

*Preliminary Findings from
the Texas Statewide LMBV
Survey: 2001*



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Overview:

Significant largemouth bass (*Micropterus salmoides*) kills attributed to the largemouth bass virus (LMBV) occurred on Sam Rayburn (1998) and Lake Fork reservoirs (1999), two of Texas' most prestigious and popular bass fisheries. These kills drew considerable public and media attention, resulting in misinformation about potential causes and their fisheries-related effects. In response, the Texas Parks and Wildlife Department (TPWD) launched an aggressive effort to: 1) increase angler understanding and awareness about LMBV; 2) study population and angling effects from kills associated with LMBV; 3) determine the distribution of LMBV in Texas and what factors might be associated with its occurrence; and 4) assess potential impacts on TPWD largemouth bass management and stocking programs. This effort included the initiation of a statewide LMBV survey on 49 Texas reservoirs in June 2000. Preliminary results of these investigations are presented. Our work may benefit other resource management agencies dealing with LMBV disease problems and help guide future research in this area.

The Texas Statewide LMBV Survey:

A statewide survey for the largemouth bass virus (LMBV) was conducted on Texas public reservoirs during the summer of 2000. A total of 2,876 adult largemouth bass were collected from 49 reservoirs representing 13 major river drainage basins (Table 1). Efforts were made to obtain 60 adult largemouth bass from each reservoir. Field sampling efforts involved 71 electrofishing and 56 angler-assisted collections statewide. All virology and related laboratory studies were conducted at the A.E. Wood Fish Hatchery in San Marcos, Texas.

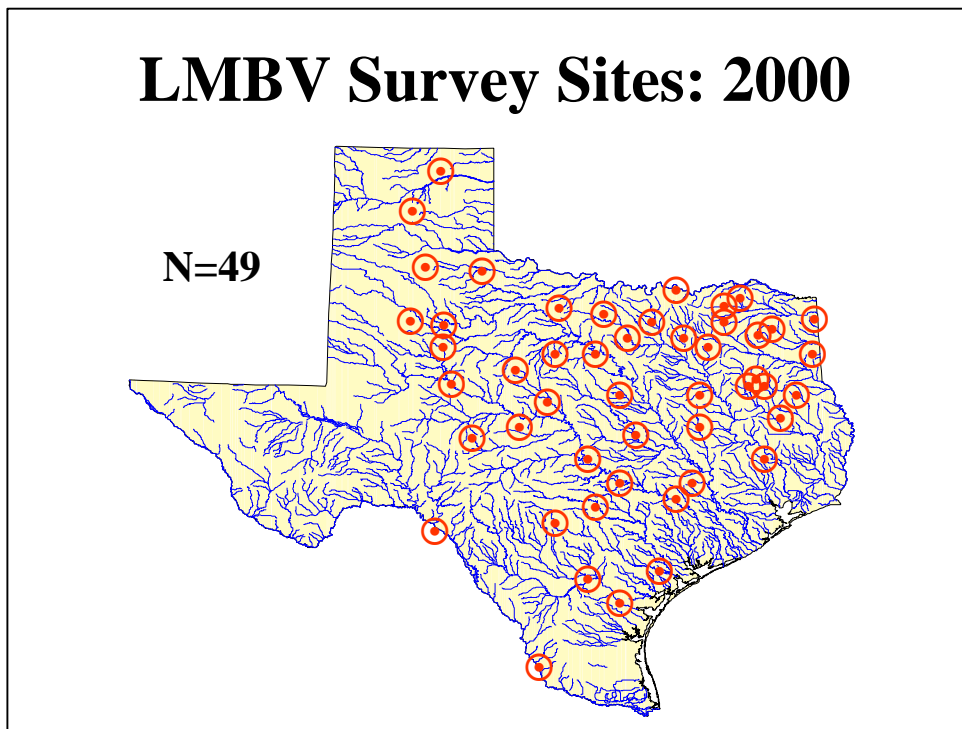
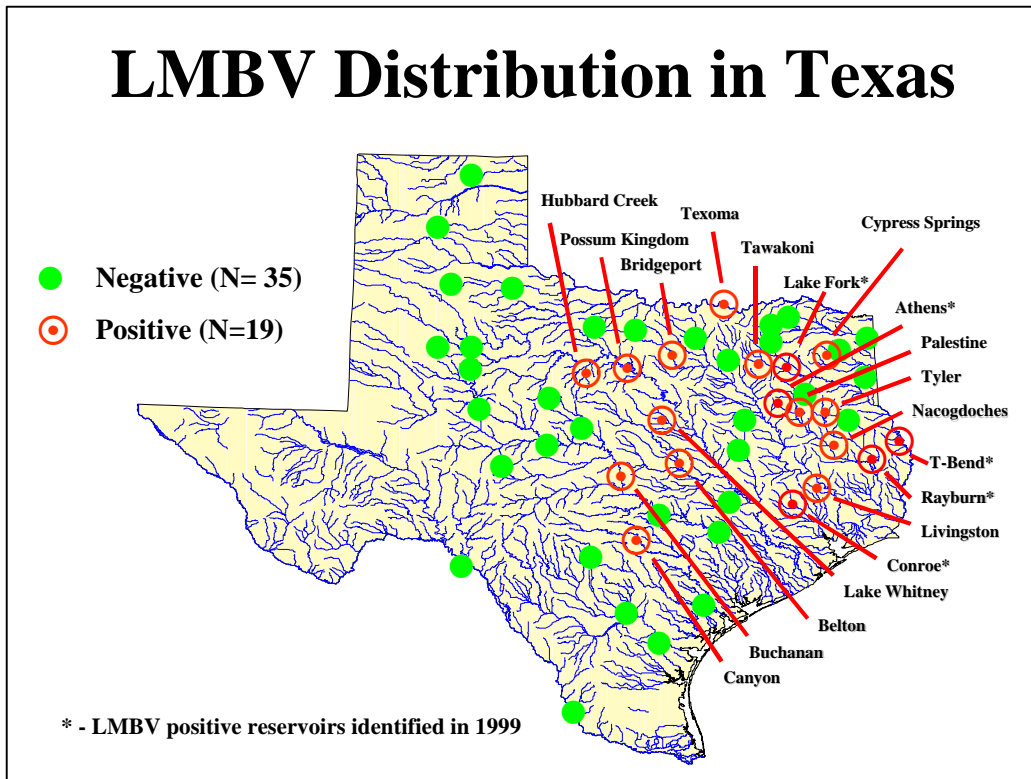


Table 1. River drainage basins and Inland Fisheries Management Districts associated with reservoir study sites for the Texas Statewide LMBV Survey.

River Drainage Basin	Reservoir Name	Management District
Canadian River	Meredith	1A - Canyon
	Palo Duro	1A - Canyon
Red River	Mackenzie	1A - Canyon
	Baylor Creek	1A - Canyon
	Diversion	2E - Wichita Falls
	Arrowhead	2E - Wichita Falls
	Texoma	2A - Denison
	Pat Mayse	3B - Tyler
Sulphur River	Cooper	3B - Tyler
	Big Creek	3B - Tyler
	Wright Patman	3A - Marshall
Cypress River	Cypress Springs	3A - Marshall
	Monticello	3A - Marshall
	Caddo Lake	3A - Marshall
Sabine River	Tawakoni	3B - Tyler
	Tyler State Park	3C - Tyler
	Murvaul	3A - Marshall
Neches River	Palestine	3C - Tyler
	Lake Tyler	3C - Tyler
	Nacogdoches	3D - Jasper
Trinity River	Bridgeport	2A - Denison
	Ray Roberts	2A - Denison
	Lavon	2A - Denison
	Richland Chambers	3C - Tyler
	Lake Livingston	3E - Bryan
Brazos River	Buffalo Springs	1A - Canyon
	Alan Henry	1A - Canyon
	White River	1A - Canyon
	Ft. Phantom Hill	1B - Abilene
	Hubbard Creek	1B - Abilene
	Poosum Kingdom	2E - Wichita Falls
	Whitney	2B - Waco
	Belton	2B - Waco
	Limestone	2B - Waco
	Lake Sommerville	3E - Bryan
Colorado River	Colorado City	1C - San Angelo
	O.H. Ivie	1C - San Angelo
	Twin Buttes	1C - San Angelo
	Austin	2C - San Marcos
	Brownwood	1B - Abilene
	Buchanan	2C - San Marcos
	Fayette County	2C - San Marcos
Guadalupe River	Canyon	2C - San Marcos
	Coletto Creek	1E - Mathis
San Antonio River	Medina	1D - San Antonio
Nueces River	Choke Canyon	1E - Mathis
	Corpus Christi	1E - Mathis
Rio Grande	Amistad	1D - San Antonio
	Falcon	1D - San Antonio

Summary of Findings:

- Only 14 of 49 Texas reservoirs tested during the 2000 statewide survey were confirmed positive for LMBV. A total of 19 reservoirs have been confirmed positive for LMBV since our investigations began in July 1998.



- Largemouth bass virus positive reservoirs are contained within 9 of the 13 major river basins in Texas. At present, infected populations occur only in the eastern and central portions of our state.

Major River Basins with LMBV Confirmation
• Red River (<i>Texoma</i>)
• Cypress (<i>Cypress Springs</i>)
• Sabine (<i>Tawakoni, Fork, Toledo Bend</i>)
• Neches (<i>Athens, Palestine, Tyler, Nacogdoches, Sam Rayburn</i>)
• Trinity (<i>Bridgeport, Livingston</i>)
• Brazos (<i>Hubbard Creek, Possum Kingdom, Whitney, Belton</i>)
• Colorado (<i>Buchanan</i>)
• Guadalupe (<i>Canyon</i>)
• San Jacinto (<i>Conroe</i>)

Major River Basins with no LMBV Confirmation
• Arkansas (<i>Canadian</i>)
• San Antonio
• Nueces
• Rio Grande
• Sulphur

- LMBV prevalence was low in 2000. Only 45 of 899 adult-size largemouth bass sampled in LMBV positive reservoirs were infected (mean prevalence rate of 5%). Also, results suggest that LMBV prevalence declined at Lake Fork since 1999 (56.7% in 1999 to 3.3% in 2000).

LMBV Prevalence - Summer 2000			
<u>Location</u>	<u>Sample size (N)</u>	<u>No. Infected</u>	<u>Prevalence (%)</u>
Texoma	60	5	8.3
Cypress Springs	60	4	6.7
Tawakoni	59	3	5.1
Fork*	60	2	3.3
Palestine	60	2	3.3
Tyler	60	1	1.7
Nacogdoches	60	4	6.7
Bridgeport	60	1	1.7
Livingston	60	3	5.0
Hubbard Creek	60	2	3.3
Poosum Kingdom	60	2	3.3
Whitney	60	4	6.7
Belton	60	8	13.3
Buchanan	60	2	3.3
Canyon	60	2	3.3
Totals	899	45	5.0

* - sampled in 2000 as part of special study

- LMBV positive largemouth bass had a significantly higher incidence of air bladder anomalies. However, air bladder anomalies were not a good indicator of the presence or absence of LMBV infection in Texas reservoirs.

Air Bladder Anomaly?	LMBV Positive	LMBV Negative	Row Total
N			
(Row %)			
(Column %)			
No	36 (4.2%) (80.0%)	825 (95.8 %) (96.6 %)	861
Yes	9 (23.7%) (20.0 %)	29 (76.3 %) (3.4 %)	38
Column Total	45	854	899

Chi-Square analysis (p<0.0001)

- **No significant relationship was found between LMBV and the presence or absence of external sores and lesions. Results suggest that LMBV positive and negative bass are equally likely to have these problems in Texas reservoirs.**

Sores or Lesions? N (Row %) (Column %)	LMBV Positive	LMBV Negative	Row Total
No	30 (4.3%) (66.7 %)	664 (95.7%) (77.8 %)	694
Yes	15 (7.3%) (33.3 %)	190 (92.7%) (22.2 %)	205
Column Total	45	854	899

Chi-Square analysis (p=0.0841)

- **No significant relationship was found between LMBV and the presence or absence of external parasites. Results suggest that LMBV positive and negative bass are equally likely to have these problems in Texas reservoirs.**

External Parasites? N (Row %) (Column %)	LMBV Positive	LMBV Negative	Row Total
No	40 (5.0%) (88.9 %)	761 (95.0%) (89.1 %)	801
Yes	5 (5.1%) (11.1 %)	93 (94.9%) (10.9 %)	98
Column Total	45	854	899

Chi-Square analysis (p=0.9630)

- **No significant relationship was found between LMBV and the presence or absence of hook marks/handling-related injury. Results suggest that LMBV positive and negative bass are equally likely to have these problems in Texas reservoirs.**

Hook Marks? N (Row %) (Column %)	LMBV Positive	LMBV Negative	Row Total
No	34 (4.5 %) (75.6 %)	728 (95.5 %) (85.2 %)	762
Yes	11 (8.0 %) (24.4 %)	126 (92.0 %) (14.8 %)	137
Column Total	45	854	899

Chi-Square analysis (p=0.0779)

- **No significant relationship was found between LMBV and the presence or absence of known water quality/pollution problems (*Reference: TNRCC's, August 2000 Clean Waters Act Section 303(d) List of Impaired Waters*). Results suggest that LMBV infection can occur in both impaired and unimpaired water quality conditions found in Texas reservoirs.**

Impaired Water? N (Row %) (Column %)	LMBV Positive	LMBV Negative	Row Total
No	34 (5.7 %) (75.6 %)	566 (94.3 %) (66.3 %)	600
Yes	11 (3.7 %) (24.4 %)	288 (96.3 %) (33.7 %)	299
Column Total	45	854	899

Chi-Square analysis (p=0.1979)

- **No significant relationship was found between LMBV and largemouth bass sex (males vs. females). Results suggest that males and females are equally susceptible to LMBV infection in Texas reservoirs.**

Sex N (Row %) (Column %)	LMBV Positive	LMBV Negative	Row Total
Female	30 (5.5 %) (69.8 %)	519 (94.5 %) (66.1 %)	549
Male	13 (4.7 %) (30.2 %)	266 (95.3 %) (33.9 %)	279
Column Total	43	785	828

Chi-Square analysis (p=0.6217)

- **No significant relationship was found between LMBV and genetic phenotypes (Florida bass, Intergrades, and Northern). Results suggest that all genetic phenotypes are equally susceptible to LMBV infection in Texas reservoirs.**

Genetic Phenotype N (Row %) (Column %)	LMBV Positive	LMBV Negative	Row Total
Florida bass	5 (7.7 %) (11.6 %)	60 (92.3 %) (7.2 %)	65
Integrade (F1 or FX)	27 (4.6 %) (62.8 %)	560 (95.4 %) (67.3 %)	587
Northern	11 (4.9 %) (25.6 %)	212 (95.1 %) (25.5 %)	223
Column Total	43	832	875

Chi-Square analysis (p=0.5494)

- No significant relationship was found between LMBV and the methods of capture used in this study (angling vs. boat electrofishing). Results suggest that angling is a viable alternative for obtaining largemouth bass samples for LMBV studies.

Capture Method? N (Row %) (Column %)	LMBV Positive	LMBV Negative	Row Total
Angling	35 (6.0 %) (77.8 %)	551 (94.0 %) (64.5 %)	586
Electrofishing	10 (3.2 %) (22.2 %)	303 (96.8 %) (35.5 %)	313
Column Total	45	854	899

Chi-Square analysis (p=0.0688)

- Logistic regression analysis revealed that LMBV was not significantly related to length, weight, condition (Wr), or age of largemouth bass. Results suggest that these parameters are unaffected by the presence of LMBV.

Length, Weight and Condition

LMBV	N	Mean Length in mm (std dev.)	Mean Weight in grams (std dev.)	Mean Wr (std dev.)
Positive	45	402 (52.83)	962 (452.86)	92 (12.89)
Negative	854	392 (54.62)	915 (448.94)	93 (13.84)

Length (p=0.2368), Weight (p=0.4951), Condition (p=0.5536)

Age

LMBV	N	Age-1	Age-2	Age-3	Age-4	Age-5	Age-6	Age-7	Age-8	Age-9	Age-11
Positive	45	2	14	15	5	4	3	1	1	0	0
Negative	844	55	271	248	121	64	37	23	14	10	1

Age (p=0.8696)

For more information on the Texas Statewide LMBV Study contact: Mr. David R. Terre, Inland Fisheries Program Director, Texas Parks and Wildlife Department, 11810 FM 848, Tyler, TX 75791 or dave.terre@tpwd.state.tx.us