

Table 4-1. Evaluation of the uncertainty associated with the lines of evidence used to assess risks to the microbial community.

Medium	Line of Evidence	Conceptual Model			Exposure Assessment				Effects Assessment					Total Evaluation Score	
		Relevance of Exposure Pathway	Relevance of Measurement Endpoint	Conceptual Model Score	Level of Standardization	Quality of Data	Quantity of Data	Exposure Assessment Score	Level of Standardization	Meets Acceptability Criteria	Demonstrated Concentration-Response Relationship	Relevance of Exposure Medium	Level of Validation		Effects Assessment Score
Whole-Sediment Chemistry	P-IOT	1.5	1	1.3	2	2	2.5	2.2	NA	NA	1.5	1	1	1.2	1.5
Whole-Sediment Toxicity	O-IOT (<i>V. fisheri</i> - B) ¹	1.5	1	1.3	NA	NA	NA	NA	1	2.5	2	1	1	1.5	1.4
	O-MOT (<i>V. fisheri</i> - B)	1.5	1	1.3	NA	NA	NA	NA	1	2.5	2	1	1	1.5	1.4

¹ *V. fisheri* = bacterium, *Vibrio fisheri*.

B = bioluminescence; NA = not applicable; P-IOT = predicted incidence of toxicity; O-IOT = observed incidence of toxicity; O-MOT = observed magnitude of toxicity.

Table 4-2. Summary of risks to the microbial community estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			<i>Percent (n) of Samples/Risk Category</i>		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	49	0.335	90% (44)	10% (5)	0% (0)
Clooney Island Loop	32	1.12	66% (21)	34% (11)	0% (0)
Contraband Bayou	9	0.167	100% (9)	0% (0)	0% (0)
Coon Island Loop	56	0.936	71% (40)	29% (16)	0% (0)
Overall UCR AOC	146	0.727	78% (114)	22% (32)	0% (0)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	53	1.92	38% (20)	62% (33)	0% (0)
Middle Bayou d'Inde	93	2.85	6% (6)	94% (87)	0% (0)
Lower Bayou d'Inde - Mainstem	38	2.49	21% (8)	79% (30)	0% (0)
Lower Bayou d'Inde - Lockport Marsh	125	2.08	35% (44)	65% (81)	0% (0)
PPG Canal	6	1.73	83% (5)	17% (1)	0% (0)
Overall BI AOC	315	2.32	26% (83)	74% (232)	0% (0)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	76	0.789	74% (56)	26% (20)	0% (0)
Prien Lake and upper old river channel	49	0.490	84% (41)	16% (8)	0% (0)
Indian Wells Lagoon	10	2.39	30% (3)	70% (7)	0% (0)
Bayou Olsen	11	0	100% (11)	0% (0)	0% (0)
Moss Lake	17	1.75	47% (8)	53% (9)	0% (0)
Overall MCR AOC	163	0.845	73% (119)	27% (44)	0% (0)
<i>AOC Subtotal</i>	<i>624</i>	<i>1.56</i>	<i>51% (316)</i>	<i>49% (308)</i>	<i>0% (0)</i>
<i>Reference</i>					
Bayou Choupique	4	0.750	100% (4)	0% (0)	0% (0)
Grand Bayou	3	0	100% (3)	0% (0)	0% (0)
Bayou Bois Connine	2	0	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.176	100% (17)	0% (0)	0% (0)
<i>Entire Estuary</i>	<i>641</i>	<i>1.53</i>	<i>52% (333)</i>	<i>48% (308)</i>	<i>0% (0)</i>

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table 4-3. Biological conditions that occur within two categories of risk to the microbial community in the Calcasieu Estuary, identified using the risk designations assigned to each sample.

Microbe Metric/Toxicity Test	Endpoint Measured	Low mean ± SD (n)	Indeterminate mean ± SD (n)	High mean ± SD (n)
<i>Sediment Toxicity</i>				
<i>Vibrio fischeri</i> (Microtox)	EC ₅₀ - Bioluminescence (% sediment WW/mL)	11.1 ± 8.37 (84)	0.496 ± 0.323 (5)	0 ± 0 (0)

SD = standard deviation; n = number of samples; WW = wet weight.

Table 5-1. Evaluation of the uncertainty associated with the lines of evidence used to assess risks to the aquatic plant community.

Medium	Line of Evidence	Conceptual Model			Exposure Assessment				Effects Assessment					Total Evaluation Score	
		Relevance of Exposure Pathway	Relevance of Measurement Endpoint	Conceptual Model Score	Level of Standardization	Quality of Data	Quantity of Data	Exposure Assessment Score	Level of Standardization	Meets Acceptability Criteria	Demonstrated Concentration-Response Relationship	Relevance of Exposure Medium	Level of Validation		Effects Assessment Score
Surface-Water Chemistry	P-IOT (SW conventionals)	3	2	2.5	3	3	1	2.3	NA	NA	1.5	3	1	1.8	2.2
	P-IOT (SW metals)	3	2	2.5	3	3	1	2.3	NA	NA	1.5	3	1	1.8	2.2
	P-IOT (SW organics)	3	2	2.5	3	3	1	2.3	NA	NA	1.5	3	1	1.8	2.2
Pore-Water Chemistry	P-IOT (PW conventionals)	1.5	2	1.8	3	3	2.5	2.8	NA	NA	1.5	1.5	1	1.3	2.0
	P-IOT (PW metals)	1.5	2	1.8	3	3	2.5	2.8	NA	NA	1.5	1.5	1	1.3	2.0
	P-IOT (PW organics)	1.5	2	1.8	3	3	2.5	2.8	NA	NA	1.5	1.5	1	1.3	2.0
Pore-Water Toxicity	O-IOT (<i>U. fasciata</i> - Ge or G) ¹	1.5	3	2.3	NA	NA	NA		1	2.5	2.5	1.5	1	1.7	2.0
	O-MOT (<i>U. fasciata</i> - Ge)	1.5	3	2.3	NA	NA	NA	NA	1	2.5	2.5	1.5	1	1.7	2.0

¹ *U. fasciata* = algae, *Ulva fasciata*.

Ge or G = germination or growth; G = germination; SW - surface water; PW = pore water; NA = not applicable; P-IOT = predicted incidence of toxicity; O-IOT = observed incidence of toxicity; O-MOT = observed magnitude of toxicity.

Table 5-2. Summary of risks to aquatic plants estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			Percent (n) of Samples/Risk Category		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	14	0.732	86% (12)	7% (1)	7% (1)
Clooney Island Loop	7	2.10	57% (4)	0% (0)	43% (3)
Contraband Bayou	7	0.893	86% (6)	0% (0)	14% (1)
Coon Island Loop	13	1.61	69% (9)	0% (0)	31% (4)
Overall UCR AOC	41	1.27	76% (31)	2% (1)	22% (9)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	10	1.83	60% (6)	0% (0)	40% (4)
Middle Bayou d'Inde	11	1.60	64% (7)	9% (1)	27% (3)
Lower Bayou d'Inde - Mainstem	7	0.857	86% (6)	14% (1)	0% (0)
Lower Bayou d'Inde - Lockport Marsh	18	1.99	56% (10)	6% (1)	39% (7)
PPG Canal	6	3.11	33% (2)	0% (0)	67% (4)
Overall BI AOC	52	1.85	60% (31)	6% (3)	35% (18)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	10	0.200	90% (9)	10% (1)	0% (0)
Prien Lake and upper old river channel	13	0.410	92% (12)	0% (0)	8% (1)
Indian Wells Lagoon	3	3.19	33% (1)	0% (0)	67% (2)
Bayou Olsen	5	0.533	80% (4)	20% (1)	0% (0)
Moss Lake	6	1.00	83% (5)	0% (0)	17% (1)
Overall MCR AOC	37	0.691	84% (31)	5% (2)	11% (4)
<i>AOC Subtotal</i>	130	1.34	72% (93)	5% (6)	24% (31)
<i>Reference</i>					
Bayou Choupique	4	0.333	100% (4)	0% (0)	0% (0)
Grand Bayou	3	1.78	67% (2)	0% (0)	33% (1)
Bayou Bois Connine	2	2.67	50% (1)	0% (0)	50% (1)
Johnson Bayou	4	0.480	100% (4)	0% (0)	0% (0)
Willow Bayou	2	0.333	100% (2)	0% (0)	0% (0)
Overall Reference Areas	15	0.972	87% (13)	0% (0)	13% (2)
<i>Entire Estuary</i>	145	1.30	73% (106)	4% (6)	23% (33)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table 5-3. Biological conditions that occur within the three categories of risk to aquatic plants in the Calcasieu Estuary, identified using the risk designations assigned to each sample.

Plant Metric/Toxicity Test	Endpoint Measured	Low	Indeterminate	High
		mean ± SD (n)	mean ± SD (n)	mean ± SD (n)
<i>Pore-water Toxicity</i>				
<i>Ulva fasciata</i>	Percent Germination	88.3 ± 7.35 (36)	59.5 ± 32.1 (3)	36.6 ± 20.0 (6)
<i>Ulva fasciata</i>	Germling cell number (n)	8.09 ± 2.73 (36)	4.33 ± 3.75 (3)	1.96 ± 1.62 (6)
<i>Ulva fasciata</i>	Germling length (µm)	57.7 ± 15.5 (36)	33.7 ± 26.1 (3)	16.6 ± 13.0 (6)

SD = standard deviation; n = number of samples or germling cells.

Table 6-1. Evaluation of the uncertainty associated with the lines of evidence used to assess risks to the benthic invertebrate community.

Medium	Line of Evidence	Conceptual Model			Exposure Assessment				Effects Assessment					Total Evaluation Score	
		Relevance of Exposure Pathway	Relevance of Measurement Endpoint	Conceptual Model Score	Level of Standardization	Quality of Data	Quantity of Data	Exposure Assessment Score	Level of Standardization	Meets Acceptability Criteria	Demonstrated Concentration-Response Relationship	Relevance of Exposure Medium	Level of Validation		Effects Assessment Score
Whole-Sediment Chemistry	P-IOT (10-d <i>A. abdita</i> - S) ¹	3	2	2.5	2	2	2.5	2.2	NA	NA	1	3	3	2.3	2.3
	P-MOT (10-d <i>A. abdita</i> - S)	3	2	2.5	2	2	2.5	2.2	NA	NA	2	2.5	3	2.5	2.4
	P-IOT (28-d <i>H. azteca</i> - S) ²	3	2	2.5	2	2	2.5	2.2	NA	NA	3	3	3	3.0	2.6
	P-MOT (28-d <i>H. azteca</i> - S)	3	2	2.5	2	2	2.5	2.2	NA	NA	3	2.5	3	2.8	2.5
Pore-Water Chemistry	P-IOT (PW conventionals)	3	2	2.5	3	3	2.5	2.8	NA	NA	1.5	2	1	1.5	2.3
	P-IOT (PW metals)	3	2	2.5	3	3	2.5	2.8	NA	NA	1.5	2	1	1.5	2.3
	P-IOT (PW organics)	3	2	2.5	3	3	2.5	2.8	NA	NA	1.5	2	1	1.5	2.3
Whole-Sediment Toxicity	O-IOT (10-d <i>A. abdita</i> - S)	3	2.5	2.8	NA	NA	NA	NA	2.5	3	1	3	3	2.5	2.6
	O-MOT (10-d <i>A. abdita</i> - S)	3	3	3.0	NA	NA	NA	NA	2.5	3	2	3	3	2.7	2.9
	O-IOT (28-d <i>H. azteca</i> - S)	3	2.5	2.8	NA	NA	NA	NA	3	3	3	2.5	3	2.9	2.8
	O-MOT (28-d <i>H. azteca</i> - S)	3	3	3.0	NA	NA	NA	NA	3	3	3	2.5	3	2.9	3.0
Pore-Water Toxicity	O-IOT (60-m/48-h <i>A. punctulata</i> - F or D) ³	3	2	2.5	NA	NA	NA	NA	1.5	2.5	2	2	1.5	1.9	2.2
	O-MOT (60-m <i>A. punctulata</i> - F)	3	2	2.5	NA	NA	NA	NA	1.5	2.5	1	2	1.5	1.7	2.1
Benthic Invertebrate	O-IOT (Benthic CS)	3	3	3.0	NA	NA	NA	NA	1	2	1	2.5	2	1.7	2.4

¹ *A. abdita* = amphipod, *Ampelisca abdita*.

² *H. azteca* = amphipod, *Hyaella azteca*.

³ *A. punctulata* = sea urchin, *Arbacia punctulata*.

S = survival; F or D = fertilization or development; CS = community structure; d = day; m - minute; PW = pore water; NA = not applicable; P-IOT = predicted incidence of toxicity; P-MOT = predicted magnitude of toxicity; O-IOT = observed incidence of toxicity; O-MOT = observed magnitude of toxicity.

Table 6-2. Summary of risks to the benthic invertebrate community estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			<i>Percent (n) of Samples/Risk Category</i>		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	49	0.519	94% (46)	4% (2)	2% (1)
Clooney Island Loop	32	1.25	78% (25)	3% (1)	19% (6)
Contraband Bayou	9	1.23	89% (8)	11% (1)	0% (0)
Coon Island Loop	56	0.816	84% (47)	4% (2)	13% (7)
Overall UCR AOC	146	0.838	86% (126)	4% (6)	10% (14)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	53	1.86	58% (31)	15% (8)	26% (14)
Middle Bayou d'Inde	93	3.01	26% (24)	13% (12)	61% (57)
Lower Bayou d'Inde - Mainstem	38	1.53	68% (26)	13% (5)	18% (7)
Lower Bayou d'Inde - Lockport Marsh	125	1.90	57% (71)	14% (17)	30% (37)
PPG Canal	6	3.24	17% (1)	33% (2)	50% (3)
Overall BI AOC	315	2.20	49% (153)	14% (44)	37% (118)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	76	0.475	91% (69)	7% (5)	3% (2)
Prien Lake and upper old river channel	49	0.270	96% (47)	4% (2)	0% (0)
Indian Wells Lagoon	10	4.33	10% (1)	0% (0)	90% (9)
Bayou Olsen	11	0.512	100% (11)	0% (0)	0% (0)
Moss Lake	17	0.691	94% (16)	6% (1)	0% (0)
Overall MCR AOC	163	0.674	88% (144)	5% (8)	7% (11)
<i>AOC Subtotal</i>	624	1.48	68% (423)	9% (58)	23% (143)
<i>Reference</i>					
Bayou Choupique	4	0.515	100% (4)	0% (0)	0% (0)
Grand Bayou	3	1.63	67% (2)	33% (1)	0% (0)
Bayou Bois Connine	2	1.36	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0.051	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0.153	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.605	94% (16)	6% (1)	0% (0)
<i>Entire Estuary</i>	641	1.46	68% (439)	9% (59)	22% (143)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table 6-3. Biological conditions that occur within the three categories of risk to the benthic invertebrate community in the Calcasieu Estuary, identified using the risk designations assigned to each sample.

Benthic Metric/Toxicity Test	Endpoint Measured	Low	Indeterminate	High
		mean ± SD (n)	mean ± SD (n)	mean ± SD (n)
<i>Sediment Toxicity</i>				
28-d <i>Hyalella azteca</i>	% survival	91.6 ± 7.03 (54)	80.5 ± 19.5 (15)	53.6 ± 28.6 (20)
28-d <i>Hyalella azteca</i>	length (mm)	3.82 ± 0.487 (54)	3.80 ± 0.625 (15)	3.76 ± 0.555 (19)
10-d <i>Ampelisca abdita</i>	% survival	62.4 ± 17.3 (54)	43.1 ± 23.6 (15)	15.5 ± 17.6 (20)
60-m <i>Arbacia punctulata</i>	% fertilization	68.4 ± 25.8 (30)	56.2 ± 36.2 (10)	23.0 ± 29.1 (5)
<i>Benthic Invertebrate Community Structure</i>				
Mean total abundance (H/H)	#/35.4 cm sq.	3.94 ± 3.38 (54)	1.48 ± 1.54 (15)	1.52 ± 2.63 (20)
Mean total abundance (H/M)	#/35.4 cm sq.	3.53 ± 5.04 (54)	0.787 ± 0.955 (15)	0.420 ± 0.908 (20)
Mean total abundance (L/L)	#/35.4 cm sq.	0.300 ± 1.18 (54)	0.760 ± 2.94 (15)	0 ± 0 (20)
Mean total abundance (M/H)	#/35.4 cm sq.	0.0667 ± 0.145 (54)	0.0667 ± 0.209 (15)	0.0200 ± 0.0894 (20)
Mean total abundance (M/L)	#/35.4 cm sq.	0.633 ± 1.78 (54)	0.587 ± 2.27 (15)	0 ± 0 (20)
Mean total abundance (M/M)	#/35.4 cm sq.	0.548 ± 0.734 (54)	0.293 ± 0.506 (15)	0.0800 ± 0.151 (20)
Nonnormalized mIBI	no units	9.15 ± 8.59 (54)	6.88 ± 14.0 (15)	2.56 ± 2.07 (20)
Normalized mIBI	no units	0.495 ± 0.177 (54)	0.354 ± 0.136 (15)	0.299 ± 0.058 (20)
Pollution Indicator Spp. (H/H + H/M + M/H)	#/35.4 cm sq.	7.54 ± 7.65 (54)	2.33 ± 2.00 (15)	1.96 ± 3.03 (20)
Pollution Sensitive (L/L + M/L)	#/35.4 cm sq.	0.933 ± 2.32 (54)	1.35 ± 5.22 (15)	0 ± 0 (20)
Richness = total # sp.	# species/35.4 cm sq.	6.72 ± 4.38 (54)	3.87 ± 3.64 (15)	2.45 ± 1.93 (20)
Total Abundance	#/35.4 cm sq.	9.03 ± 8.38 (54)	4.00 ± 7.35 (15)	2.07 ± 3.14 (20)

SD = standard deviation; n = number of samples; d = day; m = minute; H = high; M = medium; L = low; sp. = species; mIBI = macroinvertebrate index of biotic integrity.

Table 7-1. Evaluation of the uncertainty associated with the lines of evidence used to assess risks to the fish community.

Medium	Line of Evidence	Conceptual Model			Exposure Assessment				Effects Assessment					Total Evaluation Score	
		Relevance of Exposure Pathway	Relevance of Measurement Endpoint	Conceptual Model Score	Level of Standardization	Quality of Data	Quantity of Data	Exposure Assessment Score	Level of Standardization	Meets Acceptability Criteria	Demonstrated Concentration-Response Relationship	Relevance of Exposure Medium	Level of Validation		Effects Assessment Score
Surface-Water Chemistry	P-IOT (SW conventionals)	3	2	2.5	2	2.5	1	1.8	NA	NA	2	3	2	2.3	2.2
	P-IOT (SW metals)	3	2	2.5	2	2.5	1	1.8	NA	NA	2	3	2	2.3	2.2
	P-IOT (SW organics)	3	2	2.5	2	2.5	1	1.8	NA	NA	2	3	2	2.3	2.2
Whole-Sediment Chemistry	P-IOT	2.5	2	2.3	2	2.5	3	2.5	NA	NA	1	2.5	1.5	1.7	2.1
Pore-Water Chemistry	P-IOT (PW conventionals)	1.5	2	1.8	3	3	2.5	2.8	NA	NA	2	1.5	1	1.5	2.0
	P-IOT (PW metals)	1.5	2	1.8	3	3	2.5	2.8	NA	NA	2	1.5	1	1.5	2.0
	P-IOT (PW organics)	1.5	2	1.8	3	3	2.5	2.8	NA	NA	2	1.5	1	1.5	2.0
Pore-Water Toxicity	O-IOT (<i>S. ocellatus</i> - H or S) ¹	1.5	2	1.8	NA	NA	NA	NA	1	2.5	1	1.5	1	1.4	1.6
	O-MOT (<i>S. ocellatus</i> - S)	1.5	2	1.8	NA	NA	NA	NA	1	2.5	1	1.5	1	1.4	1.6

¹ *S. ocellatus* = redbfish, *Sciaenops ocellatus*

H or S = hatch or survival; NA = not applicable; PW = pore water; SW = surface water; P-IOT = predicted incidence of toxicity; O-IOT = observed incidence of toxicity; O-MOT = observed magnitude of toxicity.

Table 7-2. Summary of risks to fish estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average mean Risk Score	Predicted Risk		
			<i>Percent (n) of Samples/Risk Category</i>		
			Low	Indeterminate	High
<i>Upper Calcasieu River AOC</i>					
Upper Calcasieu River - Mainstem	49	0.250	98% (48)	0% (0)	2% (1)
Clooney Island Loop	32	1.26	75% (24)	3% (1)	22% (7)
Contraband Bayou	9	0.574	89% (8)	11% (1)	0% (0)
Coon Island Loop	65	1.13	72% (47)	8% (5)	20% (13)
Overall UCR AOC	155	0.846	82% (127)	5% (7)	14% (21)
<i>Bayou d'Inde AOC</i>					
Upper Bayou d'Inde	53	1.71	60% (32)	4% (2)	36% (19)
Middle Bayou d'Inde	93	3.81	8% (7)	5% (5)	87% (81)
Lower Bayou d'Inde - Mainstem	38	3.07	24% (9)	5% (2)	71% (27)
Lower Bayou d'Inde - Lockport Marsh	126	2.45	40% (51)	6% (8)	53% (67)
PPG Canal	6	2.12	33% (2)	67% (4)	0% (0)
Overall BI AOC	316	2.79	32% (101)	7% (21)	61% (194)
<i>Middle Calcasieu River AOC</i>					
Middle Calcasieu River - Mainstem	76	0.605	87% (66)	3% (2)	11% (8)
Prien Lake and upper old river channel	49	0.324	96% (47)	0% (0)	4% (2)
Indian Wells Lagoon	10	3.30	10% (1)	30% (3)	60% (6)
Bayou Olsen	11	0.162	100% (11)	0% (0)	0% (0)
Moss Lake	17	1.01	82% (14)	0% (0)	18% (3)
Overall MCR AOC	163	0.697	85% (139)	3% (5)	12% (19)
<i>AOC Subtotal</i>	634	1.78	58% (367)	5% (33)	37% (234)
<i>Reference</i>					
Bayou Choupique	4	0.572	100% (4)	0% (0)	0% (0)
Grand Bayou	3	0.741	100% (3)	0% (0)	0% (0)
Bayou Bois Connine	2	1.11	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0.257	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0.222	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.513	100% (17)	0% (0)	0% (0)
<i>Entire Estuary</i>	651	1.74	59% (384)	5% (33)	36% (234)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table 7-3. Biological conditions that occur within the three categories of risk to fish in the Calcasieu Estuary, identified using the risk designations assigned to each sample.

Fish Metric/Toxicity Test	Endpoint Measured	Low mean ± SD (n)	Indeterminate mean ± SD (n)	High mean ± SD (n)
<i>Pore-water Toxicity</i> <i>Sciaenops ocellatus</i>	48-h survival	2.91 ± 11.7 (33)	1.83 ± 6.35 (12)	ND

SD = standard deviation; n = number of samples; ND = no data.

Table 8-1. Risk quotients for contaminants of concern from conservative deterministic risk assessment.

Group	Contaminant of Concern	Area	Risk Quotient	Proceed to Probabilistic Assessment?
Sediment Probing Birds	Mercury	Bayou d'Inde	541	Yes
		Upper Calcasieu	412	Yes
		Middle Calcasieu	217	Yes
		Reference Areas	224	Yes
	Lead	Bayou d'Inde	5.9	Yes
		Upper Calcasieu	4	Yes
		Middle Calcasieu	2.3	Yes
		Reference Areas	1.7	Yes
	Selenium	Bayou d'Inde	2.3	Yes
		Upper Calcasieu	2.8	Yes
		Middle Calcasieu	3.7	Yes
		Reference Areas	2.1	Yes
	TCDD-TEQs	Bayou d'Inde	8.9	Yes
		Upper Calcasieu	1.9	Yes
		Reference Areas	0.1	Yes
	Carnivorous Wading Birds	Mercury	Bayou d'Inde	16.3
Upper Calcasieu			3.5	Yes
Middle Calcasieu			3.7	Yes
Reference Areas			1.5	Yes
TCDD-TEQs		Bayou d'Inde	1	Yes
		Upper Calcasieu	0.2	No
		Reference Areas	0.4	Yes
Piscivorous Birds		TCDD-TEQs	Bayou d'Inde	1.7
	Upper Calcasieu River		0.3	No
	Middle Calcasieu River		1.52	Yes
	Reference Areas		0.8	Yes
	Selenium	Bayou d'Inde	1.2	Yes
		Upper Calcasieu River	0.8	No
		Middle Calcasieu River	0.9	No
		Reference Areas	0.6	Yes
	Mercury	Bayou d'Inde	28.4	Yes
		Upper Calcasieu River	6.1	Yes
		Middle Calcasieu River	6.5	Yes
		Reference Areas	2.6	Yes

Table 8-1. Risk quotients for contaminants of concern from conservative deterministic risk assessment.

Group	Contaminant of Concern	Area	Risk Quotient	Proceed to Probabilistic Assessment?
Piscivorous Birds (cont.)	Total PCBs	Bayou d'Inde	1	Yes
		Upper Calcasieu River	0	No
		Middle Calcasieu River	0.1	No
		Reference Areas	0.6	Yes

Table 8-2. Results of the probabilistic risk assessment for sediment-probing birds in the Calcasieu Estuary.

Area / Contaminant of Concern	Risk Category					
	Average-Sized Sediment Probing Birds			Small Sediment Probing Birds		
	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>
<i>TCDD-TEQs</i>						
Bayou d'Inde	x			x		
Upper Calcasieu River	x			x		
Reference Areas	x			x		
<i>Selenium</i>						
Bayou d'Inde	x			x		
Upper Calcasieu River	x					x
Middle Calcasieu River		x				x
Reference Areas	x			x		
<i>Mercury</i>						
Bayou d'Inde	x			x		
Upper Calcasieu River	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		
<i>Lead</i>						
Bayou d'Inde		x				x
Upper Calcasieu River		x				x
Middle Calcasieu River		x				x
Reference Areas		x				x

Table 8-3. Results of the probabilistic risk assessment for carnivorous-wading birds in the Calcasieu Estuary.

Area / Contaminant of Concern	Risk Category					
	Average-Sized Carnivorous Wading Birds			Small Carnivorous Wading Birds		
	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>
<i>TCDD-TEQs</i>						
Bayou d'Inde	x			x		
Reference Areas	x			x		
<i>Mercury</i>						
Bayou d'Inde	x			x		
Upper Calcasieu River	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		

Table 8-4. Results of the probabilistic risk assessment for piscivorous birds in the Calcasieu Estuary.

Area / Contaminant of Concern	Risk Category					
	Average-Sized Piscivorous Birds			Small Piscivorous Birds		
	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>
<i>TCDD-TEQs</i>						
Bayou d'Inde		x			x	
Middle Calcasieu River	x				x	
Reference Areas	x				x	
<i>Selenium</i>						
Bayou d'Inde	x				x	
Reference Areas	x				x	
<i>Mercury</i>						
Bayou d'Inde	x				x	
Upper Calcasieu River	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		
<i>Total PCBs</i>						
Bayou d'Inde	x				x	
Reference Areas	x			x		

Table 9-1a. Results of the deterministic risk assessment for piscivorous mammals in the Calcasieu Estuary.

Contaminant of Concern	Area	Risk Quotient	Proceed to Probabilistic Assessment?
Mercury	Bayou d'Inde	12.2	Yes
	Upper Calcasieu River	3.3	Yes
	Middle Calcasieu River	3.9	Yes
	Reference Areas	2.3	Yes
TCDD-TEQs	Bayou d'Inde	22.7	Yes
	Upper Calcasieu River	7.5	Yes
	Middle Calcasieu River	10.8	Yes
	Reference Areas	1.7	Yes
Selenium	Bayou d'Inde	2.2	Yes
	Upper Calcasieu River	1.9	No
	Middle Calcasieu River	2.5	Yes
	Reference Areas	1.8	Yes
Total PCBs	Bayou d'Inde	125	Yes
	Upper Calcasieu River	46	No
	Middle Calcasieu River	40.9	No
	Reference Areas	49.9	Yes

Table 9-1b. Results of the deterministic risk assessment for omnivorous mammals in the Calcasieu Estuary.

Contaminant of Concern	Area	Risk Quotient	Proceed to Probabilistic Assessment?
Mercury	Bayou d'Inde	1.5	Yes
	Upper Calcasieu River	0.3	No
	Middle Calcasieu River	0.3	No
	Reference Areas	0.1	Yes
TCDD-TEQs	Bayou d'Inde	17.6	Yes
	Upper Calcasieu River	5	No
	Middle Calcasieu River	14.7	Yes
	Reference Areas	6.3	Yes
Selenium	Bayou d'Inde	1.6	Yes
	Upper Calcasieu River	1.1	Yes
	Middle Calcasieu River	1.2	Yes
	Reference Areas	0.8	Yes
Total PCBs	Bayou d'Inde	45.9	Yes
	Upper Calcasieu River	6.3	No
	Middle Calcasieu River	1.7	No
	Reference Areas	25.8	Yes

Table 9-2a. Results of the probabilistic risk assessment for piscivorous mammals in the Calcasieu Estuary.

Area / Contaminant of Concern	Risk Category					
	Average-Sized Piscivorous Mammals			Small Piscivorous Mammals		
	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>
<i>Mercury</i>						
Bayou d'Inde	x			x		
Upper Calcasieu River	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		
<i>TCDD-TEQs</i>						
Bayou d'Inde	x			x		
Upper Calcasieu River	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		
<i>Selenium</i>						
Bayou d'Inde	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		
<i>Total PCBs</i>						
Bayou d'Inde			x			x
Reference Areas	x			x		

Table 9-2b. Results of the probabilistic risk assessment for omnivorous mammals in the Calcasieu Estuary.

Area / Contaminant of Concern	Risk Category					
	Average-Sized Omnivorous Mammals			Small Omnivorous Mammals		
	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>	<i>Low</i>	<i>Indeterminate</i>	<i>High</i>
<i>Mercury</i>						
Bayou d'Inde	x			x		
Reference Areas	x			x		
<i>TCDD-TEQs</i>						
Bayou d'Inde	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		
<i>Selenium</i>						
Bayou d'Inde	x			x		
Upper Calcasieu River	x			x		
Middle Calcasieu River	x			x		
Reference Areas	x			x		
<i>Total PCBs</i>						
Bayou d'Inde	x			x		
Reference Areas	x			x		

Table 10-1. Summary of integrated risks to aquatic receptors (i.e., microorganisms, aquatic plants, benthic invertebrates, and fish) estimated from multiple lines of evidence in the Calcasieu Estuary.

Area of Concern (AOC)/Reach	n	Average Overall Risk Score	Predicted Risk		
			Percent (n) of Samples/Risk Category		
			Low	Indeterminate	High
Upper Calcasieu River AOC					
Upper Calcasieu River - Mainstem	49	0.380	98% (48)	2% (1)	0% (0)
Clooney Island Loop	32	1.25	75% (24)	3% (1)	22% (7)
Contraband Bayou	9	0.660	100% (9)	0% (0)	0% (0)
Coon Island Loop	65	0.942	77% (50)	8% (5)	15% (10)
Overall UCR AOC	155	0.811	85% (131)	5% (7)	11% (17)
Bayou d'Inde AOC					
Upper Bayou d'Inde	53	1.84	57% (30)	11% (6)	32% (17)
Middle Bayou d'Inde	93	3.20	9% (8)	18% (17)	73% (68)
Lower Bayou d'Inde - Mainstem	38	2.30	37% (14)	26% (10)	37% (14)
Lower Bayou d'Inde - Lockport Marsh	126	2.15	40% (50)	17% (22)	43% (54)
PPG Canal	6	2.55	33% (2)	17% (1)	50% (3)
Overall BI AOC	316	2.43	33% (104)	18% (56)	49% (156)
Middle Calcasieu River AOC					
Middle Calcasieu River - Mainstem	76	0.608	89% (68)	5% (4)	5% (4)
Prein Lake and upper old river channel	49	0.355	98% (48)	0% (0)	2% (1)
Indian Wells Lagoon	10	3.35	10% (1)	10% (1)	80% (8)
Bayou Olsen	11	0.229	100% (11)	0% (0)	0% (0)
Moss Lake	17	1.15	82% (14)	6% (1)	12% (2)
Overall MCR AOC	163	0.732	87% (142)	4% (6)	9% (15)
AOC Subtotal	634	1.60	59% (377)	11% (69)	30% (188)
Reference					
Bayou Choupique	4	0.543	100% (4)	0% (0)	0% (0)
Grand Bayou	3	1.04	100% (3)	0% (0)	0% (0)
Bayou Bois Connine	2	1.28	100% (2)	0% (0)	0% (0)
Johnson Bayou	6	0.192	100% (6)	0% (0)	0% (0)
Willow Bayou	2	0.177	100% (2)	0% (0)	0% (0)
Overall Reference Areas	17	0.550	100% (17)	0% (0)	0% (0)
Entire Estuary	651	1.57	61% (394)	11% (69)	29% (188)

n = number of samples.

Overall risk of High assigned for samples with a final risk score of >3; overall risk of Indeterminate assigned for samples with a final risk score of 2 - 3; overall risk of Low assigned for samples with a final risk score of 0 to <2.

Table 10-2. Summary of Contaminants of Concern (COCs) in the Calcasieu Estuary.

Chemicals of Potential Concern (COPCs)	Microbial Community	Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS	SW	PW	WS	PW	SW	WS	PW
<i>Conventionals</i>								
Hydrogen sulfide					*			*
Nitrogen, as Ammonia		*						
Total dissolved sulfide								
Ammonia - Toxic Units								
<i>Metals</i>								
Chromium, total				*				*
Chromium, filtered								
Copper, total				*				*
Copper, filtered		*				*		
Lead, total				*				*
Lead, filtered								
Mercury, total				*				*
Mercury, filtered								
Methyl mercury								
Nickel, total		*			*	*	*	*
Nickel, filtered		*				*		
Zinc, total				*	*			*
Zinc, filtered								
<i>PAHs</i>								
1,1'-Biphenyl	*							
1-Methylnaphthalene					*			
1-Methylphenanthrene								
2,6-Dimethylnaphthalene								
2-Methylnaphthalene	*			*				*
Acenaphthene	*			*				*
Acenaphthylene	*			*				*
Anthracene	*			*				*
Fluorene	*			*				*
Naphthalene	*							*
Phenanthrene	*			*				*
Total LMW-PAHs	*			*				*
Benz(a)anthracene	*		*	*	*			*
Benzo(a)pyrene	*			*	*			*
Benzo(b)fluoranthene	*			*				
Benzo(g,h,i)perylene	*			*				
Benzo(k)fluoranthene	*			*				
Chrysene	*			*				*
Dibenz(a,h)anthracene	*			*				*

Table 10-2. Summary of Contaminants of Concern (COCs) in the Calcasieu Estuary.

Chemicals of Potential Concern (COPCs)	Microbial Community	Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS	SW	PW	WS	PW	SW	WS	PW
PAHs (cont.)								
Fluoranthene	*			*			*	
Indeno(1,2,3-cd)pyrene	*			*				
Perylene								
Pyrene	*			*			*	
Total HMW-PAHs	*			*			*	
TOTAL PAHs	*			*			*	
PCB Aroclors								
Aroclor-1016								
Aroclor-1221								
Aroclor-1232								
Aroclor-1242								
Aroclor-1248								
Aroclor-1254								
Aroclor-1260								
Total PCBs	*			*			*	
PCB Congeners								
PCB 105								
PCB 108								
PCB 114								
PCB 118								
PCB 126								
PCB 127								
PCB 128								
PCB 132/153								
PCB 138/160								
PCB 15								
PCB 156								
PCB 157								
PCB 162								
PCB 167								
PCB 169								
PCB 170/190								
PCB 18/17								
PCB 180								
PCB 187								
PCB 189								
PCB 195/208								
PCB 206								
PCB 209								

Table 10-2. Summary of Contaminants of Concern (COCs) in the Calcasieu Estuary.

Chemicals of Potential Concern (COPCs)	Microbial Community	Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS	SW	PW	WS	PW	SW	WS	PW
<i>PCB Congeners (cont.)</i>								
PCB 28								
PCB 29								
PCB 37								
PCB 44								
PCB 5/8								
PCB 52								
PCB 58								
PCB 60								
PCB 61/70								
PCB 66								
PCB 77								
PCB 77/110								
PCB 79								
PCB 80								
PCB 81								
PCB 87/115								
PCB 90/101								
PCB 201/157/173								
<i>Organochlorine Pesticides</i>								
Aldrin					*			
Dieldrin					*		*	
<i>Phthalates</i>								
Benzylbutylphthalate								
Bis(2-ethylhexyl)phthalate	*				*			
Diethylphthalate								
Dimethylphthalate								
Di-n-butylphthalate								
Di-n-octylphthalate								
<i>Chlorinated Benzenes</i>								
1,2,3,4-Tetrachlorobenzene								
1,2,3-Trichlorobenzene								
1,2,4,5-Tetrachlorobenzene								
1,2,4-Trichlorobenzene								
1,2-Dichlorobenzene								
1,3-Dichlorobenzene								
1,4-Dichlorobenzene								
Hexachloro-1,3-butadiene					*			
Hexachlorobenzene					*			
Pentachlorobenzene								

Table 10-2. Summary of Contaminants of Concern (COCs) in the Calcasieu Estuary.

Chemicals of Potential Concern (COPCs)	Microbial Community		Aquatic Plant Community		Benthic Invertebrate Community		Fish Community		
	WS		SW	PW	WS	PW	SW	WS	PW
<i>Chlorinated Ethanes</i>									
1,1,1-Trichloroethane									
1,2-Dichloroethane									
<i>PCDDs and PCDFs</i>									
1,2,3,4,6,7,8-HpCDD									
1,2,3,4,7,8-HxCDD									
1,2,3,6,7,8-HxCDD									
1,2,3,7,8,9-HxCDD									
1,2,3,7,8-PeCDD									
2,3,7,8-TCDD									
OCDD									
Total HpCDD									
Total HxCDD									
Total PeCDD									
Total TCDD									
1,2,3,4,6,7,8-HpCDF									
1,2,3,4,7,8,9-HpCDF									
1,2,3,4,7,8-HxCDF									
1,2,3,6,7,8-HxCDF									
1,2,3,7,8,9-HxCDF									
1,2,3,7,8-PeCDF									
2,3,4,6,7,8-HxCDF									
2,3,4,7,8-PeCDF									
2,3,7,8-TCDF									
OCDF									
Total HpCDF									
Total HxCDF									
Total PeCDF									
Total TCDF									
Total Toxic Equivalent (TEQs)							*		*
<i>Other COPCs</i>									
Acetone									
Carbon Disulfide									

WS = whole sediment; PW = pore water; SW = surface water; PAHs = polycyclic aromatic hydrocarbons; PCBs = polychlorinated biphenyls

Figures
