAMHR + organic matter	98	2.3	100	0.0	NS
Napa River at Riverside Blvd. Terminus (340)	100	0.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	98	2.1	100	0.0	NS
Old River at Holland Cut (915)	98	2.3	100	0.0	NS
San Joaquin River between Hog and Turner Cuts (910)	94	3.2	95	4.5	NS
San Joaquin River, West of Oulton Point (812)	98	2.5	95	2.9	NS
Sacramento River at tip of Grand Island (711)	95	3.1	90	3.7	NS
Sacramento River Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Sacramento River across from Sherman Lake (704)	93	2.4	84	8.6	NS
Field Duplicate: San Joaquin R. between Hog and Turner Cuts (910)	98	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA	12.6	12.9
Two-way ANOVA	15.6	16.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.055	0.004	-	-	NA
DIEPAMHR + organic matter	0.089	0.007	0.086	0.010	NS
Napa River at Riverside Blvd. Terminus (340)	0.097	0.005	0.079	0.002	NS
Old River, western arm at railroad bridge (902)	0.082	0.010	0.095	0.009	NS
Old River at Holland Cut (915)	0.084	0.014	0.081	0.014	NS
San Joaquin River between Hog and Turner Cuts (910)	0.087	0.009	0.069	0.007	NS
San Joaquin River, West of Oulton Point (812)	0.083	0.005	0.078	0.011	NS
Sacramento River at tip of Grand Island (711)	0.085	0.005	0.061	0.004	NS
Sacramento River Deep Water Channel, Light 55	0.092	0.008	0.078	0.008	NS
Sacramento River across from Sherman Lake (704)	0.053	0.007	0.083	0.009	NS
Field Duplicate: San Joaquin R. between Hog and Turner Cuts (910)	0.085	0.007	-	-	NA

	MSD	PMSD
One-way ANOVA	0.039	43.6
Two-way ANOVA	0.045	50.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A67-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/28/07 - 3/29/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd. Terminus (340)	3094	18.4	7.77	9.8	26.6	0.04	0.001
Old River, western arm at railroad bridge (902)	226	13.4	7.47	10.3	8.5	0.02	0.000
Old River at Holland Cut (915)	229	14.5	7.54	10.1	5.8	0.03	0.000
San Joaquin River between Hog and Turner Cuts (910)	635	15.2	7.62	9.3	4.6	0.15	0.002
San Joaquin River, West of Oulton Point (812)	201	14.6	7.54	10.0	6.7	0.06	0.001
Sacramento River at tip of Grand Island (711)	157	14.5	7.61	10.1	3.5	0.11	0.001
Sacramento River Deep Water Channel, Light 55	358	15.0	7.93	9.9	17.9	0.08	0.002
Sacramento River across from Sherman Lake (704)	201	14.7	7.72	9.8	9.3	0.00	0.000
Field Duplicate: San Joaquin R. between Hog and Turner Cuts (910)	-	-	-	-	6.4	0.15	-

Table A67-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 3/30/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 3/28/07 - 3/29/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	365	23.2	23.9	6.7	8.5	7.58	8.22	116	60	-
DIEPAMHR + organic matter	376	23.4	24.4	6.7	8.4	7.47	8.07	116	60	-
Napa River at Riverside Blvd. Terminus (340)	3078	23.4	24.5	7.0	8.6	7.68	7.85	388	110	0.001
Old River, western arm at railroad bridge (902)	243	23.4	24.5	6.7	8.8	7.57	7.94	72	68	0.001
Old River at Holland Cut (915)	237	23.5	24.4	6.6	8.8	7.53	8.05	72	68	0.002
San Joaquin River between Hog and Turner Cuts (910)	625	23.6	24.0	6.9	8.7	7.69	7.95	148	94	0.006
San Joaquin River, West of Oulton Point (812)	227	23.6	23.9	6.6	8.6	7.53	7.88	84	64	0.002
Sacramento River at tip of Grand Island (711)	177	23.6	23.9	6.8	8.7	7.53	7.96	60	68	0.005
Sacramento River Deep Water Channel, Light 55	367	23.2	23.6	6.8	8.7	7.69	8.07	112	106	0.004
Sacramento River across from Sherman Lake (704)	213	23.6	23.6	6.6	8.9	7.60	7.98	72	74	0.000
Field Duplicate: San Joaquin R. between Hog and Turner Cuts (910)	612	23.5	23.6	7.0	8.6	7.64	7.98	144	92	0.006
DIEAPMHR + organic matter + 25 ppb PBO	356	23.4	23.5	6.6	8.4	7.45	7.97	-	-	-
Napa River at Riverside Blvd. Terminus (340) + 25 ppb PBO	3014	23.4	23.6	7.0	8.8	7.68	7.90	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	249	23.4	23.6	6.9	8.5	7.49	8.05	-	-	-
Old River at Holland Cut (915) + 25 ppb PBO	237	23.3	23.6	6.9	8.6	7.55	8.07	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	625	23.6	23.6	6.8	8.6	7.66	7.98	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	211	23.3	23.6	6.9	8.7	7.54	8.00	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	166	23.2	23.6	6.9	8.5	7.55	8.09	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	361	23.3	23.6	6.9	8.5	7.65	8.10	-	-	-
Sacramento River across from Sherman Lake (704) + 25 ppb PBO	210	23.3	23.6	6.9	8.7	7.62	8.02	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A68-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 4/13/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/11/07 - 4/12/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	92	2.7	-	-	NA
DIEMPAMHR + organic matter	100	0.0	84	7.8	NS
Napa River at Riverside Blvd terminus (340)	100	0.0	98	2.5	NS
Old River, western arm at railroad bridge (902)	94	3.3	70	18.2	NS
Old River at mouth of Holland Cut (915)	88	2.0	93	7.5	NS
San Joaquin R. between Hog and Turner Cuts (910)	97	2.8	100	0.0	NS
San Joaquin R., West of Oulton Point (812)	86	7.0	95	5.0	NS
Sacramento River Deep Water Channel, Light 55	78	4.8	59	13.3	NS
Sacramento River at tip of Grand Island (711)	63	15.9	87	3.1	NS

	MSD	PMSD
One-way ANOVA	29.9	29.9
Two-way ANOVA	40.6	40.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.046	0.009	-	-	NA
DIEMPAMHR + organic matter	0.066	0.009	0.054	0.003	NS
Napa River at Riverside Blvd terminus (340)	0.071	0.010	0.041	0.008	NS
Old River, western arm at railroad bridge (902)	0.100	0.010	0.060	0.015	NS
Old River at mouth of Holland Cut (915)	0.058	0.015	0.063	0.006	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.077	0.006	0.074	0.009	NS
San Joaquin R., West of Oulton Point (812)	0.052	0.012	0.060	0.010	NS
Sacramento River Deep Water Channel, Light 55	0.083	0.007	0.053	0.003	NS
Sacramento River at tip of Grand Island (711)	0.084	0.014	0.052	0.008	NS

	MSD	PMSD
One-way ANOVA	0.050	76.1
Two-way ANOVA	0.050	76.1

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A68-2. Summary of water chemistry measurements on samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/11/07 - 4/12/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd terminus (340)	5080	18.6	8.55	12.6	17.8	0.02	0.002
Old River, western arm at railroad bridge (902)	436	8.1	7.72	12.4	8.5	0.03	0.000
Old River at mouth of Holland Cut (915)	450	8.1	7.68	12.2	5.6	0.01	0.000
San Joaquin R. between Hog and Turner Cuts (910)	649	8.3	7.8	12.9	5.2	0.08	0.001
San Joaquin R., West of Oulton Point (812)	421	8.2	7.75	12.5	5.5	0.04	0.000
Sacramento River Deep Water Channel, Light 55	295	8.8	7.91	12.3	15.0	0.14	0.002
Sacramento River at tip of Grand Island (711)	195	9.2	7.76	12.4	3.4	0.31	0.003

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Table A68-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/13/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/11/07- 1/12/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	363	20.7	24.8	7.1	8.3	7.68	8.12	106	60	-
DIEMPAMHR + organic matter	366	20.7	24.0	7.0	8.3	7.82	8.19	106	60	-
Napa River at Riverside Blvd terminus (340)	5690	21.0	23.9	7.1	8.6	7.80	8.21	660	130	0.001
Old River, western arm at railroad bridge (902)	238	20.8	23.2	7.1	8.5	7.78	8.20	72	66	0.002
Old River at mouth of Holland Cut (915)	247	21.1	24.1	7.1	8.4	7.72	8.13	76	66	0.001
San Joaquin R. between Hog and Turner Cuts (910)	552	21.0	23.4	7.0	8.6	7.72	8.06	132	100	0.004
San Joaquin R., West of Oulton Point (812)	240	21.2	24.3	7.1	8.3	7.65	8.18	68	64	0.003
Sacramento River Deep Water Channel, Light 55	265	21.2	24.2	7.1	8.4	7.80	8.15	84	78	0.009
Sacramento River at tip of Grand Island (711)	159	21.4	23.2	7.1	8.3	7.80	8.07	48	60	0.016
DIEMPAMHR + organic matter + 25 ppb PBO	361	21.3	23.8	7.2	8.3	7.60	8.20	-	-	-
Napa River at Riverside Blvd terminus (340) + 25 ppb PBO	5540	21.2	24.0	6.8	8.9	7.73	8.19	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	243	21.5	24.0	7.0	8.3	7.67	8.15	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	246	21.6	24.2	7.0	8.4	7.62	8.24	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	562	21.6	23.9	7.0	8.6	7.89	8.01	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	244	21.2	23.8	7.1	8.3	7.59	8.21	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	263	21.7	24.2	7.1	8.5	7.76	8.13	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	159	21.8	24.4	7.3	8.4	7.70	8.16	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A69-1. Survival of *H. azteca* in a Toxicity Identification Evaluation initiated on 5/01/07 examining an ambient water column sample collected from the Sacramento River at Grand Island (POD site 711) by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/12/07.<sup>1</sup>

Treatment	Survival (%) <sup>2</sup>									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
DIEPAMHR	100	100	100	100	100	100	100	100	100	100
DIEPAMHR (HA) @ 48 mg/L	100	100	100	100	100	100	100	100	97	97
DIEPAMHR (HA) + MeOH @ 0.5%	97	93	93	93	93	93	93	93	93	93
DIEPAMHR (HA) + eluate addback @ 3x	100	100	97	93	93	93	93	93	93	93
DIEPAMHR (HA) + 48 mg/L EDTA	100	97	97	97	97	97	97	97	97	97
DIEPAMHR (HA) + 24 mg/L EDTA	100	100	100	100	100	100	100	100	100	100
DIEPAMHR (HA) + 12 mg/L EDTA	100	100	97	97	97	97	97	93	93	93
DIEPAMHR (HA) + 12 mg/L STS	97	77	57	50	47	47	40	40	40	40
DIEPAMHR (HA) + 6 mg/L STS	100	73	53	53	45	45	45	45	45	45
DIEPAMHR (HA) + 3 mg/L STS	100	76	73	66	62	62	62	62	62	62
DIEPAMHR (HA) + 500X Esterase	90	50	27	13	10	7	7	7	3	3
DIEPAMHR (HA) + 500X BSA	100	90	87	87	87	87	87	84	79	79
DIEPAMHR (HA) air stripped	100	100	100	100	100	100	100	100	100	100
DIEPAMHR C8 Blank	100	97	97	97	97	97	97	97	97	97
DIEPAMHR @ 15 C	100	100	100	100	100	100	100	97	97	97
POD 711	93	90	90	90	90	90	90	90	90	90
POD 711 + 48 mg/L EDTA	100	97	97	97	97	97	97	97	97	97
POD 711 + 24 mg/L EDTA	100	97	97	93	93	93	93	93	93	93
POD 711 + 12 mg/L EDTA	100	94	91	91	91	91	91	91	91	91
POD 711 + 12 mg/L STS	93	66	62	62	62	62	62	62	62	62
POD 711 + 6 mg/L STS	97	87	83	77	77	77	77	77	77	77
POD 711 + 3 mg/L STS	100	84	77	77	77	77	77	77	77	77
POD 711 + 500X Esterase	41	24	7	7	7	7	7	3	3	0
POD 711 + 500X BSA	97	93	90	82	82	82	79	79	79	79
POD 711 air stripped	100	93	88	88	88	88	88	88	88	88
POD 711 C8 Rinsate	93	87	87	87	87	87	87	87	87	87
POD 711 @ 15 C	100	100	100	100	100	100	100	93	93	93

1. C8 column solid phase extraction performed on 4/25/07.

2. Highlighted cells indicate less than 50% survival of test organisms.

Table A70-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 4/18/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/11/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	95	5.0	-	-	NA
DIEPAMHR + organic matter	100	0.0	98	2.5	NS
High EC Control @ 20.0 mS/cm + organic matter	78	11.1	73	9.3	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504)	98	2.5	98	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	87	6.3	95	2.9	NS
Grizzly Bay at Dolphin (602)	98	2.5	98	2.5	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	100	0.0	NS
Sacramento River, across from Sherman Lake (704)	100	0.0	95	5.0	NS
Field Duplicate: Grizzly Bay at Dolphin (602)	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA	20.9	20.9
Two-way ANOVA	21.7	21.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.058	0.006	-	-	NA
DIEPAMHR + organic matter	0.106	0.005	0.081	0.004	NS
High EC Control @ 20.0 mS/cm + organic matter	0.050	0.004	0.034	0.001	NS
Middle of Broad Slough, West end (804)	0.087	0.013	0.109	0.006	NS
Suisun Bay off Chipps Island (508)	0.103	0.003	0.099	0.005	NS
Suisun Bay, East of middle point (504)	0.100	0.005	0.077	0.005	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.070	0.009	0.084	0.005	NS
Grizzly Bay at Dolphin (602)	0.110	0.007	0.117	0.011	NS
Montezuma Slough at Nurse Slough (609)	0.125	0.002	0.084	0.015	S (67%)
Sacramento River, across from Sherman Lake (704)	0.119	0.006	0.103	0.017	NS
Field Duplicate: Grizzly Bay at Dolphin (602)	0.089	0.009	-	-	NA

	MSD	PMSD
One-way ANOVA	0.034	32.2
Two-way ANOVA	0.040	37.4

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the High EC control.

Table A70-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/11/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Middle of Broad Slough, West end (804)	493	16.2	7.45	9.8	11.6	0.11	0.001
Suisun Bay off Chipps Island (508)	2646	15.7	7.69	10.0	22.0	0.09	0.001
Suisun Bay, East of middle point (504)	7540	15.5	7.70	9.7	14.5	0.11	0.001
Carquinez Strait, West of Benicia army dock (405)	19770	15.1	7.70	9.3	16.2	0.08	0.001
Grizzly Bay at Dolphin (602)	9050	15.6	7.80	9.6	31.6	0.06	0.001
Montezuma Slough at Nurse Slough (609)	3668	16.6	7.40	8.2	64.9	0.12	0.001
Sacramento River, across from Sherman Lake (704)	603	16.3	7.70	9.6	15.2	0.13	0.002
Field Duplicate: Grizzly Bay at Dolphin (602)	-	-	-	-	30.4	0.07	-

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Table A70-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/18/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/11/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	380	23.1	24.2	6.7	8.5	7.51	8.26	106	60	-
DIEPAMHR + organic matter	374	23.9	24.2	6.4	8.3	7.40	8.27	106	60	-
High EC Control @ 20.0 mS/cm + organic matter	19465	23.9	24.3	6.7	8.5	7.42	8.00	2200	60	-
Middle of Broad Slough, West end (804)	520	23.7	24.2	6.6	8.5	7.59	8.25	92	72	0.008
Suisun Bay off Chipps Island (508)	2484	23.9	24.2	6.5	8.5	7.50	8.06	316	74	0.004
Suisun Bay, East of middle point (504)	7285	23.9	24.2	6.6	8.9	7.49	7.85	880	90	0.003
Carquinez Strait, West of Benicia army dock (405)	19345	24.3	24.3	6.0	8.5	7.40	7.60	2240	120	0.001
Grizzly Bay at Dolphin (602)	8915	24.1	24.2	6.4	8.6	7.49	7.89	510	100	0.002
Montezuma Slough at Nurse Slough (609)	3609	23.6	24.2	6.8	8.7	7.54	8.01	440	90	0.005
Sacramento River, across from Sherman Lake (704)	635	24.2	24.2	6.5	8.3	7.53	8.21	112	70	0.009
Field Duplicate: Grizzly Bay at Dolphin (602)	9190	24.0	24.2	6.9	8.8	7.55	7.83	1060	100	0.002
DIEPAMHR + organics + 25 ppb PBO	376	23.1	24.1	6.7	8.3	7.50	8.22	-	-	-
High EC Control @ 20.0 mS/cm + organic matter + 25 ppb PBO	19295	23.8	24.2	7.0	8.7	7.48	7.84	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	537	23.6	24.1	6.7	8.5	7.62	8.31	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	2610	23.4	24.2	6.5	8.9	7.04	7.74	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	7275	23.4	24.1	6.8	8.3	7.54	7.81	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	18980	23.2	24.2	7.0	8.8	7.55	7.72	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	8910	23.0	24.3	6.9	8.3	7.59	8.00	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	3578	23.0	24.4	6.8	8.3	7.56	7.89	-	-	-
Sacramento River, across from Sherman Lake (704) + 25 ppb PBO	621	22.9	24.3	6.6	8.3	7.55	8.28	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A71-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 4/26/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/25/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR 042507	100	0.0	-	-	NA
DIEPAMHR + organic matter	100	0.0	96	3.7	NS
Old River, western arm at railroad bridge (902)	98	2.5	93	2.4	NS
Old River at mouth of Holland Cut (915)	100	0.0	95	5.0	NS
San Joaquin R., between Hog and Turner Cut (910)	93	4.4	100	0.0	NS
San Joaquin R., West of Oulton Point (812)	97	2.8	100	0.0	NS
Sacramento River Deep Water Channel, Light 55	95	2.9	93	3.3	NS
Sacramento River at tip of Grand Island (711)	94	5.6	92	4.8	NS
Sacramento River across from Sherman Lake (704)	95	2.9	95	5.0	NS
Middle of Broad Slough, West end (804)	95	2.9	93	4.8	NS
Field Duplicate: Middle of Broad Slough, West end (804)	95	2.8	-	-	NA

	MSD	PMSD
One-way ANOVA	14.8	14.8
Two-way ANOVA	18.2	18.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR 042507	0.039	0.005	-	-	NA
DIEPAMHR + organic matter	0.068	0.009	0.075	0.008	NS
Old River, western arm at railroad bridge (902)	0.081	0.012	0.105	0.005	NS
Old River at mouth of Holland Cut (915)	0.089	0.012	0.102	0.006	NS
San Joaquin R., between Hog and Turner Cut (910)	0.082	0.006	0.101	0.010	NS
San Joaquin R., West of Oulton Point (812)	0.076	0.012	0.074	0.016	NS
Sacramento River Deep Water Channel, Light 55	0.071	0.009	0.078	0.013	NS
Sacramento River at tip of Grand Island (711)	0.075	0.010	0.039	0.008	NS
Sacramento River across from Sherman Lake (704)	0.099	0.009	0.054	0.004	NS
Middle of Broad Slough, West end (804)	0.082	0.007	0.077	0.005	NS
Field Duplicate: Middle of Broad Slough, West end (804)	0.076	0.012	-	-	NA

	MSD	PMSD
One-way ANOVA	0.048	70.3
Two-way ANOVA	0.049	68.6

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A71-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/25/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River, western arm at railroad bridge (902)	415	16.7	7.99	10.1	6.2	0.06	0.002
Old River at mouth of Holland Cut (915)	482	17.2	7.80	9.9	6.1	0.08	0.001
San Joaquin R., between Hog and Turner Cut (910)	680	17.1	8.15	11.1	10.9	0.1	0.004
San Joaquin R., West of Oulton Point (812)	298	16.2	7.88	10.6	7.3	0.1	0.002
Sacramento River Deep Water Channel, Light 55	230	16.7	7.89	9.8	19.2	0.21	0.005
Sacramento River at tip of Grand Island (711)	150	16.4	7.70	10.3	4.4	0.36	0.005
Sacramento River across from Sherman Lake (704)	357	16.1	7.90	10.0	14.5	0.16	0.003
Middle of Broad Slough, West end (804)	522	16.7	7.90	10.1	13.6	0.14	0.003
Field Duplicate: Middle of Broad Slough, West end (804)	522	16.7	7.90	10.1	12.1	0.15	0.003

Table A71-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/26/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/25/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	375	23.2	24.5	7.2	8.8	7.74	8.18	104	58	-
DIEPAMHR + organic matter	367	23.1	24.8	6.7	8.2	7.60	8.20	104	58	-
Old River, western arm at railroad bridge (902)	247	23.1	24.8	6.8	8.7	7.63	8.05	68	64	0.003
Old River at mouth of Holland Cut (915)	288	23.1	24.6	6.5	8.5	7.75	7.98	76	68	0.004
San Joaquin R., between Hog and Turner Cut (910)	621	23.0	24.8	6.9	8.7	7.83	8.00	144	88	0.005
San Joaquin R., West of Oulton Point (812)	233	23.1	24.8	6.8	8.2	7.66	8.04	60	64	0.005
Sacramento River Deep Water Channel, Light 55	242	23.0	24.9	6.2	8.8	7.76	8.01	84	82	0.011
Sacramento River at tip of Grand Island (711)	168	23.0	24.9	6.6	8.2	7.64	7.96	52	58	0.017
Sacramento River across from Sherman Lake (704)	341	23.1	24.8	6.9	8.6	7.63	8.17	76	68	0.011
Middle of Broad Slough, West end (804)	532	23.0	24.9	6.7	8.7	7.69	8.00	104	70	0.007
Field Duplicate: Middle of Broad Slough, West end (804)	543	23.0	24.8	6.7	8.9	7.64	7.89	92	70	0.006
DIEPAMHR + organic matter + 25 ppb PBO	360	23.0	23.8	6.7	8.2	7.66	8.20	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	247	23.0	24.1	6.7	8.5	7.63	8.16	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	271	23.0	24.2	6.5	8.6	7.67	8.03	-	-	-
San Joaquin R., between Hog and Turner Cut (910) + 25 ppb PBO	604	22.9	24.0	6.4	8.7	7.83	8.13	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	223	23.0	23.9	6.6	8.5	7.71	8.13	-	-	-
Sacramento River Deep Water Channel, Light 55 + 25 ppb PBO	244	22.9	23.9	6.7	8.3	7.79	8.15	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	161	23.0	23.7	6.6	8.8	7.70	8.17	-	-	-
Sacramento River across from Sherman Lake (704) + 25 ppb PBO	332	23.0	23.6	6.7	8.7	7.68	8.21	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	516	22.9	23.7	6.8	8.8	7.68	8.00	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A72-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 4/28/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/26/07 - 4/27/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	94	3.3	-	-	NA
DIEPAMHR + organic matter	92	2.6	95	2.9	NS
High EC Control @ 13.0 mS/cm + organic matter	98	2.5	64	11.7	S (65%)
Napa River at Riverside Blvd terminus (340)	98	2.5	93	4.8	NS
Suisun Bay off Chipps Island (508)	97	3.1	100	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	98	2.3	95	3.1	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	98	2.5	NS

	MSD	PMSD
One-way ANOVA	10.7	11.6
Two-way ANOVA	18.5	19.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.039	0.007	-	-	NA
DIEPAMHR + organic matter	0.038	0.008	0.061	0.004	NS
High EC Control @ 13.0 mS/cm + organic matter	0.024	0.006	0.019	0.003	NS
Napa River at Riverside Blvd terminus (340)	0.046	0.004	0.049	0.012	NS
Suisun Bay off Chipps Island (508)	0.040	0.010	0.068	0.004	NS
Suisun Bay, East of middle point (504)	0.049	0.004	0.051	0.005	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.062	0.007	0.035	0.004	NS
Grizzly Bay at Dolphin (602)	0.069	0.002	0.093	0.009	NS
Montezuma Slough at Nurse Slough (609)	0.090	0.006	0.099	0.005	NS

	MSD	PMSD
One-way ANOVA	0.031	82.6
Two-way ANOVA	0.032	65.0

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the High EC control.

Table A72-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/26/07 - 4/27/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd terminus (340)	7130	16.5	7.70	9.1	23.3	0.12	0.001
Suisun Bay off Chipps Island (508)	786	17.1	8.01	10.1	15.4	0.11	0.003
Suisun Bay, East of middle point (504)	4428	18.4	8.05	10.1	20.3	0.13	0.004
Carquinez Strait, West of Benicia army dock (405)	12780	18.2	8.00	10.2	18.2	0.13	0.003
Grizzly Bay at Dolphin (602)	7350	19.0	8.01	10.0	28.8	0.11	0.003
Montezuma Slough at Nurse Slough (609)	4477	17.7	7.66	8.8	54.4	0.15	0.002

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Table A72-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 4/28/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/26/07- 4/27/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	322	23.0	24.8	6.6	8.3	7.72	8.05	104	58	-
DIEPAMHR + organic matter	368	22.9	24.9	6.9	8.2	7.65	8.08	104	58	-
High EC Control @ 13.0 mS/cm + organic matter	13015	22.9	24.9	6.9	8.7	7.67	7.84	444	92	-
Napa River at Riverside Blvd terminus (340)	7565	22.9	24.8	6.6	8.7	7.83	7.89	184	116	0.004
Suisun Bay off Chipps Island (508)	707	23.1	24.7	6.2	8.6	7.72	7.86	-	-	0.005
Suisun Bay, East of middle point (504)	4344	23.0	24.9	7.0	8.5	7.64	7.83	-	-	0.005
Carquinez Strait, West of Benicia army dock (405)	12820	22.9	24.9	6.2	8.8	7.64	7.71	-	-	0.003
Grizzly Bay at Dolphin (602)	7435	22.9	24.7	6.5	8.8	7.68	7.83	-	-	0.004
Montezuma Slough at Nurse Slough (609)	4438	23.0	24.9	6.9	8.9	7.70	7.85	-	-	0.005
DIEPAMHR + organic matter + 25 ppb PBO	367	23.1	24.8	6.8	8.3	7.64	8.12	-	-	-
High EC Control @ 13.0 mS/cm + organic matter + 25 ppb PBO	12655	22.9	24.9	7.0	8.5	7.65	7.86	-	-	-
Napa River at Riverside Blvd terminus (340) + 25 ppb PBO	7355	22.8	24.7	6.9	8.6	7.84	7.90	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	721	22.8	24.9	7.0	8.4	7.82	8.16	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	4300	22.9	24.8	7.0	8.7	7.63	7.93	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	12735	22.8	24.9	6.9	8.7	7.66	7.78	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	7320	22.9	24.9	6.8	8.8	7.65	7.84	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	4331	22.8	24.8	7.0	8.6	7.68	7.88	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A73-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 05/10/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/08/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	-	-	NA
DIEPAMHR + organic matter	97	3.1	97	2.8	NS
High EC Control @ 10.0 mS/cm	79	18.0	100	0.0	NS
Sacramento Deep Water Channel, Light 55	97	2.8	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	100	0.0	92	2.7	NS
San Joaquin River between Hog and Turner Cuts (910)	93	7.5	100	0.0	NS
Middle of Broad Slough, West end (804)	98	2.5	95	5.0	NS
San Joaquin River, West of Oulton Point (812)	97	2.8	95	2.9	NS
Old River at mouth of Holland Cut (915)	95	2.9	98	2.5	NS
Sacramento River at tip of Grand Island (711)	93	4.8	98	2.5	NS
Napa River at Riverside Blvd. terminus (340) <sup>3</sup>	100	0.0	98	2.5	NS

	MSD	PMSD
One-way ANOVA	30.1	31.1
Two-way ANOVA	25.6	26.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.048	0.004	-	-	NA
DIEPAMHR + organic matter	0.094	0.004	0.035	0.006	S (37%)
High EC Control @ 10.0 mS/cm	0.069	0.004	0.041	0.007	NS
Sacramento Deep Water Channel, Light 55	0.075	0.006	0.091	0.007	NS
Sacramento R. across from Sherman Lake (704)	0.103	0.012	0.117	0.009	NS
Old River, western arm at railroad bridge (902)	0.076	0.017	0.085	0.005	NS
San Joaquin River between Hog and Turner Cuts (910)	0.072	0.008	0.106	0.002	NS
Middle of Broad Slough, West end (804)	0.075	0.007	0.096	0.016	NS
San Joaquin River, West of Oulton Point (812)	0.085	0.012	0.082	0.012	NS
Old River at mouth of Holland Cut (915)	0.081	0.007	0.087	0.009	NS
Sacramento River at tip of Grand Island (711)	0.061	0.006	0.061	0.005	NS
Napa River at Riverside Blvd. terminus (340) <sup>3</sup>	0.059	0.009	0.069	0.003	NS

	MSD	PMSD
One-way ANOVA	0.044	46.7
Two-way ANOVA	0.046	49.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

3. This high conductivity sample was compared to the High EC control.

Table A73-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/08/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total	Unionized
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		Ammonia Nitrogen (mg/L)	Ammonia (mg/L)
Sacramento Deep Water Channel, Light 55	214	19.9	8.20	8.7	12.1	0.220	0.012
Sacramento R. across from Sherman Lake (704)	771	18.1	8.00	9.4	16.1	0.000	0.000
Old River, western arm at railroad bridge (902)	252	19.8	8.16	8.8	7.7	0.010	0.001
San Joaquin River between Hog and Turner Cuts (910)	462	20.5	8.18	8.7	6.5	0.090	0.005
Middle of Broad Slough, West end (804)	646	18.5	8.20	9.3	10.7	0.070	0.003
San Joaquin River, West of Oulton Point (812)	227	18.7	8.32	9.2	7.6	0.000	0.000
Old River at mouth of Holland Cut (915)	277	21.0	8.17	8.4	3.9	0.010	0.001
Sacramento River at tip of Grand Island (711)	178	19.4	8.05	8.6	5.6	0.230	0.009
Napa River at Riverside Blvd. terminus (340)	9640	22.8	8.26	13.1	19.5	0.000	0.000

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Table A73-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 5/10/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/08/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	357	24.6	24.8	6.3	8.4	7.66	8.00	72	80	-
DIEPAMHR +organic matter	358	24.7	24.8	6.0	8.2	7.53	8.11	72	80	-
High EC Control @ 10.0 mS/cm + organic matter	9580	24.1	24.9	6.2	8.3	7.37	7.72	-	-	-
Sacramento Deep Water Channel, Light 55	232	24.7	24.7	5.9	8.9	7.80	7.96	72	76	0.010
Sacramento R. across from Sherman Lake (704)	801	24.4	24.8	6.4	8.6	7.47	7.87	124	68	0.000
Old River, western arm at railroad bridge (902)	270	24.7	24.8	5.9	8.8	7.51	7.97	80	64	0.000
San Joaquin River between Hog and Turner Cuts (910)	468	24.7	24.9	6.5	8.8	7.55	7.77	104	68	0.002
Middle of Broad Slough, West end (804)	658	24.8	24.8	6.5	8.6	7.56	7.80	108	68	0.002
San Joaquin River, West of Oulton Point (812)	239	24.8	24.8	6.3	8.5	7.59	7.92	72	64	0.000
Old River at mouth of Holland Cut (915)	299	24.8	24.9	6.2	8.9	7.54	7.76	80	66	0.000
Sacramento River at tip of Grand Island (711)	194	24.6	24.9	6.4	8.2	7.56	8.03	68	68	0.012
Napa River ar Riverside Blvd. terminus (340)	9035	24.7	24.9	6.2	8.6	7.51	7.90	356	122	0.000
DIEPAMHR +organic matter + 25 ppb PBO	357	24.2	24.9	6.5	8.2	7.67	7.81	-	-	-
High EC Control @ 10.0 mS/cm + organic matter + 25 ppb PBO	9610	24.1	25.0	6.5	8.4	7.42	7.72	-	-	-
Sacramento Deep Water Channel, Light 55 + 25 ppb PBO	236	24.2	24.7	6.4	8.4	7.74	8.07	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	789	24.2	24.7	6.5	8.3	7.52	7.94	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	274	24.3	24.7	6.2	8.4	7.62	7.92	-	-	-
San Joaquin River between Hog and Turner Cuts (910) + 25 ppb PBO	468	24.3	24.6	6.4	8.8	7.58	7.81	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	652	24.0	24.7	6.6	8.7	7.57	7.92	-	-	-
San Joaquin River, West of Oulton Point (812) + 25 ppb PBO	242	24.4	24.7	6.3	8.8	7.49	7.97	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	294	24.1	24.8	6.3	8.6	7.48	7.95	-	-	-
Sacramento River at tip of Grand Island (711) + 25 ppb PBO	196	24.3	24.8	6.3	8.6	7.49	7.98	-	-	-
Napa River ar Riverside Blvd. terminus (340) + 25 ppb PBO	9035	24.4	24.7	6.2	8.8	7.61	8.01	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A74-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 5/11/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/10/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	97	2.8	-	-	NA
DIEPAMHR + organic matter	87	1.9	97	2.8	NS
High EC control @ 12.79 mS/cm + organic matter	85	8.6	79	8.2	NS
High EC Control @ 22.5 mS/cm + organic matter	57	14.5	66	6.1	NS
Suisun Bay off Chipps Island (508)	100	0.0	92	5.3	NS
Suisun Bay, East of middle point (504)	92	2.7	98	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	85	5.7	57	7.7	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	93	4.5	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	100	0.0	98	2.5	NS
Field Duplicate: Suisun Bay, East of middle point (504)	83	6.9	-	-	NS

	MSD	PMSD
One-way ANOVA	30.6	31.5
Two-way ANOVA	29.6	30.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.064	0.010	-	-	NA
DIEPAMHR + organic matter	0.089	0.013	0.068	0.004	NS
High EC control @ 12.79 mS/cm + organic matter	0.079	0.011	0.052	0.008	NS
High EC Control @ 22.5 mS/cm + organic matter	0.059	0.011	0.040	0.004	NS
Suisun Bay off Chipps Island (508)	0.084	0.006	0.076	0.006	NS
Suisun Bay, East of middle point (504)	0.054	0.002	0.044	0.004	NS
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0.042	0.002	0.023	0.004	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	0.076	0.007	0.058	0.006	NS
Montezuma Slough at Nurse Slough (609)	0.074	0.010	0.043	0.007	NS
Field Duplicate: Suisun Bay, East of middle point (504)	0.075	0.008	-	-	NS

	MSD	PMSD
One-way ANOVA	0.042	47.4
Two-way ANOVA	0.037	41.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

3. This high conductivity sample was compared to the 22.5 mS/cm High EC control.

4. This high conductivity sample was compared to the 12.79 mS/cm High EC control.

Table A74-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/10/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay off Chipps Island (508)	3710	17.4	8.04	9.6	18.5	0.08	0.002
Suisun Bay, East of middle point (504)	6500	17.6	8.01	8.5	11.0	0.09	0.002
Carquinez Strait, West of Benicia army dock (405)	21870	15.8	7.92	9.7	7.6	0.09	0.001
Grizzly Bay at Dolphin (602)	12300	16.8	8.03	9.6	54.4	0.10	0.002
Montezuma Slough at Nurse Slough (609)	4713	17.9	7.88	8.6	40.2	0.09	0.002
Field Duplicate: Suisun Bay, East of middle point (504)	6500	17.6	8.01	8.5	10.7	0.08	0.002

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Table A74-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 5/11/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/10/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	354	22.8	24.7	6.7	8.3	7.54	8.05	72	80	-
DIEPAMHR + organic matter	350	22.9	25.4	6.9	8.5	7.45	8.06	72	80	-
High EC control @ 12.79 mS/cm + organic matter	12140	22.8	25.0	7.2	8.6	7.45	7.90	1640	100	-
High EC Control @ 22.5 mS/cm + organic matter	21475	22.8	25.1	6.6	8.2	7.47	7.69	2640	120	-
Suisun Bay off Chipps Island (508)	4034	22.8	25.1	6.9	8.8	7.54	7.93	428	72	0.003
Suisun Bay, East of middle point (504)	7990	22.7	24.8	6.9	8.6	7.52	7.85	900	100	0.003
Carquinez Strait, West of Benicia army dock (405)	21145	22.8	24.9	6.9	8.1	7.55	7.76	2640	140	0.002
Grizzly Bay at Dolphin (602)	11900	22.9	24.7	7.0	8.3	7.54	7.80	1720	100	0.002
Montezuma Slough at Nurse Slough (609)	4718	22.9	24.6	7.0	8.4	7.62	7.84	540	88	0.003
Field Duplicate: Suisun Bay, East of middle point (504)	7980	22.8	25.0	7.1	8.4	7.54	7.84	868	90	0.002
DIEPAMHR + organic matter + 25 ppb PBO	378	22.8	24.7	6.9	8.3	7.57	8.09	-	-	-
High EC control @ 12.79 mS/cm + organic matter + 25 ppb PBO	12105	22.8	25.0	6.8	8.8	7.46	7.93	-	-	-
High EC Control @ 22.5 mS/cm + organic matter + 25 ppb PBO	21535	22.8	24.6	6.9	8.3	7.53	7.89	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	3748	22.7	24.7	6.8	8.7	7.53	7.90	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	8030	22.6	24.6	7.1	8.8	7.51	7.84	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	21300	22.6	24.6	6.7	8.2	7.56	7.76	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	11835	23.0	24.6	7.0	8.7	7.55	7.86	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	4589	22.6	24.6	7.2	8.8	7.62	7.80	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A75-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 05/24/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/22/07 - 5/23/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	90	7.1	100	0.0	NS
DIEPAMHR + organic matter	92	2.6	98	2.5	NS
High EC Control @ 13.55 mS/cm + organic matter	93	4.8	90	4.1	NS
High EC Control @ 17.00 mS/cm + organic matter	85	6.4	84	5.7	NS
Sacramento R. Deep Water Channel, Light 55	89	6.1	93	2.5	NS
Sacramento R. at tip of Grand Island (711)	66	13.3	77	4.8	NS
San Joaquin R. at Stockton WWTF	100	0.0	100	0.0	NS
Napa River at Riverside Blvd Terminus (340) <sup>3</sup>	97	2.8	93	7.1	NS
Sacramento R. across from Sherman Lake (508)	92	2.6	98	2.3	NS
Suisun Bay, East of middle point (504)	90	10.0	98	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	84	3.5	85	2.7	NS

	MSD	PMSD
One-way ANOVA	31.35	34.00
Two-way ANOVA	27.80	30.15

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.045	0.002	0.041	0.004	NS
DIEPAMHR + organic matter	0.067	0.003	0.042	0.008	NS
High EC Control @ 13.55 mS/cm + organic matter	0.036	0.005	0.036	0.009	NS
High EC Control @ 17.00 mS/cm + organic matter	0.047	0.007	0.038	0.009	NS
Sacramento R. Deep Water Channel, Light 55	0.084	0.005	0.052	0.007	NS
Sacramento R. at tip of Grand Island (711)	0.090	0.012	0.066	0.003	NS
San Joaquin R. at Stockton WWTF	0.085	0.009	0.084	0.002	NS
Napa River at Riverside Blvd Terminus (340) <sup>3</sup>	0.054	0.002	0.046	0.012	NS
Sacramento R. across from Sherman Lake (508)	0.090	0.005	0.040	0.004	S (44%)
Suisun Bay, East of middle point (504)	0.053	0.009	0.043	0.004	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	0.038	0.004	0.039	0.003	NS

	MSD	PMSD
One-way ANOVA	0.03	49.60
Two-way ANOVA	0.04	53.51

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

3. This high conductivity sample was compared to the 13.55 mS/cm control.

4. This high conductivity sample was compared to the 17.00 mS/cm control.

Table A75-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/22/07 - 5/23/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. Deep Water Channel, Light 55	289	20.7	8.20	9.2	30.9	0.11	0.001
Sacramento R. at tip of Grand Island (711)	202	21.2	7.92	9.0	5.7	0.32	0.003
San Joaquin R. at Stockton WWTF	345	20.3	8.80	11.0	31.3	0.21	0.003
Napa River at Riverside Blvd Terminus (340)	13490	21.9	7.92	9.8	14.9	0.01	0.000
Sacramento R. across from Sherman Lake (508)	3459	18.9	8.05	9.2	15.4	0.07	0.001
Suisun Bay, East of middle point (504)	7420	18.7	8.01	9.0	13.9	0.08	0.001
Carquinez Strait, West of Benicia army dock (405)	16100	18.5	7.95	8.8	11.5	0.09	0.001

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Table A75-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 05/24/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/22/07- 5/23/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	356	23.3	24.0	6.8	8.2	7.57	7.90	112	62	-
DIEPAMHR + organic matter	357	23.0	23.3	6.5	8.0	7.68	7.87	112	62	-
High EC control @ 13.55 mS/cm + organic matter	13050	23.4	24.0	7.1	7.8	7.45	7.73	1520	76	-
High EC Control @ 17.00 mS/cm + organic matter	16345	23.4	24.1	7.1	7.8	7.53	7.71	1920	85	-
Sacramento R. Deep Water Channel, Light 55	231	23.1	23.4	5.5	8.4	7.64	7.79	76	78	0.002
Sacramento R. at tip of Grand Island (711)	175	23.1	23.4	5.9	8.3	7.53	7.69	56	62	0.007
San Joaquin R. at Stockton WWTP	346	23.3	24.2	6.0	8.7	7.63	7.99	80	60	0.010
Napa River at Riverside Blvd. Terminus (340)	12870	23.3	24.2	6.3	8.7	7.54	7.85	1520	160	0.000
Sacramento R. across from Sherman Lake (508)	3870	23.4	24.7	6.4	8.5	7.63	7.71	380	90	0.001
Suisun Bay, East of middle point (504)	7140	23.4	24.3	6.3	8.0	7.48	7.66	820	90	0.001
Carquinez Strait, West of Benicia army dock (405)	16515	23.4	24.2	6.5	7.8	7.48	7.67	1880	100	0.001
DIEPAMHR + 25 ppb PBO	361	23.2	23.4	6.5	8.1	7.77	7.96	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	377	23.0	23.4	6.5	8.3	7.71	7.87	-	-	-
High EC control @ 13.55 mS/cm + organic matter + 25 ppb PBO	13055	23.0	23.4	7.0	8.7	7.40	7.73	-	-	-
High EC Control @ 17.00 mS/cm + organic matter + 25 ppb PBO	16235	22.8	23.0	6.5	8.3	7.53	7.64	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	235	23.0	23.1	6.5	8.6	7.81	8.01	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	176	22.8	23.3	6.4	8.3	7.51	7.83	-	-	-
San Joaquin R. at Stockton WWTP + 25 ppb PBO	319	22.5	23.4	6.8	8.7	7.56	7.97	-	-	-
Napa River at Riverside Blvd. Terminus (340) + 25 ppb PBO	12565	22.4	23.4	6.7	8.6	7.63	7.70	-	-	-
Sacramento R. across from Sherman Lake (508) + 25 ppb PBO	21730	22.2	23.1	7.2	8.4	7.66	7.75	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	7075	22.0	23.7	6.9	8.3	7.53	7.62	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	16515	22.0	23.7	7.0	8.4	7.49	7.61	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A76-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 05/25/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/23/07 - 5/24/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	83	9.6	95	2.9	NS
DIEPAMHR + organic matter	92	2.8	83	13.2	NS
Middle of Broad Slough, West end (804)	98	2.5	95	2.9	NS
Grizzly Bay @ Dolphin (602)	92	4.8	95	2.9	NS
Sacramento R., across from Sherman Lake (704)	100	0.0	100	0.0	NS
Montezuma Slough @ Nurse Slough (609)	100	0.0	100	0.0	NS
Old River @ Holland Cut (902)	87	2.4	90	4.6	NS
San Joaquin R. @ Hog and Turner cuts	92	2.7	68	23.6	NS
Old River @ railroad bridge, west (915)	89	4.5	86	6.2	NS
San Joaquin R., West of Oulton Point (812)	98	2.5	89	4.1	NS
Field Duplicate: San Joaquin R., west of Oulton Point (812)	95	2.9	-	-	NA

	MSD	PMSD
One-way ANOVA	19.80	21.55
Two-way ANOVA	26.60	30.37

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.062	0.007	0.038	0.002	NS
DIEPAMHR + organic matter	0.057	0.006	0.036	0.011	NS
Middle of Broad Slough, West end (804)	0.070	0.004	0.082	0.015	NS
Grizzly Bay @ Dolphin (602)	0.054	0.005	0.046	0.007	NS
Sacramento R., across from Sherman Lake (704)	0.060	0.000	0.053	0.003	NS
Montezuma Slough @ Nurse Slough (609)	0.065	0.006	0.067	0.005	NS
Old River @ Holland Cut (902)	0.054	0.003	0.053	0.009	NS
San Joaquin R. @ Hog and Turner cuts	0.049	0.009	0.072	0.007	NS
Old River @ railroad bridge, west (915)	0.056	0.014	0.073	0.013	NS
San Joaquin R., West of Oulton Point (812)	0.067	0.007	0.068	0.003	NS
Field Duplicate: San Joaquin R., west of Oulton Point (812)	0.061	0.005	-	-	NA

	MSD	PMSD
One-way ANOVA	0.03	59.50
Two-way ANOVA	0.04	73.22

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A76-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/23/07 - 5/24/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total	Unionized
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		Ammonia Nitrogen (mg/L)	Ammonia (mg/L)
Middle of Broad Slough, West end (804)	664	18.8	8.20	9.2	14.8	0.04	0.002
Grizzly Bay @ Dolphin (602)	8720	18.7	8.01	8.9	23.9	0.05	0.001
Sacramento R., across from Sherman Lake (704)	308	18.8	8.20	9.2	15.3	0.09	0.005
Montezuma Slough @ Nurse Slough (609)	5400	19.1	7.80	8.1	40.9	0.08	0.001
Old River @ Holland Cut (902)	303	20.0	8.19	8.7	5.5	0.02	0.001
San Joaquin R. @ Hog and Turner cuts (910)	431	20.7	7.80	8.6	6.6	0.10	0.002
Old River @ railroad bridge, west (915)	380	20.7	8.14	8.6	4.5	0.03	0.002
San Joaquin R., West of Oulton Point (812)	277	19.7	8.12	9.2	4.9	0.05	0.002
Field Duplicate: San Joaquin R., west of Oulton Point (812)	277	19.7	8.12	9.2	5.6	0.04	0.002

Table A76-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 5/25/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/23/07 - 5/24/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	351	22.6	24.1	6.8	8.1	7.61	8.12	112	62	-
DIEPAMHR + organic matter	355	22.7	24.7	6.6	8.1	7.53	8.00	112	62	-
Middle of Broad Slough, West end (804)	628	22.7	24.6	6.6	8.6	7.56	7.96	108	68	0.002
Grizzly Bay @ Dolphin (602)	8120	22.7	24.6	6.7	8.2	7.46	7.81	920	100	0.001
Sacramento R., across from Sherman Lake (704)	426	22.7	23.9	6.5	8.3	7.55	8.14	80	70	0.006
Montezuma Slough @ Nurse Slough (609)	4882	22.7	24.1	6.9	8.2	7.51	7.80	300	80	0.002
Old River @ Holland Cut (902)	373	22.7	24.5	6.8	8.4	7.61	7.93	76	66	0.001
San Joaquin R. @ Hog and Turner cuts (910)	382	22.7	23.8	6.5	8.3	7.53	7.96	40	80	0.004
Old River @ railroad bridge, west (915)	335	22.7	24.1	6.5	8.3	7.59	7.89	84	72	0.001
San Joaquin R., West of Oulton Point (812)	263	22.7	23.9	7.0	8.3	7.62	7.95	72	64	0.002
Field Duplicate: San Joaquin R., west of Oulton Point (812)	268	22.7	23.9	6.7	8.2	7.59	7.94	72	62	0.002
DIEPAMHR + 25 ppb PBO	354	22.7	24.0	7.1	8.2	7.63	8.15	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	349	22.7	24.2	6.4	8.1	7.61	8.07	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	617	22.7	24.2	6.7	8.2	7.58	8.00	-	-	-
Grizzly Bay @ Dolphin (602) + 25 ppb PBO	7990	22.7	24.2	7.3	8.4	7.47	7.77	-	-	-
Sacramento R., across from Sherman Lake (704) + 25 ppb PBO	417	22.7	23.9	6.5	8.6	7.66	8.04	-	-	-
Montezuma Slough @ Nurse Slough (609) + 25 ppb PBO	4867	22.7	23.7	6.9	8.4	7.49	7.73	-	-	-
Old River @ Holland Cut (902) + 25 ppb PBO	385	22.7	23.5	6.6	8.2	7.64	8.06	-	-	-
San Joaquin R. @ Hog and Turner cuts (910) + 25 ppb PBO	392	22.7	23.9	6.5	8.4	7.57	7.86	-	-	-
Old River @ railroad bridge, west (915) + 25 ppb PBO	331	22.7	23.6	6.5	8.7	7.61	7.91	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	268	22.8	23.8	6.8	8.5	7.60	8.04	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A77-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 06/07/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	100	0.0	NS
DIEPAMHR + organic matter	98	2.5	100	0.0	NS
Sacramento R. at tip of Grand Island (711)	92	2.6	98	2.5	NS
Middle of Broad Slough, West end (804)	98	2.5	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	98	2.5	100	0.0	NS
Sacramento R. Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	98	2.5	NS
Old River, western arm at railroad bridge (902)	95	2.9	95	2.9	NS
San Joaquin R., West of Oulton Point (812)	100	0.0	95	5.0	NS
San Joaquin R., between Hog and Turner Cuts (910)	93	2.5	95	2.9	NS

	MSD	PMSD
One-way ANOVA	10.39	10.65
Two-way ANOVA	11.75	11.90

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.031	0.005	0.029	0.004	NS
DIEPAMHR + organic matter	0.051	0.006	0.048	0.007	NS
Sacramento R. at tip of Grand Island (711)	0.068	0.006	0.056	0.005	NS
Middle of Broad Slough, West end (804)	0.070	0.005	0.071	0.007	NS
Sacramento R. across from Sherman Lake (704)	0.076	0.006	0.068	0.006	NS
Sacramento R. Deep Water Channel, Light 55	0.064	0.006	0.080	0.006	NS
Old River at mouth of Holland Cut (915)	0.066	0.005	0.064	0.007	NS
Old River, western arm at railroad bridge (902)	0.045	0.005	0.115	0.006	S (255%)
San Joaquin R., West of Oulton Point (812)	0.060	0.007	0.110	0.013	S (183%)
San Joaquin R., between Hog and Turner Cuts (910)	0.061	0.010	0.104	0.011	S (170%)

	MSD	PMSD
One-way ANOVA	0.03	59.26
Two-way ANOVA	0.04	73.74

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Data were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A77-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. at tip of Grand Island (711)	205	20.1	7.88	7.7	3.4	0.410	0.011
Middle of Broad Slough, West end (804)	1627	18.1	8.24	9.2	17.8	0.090	0.004
Sacramento R. across from Sherman Lake (704)	1534	17.8	8.17	9.2	20.3	0.050	0.002
Sacramento R. Deep Water Channel, Light 55	225	18.7	7.94	8.8	26.4	0.150	0.004
Old River at mouth of Holland Cut (915)	344	20.7	8.14	7.9	4.7	0.040	0.002
Old River, western arm at railroad bridge (902)	289	19.9	8.22	8.3	13.2	0.040	0.002
San Joaquin R., West of Oulton Point (812)	259	19.1	8.33	9.1	8.3	0.050	0.003
San Joaquin R., between Hog and Turner Cuts (910)	486	21.9	7.80	8.6	8.9	0.180	0.005

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Table A77-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 06/07/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	347	23.0	23.4	6.5	8.4	7.64	7.93	104	60	-
DIEPAMHR + organic matter	348	23.0	23.3	6.4	8.4	7.54	7.99	104	60	-
Sacramento R. at tip of Grand Island (711)	184	23.0	23.5	6.0	8.5	7.52	7.76	60	68	0.011
Middle of Broad Slough, West end (804)	1532	23.0	23.5	6.2	8.7	7.47	7.77	196	70	0.002
Sacramento R. across from Sherman Lake (704)	1458	22.9	23.5	6.5	8.8	7.53	7.82	188	72	0.001
Sacramento R. Deep Water Channel, Light 55	205	23.0	23.4	6.0	8.4	7.59	7.93	72	74	0.006
Old River at mouth of Holland Cut (915)	338	23.0	23.4	6.2	8.6	7.57	7.73	76	70	0.001
Old River, western arm at railroad bridge (902)	281	23.2	23.4	6.3	8.6	7.56	7.94	76	66	0.002
San Joaquin R., West of Oulton Point (812)	269	23.1	23.3	6.3	8.4	7.50	8.02	68	64	0.002
San Joaquin R., between Hog and Turner Cuts (910)	449	23.3	23.3	6.1	8.2	7.58	7.73	116	76	0.004
DIEPAMHR	340	22.8	23.2	6.6	8.4	7.60	7.96	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	339	23.0	23.7	6.6	8.5	7.55	7.95	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	182	22.9	23.1	5.8	8.4	7.50	7.84	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	1533	22.7	23.1	6.4	8.7	7.51	7.72	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	1458	22.8	23.3	6.4	8.6	7.57	7.78	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	223	22.8	23.2	6.0	8.5	7.60	7.89	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	338	22.9	23.5	6.3	8.9	7.59	7.86	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	267	22.7	23.3	6.1	8.6	7.58	7.82	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	244	22.7	23.3	6.2	8.7	7.62	7.81	-	-	-
San Joaquin R., between Hog and Turner Cuts (910) + 25 ppb PBO	441	22.9	23.5	6.1	8.3	7.57	7.64	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A78-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 06/08/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07 - 6/07/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	97	3.1	100	0.0	NS
DIEPAMHR + organic matter	95	2.9	95	2.9	NS
High EC Control @ 15.55 mS/cm	78	8.5	74	16.8	NS
High EC Control @ 21.37 mS/cm	80	8.2	72	7.3	NS
Napa River at Riverside Blvd Terminus (340) <sup>3</sup>	98	2.5	89	4.2	NS
Suisun Bay off Chipps Island (508)	100	0.0	100	0.0	NS
Suisun Bay, East of middle point (504)	98	2.5	95	2.9	NS
Grizzly Bay at Dolphin (602)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	81	9.4	88	8.9	NS
Montezuma Slough at Nurse Slough (609)	98	2.3	95	5.0	NS
Cache Creek / Ulatris Creek Confluence	95	2.9	100	0.0	NS

	MSD	PMSD
One-way ANOVA	24.49	25.78
Two-way ANOVA	30.94	32.57

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.019	0.005	0.028	0.002	NS
DIEPAMHR + organic matter	0.040	0.004	0.037	0.005	NS
High EC Control @ 15.55 mS/cm	0.048	0.003	0.031	0.009	NS
High EC Control @ 21.37 mS/cm	0.033	0.006	0.025	0.003	NS
Napa River at Riverside Blvd Terminus (340) <sup>3</sup>	0.031	0.008	0.032	0.004	NS
Suisun Bay off Chipps Island (508)	0.064	0.007	0.062	0.011	NS
Suisun Bay, East of middle point (504)	0.056	0.012	0.049	0.007	NS
Grizzly Bay at Dolphin (602)	0.052	0.005	0.056	0.004	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	0.025	0.005	0.035	0.006	NS
Montezuma Slough at Nurse Slough (609)	0.067	0.008	0.063	0.008	NS
Cache Creek / Ulatris Creek Confluence	0.063	0.007	0.058	0.006	NS

	MSD	PMSD
One-way ANOVA	0.03	81.31
Two-way ANOVA	0.03	85.92

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the High EC control @ 15.55 mS/cm.
4. This high conductivity sample was compared to the High EC control @ 21.37 mS/cm.

Table A78-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07 - 6/07/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd Terminus (340)	13870	20.7	7.62	8.7	6.8	0.000	0.000
Suisun Bay off Chipps Island (508)	4035	18.3	7.90	9.5	11.5	0.040	0.001
Suisun Bay, East of middle point (504)	8910	17.8	7.96	9.4	8.3	0.000	0.000
Grizzly Bay at Dolphin (602)	9140	18.2	8.09	9.7	18.4	0.000	0.000
Carquinez Strait, West of Benicia army dock (405)	21160	17.6	7.90	9.4	13.1	0.000	0.000
Montezuma Slough at Nurse Slough (609)	5570	19.4	7.77	8.5	18.9	0.040	0.001
Cache Creek / Ulatis Creek Confluence	272	20.3	7.81	8.5	27.7	0.200	0.005

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Table A78-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 06/08/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07 - 6/07/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	356	23.2	24.1	5.8	8.6	7.57	8.09	104	60	-
DIEPAMHR + organic matter	353	22.9	24.0	5.1	8.5	7.45	8.05	104	60	-
High EC Control @ 15.55 mS/cm + organic matter	14425	23.0	24.0	6.5	8.2	7.56	7.83	1760	140	-
High EC Control @ 21.37 mS/cm + organic matter	20130	22.9	24.2	6.4	8.1	7.61	7.86	2440	120	-
Napa River at Riverside Blvd Terminus (340)	14510	23.1	24.3	6.5	8.6	7.73	7.83	436	134	0.000
Suisun Bay off Chipps Island (508)	21766	23.1	24.4	5.9	8.7	7.63	7.94	236	74	0.001
Suisun Bay, East of middle point (504)	8585	23.2	24.2	6.4	8.8	7.64	7.80	260	82	0.000
Grizzly Bay at Dolphin (602)	8800	23.2	24.1	6.5	8.8	7.62	7.83	264	84	0.000
Carquinez Strait, West of Benicia army dock (405)	19235	23.4	24.4	6.2	8.7	7.53	7.67	308	98	0.000
Montezuma Slough at Nurse Slough (609)	5225	23.4	24.3	6.3	8.5	7.70	7.77	640	120	0.001
Cache Creek / Ulatis Creek Confluence	215	23.0	24.3	5.6	8.4	7.61	7.98	68	74	0.008
DIEPAMHR + 25 ppb PBO	353	23.1	24.3	6.0	8.4	7.60	8.09	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	348	22.8	24.3	6.0	8.3	7.55	8.00	-	-	-
High EC Control @ 15.55 mS/cm + organic matter + 25 ppb PBO	14410	22.7	24.5	6.3	8.1	7.55	7.81	-	-	-
High EC Control @ 21.37 mS/cm + organic matter + 25 ppb PBO	19680	22.7	24.4	6.5	8.0	7.62	7.83	-	-	-
Napa River at Riverside Blvd Terminus (340) + 25 ppb PBO	14405	22.6	24.3	6.5	8.3	7.73	7.82	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	3839	22.5	24.2	6.4	8.5	7.65	7.93	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	8565	22.6	24.2	6.3	8.6	7.60	7.87	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	8645	22.5	23.3	6.5	8.5	7.61	7.84	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	19115	22.5	24.1	6.4	8.4	7.61	7.68	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	5200	22.5	24.3	6.5	8.8	7.73	7.82	-	-	-
Cache Creek / Ulatis Creek Confluence + 25 ppb PBO	227	22.6	24.5	6.1	8.3	7.70	8.02	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A79-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 06/21/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/20/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	97	2.8	NS
DIEPAMHR + organic matter	100	0.0	98	2.5	NS
Sacramento R. at tip of Grand Island (711)	94	3.2	85	6.4	NS
Middle of Broad Slough, west end	95	2.9	98	2.5	NS
Sacramento R. Deep Water Channel, Light 55	85	3.4	87	2.4	NS
Sacramento R. across from Sherman Lake (704)	98	2.5	95	2.9	NS
Old River at mouth of Holland Cut	88	4.8	98	2.5	NS
San Joaquin R., west of Oulton Point	90	4.1	98	2.5	NS
San Joaquin R., between Hog and Turner Cuts (910)	88	6.3	93	4.8	NS
Old River, western arm at railroad bridge	100	0.0	98	2.3	NS
Field Duplicate: Sacramento R. at tip of Grand Island (711)	79	12.1	-	-	NA

	MSD	PMSD
One-way ANOVA	24.27	24.27
Two-way ANOVA	18.04	18.04

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.075	0.005	0.104	0.006	NS
DIEPAMHR + organic matter	0.115	0.001	0.157	0.010	S (134%)
Sacramento R. at tip of Grand Island (711)	0.088	0.007	0.144	0.011	S (164%)
Middle of Broad Slough, west end	0.118	0.010	0.142	0.009	NS
Sacramento R. Deep Water Channel, Light 55	0.120	0.013	0.140	0.004	NS
Sacramento R. across from Sherman Lake (704)	0.122	0.005	0.148	0.007	NS
Old River at mouth of Holland Cut	0.136	0.008	0.097	0.002	NS
San Joaquin R., west of Oulton Point	0.121	0.010	0.101	0.007	NS
San Joaquin R., between Hog and Turner Cuts (910)	0.138	0.007	0.102	0.006	NS
Old River, western arm at railroad bridge	0.134	0.011	0.131	0.006	NS
Field Duplicate: Sacramento R. at tip of Grand Island (711)	0.134	0.006	-	-	NA

	MSD	PMSD
One-way ANOVA	0.04	35.96
Two-way ANOVA	0.04	35.96

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A79-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/20/07.

Treatment	Field Chemistry					Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	EC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. at tip of Grand Island (711)	173	162	21.9	7.80	8.1	7.0	0.08	0.002
Middle of Broad Slough, west end	2004	1844	21.0	7.94	8.7	11.2	0.03	0.001
Sacramento R. Deep Water Channel, Light 55	189	178	22.1	7.94	8.3	16.3	0.11	0.004
Sacramento R. across from Sherman Lake (704)	2933	2687	20.8	7.95	8.8	17.4	0.09	0.003
Old River at mouth of Holland Cut	292	287	24.3	8.06	7.8	4.0	0.06	0.003
San Joaquin R., west of Oulton Point	261	247	22.4	8.10	8.5	7.2	0.09	0.005
San Joaquin R., between Hog and Turner Cuts (910)	446	441	24.4	7.79	7.1	7.4	0.15	0.004
Old River, western arm at railroad bridge	273	262	22.9	8.10	8.1	8.4	0.09	0.005
Field Duplicate: Sacramento R. at tip of Grand Island (711)	171	162	22.2	7.92	8.1	7.2	0.06	0.002

Table A79-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 06/21/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/20/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	342	22.0	23.9	6.7	8.3	7.46	7.98	108	62	-
DIEPAMHR + organic matter	349	22.0	23.3	5.9	8.3	7.39	7.99	108	62	-
Sacramento R. at tip of Grand Island (711)	178	22.2	23.5	5.8	8.7	7.42	7.93	64	62	0.003
Middle of Broad Slough, west end	1942	22.2	23.2	6.2	8.7	7.32	7.80	300	10	0.001
Sacramento R. Deep Water Channel, Light 55	200	22.2	23.5	5.9	8.6	7.51	7.99	76	66	0.005
Sacramento R. across from Sherman Lake (704)	2838	22.3	23.3	6.3	8.7	7.35	7.75	340	50	0.002
Old River at mouth of Holland Cut	302	22.3	23.5	6.0	8.9	7.52	7.89	80	66	0.002
San Joaquin R., west of Oulton Point	258	22.3	23.3	6.0	8.8	7.46	7.89	80	64	0.003
San Joaquin R., between Hog and Turner Cuts (910)	347	22.1	23.5	6.1	8.5	7.43	7.93	124	80	0.006
Old River, western arm at railroad bridge	369	22.0	23.2	6.0	8.8	7.44	7.85	80	64	0.003
Field Duplicate: Sacramento R. at tip of Grand Island (711)	175	22.1	23.4	6.2	8.8	7.50	7.99	68	74	0.003
DIEPAMHR + 25 ppb PBO	339	22.1	23.0	6.5	8.3	7.42	8.01	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	347	22.2	22.9	6.0	8.3	7.40	8.03	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	175	22.2	23.1	6.2	8.9	7.51	8.02	-	-	-
Middle of Broad Slough, west end + 25 ppb PBO	1922	22.3	23.4	6.1	8.9	7.34	7.83	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	202	22.3	23.6	6.1	8.7	7.51	8.00	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	2830	22.1	23.2	6.4	8.5	7.36	7.76	-	-	-
Old River at mouth of Holland Cut + 25 ppb PBO	303	22.1	23.6	6.0	8.9	7.51	7.97	-	-	-
San Joaquin R., west of Oulton Point + 25 ppb PBO	259	22.1	23.3	6.2	8.8	7.49	8.00	-	-	-
San Joaquin R., between Hog and Turner Cuts (910) + 25 ppb PBO	349	22.1	23.5	6.1	8.7	7.43	7.89	-	-	-
Old River, western arm at railroad bridge + 25 ppb PBO	363	22.2	23.4	6.5	8.8	7.59	7.84	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A80-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 06/23/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/21/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	92	2.6	86	4.8	NS
DIEPAMHR + organic matter	95	2.9	97	2.8	NS
High EC Control @ 14.85 mS/cm	82	7.4	78	10.3	NS
High EC Control @ 17.85 mS/cm	80	4.1	77	3.5	NS
High EC Control @ 19.30 mS/cm	77	7.4	68	16.0	NS
Napa River at Vallejo Seawall (340)	85	7.7	79	7.1	NS
Suisun Bay at Chipps Island (508)	97	2.8	95	2.9	NS
Suisun Bay at Middle Point (504)	87	10.6	85	11.9	NS
Grizzly Bay at Dolphin (602)	92	4.9	70	5.1	NS
Carquinez Straight at Benicia (405)	85	2.7	85	6.4	NS
Montezuma Slough at Nurse Slough (609)	90	4.1	95	2.8	NS

	MSD	PMSD
One-way ANOVA	28.49	29.99
Two-way ANOVA	39.72	41.81

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.061	0.006	0.058	0.011	NS
DIEPAMHR + organic matter	0.078	0.005	0.088	0.009	NS
High EC Control @ 14.85 mS/cm	0.072	0.010	0.063	0.009	NS
High EC Control @ 17.85 mS/cm	0.065	0.006	0.051	0.006	NS
High EC Control @ 19.30 mS/cm	0.037	0.004	0.054	0.008	NS
Napa River at Vallejo Seawall (340)	0.066	0.003	0.066	0.012	NS
Suisun Bay at Chipps Island (508)	0.109	0.021	0.116	0.011	NS
Suisun Bay at Middle Point (504)	0.084	0.010	0.043	0.009	NS
Grizzly Bay at Dolphin (602)	0.057	0.010	0.084	0.004	NS
Carquinez Straight at Benicia (405)	0.052	0.007	0.049	0.007	NS
Montezuma Slough at Nurse Slough (609)	0.105	0.008	0.111	0.008	NS

	MSD	PMSD
One-way ANOVA	0.05	58.24
Two-way ANOVA	0.05	65.63

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the High EC control.

Table A80-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/21/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Vallejo Seawall (340)	17020	25.2	7.76	8.7	5.5	0.02	0.000
Suisun Bay at Chipps Island (508)	5360	21.0	7.97	8.8	24.0	0.10	0.003
Suisun Bay at Middle Point (504)	9520	20.4	8.01	8.8	7.6	0.07	0.002
Grizzly Bay at Dolphin (602)	14090	19.0	7.97	8.9	39.0	0.13	0.003
Carquinez Straight at Benicia (405)	17680	19.0	7.93	8.8	10.1	0.09	0.002
Montezuma Slough at Nurse Slough (609)	7000	20.8	7.84	7.9	23.1	0.12	0.003

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Table A80-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 06/23/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/21/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	348.2	23.5	23.6	6.2	8.3	7.59	8.22	108	62	-
DIEPAMHR + organic matter	354.3	23.4	23.9	6.3	8.4	7.58	8.09	108	62	-
High EC Control @ 14.85 mS/cm	14085	23.4	23.7	6.7	8.3	7.46	7.78	1280	78	-
High EC Control @ 17.85 mS/cm	17185	23.5	24.0	6.8	8.5	7.49	7.86	1500	82	-
High EC Control @ 19.30 mS/cm	18495	23.6	23.9	6.9	8.3	7.53	7.86	1820	86	-
Napa River at Vallejo Seawall (340)	16780	23.5	24.1	6.8	8.2	7.75	7.90	2000	141	0.000
Suisun Bay at Chipps Island (508)	5900	23.6	23.9	6.8	8.6	7.62	7.85	500	76	0.003
Suisun Bay at Middle Point (504)	9305	23.6	24.1	6.3	8.5	7.59	7.73	980	82	0.001
Grizzly Bay at Dolphin (602)	13675	23.7	24.1	6.8	8.1	7.62	7.74	3240	120	0.002
Carquinez Straight at Benicia (405)	17820	23.6	24.0	6.6	8.0	7.57	7.70	2000	100	0.002
Montezuma Slough at Nurse Slough (609)	7140	23.5	24.1	6.8	8.9	7.64	7.80	820	70	0.002
DIEPAMHR + 25 ppb PBO	580.05	23.5	23.8	6.5	8.3	7.89	8.16	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	352.45	23.8	24.0	6.7	8.5	7.72	8.03	-	-	-
High EC Control @ 14.85 mS/cm + 25 ppb PBO	14115	23.6	24.0	6.9	8.6	7.51	7.82	-	-	-
High EC Control @ 17.85 mS/cm + 25 ppb PBO	16560	23.7	24.0	6.1	8.3	7.52	7.85	-	-	-
High EC Control @ 19.30 mS/cm + 25 ppb PBO	18705	23.8	23.9	6.7	8.3	7.57	7.82	-	-	-
Napa River at Vallejo Seawall (340) + 25 ppb PBO	16435	24.0	24.1	6.9	8.3	7.79	7.92	-	-	-
Suisun Bay at Chipps Island (508) + 25 ppb PBO	5905	23.8	24.0	6.7	8.3	7.67	7.84	-	-	-
Suisun Bay at Middle Point (504) + 25 ppb PBO	9310	23.8	24.0	7.1	8.4	7.59	7.81	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	13915	23.4	24.2	7.0	8.3	7.64	7.76	-	-	-
Carquinez Straight at Benicia (405) + 25 ppb PBO	17885	23.3	24.2	6.9	8.0	7.62	7.72	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	7125	23.7	24.3	7.0	8.5	7.69	7.87	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A81-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 07/12/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/10/07.

### Unmanipulated Samples

Sample	Mean Survival (%) <sup>1</sup>					Weight (mg/surviving individual) <sup>1</sup>	
	24 hr	48 hr	72 hr	96 hr	10 day	mean	se
DIEPAMHR	100	100	100	100	100	0.056	0.002
DIEPAMHR + organic matter	98	95	95	95	95	0.053	0.005
High EC Control @ 15.4 mS/cm	98	93	90	85	50	0.067	0.025
High EC Control @ 22.75 mS/cm	88	58	33	30	18	0.056	0.010
Middle of Broad Slough, West end (804)	98	93	90	88	88	0.069	0.007
Montezuma Slough @ Nurse Slough (609)	98	90	77	77	75	0.063	0.006
Grizzly Bay @ Dolphin (602) <sup>2</sup>	71	49	36	33	25	0.073	0.025
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	5	3	0	0	0	-	-
Suisun Bay, East of middle point (504)	93	93	90	90	88	0.067	0.009
Suisun Bay, off Chipps Island (508)	100	100	98	93	93	0.065	0.005
Sacramento R., across from Sherman Lake (704)	98	98	98	98	98	0.070	0.007

### PBO-added treatments

Sample	Mean Survival (%) <sup>1</sup>				
	24 hr	48 hr	72 hr	96 hr	10 day
DIEPAMHR	78	30	0	0	-
DIEPAMHR + organic matter	69	39	3	0	-
High EC Control @ 15.4 mS/cm	74	29	3	0	-
High EC Control @ 22.75 mS/cm	31	10	0	0	-
Middle of Broad Slough, West end (804)	43	0	0	0	-
Montezuma Slough @ Nurse Slough (609)	93	83	70	-	-
Grizzly Bay @ Dolphin (602) <sup>2</sup>	48	18	5	-	-
Carquinez Strait, West of Benicia army dock (405) <sup>3</sup>	0	0	0	-	-
Suisun Bay, East of middle point (504)	60	5	0	-	-
Suisun Bay, off Chipps Island (508)	80	8	0	-	-
Sacramento R., across from Sherman Lake (704)	90	65	15	-	-

1. Highlighted cells indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. This high conductivity sample was compared to the 15.4 mS/cm High EC control.

3. This high conductivity sample was compared to the 22.75 mS/cm High EC control.

Table A81-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/10/07.

Treatment	Field Chemistry				Un-ionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)	
Middle of Broad Slough, West end (804)	898	21.6	8.13	8.4	0.001
Montezuma Slough @ Nurse Slough (609)	7660	-	7.85	7.9	0.001
Grizzly Bay @ Dolphin (602)	15030	20.0	7.96	8.6	0.003
Carquinez Strait, West of Benicia army dock (405)	21930	20.0	7.95	8.3	0.003
Suisun Bay, East of middle point (504)	7150	21.0	8.03	8.6	0.003
Suisun Bay, off Chipps Island (508)	4776	21.0	7.96	8.5	0.002
Sacramento R., across from Sherman Lake (704)	480	21.1	7.97	8.7	0.004

Table A81-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 07/12/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/10/07.

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH			Max pH
DIEPAMHR	337	23.8	24.6	6.8	8.0	7.48	8.18	104	60
DIEPAMHR + organic matter	340	23.0	24.6	6.7	8.5	7.41	8.12	-	-
High EC Control @ 15.4 mS/cm	14275	24.0	24.5	6.4	8.5	7.38	7.84	860	78
High EC Control @ 22.75 mS/cm	21070	23.0	24.6	6.6	8.6	7.48	7.89	1300	85
Middle of Broad Slough, West end (804)	934	24.1	24.6	6.8	8.6	7.51	8.00	120	60
Montezuma Slough @ Nurse Slough (609)	7125	24.3	24.6	6.9	8.8	7.54	7.76	180	60
Grizzly Bay @ Dolphin (602)	12935	23.9	24.6	6.6	8.0	7.41	7.75	1640	100
Carquinez Strait, West of Benicia army dock (405)	19135	22.7	24.2	7.0	7.7	7.40	7.80	2480	80
Suisun Bay, East of middle point (504)	6770	24.1	24.7	6.9	8.9	7.57	7.97	760	50
Suisun Bay, off Chipps Island (508)	4598	24.1	24.7	6.8	8.6	7.52	7.83	440	70
Sacramento R., across from Sherman Lake (704)	557	24.0	24.7	6.5	8.4	7.50	8.02	112	52
DIEPAMHR + 25 ppb PBO	347	22.7	23.0	6.7	8.4	7.51	8.28	-	-
DIEPAMHR + organic matter + 25 ppb PBO	338	22.6	23.2	7.0	8.4	7.62	8.21	-	-
High EC Control @ 15.4 mS/cm + 25 ppb PBO	14235	22.7	23.4	6.6	8.2	7.34	7.94	-	-
High EC Control @ 22.75 mS/cm + 25 ppb PBO	21315	23.0	23.5	7.0	7.7	7.43	7.92	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	4866	23.5	23.7	7.5	8.6	7.66	8.12	-	-
Montezuma Slough @ Nurse Slough (609) + 25 ppb PBO	7370	23.7	23.7	8.1	8.1	7.98	7.98	-	-
Grizzly Bay @ Dolphin (602) + 25 ppb PBO	13655	23.1	23.8	6.7	7.9	7.39	7.80	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	21010	23.2	24.1	7.0	7.8	7.48	7.81	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	6795	22.9	24.0	6.9	8.1	7.51	8.02	-	-
Suisun Bay, off Chipps Island (508) + 25 ppb PBO	4543	23.4	24.1	6.7	8.2	7.49	7.98	-	-
Sacramento R., across from Sherman Lake (704) + 25 ppb PBO	480	24.1	24.1	8.3	8.3	8.05	8.05	-	-

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Table A82-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 07/13/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	95	3.1	98	2.5	NS
DIEPAMHR + organic matter	97	2.8	95	5.0	NS
Sacramento R. Deep Water Channel, Light 55	98	2.5	98	2.5	NS
Old River at Holland Cut (915)	98	2.5	98	2.5	NS
San Joaquin R. West of Oulton Point (812)	95	2.9	98	2.5	NS
San Joaquin R. between Hog and Turner Cuts (910)	95	2.9	95	2.9	NS
Old River, Western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Sacramento R. at tip of Grand Island (711)	95	2.9	98	2.5	NS

	MSD	PMSD
One-way ANOVA	12.23	12.58
Two-way ANOVA	14.00	14.56

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.044	0.001	0.049	0.002	NS
DIEPAMHR + organic matter	0.069	0.003	0.070	0.007	NS
Sacramento R. Deep Water Channel, Light 55	0.098	0.015	0.098	0.008	NS
Old River at Holland Cut (915)	0.107	0.009	0.102	0.004	NS
San Joaquin R. West of Oulton Point (812)	0.094	0.006	0.090	0.009	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.107	0.005	0.093	0.005	NS
Old River, Western arm at railroad bridge (902)	0.093	0.002	0.096	0.008	NS
Sacramento R. at tip of Grand Island (711)	0.078	0.006	0.074	0.008	NS

	MSD	PMSD
One-way ANOVA	0.03	49.47
Two-way ANOVA	0.04	51.40

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A82-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/07.

Treatment	Field Chemistry				Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)		
Sacramento R. Deep Water Channel, Light 55	249	22.0	8.29	8.2	0.070	0.005
Old River at Holland Cut (915)	246	22.0	8.21	7.6	0.060	0.004
San Joaquin R. West of Oulton Point (812)	242	21.8	8.18	8.4	0.070	0.004
San Joaquin R. between Hog and Turner Cuts (910)	284	23.6	8.00	6.8	0.060	0.003
Old River, Western arm at railroad bridge (902)	352	20.8	8.26	7.9	0.080	0.005
Sacramento R. at tip of Grand Island (711)	126	21.5	8.03	8.2	0.180	0.008

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Table A82-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 7/13/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	348	23.6	24.6	6.1	8.4	7.42	7.87	104	60	-
DIEPAMHR + organic matter	350	23.5	24.4	6.7	8.5	7.44	7.94	104	60	-
Sacramento R. Deep Water Channel, Light 55	257	23.8	24.6	6.2	8.5	7.48	7.86	78	75	0.002
Old River at Holland Cut (915)	260	23.7	24.4	6.3	8.8	7.51	7.76	62	62	0.002
San Joaquin R. West of Oulton Point (812)	223	23.6	24.4	6.3	8.6	7.36	7.74	58	56	0.002
San Joaquin R. between Hog and Turner Cuts (910)	298	23.4	24.6	6.2	8.4	7.39	7.67	80	67	0.001
Old River, Western arm at railroad bridge (902)	299	23.8	24.4	6.4	8.4	7.40	7.66	66	59	0.002
Sacramento R. at tip of Grand Island (711)	139	23.5	24.6	5.9	8.4	7.38	7.61	52	55	0.003
DIEPAMHR + 25 ppb PBO	349	22.9	24.4	6.6	8.3	7.43	7.97	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	345	23.0	24.4	6.4	8.3	7.42	7.93	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	255	23.0	24.4	6.6	8.9	7.53	7.99	-	-	-
Old River at Holland Cut (915) + 25 ppb PBO	257	22.8	24.7	6.6	8.8	7.45	7.85	-	-	-
San Joaquin R. West of Oulton Point (812) + 25 ppb PBO	219	22.9	24.4	6.2	8.9	7.36	7.81	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	295	22.8	24.3	6.3	8.7	7.40	7.70	-	-	-
Old River, Western arm at railroad bridge (902) + 25 ppb PBO	294	22.9	24.4	6.4	8.5	7.36	7.76	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	141	22.8	24.4	6.2	8.5	7.46	7.74	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A83-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 07/26/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	100	0.0	NS
DIEPAMHR + organic matter	95	2.9	95	2.9	NS
High EC Control @ 14.5 mS/cm	72	7.3	54	8.2	NS
High EC Control @ 21.81 mS/cm	49	7.6	25	12.6	NS
Montezuma Slough at Nurse Slough (609)	70	23.5	100	0.0	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	95	2.9	100	0.0	NS
Suisun Bay, East of middle point (504)	90	4.1	95	2.9	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	95	5.0	90	7.1	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	59	7.2	33	14.9	NS
Suisun Bay off Chipps Island (508)	93	2.4	100	0.0	NS

	MSD	PMSD
One-way ANOVA	41.3	43.5
Two-way ANOVA	27.6	29.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.040	0.007	0.056	0.002	NS
DIEPAMHR + organic matter	0.080	0.003	0.063	0.006	NS
High EC Control @ 14.5 mS/cm	0.047	0.007	0.046	0.004	NS
High EC Control @ 21.81 mS/cm	0.027	0.002	0.023	0.010	NS
Montezuma Slough at Nurse Slough (609)	0.052	0.001	0.077	0.005	NS
Middle of Broad Slough, West end (804)	0.056	0.013	0.087	0.008	NS
Sacramento R. across from Sherman Lake (704)	0.086	0.004	0.079	0.005	NS
Suisun Bay, East of middle point (504)	0.054	0.003	0.058	0.013	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	0.055	0.005	0.058	0.011	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	0.039	0.005	0.039	0.007	NS
Suisun Bay off Chipps Island (508)	0.051	0.005	0.050	0.006	NS

	MSD	PMSD
One-way ANOVA	0.029	36.1
Two-way ANOVA	0.036	44.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

3. This high conductivity sample was compared to the High EC control @ 14.5 mS/cm.

4. This high conductivity sample was compared to the High EC control @ 21.81 mS/cm.

Table A83-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Montezuma Slough at Nurse Slough (609)	8150	22.9	7.73	8.2	12.7	0.010	0.000
Middle of Broad Slough, West end (804)	1087	22.0	8.01	8.3	8.3	0.030	0.001
Sacramento R. across from Sherman Lake (704)	159	22.0	7.96	8.7	9.6	0.040	0.002
Suisun Bay, East of middle point (504)	9270	22.6	7.85	8.5	12.7	0.000	0.000
Grizzly Bay at Dolphin (602)	14230	22.3	7.83	8.3	15.9	0.010	0.000
Carquinez Strait, West of Benicia army dock (405)	21500	21.5	7.81	8.2	7.5	0.030	0.001
Suisun Bay off Chipps Island (508)	5030	22.6	7.89	8.4	9.0	0.010	0.000

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Table A83-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 7/26/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	342.3	23.6	23.8	6.4	8.1	7.59	8.06	108	59	-
DIEPAMHR + organic matter	345	23.7	23.9	6.5	8.3	7.52	8.04	108	59	-
High EC Control @ 14.5 mS/cm	13260	23.7	23.9	6.4	8.3	7.44	7.76	-	-	-
High EC Control @ 21.81 mS/cm	20275	23.7	23.9	6.5	8.2	7.55	7.75	-	-	-
Montezuma Slough at Nurse Slough (609)	7605	23.4	23.8	6.6	8.4	7.62	7.77	760	95	0.000
Middle of Broad Slough, West end (804)	1067	23.8	23.8	6.5	8.9	7.52	7.78	144	60	0.001
Sacramento R. across from Sherman Lake (704)	201.25	23.7	23.9	6.2	8.6	7.48	7.98	56	56	0.002
Suisun Bay, East of middle point (504)	8905	23.8	23.9	6.5	8.2	7.47	7.77	944	74	0.000
Grizzly Bay at Dolphin (602)	13550	23.8	23.8	6.6	8.2	7.48	7.7	1380	82	0.000
Carquinez Strait, West of Benicia army dock (405)	19830	23.8	23.8	6.2	8.5	7.51	7.68	400	94	0.000
Suisun Bay off Chipps Island (508)	4845	23.7	23.9	6.6	8.3	7.47	7.84	532	66	0.000
DIEPAMHR + 25 ppb PBO	463.05	23.3	23.9	6.5	8.2	7.58	8.17	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	353.5	23.1	23.9	6.3	8.3	7.51	8.04	-	-	-
High EC Control @ 14.5 mS/cm + 25 ppb PBO	13215	23.2	23.9	6.5	8.1	7.48	7.81	-	-	-
High EC Control @ 21.81 mS/cm + 25 ppb	20000	23.4	23.9	6.6	7.8	7.58	7.81	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	7510	23.2	23.8	6.2	8.2	7.58	7.86	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	4451.5	23.2	23.8	6.4	8.5	7.53	7.84	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	215.45	23.7	24.2	6.2	8.8	7.5	7.99	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	8765	23.9	24.2	6.3	8.6	7.43	7.63	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	13515	23.8	24.2	6.3	8.8	7.52	7.66	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	20030	23.8	24.2	6.2	8.5	7.54	7.72	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	4911.5	23.8	24.5	6.5	8.9	7.49	7.78	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A84-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 07/27/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07 - 7/26/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	100	0.0	100	0.0	NS
DIEPAMHR + organic matter	98	2.3	100	0.0	NS
High EC Control @ 24.27 mS/cm	83	7.5	77	7.3	NS
Napa River at Riverside Blvd Terminus (340) <sup>3</sup>	67	10.4	44	8.7	S
San Joaquin R., West of Oulton Point (812)	100	0.0	100	0.0	NS
San Joaquin R. between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old River at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
Old River, western arm at railroad bridge (902)	98	2.5	100	0.0	NS
Sacramento R. Deep Water Channel, Light 55	92	5.3	100	0.0	NS
Sacramento R. at tip of Grand Island (711)	98	2.5	95	2.9	NS
Field Dup: Old River, western arm at railroad bridge (902)	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA	21.4	21.9
Two-way ANOVA	21.8	22.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.063	0.004	0.074	0.007	NS
DIEPAMHR + organic matter	0.086	0.013	0.108	0.007	NS
High EC Control @ 24.27 mS/cm	0.073	0.005	0.077	0.015	NS
Napa River at Riverside Blvd Terminus (340) <sup>3</sup>	0.043	0.015	0.084	0.024	NS
San Joaquin R., West of Oulton Point (812)	0.124	0.012	0.118	0.014	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.129	0.008	0.113	0.012	NS
Old River at mouth of Holland Cut (915)	0.136	0.014	0.135	0.009	NS
Old River, western arm at railroad bridge (902)	0.118	0.011	0.128	0.017	NS
Sacramento R. Deep Water Channel, Light 55	0.134	0.016	0.132	0.013	NS
Sacramento R. at tip of Grand Island (711)	0.153	0.005	0.129	0.008	NS
Field Dup: Old River, western arm at railroad bridge (902)	0.117	0.007	-	-	NA

	MSD	PMSD
One-way ANOVA	0.053	62.1
Two-way ANOVA	0.066	76.6

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the High EC control @ 24.27 mS/cm.

Table A84-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25//07- 7/26/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Napa River at Riverside Blvd Terminus (340)	24400	23.8	7.64	6.6	20.6	0.030	0.000
San Joaquin R., West of Oulton Point (812)	281	22.4	7.21	8.4	5.7	0.080	0.021
San Joaquin R. between Hog and Turner Cuts (910)	232	23.8	7.41	7.3	7.5	0.060	0.001
Old River at mouth of Holland Cut (915)	328	23.8	7.39	8.0	5.9	0.040	0.000
Old River, western arm at railroad bridge (902)	397	23.9	7.56	8.4	7.5	0.020	0.000
Sacramento R. Deep Water Channel, Light 55	263	23.1	7.32	8.5	42.2	0.060	0.001
Sacramento R. at tip of Grand Island (711)	142	22.6	7.29	8.1	11.1	0.220	0.002
Field Dup: Old River, western arm at railroad bridge (902)	397	23.9	7.58	8.4	5.8	0.030	0.001

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Table A84-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 07/27/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07 - 7/26/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	348.55	21.5	23.1	6.5	8.3	7.51	8.12	108	59	-
DIEPAMHR + organic matter	346.95	21.5	23.7	6.8	8.3	7.45	8.09	108	59	-
High EC Control @ 24.27 mS/cm	22380	21.5	23.5	6.9	8.2	7.54	7.74	-	-	-
Napa River at Riverside Blvd Terminus (340)	22800	21.5	23.9	6.7	8.0	7.42	7.84	3080	139	0.000
San Joaquin R., West of Oulton Point (812)	273.8	21.4	23.8	6.3	8.8	7.56	7.67	68	57	0.002
San Joaquin R. between Hog and Turner Cuts (910)	237.6	21.4	23.9	6.6	8.5	7.54	7.74	68	63	0.001
Old River at mouth of Holland Cut (915)	330.1	21.4	23.9	6.8	8.5	7.51	7.68	72	59	0.001
Old River, western arm at railroad bridge (902)	384.15	21.4	24.2	6.6	8.7	7.48	7.90	76	58	0.001
Sacramento R. Deep Water Channel, Light 55	207.5	21.4	24.3	6.6	8.5	7.60	7.92	80	75	0.002
Sacramento R. at tip of Grand Island (711)	194.25	21.4	24.2	6.5	8.5	7.47	7.69	52	57	0.003
Field Dup: Old River, western arm at railroad bridge (902)	384.25	21.4	24.2	6.7	8.6	7.47	7.86	68	58	0.001
DIEPAMHR + 25 ppb PBO	327.55	21.4	23.2	6.6	8.2	7.50	8.07	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	331.4	21.4	23.5	6.6	8.4	7.46	8.00	-	-	-
High EC Control @ 24.27 mS/cm + 25 ppb PBO	22050	21.4	23.4	6.7	7.9	7.50	7.74	-	-	-
Napa River at Riverside Blvd Terminus (340) + 25 ppb PBO	22305	21.3	23.3	6.5	8.2	7.45	7.84	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	276.35	21.3	23.1	6.6	8.6	7.52	7.77	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	233	21.3	23.1	6.3	8.5	7.50	7.76	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	330.4	21.2	23.0	6.6	8.4	7.47	7.70	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	373.1	21.0	22.8	6.5	8.5	7.46	7.86	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	219.35	21.0	22.8	6.6	8.7	7.60	7.98	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	195.85	21.4	23.1	6.4	8.7	7.45	7.74	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A85-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 08/09/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/08/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	98	2.5	NS
DIEPAMHR + organic matter	93	4.8	98	2.5	NS
High EC Control @ 11.68 mS/cm	100	0.0	95	3.1	NS
High EC Control @ 15.17 mS/cm	98	2.5	85	6.4	NS
High EC Control @ 23.9 mS/cm	31	6.6	5	5.0	S
Montezuma Slough at Nurse Slough (609)	95	2.9	100	0.0	NS
Middle of Broad Slough, West end (804)	98	2.5	100	0.0	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	87	7.7	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	56	2.4	29	3.2	S
Suisun Bay off Chipps Island (508)	100	0.0	98	2.5	NS
Suisun Bay, East of middle point (504) <sup>5</sup>	95	5.0	92	8.3	NS
Field Duplicate: Suisun Bay, East of middle point (504) <sup>5</sup>	95	5.0	-	-	NA

	MSD	PMSD
One-way ANOVA	20.8	22.5
Two-way ANOVA	21.4	23.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.060	0.004	0.060	0.005	NS
DIEPAMHR + organic matter	0.092	0.005	0.074	0.007	NS
High EC Control @ 11.68 mS/cm	0.065	0.003	0.070	0.005	NS
High EC Control @ 15.17 mS/cm	0.058	0.006	0.048	0.002	NS
High EC Control @ 23.9 mS/cm	0.049	0.002	0.075	-	NA
Montezuma Slough at Nurse Slough (609)	0.087	0.007	0.073	0.008	NS
Middle of Broad Slough, West end (804)	0.082	0.006	0.061	0.010	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	0.058	0.005	0.058	0.005	NS
Carquinez Strait, West of Benicia army dock (405) <sup>4</sup>	0.046	0.004	0.052	0.007	NS
Suisun Bay off Chipps Island (508)	0.063	0.007	0.064	0.007	NS
Suisun Bay, East of middle point (504) <sup>5</sup>	0.064	0.005	0.061	0.004	NS
Field Duplicate: Suisun Bay, East of middle point (504) <sup>5</sup>	0.053	0.002	-	-	NA

	MSD	PMSD
One-way ANOVA	0.025	30.0
Two-way ANOVA	0.031	33.2

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
- This high conductivity sample was compared to the 15.17 mS/cm High EC control.
- This high conductivity sample was compared to the 23.9 mS/cm High EC control.
- This high conductivity sample was compared to the 11.68 mS/cm High EC control.

Table A85-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/08/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Montezuma Slough at Nurse Slough (609)	8970	20.3	7.43	8.3	31.1	0.030	0.000
Middle of Broad Slough, West end (804)	1802	20.7	7.65	8.3	10.5	0.020	0.000
Grizzly Bay at Dolphin (602)	14440	19.4	7.69	8.8	25.2	0.080	0.001
Carquinez Strait, West of Benicia army dock (405)	22310	19.4	7.81	8.5	9.1	0.110	0.002
Suisun Bay off Chipps Island (508)	7140	20.8	7.88	8.7	19.3	0.070	0.002
Suisun Bay, East of middle point (504)	9980	20.5	7.86	8.8	8.6	0.040	0.001
Field Duplicate: Suisun Bay, East of middle point (504)	9980	20.8	7.86	8.8	8.9	0.060	0.001

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Table A85-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 8/09/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/08/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	351	23.4	23.8	6.5	8.4	7.63	8.19	104	57	-
DIEPAMHR + 1% Delta Water Concentrate	347	23.8	23.8	6.2	8.3	7.59	8.21	104	57	-
High EC Control @ 11.68 mS/cm	11300	23.7	23.9	7.0	8.4	7.49	8.01	1360	100	-
High EC Control @ 15.17 mS/cm	14445	23.7	23.8	7.0	8.1	7.55	8.01	1880	120	-
High EC Control @ 23.9 mS/cm	22780	23.8	23.8	6.5	8.1	7.54	8.05	2960	120	-
Montezuma Slough at Nurse Slough (609)	8690	23.8	23.8	6.3	8.3	7.62	7.95	1020	110	0.001
Middle of Broad Slough, West end (804)	1774	23.7	23.8	6.3	8.8	7.57	8.11	80	80	0.001
Grizzly Bay at Dolphin (602)	13945	23.7	23.9	6.5	8.3	7.54	7.87	1760	120	0.002
Carquinez Strait, West of Benicia army dock (405)	21625	23.7	23.9	6.4	8.6	7.52	7.86	2720	140	0.003
Suisun Bay off Chipps Island (508)	3835	23.8	23.8	6.6	8.6	7.51	7.94	152	70	0.003
Suisun Bay, East of middle point (504)	10185	23.7	23.8	6.4	8.5	7.53	7.91	1080	120	0.001
Field Duplicate: Suisun Bay, East of middle point (504)	10500	23.7	23.7	6.3	8.9	7.54	7.87	1240	120	0.002
DIEPAMHR + 25 ppb PBO	354	22.9	23.7	6.7	8.3	7.66	8.21	-	-	-
DIEPAMHR + 1% Delta Water Concentrate + 25 ppb PBO	16284	23.1	23.7	6.6	8.4	7.63	8.22	-	-	-
High EC Control @ 11.68 mS/cm + 25 ppb PBO	10835	23.1	23.7	7.0	8.3	7.55	8.07	-	-	-
High EC Control @ 15.17 mS/cm + 25 ppb PBO	14290	22.7	23.7	7.0	8.4	7.53	8.01	-	-	-
High EC Control @ 23.9 mS/cm + 25 ppb PBO	21790	23.1	23.8	6.9	8.0	7.57	8.00	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	15320	23.0	23.9	6.7	8.7	7.69	7.87	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	5319	23.1	23.9	6.7	8.9	7.59	8.08	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	7670	23.1	24.1	6.3	8.7	7.53	7.89	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	17625	23.0	24.0	6.4	8.3	7.52	7.83	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	6755	23.0	24.0	6.3	8.4	7.59	7.96	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	10190	23.0	24.0	6.7	8.6	7.54	8.89	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A86-1. Survival of *H. azteca* in a Toxicity Identification Evaluation initiated on 8/16/07 examining the cause of toxicity in an ambient water column sample collected at POD site 405 (the Carquinez Strait, West of the Benicia army dock) by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/8/07.<sup>1</sup>

Treatment	% Survival <sup>2</sup>									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
DIEPAMHR	100	100	100	100	100	100	100	100	100	100
DIEPAMHR @ 15°C	100	100	100	100	100	97	97	97	93	93
High EC DIEPAMHR @ 21.16 mS	100	88	80	80	73	65	50	47	31	28
High EC DIEPAMHR @ 15°C	100	93	93	80	57	47	37	30	27	20
High EC DIEPAMHR + MeOH @ 0.5%	100	96	90	90	90	86	76	65	41	34
High EC DIEPAMHR + eluate addback @ 3X	100	73	65	51	41	41	41	35	14	10
High EC DIEPAMHR + 50 ppb PBO	100	96	82	82	71	68	61	54	30	30
High EC DIEPAMHR + 500X esterase	100	92	92	92	92	92	92	92	92	92
High EC DIEPAMHR + 500X BSA	95	72	39	29	29	29	29	24	24	19
DIEPAMHR C8 Blank	97	97	97	90	90	90	90	90	90	90
POD 405	97	97	87	87	83	83	77	77	77	77
POD 405 @ 15°C	97	97	97	83	70	57	57	50	50	47
POD 405 + 50 ppb PBO	96	79	63	63	58	58	58	58	58	58
POD 405 + 500X esterase	83	83	80	80	77	73	73	73	73	73
POD 405 + 500X BSA	100	47	43	27	23	19	19	8	8	0
Sample C8 Rinsate	97	87	87	73	73	73	73	73	73	73

1) Sample was treated through Varian C8 column on 08/14/07.

2) Highlighted cells indicate less than 50% survival of test organisms.

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Table A87-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 08/10/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/09/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	100	0.0	98	2.5	NS
DIEPAMHR + organic matter	98	2.5	93	4.8	NS
San Joaquin R., West of Oulton Point (812)	95	2.9	90	4.1	NS
Old River at mouth of Holland Cut (915)	98	2.5	95	2.9	NS
San Joaquin R., between Hog and Turner Cuts (910)	100	0.0	98	2.5	NS
Old River, western arm at railroad bridge (902)	92	2.6	93	2.5	NS
Sacramento R. at tip of Grand Island (711)	90	7.1	90	5.8	NS
Sacramento R. across from Sherman Lake (704)	98	2.5	98	2.5	NS
Sacramento R. Deep Water Channel, Light 55	95	2.9	98	2.5	NS
Field Duplicate: Old R. at mouth of Holland Cut (915)	100	0.0	-	-	NA

	MSD	PMSD
<b>One-way ANOVA</b>	14.6	15.0
<b>Two-way ANOVA</b>	17.5	18.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		
	mean	se	mean	se	vs Non-PBO <sup>2</sup>
DIEPAMHR	0.076	0.006	0.068	0.007	NS
DIEPAMHR + organic matter	0.081	0.005	0.102	0.013	NS
San Joaquin R., West of Oulton Point (812)	0.111	0.005	0.084	0.005	NS
Old River at mouth of Holland Cut (915)	0.102	0.006	0.106	0.016	NS
San Joaquin R., between Hog and Turner Cuts (910)	0.107	0.014	0.115	0.012	NS
Old River, western arm at railroad bridge (902)	0.092	0.011	0.090	0.008	NS
Sacramento R. at tip of Grand Island (711)	0.099	0.009	0.088	0.010	NS
Sacramento R. across from Sherman Lake (704)	0.101	0.009	0.101	0.008	NS
Sacramento R. Deep Water Channel, Light 55	0.119	0.034	0.095	0.010	NS
Field Duplicate: Old R. at mouth of Holland Cut (915)	0.100	0.009	-	-	NA

	MSD	PMSD
<b>One-way ANOVA</b>	0.064	79.8
<b>Two-way ANOVA</b>	0.063	78.3

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A87-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/09/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
San Joaquin R., West of Oulton Point (812)	360	21.9	7.86	8.5	3.0	0.080	0.002
Old River at mouth of Holland Cut (915)	397	22.8	7.65	8.2	2.8	0.050	0.001
San Joaquin R., between Hog and Turner Cuts (910)	325	24.3	7.54	7.0	4.2	0.050	0.001
Old River, western arm at railroad bridge (902)	576	22.6	7.81	8.9	3.0	0.040	0.001
Sacramento R. at tip of Grand Island (711)	143	22.1	7.86	8.6	2.3	0.200	0.006
Sacramento R. across from Sherman Lake (704)	1603	21.4	7.73	8.7	8.6	0.080	0.002
Sacramento R. Deep Water Channel, Light 55	237	22.3	7.96	8.6	17.5	0.080	0.003
Field Duplicate: Old R. at mouth of Holland Cut (915)	397	22.8	7.65	8.2	2.9	0.040	0.001

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Table A87-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 08/10/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/09/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	350	23.7	23.9	6.3	8.1	7.50	8.13	104	60	-
DIEPAMHR + organic matter	346	23.4	23.8	6.5	8.3	7.49	8.14	104	60	-
San Joaquin R., West of Oulton Point (812)	363	23.8	24.0	6.3	8.6	7.48	7.98	68.0	58.0	0.004
Old River at mouth of Holland Cut (915)	376	23.8	23.8	6.7	8.2	7.53	7.99	108	58	0.002
San Joaquin R., between Hog and Turner Cuts (910)	331	23.8	23.8	6.4	8.8	7.57	7.70	44	70	0.001
Old River, western arm at railroad bridge (902)	574	23.8	23.8	6.6	8.6	7.51	8.11	92	58	0.002
Sacramento R. at tip of Grand Island (711)	155	23.8	23.8	6.3	8.6	7.51	8.14	52	58	0.013
Sacramento R. across from Sherman Lake (704)	1576	23.8	23.9	6.6	8.7	7.48	7.89	192	70	0.003
Sacramento R. Deep Water Channel, Light 55	239	23.8	23.8	6.4	8.2	7.62	8.15	72	60	0.005
Field Duplicate: Old R. at mouth of Holland Cut (915)	385	23.8	23.8	6.4	8.4	7.51	7.86	76	58	0.001
DIEPAMHR + 25 ppb PBO	346	23.7	23.8	6.7	8.2	7.54	8.13	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	344	23.5	23.8	6.6	8.3	7.50	8.09	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	360	23.2	23.8	6.6	8.9	7.51	7.97	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	366	23.2	23.8	6.5	8.4	7.54	7.92	-	-	-
San Joaquin R., between Hog and Turner Cuts (910) + 25 ppb PBO	333	23.2	23.9	6.4	8.4	7.59	7.91	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	571	23.2	23.8	6.5	8.6	7.52	8.11	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	155	23.2	23.9	6.7	8.7	7.62	7.87	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	1558	23.2	24.0	6.8	8.8	7.51	7.97	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	241	23.1	24.2	6.8	8.4	7.65	8.12	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A88-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 8/23/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/22/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
DIEPAMHR + organic matter	90	4.1	92	5.3	NS
High EC Control @ 12.53 mS/cm	100	0.0	90	4.1	NS
High EC Control @ 17.15 mS/cm	93	2.5	100	0.0	NS
High EC Control @ 24.14 mS/cm	75	9.6	48	13.4	NS
Montezuma Slough at Nurse Slough (609)	93	2.4	100	0.0	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	98	2.5	95	2.9	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	83	7.8	82	5.5	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	95	2.9	NS
Middle of Broad Slough, West end (804)	98	2.5	98	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	29	18.2	28	6.5	NS
Suisun Bay off Chipps Island (508)	95	5.0	97	2.8	NS
Field Duplicate: Middle of Broad Slough, West end (804)	98	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA	32.6	36.9
Two-way ANOVA	32.5	36.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.058	0.003	0.043	0.002	NS
DIEPAMHR + organic matter	0.084	0.011	0.078	0.003	NS
High EC Control @ 12.53 mS/cm	0.076	0.004	0.065	0.011	NS
High EC Control @ 17.15 mS/cm	0.065	0.003	0.065	0.004	NS
High EC Control @ 24.14 mS/cm	0.052	0.009	0.055	0.002	NS
Montezuma Slough at Nurse Slough (609)	0.076	0.005	0.067	0.004	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.067	0.001	0.053	0.010	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	0.063	0.005	0.051	0.006	NS
Sacramento R. across from Sherman Lake (704)	0.099	0.011	0.078	0.010	NS
Middle of Broad Slough, West end (804)	0.093	0.014	0.076	0.002	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.031	0.004	0.037	0.011	NS
Suisun Bay off Chipps Island (508)	0.083	0.008	0.070	0.004	NS
Field Duplicate: Middle of Broad Slough, West end (804)	0.071	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.038	45.0
Two-way ANOVA	0.039	47.0

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This high conductivity sample was compared to the 12.53 mS/cm High EC control.
4. This high conductivity sample was compared to the 17.15 uS/cm High EC control.
5. This high conductivity sample was compared to the 24.14 mS/cm High EC control.

Table A88-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/22/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Montezuma Slough at Nurse Slough (609)	10450	24.9	7.02	9.0	12.1	0.010	0.0000
Suisun Bay, East of middle point (504)	12340	22.4	7.02	8.9	6.9	0.030	0.0001
Grizzly Bay at Dolphin (602)	17510	22.7	6.81	8.7	4.8	0.050	0.0001
Sacramento R. across from Sherman Lake (704)	1578	23.7	6.78	8.5	20.9	0.060	0.0002
Middle of Broad Slough, West end (804)	1960	22.6	6.64	8.6	8.1	0.030	0.0001
Carquinez Strait, West of Benicia army dock (405)	23850	22.6	6.73	8.9	10.1	0.140	0.0002
Suisun Bay off Chipps Island (508)	6780	22.3	6.32	8.9	9.5	0.020	0.0000
Field Duplicate: Middle of Broad Slough, West end (804)	-	-	-	-	8.1	-	-

Table A88-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 08/23/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/22/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	389	23.3	24.1	6.1	8.4	7.58	8.11	104	59	-
DIEPAMHR + organic matter	343	23.4	24.1	6.0	8.4	7.57	8.11	104	59	-
High EC Control @ 12.53 mS/cm	11710	23.5	24.1	6.2	8.3	7.46	8.01	-	-	-
High EC Control @ 17.15 mS/cm	15940	23.6	24.1	5.9	8.2	7.44	8.04	-	-	-
High EC Control @ 24.14 mS/cm	22745	23.6	24.0	6.0	8.1	7.49	8.09	2690	92	-
Montezuma Slough at Nurse Slough (609)	9955	23.6	24.0	6.2	8.9	7.68	7.92	1160	96	0.0003
Suisun Bay, East of middle point (504)	11525	23.7	24.0	6.4	8.5	7.56	7.84	1280	76	0.0007
Grizzly Bay at Dolphin (602)	15845	23.8	24.0	6.3	8.6	7.57	7.85	1840	84	0.0012
Sacramento R. across from Sherman Lake (704)	1570	23.7	24.0	5.9	8.4	7.67	8.07	196	64	0.0030
Middle of Broad Slough, West end (804)	1824	23.8	24.1	6.2	8.5	7.59	8.00	212	66	0.0013
Carquinez Strait, West of Benicia army dock (405)	22875	23.8	24.1	6.3	8.7	7.56	7.80	2680	94	0.0027
Suisun Bay off Chipps Island (508)	6595	23.8	24.1	6.1	8.7	7.52	7.91	732	70	0.0006
Field Duplicate: Middle of Broad Slough, West end (804)	1863	23.7	24.1	6.3	8.9	7.57	8.02	216	66	0.0013
DIEPAMHR + 25 ppb PBO	354	23.3	24.1	6.3	8.4	7.59	8.18	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	353	23.4	24.1	6.1	8.4	7.56	8.12	-	-	-
High EC Control @ 12.53 mS/cm + 25 ppb PBO	11555	23.3	24.1	6.3	8.7	7.48	8.01	-	-	-
High EC Control @ 17.15 mS/cm + 25 ppb PBO	15875	23.3	24.1	6.1	8.7	7.49	8.04	-	-	-
High EC Control @ 24.14 mS/cm + 25 ppb PBO	22425	23.3	24.1	5.9	8.5	7.53	8.04	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	9805	23.3	24.1	6.3	8.9	7.69	7.94	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	11430	23.3	24.1	6.3	8.7	7.55	7.86	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	15800	23.3	24.1	6.2	8.5	7.58	7.86	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	1570	23.2	24.1	6.3	8.9	7.64	8.08	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	1581	23.3	24.2	6.3	8.9	7.59	8.01	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	22490	23.4	24.2	6.3	8.9	7.61	7.80	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	6605	23.4	24.4	6.3	8.6	7.59	7.94	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A89-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 8/24/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/23/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	97	2.8	100	0.0	NS
DIEPAMHR + organic matter	100	0.0	100	0.0	NS
San Joaquin R. between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
San Joaquin R. West of Oulton Point (812)	98	2.5	100	0.0	NS
Old R., western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Sacramento R. at tip of Grand Island (711) <sup>3</sup>	88	2.5	98	2.5	NS
Sacramento R. Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Old R. at mouth of Holland Cut (915)	100	0.0	95	2.9	NS

	MSD	PMSD
One-way ANOVA	7.4	7.4
Two-way ANOVA	7.6	7.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.054	0.010	0.043	0.002	NS
DIEPAMHR + organic matter	0.067	0.010	0.072	0.009	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.081	0.013	0.082	0.013	NS
San Joaquin R. West of Oulton Point (812)	0.071	0.002	0.092	0.011	NS
Old R., western arm at railroad bridge (902)	0.119	0.020	0.109	0.011	NS
Sacramento R. at tip of Grand Island (711)	0.070	0.007	0.079	0.005	NS
Sacramento R. Deep Water Channel, Light 55	0.104	0.010	0.115	0.005	NS
Old R. at mouth of Holland Cut (915)	0.096	0.004	0.111	0.007	NS

	MSD	PMSD
One-way ANOVA	0.051	76.5
Two-way ANOVA	0.051	75.9

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable
3. This sample was found to show reduced survival because of the low MSD. This result was found both when the data were analyzed with Tukey's Multiple Comparison Procedure, and when the data were analyzed with USEPA standard statistics.

Table A89-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/23/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
San Joaquin R. between Hog and Turner Cuts (910)	416	25.4	7.12	6.4	6.62	0.040	0.0003
San Joaquin R. West of Oulton Point (812)	585	23.6	7.14	8.4	3.80	0.060	0.0004
Old R., western arm at railroad bridge (902)	735	25.5	8.07	9.2	4.53	0.000	0.0000
Sacramento R. at tip of Grand Island (711)	162	23.6	6.90	7.8	5.74	0.180	0.0007
Sacramento R. Deep Water Channel, Light 55	270	22.9	6.84	8.3	39.80	0.020	0.0001
Old R. at mouth of Holland Cut (915)	603	25.4	7.65	8.6	3.80	0.000	0.0000

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Table A89-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 08/24/2007 of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/23/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	349	23.6	24.2	6.1	8.2	7.54	8.00	104	59	-
DIEPAMHR + organic matter	343	23.2	24.2	6.3	8.3	7.52	8.15	104	59	-
San Joaquin R. between Hog and Turner Cuts (910)	407	23.2	24.2	6.1	8.7	7.59	7.71	100	77	0.001
San Joaquin R. West of Oulton Point (812)	568	23.3	24.2	6.1	8.8	7.48	7.86	96	63	0.002
Old R., western arm at railroad bridge (902)	705	23.2	24.2	6.2	8.8	7.55	8.38	108	61	0.000
Sacramento R. at tip of Grand Island (711)	166	23.3	24.2	5.8	8.6	7.49	7.72	58	66	0.004
Sacramento R. Deep Water Channel, Light 55	267	23.2	24.2	6.0	8.7	7.61	8.05	82	77	0.001
Old R. at mouth of Holland Cut (915)	586	23.3	24.2	6.1	8.7	7.44	8.09	96	62	0.000
DIEPAMHR + 25 ppb PBO	336	22.7	24.2	6.5	8.2	7.57	8.15	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	334	22.7	24.2	6.3	8.3	7.48	8.19	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	401	22.6	24.1	6.2	8.9	7.61	7.79	-	-	-
San Joaquin R. West of Oulton Point (812) + 25 ppb PBO	566	22.6	24.1	6.3	8.8	7.52	7.93	-	-	-
Old R., western arm at railroad bridge (902) + 25 ppb PBO	707	22.7	24.2	6.3	8.9	7.52	8.37	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	163	22.6	24.0	6.0	8.7	7.55	7.76	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	261	22.9	24.3	6.3	8.6	7.65	8.11	-	-	-
Old R. at mouth of Holland Cut (915) + 25 ppb PBO	620	22.9	24.3	6.0	8.6	7.48	8.02	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A90-1. Summary of 10-day *H. azteca* water column toxicity test initiated on 9/5/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/4/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	95	2.9	95	2.9	NS
DIEPAMHR + organic matter	95	5.0	89	7.9	NS
High EC Control @ 12.97 mS/cm	93	4.8	79	7.1	NS
High EC Control @ 17.75 mS/cm	83	11.1	36	10.4	S (43%)
High EC Control @ 24.62 mS/cm	38	9.5	5	2.9	NS
Sacramento R. across from Sherman Lk. (704)	100	0.0	98	2.5	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	100	0.0	92	2.6	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	13	4.8	15	8.7	NS
Suisun Bay, off Chipps Island (508)	100	0.0	95	2.9	NS
Grizzly Bay at dolphin (602) <sup>4</sup>	92	2.7	77	6.1	NS
Montezuma Sl. At Nurse Sl. (609) <sup>3</sup>	98	2.5	93	4.8	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS
Trip Blank (427)	98	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA	24.5	25.8
Two-way ANOVA	28.8	30.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.022	0.005	0.046	0.004	NS
DIEPAMHR + organic matter	0.075	0.007	0.080	0.006	NS
High EC Control @ 12.97 mS/cm	0.070	0.007	0.066	0.006	NS
High EC Control @ 17.75 mS/cm	0.055	0.007	0.038	0.009	NS
High EC Control @ 24.62 mS/cm	0.082	0.015	0.045	0.005	NS
Sacramento R. across from Sherman Lk. (704)	0.076	0.007	0.065	0.005	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.069	0.008	0.055	0.008	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.057	0.022	0.050	0.010	NS
Suisun Bay, off Chipps Island (508)	0.061	0.002	0.079	0.010	NS
Grizzly Bay at dolphin (602) <sup>4</sup>	0.056	0.002	0.061	0.005	NS
Montezuma Sl. At Nurse Sl. (609) <sup>3</sup>	0.073	0.004	0.073	0.005	NS
Middle of Broad Slough, West end (804)	0.073	0.002	0.086	0.007	NS
Trip Blank (427)	0.052	0.004	-	-	NA

	MSD	PMSD
One-way ANOVA	0.039	52.0
Two-way ANOVA	0.040	53.0

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. This high conductivity sample was compared to the 12.97 mS/cm High EC control.
4. This high conductivity sample was compared to the 17.75 mS/cm High EC control.
5. This high conductivity sample was compared to the 24.62 mS/cm High EC control.

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Table A90-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/4/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. across from Sherman Lk. (704)	3180	22.5	7.51	8.1	12.6	0.040	0.000
Suisun Bay, East of middle point (504)	12610	22.2	7.66	8.3	12.3	0.060	0.001
Carquinez Strait, West of Benicia army dock (405)	23880	22.0	7.77	8.5	15.3	0.130	0.002
Suisun Bay, off Chipps Island (508)	7890	22.4	7.63	8.3	8.4	0.060	0.001
Grizzly Bay at dolphin (602)	17950	22.5	7.77	8.5	28.8	0.080	0.001
Montezuma Sl. At Nurse Sl. (609)	11930	23.6	7.59	7.6	18.3	0.090	0.001
Middle of Broad Slough, West end (804)	2444	23.4	7.53	8.0	8.9	0.100	0.001
Trip Blank (427)	336	23.6	8.21	7.9	0.3	0.010	0.001

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Table A90-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 09/05/2007 of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/4/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	352	24.2	24.4	5.7	8.1	7.46	8.15	104	60	-
DIEPAMHR + organic matter	358	24.1	24.5	6.4	8.2	7.58	8.11	104	60	-
High EC Control @ 12.97 mS/cm	12050	24.2	24.5	6.7	7.8	7.55	8.10	1480	120	-
High EC Control @ 17.75 mS/cm	16600	24.3	24.5	6.6	8.7	7.58	8.09	2040	120	-
High EC Control @ 24.62 mS/cm	23205	24.2	24.5	6.4	8.1	7.66	8.11	2840	140	-
Sacramento R. across from Sherman Lk. (704)	3054	24.2	24.5	6.3	8.2	7.62	7.87	360	76	0.001
Suisun Bay, East of middle point (504)	12265	24.2	24.4	6.5	8.8	7.55	7.88	1400	100	0.002
Carquinez Strait, West of Benicia army dock (405)	23390	24.3	24.4	6.3	7.6	7.62	7.84	2800	140	0.003
Suisun Bay, off Chipps Island (508)	8065	24.0	24.4	6.6	8.4	7.66	7.93	960	90	0.002
Grizzly Bay at dolphin (602)	16960	24.3	24.4	6.1	7.9	7.54	7.88	1920	120	0.002
Montezuma Sl. At Nurse Sl. (609)	10920	23.8	24.5	6.3	8.2	7.69	7.82	1320	120	0.002
Middle of Broad Slough, West end (804)	2352	24.1	24.4	6.1	8.3	7.70	8.00	268	70	0.004
Trip Blank (427)	397	24.0	24.5	6.2	8.6	7.64	8.16	108	60	0.001
DIEPAMHR + 25 ppb PBO	357	24.2	24.4	6.1	8.2	7.61	8.14	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	362	22.8	24.4	6.3	8.1	7.62	8.19	-	-	-
High EC Control @ 12.97 mS/cm + 25 ppb PBO	12000	23.1	24.4	6.6	8.3	7.59	8.04	-	-	-
High EC Control @ 17.75 mS/cm + 25 ppb PBO	16410	22.9	24.6	6.5	8.1	7.60	8.06	-	-	-
High EC Control @ 24.62 mS/cm + 25 ppb PBO	22685	22.7	24.5	6.6	8.9	7.69	8.10	-	-	-
Sacramento R. across from Sherman Lk. (704) + 25 ppb PBO	3079.5	22.6	24.5	6.7	8.5	7.74	8.05	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	12010	22.7	24.5	6.5	8.2	7.59	7.93	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	22750	22.6	24.5	6.1	8.3	7.59	7.85	-	-	-
Suisun Bay, off Chipps Island (508) + 25 ppb PBO	7750	22.5	24.5	6.5	8.8	7.65	7.96	-	-	-
Grizzly Bay at dolphin (602) + 25 ppb PBO	16350	22.5	24.5	6.1	8.6	7.56	7.87	-	-	-
Montezuma Sl. At Nurse Sl. (609) + 25 ppb PBO	10910	22.5	24.5	6.5	8.8	7.75	7.76	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	2380	22.5	24.6	6.4	8.9	7.13	7.75	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A91-1. Survival of *H. azteca* in a Phase I Toxicity Identification Evaluation initiated on 9/12/07 examining an ambient water sample collected at POD site 405 by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/04/07.

Treatment	Survival (%)									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
DIEPAMHR	100	100	100	100	100	100	100	100	100	100
DIEPAMHR (ECA) @ 24.62 mS/cm	100	100	93	93	90	83	83	83	80	80
DIEPAMHR + MeOH @ 0.5%	100	100	100	100	87	87	87	87	87	87
DIEPAMHR + eluate addback @ 3x <sup>2</sup>	95	95	95	90	60	50	50	50	50	43
DIEPAMHR (ECA) + 120 mg/L EDTA	100	100	97	97	30	13	7	7	7	7
DIEPAMHR (ECA) + 30 mg/L EDTA	100	97	97	97	53	53	43	40	37	37
DIEPAMHR (ECA) + 7.5 mg/L EDTA	100	100	100	97	83	69	66	62	62	62
DIEPAMHR (ECA) + 2 mg/L STS	100	100	97	97	83	73	59	59	59	59
DIEPAMHR (ECA) + 0.5 mg/L STS	100	100	100	100	52	42	39	28	28	25
DIEPAMHR (ECA) + 0.125 mg/L STS	100	100	97	93	74	56	48	48	48	45
DIEPAMHR (ECA) air stripped	100	100	100	100	60	60	56	56	53	53
DIEPAMHR C8 Blank	100	100	100	100	97	97	97	97	97	97
POD 405 090407	100	100	97	93	93	93	93	90	90	87
POD 405 + 120 mg/L EDTA	100	100	76	76	76	76	76	70	70	70
POD 405 + 30 mg/L EDTA	100	100	100	100	100	100	95	86	86	86
POD 405 + 7.5 mg/L EDTA	100	100	93	93	90	90	90	90	90	90
POD 405 + 2 mg/L STS	100	96	93	93	86	82	79	75	71	71
POD 405 + 0.5 mg/L STS	100	100	97	93	93	93	93	93	90	86
POD 405 + 0.125 mg/L STS	100	100	97	97	88	88	88	88	85	81
POD 405 air stripped	100	100	93	93	93	86	83	78	78	78
POD 405 C8 Rinsate	100	93	89	89	82	82	79	71	71	68

1. Highlighted cells indicate 50% or greater mortality.
2. Sample was eluted through a C8 column on 9/10/07.

Table A92-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 9/6/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/5/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	94	3.4	95	5.0	NS
DIEPAMHR + organic matter	81	9.6	82	8.0	NS
Old R., western arm at railroad bridge (902)	95	2.9	97	3.1	NS
San Joaquin R. between Hog and Turner Cuts (910)	100	0.0	98	2.5	NS
Sacramento R. Deep Water Channel, Light 55	100	0.0	93	7.5	NS
Sacramento R. at tip of Grand Island (711)	83	6.7	87	4.7	NS
Old R. at mouth of Holland Cut (915)	98	2.5	90	10.0	NS
San Joaquin R., West of Oulton Pt. (812)	98	2.5	98	2.5	NS
Sacramento R. at Hood DWR Station	78	7.5	98	2.5	NS
Trip Blank (527)	100	0.0	-	-	NA
Field Dup.: Sacramento R. at Hood DWR Station	88	4.8	-	-	NA
Bottle Blank (227)	92	4.8	-	-	NA

	MSD	PMSD
One-way ANOVA	23.8	29.4
Two-way ANOVA	28.0	34.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.028	0.002	0.050	0.007	NS
DIEPAMHR + organic matter	0.040	0.007	0.061	0.002	NS
Old R., western arm at railroad bridge (902)	0.057	0.005	0.066	0.005	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.066	0.011	0.047	0.006	NS
Sacramento R. Deep Water Channel, Light 55	0.074	0.005	0.090	0.004	NS
Sacramento R. at tip of Grand Island (711)	0.044	0.009	0.056	0.003	NS
Old R. at mouth of Holland Cut (915)	0.050	0.002	0.052	0.009	NS
San Joaquin R., West of Oulton Pt. (812)	0.067	0.007	0.053	0.008	NS
Sacramento R. at Hood DWR Station	0.045	0.003	0.063	0.006	NS
Trip Blank (527)	0.051	0.005	-	-	NA
Field Dup.: Sacramento R. at Hood DWR Station	0.057	0.005	-	-	NA
Bottle Blank (227)	0.043	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.029	72.5
Two-way ANOVA	0.032	79.2

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable

Table A92-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/5/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old R., western arm at railroad bridge (902)	830.0	23.5	8.24	8.3	6.1	0.020	0.001
San Joaquin R. between Hog and Turner Cuts (910)	475.8	24.2	7.31	6.1	8.7	0.050	0.000
Sacramento R. Deep Water Channel, Light 55	265.3	22.9	7.60	7.9	40.0	0.030	0.001
Sacramento R. at tip of Grand Island (711)	173.7	22.4	7.10	7.8	17.9	0.130	0.001
Old R. at mouth of Holland Cut (915)	623.0	23.8	7.78	7.8	4.8	0.000	0.000
San Joaquin R., West of Oulton Pt. (812)	393.9	22.7	7.55	7.8	5.6	0.060	0.001
Sacramento R. at Hood DWR Station	169.6	23.7	7.48	7.9	13.8	0.100	0.001
Trip Blank (527)	371.4	23.4	8.25	8.1	0.7	0.000	0.000
Field Dup.: Sacramento R. at Hood DWR Station	166.2	23.7	7.48	7.6	12.5	0.090	0.001
Bottle Blank (227)	-	-	-	-	0.4	0.000	-

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Table A92-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 09/06/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/5/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	359.2	23.2	23.8	5.8	8.1	7.43	8.04	104	56	-
DIEPAMHR + Organic Matter	354.9	22.9	24.0	5.4	8.3	7.57	8.05	104	56	-
Old R., western arm at railroad bridge (902)	805.0	23.2	23.7	6.4	8.4	7.52	8.10	124	68	0.001
San Joaquin R. between Hog and Turner Cuts (910)	486.5	23.0	23.8	6.1	8.2	7.59	7.74	112	84	0.001
Sacramento R. Deep Water Channel, Light 55	289.7	23.0	23.9	5.9	8.2	7.59	8.04	88	82	0.001
Sacramento R. at tip of Grand Island (711)	173.9	22.9	23.8	6.2	8.3	7.52	7.89	52	68	0.004
Old R. at mouth of Holland Cut (915)	689.5	22.9	23.7	6.3	8.4	7.53	7.92	116	68	0.000
San Joaquin R., West of Oulton Pt. (812)	404.9	23.0	23.7	6.0	8.5	7.51	7.83	92	68	0.002
Sacramento R. at Hood DWR Station	166.0	22.9	23.8	6.2	8.3	7.46	7.84	64	70	0.003
Trip Blank (527)	335.4	22.6	23.7	5.9	8.5	7.39	8.09	100	58	0.000
Field Dup.: Sacramento R. at Hood DWR Station	167.7	22.8	23.8	5.5	8.7	7.37	7.94	60	68	0.003
Bottle Blank (227)	338.9	22.9	23.7	6.0	8.4	7.41	8.12	108	60	0.000
DIEPAMHR + 25 ppb PBO	338.6	22.1	23.9	6.3	8.2	7.44	8.08	-	-	-
DIEPAMHR + Organic Matter 25 ppb PBO	336.2	22.0	23.9	6.3	8.2	7.47	8.07	-	-	-
Old R., western arm at railroad bridge (902) + 25 ppb PBO	770.0	22.0	23.9	6.5	8.6	7.54	8.15	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	451.7	22.1	23.8	6.6	8.4	7.56	7.93	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	266.8	22.0	23.9	6.3	8.7	7.64	8.20	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	162.7	22.2	23.8	6.0	8.3	7.44	7.97	-	-	-
Old R. at mouth of Holland Cut (915) + 25 ppb PBO	684.0	22.1	24.1	6.6	8.7	7.62	8.02	-	-	-
San Joaquin R., West of Oulton Pt. (812) + 25 ppb PBO	395.9	22.0	23.9	6.3	8.6	7.60	7.97	-	-	-
Sacramento R. at Hood DWR Station + 25 ppb PBO	166.8	22.0	24.0	6.1	8.8	7.45	7.93	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A93-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 9/20/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/19/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	95	2.9	100	0.0	NS
DIEPAMHR + organic matter	88	7.5	83	2.5	NS
High EC Control @ 13.15 mS/cm + organic matter	93	2.5	83	7.5	NS
High EC Control @ 16.01 mS/cm + organic matter	84	5.2	77	7.8	NS
High EC Control @ 24.23 mS/cm + organic matter	54	9.1	38	9.3	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	90	7.1	70	20.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	37	5.8	13	4.8	NS
Sacramento R. across from Sherman Lk. (704)	98	2.5	95	2.9	NS
Middle of Broad Sl., West end (804)	98	2.5	97	2.8	NS
Suisun Bay off Chipps Island (508)	98	2.5	90	5.8	NS
Montezuma Sl. at Nurse Sl. (609) <sup>3</sup>	92	4.8	93	4.8	NS
Grizzly Bay at dolphin (602) <sup>4</sup>	87	7.1	90	4.1	NS
Trip Blank (527)	92	2.6	-	-	NA

	MSD	PMSD
One-way ANOVA	26.4	30.2
Two-way ANOVA	36.5	41.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.047	0.002	0.035	0.002	NS
DIEPAMHR + organic matter	0.055	0.007	0.038	0.002	NS
High EC Control @ 13.15 mS/cm + organic matter	0.058	0.006	0.035	0.006	NS
High EC Control @ 16.01 mS/cm + organic matter	0.058	0.004	0.035	0.010	NS
High EC Control @ 24.23 mS/cm + organic matter	0.033	0.002	0.033	0.003	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.055	0.005	0.036	0.008	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.026	0.008	0.042	0.009	NS
Sacramento R. across from Sherman Lk. (704)	0.050	0.004	0.060	0.006	NS
Middle of Broad Sl., West end (804)	0.063	0.007	0.047	0.004	NS
Suisun Bay off Chipps Island (508)	0.051	0.011	0.046	0.003	NS
Montezuma Sl. at Nurse Sl. (609) <sup>3</sup>	0.054	0.003	0.030	0.004	NS
Grizzly Bay at dolphin (602) <sup>4</sup>	0.054	0.004	0.024	0.002	S (44%)
Trip Blank (527)	0.046	0.004	-	-	NA

	MSD	PMSD
One-way ANOVA	0.028	51.1
Two-way ANOVA	0.030	54.4

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the 13.15 mS/cm High EC control.

4. This high conductivity sample was compared to the 16.01 mS/cm High EC control.

5. This high conductivity sample was compared to the 24.23 mS/cm High EC control.

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Table A93-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/19/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	10190	18.5	7.10	9.1	9.5	0.050	0.000
Carquinez Strait, West of Benicia army dock (405)	21750	18.1	7.20	9.1	19.6	0.050	0.000
Sacramento R. across from Sherman Lk. (704)	1708	19.1	7.00	8.9	15.2	0.020	0.000
Middle of Broad Sl., West end (804)	1511	19.8	7.48	8.9	6.3	0.000	0.000
Suisun Bay off Chipps Island (508)	5700	18.4	6.80	8.9	10.0	0.030	0.000
Montezuma Sl. at Nurse Sl. (609)	12340	19.0	7.30	8.8	27.3	0.000	0.000
Grizzly Bay at dolphin (602)	15440	17.9	7.10	9.1	21.9	0.040	0.000
Trip Blank (527)	343	21.4	8.06	8.5	0.2	0.000	0.000

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Table A93-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 09/20/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/19/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	338	22.0	22.2	6.5	8.4	7.52	8.13	104	58	-
DIEPAMHR + organic matter	327	22.2	22.5	6.0	8.6	7.59	8.11	104	58	-
High EC Control @ 13.15 mS/cm + organic matter	11950	22.2	22.7	6.3	8.6	7.46	7.93	1400	74	-
High EC Control @ 16.01 mS/cm + organic matter	14360	22.4	22.6	6.6	8.8	7.55	7.94	1760	74	-
High EC Control @ 24.23 mS/cm + organic matter	22205	22.4	22.7	6.8	8.6	7.64	7.93	2760	88	-
Suisun Bay, East of middle point (504)	9650	22.5	22.8	6.5	8.5	7.51	7.91	1220	78	0.001
Carquinez Strait, West of Benicia army dock (405)	21945	22.4	22.5	6.1	8.4	7.58	7.82	2720	94	0.001
Sacramento R. across from Sherman Lk. (704)	1738	22.5	22.5	6.8	8.7	7.61	8.08	220	72	0.001
Middle of Broad Sl., West end (804)	8012	22.4	22.6	6.5	8.4	7.54	8.12	188	80	0.000
Suisun Bay off Chipps Island (508)	5530	22.1	22.6	6.4	8.7	7.51	7.90	840	76	0.001
Montezuma Sl. at Nurse Sl. (609)	11610	22.3	22.4	6.7	8.6	7.65	7.81	1600	96	0.000
Grizzly Bay at dolphin (602)	14670	22.5	22.6	6.8	8.5	7.62	7.85	2080	82	0.001
Trip Blank (527)	433	22.7	22.7	6.7	8.6	7.51	8.19	104	60	0.000
DIEPAMHR + 25 ppb PBO	413	22.3	22.4	6.6	8.4	7.58	8.13	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	354	22.4	22.6	6.3	8.4	7.42	8.12	-	-	-
High EC Control @ 13.15 mS/cm + organic matter + 25 ppb PBO	11785	22.6	22.8	6.6	8.6	7.46	7.93	-	-	-
High EC Control @ 16.01 mS/cm + organic matter + 25 ppb PBO	14760	22.5	22.8	6.8	8.9	7.53	7.94	-	-	-
High EC Control @ 24.23 mS/cm + organic matter + 25 ppb PBO	21815	22.5	22.6	6.9	8.5	7.66	7.93	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	9750	22.6	22.7	6.8	8.4	7.54	7.95	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	21975	22.5	22.7	6.7	8.6	7.58	7.79	-	-	-
Sacramento R. across from Sherman Lk. (704) + 25 ppb PBO	1770.5	22.7	22.7	6.7	8.5	7.56	8.13	-	-	-
Middle of Broad Sl., West end (804) + 25 ppb PBO	1524.5	22.6	22.6	6.6	8.4	7.57	8.11	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	5595	22.1	22.7	6.7	8.6	7.57	7.91	-	-	-
Montezuma Sl. at Nurse Sl. (609) + 25 ppb PBO	11605	22.5	22.6	6.8	8.5	7.61	7.91	-	-	-
Grizzly Bay at dolphin (602) + 25 ppb PBO	14370	22.5	22.5	6.5	8.5	7.54	7.85	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A94-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 9/20/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/21/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	92	2.6	92	4.8	NS
DIEPAMHR + organic matter	98	2.5	91	6.4	NS
Sacramento R. at tip of Grand Island (711)	93	4.8	88	5.6	NS
Sacramento R. Deep Water Channel, Light 55	92	4.9	95	5.0	NS
Old R. at mouth of Holland Cut (915)	100	0.0	98	2.5	NS
San Joaquin R. between Hog and Turner Cuts (910)	97	3.1	95	2.9	NS
Old R., western arm at railroad bridge (902)	94	5.6	93	4.8	NS
San Joaquin R., West of Oulton Point (812)	98	2.5	100	0.0	NS
Sacramento R. at Hood DWR Station	74	11.7	78	4.3	NS
Trip Blank (427)	98	2.5	-	-	NA
Bottle Blank (227)	92	4.8	-	-	NA

	MSD	PMSD
One-way ANOVA	24.5	25.1
Two-way ANOVA	24.7	25.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.034	0.004	0.036	0.002	NS
DIEPAMHR + organic matter	0.046	0.006	0.046	0.006	NS
Sacramento R. at tip of Grand Island (711)	0.049	0.002	0.048	0.003	NS
Sacramento R. Deep Water Channel, Light 55	0.060	0.007	0.057	0.002	NS
Old R. at mouth of Holland Cut (915)	0.080	0.005	0.052	0.007	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.063	0.006	0.060	0.005	NS
Old R., western arm at railroad bridge (902)	0.072	0.003	0.055	0.006	NS
San Joaquin R., West of Oulton Point (812)	0.067	0.006	0.056	0.006	NS
Sacramento R. at Hood DWR Station	0.054	0.003	0.035	0.004	NS
Trip Blank (427)	0.045	0.003	-	-	NA
Bottle Blank (227)	0.029	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.023	50.7
Two-way ANOVA	0.026	56.0

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A94-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 9/20/07 - 9/21/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. at tip of Grand Island (711)	170.9	18.6	7.40	8.5	6.1	0.180	0.002
Sacramento R. Deep Water Channel, Light 55	286.4	19.0	7.50	8.6	42.2	0.020	0.000
Old R. at mouth of Holland Cut (915)	684.0	19.4	7.40	8.7	4.5	0.000	0.000
San Joaquin R. between Hog and Turner Cuts (910)	454.5	20.5	7.30	7.3	10.5	0.000	0.000
Old R., western arm at railroad bridge (902)	620.0	19.2	8.10	8.9	4.3	0.000	0.000
San Joaquin R., West of Oulton Point (812)	439.7	19.1	7.50	8.7	7.6	0.040	0.000
Sacramento R. at Hood DWR Station	157.1	19.5	8.76	8.6	14.1	0.170	0.029
Trip Blank (427)	310.4	19.7	8.15	8.7	2.0	0.000	0.000
Bottle Blank (227)	-	-	-	-	0.4	-	-

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Table A94-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 08/24/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/23/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	342.6	22.2	22.4	6.0	8.5	7.48	8.07	104	58	-
DIEPAMHR + organic matter	341.2	22.1	22.7	5.9	8.5	7.35	8.14	104	58	-
Sacramento R. at tip of Grand Island (711)	180.9	22.2	23.0	5.4	8.6	7.44	7.84	60	70	0.006
Sacramento R. Deep Water Channel, Light 55	265.1	22.1	22.2	5.8	8.7	7.58	8.04	88	82	0.001
Old R. at mouth of Holland Cut (915)	651.0	22.1	22.8	6.2	8.6	7.55	8.11	108	68	0.000
San Joaquin R. between Hog and Turner Cuts (910)	443.9	22.0	22.9	6.0	8.5	7.59	7.91	112	84	0.000
Old R., western arm at railroad bridge (902)	672.0	22.1	23.1	6.1	8.5	7.51	8.25	108	68	0.000
San Joaquin R., West of Oulton Point (812)	482.9	21.9	23.0	5.9	8.7	7.54	8.16	92	70	0.002
Sacramento R. at Hood DWR Station	163.2	21.9	22.7	5.2	8.7	7.34	7.62	68	66	0.003
Trip Blank (427)	340.8	21.9	22.5	6.6	8.5	7.56	8.15	104	58	0.000
Bottle Blank (227)	337.5	21.9	23.1	6.5	8.4	7.52	8.05	116	60	-
DIEPAMHR + 25 ppb PBO	339.9	21.9	23.2	6.3	8.4	7.53	8.14	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	337.0	21.9	23.2	5.8	8.6	7.48	8.16	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	176.6	21.9	23.2	5.8	8.7	7.49	7.92	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	269.3	21.9	23.3	5.9	8.5	7.65	8.12	-	-	-
Old R. at mouth of Holland Cut (915) + 25 ppb PBO	666.0	21.9	23.4	6.1	8.6	7.56	8.16	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	437.9	21.9	23.5	6.1	8.4	7.61	7.98	-	-	-
Old R., western arm at railroad bridge (902) + 25 ppb PBO	671.5	22.0	23.3	5.9	8.6	7.53	8.24	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	485.6	21.9	23.4	6.2	8.5	7.56	8.06	-	-	-
Sacramento R. at Hood DWR Station + 25 ppb PBO	161.0	21.9	23.3	5.1	8.6	7.35	7.55	116	60	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A95-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/4/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/2/07 - 10/3/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	97	2.8	98	2.5	NS
DIEPAMHR + organic matter	100	0.0	100	0.0	NS
Sacramento R. Deep Water Channel, Light 55	100	0.0	98	2.5	NS
Sacramento R. at tip of Grand Island (711)	100	0.0	100	0.0	NS
San Joaquin R., West of Oulton Point (812)	100	0.0	98	2.5	NS
San Joaquin R. between Hog and Turner Cut (910)	100	0.0	100	0.0	NS
Old R. at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
Old R., western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Sacramento R. at Hood DWR Station	43	7.3	89	4.5	S (207%)
Field Dup: Sacramento R. at tip of Grand Island (711)	100	0.0	-	-	NA
Bottle Blank	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA	11.6	11.6
Two-way ANOVA	12.3	12.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.046	0.006	0.038	0.002	NS
DIEPAMHR + organic matter	0.060	0.008	0.068	0.010	NS
Sacramento R. Deep Water Channel, Light 55	0.064	0.006	0.074	0.005	NS
Sacramento R. at tip of Grand Island (711)	0.067	0.009	0.075	0.001	NS
San Joaquin R., West of Oulton Point (812)	0.075	0.009	0.082	0.006	NS
San Joaquin R. between Hog and Turner Cut (910)	0.055	0.008	0.083	0.005	NS
Old R. at mouth of Holland Cut (915)	0.069	0.004	0.072	0.008	NS
Old R., western arm at railroad bridge (902)	0.068	0.006	0.060	0.006	NS
Sacramento R. at Hood DWR Station	0.093	0.019	0.062	0.006	NS
Field Dup: Sacramento R. at tip of Grand Island (711)	0.076	0.009	-	-	NA
Bottle Blank	0.046	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.044	72.5
Two-way ANOVA	0.041	67.9

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A95-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/2/07 - 10/3/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. Deep Water Channel, Light 55	177	18.2	7.70	8.9	14.8	0.17	0.003
Sacramento R. at tip of Grand Island (711)	158	17.8	7.67	8.9	7.3	0.25	0.004
San Joaquin R., West of Oulton Point (812)	500	18.1	7.87	9.1	6.0	0.07	0.002
San Joaquin R. between Hog and Turner Cut (910)	528	19.7	7.65	7.2	7.2	0.06	0.001
Old R. at mouth of Holland Cut (915)	595	18.6	7.97	9.2	3.8	0.02	0.001
Old R., western arm at railroad bridge (902)	651	18.5	7.88	9.4	7.6	0.03	0.001
Sacramento R. at Hood DWR Station	142	18.6	7.23	8.7	6.9	0.31	0.002
Field Dup: Sacramento R. at tip of Grand Island (711)	158	17.8	7.67	8.9	7.6	0.23	0.003
Bottle Blank	-	-	-	-	0.3	-	-

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Table A95-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/04/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/02/07- 10/03/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	350	22.2	22.2	6.5	8.6	7.50	8.19	102	58	-
DIEPAMHR + organic matter	337	22.1	22.5	6.7	8.6	7.50	8.06	102	58	-
Sacramento R. Deep Water Channel, Light 55	183	22.2	23.0	6.0	8.5	7.49	7.82	66	70	0.005
Sacramento R. at tip of Grand Island (711)	164	22.1	23.1	6.3	8.5	7.50	7.91	54	63	0.009
San Joaquin R., West of Oulton Point (812)	488	22.2	23.1	6.4	8.6	7.53	7.87	90	68	0.002
San Joaquin R. between Hog and Turner Cut (910)	508	22.5	23.0	6.5	8.6	7.65	7.79	122	93	0.002
Old R. at mouth of Holland Cut (915)	575	22.4	23.2	6.8	8.8	7.58	8.01	100	71	0.001
Old R., western arm at railroad bridge (902)	615	22.3	22.9	6.6	8.8	7.58	8.08	100	70	0.002
Sacramento R. at Hood DWR Station	144	22.4	22.9	6.2	8.7	7.29	7.73	60	61	0.008
Field Dup: Sacramento R. at tip of Grand Island (711)	166	22.4	22.9	6.4	8.8	7.51	7.86	56	64	0.007
Bottle Blank	337	22.3	22.9	6.8	8.7	7.52	8.04	100	58	0.000
DIEPAMHR + 25 ppb PBO	333	22.5	22.7	7.0	8.4	7.54	8.07	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	328	22.4	22.8	6.8	8.6	7.46	8.04	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	182	22.3	22.8	6.2	8.7	7.50	7.89	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	163	22.4	22.8	6.3	8.7	7.45	7.87	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	490	22.4	22.4	6.7	8.9	7.52	7.91	-	-	-
San Joaquin R. between Hog and Turner Cut (910) + 25 ppb PBO	501	22.3	22.7	6.9	8.9	7.72	7.86	-	-	-
Old R. at mouth of Holland Cut (915) + 25 ppb PBO	572	22.3	22.5	6.5	8.8	7.55	8.02	-	-	-
Old R., western arm at railroad bridge (902) + 25 ppb PBO	602	22.4	22.7	6.7	8.8	7.57	8.06	-	-	-
Sacramento R. at Hood DWR Station + 25 ppb PBO	144	22.4	23.1	6.3	8.6	7.29	7.73	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A96-1. Survival of *H. azteca* in a Phase I Toxicity Identification Evaluation initiated on 10/21/07 examining causes of toxicity in an ambient water column sample collected at the HOOD DWR Station on the Sacramento River by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/02/07.<sup>1</sup>

Treatment	Mean Survival (%) <sup>2</sup>									
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
DIEPAMHR	100	100	100	100	100	100	83	83	83	83
DIEPAMHR (HA) @ 60 mg/L	100	100	100	100	100	100	100	100	100	100
DIEPAMHR (HA) + MeOH @ 0.5%	100	100	100	100	100	97	90	90	90	90
DIEPAMHR (HA) + eluate addback @ 3x	100	100	100	100	100	100	100	90	90	90
DIEPAMHR (HA) + eluate addback @ 1x	100	100	100	100	100	100	100	97	93	87
DIEPAMHR C8 Blank	100	100	100	100	100	100	100	100	100	100
POD Hood 100207	97	97	97	97	97	97	97	97	97	97
POD Hood C8 Rinsate	100	100	100	100	100	100	100	100	100	100

1. Sample was treated through Varian C8 column on 10/19/07.
2. Highlighted cells indicate less than 50% survival of test organisms.

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Table A96-2. Water chemistry measured during a 10 day *H. azteca* Phase I Toxicity Identification Evaluation initiated on 10/21/07 examining causes of toxicity in an ambient water column sample collected 10/02/07 at the Hood DWR Station on the Sacramento River.

Treatment	Mean EC (uS/cm)	Min Temp	Max Temp	Min DO	Max DO	Min pH	Max pH
DIEPAMHR	370.9	21.3	21.3	6.9	8.6	7.55	7.65
DIEPAMHR (HA) @ 60 mg/L	235.9	21.0	21.0	6.5	8.6	7.27	7.5
DIEPAMHR (HA) + MeOH @ 0.5%	212.5	21.5	21.5	1.2	8.6	6.90	7.09
DIEPAMHR (HA) + eluate addback @ 3x	218.6	21.3	21.3	1.2	8.6	6.92	7.12
DIEPAMHR (HA) + eluate addback @ 1x	223.5	21.3	21.3	5.4	8.6	7.06	7.37
DIEPAMHR C8 Blank	379.4	21.4	21.4	6.8	8.6	7.55	7.63
POD Hood 100207	178.9	21.6	21.6	6.4	10.3	7.48	7.58
POD Hood C8 Rinsate	182.9	21.8	21.8	7.0	10.3	7.62	7.64

Table A97-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/5/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/4/07 - 10/5/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
DIEPAMHR + organic matter	100	0.0	100	0.0	NS
High EC Control @ 13.99 mS/cm + organic matter	100	0.0	98	2.5	NS
High EC Control @ 18.51 mS/cm + organic matter	100	0.0	95	3.1	NS
High EC Control @ 25.40 mS/cm + organic matter	98	2.5	97	2.8	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	76	5.0	77	4.6	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	100	0.0	95	5.0	NS
Sacramento R. across from Sherman Lake (704)	98	2.5	98	2.5	NS
Suisun Bay off Chipps Island (508)	90	4.1	100	0.0	NS
Montezuma Sl. At Nurse Sl. (609) <sup>3</sup>	100	0.0	100	0.0	NS
Middle of Broad Sl., West end (804)	98	2.5	100	0.0	NS
Pachecco Creek Outflow (409) <sup>5,6</sup>	78	9.5	25	6.2	S (32%)
Suisun Bay, East of middle point (504) <sup>3</sup>	100	0.0	98	2.5	NS
Trip Blank (427)	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA	16.5	16.5
Two-way ANOVA	17.6	17.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.042	0.009	0.042	0.004	NS
DIEPAMHR + organic matter	0.070	0.006	0.078	0.009	NS
High EC Control @ 13.99 mS/cm + organic matter	0.044	0.009	0.058	0.007	NS
High EC Control @ 18.51 mS/cm + organic matter	0.034	0.005	0.047	0.009	NS
High EC Control @ 25.40 mS/cm + organic matter	0.024	0.007	0.038	0.005	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.050	0.006	0.048	0.003	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	0.038	0.006	0.042	0.006	NS
Sacramento R. across from Sherman Lake (704)	0.040	0.011	0.050	0.007	NS
Suisun Bay off Chipps Island (508)	0.050	0.004	0.049	0.006	NS
Montezuma Sl. At Nurse Sl. (609) <sup>3</sup>	0.050	0.004	0.035	0.010	NS
Middle of Broad Sl., West end (804)	0.077	0.005	0.077	0.007	NS
Pachecco Creek Outflow (409) <sup>5,6</sup>	0.039	0.004	0.110	0.033	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.052	0.005	0.070	0.010	NS
Trip Blank (427)	0.040	0.007	-	-	NA

	MSD	PMSD
One-way ANOVA	0.033	47.5
Two-way ANOVA	0.051	73.8

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. This high conductivity sample was compared to the 13.99 mS/cm High EC control.
4. This high conductivity sample was compared to the 18.51 mS/cm High EC control.
5. This high conductivity sample was compared to the 25.40 mS/cm High EC control.
6. This was a permethrin spiked sample. See Table A97-2.

Table A97-2. Summary of a blind spike in a 10-day *H. azteca* water column toxicity test initiated on 10/5/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/4/07 - 10/5/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
DIEPAMHR + organic matter	100	0.0	100	0.0	NS
High EC Control @ 18.51 mS/cm + organic matter	100	0.0	95	3.1	NS
High EC Control @ 25.40 mS/cm + organic matter	98	2.5	97	2.8	NS
Permethrin Spike @ 23 mS/cm <sup>3</sup>	78	9.5	25	6.2	S (32%)

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.042	0.009	0.042	0.004	NS
DIEPAMHR + organic matter	0.070	0.006	0.078	0.009	NS
High EC Control @ 18.51 mS/cm + organic matter	0.034	0.005	0.047	0.009	NS
High EC Control @ 25.40 mS/cm + organic matter	0.024	0.007	0.038	0.005	NS
Permethrin Spike @ 23 mS/cm <sup>3,4</sup>	0.039	0.004	0.110	0.033	S (282%)

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. This high conductivity sample was compared to the 25.40 mS/cm High EC control.
4. The significant increase in weight with PBO addition may be an artifact of scale imprecision, since 3 of the replicates of this treatment showed low weights, and 1 replicate containing 1 animal was found to be very heavy.

Table A97-3. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/4/07 - 10/5/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Carquinez Strait, West of Benicia army dock (405)	23670	17.3	7.71	9.5	31.0	0.1	0.0011
Grizzly Bay at Dolphin (602)	17920	17.3	7.71	9.2	28.6	0.11	0.0012
Sacramento R. across from Sherman Lake (704)	2733	18.1	7.84	9.5	19.3	0.06	0.0012
Suisun Bay off Chipps Island (508)	6410	17.6	7.77	9.2	6.7	0.07	0.0010
Montezuma Sl. At Nurse Sl. (609)	13390	18.2	7.58	8.8	10.3	0.01	0.0001
Middle of Broad Sl., West end (804)	1972	18.4	7.92	9.4	8.2	0.05	0.0012
Suisun Bay, East of middle point (504)	10900	17.4	7.75	9.1	7.7	0.06	0.0008
Trip Blank (427)	337	20.7	8.12	8.7	0.1	0.01	0.0005

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Table A97-4. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/5/07 of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/4/07 - 10/5/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	357	21.6	22.6	6.8	8.3	7.59	8.23	102	58	-
DIEPAMHR + organic matter	356	21.7	22.0	6.6	8.5	7.57	8.11	102.0	58.0	-
High EC Control @ 13.99 mS/cm + organic matter	12930	21.7	22.7	6.7	8.4	7.47	7.95	1560	80	-
High EC Control @ 18.51 mS/cm + organic matter	16780	21.7	22.4	6.9	8.1	7.63	7.98	2200	84	-
High EC Control @ 25.40 mS/cm + organic matter	22850	21.6	22.3	7.0	8.3	7.68	7.97	2960	94	-
Carquinez Strait, West of Benicia army dock (405)	21840	21.7	22.6	6.3	8.7	7.52	7.81	2880	100	0.002
Grizzly Bay at Dolphin (602)	16870	21.7	23.2	6.7	8.7	7.59	7.90	2040	94	0.003
Sacramento R. across from Sherman Lake (704)	2696	21.7	23.0	6.5	8.5	7.64	8.10	320	78	0.003
Suisun Bay off Chipps Island (508)	6160	21.6	23.1	6.7	8.8	7.56	7.97	960	82	0.002
Montezuma Sl. At Nurse Sl. (609)	12805	21.7	23.1	6.5	8.6	7.62	7.87	1880	98	0.000
Middle of Broad Sl., West end (804)	1890	21.7	23.0	6.5	8.9	7.63	8.16	236	76	0.003
Pacheco Creek Outflow (409)	23140	21.8	23.3	6.8	8.8	7.66	7.89	3600	110	0.000
Suisun Bay, East of middle point (504)	10730	21.7	22.1	6.5	8.4	7.61	7.92	1520	88	0.002
Trip Blank (427)	342	21.6	22.8	6.3	8.8	7.66	8.24	112	64	0.001
DIEPAMHR + 25 ppb PBO	341	21.6	22.8	6.2	8.6	7.64	8.16	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	337	21.6	22.9	6.2	8.5	7.60	8.13	-	-	-
High EC Control @ 13.99 mS/cm + organic matter + 25 ppb PBO	71925	21.7	22.9	7.0	8.8	7.55	7.95	-	-	-
High EC Control @ 18.51 mS/cm + organic matter + 25 ppb PBO	18320	21.7	22.7	6.7	8.8	7.58	7.97	-	-	-
High EC Control @ 25.40 mS/cm + organic matter + 25 ppb PBO	22420	21.7	22.9	6.8	8.3	7.65	7.95	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	22445	21.5	22.9	6.4	8.1	7.50	7.82	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	16845	21.5	23.0	6.8	8.7	7.56	7.90	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	2654.5	21.6	23.1	6.4	8.4	7.58	8.15	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	6040	21.6	22.9	6.8	8.5	7.55	7.95	-	-	-
Montezuma Sl. At Nurse Sl. (609) + 25 ppb PBO	12710	21.5	22.9	6.6	8.3	7.58	7.83	-	-	-
Middle of Broad Sl., West end (804) + 25 ppb PBO	1855	21.5	22.8	6.6	8.9	7.58	8.06	-	-	-
Pacheco Creek Outflow (409) + 25 ppb PBO	23135	21.6	23.1	6.5	8.0	7.61	7.86	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	10665	21.5	22.9	6.7	8.4	7.56	7.89	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A98-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/18/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/16/07 - 10/17/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	100	0.0	NS
DIEPAMHR + organic matter	97	2.8	100	0.0	NS
Sacramento R. @ Hood DWR Station	86	5.0	84	4.7	NS
Sacramento R. at tip of Grand Island (711)	90	4.1	100	0.0	NS
San Joaquin R., West of Oulton Point (812)	98	2.5	100	0.0	NS
San Joaquin R. between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Old R. at mouth of Holland Cut (915)	98	2.5	98	2.5	NS
Old R. western arm at railroad bridge (902)	100	0.0	98	2.5	NS
Sacramento R. Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Bottle Blank	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA	12.0	12.3
Two-way ANOVA	12.0	12.4

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.046	0.004	0.059	0.005	NS
DIEPAMHR + organic matter	0.056	0.006	0.051	0.005	NS
Sacramento R. @ Hood DWR Station	0.062	0.010	0.056	0.007	NS
Sacramento R. at tip of Grand Island (711)	0.067	0.004	0.065	0.004	NS
San Joaquin R., West of Oulton Point (812)	0.078	0.007	0.065	0.005	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.078	0.004	0.088	0.006	NS
Old R. at mouth of Holland Cut (915)	0.067	0.003	0.088	0.004	NS
Old R. western arm at railroad bridge (902)	0.095	0.005	0.060	0.008	Sig (63%)
Sacramento R. Deep Water Channel, Light 55	0.087	0.007	0.068	0.008	NS
Bottle Blank	0.055	0.007	-	-	NA

	MSD	PMSD
One-way ANOVA	0.030	53.0
Two-way ANOVA	0.032	56.0

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A98-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/16//07- 10/17/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. @ Hood DWR Station	215	17.0	7.30	8.6	3.8	0.370	0.002
Sacramento R. at tip of Grand Island (711)	251	16.4	7.57	9.1	6.2	0.370	0.004
San Joaquin R., West of Oulton Point (812)	832	18.3	7.30	9.2	5.0	0.080	0.000
San Joaquin R. between Hog and Turner Cuts (910)	540	18.4	7.30	8.5	5.9	0.100	0.001
Old R. at mouth of Holland Cut (915)	664	17.9	7.63	9.5	3.8	0.040	0.001
Old R. western arm at railroad bridge (902)	744	17.3	7.76	9.4	4.4	0.030	0.000
Sacramento R. Deep Water Channel, Light 55	354	16.9	7.94	9.4	15.3	0.170	0.004
Bottle Blank	-	-	-	-	0.2	-	-

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Table A98-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/18/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/16/07 - 10/17/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	358	22.8	23.5	6.6	8.4	7.79	8.03	120	60	-
DIEPAMHR + organic matter	361	23.3	23.5	6.7	8.3	7.74	8.07	120	60	-
Sacramento R. @ Hood DWR Station	152	23.6	23.8	5.6	8.6	7.41	7.59	54	59	0.006
Sacramento R. at tip of Grand Island (711)	168	23.6	24.1	6.2	8.5	7.56	7.79	56	58	0.007
San Joaquin R., West of Oulton Point (812)	780	23.7	24.2	6.7	8.7	7.76	7.91	118	67	0.002
San Joaquin R. between Hog and Turner Cuts (910)	464	23.5	23.7	6.6	8.2	7.74	8.04	112	89	0.002
Old R. at mouth of Holland Cut (915)	579	23.7	24.0	6.6	8.7	7.74	7.87	100	69	0.001
Old R. western arm at railroad bridge (902)	659	23.2	23.7	6.6	8.6	7.82	7.92	106	68	0.001
Sacramento R. Deep Water Channel, Light 55	203	23.6	24.0	6.7	8.9	7.77	7.87	66	69	0.005
Bottle Blank	350	23.2	24.0	6.2	8.8	7.72	8.04	106	58	0.000
DIEPAMHR + 25 ppb PBO	355	23.0	23.7	6.8	8.3	7.73	8.05	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	357	23.2	23.6	6.5	8.4	7.80	8.07	-	-	-
Sacramento R. @ Hood DWR Station + 25 ppb PBO	153	23.5	23.9	5.9	8.6	7.50	7.65	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	166	23.8	23.9	6.0	8.6	7.58	7.76	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	781	23.2	23.8	6.5	8.7	7.81	7.90	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	469	23.9	24.1	6.5	8.4	7.77	8.01	-	-	-
Old R. at mouth of Holland Cut (915) + 25 ppb PBO	583	23.4	23.8	6.7	8.7	7.81	7.89	-	-	-
Old R. western arm at railroad bridge (902) + 25 ppb PBO	658	23.1	24.4	6.7	8.6	7.81	7.94	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	203	23.8	24.1	6.4	8.8	7.70	7.85	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A99-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 10/19/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/18/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	98	2.5	NS
DIEPAMHR + organic matter	98	2.5	100	0.0	NS
High EC Control @ 14.97 mS/cm	100	0.0	95	2.9	NS
High EC Control @ 18.62 mS/cm	95	5.0	93	4.8	NS
High EC Control @ 24.20 mS/cm	87	6.3	80	14.1	NS
Montezuma Sl. At Nurse Sl. (609) <sup>3</sup>	98	2.5	100	0.0	NS
Suisun Bay off Chipps Island (508)	100	0.0	97	3.1	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	90	4.1	89	6.1	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	98	2.5	92	2.6	NS
Middle of Broad Sl., West end (804)	100	0.0	100	0.0	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	81	2.8	78	6.3	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
Trip Blank	98	2.5	-	-	NA
Bottle Blank	95	2.9	-	-	NA

	MSD	PMSD
One-way ANOVA	14.9	15.3
Two-way ANOVA	23.0	23.6

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.054	0.009	0.053	0.010	NS
DIEPAMHR + organic matter	0.067	0.007	0.056	0.004	NS
High EC Control @ 14.97 mS/cm	0.081	0.010	0.063	0.008	NS
High EC Control @ 18.62 mS/cm	0.065	0.007	0.063	0.007	NS
High EC Control @ 24.20 mS/cm	0.059	0.002	0.066	0.014	NS
Montezuma Sl. At Nurse Sl. (609) <sup>3</sup>	0.072	0.002	0.077	0.008	NS
Suisun Bay off Chipps Island (508)	0.085	0.011	0.068	0.004	NS
Grizzly Bay at Dolphin (602) <sup>4</sup>	0.063	0.006	0.068	0.008	NS
Suisun Bay, East of middle point (504) <sup>3</sup>	0.066	0.009	0.065	0.008	NS
Middle of Broad Sl., West end (804)	0.079	0.004	0.096	0.003	NS
Carquinez Strait, West of Benicia army dock (405) <sup>5</sup>	0.048	0.006	0.069	0.009	NS
Sacramento R. across from Sherman Lake (704)	0.099	0.007	0.092	0.004	NS
Trip Blank	0.049	0.006	-	-	NA
Bottle Blank	0.043	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.035	52.1
Two-way ANOVA	0.041	60.2

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC control @ 14.97 mS/cm.

4. This high conductivity sample was compared to the High EC control @ 18.62 mS/cm.

5. This high conductivity sample was compared to the High EC control @ 24.20 mS/cm.

Table A99-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/18/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Montezuma Sl. At Nurse Sl. (609)	14420	17.1	7.59	9.6	8.6	0.070	0.001
Suisun Bay off Chipps Island (508)	7590	16.9	7.81	10.2	4.2	0.080	0.001
Grizzly Bay at Dolphin (602)	17620	16.7	7.81	10.4	9.0	0.100	0.001
Suisun Bay, East of middle point (504)	13270	16.9	7.77	10.2	5.5	0.110	0.001
Middle of Broad Sl., West end (804)	1824	17.3	7.85	10.1	4.6	0.060	0.001
Carquinez Strait, West of Benicia army dock (405)	22250	16.6	7.81	10.3	7.0	0.490	0.006
Sacramento R. across from Sherman Lake (704)	3440	17.2	7.81	10.1	8.4	0.000	0.000
Trip Blank	327	21.2	8.02	8.5	0.2	0.000	0.000
Bottle Blank	-	-	-	-	0.3	-	-

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Table A99-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 10/19/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/18/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	352	22.1	23.8	6.7	8.3	7.61	8.02	120	60	-
DIEPAMHR + organic matter	354	22.1	23.7	7.2	8.4	7.68	8.06	120	60	-
High EC Control @ 14.97 mS/cm	13850	22.1	23.8	7.2	8.9	7.25	7.66	1800	82	-
High EC Control @ 18.62 mS/cm	17255	22.1	22.9	6.9	8.4	7.30	7.65	2280	88	-
High EC Control @ 24.20 mS/cm	22585	22.1	23.3	7.1	8.4	7.03	7.65	2880	94	-
Montezuma Sl. At Nurse Sl. (609)	13890	22.1	24.2	7.7	8.9	7.47	7.81	1680	96	0.001
Suisun Bay off Chipps Island (508)	8185	22.1	24.2	7.2	8.8	7.59	7.71	960	82	0.002
Grizzly Bay at Dolphin (602)	17095	22.1	24.3	6.6	8.8	7.57	7.65	2080	92	0.001
Suisun Bay, East of middle point (504)	12050	22.1	23.5	7.0	8.9	7.63	7.68	1440	86	0.002
Middle of Broad Sl., West end (804)	1763	22.1	23.8	6.8	8.9	7.72	7.87	208	72	0.002
Carquinez Strait, West of Benicia army dock (405)	21665	22.1	23.9	6.8	8.4	7.53	7.65	2720	98	0.006
Sacramento R. across from Sherman Lake (704)	3132	22.0	24.4	7.6	8.9	7.76	7.77	356	74	0.002
Trip Blank	354	22.0	23.5	7.0	8.9	7.65	8.05	112	62	0.000
Bottle Blank	356	22.1	23.5	7.3	8.6	7.70	8.05	1120	64	0.000
DIEPAMHR + 25 ppb PBO	346	22.0	23.5	7.0	8.6	7.71	8.03	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	346	22.1	23.9	6.9	8.3	7.64	8.03	-	-	-
High EC Control @ 14.97 mS/cm + 25 ppb PBO	13840	22.1	23.2	7.1	8.7	7.30	7.66	-	-	-
High EC Control @ 18.62 mS/cm + 25 ppb PBO	17290	22.1	23.4	7.2	8.0	7.32	7.65	-	-	-
High EC Control @ 24.20 mS/cm + 25 ppb PBO	22355	22.1	23.6	6.9	8.3	7.10	7.64	-	-	-
Montezuma Sl. At Nurse Sl. (609) + 25 ppb PBO	13875	22.0	23.3	7.1	8.1	7.47	7.77	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	8155	22.0	23.6	7.3	8.8	7.63	7.68	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	16950	22.0	23.7	7.1	8.5	7.58	7.67	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	12170	22.1	23.6	7.4	8.7	7.65	7.70	-	-	-
Middle of Broad Sl., West end (804) + 25 ppb PBO	1738	22.1	23.6	7.4	8.9	7.76	7.87	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	21585	22.0	23.6	7.0	8.2	7.60	7.63	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	3151.5	22.1	23.4	7.2	8.9	7.56	7.80	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A100-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/1/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/30/07 - 10/31/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	98	2.3	NS
DIEPAMHR + organic matter	100	0.0	98	2.3	NS
Sacramento R. at Hood DWR Station	82	2.5	91	5.4	Sig
Sacramento R. Deep Water Channel, Light 55	90	0.0	100	0.0	Sig
San Joaquin R., West of Oulton Point (812)	100	0.0	100	0.0	NS
Old R, at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
Sacramento R. at tip of Grand Island (711)	100	0.0	98	2.5	NS
Old R., western arm at railroad bridge (902)	100	0.0	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
San Joaquin R, between Hog and Turner Cuts (910)	100	0.0	100	0.0	NS
Bottle Blank	100	0.0	-	-	NA
Trip Blank	100	0.0	-	-	NA

	MSD	PMSD
One-way ANOVA	2.6	2.6
Two-way ANOVA	6.1	6.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.038	0.009	0.066	0.003	NS
DIEPAMHR + organic matter	0.057	0.004	0.082	0.002	NS
Sacramento R. at Hood DWR Station	0.049	0.006	0.066	0.003	NS
Sacramento R. Deep Water Channel, Light 55	0.061	0.008	0.077	0.006	NS
San Joaquin R., West of Oulton Point (812)	0.038	0.020	0.078	0.011	NS
Old R, at mouth of Holland Cut (915)	0.060	0.006	0.053	0.012	NS
Sacramento R. at tip of Grand Island (711)	0.084	0.008	0.042	0.002	Sig
Old R., western arm at railroad bridge (902)	0.062	0.009	0.052	0.011	NS
Sacramento R. across from Sherman Lake (704)	0.062	0.003	0.066	0.006	NS
San Joaquin R, between Hog and Turner Cuts (910)	0.063	0.015	0.076	0.006	NS
Bottle Blank	0.055	0.006	-	-	NA
Trip Blank	0.064	0.002	-	-	NA

	MSD	PMSD
One-way ANOVA	0.028	49.3
Two-way ANOVA	0.029	51.6

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.  
Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).  
Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A100-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/30/07 - 10/31/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. at Hood DWR Station	207	18.0	7.11	9.0	7.5	0.440	0.002
Sacramento R. Deep Water Channel, Light 55	247	16.6	7.59	9.5	15.2	0.200	0.002
San Joaquin R., West of Oulton Point (812)	828	16.8	7.84	9.6	4.9	0.070	0.001
Old R, at mouth of Holland Cut (915)	631	17.1	7.70	9.5	3.9	0.070	0.001
Sacramento R. at tip of Grand Island (711)	250	16.5	7.55	9.4	7.0	0.290	0.003
Old R., western arm at railroad bridge (902)	754	17.0	7.39	9.6	2.6	0.050	0.000
Sacramento R. across from Sherman Lake (704)	3816	16.8	7.89	9.7	17.1	0.110	0.002
San Joaquin R, between Hog and Turner Cuts (910)	633	17.0	7.71	9.6	3.9	0.080	0.001
Bottle Blank	-	-	-	-	0.3	0.010	-
Trip Blank	333	10.2	8.04	9.0	0.3	0.010	0.000

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Table A100-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/01/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 10/30/07 - 10/31/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	349	21.5	24.1	7.3	8.6	7.79	8.12	104	59	-
DIEPAMHR + organic matter	348	21.6	23.7	7.3	8.4	7.71	8.06	104	59	-
Sacramento R. at Hood DWR Station	165	21.8	24.5	7.0	8.6	7.54	7.82	56	64	0.015
Sacramento R. Deep Water Channel, Light 55	187	21.5	23.7	6.9	8.4	7.59	8.01	70	74	0.009
San Joaquin R., West of Oulton Point (812)	718	21.6	23.6	7.4	8.5	7.77	7.97	110	68	0.003
Old R, at mouth of Holland Cut (915)	563	21.2	23.4	7.5	8.4	7.80	7.98	98	74	0.003
Sacramento R. at tip of Grand Island (711)	207	21.3	24.5	7.3	8.8	7.60	7.94	66	68	0.012
Old R., western arm at railroad bridge (902)	706	21.0	23.2	7.6	8.4	7.78	8.01	114	71	0.002
Sacramento R. across from Sherman Lake (704)	3752	21.1	24.4	7.5	8.3	7.73	7.92	422	75	0.004
San Joaquin R, between Hog and Turner Cuts (910)	562	20.6	24.3	7.5	8.7	7.90	8.06	134	104	0.003
Bottle Blank	330	21.0	23.6	7.7	8.4	7.80	8.09	106	61	0.001
Trip Blank	348	21.0	24.3	7.7	8.7	7.86	8.07	104	62	0.001
DIEPAMHR + 25 ppb PBO	349	21.4	23.0	7.6	8.3	7.80	8.06	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	352	21.6	23.2	7.5	8.3	7.78	8.08	-	-	-
Sacramento R. at Hood DWR Station + 25 ppb PBO	161	21.2	23.4	7.0	8.2	7.53	7.94	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	187	21.6	23.9	7.6	8.5	7.65	7.97	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	707	21.0	23.1	7.6	8.3	7.75	7.99	-	-	-
Old R, at mouth of Holland Cut (915) + 25 ppb PBO	558	21.1	23.5	7.7	8.5	7.79	8.01	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	203	21.0	23.9	7.4	8.6	7.59	7.86	-	-	-
Old R., western arm at railroad bridge (902) + 25 ppb PBO	702	21.4	23.8	7.7	8.5	7.80	8.01	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	3772	21.5	23.7	7.7	8.4	7.73	7.86	-	-	-
San Joaquin R, between Hog and Turner Cuts (910) + 25 ppb PBO	577	21.5	23.7	7.7	8.7	8.01	8.03	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A101-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/2/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/01/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	97	2.8	98	2.5	NS
DIEPAMHR + organic matter	98	2.5	95	5.0	NS
High EC Control @ 10.21 mS/cm	100	0.0	98	2.3	NS
High EC Control @ 15.65 mS/cm	100	0.0	100	0.0	NS
High EC Control @ 19.7 mS/cm	100	0.0	98	2.3	NS
High EC Control @ 25.31 mS/cm	89	0.6	93	2.5	NS
Carquinez Strait, West of Benicia army dock (405) <sup>6</sup>	75	6.8	81	8.3	NS
Grizzly Bay at Dolphin (602) <sup>5</sup>	88	4.8	95	2.9	NS
Suisun Bay off Chipps Island (508) <sup>3</sup>	98	2.5	100	0.0	NS
Middle of Broad Slough, West end (804)	100	0.0	100	0.0	NS
Montezuma Slough at Nurse Slough (609) <sup>4</sup>	100	0.0	98	2.5	NS
Suisun Bay, East of middle point (504) <sup>5</sup>	100	0.0	98	2.5	NS

	MSD	PMSD
One-way ANOVA	9.9	10.1
Two-way ANOVA	11.8	12.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.038	0.007	0.034	0.006	NS
DIEPAMHR + organic matter	0.031	0.009	0.055	0.007	NS
High EC Control @ 10.21 mS/cm	0.068	0.005	0.073	0.009	NS
High EC Control @ 15.65 mS/cm	0.066	0.008	0.078	0.014	NS
High EC Control @ 19.7 mS/cm	0.041	0.003	0.040	0.004	NS
High EC Control @ 25.31 mS/cm	0.019	0.001	0.046	0.016	NS
Carquinez Strait, West of Benicia army dock (405) <sup>6</sup>	0.018	0.005	0.028	0.002	NS
Grizzly Bay at Dolphin (602) <sup>5</sup>	0.044	0.003	0.049	0.007	NS
Suisun Bay off Chipps Island (508) <sup>3</sup>	0.052	0.008	0.057	0.010	NS
Middle of Broad Slough, West end (804)	0.070	0.004	0.057	0.005	NS
Montezuma Slough at Nurse Slough (609) <sup>4</sup>	0.059	0.004	0.055	0.003	NS
Suisun Bay, East of middle point (504) <sup>5</sup>	0.065	0.005	0.038	0.005	NS

	MSD	PMSD
One-way ANOVA	0.020	63.9
Two-way ANOVA	0.027	87.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. This high conductivity sample was compared to the High EC control @ 10.21 mS/cm.
4. This high conductivity sample was compared to the High EC control @ 15.65 mS/cm.
5. This high conductivity sample was compared to the High EC control @ 19.7 mS/cm.
6. This high conductivity sample was compared to the High EC control @ 25.31 mS/cm.

Table A101-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/01/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Carquinez Strait, West of Benicia army dock (405)	23860	16.4	7.83	10.0	9.5	0.120	0.002
Grizzly Bay at Dolphin (602)	18760	16.3	7.8	10.1	25.9	0.120	0.002
Suisun Bay off Chipps Island (508)	9250	16.7	7.75	10.1	9.8	0.080	0.001
Middle of Broad Slough, West end (804)	2833	16.9	7.82	10.0	6.8	0.060	0.001
Montezuma Slough at Nurse Slough (609)	14840	17.2	7.46	8.9	20.4	0.060	0.000
Suisun Bay, East of middle point (504)	16720	16.6	7.79	10.0	12.6	0.100	0.001

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Table A101-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/02/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/01/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	359	21.1	24.0	7.4	8.4	7.76	8.06	104	59	-
DIEPAMHR + organic matter	358	20.3	24.5	7.8	8.4	7.72	8.01	104	59	-
High EC Control @ 10.21 mS/cm	9785	21.7	23.7	7.2	8.6	7.54	7.85	1120	60	-
High EC Control @ 15.65 mS/cm	14705	20.5	24.3	7.1	8.4	7.52	7.87	1760	80	-
High EC Control @ 19.7 mS/cm	19040	21.1	24.5	7.0	8.5	7.61	7.88	2120	100	-
High EC Control @ 25.31 mS/cm	24420	21.8	24.5	7.2	8.6	7.67	7.89	2800	100	-
Carquinez Strait, West of Benicia army dock (405)	22770	21.5	22.9	6.9	8.4	7.61	7.74	3070	160	0.002
Grizzly Bay at Dolphin (602)	18660	21.5	22.9	7.1	8.8	7.64	7.78	2280	140	0.002
Suisun Bay off Chipps Island (508)	9595	21.9	23.7	7.6	8.6	7.69	7.79	1080	100	0.002
Middle of Broad Slough, West end (804)	2924	22.0	24.3	6.4	8.8	7.75	7.82	332	76	0.002
Montezuma Slough at Nurse Slough (609)	14985	21.6	24.1	7.2	8.5	7.49	7.81	1760	140	0.001
Suisun Bay, East of middle point (504)	17290	22.0	24.5	7.1	8.5	7.66	7.79	1880	140	0.002
DIEPAMHR + 25 ppb PBO	366	22.0	24.2	6.5	8.4	7.81	8.09	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	377	21.9	24.4	6.2	8.8	7.75	8.05	-	-	-
High EC Control @ 10.21 mS/cm + 25 ppb PBO	9965	22.0	24.5	7.5	8.5	7.54	7.84	-	-	-
High EC Control @ 15.65 mS/cm + 25 ppb PBO	15070	22.3	24.5	6.9	8.1	7.56	7.86	-	-	-
High EC Control @ 19.7 mS/cm + 25 ppb PBO	19030	22.4	24.5	7.2	8.3	7.57	7.87	-	-	-
High EC Control @ 25.31 mS/cm + 25 ppb PBO	24220	21.6	24.5	7.0	7.8	7.64	7.88	-	-	-
Carquinez Strait, West of Benicia army dock (405) + 25 ppb PBO	23630	22.7	24.4	7.0	8.0	7.65	7.77	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	18920	22.3	24.5	7.0	8.4	7.62	7.76	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	9575	21.4	24.5	7.2	8.9	7.68	7.78	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	2913	22.7	24.4	7.1	8.9	7.78	7.84	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	14625	22.2	24.5	7.1	8.3	7.50	7.76	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	17165	22.7	24.3	6.9	8.6	7.62	7.81	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A102-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/15/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/13/07 - 11/14/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	98	2.5	NS
DIEPAMHR + organic matter	98	2.5	97	2.8	NS
Sacramento R. at Hood DWR Station	76	3.2	68	4.8	NS
Sacramento R. Deep Water Channel, Light 55	95	2.9	98	2.5	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	98	2.5	NS
Sacramento R. at tip of Grand Island (711)	93	2.5	95	2.9	NS
Bottle Blank	95	5.0	-	-	NA

	MSD	PMSD
One-way ANOVA	13.8	14.1
Two-way ANOVA	13.9	14.3

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.051	0.003	0.048	0.003	NS
DIEPAMHR + organic matter	0.060	0.003	0.055	0.005	NS
Sacramento R. at Hood DWR Station	0.046	0.006	0.057	0.002	NS
Sacramento R. Deep Water Channel, Light 55	0.048	0.003	0.055	0.006	NS
Sacramento R. across from Sherman Lake (704)	0.058	0.009	0.069	0.010	NS
Sacramento R. at tip of Grand Island (711)	0.053	0.007	0.072	0.014	NS
Bottle Blank	0.059	0.008	-	-	NA

	MSD	PMSD
One-way ANOVA	0.028	45.9
Two-way ANOVA	0.033	55.5

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A102-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25//07- 7/26/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. at Hood DWR Station	235	16.4	7.19	9.1	4.6	0.34	0.001
Sacramento R. Deep Water Channel, Light 55	2984	16.4	7.26	9.6	19.7	0.24	0.001
Sacramento R. across from Sherman Lake (704)	2714	16.5	7.34	9.8	18.2	0.13	0.001
Sacramento R. at tip of Grand Island (711)	269	16.9	7.15	9.2	6.5	0.31	0.001
Bottle Blank	-	-	-	-	0.3	0.00	-

Table A102-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/15/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/13/07 - 11/14/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	376	21.7	24.9	7.6	8.6	7.84	8.03	104	60	-
DIEPAMHR + organic matter	381	21.7	25.2	7.9	8.4	7.79	8.05	104	60	-
Sacramento R. at Hood DWR Station	203	21.7	25.3	7.3	8.6	7.69	7.75	72	76	0.010
Sacramento R. Deep Water Channel, Light 55	224	21.6	24.7	7.3	8.6	7.78	7.92	72	74	0.010
Sacramento R. across from Sherman Lake (704)	2838	21.7	24.1	7.9	8.6	7.70	7.84	308	70	0.004
Sacramento R. at tip of Grand Island (711)	205	21.7	24.7	7.7	8.7	7.87	7.94	70	70	0.012
Bottle Blank	374	21.7	24.4	7.9	8.6	7.88	8.02	108	57	0.000
DIEPAMHR + 25 ppb PBO	368	21.0	24.2	7.9	8.4	7.88	8.08	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	375	21.4	24.9	7.9	8.6	7.78	8.06	-	-	-
Sacramento R. at Hood DWR Station + 25 ppb PBO	200	21.9	24.6	7.3	8.6	7.58	7.75	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	226	21.9	24.5	7.6	8.5	7.84	7.87	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	2921	21.7	24.4	7.8	8.4	7.72	7.87	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	215	21.8	24.4	7.6	8.6	7.85	7.92	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A103-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/16/2007 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/15/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	92	2.6	NS
DIEPAMHR + organic matter	100	0.0	98	2.5	NS
High EC Control @ 17.58 mS/cm	20	9.1	25	8.7	NS
High EC Control @ 29.52 mS/cm	18	6.3	8	7.5	NS
Old River at mouth of Holland Cut (915)	98	2.5	95	5.0	NS
Suisun Bay, off Chipps Island (508)	90	4.1	97	2.8	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	77	5.3	78	7.9	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	95	3.1	100	0.0	NS
San Joaquin, between Hog/Turner Cut (910)	93	4.8	95	2.9	NS
Old River, western arm at railroad bridge (902)	100	0.0	95	2.9	NS
San Joaquin, just west of Oulton Point (812)	100	0.0	95	2.9	NS
Middle of Broad Slough, west end (804)	100	0.0	90	7.1	NS
Suisun Bay, east of middle point (504) <sup>3</sup>	89	6.1	95	2.9	NS
Carquinez Straight, just west of Benicia army dock (405) <sup>4</sup>	21	4.3	12	5.1	NS
Trip Blank	95	2.9	-	-	NA

	MSD	PMSD
One-way ANOVA	21.6	21.6
Two-way ANOVA	21.5	21.5

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.039	0.006	0.046	0.003	NS
DIEPAMHR + organic matter	0.043	0.005	0.070	0.006	NS
High EC Control @ 17.58 mS/cm	0.037	0.018	0.041	0.002	NS
High EC Control @ 29.52 mS/cm	0.040	0.010	0.017	-	NA
Old River at mouth of Holland Cut (915)	0.056	0.004	0.050	0.003	NS
Suisun Bay, off Chipps Island (508)	0.034	0.004	0.038	0.006	NS
Grizzly Bay at Dolphin (602) <sup>3</sup>	0.026	0.008	0.027	0.002	NS
Montezuma Slough at Nurse Slough (609) <sup>3</sup>	0.039	0.004	0.050	0.005	NS
San Joaquin, between Hog/Turner Cut (910)	0.041	0.006	0.064	0.001	NS
Old River, western arm at railroad bridge (902)	0.050	0.001	0.056	0.004	NS
San Joaquin, just west of Oulton Point (812)	0.056	0.004	0.055	0.004	NS
Middle of Broad Slough, west end (804)	0.050	0.004	0.053	0.004	NS
Suisun Bay, east of middle point (504) <sup>3</sup>	0.049	0.008	0.032	0.002	NS
Carquinez Straight, just west of Benicia army dock (405) <sup>4</sup>	0.034	0.014	0.073	0.012	NS
Trip Blank (427)	0.040	0.002	-	-	NA

	MSD	PMSD
One-way ANOVA	0.036	83.0
Two-way ANOVA	0.033	78.0

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
3. This high conductivity sample was compared to the High EC control @ 17.58 mS/cm.
4. This high conductivity sample was compared to the High EC control @ 29.52 mS/cm.

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Table A103-2. Summary of water chemistry measurements on samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/15//07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Old River at mouth of Holland Cut (915)	627	17.3	7.11	9.9	3.4	0.04	0.000
Suisun Bay, off Chipps Island (508)	9120	18.9	7.01	9.9	5.8	0.12	0.000
Grizzly Bay at Dolphin (602)	16000	18.4	7.12	9.6	7.0	0.12	0.000
Montezuma Slough at Nurse Slough (609)	15130	18.5	6.89	9.4	18.3	0.08	0.000
San Joaquin, between Hog/Turner Cut (910)	487	17.5	7.08	9.4	3.0	0.04	0.000
Old River, western arm at railroad bridge (902)	644	17.3	7.10	9.8	2.2	0.04	0.000
San Joaquin, just west of Oulton Point (812)	628	16.8	7.18	9.9	5.5	0.10	0.000
Middle of Broad Slough, west end (804)	4316	17.9	7.06	9.9	5.2	0.08	0.000
Suisun Bay, east of middle point (504)	15040	18.4	6.98	10.1	6.1	0.12	0.000
Carquinez Straight, just west of Benicia army dock (405)	28200	17.3	7.29	9.9	6.1	0.13	0.001
Trip Blank (427)	328	20.2	7.69	8.9	0.2	0.00	0.000

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Table A103-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/16/2007 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/15/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	388	21.8	24.1	6.9	8.5	7.76	8.03	104	60	-
DIEPAMHR + organic matter	387	21.8	24.3	6.8	8.6	7.81	8.01	104	60	-
High EC Control @ 17.58 mS/cm	17760	21.8	23.8	7.6	8.8	7.52	7.88	1960	82	-
High EC Control @ 29.52 mS/cm	29610	22.0	23.8	7.3	8.4	7.56	7.81	3440	104	-
Old River at mouth of Holland Cut (915)	606	22.0	23.8	7.7	8.9	7.78	7.96	98	70	0.001
Suisun Bay, off Chipps Island (508)	9710	21.5	22.8	7.9	8.9	7.64	7.74	1100	83	0.002
Grizzly Bay at Dolphin (602)	17125	21.7	23.7	7.5	8.3	7.55	7.73	1900	91	0.001
Montezuma Slough at Nurse Slough (609)	15240	21.8	23.2	7.4	8.7	7.33	7.71	1740	102	0.001
San Joaquin, between Hog/Turner Cut (910)	448	21.8	23.5	7.0	8.6	7.68	7.94	100	79	0.001
Old River, western arm at railroad bridge (902)	672	21.9	24.0	6.9	8.2	7.73	7.88	104	70	0.001
San Joaquin, just west of Oulton Point (812)	679	22.0	24.1	6.8	8.9	7.70	7.85	104	69	0.002
Middle of Broad Slough, west end (804)	3973.5	21.8	24.0	7.9	8.8	7.62	7.75	422	75	0.001
Suisun Bay, east of middle point (504)	14490	21.8	23.4	7.5	8.7	7.50	7.79	1720	90	0.001
Carquinez Straight, just west of Benicia army dock (405)	28260	21.9	23.8	6.9	8.4	7.51	7.72	3240	104	0.001
Trip Blank (427)	364	21.8	23.2	6.8	8.8	7.77	8.00	110	60	0.000
DIEPAMHR+ 25 ppb PBO	372	21.5	23.7	7.8	8.6	7.82	7.94	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	365	21.7	23.8	7.9	8.7	7.86	8.00	-	-	-
High EC Control @ 17.58 mS/cm + 25 ppb PBO	17230	21.5	24.0	7.7	8.5	7.61	7.83	-	-	-
High EC Control @ 29.52 mS/cm + 25 ppb PBO	28845	21.6	23.8	7.5	8.2	7.62	7.85	-	-	-
Old River at mouth of Holland Cut (915) + 25 ppb PBO	566.5	21.8	23.7	7.9	8.8	7.78	7.92	-	-	-
Suisun Bay, off Chipps Island (508) + 25 ppb PBO	9815	21.5	23.9	7.8	8.6	7.58	7.73	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	16945	21.6	23.9	7.4	8.5	7.58	7.78	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	15310	21.7	24.0	7.4	8.3	7.43	7.74	-	-	-
San Joaquin, between Hog/Turner Cut (910) + 25 ppb PBO	462	21.6	23.8	7.4	8.7	7.74	7.96	-	-	-
Old River, western arm at railroad bridge (902) + 25 ppb PBO	667.5	21.7	23.9	7.9	8.9	7.77	7.86	-	-	-
San Joaquin, just west of Oulton Point (812) + 25 ppb PBO	670.5	21.7	23.8	7.7	8.7	7.71	7.85	-	-	-
Middle of Broad Slough, west end (804) + 25 ppb PBO	3985	21.6	23.7	8.0	8.9	7.66	7.85	-	-	-
Suisun Bay, east of middle point (504) + 25 ppb PBO	15240	21.6	23.8	7.5	8.8	7.57	7.78	-	-	-
Carquinez Straight, just west of Benicia army dock (405) + 25 ppb PBO	27915	21.5	23.9	7.3	8.2	7.59	7.75	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A104-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/29/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/27/07 - 11/28/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	98	2.5	98	2.5	NS
DIEPAMHR + organic matter	97	2.8	98	2.5	NS
Sacramento R. at Hood DWR Station	90	7.1	100	0.0	NS
Old R., Western arm at railroad bridge (902)	98	2.5	98	2.5	NS
Sacramento R., across from Sherman Lake (704)	100	0.0	98	2.5	NS
Sacramento R. at tip of Grand Island (711)	85	2.7	83	2.8	NS
Sacramento R. Deep Water Channel, Light 55	82	2.5	75	6.5	NS
San Joaquin R. between Hog and Turner Cuts (910)	98	2.5	100	0.0	NS
Old R. at mouth of Holland Cut (915)	98	2.5	100	0.0	NS
San Joaquin R., West of Oulton Point (812)	100	0.0	100	0.0	NS
Trip Blank	89	0.3	-	-	NA
Bottle Blank	98	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA	14.5	14.9
Two-way ANOVA	15.3	15.8

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.055	0.007	0.053	0.001	NS
DIEPAMHR + organic matter	0.074	0.002	0.067	0.004	NS
Sacramento R. at Hood DWR Station	0.066	0.006	0.060	0.003	NS
Old R., Western arm at railroad bridge (902)	0.080	0.007	0.076	0.003	NS
Sacramento R., across from Sherman Lake (704)	0.064	0.005	0.067	0.006	NS
Sacramento R. at tip of Grand Island (711)	0.058	0.003	0.058	0.004	NS
Sacramento R. Deep Water Channel, Light 55	0.056	0.010	0.067	0.010	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.076	0.007	0.073	0.002	NS
Old R. at mouth of Holland Cut (915)	0.069	0.003	0.072	0.005	NS
San Joaquin R., West of Oulton Point (812)	0.064	0.007	0.072	0.004	NS
Trip Blank	0.059	0.008	-	-	NA
Bottle Blank	0.055	0.003	-	-	NA

	MSD	PMSD
One-way ANOVA	0.031	41.2
Two-way ANOVA	0.029	39.5

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A104-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/27/07 - 11/28/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. at Hood DWR Station	262	13.0	7.16	10.8	4.6	0.37	0.001
Old R., Western arm at railroad bridge (902)	459	14.0	6.91	10.7	3.4	0.10	0.000
Sacramento R., across from Sherman Lake (704)	5050	14.0	7.11	10.6	18.2	0.15	0.000
Sacramento R. at tip of Grand Island (711)	289	13.0	6.90	11.1	6.5	0.25	0.000
Sacramento R. Deep Water Channel, Light 55	336	13.0	6.87	11.3	19.7	0.23	0.000
San Joaquin R. between Hog and Turner Cuts (910)	474	14.2	6.87	10.2	3.4	0.08	0.000
Old R. at mouth of Holland Cut (915)	513	14.1	6.87	10.7	3.4	0.09	0.000
San Joaquin R., West of Oulton Point (812)	743	14.1	6.87	10.6	5.5	0.10	0.000
Trip Blank	348	16.9	8.18	9.5	0.2	0.01	0.000
Bottle Blank	-	-	-	-	0.3	0.00	-

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Table A104-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/29/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/27/07 - 11/28/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	359	21.3	22.4	7.6	8.6	7.74	8.03	112	62	-
DIEPAMHR + organic matter	360	21.9	22.2	7.8	8.8	7.68	8.01	112	62	-
Sacramento R. at Hood DWR Station	214	22.1	23.4	7.0	8.4	7.53	7.88	84	80	0.013
Old R., Western arm at railroad bridge (902)	571	21.8	22.6	7.5	8.2	7.69	7.96	272	76	0.004
Sacramento R., across from Sherman Lake (704)	4960	21.9	22.1	7.6	8.9	7.65	7.78	560	83	0.003
Sacramento R. at tip of Grand Island (711)	226	21.9	22.8	7.4	8.6	7.70	7.99	74	82	0.011
Sacramento R. Deep Water Channel, Light 55	237	21.7	23.0	7.2	8.0	7.74	7.91	82	88	0.008
San Joaquin R. between Hog and Turner Cuts (910)	382	21.8	22.8	7.5	8.1	7.75	8.01	100	81	0.003
Old R. at mouth of Holland Cut (915)	467	22.5	22.7	7.5	8.3	7.75	7.98	96	73	0.004
San Joaquin R., West of Oulton Point (812)	707	22.2	23.2	7.4	8.3	7.72	7.94	112	76	0.004
Trip Blank	357	22.1	22.6	7.6	8.2	7.73	8.05	108	61	0.000
Bottle Blank	360	22.1	22.7	7.7	8.3	7.74	8.04	104	61	0.000
DIEPAMHR + 25 ppb PBO	351	21.8	22.0	7.7	8.4	7.68	8.05	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	354	21.8	22.2	7.6	8.6	7.67	8.02	-	-	-
Sacramento R. at Hood DWR Station + 25 ppb PBO	210	21.8	22.3	6.8	8.3	7.52	7.98	-	-	-
Old R., Western arm at railroad bridge (902) + 25 ppb PBO	556	21.5	22.0	7.5	8.3	7.75	7.99	-	-	-
Sacramento R., across from Sherman Lake (704) + 25 ppb PBO	5060	21.8	22.0	7.6	8.1	7.67	7.81	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	215	22.1	22.2	7.5	8.2	7.75	8.15	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	227	21.9	22.1	7.5	8.7	7.75	8.00	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	374	21.8	21.9	7.5	8.3	7.76	8.02	-	-	-
Old R. at mouth of Holland Cut (915) + 25 ppb PBO	462	21.9	21.9	7.6	8.3	7.79	8.01	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	693	21.7	21.7	7.4	8.5	7.70	7.95	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A105-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 11/30/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/29/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	90	0.0	98	2.5	NS
DIEPAMHR + organic matter	88	4.8	100	0.0	NS
High EC Control @ 12.59 mS/cm	100	0.0	100	0.0	NS
High EC Control @ 18.56 mS/cm	93	4.8	98	2.5	NS
Grizzly Bay at Dolphin (602)	95	2.9	98	2.5	NS
Middle of Broad Slough, West end (804)	98	2.5	100	0.0	NS
Suisun Bay, East of middle point (504) <sup>4</sup>	95	3.1	100	0.0	NS
Montezuma Slough at Nurse Slough (609) <sup>4</sup>	100	0.0	100	0.0	NS
Suisun Bay off Chipps Island (508) <sup>3</sup>	100	0.0	97	2.8	NS

	MSD	PMSD
One-way ANOVA	13.4	15.3
Two-way ANOVA	12.0	13.7

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.043	0.005	0.049	0.004	NS
DIEPAMHR + organic matter	0.049	0.003	0.055	0.005	NS
High EC Control @ 12.59 mS/cm	0.086	0.002	0.035	0.003	S (41%)
High EC Control @ 18.56 mS/cm	0.024	0.003	0.026	0.002	NS
Grizzly Bay at Dolphin (602)	0.038	0.004	0.044	0.006	NS
Middle of Broad Slough, West end (804)	0.072	0.006	0.067	0.016	NS
Suisun Bay, East of middle point (504) <sup>4</sup>	0.021	0.006	0.032	0.003	NS
Montezuma Slough at Nurse Slough (609) <sup>4</sup>	0.039	0.009	0.035	0.006	NS
Suisun Bay off Chipps Island (508) <sup>3,5</sup>	0.032	0.001	0.046	0.006	NS

	MSD	PMSD
One-way ANOVA	0.024	48.8
Two-way ANOVA	0.031	63.1

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control.

Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).

2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

3. This high conductivity sample was compared to the High EC control @ 12.59 mS/cm.

4. This high conductivity sample was compared to the High EC control @ 18.56 mS/cm.

5. Although sample 508 showed significantly lower weights than the High EC control @ 12.59 mS/cm, this control showed anomalously high weights compared to the other treatments in this test. *Hyaella* weight is not typically enhanced in this conductivity range (SEE FIGURE X), and in our best professional judgement it is more reasonable to use the weights observed in the primary control treatment to evaluate the performance of animals exposed to sample 508.

Table A105-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/29/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Grizzly Bay at Dolphin (602)	16640	12.5	7.70	10.9	11.0	0.15	0.001
Middle of Broad Slough, West end (804)	4718	13.3	7.38	10.8	8.8	0.12	0.001
Suisun Bay, East of middle point (504)	16940	12.9	7.57	10.9	14.2	0.16	0.001
Montezuma Slough at Nurse Slough (609)	14940	12.4	7.21	9.9	27.4	0.27	0.001
Suisun Bay off Chipps Island (508)	12250	12.8	7.54	11.0	14.9	0.15	0.001

Table A105-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 11/30/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 11/29/07.

Treatment	Laboratory Chemistry								Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH				
DIEPAMHR	360	22.1	22.5	7.7	8.7	7.76	7.99	112	62	-	
DIEPAMHR + organic matter	360	22.4	23.0	7.5	8.6	7.72	8.00	112	62	-	
High EC Control @ 12.59 mS/cm	12520	22.4	22.8	7.5	8.2	7.68	7.94	1380	78	-	
High EC Control @ 18.56 mS/cm	18185	22.5	22.8	7.1	8.4	7.62	7.91	2120	88	-	
Grizzly Bay at Dolphin (602)	17000	22.4	22.8	7.0	8.1	7.69	7.78	1920	94	0.003	
Middle of Broad Slough, West end (804)	4760	22.0	22.1	7.2	8.7	7.77	7.82	560	80	0.003	
Suisun Bay, East of middle point (504)	18045	22.3	22.5	7.1	8.3	7.71	7.79	1940	94	0.003	
Montezuma Slough at Nurse Slough (609)	15490	21.9	22.7	7.3	8.3	7.58	7.84	1780	102	0.003	
Suisun Bay off Chipps Island (508)	12655	21.9	23.2	7.4	8.5	7.74	7.81	1360	86	0.003	
DIEPAMHR + 25 ppb PBO	382	22.0	23.1	7.6	8.4	7.76	8.17	-	-	-	
DIEPAMHR + organic matter + 25 ppb PBO	383	22.2	22.5	7.5	8.6	7.73	8.06	-	-	-	
High EC Control @ 12.59 mS/cm + 25 ppb PBO	12565	22.3	23.8	7.5	8.6	7.70	7.91	-	-	-	
High EC Control @ 18.56 mS/cm + 25 ppb PBO	16955	22.3	23.2	6.4	8.3	7.57	7.91	-	-	-	
Grizzly Bay at Dolphin (602) + 25 ppb PBO	17065	22.0	23.4	7.2	8.3	7.73	7.83	-	-	-	
Middle of Broad Slough, West end (804) + 25 ppb PBO	4803	22.1	23.2	7.6	8.7	7.79	7.87	-	-	-	
Suisun Bay, East of middle point (504) + 25 ppb PBO	17815	22.0	23.5	7.2	8.4	7.72	7.82	-	-	-	
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	15355	22.0	22.9	7.3	8.5	7.74	7.84	-	-	-	
Suisun Bay off Chipps Island (508) + 25 ppb PBO	12700	22.0	23.0	7.4	8.4	7.76	7.81	-	-	-	

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A106-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 12/13/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/11/07 - 12/12/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	98	2.5	NS
DIEPAMHR + Organic Matter	89	4.5	100	0.0	NS
Sacramento R. @ Hood DWR Station	98	2.5	98	2.5	NS
Old R., western arm at railroad bridge (902)	97	2.8	100	0.0	NS
Old R. at mouth of Holland Cut (915)	100	0.0	100	0.0	NS
San Joaquin R. between Hog and Turner Cuts (910)	100	0.0	98	2.3	NS
San Joaquin R., West of Oulton Point (812)	100	0.0	100	0.0	NS
Sacramento R. Deep Water Channel, Light 55	100	0.0	100	0.0	NS
Sacramento R. at tip of Grand Island (711)	95	2.9	90	4.1	NS
Field Dup.: San Joaquin R. between Hog and Turner Cuts (910)	98	2.5	-	-	NA
Field Dup.: Old R., western arm at railroad bridge (902)	100	0.0	-	-	NA
Field Dup.: Sacramento R. @ Hood DWR Station	98	2.5	-	-	NA
Bottle Blank (227)	100	0.0	-	-	NA
Bottle Blank (228)	98	2.5	-	-	NA
Bottle Blank (229)	98	2.5	-	-	NA
Bottle Blank (230)	98	2.5	-	-	NA

	MSD	PMSD
One-way ANOVA	11.0	12.3
Two-way ANOVA	10.8	12.0

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.047	0.004	0.065	0.008	NS
DIEPAMHR + Organic Matter	0.058	0.005	0.070	0.003	NS
Sacramento R. @ Hood DWR Station	0.066	0.009	0.059	0.005	NS
Old R., western arm at railroad bridge (902)	0.073	0.005	0.081	0.006	NS
Old R. at mouth of Holland Cut (915)	0.079	0.002	0.063	0.003	NS
San Joaquin R. between Hog and Turner Cuts (910)	0.078	0.005	0.067	0.012	NS
San Joaquin R., West of Oulton Point (812)	0.076	0.007	0.067	0.010	NS
Sacramento R. Deep Water Channel, Light 55	0.071	0.009	0.077	0.006	NS
Sacramento R. at tip of Grand Island (711)	0.045	0.012	0.051	0.004	NS
Field Dup.: San Joaquin R. between Hog and Turner Cuts (910)	0.096	0.008	-	-	NA
Field Dup.: Old R., western arm at railroad bridge (902)	0.068	0.006	-	-	NA
Field Dup.: Sacramento R. @ Hood DWR Station	0.058	0.008	-	-	NA
Bottle Blank (227)	0.047	0.007	-	-	NA
Bottle Blank (228)	0.042	0.010	-	-	NA
Bottle Blank (229)	0.050	0.004	-	-	NA
Bottle Blank (230)	0.034	0.009	-	-	NA

	MSD	PMSD
One-way ANOVA	0.038	65.2
Two-way ANOVA	0.039	66.5

1. Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
2. NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.

Table A106-2. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/11/07 - 12/12/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Sacramento R. @ Hood DWR Station	205	10.8	7.03	11.4	12.1	0.30	0.001
Old R., western arm at railroad bridge (902)	696	10.7	7.18	11.3	7.0	0.16	0.000
Old R. at mouth of Holland Cut (915)	660	10.5	7.23	11.2	3.6	0.15	0.000
San Joaquin R. between Hog and Turner Cuts (910)	437	10.9	7.06	10.8	4.4	0.09	0.000
San Joaquin R., West of Oulton Point (812)	802	11.0	7.17	11.2	6.2	0.16	0.000
Sacramento R. Deep Water Channel, Light 55	328	10.7	7.05	11.7	16.6	0.22	0.000
Sacramento R. at tip of Grand Island (711)	272	10.4	7.14	10.7	7.8	0.31	0.001
Field Dup.: San Joaquin R. between Hog and Turner Cuts (910)	437	10.9	7.06	10.8	3.9	0.08	0.000
Field Dup.: Old R., western arm at railroad bridge (902)	696	10.7	7.18	11.3	5.2	0.12	0.000
Field Dup.: Sacramento R. @ Hood DWR Station	205	10.8	7.03	11.4	11.9	0.29	0.001
Bottle Blank (227)	-	-	-	-	0.2	0.00	-
Bottle Blank (228)	-	-	-	-	0.3	0.01	-
Bottle Blank (229)	-	-	-	-	0.2	0.00	-
Bottle Blank (230)	-	-	-	-	0.2	0.02	-

Table A106-3. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 12/13/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/11/07 - 12/12/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	365	22.6	23.2	7.4	8.6	7.75	8.15	100	60	-
DIEPAMHR + Organic Matter	359	22.7	22.9	7.3	8.5	7.70	8.14	100	60	-
Sacramento R. @ Hood DWR Station	217	22.6	22.8	6.8	8.8	7.67	8.09	88	86	0.016
Old R., western arm at railroad bridge (902)	697	22.6	23.4	7.4	8.5	7.74	8.04	100	74	0.008
Old R. at mouth of Holland Cut (915)	689	22.5	23.4	7.4	8.9	7.79	8.05	116	54	0.007
San Joaquin R. between Hog and Turner Cuts (910)	409	22.5	23.4	7.4	8.9	7.83	8.10	88	84	0.005
San Joaquin R., West of Oulton Point (812)	775	22.5	23.2	7.5	8.9	7.73	8.10	124	76	0.008
Sacramento R. Deep Water Channel, Light 55	268	22.4	23.4	7.4	8.6	7.89	8.19	88	90	0.015
Sacramento R. at tip of Grand Island (711)	220	22.4	23.2	7.4	8.9	7.82	8.10	80	80	0.017
Field Dup.: San Joaquin R. between Hog and Turner Cuts (910)	414	22.3	23.6	7.5	8.9	7.81	8.13	104	80	0.005
Field Dup.: Old R., western arm at railroad bridge (902)	679	22.3	23.2	7.4	8.9	7.80	8.05	116	74	0.006
Field Dup.: Sacramento R. @ Hood DWR Station	218	22.3	23.6	6.9	8.8	7.70	8.02	80	86	0.014
Bottle Blank (227)	361	22.5	23.3	7.5	8.8	7.72	8.06	104	48	0.000
Bottle Blank (228)	353	22.1	23.0	7.6	8.9	7.71	8.00	108	78	0.000
Bottle Blank (229)	356	22.1	23.0	7.7	8.6	7.75	8.08	108	68	0.000
Bottle Blank (230)	364	22.0	23.0	7.6	8.7	7.79	8.08	104	58	0.001
DIEPAMHR + 25 ppb PBO	349	22.6	22.9	7.4	8.5	7.71	8.08	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	342	22.5	22.8	7.4	8.5	7.72	8.02	-	-	-
Sacramento R. @ Hood DWR Station + 25 ppb PBO	217	22.5	22.7	6.9	8.9	7.70	8.04	-	-	-
Old R., western arm at railroad bridge (902) + 25 ppb PBO	690	22.4	22.9	7.1	8.6	7.75	8.07	-	-	-
Old R. at mouth of Holland Cut (915) + 25 ppb PBO	640	22.4	22.8	7.4	8.8	7.79	8.05	-	-	-
San Joaquin R. between Hog and Turner Cuts (910) + 25 ppb PBO	419	22.4	22.8	7.2	8.6	7.78	8.07	-	-	-
San Joaquin R., West of Oulton Point (812) + 25 ppb PBO	772	22.4	22.6	7.3	8.7	7.76	7.92	-	-	-
Sacramento R. Deep Water Channel, Light 55 + 25 ppb PBO	264	22.3	23.1	7.2	8.9	7.80	8.12	-	-	-
Sacramento R. at tip of Grand Island (711) + 25 ppb PBO	217	22.3	22.8	7.2	8.5	7.75	7.97	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

Table A107-1. Summary of a 10-day *H. azteca* water column toxicity test initiated on 12/14/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/13/07.

Treatment	Survival (%) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	100	0.0	98	2.5	NS
DIEPAMHR + organic matter	100	0.0	98	2.5	NS
High EC Control @ 13.39 mS+ organic matter	100	0.0	98	2.5	NS
High EC Control @ 16.54 mS+ organic matter	100	0.0	98	2.5	NS
DIEPAMHR + 75 ng/L permethrin	3	2.5	0	0.0	NS
Suisun Bay, East of middle point (504)	100	0.0	95	2.9	NS
Grizzly Bay at Dolphin (602)	95	2.9	100	0.0	NS
Suisun Bay off Chipps Island (508)	97	2.8	100	0.0	NS
Sacramento R. across from Sherman Lake (704)	100	0.0	100	0.0	NS
Middle of Broad Slough, West end (804)	98	2.5	100	0.0	NS
Montezuma Slough at Nurse Slough (609)	98	2.3	100	0.0	NS
Field Dup.: Montezuma Slough at Nurse Slough (609)	100	0.0	-	-	NA
Bottle Blank (231)	98	2.5	-	-	NA
Bottle Blank (232)	100	0.0	-	-	NA
DIEPAMHR (renewed every 2 days)	100	0.0	100	0.0	NS
DIEPAMHR + 75 ng/L Permethrin (renewed every 2 days)	0	0.0	0	0.0	NS

	MSD	PMSD
One-way ANOVA	8.0	8.0
Two-way ANOVA	9.1	9.1

Treatment	Weight (mg/surviving individual) <sup>1</sup>				
	Unmanipulated		25 ppb PBO added		vs Non-PBO <sup>2</sup>
	mean	se	mean	se	
DIEPAMHR	0.065	0.010	0.078	0.006	NS
DIEPAMHR + organic matter	0.098	0.008	0.090	0.008	NS
High EC Control @ 13.39 mS+ organic matter	0.071	0.002	0.068	0.006	NS
High EC Control @ 16.54 mS+ organic matter	0.063	0.004	0.071	0.003	NS
DIEPAMHR + 75 ng/L permethrin <sup>5</sup>	0.230	-	-	-	NA
Suisun Bay, East of middle point (504)	0.073	0.006	0.066	0.008	NS
Grizzly Bay at Dolphin (602)	0.071	0.004	0.079	0.004	NS
Suisun Bay off Chipps Island (508)	0.078	0.009	0.087	0.003	NS
Sacramento R. across from Sherman Lake (704)	0.092	0.006	0.087	0.005	NS
Middle of Broad Slough, West end (804)	0.096	0.006	0.101	0.007	NS
Montezuma Slough at Nurse Slough (609)	0.095	0.002	0.089	0.006	NS
Field Dup.: Montezuma Slough at Nurse Slough (609)	0.090	0.003	-	-	NA
Bottle Blank (231)	0.085	0.004	-	-	NA
Bottle Blank (232)	0.084	0.003	-	-	NA
DIEPAMHR (renewed every 2 days)	0.066	0.005	0.059	0.003	NS
DIEPAMHR + 75 ng/L Permethrin (renewed every 2 days)	-	-	-	-	NA

	MSD	PMSD
One-way ANOVA	0.029	29.9
Two-way ANOVA	0.032	32.3

- Highlighted areas indicate a significant reduction in survival or weight compared to the appropriate control. Unmanipulated samples were analyzed using one-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ). Samples with PBO additions were analyzed using two-way ANOVA and Tukey's Multiple Comparison Procedure ( $P < 0.05$ ).
- NS: Nonsignificant, S: Significant (% non-PBO mean), NA: Not applicable.
- This high conductivity sample was compared to the High EC control @ 13.39 mS/cm.
- This high conductivity sample was compared to the High EC control @ 16.54 mS/cm.
- DIEPAMHR + 75 ng/L permethrin exhibited 3% survival, however average weight exceeded all other weights at 0.230 mg/individual. This anomalous weight is due to the error of the scale used to determine weights rather than abnormally large *H. azteca*.

Table A107-2. Daily survival of *H. azteca* exposed to control water spiked with permethrin during a 10-day water column toxicity test initiated on 12/14/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/13/07.

Treatment	Renewal	Treatment ID	Survival (%)				
			Day 1	Day 2	Day 3	Day 4	Day 10
Control	5 day	131	100	100	100	100	100
Control + 25 ppb PBO	5 day	145	100	98	98	98	98
Control	2 day	156	100	100	100	100	100
Control + 25 ppb PBO	2 day	158	100	100	100	100	100
75 ng/L Permethrin	5 day	135	15	8	5	3	3
75 ng/L Permethrin + 25 ppb PBO	5 day	149	8	5	0	0	0
75 ng/L Permethrin	2 day	157	35	23	3	3	0
75 ng/L Permethrin + 25 ppb PBO	2 day	159	23	10	0	0	0

Table A107-3. Summary of water chemistry at field conditions of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/13/07.

Treatment	Field Chemistry				Turbidity (NTU)	Total Ammonia Nitrogen (mg/L)	Unionized Ammonia (mg/L)
	SC (uS/cm)	Temp (°C)	pH	DO (mg/L)			
Suisun Bay, East of middle point (504)	16920	10.5	7.56	11.8	15.7	0.24	0.001
Grizzly Bay at Dolphin (602)	15660	10.0	7.45	12.1	10.7	0.21	0.001
Suisun Bay off Chipps Island (508)	12200	10.1	7.20	11.9	15.1	0.21	0.000
Sacramento R. across from Sherman Lake (704)	2957	10.0	7.25	11.9	13.1	0.26	0.001
Middle of Broad Slough, West end (804)	4146	10.5	6.80	11.8	14.2	0.23	0.000
Montezuma Slough at Nurse Slough (609)	6840	9.6	7.12	11.9	11.9	0.23	0.000
Field Dup.: Montezuma Slough at Nurse Slough (609)	6840	9.6	7.12	11.9	15.6	0.24	0.000
Bottle Blank (231)	-	-	-	-	0.2	0.02	-
Bottle Blank (232)	-	-	-	-	0.2	0.01	-

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Table A107-4. Summary of water chemistry during a *H. azteca* initial screening toxicity test initiated on 12/14/07 of samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 12/13/07.

Treatment	Laboratory Chemistry							Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Unionized Ammonia (mg/L) <sup>1</sup>
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L) <sup>2</sup>	Max DO (mg/L)	Min pH	Max pH			
DIEPAMHR	352	22.8	22.8	7.4	8.7	7.77	8.41	100	60	-
DIEPAMHR + organic matter	358	22.5	22.8	7.2	8.7	7.71	8.26	100	60	-
High EC Control @ 13.39 mS + organic matter	12690	22.5	22.7	7.3	8.9	7.67	7.77	-	-	-
High EC Control @ 16.54 mS + organic matter	16185	22.5	22.5	7.4	8.6	7.67	7.77	-	-	-
DIEPAMHR + 75 ng/L permethrin	755	22.3	22.9	6.5	8.9	7.65	8.28	-	-	-
Suisun Bay, East of middle point (504)	17025	22.5	23.0	7.3	8.8	7.62	7.88	1000	90	0.004
Grizzly Bay at Dolphin (602)	15900	22.4	22.9	7.2	8.8	7.66	7.90	1120	92	0.004
Suisun Bay off Chipps Island (508)	12660	22.3	23.7	7.7	8.6	7.69	7.94	1400	88	0.005
Sacramento R. across from Sherman Lake (704)	3214	22.3	23.7	7.4	8.9	7.77	8.23	332	80	0.010
Middle of Broad Slough, West end (804)	4363	22.3	23.8	7.5	8.8	7.75	8.06	464	82	0.007
Montezuma Slough at Nurse Slough (609)	7035	22.4	23.8	7.5	8.9	7.68	8.03	728	82	0.006
Field Dup.: Montezuma Slough at Nurse Slough (609)	7170	22.1	23.8	7.4	8.9	7.70	8.00	732	84	0.005
Bottle Blank (231)	537	22.3	24.0	7.5	8.8	7.82	8.40	100	58	0.001
Bottle Blank (232)	374	22.2	23.8	7.4	8.6	7.82	8.29	104	58	0.000
DIEPAMHR + 25 ppb PBO	364	22.2	22.5	7.4	8.7	7.66	8.22	-	-	-
DIEPAMHR + organic matter + 25 ppb PBO	359	22.5	22.6	7.3	8.6	7.64	8.28	-	-	-
High EC Control @ 13.39 mS + organic matter + 25 ppb PBO	12730	22.2	22.5	7.4	8.6	7.67	7.80	-	-	-
High EC Control @ 16.54 mS + organic matter + 25 ppb PBO	16065	22.2	22.6	7.4	8.7	7.69	7.80	-	-	-
DIEPAMHR + 75 ng/L permethrin + 25 ppb PBO	385	22.7	22.7	2.7	8.7	7.55	8.09	-	-	-
Suisun Bay, East of middle point (504) + 25 ppb PBO	17320	22.3	22.5	7.1	8.4	7.66	7.78	-	-	-
Grizzly Bay at Dolphin (602) + 25 ppb PBO	15805	22.4	22.6	7.0	8.6	7.65	7.83	-	-	-
Suisun Bay off Chipps Island (508) + 25 ppb PBO	12440	22.4	22.6	7.4	8.7	7.68	7.90	-	-	-
Sacramento R. across from Sherman Lake (704) + 25 ppb PBO	3203	22.4	22.7	7.4	8.9	7.79	8.19	-	-	-
Middle of Broad Slough, West end (804) + 25 ppb PBO	4333	22.5	22.7	7.2	8.8	7.78	8.11	-	-	-
Montezuma Slough at Nurse Slough (609) + 25 ppb PBO	7120	22.6	22.6	7.6	8.7	7.74	7.97	-	-	-
DIEPAMHR (renewed every 2 days)	420	22.6	23.6	7.6	8.5	7.77	8.49	100	60	-
DIEPAMHR + 75 ng/L Permethrin (renewed every 2 days)	245	20.6	23.6	4.5	8.9	7.61	7.96	100	60	-
DIEPAMHR (renewed every 2 days) + 25 ppb PBO	368	22.6	22.9	7.6	8.8	7.90	8.37	-	-	-
DIEPAMHR + 75 ng/L Permethrin (renewed every 2 days) + 25 ppb PBO	1799	21.9	22.7	3.6	8.6	7.40	8.01	-	-	-

1: This Unionized ammonia reading is based on the ammonia nitrogen measured upon sample receipt and upon the water chemistry measured at test initiation.

2: Highlighted cells indicate anomolous dissolved oxygen measurements. It is unlikely that these low DO measurements were the cause of high mortality exhibited in these samples, as the samples spiked with permethrin without the addition of PBO also exhibited high mortality.

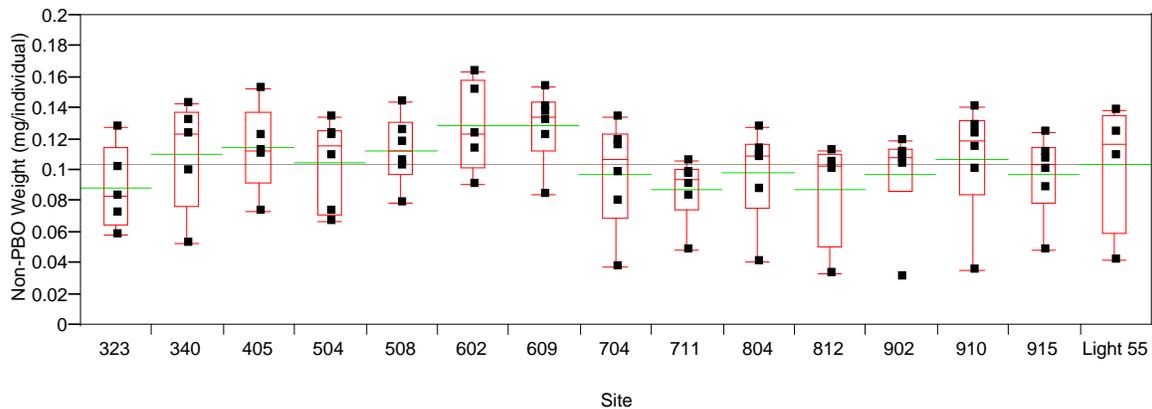
## Appendix B

# *Hyalella azteca*

Weight and PBO Effects by Season

Appendix B. Section 1. Weights of *H. azteca* at each site during every season, and tables of model coefficients showing possible between-site effects on weight after controlling for the effects of differences in conductivity. Note that weight as a percentage of the control weight was used as the response variable in the ANCOVA models in order to minimize variation due to differences in the size of *H. azteca* used in different tests.

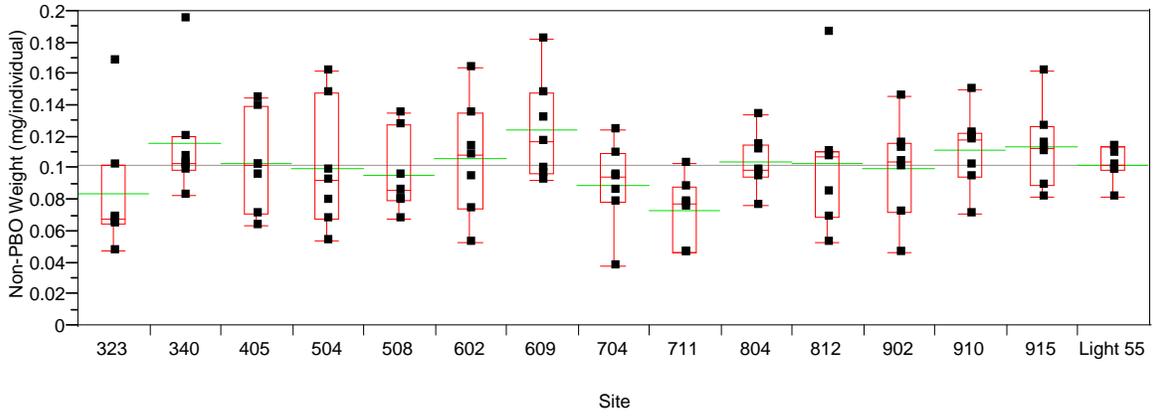
### Winter 2006



Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	164.8		7.9	20.93	<.0001
Log EC	30.2		22.8	1.32	0.1919
(Log EC) <sup>2</sup>	-41.5		20.8	-2.00	0.0505
Sample[323]	-26.3		24.3	-1.08	0.2836
Sample[340]	-4.7		21.8	-0.22	0.8301
Sample[405]	-2.4		18.7	-0.13	0.8981
Sample[504]	-10.7		14.5	-0.74	0.4639
Sample[508]	-1.7		16.1	-0.10	0.9175
Sample[602]	21.7		15.7	1.38	0.1718
Sample[609]	8.2		16.7	0.49	0.6256
Sample[704]	0.2		16.6	0.01	0.9903
Sample[711]	2.5		19.3	0.13	0.8977
Sample[804]	4.8		17.5	0.27	0.7849
Sample[812]	-1.7		19.5	-0.09	0.9317
Sample[902]	-6.8		16.1	-0.42	0.6735
Sample[910]	11.3		16.1	0.70	0.4852
Sample[915]	-3.9		16.1	-0.24	0.8101
Sample[Light 55]	9.5		17.7	0.54	0.5941

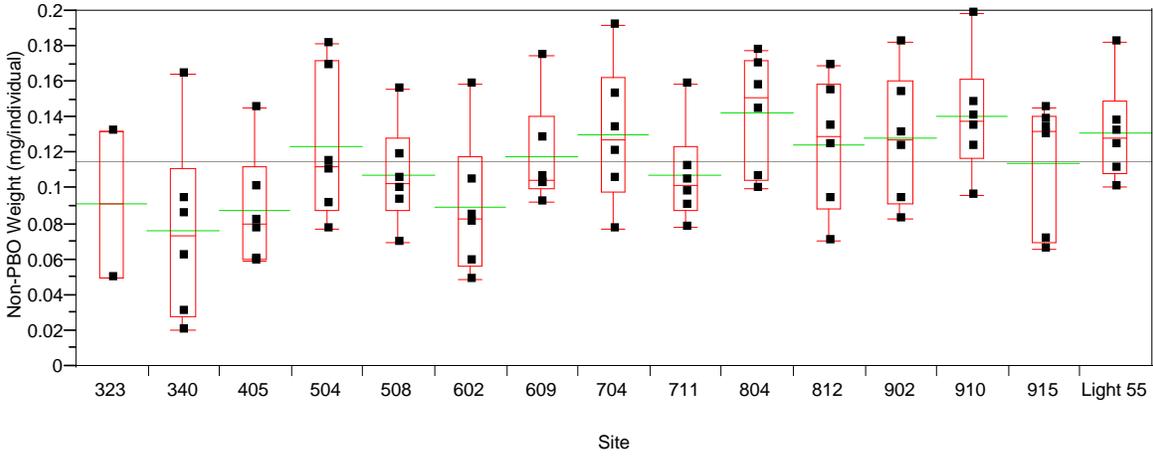
Spring 2006



Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	157.0		7.3	21.47	<.0001
Log EC	40.3		31.0	1.30	0.1972
(Log EC) <sup>2</sup>	-57.9		26.8	-2.16	0.0334
Sample[323]	-0.1		26.7	-0.00	0.9974
Sample[340]	13.2		21.9	0.60	0.5489
Sample[405]	-7.4		17.8	-0.41	0.6807
Sample[504]	-9.4		15.3	-0.61	0.5415
Sample[508]	-14.8		16.3	-0.91	0.3673
Sample[602]	-2.4		15.0	-0.16	0.8738
Sample[609]	8.3		16.6	0.50	0.6179
Sample[704]	-11.4		15.6	-0.73	0.4683
Sample[711]	-37.4		17.2	-2.18	0.0323
Sample[804]	19.94		16.0	1.24	0.2172
Sample[812]	24.4		16.1	1.52	0.1319
Sample[902]	-9.7		16.3	-0.60	0.5533
Sample[910]	13.8		16.6	0.83	0.4105
Sample[915]	23.3		16.2	1.43	0.1554
Sample[Light 55]	-10.5		17.8	-0.59	0.5557

Summer 2006

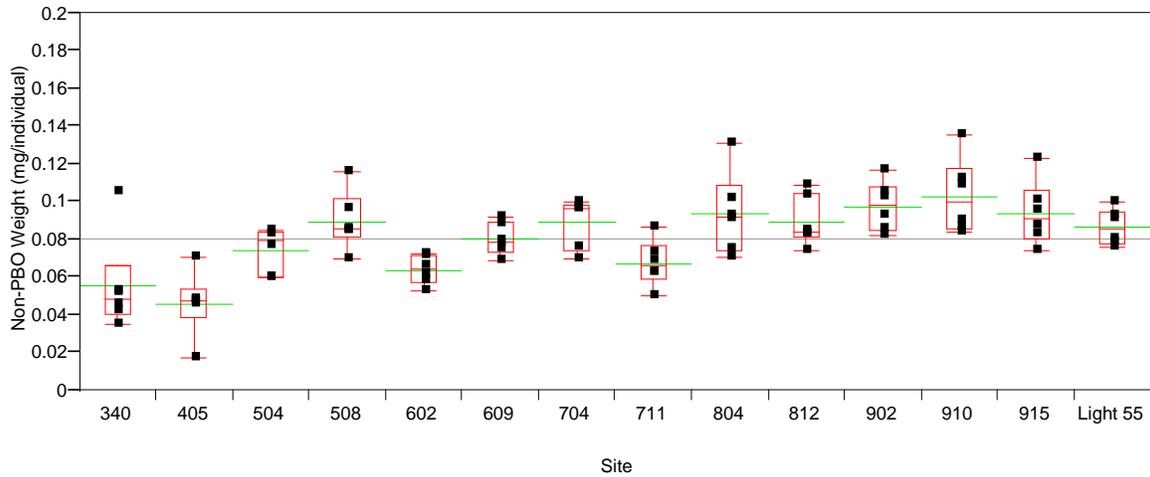


Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	155.0		14.1	10.97	<.0001
Log EC	-18.2		28.7	-0.64	0.5270
(Log EC) <sup>2</sup>	-47.6		31.0	-1.53	0.1294
Sample[340]	16.8		37.3	0.45	0.6527
Sample[405]	24.7		31.3	0.79	0.4316
Sample[504]	9.4		22.7	0.41	0.6803
Sample[508]	0.0		19.1	0.00	0.9983
Sample[602]	-5.3		26.2	-0.20	0.8397
Sample[609]	18.9		19.2	0.99	0.3263
Sample[704]	-24.1		20.1	-1.20	0.2340
Sample[711]	-13.2		24.3	-0.54	0.5898
Sample[804]	-15.1		17.6	-0.86	0.3932
Sample[812]	-28.0		20.9	-1.34	0.1862
Sample[902]	4.4		21.0	0.21	0.8357
Sample[910]	17.6		17.9	0.99	0.3280
Sample[915]	-13.3		21.0	-0.63	0.5296
Sample[Light 55]	7.0		18.5	0.38	0.7062

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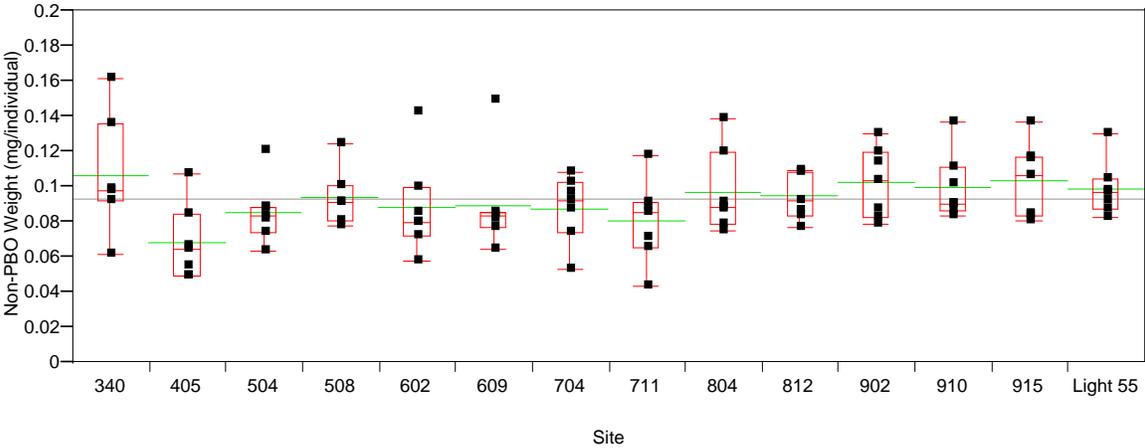
Fall 2006



Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	137.8		7.8	17.58	<.0001
Log EC	4.4		13.6	0.32	0.7478
(Log EC) <sup>2</sup>	-13.6		15.7	-0.87	0.3891
Sample[340]	-33.7		15.5	-2.18	0.0327
Sample[405]	-47.7		16.9	-2.82	0.0062
Sample[504]	-0.3		12.7	-0.02	0.9825
Sample[508]	23.2		11.6	2.00	0.0494
Sample[602]	-18.7		14.4	-1.30	0.1979
Sample[609]	10.5		13.2	0.80	0.4281
Sample[704]	2.5		10.8	0.24	0.8147
Sample[711]	-18.7		16.3	-1.15	0.2538
Sample[804]	7.7		11.2	0.68	0.4966
Sample[812]	8.3		13.1	0.64	0.5268
Sample[902]	18.8		13.0	1.44	0.1539
Sample[910]	28.1		13.1	2.15	0.0353
Sample[915]	13.6		13.3	1.02	0.3097
Sample[Light 55]	6.4		14.5	0.44	0.6602

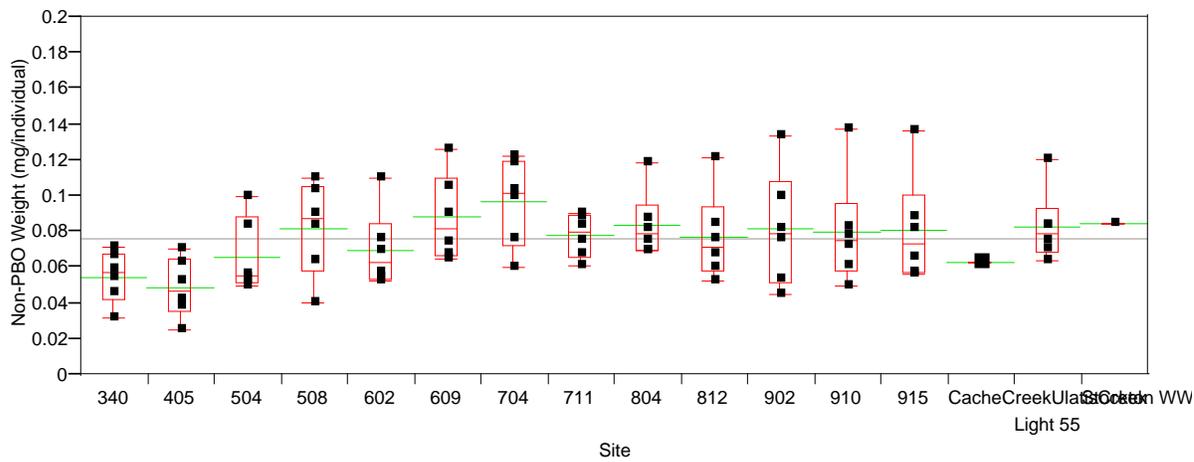
Winter 2007



Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	128.7		6.6	19.40	<.0001
Log EC	5.0		13.2	0.38	0.7049
(Log EC) <sup>2</sup>	-28.7		17.6	-1.63	0.1072
Sample[340]	20.1		13.0	1.55	0.1264
Sample[405]	-7.4		19.1	-0.39	0.7002
Sample[504]	0.4		14.5	0.03	0.9786
Sample[508]	5.6		14.2	0.40	0.6939
Sample[602]	5.1		15.3	0.33	0.7415
Sample[609]	4.2		14.6	0.29	0.7732
Sample[704]	-13.7		13.0	-1.05	0.2951
Sample[711]	-17.6		15.1	-1.17	0.2466
Sample[804]	11.0		14.0	0.79	0.4340
Sample[812]	-4.2		12.7	-0.33	0.7400
Sample[902]	2.1		12.5	0.17	0.8618
Sample[910]	-5.2		12.5	-0.42	0.6784
Sample[915]	0.5		12.5	0.04	0.9682
Sample[Light 55]	-0.9		12.7	-0.07	0.9433

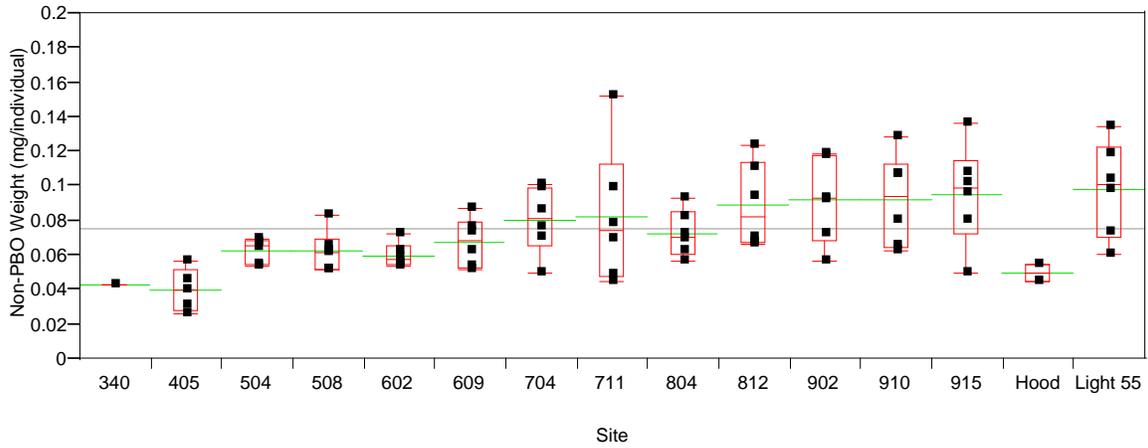
Spring 2007



Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	160.7		43.8	3.66	0.0011
Log EC	132.0		86.1	1.53	0.1373
(Log EC) <sup>2</sup>	10.3		83.1	0.12	0.9020
Sample[340]	-158.9		82.6	-1.92	0.0654
Sample[405]	-202.3		88.5	-2.29	0.0307
Sample[504]	-71.8		72.0	-1.00	0.3276
Sample[508]	-14.3		69.0	-0.21	0.8365
Sample[602]	-114.5		74.3	-1.54	0.1356
Sample[609]	-21.8		68.1	-0.32	0.7518
Sample[704]	21.0		49.3	0.43	0.6735
Sample[711]	128.8		98.9	1.30	0.2041
Sample[804]	17.4		52.8	0.33	0.7444
Sample[812]	85.8		76.1	1.13	0.2704
Sample[902]	56.3		65.2	0.86	0.3960
Sample[910]	65.2		60.4	1.08	0.2901
Sample[915]	82.5		66.8	1.24	0.2276
Sample[Light 55]	126.5		88.3	1.43	0.1638

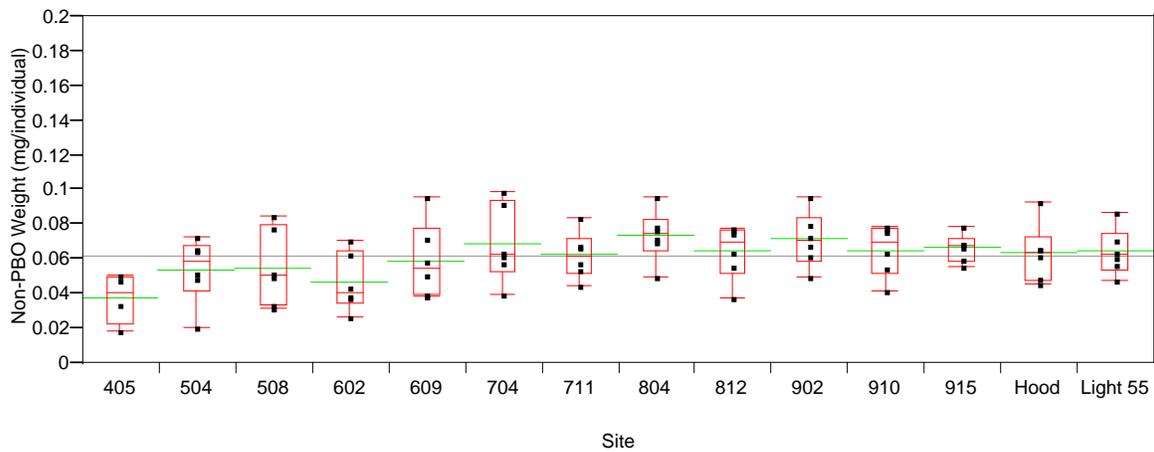
Summer 2007



Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	105.8		32.5	3.26	0.0019
Log EC	79.9		55.1	1.45	0.1528
(Log EC) <sup>2</sup>	139.0		67.9	2.05	0.0455
Sample[405]	-239.0		88.9	-2.69	0.0094
Sample[504]	-92.6		51.9	-1.78	0.0799
Sample[508]	-35.9		35.9	-1.00	0.3217
Sample[602]	-152.1		67.8	-2.25	0.0287
Sample[609]	-71.7		49.1	-1.46	0.1495
Sample[704]	74.1		36.1	2.05	0.0450
Sample[711]	25.9		51.6	0.50	0.6172
Sample[804]	45.2		34.3	1.32	0.1933
Sample[812]	82.0		44.7	1.84	0.0715
Sample[902]	93.6		43.6	2.15	0.0361
Sample[910]	87.0		45.0	1.94	0.0579
Sample[915]	95.9		43.9	2.18	0.0332
Sample[Light 55]	87.6		46.9	1.87	0.0667

Fall 2007



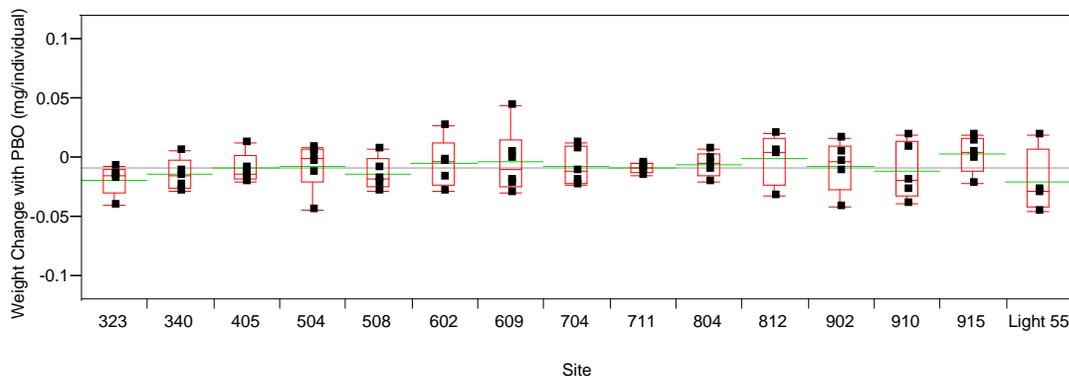
Effects on Non-PBO Weight (measured as % of Non-PBO Control Weight)

Term	Scaled Estimate	Plot Estimate	Std Error	t Ratio	Prob> t
Intercept	125.5		19.9	6.29	<.0001
Log EC	-84.8		49.3	-1.72	0.0904
(Log EC) <sup>2</sup>	17.1		44.5	0.38	0.7024
Sample[405]	26.9		47.6	0.57	0.5733
Sample[504]	48.2		38.5	1.25	0.2151
Sample[508]	37.0		33.2	1.12	0.2682
Sample[602]	32.2		40.9	0.79	0.4332
Sample[609]	52.6		36.6	1.44	0.1549
Sample[704]	29.0		26.1	1.11	0.2694
Sample[711]	-71.6		48.4	-1.48	0.1436
Sample[804]	50.3		25.0	2.02	0.0478
Sample[812]	-16.3		23.0	-0.71	0.4807
Sample[902]	-2.3		23.4	-0.10	0.9231
Sample[910]	-29.2		27.7	-1.06	0.2945
Sample[915]	-16.8		24.6	-0.68	0.4963
Sample[Hood]	-75.8		51.3	-1.48	0.1441
Sample[Light 55]	-64.4		45.6	-1.41	0.1627

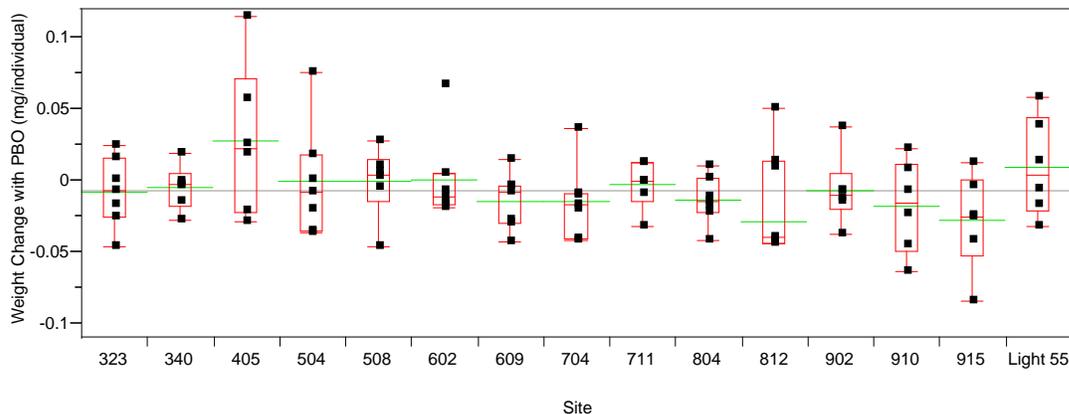
Appendix B. Section 2. *H. azteca* weight changes with PBO addition.

Weight changes induced by PBO addition in *H. azteca* 10 day water column toxicity tests did not differ significantly between sites in any season (one-way ANOVAs,  $P > 0.05$ ). Nonetheless, box plots show some apparent variation between sites in the effects of PBO addition.

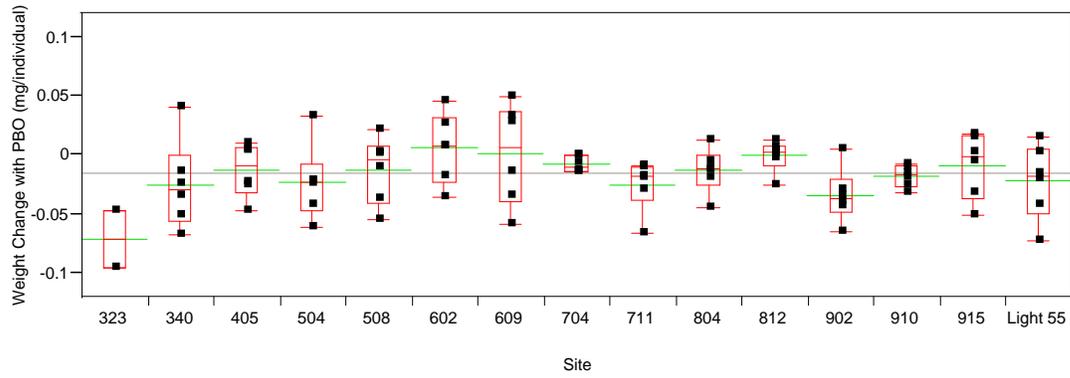
## Winter 2006



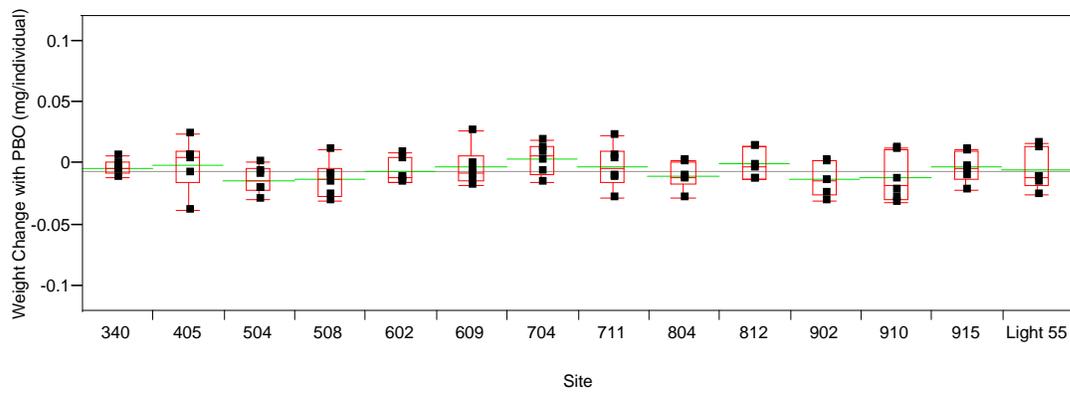
## Spring 2006



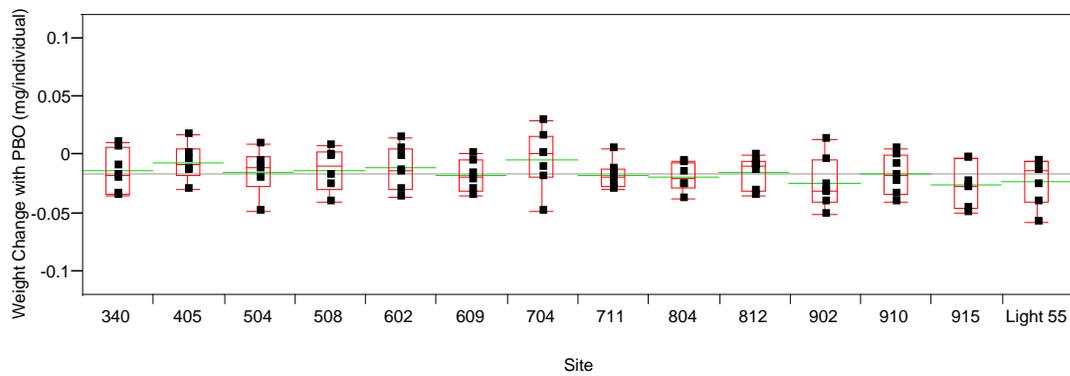
## Summer 2006



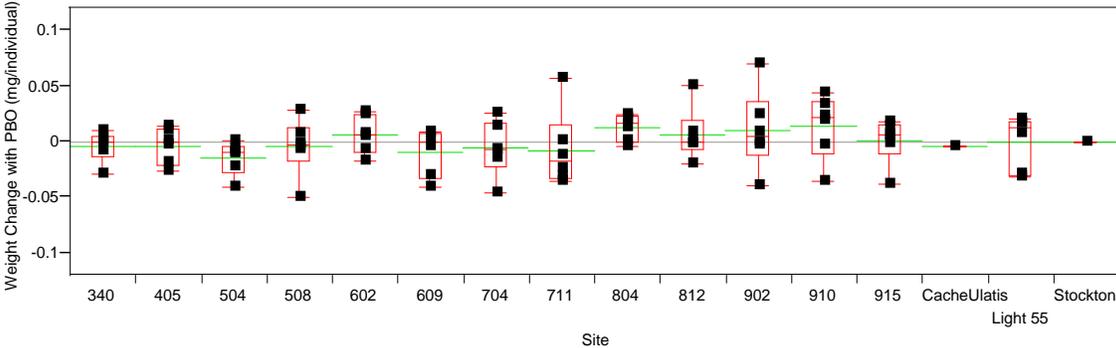
## Fall 2006



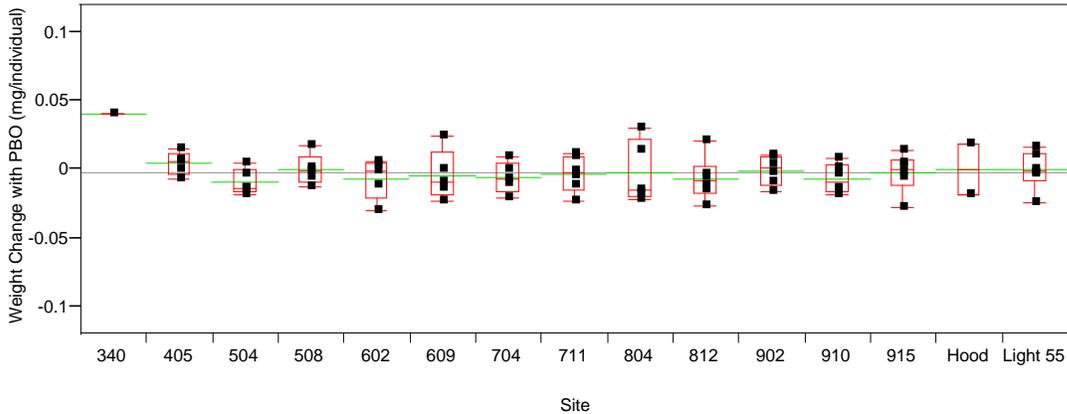
## Winter 2007



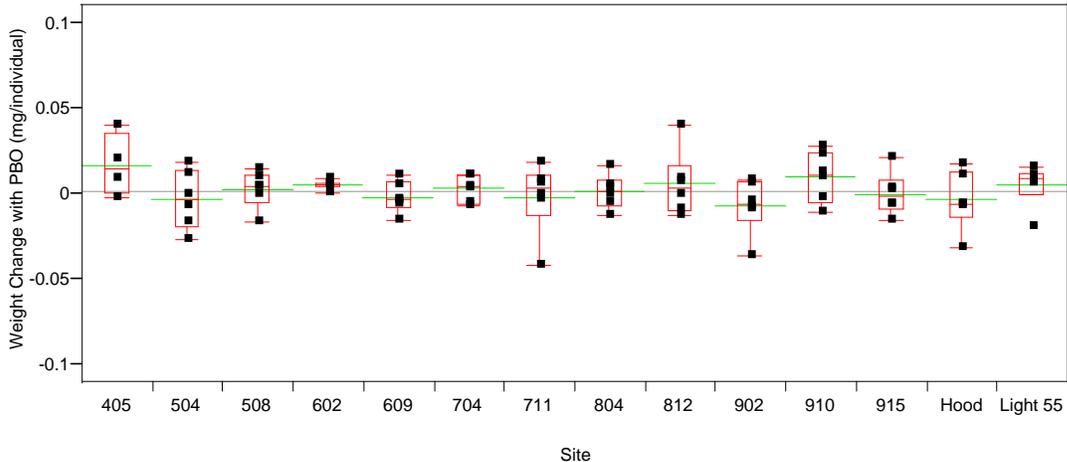
Spring 2007



Summer 2007



Fall 2007



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Appendix C

*Morone saxatilis*

(Striped Bass)

Table C1-1. Results of 7-day *M. saxatilis* toxicity test initiated on 7/30/05 conducted on samples collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/27/05 and 7/28/05.

Treatment	Survival (%) <sup>1</sup>		Length (cm) <sup>1</sup>		Weight (g) <sup>1</sup>	
	mean	se	mean	se	mean	se
Control	100 <sup>P</sup>	0.0	5.2	0.3	1.4	0.1
915	100	0.0	5.3	0.1	1.5	0.1
711	96	4.0	5.3	0.1	1.4	0.1
609	100	0.0	5.4	0.1	1.7	0.1
340	100	0.0	5.2	0.1	1.5	0.1

P. The laboratory control met the criteria for test acceptability.

1. Highlighted areas indicate a significant reduction in survival, length, or weight when compared to the laboratory control. All endpoints were analyzed according to EPA standard methods (1-tailed test,  $P < 0.05$ ).

Table C1-2. Summary of water chemistry measurements taken during a 7-day *M. saxatilis* toxicity test initiated on 7/30/05 examining samples collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/27/05 and 7/28/05.

Treatment	Lab Temp (°C)	Lab pH	Lab EC (µmhos/cm)	Lab DO (mg/L)	Hardness (mg/L CaCO <sub>3</sub> )	Alkalinity (mg/L CaCO <sub>3</sub> )	Ammonia Nitrogen (mg/L)
Control	21	7.98	414	10.2	208	222	NAP
915	19	8.03	157	8.8	96	70	0.00
711	20	7.89	132	8.8	92	78	0.07
609	20	7.63	2740	8.4	376	92	0.10
340	19	7.58	7640	8.8	188	144	0.01

Table C2-1. Effects of Cu+ on striped bass (*M. saxatilis*) during a 7-day exposure conducted using dilute well water spiked with copper chloride initiated on 8/11/05.

Total Cu <sup>+</sup> (2)	Dissolved Cu <sup>+</sup> (2)	Survival (%) <sup>1</sup>		Length (cm) <sup>1</sup>		Weight (g) <sup>1</sup>	
		mean	sd	mean	sd	mean	sd
0 ppb	0 ppb	100 <sup>P</sup>	0.0	5.48	0.34	1.73	0.40
42 ppb	40 ppb	100	0.0	5.41	0.29	1.58	0.30
160 ppb	160 ppb	92	17.9	5.42	0.41	1.66	0.49
470 ppb	440 ppb	0	0.0	-	-	-	-
900 ppb	810 ppb	0	0.0	-	-	-	-

Endpoint	Total Cu <sup>+</sup> (ug/L)			Dissolved Cu <sup>+</sup> (ug/L)		
	LC50	NOEC	LOEC	LC50	NOEC	LOEC
96 Hours	441	160	470	414	160	440
7 Days	262	160	470	254	160	440

P. The laboratory control met the criteria for test acceptability.

1. Highlighted areas indicate a significant reduction in survival, length, or weight when compared to the laboratory control. All endpoints were analyzed according to EPA standard methods. (1-tailed test,  $P < 0.05$ )

2. Copper concentrations were measured analytically.

Table C3-1. Summary of a Striped Bass (*M. saxatilis*) water column toxicity test initiated on 6/20/06 conducted on control water with test animals loaded using two alternative techniques.

Treatment	Day 1 Survival (%) <sup>1</sup>	Day 2 Survival (%) <sup>1</sup>	Day 4 Survival (%) <sup>1</sup>	Day 6 Survival (%) <sup>1</sup>	Day 7 Survival (%) <sup>1</sup>
Short cut pipette with elastic bulb	70	38	5	0	0
Long pipette with pipette pump	70	53	5	5	5
<b>MSD</b>	<b>27</b>	<b>45</b>	<b>19</b>	<b>17</b>	<b>17</b>

1. No significant differences in survival were found at any timepoint.

Table C3-2. Summary of water chemistry measurements during a Striped Bass (*M. saxatilis*) test initiated on 6/20/06 conducted on control water using two alternative loading techniques.

Treatment	Temp (°C)	pH	EC (µS/cm)	DO (mg/L)	Max Unionized Ammonia (mg/L)
Short cut pipette with elastic bulb	21	8.28	912	9.2	0.034
Long pipette with pipette pump	21	8.28	912	9.2	0.034

Table C4-1. Summary of a Striped Bass (*M. saxatilis*) water column toxicity test initiated on 7/14/06 conducted on samples collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/06 - 7/12/06.

Treatment	Day 1 Survival (%) <sup>1</sup>	Day 2		Day 3			Day 4					
		Survival (%) <sup>2</sup>		Survival (%) <sup>2</sup>			Survival (%) <sup>2</sup>					
		A	B	A	B	C	A	B	C			
Well Water	89	66	A	B	61	A	B	C	45	A	B	C
Low EC Control @ 100 $\mu$ S/cm	81	61		B	56	A	B	C	33	A	B	C
High EC Control @ 18,500 $\mu$ S/cm	97	97	A		83	A	B		75	A	B	
POD 508	94	88	A	B	83	A	B	C	74	A	B	
POD 915	79	68	A	B	44		B	C	28		B	C
POD 910	93	84	A	B	64	A	B	C	34	A	B	C
POD 711	90	69	A	B	43			C	24			C
POD 340 <sup>3</sup>	100	97	A		95	A			82	A		
POD 609	100	91	A	B	82	A	B	C	64	A	B	C
<b>MSD</b>	<b>41</b>	<b>47</b>			<b>53</b>				<b>65</b>			

1. No significant differences in survival were found at this timepoint.
2. Treatments not sharing at least one significance group are significantly different from one another using Tukey's multiple comparison procedure.
3. This High EC sample should be compared to the High EC control.

Table C4-2. Summary of water chemistry measurements during a Striped Bass (*M. saxatilis*) test initiated on 7/14/06 conducted on samples collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/11/06 - 7/12/06.

Treatment	Laboratory Chemistry				Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Initial Un-ionized Ammonia (mg/L)	Maximum Un-ionized Ammonia (mg/L)
	Temp (°C)	pH	EC ( $\mu$ S/cm)	DO (mg/L)				
Well Water	22	8.10	675	9.4	NA	NA	NA	0.009
Low EC Control @ 100 $\mu$ S/cm	21	8.24	128	8.9	NA	NA	NA	0.015
High EC Control @ 18,500 $\mu$ S/cm	21	7.77	16490	9.0	NA	NA	NA	0.003
POD 508	20	7.72	877	9.5	122	52	0.000	0.006
POD 915	20	7.70	146	8.9	42	40	0.001	0.006
POD 910	20	7.32	269	7.5	72	52	0.003	0.004
POD 711	20	7.75	156	9.8	52	56	0.003	0.008
POD 340	20	7.44	15750	9.2	1960	160	0.001	0.003
POD 609	19	7.50	650	8.7	102	70	0.001	0.003

Table C5-1. Summary of a 7-day Striped Bass (*M. saxatilis*) water column toxicity test initiated on 8/25/06 examining samples collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/22/06 - 8/23/06.

Treatment	Survival (%) <sup>1</sup>		Weight (g) <sup>1</sup>		Length (cm) <sup>1</sup>	
	Mean	SE	Mean	SE	Mean	SE
Well Water	100	0.0	4.09	0.38	7.0	0.18
High EC Control @ 18 mS/cm	100	0.0	3.14	0.36	6.4	0.21
Suisun Bay at Middle Point (508)	100	0.0	3.64	0.44	6.6	0.19
Montezuma Slough at Nurse Slough (609)	100	0.0	3.62	0.20	6.6	0.12
Old River at Holland Cut (915)	100	0.0	4.39	0.57	7.0	0.31
San Joaquin River at Hog and Turner Cut (910)	100	0.0	3.20	0.18	6.4	0.10
Sacramento River at tip of Grand Island (711)	100	0.0	4.08	0.12	6.8	0.06
Napa River at Vallejo Seawall (340) <sup>2</sup>	100	0.0	4.35	0.09	7.0	0.09
Field Duplicate: Montezuma Slough at Nurse Slough (609)	100	0.0	4.92	0.36	7.4	0.18

**Survival PMSD: NA<sup>3</sup>**

**Weight PMSD: 53.0**

**Length PMSD: 16.2**

1. No significant differences in survival, weight or length were found compared to the appropriate control.
2. This high conductivity sample was compared to the High EC control.
3. Not possible to calculate MSD due to lack of variability in data.

Table C5-2. Summary of water chemistry measurements during a 7-day striped bass (*M. saxatilis*) test initiated on 8/25/06 examining samples collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/22/06 - 8/23/06.

Treatment	Laboratory Chemistry				Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Initial Unionized Ammonia (mg/L)	Maximum Unionized Ammonia (mg/L)
	EC (μS/cm)	Temp (°C)	pH	DO (mg/L)				
Well Water	729	20.4	7.88	9.2	NA	NA	NA	0.653
High EC Control @ 18,000 uS/cm	18800	20.4	7.76	8.9	NA	NA	NA	0.236
Suisun Bay at Middle Point (508)	3007	20.0	7.65	9.2	396	68	0.002	0.160
Montezuma Slough at Nurse Slough (609)	4887	20.3	7.53	8.9	720	85	0.002	0.153
Old River at Holland Cut (915)	222	19.7	7.73	9.1	68	58	0.001	0.435
San Joaquin River at Hog and Turner Cut (910)	343	19.7	7.17	7.9	100	74	0.003	0.306
Sacramento River at tip of Grand Island (711)	133	20.0	7.59	9.2	56	64	0.005	0.227
Napa River at Vallejo Seawall (340)	16070	20.1	7.46	8.7	3720	260	0.000	0.175
Field Duplicate: Montezuma Slough at Nurse Slough (609)	5010	20.0	7.54	8.9	670	85	0.002	0.128

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Table C6-1. Effects of esfenvalerate on striped bass (*M. saxatilis*) during a 24-hour exposure initiated on 8/22/06.

Treatment <sup>2</sup>	4 hours							
	Survival (%)		Normal Swimming (%) <sup>1</sup>					
	Mean	SE	Mean	SE				
Control	1.00	0.00	1.00	0.00				
Solvent Control	1.00	0.00	1.00	0.00				
0.64 ug/L Esfenvalerate	1.00	0.00	1.00	0.00				
2.2 ug/L Esfenvalerate	1.00	0.00	1.00	0.00				
4.4 ug/L Esfenvalerate	1.00	0.00	0.64	0.07				
6.4 ug/L Esfenvalerate	1.00	0.00	0.24	0.04				

Treatment <sup>2</sup>	24 hours							
	Survival (%) <sup>1</sup>		Normal Swimming (%) <sup>1</sup>		Length (cm)		Weight (g)	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Control	1.00	0.00	1.00	0.00	6.58	0.42	3.74	0.74
Solvent Control	1.00	0.00	0.96	0.04	6.44	0.39	3.46	0.61
0.64 ug/L Esfenvalerate	1.00	0.00	1.00	0.00	6.65	0.36	3.91	0.60
2.2 ug/L Esfenvalerate	0.40	0.19	0.28	0.19	6.62	0.55	4.02	1.06
4.4 ug/L Esfenvalerate	0.00	0.00	0.00	0.00	-	-	-	-
6.4 ug/L Esfenvalerate	0.00	0.00	0.00	0.00	-	-	-	-

1: Highlighted areas indicate a significant reduction in survival or normal swimming behavior when compared to the laboratory control. All endpoints were analyzed according to EPA standard methods (1-tailed test, P < 0.05)

2. Esfenvalerate concentrations were measured analytically.

Time	Survival			Swimming Behavior		
	LC50 <sup>3</sup>	NOEC <sup>3</sup>	LOEC <sup>3</sup>	EC25 <sup>3</sup>	NOEC <sup>3</sup>	LOEC <sup>3</sup>
4 hours	NA	6.4	> 6.5	3.88	2.2	4.4
24 hours	2.17	0.64	2.2	1.07	0.64	2.2

3: all concentrations given in ug/L Esfenvalerate

Appendix D

*Hypomesus transpacificus*

(Delta Smelt)

## Methods Tests

Table D1-1. Summary of a 7-day *H. transpacificus* test initiated on 8/11/05 examining survival in three different holding conditions.

Treatment	Rep	# Surviving Fish by Test Day						
		1	2	3	4	5	6	7
5 fish in 5 Liters	1	4	4	4	4	4	3	3
	2	4	3	3	3	3	3	3
Ammonia-N (mg/L)		0.19	0.94	1.14	0.39	1.24	1.87	0.79
10 fish in 5 Liters	1	7	7	7	7	7	7	7
	2	10	9	9	9	9	9	9
Ammonia-N (mg/L)		0.34	1.27	1.42	0.42	1.78	2.75	1.30
10 fish in 8 Liters	1	10	10	10	10	10	10	10
	2	10	9	9	9	9	9	9
Ammonia-N (mg/L)		0.25	0.91	1.05	0.38	1.21	2.15	0.72
% Water Renewed		50	50	80	50	50	80	

Table D1-2. Summary of water chemistry measurements taken on termination of *H. transpacificus* holding conditions test initiated on 8/11/05.

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Ammonia Nitrogen (mg/L)
5 fish in 5 liters	21	8.29	456	8.4	0.79
10 fish in 5 liters	21	8.42	458	8.9	1.30
10 fish in 5 liters	20	8.34	451	8.9	0.72

Table D2-1. Summary of a *H. transpacificus* water column toxicity test initiated on 4/18/06 examining the response of 15 day old fish to control waters with algae added.

Water Bath	Treatment	Day 2 Survival <sup>1</sup>		Day 4 Survival <sup>1</sup>		Day 6 Survival <sup>1</sup>		Day 7 Survival <sup>1</sup>		Day 7 Biomass <sup>1</sup>	
		Survival (%)	Significance Group	Biomass (mg/individual)	Significance Group						
1	Hatchery Water	100	<b>A</b>	98	<b>A</b>	91	<b>A</b>	85	<b>A</b>	0.295	<b>A</b>
	DIEPAMH No Algae	83	<b>B</b>	58	<b>A B C</b>	NA	- - -	48	<b>B</b>	0.113	<b>B</b>
	DIEPAMH + 1x Algae	100	<b>A</b>	75	<b>A B</b>	45	<b>B</b>	13	<b>B C</b>	0.016	<b>B</b>
	DIEPAMH + 2x Algae	100	<b>A</b>	40	<b>B C</b>	0	<b>C</b>	0	<b>C</b>	0.000	<b>B</b>
	DIEPAMH + 3x Algae	95	<b>A B</b>	13	<b>C</b>	3	<b>C</b>	0	<b>C</b>	0.000	<b>B</b>
MSD	21		61		55		51		0.159		
2	Hatchery Water	100	<b>A</b>	100	<b>A</b>	100	<b>A</b>	92	<b>A</b>	0.299	<b>A</b>
	DIEPAMH No Algae	81	<b>A</b>	52	<b>B</b>	NA	- -	36	<b>B</b>	0.081	<b>B</b>
	DIEPAMH + 1x Algae	100	<b>A</b>	36	<b>B</b>	11	<b>B</b>	5	<b>B</b>	0.009	<b>B</b>
	DIEPAMH + 2x Algae	100	<b>A</b>	36	<b>B</b>	3	<b>B</b>	0	<b>B</b>	0.000	<b>B</b>
	DIEPAMH + 3x Algae	100	<b>A</b>	15	<b>B</b>	5	<b>B</b>	0	<b>B</b>	0.000	<b>B</b>
MSD	33		60		20		54		0.122		

1. Treatments not sharing at least one significance group are significantly different from one another using Tukey's multiple comparison procedure.

Table D2-2. Summary of water chemistry measurements during a *H. transpacificus* test initiated on 4/18/06 performed on control waters with algae added to increase turbidity.

Light	Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Initial Unionized Ammonia (mg/L)	Maximum Unionized Ammonia (mg/L)
Fluorescent	Hatchery Water	19	7.32	1654	9.5	0.009	0.013
	DIEPAMH No Algae	19	8.01	288	9.5	0.001	0.016
	DIEPAMH + 1x Algae	18	8.00	289	8.5	0.003	0.029
	DIEPAMH + 2x Algae	20	7.75	291	8.6	0.000	0.031
	DIEPAMH + 3x Algae	20	7.87	306	8.4	0.000	0.060
Ambient	Hatchery Water	19	6.55	1689	8.4	0.003	0.015
	DIEPAMH No Algae	19	8.01	288	9.5	0.001	0.012
	DIEPAMH + 1x Algae	18	8.00	289	8.5	0.004	0.018
	DIEPAMH + 2x Algae	19	8.02	291	9.3	0.004	0.035
	DIEPAMH + 3x Algae	20	7.87	306	8.4	0.003	0.042

## Ambient Monitoring Toxicity Tests – 2005

Table D3-1. Summary of 7-day *H. transpacificus* toxicity test conducted on samples collected by the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/30/05.<sup>1</sup>

Treatment	Survival (%) <sup>2</sup>		Length (cm) <sup>2</sup>		Weight (g) <sup>2</sup>	
	mean	se	mean	se	mean	se
Laboratory Control (Dilute Well Water)	95 <sup>P</sup>	2.9	3.79	0.06	0.29	0.01
711	98	2.5	3.87	0.09	0.29	0.02
915	92	4.9	3.94	0.08	0.34	0.03
609	100	0.0	3.91	0.02	0.32	0.00
340	85	2.9	3.97	0.06	0.32	0.02

P. The laboratory control met the criteria for test acceptability.

1. This test was set up on 9/01/05.

2. Highlighted areas indicate a significant reduction in survival, length, or weight when compared to the laboratory control. All endpoints were analyzed according to EPA standard methods. (1-tailed test,  $P < 0.05$ )

Table D3-2. Summary of water chemistry measurements taken during a 7-day *H. transpacificus* toxicity test initiated on 9/01/05 examining samples collected by the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/30/05.

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Ammonia Nitrogen (mg/L)
Lab Control (Dilute Well Water)	23	8.16	470	8.7	212	200	NAP
711	21	7.91	169	9.1	68	78	0.13
915	21	8.04	360	9.1	740	70	0.07
609	22	7.58	6460	8.2	2236	100	0.08
340	22	7.55	19050	8.4	80	138	0.03

## Ambient Monitoring Toxicity Tests – 2006

Table D4-1. Summary of a 7-day *H. transpacificus* water column toxicity test initiated on 4/05/06 conducted on samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) on 4/03/06 - 4/04/06. (9 day old smelt)

Treatment	Day 2 Survival (%) <sup>1</sup>	Day 4 Survival <sup>2</sup>		Day 6 Survival <sup>2</sup>		Day 7 Survival (%) <sup>1</sup>
		Survival (%)	Significance Group	Survival (%)	Significance Group	
Lab Control (DIEPAMH)	92	23	<b>B</b>	0	<b>B</b>	0
340	100	75	<b>A</b>	45	<b>A</b>	8
508	100	75	<b>A</b>	5	<b>B</b>	0
609	93	85	<b>A</b>	12	<b>B</b>	0
711	100	93	<b>A</b>	15	<b>B</b>	0
910	87	82	<b>A</b>	5	<b>B</b>	0
915	98	87	<b>A</b>	16	<b>B</b>	0
MSD	19	46		22		11

1. No significant differences in survival were found at this timepoint
2. Treatments not sharing at least one significance group are significantly different from one another using Tukey's multiple comparison procedure.

Table D4-2. Summary of water chemistry measurements during a *H. transpacificus* test performed on samples collected by the the UC Davis Aquatic Toxicology and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 4/05/06.

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Initial Unionized Ammonia (mg/L)	Maximum Unionized Ammonia (mg/L)
Lab Control (DIEPAMH)	18	7.99	290	9.6	84	64	-	0.019
340	18	7.57	815	9.8	140	76	0.004	0.008
508	17	7.63	220	10.6	68	56	0.002	0.014
609	18	7.43	574	10.5	128	78	0.002	0.018
711	18	7.48	141	10.8	52	48	0.002	0.023
910	18	7.67	208	10.7	60	54	0.007	0.017
915	18	7.61	182	10.7	60	48	0.002	0.009

Table D5-1. Summary of a 7-day *H. transpacificus* water column toxicity test conducted on samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) on 5/01/06 - 5/02/06.<sup>1</sup> (30 day old Smelt)

Treatment	Day 2 Survival (%) <sup>2</sup>	Day 4 Survival (%) <sup>2</sup>	Day 6 Survival <sup>3</sup>			Day 7 Survival <sup>3</sup>				
			Survival (%)	Significance Group		Survival (%)	Significance Group			
Hatchery Water from Fish Culture <sup>4</sup>	98	95	79	A		79	A			
Hatchery Water from Tap <sup>4</sup>	100	79	54	A	B	C	43	B	C	D
Diluted Hatchery Water	100	92	63	A	B	C	53	A	B	C
711	98	82	58	A	B	C	40	B C D		
910	95	57	51	A	B	C	30	C D		
915	98	76	37	B C			27	C D		
340	95	71	61	A	B	C	55	A	B	C
508	95	78	28	C			18	D		
609	100	95	73	A	B		64	A	B	
MSD	16	51	48				45			

1. This test was set up on 5/03/06.
2. No significant differences in survival were found at this timepoint
3. Treatments not sharing at least one significance group are significantly different from one another using Tukey's multiple comparison procedure.
4. Hatchery water from the fish culture was Hatchery Tap Water with Nanno 3600 and salt water added.

Table D5-2. Summary of water chemistry measurements during a 7-day *H. transpacificus* test initiated on 5/03/06 examining samples collected by the the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/01/06 - 5/02/06.

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Initial Unionized Ammonia (mg/L)	Maximum Unionized Ammonia (mg/L)
Hatchery Water	17.1	7.19	1117	8.9	-	-	0.001	0.003
Filtered Hatchery Water	17.1	7.84	135	9.7	-	-	0.000	0.008
Diluted Hatchery Water	17.4	7.46	154	9.6	-	-	0.000	0.005
711	19.3	7.84	104	9.5	52	46	0.003	0.015
910	17.6	7.66	137	8.9	44	40	0.002	0.011
915	17.0	7.31	152	9.0	44	42	0.001	0.009
340	17.3	7.64	461	9.1	124	68	0.002	0.014
508	17.3	7.80	141	9.2	56	58	0.002	0.018
609	17.6	7.80	506	9.1	112	70	0.004	0.014

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Table D6-1. Summary of a *H. transpacificus* water column toxicity test conducted on samples collected by the UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) on 5/15/06 - 5/16/06.<sup>1</sup> (40 day old Smelt)

Treatment	Day 1 Survival <sup>2</sup>		Day 2 Survival <sup>2</sup>	
	Survival (%)	Significance Group	Survival (%)	Significance Group
Hatchery Water	35	A B	5	C
711	44	A B	33	B C
910	50	A B	35	A B C
915	76	A B	24	B C
340	83	A	74	A
508	30	B	5	C
609	70	A B	50	A B
Low Salinity Hatchery Water + Algae	NA	- -	10	B C
MSD	69		52	

1. This test was set up on 5/17/06.
2. Treatments not sharing at least one significance group are significantly different from one another using Tukey's multiple comparison procedure.

Table D6-2. Summary of water chemistry measurements during a *H. transpacificus* test performed on samples collected by the UC Davis Aquatic Toxicology Laboratory (UCD ATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/15/06 - 5/16/06.

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Initial Unionized Ammonia (mg/L)	Maximum Unionized Ammonia (mg/L)
Hatchery Water	18.2	7.50	703	9.3	-	-	-	0.009
711	18.0	7.74	102	10.3	44	46	0.003	0.009
910	18.2	7.85	134	9.8	44	37	0.007	0.009
915	19.0	7.48	130	9.6	36	35	0.002	0.008
340	18.6	7.61	2347	9.7	280	72	0.003	0.007
508	18.6	7.96	127	9.6	52	46	0.007	0.009
609	18.2	8.10	314	9.3	72	58	0.010	0.011
Low Salinity Hatchery Water + Algae	17.9	7.81	112	8.9	-	-	-	0.005

Table D7-1. Summary of a *H. transpacificus* water column toxicity test conducted on samples collected by the UC Davis Aquatic Toxicology Laboratory (UCD ATL) and the California Department of Fish and Game (CDFG) on 5/30/06 - 5/31/06.<sup>1</sup> (60 day old Smelt)

Treatment	Day 2 Survival <sup>2</sup>		Day 4 Survival <sup>2</sup>	
	Survival (%)	Significance Group	Survival (%)	Significance Group
Hatchery Water	60	<b>A B</b>	55	<b>A B</b>
Low Salinity Hatchery Water + Algae	37	<b>B</b>	30	<b>A B</b>
711	38	<b>B</b>	20	<b>B</b>
910	45	<b>A B</b>	33	<b>A B</b>
915	43	<b>A B</b>	31	<b>B</b>
340	88	<b>A</b>	86	<b>A</b>
508	68	<b>A B</b>	58	<b>A B</b>
609	68	<b>A B</b>	68	<b>A B</b>
MSD	62		69	

1. This test was set up on 6/01/06.
2. Treatments not sharing at least one significance group are significantly different from one another using Tukey's multiple comparison procedure.

Table D7-2. Summary of water chemistry measurements during a *H. transpacificus* test performed on samples collected by the UC Davis Aquatic Toxicology Laboratory (UCD ATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/30/06 - 5/31/06.

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Initial Unionized Ammonia (mg/L)	Maximum Unionized Ammonia (mg/L)
Hatchery Water	16	7.99	491	10.1	-	-	0.001	0.005
Low Salinity Hatchery Water + Algae	17	8.20	124	9.8	-	-	0.006	0.021
711	16	7.94	124	10.5	50	52	0.008	0.026
910	15	7.80	131	10.8	40	35	0.006	0.015
915	15	7.68	1355	10.8	32	34	0.003	0.014
340	16	7.66	3412	10.0	382	61	0.003	0.013
508	13	7.55	614	10.3	48	46	0.001	0.020
609	14	7.69	624	9.9	92	60	0.004	0.014

Table D8-1. Summary of a *H. transpacificus* water column toxicity test conducted on samples collected by the UC Davis Aquatic Toxicology Laboratory (UCD ATL) and the California Department of Fish and Game (CDFG) on 6/13/06 - 6/14/06.<sup>1</sup> (90 day old Smelt)

Treatment	Day 1 Survival (%) <sup>2</sup>	Day 2 Survival (%) <sup>2</sup>	Day 4 Survival (%) <sup>2</sup>	Day 6 Survival (%) <sup>2</sup>	Day 7 Survival (%) <sup>2</sup>
Hatchery Water (1500 uS/cm)	96	88	75	58	58
711 salted to 1500 uS/cm	83	67	67	63	59
Low Conductivity Control	83	71	62	62	62
711	92	88	69	66	66
910	84	64	50	35	35
915	85	77	52	41	41
340	96	96	77	78	81
508	77	77	52	43	44
609	79	71	50	46	46
Hatchery Water (1500 uS/cm) in 2 <sup>nd</sup> water bath	83	80	66	60	62
DIEPAMH salted to 1500 uS/cm in 2 <sup>nd</sup> water bath	91	91	82	77	77
MSD	51	71	80	77	76

1. This test was set up on 6/15/06.
2. No significant differences in survival were found at any timepoint

Table D8-2. Summary of water chemistry measurements during a *H. transpacificus* test performed on samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/13/06 -6/14/06.

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	Initial Unionized Ammonia (mg/L)	Maximum Unionized Ammonia (mg/L)
Hatchery Water (1500 uS/cm)	19	7.90	1535	9.2	40	32	0.004	0.011
711 salted to 1500 uS/cm	19	7.93	1474	9.6	172	57	0.006	0.012
Low Conductivity Control	18	7.83	241	8.9	12	10	0.004	0.011
711	18	8.05	120	9.3	48	48	0.009	0.012
910	19	7.88	124	8.9	42	32	0.005	0.011
915	18	7.85	179	9.1	52	36	0.003	0.012
340	21	7.76	6400	8.9	876	70	0.005	0.011
508	18	8.09	137	9.4	44	48	0.010	0.013
609	18	8.11	195	9.4	60	52	0.005	0.010
Hatchery Water (1500 uS/cm) in 2 <sup>nd</sup> water bath	19	7.90	1535	9.2	40	32	0.004	0.012
DIEPAMH salted to 1500 uS/cm in 2 <sup>nd</sup> water bath	18	8.05	1493	9.5	190	60	0.003	0.006

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## Ambient Monitoring Toxicity Tests – 2007

Table D9-1. Summary of a 7-day *H. transpacificus* water column toxicity test initiated on 5/12/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/8/07 and 5/10/07.<sup>1</sup>

Treatment <sup>3</sup>	Survival (%) <sup>2</sup>													Weight <sup>2</sup> (mg/surviving individual)		Biomass <sup>2</sup> (mg/original individual)						
	Day 1	Day 2	Day 3	Day 4	Day 5	5A	5B	Day 6	6A	6B	6C	Day 7	7A	7B	7C	Mean	SE	Mean	SE	A	B	C
Low EC Control @ 180 uS/cm	98	87	82	71	64			33			<b>C</b>	21			<b>C</b>	0.948	0.072	0.195	0.084			<b>C</b>
711	100	82	71	59	48		<b>B</b>	30			<b>C</b>	20			<b>C</b>	0.889	0.173	0.173	0.067			<b>C</b>
Hood	100	87	81	74	69			50		<b>B</b>	<b>C</b>	45		<b>B</b>	<b>C</b>	0.824	0.069	0.384	0.101			
915	95	93	88	83	78			68				45		<b>B</b>	<b>C</b>	0.909	0.064	0.410	0.084			
Vernalis	100	90	80	70	62			54				45		<b>B</b>	<b>C</b>	0.821	0.066	0.362	0.062			
Hatchery Rearing Water @ 2500 uS/cm	95	93	88	86	84			60				39		<b>B</b>	<b>C</b>	0.767	0.047	0.299	0.035			<b>B</b> <b>C</b>
High EC Control @ 5000 uS/cm	100	97	97	97	89		<b>A</b>	89		<b>A</b>	<b>B</b>	73		<b>A</b>	<b>B</b>	0.813	0.062	0.597	0.074	<b>A</b>	<b>B</b>	
609	95	78	78	76	68			59				51				0.832	0.051	0.404	0.082			
508	100	95	85	85	70			54				43		<b>B</b>	<b>C</b>	0.795	0.063	0.352	0.092			<b>B</b> <b>C</b>
340	100	94	94	91	91		<b>A</b>	91		<b>A</b>		89		<b>A</b>		0.817	0.058	0.717	0.029	<b>A</b>		

1. Test was conducted in beakers.

Smelt were 36-days old at test initiation.

2. All samples and controls were compared to one another using ANOVA and Tukey's multiple comparison procedure.

3. The Low EC control showed lower Day 6 Survival, Day 7 Survival, and Biomass than the High EC Control.

Table D9-2. Water chemistry at field conditions of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/8/07 and 5/10/07.

Treatment	Field Chemistry				
	SC (uS/cm)	EC (uS/cm)	Temp (°C)	DO (mg/L)	pH
Sacramento R. at Grand Island (711)	177.7	157.8	19.4	8.60	8.05
Sacramento R. at Hood DWR Station	189.1	170.9	20.2	8.61	7.34
Old River at Holland Cut (915)	277.0	254.8	21.0	8.40	8.17
Sacramento R. at Vernalis DWR Station	474.0	436.1	21.0	9.85	8.06
Montezuma Slough at Nurse Slough (609)	4713.0	4043.8	17.9	8.64	7.88
Suisun Bay off Chipps Island (508)	5390.0	4678.5	18.4	9.76	8.02
Napa River at Riverside Blvd Terminus (340)	9640.0	9215	22.8	13.07	8.26

Table D9-3. Summary of water chemistry during a *H. transpacificus* (Delta Smelt) 7-day test initiated on 5/12/07 evaluating the toxicity of Sacramento River and Delta water samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/8/07 and 5/10/07.

Treatment	Temp (°C)			EC (uS/cm)			DO (mg/L)			pH			Turbidity (NTU)			Un-ionized Ammonia (mg/L)			Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N		
Low EC Control @ 160 uS/cm	16.4	0.4	8	157	4	4	8.7	0.9	8	7.70	0.24	8	-	-	0	0.009	0.001	3	-	-
Sacramento R. at Grand Island (711)	16.3	0.4	8	149	9	4	9.2	1.0	8	7.69	0.09	8	5.6	0.2	3	0.015	0.002	3	68	68
Sacramento R. at Hood DWR Station	16.5	0.4	8	156	5	4	9.2	0.9	8	7.61	0.13	8	4.2	-	1	0.021	0.002	3	72	66
Old River at Holland Cut (915)	16.6	0.5	8	236	8	4	9.1	1.0	8	7.70	0.15	8	3.9	0.0	3	0.011	0.001	3	80	66
Sacramento R. at Vernalis DWR Station	16.6	0.6	8	326	3	4	9.3	1.0	8	7.76	0.15	8	4.4	-	1	0.010	0.001	3	100	58
Hatchery Water @ 2500 uS/cm	16.7	0.6	8	2072	36	4	8.6	0.8	8	7.76	0.19	8	-	-	0	0.012	0.001	3	480	360
High EC Control @ 5000 uS/cm	16.7	0.8	8	4331	42	4	8.8	0.8	8	7.65	0.19	8	-	-	0	0.008	0.001	3	-	-
Montezuma Slough at Nurse Slough (609)	16.6	0.7	8	3834	33	4	9.2	0.9	8	7.63	0.09	8	40.2	0.8	3	0.010	0.002	3	540	88
Suisun Bay off Chipps Island (508)	16.6	0.7	8	4391	89	4	9.2	0.9	8	7.69	0.11	8	18.5	0.7	3	0.009	0.001	3	428	72
Napa River at Riverside Blvd Terminus (340)	16.6	0.6	8	7773	90	4	9.2	1.2	8	7.79	0.13	8	19.5	0.5	3	0.013	0.003	3	356	122

Table D10-1. Summary of a 7-day *H. transpacificus* water column toxicity test conducted in aquaria initiated on 5/24/07 examining samples collected by the UC Davis Aquatic Toxicology Laboratory (UCD ATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/23/07 and 5/24/07.

Treatment	Day 7 Survival (%) <sup>1</sup>					Weight (mg/surviving individual) <sup>1</sup>		Biomass (mg/original individual) <sup>1</sup>				
	mean	se	A	B	C	mean	se	mean	se	A	B	C
Low EC Control @ 180 uS/cm	31.8	6.6			<b>C</b>	0.742	0.039	0.233	0.047			<b>C</b>
Sacramento R. at tip of Grand Island (711)	36.5	4.0			<b>C</b>	0.633	0.061	0.226	0.021			<b>C</b>
Sacramento R. at Hood DWR Station	40.5	13.3		<b>B</b>	<b>C</b>	0.675	0.040	0.282	0.101			<b>C</b>
Old River at Holland Cut (915)	31.7	2.8			<b>C</b>	0.812	0.044	0.258	0.027			<b>C</b>
San Joaquin R. at Vernalis DWR Station	39.2	5.9		<b>B</b>	<b>C</b>	0.687	0.049	0.263	0.029			<b>C</b>
Hatchery Rearing Water @ 2188 uS/cm	53.0	7.1		<b>B</b>	<b>C</b>	0.895	0.150	0.462	0.066		<b>B</b>	<b>C</b>
High EC Control @ 5000 uS/cm	50.8	10.0		<b>B</b>	<b>C</b>	0.791	0.027	0.405	0.083		<b>B</b>	<b>C</b>
Montezuma Slough @ Nurse Slough (609) <sup>2</sup>	90.0	0.9	<b>A</b>			0.840	0.039	0.756	0.031	<b>A</b>		
Sacramento R. across from Sherman Lake (508)	69.9	2.7	<b>A</b>	<b>B</b>		0.790	0.045	0.553	0.039	<b>A</b>	<b>B</b>	
Napa River at Riverside Blvd Terminus (340) <sup>2</sup>	87.2	5.1	<b>A</b>			0.854	0.042	0.743	0.049	<b>A</b>		

- No significant reduction in survival, weight or biomass were observed compared to the appropriate control. No significant differences in weight were observed between treatments. All pairwise comparisons were evaluated with Tukey's multiple comparison procedure.
- Samples 609 and 340 showed significantly higher survival and biomass than the high EC control. Smelt were 30 days old at test initiation.

Table D10-2. Water chemistry at field conditions of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/23/07 and 5/24/07.

Sample	Field Chemistry					Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )
	SC (µS/cm)	EC (µS/cm)	Temp (°C)	DO (mg/L)	pH		
Sacramento R. at Grand Island (711)	202.3	186.9	21.2	9.0	7.92	56	62
Sacramento R. at Hood DWR Station	327.7	307.4	21.9	7.6	7.32	60	68
Old River at Holland Cut (915)	380.4	347.7	20.7	8.6	8.14	84	72
Sacramento R. at Vernalis DWR Station	451.9	403.1	19.6	11.0	8.39	100	64
Montezuma Slough at Nurse Slough (609)	5400.0	4762.8	19.1	8.1	7.80	300	80
Suisun Bay off Chipps Island (508)	3459.0	3037.0	18.9	9.2	8.05	380	90
Napa River at Riverside Blvd Terminus (340)	13490.0	12653.6	21.9	9.8	7.92	1520	160

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Table D10-3. Summary of water chemistry during a *H. transpacificus* (Delta Smelt) 7-day test initiated on 5/24/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 5/23/07 and 5/24/07.

Treatment	Temp (°C)			EC (µS/cm)			DO (mg/L)			pH			Turbidity (NTU)			Un-ionized Ammonia (mg/L)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
Low EC Control @ 160 µS/cm	16.6	0.4	5	190	54	5	9.6	0.5	5	7.48	0.25	5	9.9	-	1	0.001	0.001	4
Sacramento R. at Grand Island (711)	16.3	0.4	5	194	55	5	9.7	0.2	5	7.82	0.07	5	5.7	-	1	0.012	0.003	5
Sacramento R. at Hood DWR Station	16.4	0.3	5	198	50	5	9.6	0.3	5	7.77	0.12	5	2.8	-	1	0.011	0.004	5
Old River at Holland Cut (915)	16.4	0.3	5	317	39	5	9.8	0.3	5	7.85	0.18	5	4.5	-	1	0.002	0.002	4
Sacramento R. at Vernalis DWR Station	16.4	0.5	5	379	55	5	9.7	0.2	5	7.92	0.08	5	5.9	-	1	0.002	0.002	5
Hatchery Water @ 2500 µS/cm	16.9	1.0	5	1411	647	5	9.6	0.2	5	7.84	0.13	5	19.7	-	1	0.003	0.002	4
High EC Control @ 5000 µS/cm	16.7	0.4	5	4316	303	5	9.5	0.5	5	7.87	0.06	5	19.7	-	1	0.003	0.001	4
Montezuma Slough at Nurse Slough (609)	16.4	0.3	5	4571	387	5	9.6	0.2	5	7.79	0.15	5	40.9	-	1	0.002	0.000	5
Suisun Bay off Chipps Island (508)	16.3	0.4	5	3691	173	5	9.7	0.2	5	7.83	0.13	5	15.4	-	1	0.002	0.001	5
Napa River at Riverside Blvd Terminus (340)	16.5	0.3	5	11318	997	5	9.6	0.2	5	7.76	0.14	5	14.9	-	1	0.001	0.002	5

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Table D11-1. Results of a 7-day *H. transpacificus* test initiated on 6/07/07 examining the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07 - 6/07/07.

Treatment	Survival (%) <sup>1</sup>					Weight (mg) <sup>1</sup>		Biomass (mg) <sup>1</sup>			
	mean	se	A	B	C	mean	se	mean	se	A	B
Low EC Control @ 160 µS/cm	89.4	2.0	A	B		2.215	0.118	1.981	0.121	A	B
Sacramento R. at Grand Island (711)	74.8	6.1		B	C	1.952	0.153	1.471	0.192		B
Sacramento R. at Hood DWR Station	68.4	4.6			C	2.124	0.246	1.447 <sup>2</sup>	0.171		B
Old River at Holland Cut (915)	87.1	5.5	A	B	C	1.900	0.125	1.659	0.157	A	B
Sacramento R. at Vernalis DWR Station	86.6	2.7	A	B	C	2.184	0.115	1.885	0.087	A	B
Hatchery Water @ 2500 µS/cm	97.7	2.3	A			2.182	0.127	2.124	0.075	A	B
High EC Control @ 5000 µS/cm	93.6	4.0	A	B		2.514	0.214	2.377	0.292	A	
Montezuma Slough at Nurse Slough (609)	93.6	4.0	A	B		2.206	0.127	2.071	0.180	A	B
Suisun Bay off Chipps Island (508)	93.8	2.1	A	B		2.296	0.188	2.140	0.136	A	B
Napa River at Riverside Blvd Terminus (340)	89.2	3.9	A	B		2.725	0.205	2.409	0.122	A	

**Survival PMSD: 19.6%**

**Weight PMSD: 37.2%**

**Biomass PMSD: 37.3%**

1. Highlighted areas indicate significant reduction in survival, weight or biomass compared to the appropriate control.

Data were analyzed using EPA standard statistical procedures, one-way ANOVAs, and Tukey's multiple comparison procedure.

2. This biomass was found to differ significantly from the control by EPA statistical procedures, but not by ANOVA.

Smelt were 44 days old at test initiation.

Table D11-2. Water chemistry at field conditions of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07 - 6/07/07.

Treatment	Field Chemistry					Unionized Ammonia (mg/L)	Turbidity (NTU)
	SC (µS/cm)	EC (µS/cm)	Temp (°C)	DO (mg/L)	pH		
Sacramento R. at Grand Island (711)	205.1	185.7	20.1	7.7	7.88	0.013	3.4
Sacramento R. at Hood DWR Station	327.7	172.4	21.9	7.6	7.32	0.010	5.5
Old River at Holland Cut (915)	343.9	316.8	20.7	7.9	8.14	0.002	4.7
Sacramento R. at Vernalis DWR Station	451.9	396.8	19.6	11	8.39	0.000	5.0
Montezuma Slough at Nurse Slough (609)	5570	4946.2	19.4	8.5	7.77	0.001	18.9
Suisun Bay off Chipps Island (508)	4035	3494.3	18.3	9.5	7.9	0.002	11.5
Napa River at Riverside Blvd Terminus (340)	13870	15170	20.7	8.7	7.62	0.000	6.8

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Table D11-3. Water chemistry during a *H. transpacificus* (Delta Smelt) 7-day test initiated on 6/07/07 evaluating the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/06/07 - 6/07/07.

Treatment	Temp (°C)		EC (µS/cm)		DO (mg/L)		pH		Turbidity (NTU)		Un-ionized Ammonia (mg/L)		Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )
	N = 5		N = 5		N = 5		N = 5		N = 4		N = 5			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Low EC Control @ 160 µS/cm	16.6	0.6	250	106	8.8	0.5	7.66	0.22	8.7	4.1	0.006	0.005	44	34
Sacramento R. at Grand Island (711)	16.6	0.6	222	103	9.7	0.2	7.88	0.14	2.1	0.8	0.019	0.005	60	68
Sacramento R. at Hood DWR Station	16.7	0.9	217	94	9.6	0.0	7.78	0.18	2.6	0.9	0.010	0.004	64	72
Old River at Holland Cut (915)	16.8	0.7	356	101	9.8	0.2	7.88	0.12	2.4	1.0	0.004	0.002	76	70
Sacramento R. at Vernalis DWR Station	16.8	1.0	438	76	9.7	0.2	8.10	0.23	3.5	1.1	0.004	0.003	148	82
Hatchery Water @ 2500 µS/cm	16.8	0.7	2273	141	9.2	0.3	7.79	0.15	6.4	1.9	0.007	0.007	580	390
High EC Control @ 5000 µS/cm	16.7	0.8	4305	278	9.0	0.3	7.76	0.13	6.7	1.9	0.007	0.007	640	70
Montezuma Slough at Nurse Slough (609)	16.7	0.6	4644	336	9.7	0.3	7.81	0.11	7.7	2.8	0.002	0.002	3200	120
Suisun Bay off Chipps Island (508)	16.6	0.8	3538	197	9.7	0.3	7.87	0.09	6.3	1.3	0.003	0.002	944	120
Napa River at Riverside Blvd Terminus (340)	16.8	0.7	12888	1118	9.5	0.4	7.82	0.11	3.7	1.2	0.002	0.002	1744	134

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Table D12-1. Results of a *H. transpacificus* 7-day test initiated on 6/22/07 evaluating the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/20/07 - 6/21/07. Smelt were 59 days old at test initiation.

Treatment	Survival (%) <sup>1</sup>	
	mean	se
Low EC Control	85.0	5.0
Sacramento R. at tip of Grand Island (711)	72.5	9.5
Sacramento R. at Hood DWR Station	80.2	5.9
Old R. at Holland Cut (915)	75.1	8.4
Hatchery Rearing Water Control	81.7	8.0
High EC Control @ 5000 uS/cm and 11 NTU	94.4	3.2
Montezuma Slough at Nurse Slough (609)	88.9	7.9
Suisun Bay off Chipps Island (508)	91.9	5.3
Napa River at Riverside Blvd Terminus (340)	94.7	3.1
Low Turbidity Control	83.3	9.6

**Tukey's MSD: 33.6%**

1. No significant reductions in survival were seen in any sample, and no significant differences in survival were seen among the various controls. Data were analyzed using both Tukey's multiple comparison procedure and EPA standard statistical protocols.

Table D12-2. Water chemistry at field conditions of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/20/07 - 6/21/07.

Sample	Field Chemistry				
	SC ( $\mu$ S/cm)	EC ( $\mu$ S/cm)	Temp ( $^{\circ}$ C)	DO (mg/L)	pH
Sacramento R. at Grand Island (711)	172.6	161.9	21.9	8.1	7.80
Sacramento R. at Hood DWR Station	124.1	119.4	23.1	7.0	7.32
Old River at Holland Cut (915)	291.5	287.4	24.3	7.8	8.06
Montezuma Slough at Nurse Slough (609)	7000	6412	20.8	7.9	7.84
Suisun Bay off Chipps Island (508)	5360	4931	21.0	8.8	7.97
Napa River at Riverside Blvd Terminus (340)	17020	17088	25.2	8.7	7.76

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Table D12-3. Water chemistry during a *H. transpacificus* (Delta Smelt) 7-day test initiated on 6/22/07 evaluating the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 6/20/07 - 6/21/07.

Treatment	Temp (°C)			EC (µS/cm)			DO (mg/L)			pH			Turbidity (NTU)			Un-ionized Ammonia (mg/L)			Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N		
Low EC Control	17.2	0.9	8	164	19	8	9.2	0.5	8	7.78	0.19	8	7.8	0.7	7	0.000	0.015	5	36	26
Sacramento R. at tip of Grand Island (711)	16.9	1.0	8	171	24	8	9.5	0.3	8	7.96	0.08	8	4.0	1.3	8	0.001	0.012	5	64	62
Sacramento R. at Hood DWR Station	16.8	0.6	8	134	26	8	9.5	0.3	8	7.98	0.13	8	2.5	1.6	8	0.003	0.009	5	52	50
Old R. at Holland Cut (915)	16.7	1.2	8	273	23	8	9.5	0.3	8	8.03	0.12	8	2.3	0.8	8	0.001	0.008	5	80	66
Hatchery Rearing Water Control	17.1	0.5	8	924	19	8	9.4	0.3	8	7.98	0.08	8	5.7	0.8	7	0.004	0.010	4	144	86
High EC Control	17.2	0.6	8	4146	145	8	9.4	0.4	8	7.89	0.09	8	7.0	1.4	7	0.002	0.010	4	640	70
Montezuma Slough at Nurse Slough (609)	16.7	1.3	8	5040	542	8	9.4	0.3	8	7.93	0.15	8	8.9	5.8	8	0.001	0.006	5	820	70
Suisun Bay off Chipps Island (508)	16.7	1.0	8	4040	370	8	9.5	0.4	8	7.93	0.10	8	7.8	6.6	8	0.001	0.006	5	500	76
Napa River at Riverside Blvd Terminus (340)	17.1	0.8	8	14129	1141	8	9.3	0.4	8	7.92	0.11	8	3.5	1.3	8	0.000	0.003	5	2000	141
Low Turbidity Control	16.9	1.5	8	948	54	8	9.3	0.7	8	7.95	0.09	8	1.8	0.5	7	0.003	0.005	4	160	82

Table D13-1. Results of a *H. transpacificus* 96-hour test initiated on 7/26/07 evaluating the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07 - 7/26/07.

Treatment	Survival (%) <sup>1</sup>	
	mean	se
Low EC Control	61.0	8.4
Sacramento R. at tip of Grand Island (711)	29.3	6.3
Sacramento R. at Hood DWR Station	56.5	14.9
Old R. at Holland Cut (915)	51.9	5.3
San Joaquin R. at Vernalis	66.1	11.5
Hatchery Rearing Water Control	40.8	8.9
High EC Control	26.5	6.2
Montezuma Slough at Nurse Slough (609)	41.3	10.9
Suisun Bay off Chipps Island (508)	32.9	5.3
Napa River at Riverside Blvd Terminus (340)	57.5	11.3
Low Turbidity Control <sup>2</sup>	24.6	3.1

1. Data were analyzed using both EPA standard statistical protocols and Tukey's multiple comparison procedure. Highlighted areas indicate significant reduction in survival or biomass compared to the appropriate conductivity control when analyzed by EPA statistics. Tukey's multiple comparison procedure was unable to detect any significant differences.

2. The low turbidity control was not found to be significantly different than the hatchery water control.

Smelt were 54 days old at test initiation.

Table D13-2. Water chemistry at field conditions of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07 - 7/26/07.

Sample	Field Chemistry				
	SC ( $\mu$ S/cm)	EC ( $\mu$ S/cm)	Temp ( $^{\circ}$ C)	DO (mg/L)	pH
Sacramento R. at Grand Island (711)	141.5	134.7	22.6	8.1	7.29
Sacramento R. at Hood DWR Station	154.6	148.1	22.9	8.1	7.64
Old River at Holland Cut (915)	328.4	320.5	23.8	8.0	7.39
San Joaquin R. at Vernalis	587	583.5	24.7	9.7	8.43
Montezuma Slough at Nurse Slough (609)	8150	7808	22.9	8.2	7.73
Suisun Bay off Chipps Island (508)	5030	4789	22.6	8.4	7.89
Napa River at Riverside Blvd Terminus (340)	24400	23814	23.8	6.6	7.64

Table D13-3. Water chemistry during a *H. transpacificus* (Delta Smelt) 96-hour test initiated on 7/26/07 evaluating the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 7/25/07 - 7/26/07.

Treatment	Temp (°C)		EC (µS/cm)		DO (mg/L)		pH		Turbidity (NTU)		Un-ionized Ammonia (mg/L)		Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )
	N = 5		N = 5		N = 5		N = 5		N = 4		N = 4			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Low EC Control	16.6	0.7	219	75	9.6	0.2	7.69	0.27	5.5	0.7	0.007	0.006	-	-
Sacramento R. at tip of Grand Island (711)	16.5	0.6	179	64	9.8	0.1	7.84	0.17	3.1	0.4	0.011	0.003	52	57
Sacramento R. at Hood DWR Station	16.9	0.9	200	111	9.7	0.1	7.90	0.18	3.1	0.3	0.004	0.003	56	60
Old R. at Holland Cut (915)	16.7	0.8	325	46	9.7	0.2	7.91	0.18	2.7	0.6	0.005	0.002	72	59
San Joaquin R. at Vernalis	16.4	0.8	523	42	10.0	0.3	8.19	0.16	5.2	1.2	0.009	0.001	136	105
Hatchery Rearing Water Control	16.6	0.8	1746	256	9.8	0.3	7.88	0.10	2.2	0.7	0.006	0.004	-	-
High EC Control	16.6	0.6	4085	250	9.6	0.3	7.87	0.13	1.6	0.8	0.004	0.003	-	-
Montezuma Slough at Nurse Slough (609)	16.5	0.5	6558	372	9.8	0.2	7.88	0.13	4.4	0.9	0.004	0.003	760	95
Suisun Bay off Chipps Island (508)	16.6	0.6	4243	158	9.7	0.2	7.85	0.17	3.1	0.6	0.004	0.003	532	66
Napa River at Riverside Blvd Terminus (340)	16.6	0.8	19248	1456	9.4	0.3	7.79	0.19	4.3	0.4	0.003	0.002	3080	139
Low Turbidity Control	16.7	0.8	1133	69	9.7	0.2	7.69	0.30	1.3	0.2	0.001	0.002	-	-

Table D14-1. Results of a *H. transpacificus* 7-day test initiated on 8/09/07 evaluating the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/8/07 - 8/09/07.

Treatment	Survival (%) <sup>1</sup>	
	mean	se
Low EC Control @ 135 $\mu$ S/cm	82.3	7.3
Sacramento R. at tip of Grand Island (711)	58.9	9.9
Sacramento R. at Hood DWR Station	62.5	17.5
Old R. at mouth of Holland Cut (915)	75.0	5.0
San Joaquin R. at Vernalis DWR Station	96.9	3.1
Hatchery Water @ 1746 $\mu$ S/cm	92.2	4.8
High EC Control @ 5000 $\mu$ S/cm	93.7	3.7
Montezuma Slough at Nurse Slough (609)	90.5	3.2
Suisun Bay off Chipps Island (508)	92.9	4.1
Napa R. at Riverside Blvd terminus (340)	81.5	8.9
Low Turbidity Control (2 - 3 NTU) at 3131 $\mu$ S/cm	70.8	13.1

1. Highlighted areas indicate significant reduction in survival compared to the appropriate control. Data were analyzed using both USEPA standard statistical protocols and Tukey's multiple comparison procedure.

Smelt were 92 days old at test initiation.

Table D14-2. Water chemistry at field conditions of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/8/07 - 8/09/07.

Sample	Field Chemistry				
	SC ( $\mu$ S/cm)	EC ( $\mu$ S/cm)	Temp (°C)	DO (mg/L)	pH
Sacramento R. at tip of Grand Island (711)	142.6	134.3	22.1	8.6	7.86
Sacramento R. at Hood DWR Station	153.5	140.6	20.8	8.3	7.22
Old R. at mouth of Holland Cut (915)	396.6	379.1	22.8	8.2	7.65
San Joaquin R. at Vernalis DWR Station	-	-	-	-	-
Montezuma Slough at Nurse Slough (609)	8970	8127	20.3	8.3	7.43
Suisun Bay off Chipps Island (508)	7140	6497	20.5	8.7	7.88
Napa R. at Riverside Blvd terminus (340)	25760	23905	21.4	7.0	7.25

Table D14-3. Water chemistry during a *H. transpacificus* (Delta Smelt) 7-day test initiated on 8/09/07 evaluating the toxicity of samples collected by the UC Davis Aquatic Toxicology Laboratory (UCDATL) and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) on 8/8/07 - 8/09/07.

Treatment	Temp (°C)		EC (µS/cm)		DO (mg/L)		pH		Turbidity (NTU)		Un-ionized Ammonia (mg/L)			Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )
	N = 8		N = 8		N = 8		N = 8		N = 7		Mean	SD	N		
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	N		
Low EC Control	17.1	0.3	204	86	9.3	0.1	7.46	0.11	4.2	0.9	0.003	0.001	4	28	24
Sacramento R. at tip of Grand Island (711)	17.1	0.4	179	72	9.4	0.2	7.74	0.09	2.1	0.5	0.005	0.002	5	52	58
Sacramento R. at Hood DWR Station	17.2	0.5	189	88	9.6	0.2	7.80	0.08	2.7	0.6	0.003	0.001	5	56	62
Old R. at mouth of Holland Cut (915)	17.2	0.6	363	77	9.5	0.3	7.86	0.06	2.3	0.5	0.004	0.002	5	108	58
San Joaquin R. at Vernalis DWR Station	17.1	0.4	564	54	9.5	0.2	8.08	0.06	4.5	0.7	0.007	0.003	5	152	112
Hatchery Water Control	17.2	0.4	1602	89	8.7	0.2	7.62	0.11	5.3	0.5	0.004	0.001	4	208	60
High EC Control	17.4	0.5	4103	77	8.9	0.3	7.65	0.09	5.5	0.8	0.003	0.001	4	550	71
Montezuma Slough at Nurse Slough (609)	17.3	0.6	7220	266	9.4	0.3	7.89	0.07	4.9	1.9	0.002	0.001	5	1020	110
Suisun Bay off Chipps Island (508)	17.1	0.7	4852	1997	9.5	0.2	7.77	0.07	3.3	2.5	0.002	0.001	5	152	70
Napa R. at Riverside Blvd terminus (340)	16.9	0.6	19993	1427	9.0	0.4	7.79	0.08	3.4	1.2	0.002	0.001	5	3160	180
Low Turbidity Control	17.3	0.5	1497	48	9.5	0.3	6.97	1.09	1.1	0.5	0.001	0.000	4	126	24

## Reference Toxicant Dilution Series – Copper

Table D15-1. Summary of a 7-day *H. transpacificus* test initiated on 9/01/05 examining the toxicity of Copper (Cu<sup>+</sup>).

Treatment	Rep	# Surviving Fish by Test Day						
		1	2	3	4	5	6	7
0 ppb Control (Dilute Well Water)	1	5	4	4	4	4	4	4
	2	5	5	5	4	4	4	4
50 ppb Cu <sup>+</sup>	1	4	3	3	2	2	2	2
	2	0	0	0	0	0	0	0
200 ppb Cu <sup>+</sup>	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
500 ppb Cu <sup>+</sup>	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0
1000 ppb Cu <sup>+</sup>	1	0	0	0	0	0	0	0
	2	0	0	0	0	0	0	0

Table D15-2. Summary of water chemistry measurements taken during a 7-day *H. transpacificus* test initiated on 9/01/05 examining the toxicity of Copper (Cu<sup>+</sup>).

Treatment	Temp (°C)	pH	EC (uS/cm)	DO (mg/L)	Ammonia Nitrogen (mg/L)
Lab Control (Dilute Well Water)	20	8.52	507	9.2	0.15
50 ppb Cu <sup>+</sup>	20	8.46	440	9.1	0.09
200 ppb Cu <sup>+</sup>	21	8.43	266	8.7	0.10
500 ppb Cu <sup>+</sup>	21	8.46	235	9.0	0.08
1000 ppb Cu <sup>+</sup>	21	8.46	325	9.1	0.10

Table D16-1. Summary of 7-day *H. transpacificus* Cu<sup>+</sup> reference toxicant test conducted using dilute well water spiked with copper chloride.<sup>1</sup>

Treatment	Survival (%) <sup>2</sup>		Length (cm) <sup>2</sup>		Weight (g) <sup>2</sup>	
	mean	se	mean	se	mean	se
Laboratory Control (Dilute Well Water)	100 <sup>P</sup>	0.0	3.42	0.04	0.24	0.00
5 ppb Cu <sup>+</sup>	93	6.7	3.53	0.05	0.24	0.01
10 ppb Cu <sup>+</sup>	95	2.9	3.49	0.04	0.23	0.00
25 ppb Cu <sup>+</sup>	40	4.1	3.57	0.11	0.26	0.02
50 ppb Cu <sup>+</sup>	23	4.7	3.52	0.08	0.26	0.02

P. The laboratory control met the criteria for test acceptability.

1. This test was set up on 9/14/05.

2. Highlighted areas indicate a significant reduction in survival, length, or weight when compared to the laboratory control. All endpoints were analyzed according to EPA standard methods. (1-tailed test, P < 0.05)

	Survival	
	96 hr	7 day
NOEC	10	10
LOEC	25	25
LC50	33.5	24.7

Table D16-2. Summary of water chemistry measurements taken during a 7-day *H. transpacificus* reference toxicant test initiated on 9/14/05 using dilute well water spiked with copper chloride.<sup>1</sup>

Treatment	Temp (°C)	Lab pH	EC (uS/cm)	DO (mg/L)	Ammonia Nitrogen (mg/L)
Lab. Control (Dilute Well Water)	21	8.40	431	8.8	0.28
5 ppb Cu <sup>+</sup>	21	8.49	456	8.7	0.24
10 ppb Cu <sup>+</sup>	21	8.48	461	9.0	0.23
25 ppb Cu <sup>+</sup>	21	8.46	455	8.8	0.37
50 ppb Cu <sup>+</sup>	21	8.39	457	8.9	0.14

## Esfenvalerate Exposures

Table D17. Results of a *H. transpacificus* 24-hour test initiated 5/23/06 evaluating the toxicity of esfenvalerate to 10 day old fish.

Treatment	4-hour Survival (%) <sup>1</sup>		24-hour Survival (%) <sup>1</sup>		4-hour Normal Swimming (%) <sup>1</sup>		24-hour Normal Swimming (%) <sup>1</sup>	
	mean	se	mean	se	mean	se	mean	se
Method Control	97.5	2.5	77.5	4.8	92.5	2.5	62.5	2.5
Solvent Control	97.5	2.5	82.5	2.5	93.0	4.4	72.5	2.5
0.03125 µg/L Esfenvalerate	100.0	0.0	87.5	9.5	97.7	2.3	65.0	11.9
0.0625 µg/L Esfenvalerate	97.5	2.5	75.0	9.6	95.0	2.9	27.5	10.3
0.125 µg/L Esfenvalerate	97.5	2.5	57.5	7.5	87.5	4.8	0.0	0.0
0.25 µg/L Esfenvalerate	100.0	0.0	25.0	2.9	77.5	2.5	0.0	0.0
0.5 µg/L Esfenvalerate	100.0	0.0	0.0	0.0	60.0	5.8	0.0	0.0

1. Highlighted areas indicate significant reduction in survival or biomass compared to the solvent control. Data were analyzed using USEPA standard statistical protocols.

Table D18. Results of a *H. transpacificus* 24-hour test initiated 6/01/06 evaluating the toxicity of esfenvalerate to 31 day old fish.

Treatment	4-hour Survival (%) <sup>1</sup>		24-hour Survival (%) <sup>1</sup>		4-hour Normal Swimming (%) <sup>1</sup>		24-hour Normal Swimming (%) <sup>1</sup>	
	mean	se	mean	se	mean	se	mean	se
Method Control	100.0	0.0	100.0	0.0	100.0	0.0	100.0	0.0
Solvent Control	100.0	0.0	100.0	0.0	100.0	0.0	97.5	2.5
0.03125 µg/L Esfenvalerate	100.0	0.0	100.0	0.0	97.5	2.5	97.5	2.5
0.0625 µg/L Esfenvalerate	100.0	0.0	100.0	0.0	100.0	0.0	87.5	4.8
0.125 µg/L Esfenvalerate	100.0	0.0	95.0	2.9	92.5	2.5	70.0	4.1
0.25 µg/L Esfenvalerate	100.0	0.0	87.5	12.5	95.0	5.0	37.5	13.1
0.5 µg/L Esfenvalerate	100.0	0.0	55.0	9.6	87.5	4.8	0.0	0.0
1.0 µg/L Esfenvalerate	100.0	0.0	10.0	7.1	75.0	2.9	0.0	0.0

1. Highlighted areas indicate significant reduction in survival or biomass compared to the solvent control. Data were analyzed using USEPA standard statistical protocols.

Table D19. Results of a *H. transpacificus* 24-hour test initiated 5/23/06 evaluating the toxicity of esfenvalerate to 52 day old fish.

Treatment	4-hour Survival (%) <sup>1</sup>		24-hour Survival (%) <sup>1</sup>		4-hour Normal Swimming (%) <sup>1</sup>		24-hour Normal Swimming (%) <sup>1</sup>	
	mean	se	mean	se	mean	se	mean	se
Method Control	100.0	0.0	100.0	0.0	82.5	4.8	82.5	4.8
Solvent Control	100.0	0.0	97.5	2.5	72.5	2.5	70.0	0.0
0.03125 µg/L Esfenvalerate	100.0	0.0	100.0	0.0	80.0	0.0	80.0	0.0
0.0625 µg/L Esfenvalerate	100.0	0.0	92.5	2.5	72.5	6.3	65.0	5.0
0.125 µg/L Esfenvalerate	100.0	0.0	95.0	5.0	57.5	4.8	52.5	6.3
0.25 µg/L Esfenvalerate	87.5	4.8	40.0	12.2	47.5	13.1	0.0	0.0

1. Highlighted areas indicate significant reduction in survival or biomass compared to the solvent control. Data were analyzed using USEPA standard statistical protocols.

Table D20. Results of a *H. transpacificus* 24-hour test initiated 10/18/06 evaluating the toxicity of esfenvalerate to 204 day old fish.

Treatment	4-hour Survival (%) <sup>1</sup>		24-hour Survival (%) <sup>1</sup>		4-hour Normal Swimming (%) <sup>1</sup>		24-hour Normal Swimming (%) <sup>1</sup>	
	mean	se	mean	se	mean	se	mean	se
Method Control	100.0	0.0	100.0	0.0	100.0	0.0	92.5	2.5
Solvent Control	100.0	0.0	95.0	2.9	100.0	0.0	92.5	2.5
0.1 µg/L Esfenvalerate	100.0	0.0	94.7	3.1	100.0	0.0	82.2	7.4
0.25 µg/L Esfenvalerate	100.0	0.0	87.5	2.5	97.5	2.5	75.0	6.5
0.5 µg/L Esfenvalerate	100.0	0.0	82.5	6.3	100.0	0.0	37.5	2.5
1.0 µg/L Esfenvalerate	100.0	0.0	20.0	10.0	92.5	4.8	0.0	0.0
5.0 µg/L Esfenvalerate	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

1. Highlighted areas indicate significant reduction in survival or biomass compared to the solvent control. Data were analyzed using USEPA standard statistical protocols.

Treatment	Length (mm) <sup>1</sup>		Weight (g) <sup>1</sup>	
	mean	se	mean	se
Method Control	61.2	2.2	1.61	0.17
Solvent Control	59.7	1.1	1.50	0.09
0.1 µg/L Esfenvalerate	60.3	0.9	1.52	0.08
0.25 µg/L Esfenvalerate	60.9	0.6	1.60	0.08
0.5 µg/L Esfenvalerate	61.1	1.6	1.62	0.17
1.0 µg/L Esfenvalerate	54.9	5.1	1.18	0.28
5.0 µg/L Esfenvalerate	-	-	-	-

Appendix E

*Pimephales promelas*

(Fathead Minnow)

Table E1-1. Results of a *P. promelas* (Fathead Minnow) 7-day test initiated on 5/23/07 evaluating the toxicity of water collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) from the San Joaquin River at the Stockton WWTP on 5/22/07.

Treatment	Survival (%) <sup>1</sup>		Biomass (mg) <sup>1</sup>	
	mean	se	mean	se
DIEPAMH	100.0	0.0	0.386	0.011
SJR @ WWTP (Stockton)	97.5	2.5	0.429	0.006

1. No significant reductions in survival or biomass were seen compared to the DIEPAMH control.

Table E1-2. Water chemistry during a *P. promelas* (Fathead Minnow) 7-day test initiated on 5/23/07 evaluating the toxicity of water collected by UC Davis Aquatic Toxicology Laboratory and the California Department of Fish and Game (CDFG) for the Department of Water Resources (DWR) from the San Joaquin River at the Stockton WWTP on 5/22/07.

Treatment	Field Chemistry				Unionized Ammonia (mg/L)	Turbidity (NTU)
	SC (uS/cm)	Temp (°C)	DO (mg/L)	pH		
San Joaquin River at Stockton WW	345.3	20.3	11	8.8	0.016	31

Treatment	Laboratory Chemistry						Hardness (mg/L as CaCO <sub>3</sub> )	Alkalinity (mg/L as CaCO <sub>3</sub> )	
	EC (uS/cm)	Min Temp (°C)	Max Temp (°C)	Min DO (mg/L)	Max DO (mg/L)	Min pH			Max pH
DIEPAMH	286	24	25	7.1	8.4	7.66	8.18	92	60
San Joaquin River at Stockton WW	322	24	25	7.8	8.2	7.81	8.24	80	60

Appendix F  
Quality Assurance/Quality Control

Table F1. Frequency of QA/QC samples sharing equivalent results: 2006-2007

Quality Assurance Samples	<i>H. azteca</i> Survival		<i>H. azteca</i> Weight	
	Sample Size	% Agreement	Sample Size	% Agreement
Field Duplicates	39	100	39	100
Bottle Blanks	16	100	16	94
Trip Blanks	13	100	13	100

Table F2. Individual RPDs of water chemistry measurements on duplicate samples collected February – June 2006.

Field Duplicate & Sample Date	Water Chemistry Measurements					
	EC	DO	pH	Hardness	Alkalinity	Ammonia
Site 915 February 21, 2006	2.29 8.55	4.55 5.33 0.00	1.58 0.53	0.00	3.57	200.00 <sup>A,B</sup>
Site 804 March 7, 2006	43.30 <sup>B</sup> 1.62	2.33 2.78 14.59	2.85 1.44 6.94	5.13	0.00	11.76
Site 915 March 20, 2006	71.28 <sup>B</sup> 5.94	1.24 6.06 3.92	1.38 0.26 0.52	24.39	25.45	168.00 <sup>A,B</sup>
Site 915 April 3, 2006	16.17 23.33	5.06 2.78 7.50	0.85 1.83 3.87	23.53	50.00 <sup>B</sup>	111.11 <sup>A,B</sup>
Site 340 April 4, 2006	47.64 <sup>B</sup> 3.56	1.24 1.44 8.00	1.11 0.13 3.74	22.22	0.00	18.18
Site 910 April 17, 2006	10.58 5.58	2.30 1.38 0.00	1.90 1.01 0.26	6.45	0.00	8.00
Site Light 55 May 1, 2006	0.23 0.82	3.55 1.26 4.38	1.19 0.63 0.25	5.56	1.63	40.00 <sup>A,B</sup>
Site 812 May 2, 2006	8.70 2.86	0.00 0.00 4.58	0.13 0.39 0.26	8.00	4.65	46.15 <sup>A,B</sup>
Site Light 55 May 15, 2006	4.52 1.88	1.24 2.74 0.00	0.00 7.02 0.12	2.41	1.44	0.00
Site 804 June 1, 2006	3.98 18.20	1.20 3.57 0.00	0.88 0.14 0.26	0.00	13.33	28.57
Site 804 June 13, 2006	3.13 0.23	2.35 4.80 1.87	1.40 1.06	9.52	2.47	0.00
Site 915 June 28, 2006	1.81 1.89	1.17 0.00 0.00	1.13 5.15 0.80	24.39	2.74	0.00

Table F3. Average RPDs of water chemistry measurements on duplicate samples collected February – June 2006.

Field Duplicate & Sample Date	Water Chemistry Measurements								
	EC			DO			pH		
	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation
Site 915 February 21, 2006	2	5.42	4.43	3	3.29	2.88	2	1.05	0.74
Site 804 March 7, 2006	2	22.46	29.47	3	6.57	6.96	3	3.75	2.86
Site 915 March 20, 2006	2	38.61	46.20	3	3.74	2.41	3	2.41	0.58
Site 915 April 3, 2006	2	19.75	5.07	3	5.11	2.36	3	2.18	1.54
Site 340 April 4, 2006	2	25.60	31.17	3	3.56	3.85	3	1.66	1.87
Site 910 April 17, 2006	2	8.08	3.54	3	1.23	1.16	3	1.06	0.82
Site Light 55 May 1, 2006	2	0.52	0.42	3	3.06	1.62	3	0.69	0.47
Site 812 May 2, 2006	2	5.78	4.13	3	1.53	2.64	3	0.26	0.13
Site Light 55 May 15, 2006	2	3.20	1.87	3	1.33	1.37	3	2.38	4.02
Site 804 June 1, 2006	2	11.09	10.05	3	1.59	1.59	3	0.43	0.40
Site 804 June 13, 2006	2	1.68	2.05	3	3.01	1.57	2	1.23	0.12
Site 915 June 28, 2006	2	1.85	0.05	3	0.39	0.68	3	2.36	2.42

Table F4. Individual RPDs of water chemistry measurements on duplicate samples collected July 2006 – January 2007.

Field Duplicate & Sample Date	Water Chemistry Measurements					
	EC	DO	pH	Hardness	Alkalinity	Ammonia
Site 915	1.74	1.23	0.37			
July 25, 2006	0.95	1.21	3.05	7.41	14.81	200.00 <sup>A,B</sup>
		1.74				
Site 405	0.47	1.24	1.16			
August 9, 2006	196.04 <sup>B</sup>	2.41	0.81	63.59 <sup>B</sup>	9.52	200.00 <sup>A,B</sup>
		3.17				
Site 609	0.40	0.00	0.50			
August 23, 2006	0.39	0.00	0.52	7.19	0.00	15.38
		2.74				
Site Light 55	2.41	4.76	0.37			
September 5, 2006	0.06	1.21	0.38	3.92	3.35	200.00 <sup>A,B</sup>
		2.94				
Site 812	46.65 <sup>B</sup>	1.26	1.49			
September 20, 2006	43.36 <sup>B</sup>	0.00	0.25	40.00 <sup>B</sup>	21.12	0.00
		6.90				
Site 340	1.23	2.41	1.18			
October 5, 2006	0.55	1.13	0.50	0.36	1.42	0.00
		2.60				
Site 602	0.89	4.60	1.40			
October 18, 2006	4.23	1.20	3.05	2.35	13.33	24.00
		1.26				
Site 711	22.10	2.35	1.64			
October 31, 2006	0.73	2.33	0.89	14.29	0.00	20.69
		1.32				
Site Light 55	59.21 <sup>B</sup>	0.00	0.12			
January 4, 2007	7.17	1.18	0.25	8.70	0.00	0.00
		1.40				

Table F5. Average RPDs of water chemistry measurements on duplicate samples collected July 2006 – January 2007.

Field Duplicate & Sample Date	Water Chemistry Measurements								
	EC			DO			pH		
	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation
Site 915 July 25, 2006	4	1.35	0.56	6	1.39	0.30	4	1.71	1.89
Site 405 August 9, 2006	4	98.25	138.29	6	2.28	0.97	4	0.98	0.25
Site 609 August 23, 2006	4	0.40	0.00	6	0.92	1.58	4	0.51	0.02
Site Light 55 September 5, 2006	4	1.23	1.66	6	2.97	1.77	4	0.38	0.01
Site 812 September 20, 2006	4	45.01	2.33	6	22.45	31.96	4	0.87	0.88
Site 340 October 5, 2006	4	0.89	0.48	6	2.05	0.80	4	0.84	0.48
Site 602 October 18, 2006	4	2.56	2.36	6	2.35	1.95	4	2.22	1.16
Site 711 October 31, 2006	4	11.41	15.11	6	2.00	0.59	4	1.27	0.53
Site Light 55 January 4, 2007	4	33.19	36.80	6	0.86	0.75	4	0.19	0.10

Table F6. Individual RPDs of water chemistry measurements on duplicate samples collected February – August 2007.

Field Duplicate & Sample Date	Water Chemistry Measurements					
	EC	DO	pH	Hardness	Alkalinity	Ammonia
Site 704 March 16, 2007	2.00 3.03	1.43 4.76 1.29	0.13 0.13	5.41	32.65	8.00
Site 902 July 26, 2007	1.13 1.05	2.35 1.16 1.40	0.51 0.53	11.11	0.00	560.00 <sup>A,B</sup>
Site 504 August 8, 2007	2.30 3.74	3.73 4.60 1.57	0.51 0.13	13.79	0.00	40.00 <sup>A,B</sup>
Site 804 August 22, 2007	1.54 2.74	1.18 6.98 2.99	0.25 0.90	1.87	0.00	0.00
Site 910 March 29, 2007	4.41 0.00	1.20 1.16 1.44	0.38 0.26	2.74	0.00	0.00
Site 602 April 11, 2007	1.82 4.20	2.30 1.20 7.52	0.76 0.80	70.06 <sup>B</sup>	0.00	15.38
Site 804 April 25, 2007	3.00 1.23	5.92 8.19 0.00	1.38 0.40	12.24	0.00	6.90
Site 504 May 10, 2007	0.62 0.38	1.24 2.35 2.86	0.13 0.26	3.62	10.53	11.76
Site 812 May 24, 2007	4.64 0.46	1.21 2.53 2.78	0.13 0.26	0.00	3.17	22.22
Site 711 June 20, 2007	0.43 3.33	1.21 1.14 1.31	0.75 0.64	6.06	17.65	28.57

Table F7. Average RPDs of water chemistry measurements on duplicate samples collected February – August 2007.

Field Duplicate & Sample Date	Water Chemistry Measurements								
	EC			DO			pH		
	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation
Site 704 March 16, 2007	4	2.51	0.73	6	2.40	2.05	4	0.13	0.00
Site 910 March 29, 2007	4	2.20	3.12	6	1.26	0.15	4	0.32	0.08
Site 602 April 11, 2007	4	3.01	1.68	6	3.67	3.38	4	0.78	0.02
Site 804 April 25, 2007	4	2.10	1.23	6	4.70	4.23	4	0.88	0.71
Site 504 May 10, 2007	4	0.50	0.17	6	2.15	0.83	4	0.20	0.10
Site 812 May 24, 2007	4	2.55	2.95	6	2.17	0.84	4	0.19	0.10
Site 711 June 20, 2007	4	1.88	2.05	6	1.22	0.08	4	0.70	0.08
Site 902 July 26, 2007	4	1.09	0.06	6	1.64	0.63	4	0.52	0.01
Site 504 August 8, 2007	4	3.02	1.04	6	3.30	1.56	4	0.32	0.26
Site 804 August 22, 2007	4	2.14	0.85	6	3.72	2.96	4	0.58	0.46

Table F8. Individual RPDs of water chemistry measurements on duplicate samples collected September – December 2007.

Field Duplicate & Sample Date	Water Chemistry Measurements					
	EC	DO	pH	Hardness	Alkalinity	Ammonia
Site Hood September 5, 2007	0.97 2.68	0.00 5.92 11.97	1.27 1.21	6.45	2.90	10.53
Site 711 October 3, 2007	0.53 1.28	1.17 8.28 1.46	0.63 0.26	3.64	1.57	0.00
Site Hood December 11, 2007	0.99 1.33	1.20 0.00 1.32	0.87 0.13	9.52	0.00	3.39
Site 910 December 12, 2007	3.59 0.87	2.38 0.00 2.56	0.37 0.25	16.67	4.88	11.76
Site 902 December 12, 2007	2.63 2.61	4.76 4.60 1.31	0.12 0.26	14.81	0.00	28.57
Site 609 December 13, 2007	2.67 1.21	4.76 0.00 2.63	0.64 0.37	0.55	2.41	4.26

Table F9. Average RPDs of water chemistry measurements on duplicate samples collected September – December 2007.

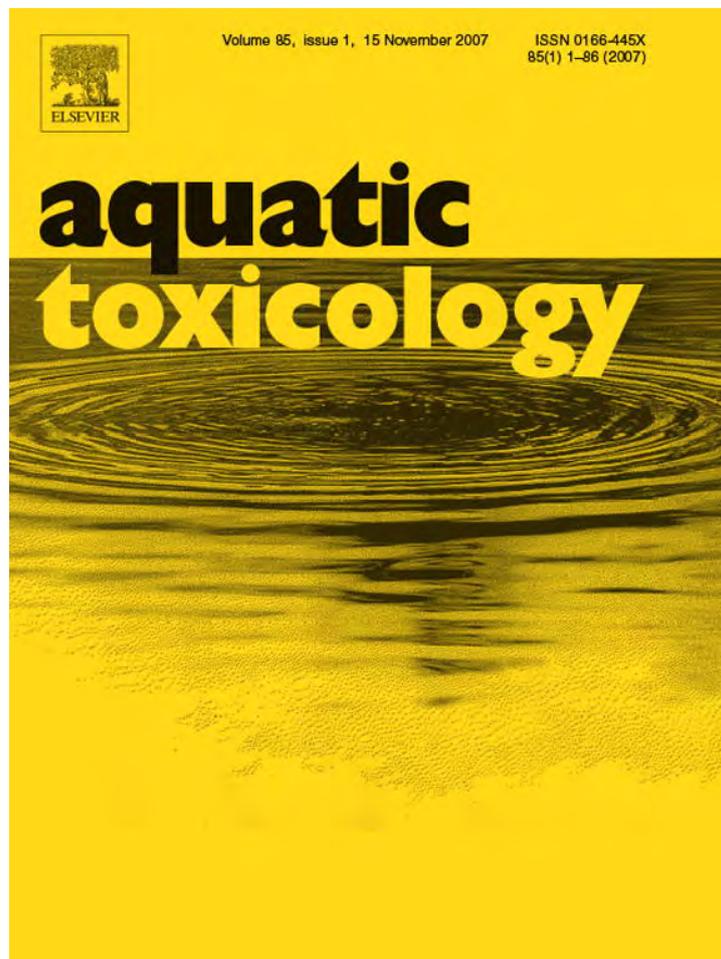
Field Duplicate & Sample Date	Water Chemistry Measurements								
	EC			DO			pH		
	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation	Sample Size	Average	Standard Deviation
Site Hood September 5, 2007	4	1.82	1.21	6	5.96	5.98	4	1.24	0.04
Site 711 October 3, 2007	4	0.91	0.53	6	3.64	4.03	4	0.45	0.26
Site Hood December 11, 2007	4	1.16	0.24	6	0.84	0.73	4	0.50	0.52
Site 910 December 12, 2007	4	2.23	1.92	6	1.65	1.43	4	0.31	0.08
Site 902 December 12, 2007	4	2.62	0.01	6	3.56	1.95	4	0.19	0.09
Site 609 December 13, 2007	4	1.94	1.04	6	2.46	2.39	4	0.51	0.19

<sup>A</sup>: Caution should be applied when interpreting water quality precision data. Although the difference between ammonia replicates is large, it is because low concentrations of ammonia were measured rather than lack of precision. For instance, comparing ammonia measurements of 0.004 vs 0.000 will yield a RPD of 200%

<sup>B</sup>: Exceeds SWAMP RPD range

# Appendix G

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# Comparisons of tissue-specific transcription of stress response genes with whole animal endpoints of adverse effect in striped bass (*Morone saxatilis*) following treatment with copper and esfenvalerate

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## Abstract

Changes in the gene transcription of stress response genes in resident fish can be powerful biomarkers for the identification of sublethal impacts of environmental stressors on aquatic ecosystems. In this study, we tested the effects of two reference toxicants, copper (Cu) and the pyrethroid insecticide esfenvalerate [(*S*)- $\alpha$ -cyano-3-phenoxybenzyl-(*S*)-2-(4-chlorophenyl)-3-methylbutyrate], on lethal (mortality) and sublethal endpoints (growth, swimming behavior, transcription levels of stress response genes) in juvenile (81–90-day-old) striped bass (*Morone saxatilis*). We established cellular stress response markers for proteotoxicity (HSP70, HSP90), phase I detoxification mechanism (CYP1A1), metal-binding (metallothionein), as well as immune-function and pathogen-defense (TGF- $\beta$ , Mx-protein, nRAMP). Quantitative real-time TaqMan<sup>®</sup> PCR was used to examine tissue-specific changes in the transcriptome of liver, spleen, white muscle, anterior kidney and gills after 7-day Cu exposures and 24-h esfenvalerate exposures. On the transcriptome level, exposure to Cu showed strongest effects on the transcription of metallothionein in spleen tissue, causing a 4-fold increase of mRNA at 42 ppb total Cu and a 10-fold increase at 160 ppb Cu. Exposure to Cu also caused significant tissue-specific changes in gene transcription for immune-system related genes. Esfenvalerate exposure had tissue-specific effects on the transcription of HSP70, HSP90 and CYP1A1. The most significant effects were detected in liver tissue after exposure to 0.64  $\mu$ g/L esfenvalerate.

Our results show that the stress response at the transcriptome level is a more sensitive indicator for Cu and esfenvalerate exposures at low concentrations than swimming behavior, growth or mortality. The accuracy of studies on quantitative changes in the transcriptome can benefit from an initial evaluation or the inclusion of several different tissues and the use of multiple housekeeping genes.

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**Keywords:** Contaminants; Cellular stress response; Sublethal toxicity; Biomarker; Ecotoxicogenomics; Transcriptome; Behavior

## 1. Introduction

The current rate of biodiversity loss in aquatic ecosystems threatens to disrupt their functioning in many parts of the world. In most cases a multitude of factors, including overfishing, loss and degradation of habitat, the invasion of exotic species, flow modification, and pollution all interact and simultaneously contribute to the decline of species (Bennett and Moyle, 1996).

Ecological forensic methods try to separate and identify factors for species declines, but for non-model organisms, such attempts are often difficult to realize.

In the last several years, abundance indices of numerous pelagic fish species residing in the Sacramento-San Joaquin Delta of California, USA, have shown marked declines and record lows for the endemic delta smelt (*Hypomesus transpacificus*), age-0 striped bass (*Morone saxatilis*), longfin smelt (*Spirinchus thaleichthys*) and threadfin shad (*Dorosoma petenense*) (Stevens and Miller, 1983; Stevens et al., 1985; Moyle et al., 1992; Moyle and Williams, 1990). While several of these species – in particular longfin smelt and juvenile striped bass – have shown evidence of long-term declines, there appears to have been a precipitous “step-change” to very low abundance

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during the period 2002–2004 (Bryant and Souza, 2004; Hieb et al., 2005; Feyrer et al., 2007). At present, it is unclear what might have caused this critical population decline, but toxic contaminants may be one of several factors acting individually or in concert to lower pelagic productivity.

Agricultural, industrial, urban and mining sources release contaminants into waterways, and water quality assessment studies indicate that the criteria for the protection of freshwater aquatic life have been exceeded in many Central Valley water bodies (Domagalski et al., 2000; Dubrovsky et al., 1998; De Vlaming et al., 2000; Werner et al., 2000). While measured concentrations of chemical contaminants were generally below acutely toxic levels for fish, potential sublethal toxic effects resulting in, e.g. energy reallocation or behavioral abnormalities are of concern. Sublethal effects are difficult to detect in the field, but they may decrease the evolutionary fitness of fish populations (Scholz et al., 2000; Sorensen, 1991; De Vlaming et al., 2000; Sandahl et al., 2005).

Ecological effects of aquatic contaminants are difficult to detect and quantify. Available ecotoxicological tools for screening contaminant exposures in the field include bioassays, toxicity identification evaluations (TIEs), or risk assessments based on existing data (Rand, 1995; USEPA, 1989a,b, 1991, 2000). On a level of higher resolution, altered cellular and molecular responses to stressors can be used as powerful tools for gaining a better understanding of the mechanisms and toxicants involved, and thus as biomarkers for the identification of environmental impacts of contaminants on aquatic ecosystems (Huggett et al., 1992). The rising field of ecotoxicogenomics links the two disciplines: genomics and ecotoxicology, mostly by identifying cellular biomarkers and biosignals at the transcriptome level, thus creating sensitive indicators for the exposure to contaminants. In a first step, microarray approaches are used to initially identify suites of up- or down-regulated genes, and changes in gene expression of selected genes are quantified subsequently by quantitative real-time PCR. However, for non-model species the high number of unidentifiable genes from random libraries and the comparatively high costs of microarray development and use can pose substantial limitations to this approach. In addition, only few studies simultaneously consider multiple tissues and tissue-specific effects when carrying out studies on the transcriptome.

In the present study on striped bass (*M. saxatilis*) we chose a mechanistic approach, i.e. selecting and developing biomarkers for the detection of changes at the transcriptome level, based on well-defined biochemical toxicity pathways in fish and other vertebrates. In a first step, real-time TaqMan PCR biomarker systems were developed for a suite of three housekeeping genes (18S, L9, GAPDH) and seven stress response biomarkers for proteotoxicity (HSP70, HSP90), phase I detoxification mechanism (CYP1A1), metal-binding (metallothionein), immune-system functioning and pathogen-defense (TGF- $\beta$ , Mx-protein, nRAMP). Striped bass are pelagic, euryhaline, apex predatory fish with Atlantic origin. Due to their popularity as sport fish, they are economically important and have been introduced to areas outside their natural distribution range such as the Sacramento-San Joaquin Delta and San-Francisco Bay of Cali-

fornia. However, abundance indices of age-0 striped bass in the Sacramento-San Joaquin Delta have shown dramatic declines in recent years (Stevens et al., 1985; Kimmerer et al., 2000, 2001).

The overall objective of this study was to assess the toxicity of two chemicals with different mechanisms of action, the heavy metal copper, and the pyrethroid insecticide esfenvalerate [(*S*)- $\alpha$ -cyano-3-phenoxybenzyl-(*S*)-2-(4-chlorophenyl)-3-methylbutyrate], at different levels of biological organization (mortality, growth, swimming behavior, and transcription levels of stress response genes) to striped bass. Copper is one of the most ubiquitous environmental pollutants worldwide, entering aquatic systems as a consequence of past and present mining activities, domestic effluents and runoff from agricultural and urban areas (Nriagu, 1979; Kayhanian et al., 2003). Copper is widely used as a fungicide in California, especially in vineyards, and has been found at high concentrations in environmental samples from the San-Francisco Bay area (De Vlaming et al., 2000, and references therein). Copper concentrations measured in northern California streams have ranged from 3.4 to 64.5  $\mu\text{g/L}$  (Eaton, 2007). The pyrethroid insecticide esfenvalerate has been shown to be present at toxic concentrations in agricultural stormwater runoff (up to 720 ng/L in orchard runoff; Werner et al., 2002a, 2004), and in sediments of agricultural and urban water bodies (Weston et al., 2004, 2005; Amweg et al., 2006). Esfenvalerate concentrations in Central Valley streams receiving winter storm runoff from fruit orchards ranged from trace level to 93 ng/L (Bacey et al., 2005).

We conducted this study using two reference toxicants with different mechanisms of action to compare the sensitivity of the commonly used mortality endpoint with sublethal responses such as altered swimming behavior and changes at the transcriptome level. We tested the hypotheses that copper and esfenvalerate have different effects on the transcription of selected stress response genes, and that various tissues (liver, spleen, white muscle, anterior kidney, and gills) show different quality and quantity of mRNA transcription.

## 2. Material and methods

### 2.1. Fish exposures

Juvenile striped bass were exposed to copper or the pyrethroid insecticide esfenvalerate [(*S*)- $\alpha$ -cyano-3-phenoxybenzyl-(*S*)-2-(4-chlorophenyl)-3-methylbutyrate, 98% purity, Chem Service Inc., West Chester, PA, USA] in two separate tests. Fish were exposed to  $\text{CuCl}_2 \cdot \text{H}_2\text{O}$  (Sigma, St. Louis, MO, USA) for 7 days, and to esfenvalerate for 24 h, and mortality as well as sublethal endpoints (growth, swimming behavior, transcription of stress response genes) were quantified. The shorter exposure time for the esfenvalerate study is based on the hypothesis that this hydrophobic chemical tends to quickly adsorb to particulate and organic matter in a typical field situation (Yang et al., 2006a,b; Brady et al., 2006) thus rendering exposure times for fish relatively short.

Juvenile striped bass used in the Cu exposure (90 days old, fork lengths 5.0–5.4 cm) were purchased from Professional Aquaculture Services (Chico, CA). Slightly larger, but only

81-day-old offspring from the same broodstock (fork lengths 5.3–8.0 cm; provided by D.J. Ostrach, UC Davis) were used for the esfenvalerate exposure. Fish used in the copper exposure were slowly acclimated to experimental conditions (conductivity:  $890 \pm 20 \mu\text{S}/\text{cm}$ ; hardness:  $200 \text{ mg}/\text{L CaCO}_3$ ) over the course of 3 days before tests were initiated. The acclimation and control water was obtained from a local, approximately 60 m deep well, passed through a packed column aerator to remove excess nitrogen and re-oxygenate. Striped bass used in the esfenvalerate exposure were maintained in flow-through circular tanks containing well water treated as described above for 2 weeks before the tests. Previous fish exposures have shown that stress due to transport and maintenance in the laboratory following the procedures described above is minimal. Fish were loaded into experimental 2.5-gal aquaria 24 h prior to testing. Each experimental treatment was comprised of five replicate aquaria containing five animals each. Each tank contained 5 L of water at  $20^\circ\text{C}$  and was aerated throughout the experiment. Tests were initiated by replacing 80% of the water with experimental copper or esfenvalerate solutions, or control water to yield nominal concentrations of 0 (control), 50, 200, 500 and  $1000 \mu\text{g}/\text{L Cu}^{2+}$ , or 0 (control),  $200 \mu\text{L}/\text{L MeOH}$  (solvent control), 1, 3, 7 and  $10 \mu\text{g}/\text{L}$  esfenvalerate. Measured copper concentrations on day 0 were 42, 160, 470, and  $900 \text{ ppb total Cu}^{2+}$ , and 42, 160, 440, and  $810 \text{ ppb dissolved Cu}^{2+}$ . Measured esfenvalerate concentrations on day 0 were 0.64, 2.20, 4.40 and  $6.50 \mu\text{g}/\text{L}$ .

Experiments were conducted using a light:dark cycle of 16 h:8 h. During the 7-day copper exposure, fish were fed daily (Silver Cup 2.0 mm pellets). Approximately 80% of the water in each replicate was renewed on days 2, 4 and 6. On days 1, 3 and 5, the numbers of live, dead, and missing fish were scored for each replicate. For the 24 h esfenvalerate exposure, fish were not fed and no water exchange was carried out.

Water temperature ( $T$ ), pH, ammonia nitrogen ( $\text{NH}_3\text{-N}$ ), and dissolved oxygen (DO) were measured daily and at test termination. Measured mean values ( $\pm\text{S.D.}$ ) were  $T$ :  $20.4 (\pm 0.7)^\circ\text{C}$ , pH:  $8.2 (\pm 0.3)$ ,  $\text{NH}_3\text{-N}$ :  $0.5 (\pm 0.4) \text{ mg}/\text{L}$ , DO:  $8.5 (\pm 0.4) \text{ mg}/\text{L}$  for the Cu exposure and  $T$ :  $20.3 (\pm 0.4)^\circ\text{C}$ , pH:  $7.8 (\pm 0.3)$ ,  $\text{NH}_3\text{-N}$ :  $0.3 (\pm 0.3) \text{ mg}/\text{L}$ , DO:  $8.2 (\pm 0.7) \text{ mg}/\text{L}$  for the esfenvalerate exposure. On days 2 and 3 of the Cu exposure, ammonia-N temporarily reached  $0.8/1.1 \text{ mg}/\text{L}$  ( $0.1/0.19 \text{ mg}/\text{L}$  unionized  $\text{NH}_3$ ) in controls,  $0.95/1.0 \text{ mg}/\text{L}$  ( $0.15/0.14 \text{ mg}/\text{L}$  unionized  $\text{NH}_3$ ) in the 50 ppb Cu treatment, and  $1.37/1.07 \text{ mg}/\text{L}$  ( $0.19/0.15$  unionized  $\text{NH}_3$ ) in the 200 ppb Cu treatment. This was probably due to excess feeding during those days but did not cause mortality. Overall, no significant deviations between measured water parameters among treatments or replicates were detected.

The number of dead fish was counted at the end of the experiment and surviving fish were sacrificed using an overdose of the anesthetic MS-222 (Sigma, St. Louis, MO, USA) in ice water to minimize degradation of RNA. Fork length (to nearest mm) and weight (to nearest 0.1 g) of each fish were recorded. No significant differences in length or weight were detected between individual treatment groups and controls. During the esfenvalerate exposure, swimming behavior and mortality endpoints were assessed after 4 and 24 h. Swimming behavior was assessed by observing each tank for 5 min. Any pronounced deviation

(>1 min) from normal (control) swimming patterns was assessed to be abnormal, e.g. when fish were not able to maintain buoyancy, flipped to their sides, lay on the ground, or repeatedly swam in small circles.

## 2.2. Quantitative real-time PCR

### 2.2.1. Tissue preparation, RNA extraction and cDNA synthesis

Surviving individuals (control group, 42 ppb total Cu, 160 ppb treatments for Cu exposure; control, solvent control, 0.64 and  $2.2 \mu\text{g}/\text{L}$  for esfenvalerate exposure) were sampled for subsequent analyses of sublethal biomarkers. Fifteen fish per treatment (three fish per replicate) were dissected immediately after individuals were sacrificed and measured. The entire gill apparatus, liver, spleen, anterior kidney and two pieces of epaxial muscle from the left flank (<30 mg) were removed, placed in sterile, RNase and DNase free 1.5 mL Eppendorf vials, and immediately snap-frozen in liquid nitrogen. Samples were stored at  $-80^\circ\text{C}$  until RNA extraction and cDNA synthesis. Frozen tissue samples (approximately 10 mg of liver, muscle and gill, 9 mg total spleen and 4 mg total anterior kidney) were transferred to 1.5 mL collection tubes (RNeasy Mini Kit, Qiagen Inc., Valencia, CA), re-immersed in liquid nitrogen and ground to a fine powder with a sterile pestle. Subsequently,  $350 \mu\text{L}$  of RNeasy lysis buffer (RLT, RNeasy Mini Kit, Qiagen Inc.) were added, and lysates were homogenized by pestle and by passing them through a pipette tip approximately 10 times. After incubation for 3 min at room temperature, the RNA was extracted according to the manufacturer's recommendations (RNeasy Mini Kit, Qiagen Inc.). Thereafter,  $20 \mu\text{L}$  of each freshly extracted nucleic acid sample was digested with 10 U of RNase free DNase I (Roche, Mannheim, Germany) for 15 min at  $37^\circ\text{C}$  to remove genomic DNA. DNase digested RNA was quality controlled for absence of genomic DNA contamination. All samples had a minimal difference of 7 CT values between the cDNA and digested total RNA (tRNA), indicating that remaining gDNA contamination in the tRNA was 1% or less. Complementary DNA (cDNA) was synthesized using 100 units of SuperScript III (Invitrogen, Carlsbad, CA, USA), 600 ng random hexadeoxyribonucleotide (pd(N)6) primers (random hexamer primer), 10 U RNaseOut (RNase inhibitor), and 1 mM dNTPs (all Invitrogen, Carlsbad, CA, USA) in a final volume of  $40 \mu\text{L}$ . The reverse transcription reaction proceeded for 50 min at  $50^\circ\text{C}$ . After addition of  $60 \mu\text{L}$  of water, the reaction was terminated by heating for 5 min to  $95^\circ\text{C}$  and cooling on ice.

### 2.3. Real-time TaqMan<sup>®</sup> PCR

A suite of new real-time TaqMan PCR systems for proteotoxicity (HSP70, HSP90), phase I detoxification mechanism (CYP1A1), metal-binding (metallothionein), immune-system functioning and pathogen-defense (TGF- $\beta$ , Mx-protein, nRAMP) were designed for studying sublethal stress response at the transcriptome level (see Table 1). For each target gene, two primers and an internal, fluorescent-labeled TaqMan probe (5' end, reporter dye FAM (6-carboxyfluorescein), 3' end, quencher

Table 1  
List of real-time TaqMan PCR systems developed for striped bass (*Morone saxatilis*)

Gene specification	Species for starting sequence	NCBI GenBank accession number	Primer sequences	Positions start–end	TaqMan probe number and sequence
<b>Stress response genes</b>					
HSP70	<i>Dicentrarchus labrax</i>	AY423555	F: CATCCTTCTGGGGACAAGTCAG R: ACACCTCCAGCGGTCTCAATAC	1251–1343	62, ACCTGCTG
HSP90	<i>Dicentrarchus labrax</i>	AY395632	F: GACGAATACTGTGTCCAGCAGTTG R: CAGCTCCAGACCCCTCTTTGGT	1631–1708	54, CTGGTCTC
CYP1A1	<i>Dicentrarchus labrax</i>	AJ251913	F: GCGGCACAACCCAGAGTA R: CAGCTTTCATGACGGTGTGAG	461–556	65, CTGGAGGA
Metallothionein	<i>Morone saxatilis</i>	AF091100	F: GCGGAGGATCCTGCCTTG R: CAGCCAGAGGCACACTTGGT	41–140	68, CTGCTCCT
TGF- $\beta$	<i>Morone chrysops</i> $\times$ <i>Morone saxatilis</i>	AF140363	F: ATGGTTAAGAAAAGCGCATTGAA R: TCCGGCTCAGGCTCTTTG	88–167	36, GGAGCCAG
Mx-protein	<i>Dicentrarchus labrax</i>	AY424962	F: GTTCATGGTCAAGGAGCAGATCA R: GCTGTATGAACACCTTTCTAACAGCAT	1254–1348	11, GCTGGAAG
nRAMP	<i>Morone saxatilis</i>	AY008746	F: CTACTTCATTGAGTCAACTATTGCTCTCTT R: TCATGCACTTCCATATTGGTTTTATT	867–977	12, CTCCTTCC
<b>Housekeeping genes</b>					
18S	<i>Dicentrarchus labrax</i>	AY831388	F: GGCCGCTTTGGTGACTCTAGATA R: GAAAGTTGATAGGCAGACATTTCG	142–230	149, AGGCGGCGA
L9	<i>Dicentrarchus labrax</i>	DT044997	F: AAGCTTCGTGTGGATAAATGGTG R: GCAGATGGTGGGACTGTG	166–228	12, HGGAAAGGAG
GAPDH	<i>Dicentrarchus labrax</i>	AJ567450	F: TGTCCACAGACTTCAACAGTGACC R: AAAGTGGTCGTTGAGAGCGATG	372–459	25, HCTCCTCCA

Gene specification, species and NCBI GenBank accession number based upon which systems were designed, primer sequences, amplicon start and end position, TaqMan probe number (Universal Probe Library, Roche), and probe sequence.

dye TAMRA (6-carboxytetramethylrhodamine)) were designed using Primer Express software (Applied Biosystems, Foster City, CA, USA). TaqMan-primer design was based on NCBI Gene Bank sequence information for *M. saxatilis* and related bass species. Three housekeeping gene TaqMan systems (L9, 18S, GAPDH) were designed, based on sequence information from *Dicentrarchus labrax*. All real-time TaqMan PCR systems were validated for specificity and amplification efficiencies as described in Leutenegger et al. (1999). Briefly, 2-fold dilution series of cDNA samples were tested in triplicate with the respective real-time TaqMan PCR system. From the slope of the standard curve, the amplification efficiency was calculated using the formula  $E = 10^{1/s} - 1$ . All amplification efficiencies were above 90%, validating the specificity of the marker systems. Real-time TaqMan PCR mixes contained 400 nM of each of two primers and 80 nM of the appropriate TaqMan probe. We used TaqMan Universal PCR Mastermix (Applied Biosystems, Foster City, CA, USA) containing 10 mM Tris-HCl (pH 8.3), 50 mM KCl, 5 mM MgCl<sub>2</sub>, 2.5 mM deoxynucleotide triphosphates, 0.625 U AmpliTaq Gold DNA polymerase per reaction, 0.25 U AmpErase UNG per reaction and 5  $\mu$ L of the diluted cDNA sample in a final volume of 12  $\mu$ L. The samples were placed in 384 well plates and cDNA was amplified in an automated fluorometer (ABI PRISM 7900 Sequence Detection System, Applied Biosystems). Amplification conditions were 2 min at 50 °C, 10 min at 95 °C, 40 cycles of 15 s at 95 °C and

60 s at 60 °C. Fluorescence of samples was measured every 7 s and signals were considered positive if fluorescence intensity exceeded 10 times the standard deviation of the baseline fluorescence (threshold cycle,  $C_T$ ). SDS 2.2.1 software (Applied Biosystems) was used to quantify transcription.

#### 2.4. Relative quantification of stress response gene transcription

The comparative  $C_T$  method was applied to quantify gene transcription of investigated stress response genes (User Bulletin #2, Applied Biosystems). Values are reported as relative transcription or the  $n$ -fold difference relative to a calibrator cDNA (i.e. average target gene transcription of control fish). Three housekeeping genes (18S, L9, GAPDH) were tested and the one revealing smallest standard deviation and most stable transcription levels over all treatments (L9) was used to normalize the target gene signals ( $\Delta C_T$ ) for the differences in the amount of nucleic acid added to each reaction and the efficiency of the reverse transcriptase step. The  $\Delta C_T$  for each experimental sample from the exposed fish was subtracted from the  $\Delta C_T$  of the calibrator, the mean target gene signal of control fish. Finally, the linear amount of target molecules relative to the calibrator was calculated by  $2^{-\Delta\Delta C_T}$ . Therefore, all stress response gene transcriptions are expressed as an  $n$ -fold difference relative to the calibrator. For comparisons of basic linearized transcription

values between tissues of all pooled control fish, muscle tissue revealed lowest transcription levels in all stress response genes and average transcription of each stress response gene in muscle was thus used as a calibrator for other tissues.

### 2.5. Statistical analyses

Gene transcription data were first tested for normality and equality of variances. Since more than the randomly expected number of datasets was either not normally distributed or failed equality of variance tests, we generally used non-parametric methods for comparisons between treatments and tissues. Kruskal–Wallis one-way analysis of variance on ranks (K-W ANOVA) was used to detect differences in linearized mean responses between treatments and tissues. In case of significance ( $p < 0.05$ ), we tested for (i) differences in gene transcription between control and treatment groups and (ii) differences in gene transcription between the tissue with the weakest transcription level and other tissues by using non-parametric Mann–Whitney  $U$ -test. For comparisons between tissue types, Bonferroni corrections were applied to adjust  $p$ -values for multiple comparisons.

We decided to use a conservative and non-parametric statistical approach throughout the dataset for simplicity and in order to reduce the number of false-positives. It should be noted, however, that the robustness of data interpretation is strengthened by the fact that these results were very similar to those obtained by using parametric tests (one-way analysis of variance, ANOVA and Dunn's or Tukey's post hoc tests) with the limitation that some comparisons could not have been carried out under the requirements for equality of variances and normal distribution. Statistical analyses were carried out using the statistical programs Statistica 6.0 (StatSoft Inc., Tulsa, OK, USA), SPSS 7.0 and SigmaStat 2.0 (SPSS, Inc., Chicago, IL).

Lethal and sublethal effective concentrations were calculated using CETIS v. 1.1.2 (Tidepool Scientific Software, McKinleyville, CA, USA, 2006). NOEC and LOEC were calculated using USEPA standard statistical protocols (USEPA, 2002). LC50s and EC50s were calculated using linear regression, non-linear regression, or linear interpolation methods. For each endpoint, toxicity is defined as a statistically significant difference ( $p < 0.05$ ) to the laboratory control.

## 3. Results

### 3.1. Responses to Cu and esfenvalerate at the organism level

Summaries of the effect concentrations of Cu and esfenvalerate on survival of striped bass juveniles are provided in Tables 2 and 3. For the Cu exposure, 100% mortality was observed at 470 and 900  $\mu\text{g/L}$  Cu (440 and 810  $\mu\text{g/L}$  dissolved Cu), whereas all fish survived in control water and at 42  $\mu\text{g/L}$  Cu (40  $\mu\text{g/L}$  dissolved Cu). At 160  $\mu\text{g/L}$  Cu, survival was 92%. The NOEC and LOEC for 96 h and 7 days were the same. No significant effects of Cu exposure on growth or swimming behavior were observed. LC50 and EC25 for total and dissolved

Table 2

Effect concentrations of  $\text{Cu}^{2+}$  on striped bass (*Morone saxatilis*) survival during a 7-day exposure

Time	Total $\text{Cu}^{2+}$ (ppb)			Dissolved $\text{Cu}^{2+}$ (ppb)		
	LC50	NOEC	LOEC	EC25	NOEC	LOEC
96 h	441	160	470	414	160	440
7 days	262	160	470	254	160	440

Cu in the 7-day exposure were about 60% of those for the 96 h exposure.

Exposure to esfenvalerate for 24 h resulted in 100% mortality at 4.4 and 6.5  $\mu\text{g/L}$  esfenvalerate. At 2.2  $\mu\text{g/L}$  24-h survival was 40%. All individuals of control, solvent control and 0.64  $\mu\text{g/L}$  esfenvalerate treatments survived, and only 1 out of the 25 solvent control fish (4%) showed abnormal swimming behavior. No mortality was observed after 4 h in any treatment, but abnormal swimming behavior was observed in 76% of striped bass exposed to 6.5  $\mu\text{g/L}$  esfenvalerate, and in 36% of fish exposed to 4.4  $\mu\text{g/L}$  esfenvalerate.

### 3.2. Responses to Cu and esfenvalerate at the molecular level

#### 3.2.1. Housekeeping and stress response gene transcription across all tissues

Across all tissues and treatments, 18S showed highest transcription levels out of the three housekeeping genes tested in this study, followed by L9 and GAPDH. Pairwise comparisons between housekeeping genes revealed that transcription levels remained most constant for L9 in striped bass under various exposure conditions. Thus, all subsequent comparisons of stress response gene transcription are expressed as  $n$ -fold differences to the calibrator L9 gene. Transcription of sublethal stress markers HSP70, HSP90, CYP1A, TGF- $\beta$ , MT, MX, and nRAMP was detected in all tissues (gills, liver, muscle, spleen and kidney tissue), but differed significantly between tissues in terms of both total transcription levels and the direction of the response (up-/down-regulation).

#### 3.2.2. Tissue-specific effects of Cu

Significant changes in the transcription of stress response genes after 7-day Cu exposure were detected for four stress response genes in kidney tissue, for two genes each in spleen, muscle and gill tissue, and for one gene in liver tissue. A summary of transcription levels of stress response genes in investigated tissues of control, 42 and 160 ppb Cu exposed fish is

Table 3

Effect concentrations of esfenvalerate ( $\mu\text{g/L}$ ) on striped bass (*Morone saxatilis*) survival and swimming behavior during a 24-h exposure

Time (h)	Survival			Swimming behavior		
	LC50	NOEC	LOEC	EC25	NOEC	LOEC
4	NA	6.5	>6.5	3.88	2.2	4.4
24	2.17	0.64	2.2	1.07	0.64	2.2

Table 4

Changes in mean tissue-specific stress response gene transcription levels and standard deviations (S.D.) of control, 42 ppb total Cu and 160 ppb Cu exposed *Morone saxatilis* expressed as *n*-fold linear differences to ribosomal L9 housekeeping gene transcription

Tissue	HSP70	HSP90	CYP1A1	MT	TGF- $\beta$	MX	nRAMP
<b>Muscle</b>							
Control mean	0.1	-0.2	-0.1	-0.1	-0.1	0.0	-0.2
S.D.	2.1	3.7	2.8	4.4	2.0	3.3	2.4
42 ppb Cu mean	-1.0	-1.2	-1.2	-0.8	-1.9*	0.5	-1.0
S.D.	1.9	1.4	2.5	1.4	3.0	3.7	2.3
160 ppb Cu mean	0.8	-1.0	-1.8	2.0*	-2.4**	-2.4	-0.4
S.D.	2.4	1.8	5.7	2.8	1.7	2.2	3.6
<b>Spleen</b>							
Control mean	-0.1	-0.1	0.2	0.2	0.1	0.0	0.1
S.D.	1.6	1.8	3.8	2.5	2.0	2.6	1.5
42 ppb Cu mean	0.8	-0.3	-1.2	3.7*	0.1	1.7	-0.8
S.D.	1.5	2.0	2.3	3.5	1.6	1.6	1.5
160 ppb Cu mean	0.7	0.6	-0.9	9.5***	1.9*	0.9	0.3
S.D.	1.6	2.1	2.1	7.0	1.4	2.4	1.5
<b>Gill</b>							
Control mean	0.0	0.0	0.1	-0.1	-0.2	0.2	-0.2
S.D.	2.0	1.9	2.4	5.3	3.6	2.0	1.6
42 ppb Cu mean	-0.5	-0.9	-1.6	6.4*	1.8	-1.0	0.4
S.D.	3.8	3.2	7.1	6.8	3.7	3.0	2.5
160 ppb Cu mean	-1.6	-1.1	0.1	2.4	1.4	-6.3***	-1.0
S.D.	3.5	4.3	8.5	3.9	5.5	5.9	4.1
<b>Liver</b>							
Control mean	0.1	0.1	0.0	-0.1	0.2	0.0	0.0
S.D.	3.2	3.4	5.0	3.1	3.5	4.1	4.0
42 ppb Cu mean	2.3	1.5	2.2	2.0	6.3**	3.2	0.9
S.D.	5.2	5.3	6.3	4.2	7.6	4.5	3.8
160 ppb Cu mean	2.3	3.4	0.4	2.5	4.0**	1.2	1.2
S.D.	3.1	3.7	2.8	5.3	2.5	3.7	2.7
<b>Kidney</b>							
Control mean	0.0	0.2	0.0	0.1	-0.2	0.0	0.3
S.D.	1.8	1.6	3.0	2.1	1.8	3.2	2.1
42 ppb Cu mean	1.9**	1.7	-0.2	1.0	0.5*	3.4	3.1*
S.D.	1.4	1.8	1.6	3.0	5.9	4.8	3.6
160 ppb Cu mean	1.8**	2.0	0.6	4.4***	2.7**	0.9	2.9**
S.D.	1.8	2.0	1.8	2.9	2.0	2.1	1.4

\* \*\* and \*\*\* refer to significant differences of mean values at *p*-values of <0.05, <0.01 and <0.001, respectively; Mann–Whitney *U* post hoc tests were only carried out when Kruskal–Wallis ANOVA had *p* < 0.05.

provided in Table 4 and Fig. 1. Overall, the strongest changes in transcription levels were detected for metallothionein, which was on average (all tissues) up-regulated 2.5-fold following the 42 ppb Cu treatment, and 4.2-fold after the 160 ppb Cu treatment compared to control fish. The strongest effects on metallothionein transcription were observed in the spleen tissue, where transcription increased 3.7- and 9.5-fold in the 42 and 160 ppb Cu treatments, respectively. A positive correlation between Cu-concentrations in water and metallothionein expression was found in all tissues except gills. However, in the high-surface gill tissue, being most directly and intensely exposed to dissolved copper, metallothionein transcription had its peak (6.4-fold increase) at 42 ppb Cu, and transcription levels were lower in the 160 ppb treatment group (2.4-fold increase).

Significant changes in gene transcription levels were also detected for TGF- $\beta$ , indicating a link between heavy metal exposure and the immune response. TGF- $\beta$  gene transcription showed significant increases in liver and kidney tissue after

exposure to 42 and 160 ppb Cu, and following 160 ppb Cu in spleen tissue. In contrast, TGF- $\beta$  transcription was significantly reduced in muscle tissue (-1.9 at 42 ppb and -2.4 at 160 ppb). In gill tissue, TGF- $\beta$  transcription remained constant, but transcription of the cytokine MX was significantly decreased after exposure to 160 ppb Cu. The transcription of nRAMP remained constant in most tissues, but was significantly increased by a factor of 3 in kidney following both sublethal copper treatments. Although significant changes in the average transcription levels of heat shock proteins between treatments were only detected for HSP70 in kidney tissue, strongest individual effects for HSP70 and HSP90 occurred in liver tissue. As expected, the transcription of the phase-1 detoxification enzyme CYP1A1 was not affected by any tested Cu concentration in any tissue.

### 3.2.3. Tissue-specific effects of esfenvalerate

Overall, exposure of striped bass to esfenvalerate for 24 h resulted in less pronounced changes in gene transcription than

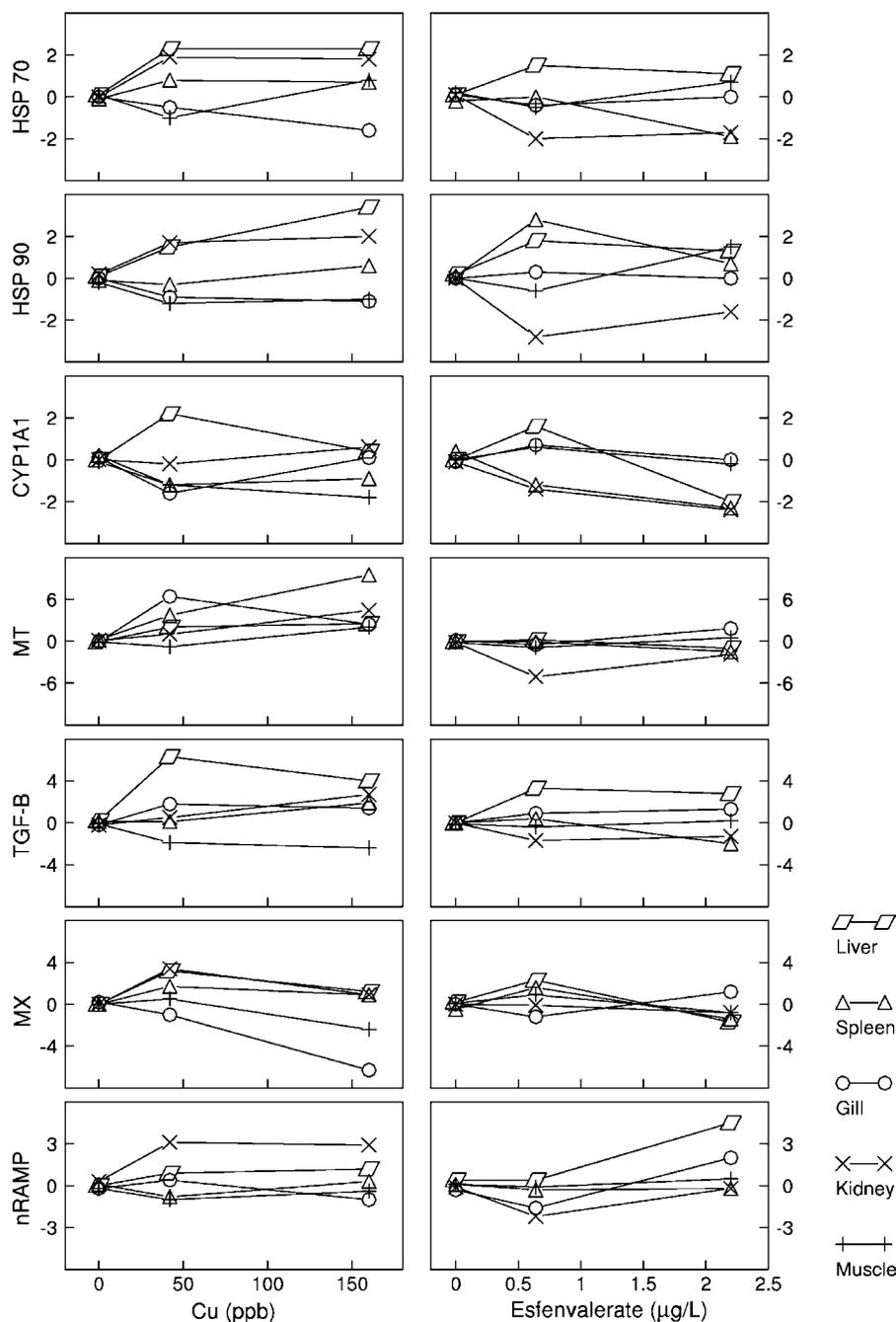


Fig. 1. Graphic overview showing changes in mean tissue-specific stress response gene transcription levels for Cu and esfenvalerate exposed *Morone saxatilis*, expressed as *n*-fold linear differences to ribosomal L9 housekeeping gene transcription; for details and standard deviations see Tables 4 and 5.

those observed after Cu treatments. A summary of changes in gene transcription after esfenvalerate exposure is given in Table 5 and Fig. 1. Significant alteration of transcription was detected in spleen and liver. Only two of the genes investigated were affected in kidney, and no changes were found in muscle and gill tissue. Most pronounced effects were detected for HSP90, with a 2.8-fold increase of transcription in spleen tissue. Transcription of HSP70 was up-regulated in the liver but down-regulated in spleen tissue. The same pattern was evident for CYP1A1. TGF- $\beta$  transcription was increased 3.3-fold on average in liver tissue, corroborating our finding that it also showed strongest transcription increases in liver tissue following Cu exposure. Overall,

strongest effects of esfenvalerate exposure on gene transcription were observed at 0.64  $\mu\text{g/L}$ , whereas weaker and insignificant changes of transcription were seen at 2.2  $\mu\text{g/L}$ . Fish exposed to methanol (MeOH) (solvent control) and control fish had similar transcription values and showed no significant differences of transcription levels in any of the tissues investigated.

### 3.2.4. Comparison of gene transcription levels between tissues

A moderate to very high variation of gene transcription for individual stress response genes was observed between tissues (Fig. 2). Baseline levels of stress gene transcription for pooled

Table 5

Changes in mean tissue-specific stress response gene transcription levels and standard deviations (S.D.) of control, 0.64 and 2.20  $\mu\text{g/L}$  esfenvalerate exposed *Morone saxatilis* expressed as *n*-fold linear differences to ribosomal L9 housekeeping gene transcription

Tissue	HSP70	HSP90	CYP1A1	MT	TGF- $\beta$	MX	nRAMP
<b>Muscle</b>							
Solv. control mean	0.2	0.0	0.0	-0.2	-0.1	0.1	0.1
S.D.	2.4	2.9	3.4	4.0	2.3	2.4	4.2
0.64 $\mu\text{g/L}$ esfenv. mean	-0.5	-0.6	0.6	-0.9	-0.4	0.9	-0.1
S.D.	1.9	2.6	3.5	3.4	2.2	4.0	2.2
2.20 $\mu\text{g/L}$ esfenv. mean	0.7	1.5	-0.2	0.5	0.2	-0.8	0.5
S.D.	1.8	3.0	1.9	4.8	2.2	2.5	3.2
<b>Spleen</b>							
Solv. control mean	-0.2	0.1	0.4	0.0	0.0	-0.5	0.1
S.D.	1.8	2.5	5.1	2.0	2.1	2.2	2.0
0.64 $\mu\text{g/L}$ esfenv. mean	0.0	2.8**	-1.2	-0.1	0.4	1.6*	-0.3
S.D.	1.6	1.6	2.9	2.6	1.9	2.2	2.2
2.20 $\mu\text{g/L}$ esfenv. mean	-1.9**	0.7	-2.3*	-1.5	-2.0	-1.4	-0.2
S.D.	0.6	1.9	3.0	1.4	1.0	1.8	1.8
<b>Gill</b>							
Solv. control mean	0.1	0.0	-0.1	0.1	0.0	0.0	-0.3
S.D.	1.9	2.8	2.1	1.6	2.2	2.7	2.4
0.64 $\mu\text{g/L}$ esfenv. mean	-0.4	0.3	0.7	-0.5	0.9	-1.2	-1.6
S.D.	3.5	3.9	4.1	6.1	3.4	3.7	4.0
2.20 $\mu\text{g/L}$ esfenv. mean	0.0	0.0	0.0	1.8	1.3	1.2	2.0
S.D.	2.3	3.7	3.7	2.9	2.1	2.4	2.4
<b>Liver</b>							
Solv. control mean	0.1	0.2	0.0	-0.1	0.0	0.2	0.4
S.D.	1.3	2.0	1.7	2.3	3.7	2.7	4.5
0.64 $\mu\text{g/L}$ esfenv. mean	1.5**	1.8*	1.6*	0.2	3.3**	2.3	0.4
S.D.	0.9	0.3	1.5	1.7	1.5	5.2	2.9
2.20 $\mu\text{g/L}$ esfenv. mean	1.1	1.3	-2.0	-1.0	2.8	-1.7	4.5
S.D.	1.9	2.0	5.4	3.1	1.6	3.5	5.7
<b>Kidney</b>							
Solv. control mean	0.1	0.0	-0.1	-0.2	0.0	0.0	-0.1
S.D.	3.3	2.9	2.8	3.3	2.8	2.9	2.6
0.64 $\mu\text{g/L}$ esfenv. mean	-2.0	-2.8	-1.4	-5.1*	-1.7	-0.1	-2.2*
S.D.	1.6	1.4	2.0	5.2	1.8	3.4	2.8
2.20 $\mu\text{g/L}$ esfenv. mean	-1.7	-1.6	-2.4	-1.9	-1.3	-0.8	-0.2
S.D.	2.8	2.8	2.0	2.8	3.4	4.7	2.0

\* \*\* and \*\*\* refer to significant differences of mean values at *p*-values of <0.05, <0.01 and <0.001, respectively; Mann–Whitney *U* tests post hoc tests were only carried out when Kruskal–Wallis ANOVA had *p* < 0.05.

control and solvent control fish were lowest in muscle tissue, thus average transcription for respective stress response genes in this tissue was used as a calibrator reference for comparisons with other tissues. Transcription of HSP70 and HSP90 was on an average 5–10-fold enhanced in spleen, gill, and kidney in comparison to muscle tissue. CYP1A1 showed most pronounced tissue-specific effects with up to 1000-fold stronger transcription in liver than in muscle. Metallothionein transcription was highest in liver, kidney and spleen tissues, whereas cytokine (TGF- $\beta$ , MX, nRAMP) transcription was most pronounced in spleen.

#### 4. Discussion

This study provides new information on the lethal and sub-lethal effects of two prominent water contaminants, the heavy metal copper and the pyrethroid insecticide esfenvalerate, on juvenile striped bass, a non-model fish species for which little is known about its sensitivity to pollutants. By quantifying

effects across different levels of biological organization, we provide information on the links between molecular responses and ecologically relevant effects.

The contaminants used in this study, copper and esfenvalerate, are known to be toxic to fish, but have very different mechanisms of action. Copper, an abundant heavy metal in the environment (Bielmyer et al., 2006), exerts its toxicity to fish by inhibiting the branchial  $\text{Na}^+\text{K}^+$ -ATPase and ion uptake as well as stimulating  $\text{Na}^+$ ,  $\text{K}^+$  and  $\text{Cl}^-$  efflux from gill surfaces (Lauren and McDonald, 1985). The pyrethroid insecticide esfenvalerate is a potent neurotoxicant that interferes with nerve cell function by interacting with voltage-dependent sodium channels as well as other ion channels, resulting in repetitive firing of neurons and eventually causing paralysis (Bradbury and Coats, 1989). It has been previously shown that juvenile hybrid striped bass (*Morone chrysops*  $\times$  *M. saxatilis*) are relatively sensitive to Cu exposure if acclimated to freshwater, with 96-h acute median lethal concentrations of 94  $\mu\text{g/L}$  (Bielmyer et al., 2006). This concentration

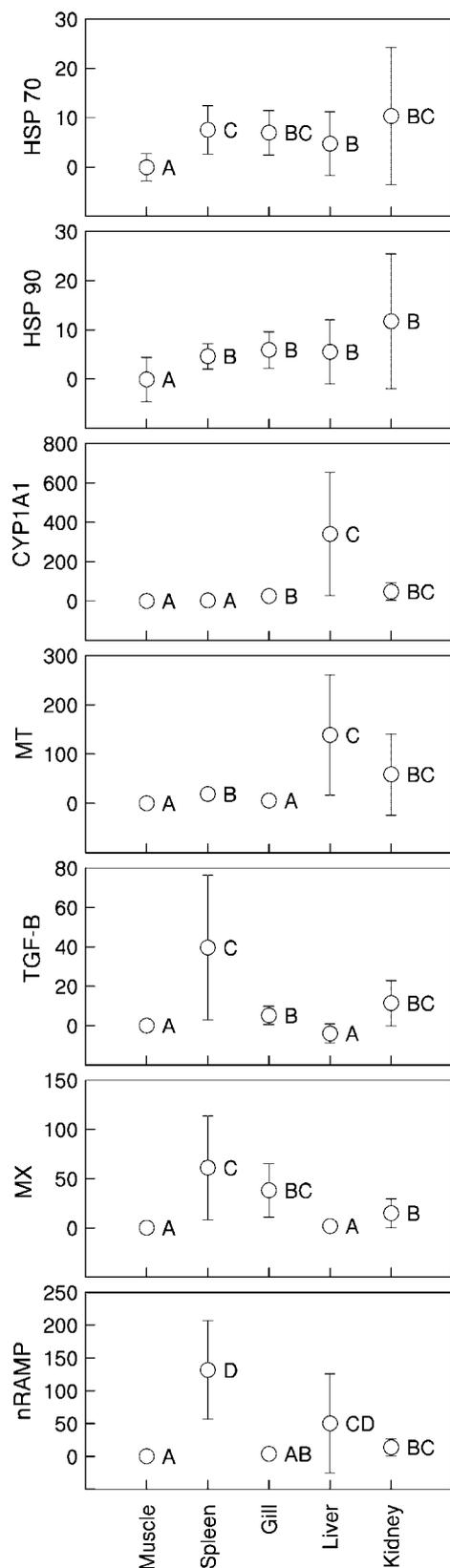


Fig. 2. Comparison of mean gene transcription profiles between tissues and standard deviation (S.D.) for stress response genes of all pooled striped bass (*Morone saxatilis*) from control treatments using muscle tissue from control fish as an overall calibration reference. Different letters indicate significant differences of  $p < 0.05$ .

is lower than the values observed in this study (414  $\mu\text{g/L}$ ), but toxicity of Cu in fish is strongly influenced by environmental parameters such as DOC, pH, hardness and salinity (Reardon and Harrell, 1990; Welsh et al., 1995; Erickson et al., 1996). Acute toxicity of esfenvalerate in fish occurs at concentrations of approximately 0.1–0.5  $\mu\text{g/L}$  (24–96-h LC50; Siepmann and Holm, 2000; Oros and Werner, 2005). Due to the compound's hydrophobic properties, exposure of aquatic organisms living in the water-column may only be brief (a few hours) or take place via dietary uptake (Werner et al., 2002b). The available data suggests that esfenvalerate toxicity to fish is size-dependent. This may explain why the 24-h LC50 of 2.17  $\mu\text{g/L}$  for striped bass juveniles used in this study was higher than reported values.

Sublethal toxic effects can occur at exposure levels far below the concentrations that cause lethality and can have severe consequences for the fitness, reproductive success and survival of aquatic organisms, ultimately leading to population-level effects (Carson, 1962). For an assessment of the toxic potential of chemicals on fish and aquatic ecosystems, endpoints from laboratory tests such as growth, swimming behavior and molecular stress responses should therefore be interpreted in the context of their environmental consequences. As confirmed in this study, growth endpoints are of limited value for short-term (<7 days) exposures of juvenile striped bass, especially if fish size is not homogenous and if the number of organisms tested must be limited to low numbers. Monitoring of swimming behavior can be a powerful and sensitive biomarker for sublethal effects, as shown for the esfenvalerate exposure. Decreased swimming performance most likely decreases the ability to chase prey or to avoid predation, and is thus an important indicator for overall fitness (Holcombe et al., 1982; Little et al., 1990; Scholz et al., 2000; Sandahl et al., 2005). Non-technical and non-computational methods for the assessment of abnormal swimming behavior, however, are prone to a certain bias depending on the researcher and the time intervals in which they are carried out, and are thus difficult to standardize. Linking results from laboratory exposures to field data is complicated by the fact that it mostly remains untested if fish are able to sense certain chemicals and minimize their exposure by swimming into refuge areas or if they become more vulnerable to predation.

Molecular endpoints are the most sensitive biomarker tools to identify and discriminate between exposures to groups of chemicals with different mechanisms of action, detoxification pathways, and biochemical stress responses. Our results demonstrate that analysis of even a limited set of molecular markers can be a useful approach in the field of "environmental forensics". The low amount of tissue needed for analysis (in the order of 2–10 mg), the short time lag between exposure and response, and the cost-effectiveness of the method are additional advantages. Toxicant-specific markers (e.g. metallothionein as an indicator for heavy metal exposure) may be most useful for toxicant identification, whereas integral pleiotropic markers that interact with different systems in diverse ways (e.g. HSP, see Basu et al., 2002) are most powerful for a general screening of overall stress in fish. It has to be noted, however, that for many model organisms and for all non-model organisms, the consequences of the complex temporal patterns of up-/down-regulation of mRNA

transcription and their link with proteomics and organismic effects are still poorly understood, particularly for long-term and repeated exposures. In addition, environmental stressors may induce responses and effects at different levels of organization. Thus, linking molecular responses with ecologically relevant parameters remains challenging.

Under environmental conditions it is likely that multiple stressors simultaneously impact fish populations, and that mixture effects between different chemical contaminants, physical stressors and pathogens may occur and exacerbate overall deleterious effects (Eder et al., 2007). Unknown “side effects” of pollutants, such as alteration of the immune response as observed in this study, behavioral changes, or interference of contaminants with the reproductive system may greatly reduce an organism’s fitness in the wild. For instance, synergistic effects between the pyrethroid insecticide esfenvalerate and viral susceptibility have been described in fish (Eder et al., 2007; Clifford et al., 2005). Also, indirect contaminant-induced effects, such as changes in trophic cascades (Fleeger et al., 2003) may influence populations and communities in nature and can only be detected if the most sensitive species are considered in monitoring.

The bioindicative function of transcriptomics is complicated by the high variability of direction and intensity of changes in gene transcription found in this study. Age and size of the organisms studied can strongly influence sensitivity, which may partly explain the highly variable transcriptome responses. Generally, one of the main limitations in studying “natural” populations is most likely the considerable degree of variation in gene transcription and expression levels between individuals and populations, which was evident for striped bass in this study, and which has been described before for other natural fish populations (e.g. Oleksiak et al., 2002). It is likely that variation in gene expression has a strong impact on evolution (King and Wilson, 1975) and that natural populations have the ability to adapt to certain levels of environmental stressors.

It is also essential that tissue-specific effects be taken into account when assessing an organism’s overall response to environmental stressors. In fact, there are usually various cell types within tissues, and a mere shift in the relative percentage of these can influence the intensity of the response. For instance, copper exposure for 7 days was described to cause a decrease in the number of kidney leukocytes in zebrafish (Rougier et al., 1994), suggesting that dilution or concentration effects can potentially disguise cellular response patterns if whole organs are analyzed. For routine applications and field screenings, however, investigations beyond the tissue level are at present not realistic and were thus not considered in this study. From a biomarker perspective, focusing on relative changes in gene transcription of stress response genes is most relevant, whereas an organism’s overall response will most likely better match the ecological relevance.

Both enhancement and silencing of gene transcription of stress response genes provide important mechanistic information on the organismal effects of contaminants. For example, the observed pronounced effects of Cu exposure on transcription of the cytokine TGF- $\beta$  in several tissues suggest that there is a link between Cu and an altered immune response. This

result confirms earlier studies, where a link between exposure to Cu and cellular and non-specific immune-function was reported (Zelikoff, 1993; Rougier et al., 1994; Dethloff and Bailey, 1998; Dethloff et al., 2001; Shariff et al., 2001; Broeg, 2003). Furthermore, transcription of genes associated with the immune system was down-regulated in *Daphnia* sp. following Cu exposure (Poynton et al., 2007). Exposures to environmental stressors that have the potential of modulating the immune system can often be linked to ecologically relevant endpoints, such as decreased resistance to disease (Peters and Schwarzer, 1985; Anderson, 1990; Rougier et al., 1994; Dunier, 1996; Pulsford et al., 1995; Dethloff and Bailey, 1998; Dethloff et al., 2001). Corroborating existing information on the effects of Cu exposure on protein levels of MT (Hamer, 1986; Lauren and McDonald, 1987), transcription of this metal-binding protein was significantly induced in response to Cu treatment. However, induction was more pronounced in hematopoietic tissues (spleen, kidney) than in liver, where protein levels are commonly measured. Our data underline the potential of using MT induction on the transcriptome level as a biomarker, especially since the availability of sufficient amounts of tissue can quickly become a challenge when quantifying proteins in spleen or kidney of small fish. In addition, signals at the transcriptome level generally take less time to manifest themselves. Combining studies into the transcriptome as well as proteome of stress response mechanisms in fish can thus be useful for separating and assessing the spheres of effect and response. This study also shows that higher concentrations of Cu and esfenvalerate can result in weaker responses on the transcriptome level than lower concentrations, indicating that receptor saturation (high dose inhibition) or cellular damage may play a role, leading to potentially irreversible effects. For heavy metals, stimulation of macrophages at lower exposure concentrations and inhibition at high concentrations has been previously reported (e.g., Pulsford et al., 1995).

Our findings for the non-model organism striped bass suggest that mechanistic approaches in transcription biomarker studies, i.e. hypothesis-driven approaches of investigating gene transcription in pre-selected target genes for a large number of individuals in various tissues, can be an effective alternative to microarray studies, where costs can severely limit the number of tissues and individuals to be used, and where interpretations of up- or down-regulation often cannot be linked to known biochemical pathways. Molecular endpoints, i.e. the change in transcription levels of stress response genes, were more sensitive indicators for exposure to model contaminants than other sublethal (growth, swimming behavior) or lethal (mortality) endpoints. These results indicate that changes in transcription of selected stress response genes can be powerful biomarkers for the detection of toxic effects at sublethal levels, and for the identification of pollutants. Our findings demonstrate that it is possible to carry out functional genomic experiments in the context of ecotoxicogenomics, even in species with limited availability of sequence information. The strong dependence of the observed transcriptome response on tissue type and dose, and the fact that organisms are often exposed to multiple stressors simultaneously, still pose challenges to the routine use of this technique for field sample assessment.

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