



AEW Laboratory Fish Health Report

Date: July 13, 2011
Site: Red River
Species: Flathead catfish (5)
Life stage: Adult
Submitted by: Matt Mauck (OK DWC)

LAB USE ONLY:

Case number: 11 - 57
Diagnostician: GMS
Parasitology? Yes
Bacteriology? Yes
Virology? Yes
Other: Water sample analysis

Water Conditions

Water source: Red River (downstream of IH-35 bridge in Love County, Oklahoma)
Water chemistry: See OK Department of Wildlife Conservation field notes
Flow through? No
Algae bloom? Suspect (water samples containing toxigenic golden alga *Prymnesium parvum*)

Feeding and Previous Treatments

Forage? (if yes, type and size) n/a
Commercial feed (if yes, type and size) n/a
Previous treatment (describe regime if applicable) n/a

Fish

Stocking date: n/a
Mortalities: Date began early July Est. number see field data estimates
Behavior: unknown
Appetite: unknown
Number shipped/collected: 5 on wet ice (collected moribund)

Brief description of clinical signs and characteristics of mortality/additional remarks:

From: Matt Mauck [mailto:mmauck@simplynet.net]
Sent: Friday, July 08, 2011 4:11 PM
To: Bruce Hysmith; Melissa Dudley; Brian VanZee; Stephan Magnelia; Dave Terre; Gary Saul
Cc: Mark Howell; Gilliland, Gene; Barry Bolton; Buck Ray; Cliff Sager; John Moczygemba
Subject: Re: Fish Kill Red River

TPWD -

We would welcome any ideas, suggestions, or involvement you wish to offer up. This kill is certainly one that leaves open ends as no clear determining factor has been identified. This kill originated south of Oscar, OK about 5-7 days ago and has steadily been moving downstream. The bottom end has moved 6.5 miles in the past day and continues to kill fish. It will likely reach Interstate 35 bridge tomorrow if it doesn't slow down or stop. The currently impacted river stretch is around 55 miles long. Mostly large fish are being effected and represent several species of fish (blue catfish, flathead catfish, buffalo species, gizzard shad, carp, grass carp, and even a couple gar). Large blue and flathead catfish are commonly found.

River flow is very low. Only about 10-15% of median daily discharge. Water temperature is hot, reaching 93-95 F in the afternoon.

Dissolved oxygen readings are from 8-10 mg/L in daytime hours and from 3.1-5.8 in early morning hours. We are visually watching stressing and dying fish in the middle of afternoon with high oxygen readings.

External parasites (likely Argulus) are found on a lot of the fish but more detailed external and internal examinations are pending. Several fish were collected in the process of dying, placed on ice, and sent to a laboratory at Oklahoma State University for further analysis.

The OU Biological Station has identified low density of golden algae in samples we delivered to them. No bloom present for blue green algae or golden algae. Samples from the lower end of the kill were delivered this morning and we expect to receive answers soon with further details.

Water samples have also been provided to the OK Department of Environmental Quality. Preliminary results don't reveal anything out of the ordinary but more tests, including samples at the downstream end to the kill are pending.

Oil and gas activity is common around the river but we haven't been able to identify a "smoking gun". Conductivity readings are high but are comparable to readings above and below kill zone.

As you can imagine, this issue has caught the public eye and is receiving media attention.

Any suggestions or assistance is welcomed.

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Necropsy Report

Number of fish examined:	5
Life stage:	Adult
Total length (mm):	n/a
Weight (g):	n/a
Deformities (describe):	none
Body Surface:	Excess mucus production; petechial hemorrhages
Fins:	Necrotic, frayed, eroded
Caudal peduncle:	Swollen
Gills:	Pale
Pseudobranchs:	Normal
Musculature:	Normal
Eyes:	Normal
Body cavity:	Clear/straw-colored fluid
Intestinal tract:	Normal
Liver:	Pale, general discoloration (integrity compromised)
Bile/gall bladder:	Dark, blue green
Spleen:	Black
Pyloric caeca:	Normal
Kidney:	Swollen
Additional remarks:	none

Parasitology	Samples 1-5 negative for external and internal parasites
Bacteriology	Sample FCS#1 – systemic infection of kidney and liver (<i>Vibrio vulnificus</i>) Sample FCS#3 – systemic infection of liver (<i>Vibrio</i> spp.) Samples FCS#2, 4, 5 – negative for systemic bacterial infection(s)
Virology	Samples 1-5 negative for known viral agents (i.e. VHS virus, IPNV)

Conclusion

- No outstanding pathogens (parasitic, bacterial, or viral) were detected to be suspected as related to the mortality observed.
- Systemic infections for two (#1 and #3) of the five fish submitted involve *Vibrio* species. Vibriosis disease is normally found in fish found in marine environments but these microbes have also been found in brackish freshwater systems. Not normally considered to be primary pathogens, *Vibrio* spp. can lead to vibriosis as opportunistic invaders by bypassing normal immune defenses due to a variety of reasons (e.g. stress, poor water quality, rapid temperature change, handling, spawning injury, aggressive behaviors, etc.). More information on *Vibrio* infections in fish can be found at: <http://edis.ifas.ufl.edu/fa036>
- Excess mucus production and petechial hemorrhages observed on exterior of fish samples may indicate exposure to some form of environmental toxicant, pollutant, or adverse water condition(s) presently unknown.
- Known water quality variables appear to not be reason for concern (Table 1).
- Golden alga *Prymnesium parvum* was determined to be at elevated densities with toxicity observed in several samples (Table 1).

Reported by



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Date of Report: September 1, 2011

Images



Flathead catfish sample (FCS) #1



FCS#1 – excess mucus production



FCS#2



FCS#2 – inflammation and necrosis in caudal region



FCS#3



FCS#3 – external petechial hemorrhages



Close-up view of petechial hemorrhages (FCS#3)



FCS#4 – excess mucus production



FCS#4 – external petechial hemorrhages



Close-up view of petechial hemorrhages (FCS#4)



FCS#5



FCS#5 – excessive mucus production

Table 1 - Water Quality Analysis (from OU Biological Station)

UOBS Lab
analysis

Red River samples from fish kill 5 Jul 2011

Date Sampled	Site	Specific conductivity mS/sec	Salinity ppt	pH	Chlorophyll-a µg/L	P. parvum density cells/ml		Total Phosphorus mg/L	Total Nitrogen mg/L	*Toxic
						microscope	qPCR			
5-Jul-11	#3	7.55	4.2	8.57	41.93	2167	3467	0.17	2.00	Y
5-Jul-11	#4	7.11	3.96	8.54	37.61	167	683	0.18	1.64	N
6-Jul-11	Backwater	10.88	6.04	8.77	1524.90	0	**BDL	ND	ND	N
6-Jul-11	1-B	7.12	3.86	8.56	48.60	8750	5417	0.16	1.91	Y
6-Jul-11	#5	7.13	3.88	8.4	38.55	0	400	0.17	1.56	N
7-Jul-11	#6	7.22	3.94	8.41	34.61	0	BDL	0.18	1.69	N
7-Jul-11	1	7.19	3.92	8.22	47.63	400	2267	0.58	1.91	N
7-Jul-11	4	7.11	3.89	8.28	48.49	0	3383	ND	ND	Y
7-Jul-11	8	7.06	3.84	8.29	51.60	0	400	0.16	1.65	Y
7-Jul-11	13	7.07	3.84	8.24	47.48	0	5400	0.17	1.68	Y
7-Jul-11	14	7.07	3.58	8.23	54.15	0	1300	0.16	1.64	N
7-Jul-11	15	6.88	3.74	8.2	67.09	0	383	0.22	1.81	N
12-Jul-11	#24	6.84	3.64	8.21	35.43	16000	2195	0.51	1.74	Y
12-Jul-11	#28	6.84	3.76	8.09	40.60	6667	1211	0.20	1.99	Y
12-Jul-11	#29	6.84	3.7	8.27	31.67	14667	654	0.17	1.82	Y
12-Jul-11	#29 bottom 6'	6.88	3.74	8.31	37.13	15667	2703	ND	ND	Y
15-Jul-11	#24	6.91	3.79	7.92	53.57	9667	1553	ND	ND	N
15-Jul-11	#28	6.95	3.78	7.68	51.97	8000	305	ND	ND	N
15-Jul-11	#29	6.72	3.68	7.86	50.47	7000	876	ND	ND	N
15-Jul-11	#33	6.9	3.82	7.85	71.25	7000	1219	ND	ND	N
15-Jul-11	#34	7.05	3.86	7.89	77.35	8667	722	ND	ND	N

Notes *Toxicity is defined as mortality to 10 day old minnow fry within 48 hours in the sample.

**BDL: Below Detection Limit

***ND: No Data