

**DISTRIBUTIONAL SURVEYS OF
FRESHWATER BIVALVES IN TEXAS:
PROGRESS REPORT FOR 2001**

by
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Many biologists and technicians with Texas Parks and Wildlife's (TPW) Inland Fisheries Heart of the Hills Research Station obtained freshwater mussels during other department field work and provided editorial review of this report. Volunteers supplying specimens or data during 2001 included Dr. Don Shepherd, Stephan Tower, Jesse Todd, Nathan Allan, Marvin Eisthen, Sue Calbert, Roe Davenport, Alex Brence, and Joe Bergmann. Additionally, Dr. Art Bogan loaned previously collected unionids currently in the North Carolina State Natural History Museum collection to HOH for examination and Jack Ralph (TPW) provided data from a collection made in the Colorado River prior to the initiation of HOH freshwater mussel surveys.

ABSTRACT

During 2001, less than 150 unionid specimens were documented among 90 locations examined statewide in Texas where specimens were either directly surveyed by the Heart of the Hills Research Station (HOH) staff or were sent to HOH by volunteers. Living specimens and recently-dead shells were found in 13.3% of the collections and 70.0% produced no unionids or their remains.

In general, too few specimens were obtained from too few sites to draw extensive conclusions about the status of freshwater mussels in Texas in 2001. Drought conditions that began in mid-1995 in many areas of Texas continued, more or less continually, until mid-2000 when many locations experienced an increase in precipitation and elevation in water levels. Indeed, at some sites drought followed by scouring flooding occurred with subsequent negative impacts on local mussels.

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INTRODUCTION

Beginning in January 1992, Texas Parks and Wildlife Department's (TPWD) Heart of the Hills Research Station (HOH) began surveys of freshwater mussel populations within the state to better understand this resource and manage the fishery for them. A questionnaire survey of mussel license holders in 1992 was reported by Howells (1993). Field surveys of unionid populations also began in 1992 and have continued through the present. These have been reported on an annual basis (Howells 1994, 1995, 1996a, 1996b, 1997a, 1997b, 1998, 1999, 2000, 2001). Some of these data were ultimately used to compile *Freshwater Mussels of Texas* (Howells et al. 1996). Discussed here are findings from continuing surveys conducted in 2001, with comments relating to prior findings.

MATERIALS AND METHODS

Various habitats were sampled at each collection site. Collection methods and sampling effort varied between sites depending upon personnel, equipment, and time available as well as field conditions at the time of sampling. Minimal sampling efforts involved visual examination of shoreline and shallow-water habitats with hand collection. Where possible, sites were sampled by wading and snorkeling with hand collection. Previous annual reports discuss details of these methods (Howells 1994, 1995, 1996a, 1996b).

Results are presented in numbers collected (retained or released) and percent composition of the collection. Caution should be used in considering percentages calculated from small sample sizes, where mussel abundance and species composition may have been altered (e.g., after harvest by musselers), or where collection efforts focused on obtaining selected species (e.g., for laboratory work or reference specimens). Where a species at a given locality was represented only by fragments or definite numbers were not documented, they were excluded from percent-composition calculations.

Mussels taken were identified to species whenever possible. Some subfossil or badly weathered specimens could not be identified to species. Ill-defined taxonomic status of some "species" also sometimes precluded assigning specific identifications at this time. Other non-unionid bivalves were also documented when encountered. Where "no bivalves" including Asian clams (*Corbicula*) were found, this was indicated, but where unionids were absent and Asian clams were not documented as either present or absent at a particular site, it was reported as "no unionids present." Common and scientific names used generally follow Turgeon et al. (1988), Williams et al. (1993), and Howells et al. (1996), and are presented in Howells (1995, 1996a, 1996b) and Appendix I.

Varying environmental conditions can confound attempts to define how long a given specimen has been dead; however, a number of terms have been used herein to convey an approximation of this. While inherently imprecise, these attempts to characterize time since

death are useful in distinguishing between shells that have been dead for many years or decades from others which clearly died only days or weeks before collection. Terminology relating to condition of dead shells and shell counting methods are summarized in Howells (1996a, 1996b) and Appendix I.

RESULTS AND DISCUSSION

Red River Drainage

Hicks Creek, Camp Maxey, Lamar County, Texas, 30 August 2001.

A volunteer reported finding four, recently-dead tapered pondhorn specimens here.

Lake Lamar, Camp Maxey, Lamar County, Texas, 30 August 2001.

A volunteer reported finding giant floater shells at this site (number and shell condition were not undefined).

Sulfur River Drainage

North Sulphur River, north of Ladonia, Hunt County, Texas, 26 May 2001.

A volunteer reported finding:

North Sulphur River				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Threeridge	0	0.5x4	subfossil	44.4
Pondhorn	0	0.5x5	subfossil	55.6

Neches River Drainage

B.A. Steinhagen Reservoir, Jasper and Tyler counties, Texas.

This reservoir was not surveyed in 2001. However, periodic drawdowns from 1992 through 1999 were documented (Howells et al. 2000) and an additional drawdown in 2000 was reported by a volunteer (Howells 2001). In December 2001, the U.S. Army Corps of Engineers, that operates this reservoir, informed HOH that water levels had been reduced to the 23.3-m elevation for several months for maintenance of the reservoir embankments and further, that water level would be held at this elevation to allow cold temperatures to kill water hyacinth *Eichhornia crassipes* and other aquatic macrophytes. This reservoir and the Neches River immediately downstream of Town Bluff Dam support the largest and most diverse unionid assemblage documented in Texas to date.

Future unionids surveys may need to note the extended low-water period in 2001 when evaluating the status of local unionid populations.

Trinity River Drainage

Live Oak Creek, upstream of Lake Worth, Tarrant County, Texas, 8 March 2001.

A volunteer found a broken, subfossil valve of threeridge at this location.

Lake Arlington, yacht club on Arkansas Lane, Tarrant County, Texas, 7 July 2001.

A volunteer examined this site, but found only Asian clams.

Bedford Boys Ranch Pond, Tarrant County, Texas, 26 April 2001.

A volunteer examined this site also reported finding several dead giant floaters as well as fingernail clams.

Bachman Lake, Dallas, Dallas County, Texas, 1 February 2001.

While investigating an introduced population of Chinese mysterysnails *Cipangopaludina chinensis malleata* introduced here, a volunteer also documented:

Bachman Lake Species	N alive	N shells	Condition	Percentage
Giant floater	0	2.0	unstated	100.0
Asian clam (present)				

White Rock Creek (Trinity River drainage), bridge on Gibbons Drive, Dallas County, Texas, 18 May 2001.

A volunteer reported finding a living specimen of paper pondshell at this site.

Hutton Creek, Jimmy Porter Park, Carrollton, Dallas County, Texas, 26 June 2001.

A volunteer examined this site, and reported finding 5 valves of pondmussel and Asian clams. All were long dead.

North Pond, Ken Good Park, Carrollton, Dallas County, Texas, 28 June 2001.

A volunteer examined this site, but only Asian clams were found.

Country Brook Estates Pond, Frankford Road, Dallas, Dallas County, Texas, two dates – 18 May 2001 and 2 July 2001.

A volunteer examined this site twice and found a single recently dead paper pondshell on each occasion.

Galveston Bay Drainage

Mustang Bayou, at C.R. 95, west of Alvin, near S.H. 6, Brazoria County, Texas, 3 February 2001.

A volunteer examined this site and found the following species:

Mustang Bayou, at C.R. 95				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Round pearlshell	0	0.5x3	recently dead	75.0
Texas lilliput	0	0.5x1	recently dead	25.0
Asian clam (present)				

Brazos River Drainage

Carter Creek, at S.H. 30 just east of S.H. 6 and College Station, Brazos County, Texas, 25 January 2001.

A volunteer examined this site. No unionids or Asian clams were present, but numerous Sphaeriidae were present in drift areas.

Small pond near Carter Creek, off S.H. 30 east of College Station, Brazos County, Texas, 25 January 2001.

A volunteer examined this site, but found no bivalves.

Turkey Creek, at S.H. 46 west of College Station, Brazos County, Texas, 25 January 2001.

A volunteer examined this site, but found no bivalves.

Small lake near the intersection of S.H. 46 and F.M. 1688 west of Bryan, Brazos County, Texas, 25 January 2001.

A volunteer examined this site, but found no bivalves.

Little Brazos River, at S.H. 21, Brazos County, Texas, two dates. 25 January 2001.

A volunteer examined this site and reported the following species:

35 January 2001

Little Brazos River, at S.H. 21, 25 January 2001				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Threeridge	0	2.0+0.5x4	recently - long dead	18.2
Yellow sandshell	0	1.0+0.5x3	recently - long dead	12.1
Bleufer	0	0.5x4	relatively-recently dead	12.1

Giant floater	0	0.5x1	recently dead	3.0
Southern mapleleaf	0	3.0+0.5x9	recently - long dead	36.4
Smooth pimpleback	0	1.0+0.5x2	recently - long dead	9.1
Texas lilliput	0	0.5x2	very-long dead	6.1
Unidentified unionid	0	0.5x1	relatively-recently dead	3.0
Asian clam (present)				

27 September 2001

Little Brazos River, at S.H. 21, 27 September 2001

Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Threeridge	0	3.0+fragments	recently dead	60.0
Yellow sandshell	0	1.0	recently dead	20.0
Southern mapleleaf	0	1.0	recently dead	20.0
Asian clam (present)				

American Canal, west of S.H. 528, north of Alvin, Galveston County, 3 February 2001.
A volunteer examined this site, but found no bivalves.

San Bernard River Drainage

San Bernard River, at U.S. 10, Austin and Colorado Counties, Texas, 3 January 2001.
A volunteer examined this site and found no access, but observed no bivalves.

Colorado River Drainage

Elm and Bluff creeks, upstream of Ballinger, Runnels County, Texas, 17 July 2001.

These sites were examined by a volunteer. Although they once contained populations of rare, endemic Texas fatmuckets and Texas pimplebacks, no living or recently dead specimens were found. Extensive flooding several months earlier resulted in major flow alterations of these streams. Additionally, Internet release of site location data by both Nature Conservancy and TPW may also have resulted in collection of these rare, but unprotected, mussels by shell collectors.

Wolf Creek, upstream of Ballinger, Runnels County, Texas, 17 July 2001.

This creek was examined by a volunteer. Although often dry, it contained water, but cobble dams created by recent flooding had ponded available water into standing pools and blocked normal stream flow. No living bivalves were reported found.

Colorado River, ca. 1.6 km downstream of Regency, San Saba County, Texas, April 2001.

A volunteer collected the following specimens and sent them to HOH for examination.

Colorado River, ca. 1.6 km downstream of Regency				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x1	relatively-recently dead	14.3
Yellow sandshell	0	1.0	relatively-recently dead	14.3
Bleufer	0	0.5x1	relatively-recently dead	14.3
Southern mapleleaf	0	1.0	relatively-recently dead	14.3
Texas pimpleback	0	0.5x3	relatively-recently to very long dead	42.9
Asian clam (present)				

Colorado River, at the mouth of the San Saba River, San Saba County, Texas, 13 October 1989, During examination of a fish and mussel kill at this site associated with the dinoflagellate *Prynesium parvum* the following specimens were discovered by J. Ralph (TPW, Kills and Spills Team) and submitted to R. W. Neck for identification. These data only recently became available.

Colorado River, at the mouth of the San Saba River				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x1	not stated	16.7
Fragile papershell	0	3.0	not stated	50.0
Bleufer	0	0.5x1	not stated	16.7
Texas pimpleback	0	1.0	not stated	16.7

Lake LBJ, Lower Colorado River Authority Park on the north side of the dam, Burnet County, Texas, 21 July 2001.

Lake LBJ, north side of dam				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Threeridge	0	1.0	very-long dead	9.1
Tampico pearlymussel	0	2.0+0.5x2	very-long dead	36.4
Southern mapleleaf	0	2.0+0.5x3	very-long dead	45.5
Smooth pimpleback	0	1.0	very-long dead	9.1
Asian clam (common – also very long dead)				

Lake LBJ, Legends Subdivision at the Old Bachner Ranch, northwest shore of the riverine portion of the reservoir upstream of the confluence with the Llano River, Llano County, Texas, Llano County, Texas, 24 July 2001.

Two volunteers obtained a living smooth pimpleback from this location and transported it to HOH so tissue could be obtained to assist with genetic studies being done elsewhere.

Harveys Creek, north side of Weimer Park, Colorado County, Texas, 3 January 2001.

A volunteer examined this site and found a single recently dead fingernail clam (*Sphaerium* sp.).

South Fork, just west of Borden and U.S. 90, Colorado County, Texas, 3 January 2001.

A volunteer examined this site, but found no bivalves.

Pond in roadside park between U.S. 10 and U.S. 90 east of Borden, Colorado County, Texas, 3 January 2001.

A volunteer examined this site, but found no bivalves.

Colorado River, east bank at U.S. 90, Colorado County, Texas, 3 January 2001.

A volunteer examined this site, but only two small, living Asian clams were found.

Willow Creek, under bridge at U.S. 10 east of Columbus, Colorado County, Texas, 3 January 2001.

A volunteer examined this site and reported the following species:

Willow Creek, at U.S. 10				
Species	N alive	N shells	Condition	Percentage
Tapered pondhorn	0	1.0	recently dead	100.0
Fingernail clam (present)				

Lavaca-Navidad River Drainage

Lavaca River, at S.H. 111, Lavaca County, Texas, 1 January and 7 February 2001.

A volunteer examined this site. A single living Asian clam was located in January, otherwise no bivalves were found.

Brushy Creek, at S.H. 111, Lavaca County, Texas, 7 February 2001.

A volunteer examined this site, but no bivalves were found.

Guadalupe River Drainage

Johnson Creek (Guadalupe River drainage), just upstream of HOH, Kerr County, Texas, 20 March 2001.

A single, very long dead Texas lilliput shell was found.

Guadalupe River, Indian Creek Crossing off Old Ingram Loop, Kerr County, Texas, 22 May 2001.

The following species were observed during a drawdown:

Guadalupe River, Indian Creek Crossing				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas lilliput	0	1.0	recently dead	100.0
Asian clam (present)				

Guadalupe River, downstream of Flat Rock Dam at Kerrville State Park, Kerrville, Texas, 1-2 July 1977.

Four specimens (eight of valves) from the North Carolina State Museum or Natural Sciences collection (NCSM 6923) were sent to HOH for examination and identification. All were golden orb specimens that appeared to have been collected alive or recently dead. They were in good condition, had very dark brown to black epidermis coloration and displayed little or no indication of external erosion. Specimens were identified and returned. None are currently known to persist at this location at present.

Beitel Creek (San Antonio River drainage), adjacent to the U.S. 35 and U.S. 410 intersection, San Antonio, Bexar County, Texas, 5 January 2001.

A volunteer examined this site and found several species of fingernail clams (recently dead), but no unionids or Asian clams were present.

Salado Creek (San Antonio River drainage), central reaches, Bexar County, Texas, 21 May 2001. Photos of two subfossil valves of yellow sandshell were Emailed to HOH by a consulting firm in San Antonio for identification.

Salado Creek (San Antonio River drainage), exact location not given, Bexar County, Texas, July 2001.

A member of the Salado Creek Foundation sent several subfossil valves to HOH for identification.

Salado Creek				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell	0	2.0	recently to very recently dead	50.0
False spike	0	0.5x1	subfossil	25.0
Yellow sandshell	0	0.5x1	subfossil	25.0

False spike is a rare, endemic species now apparently on the brink of extinction and this may be the only record of this species from Salado Creek. Unfortunately there is no indication it still persists here.

Creek crossing S.H. 16 at San Geronimo near the Medina County line (San Antonio River drainage), Bexar County, Texas, 9 January 2001.

A volunteer examined this site, but only a single recently dead Asian clam valve was found.

Irish Creek (Guadalupe River drainage), U.S. 87 between Cuero and Thomaston, DeWitt County, Texas, 16 July 2001.

A volunteer examined this site. No unionids were located, but numerous Asian clam valves were present.

Price Creek, at U.S. 87 south of Thomaston, DeWitt County, Texas, 16 July 2001.

A volunteer examined this site, but found no bivalves.

Irrigation canal on the east side of the Lower Colorado River Authority facility west of Bay City, Matagorda County, Texas, 1 January 2001.

A volunteer examined this site. No unionids were found, but recently dead Asian clams were present.

Nueces – Frio River Drainage

Choke Canyon Reservoir, at S.H. 99 bridge, McMullen County, Texas, 11 October 2001.

Volunteers found the following specimens.

Choke Canyon Reservoir, at S.H. 99				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Yellow sandshell	0	1.0	recently dead	16.7
Giant floater	0	1.0	recently dead	16.7

Texas lilliput	0	1.0+0.5x3	relatively-recently dead	66.7
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Baffin Bay – Laguna Madre Drainage

Lake Alice, Jim Wells County, Texas, 26 January 2001.

A volunteer reported finding the following species:

Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Texas lilliput	0	1.0+0.5x2	recently dead	100.0
Asian clam (present)				

Enmedio Creek (Resaca de Enmedio), at U.S. 281, Jim Wells County, Texas, 10 February 2001:

A volunteer examined this site, but found no bivalves.

Small creek at U.S. 281 north of S.H. 141, Jim Wells County, Texas, 10 February 2001:

A volunteer examined this site and found.

Creek at U.S. 281 and S.H. 141				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Pondhorn sp(p).	0	1.0+0.5x1	long dead	100.0

Santa Gertrudis Creek, at U.S. 281 just south of F.M. 735, Jim Wells County, Texas, 10 February 2001.

A volunteer examined this site, but found no bivalves.

Small creek, at U.S. 281 just north of F.M. 735, Jim Wells County, Texas, 10 February 2001.

A volunteer examined this site, but found no bivalves.

Trinidad Creek, at U.S. 281 0.8 km north of F.M. 735, Jim Wells County, Texas, 10 February 2001.

A volunteer examined this site, but found no bivalves.

San Andreas Creek, on U.S. 281, ca 4 km north of F.M. 735, Jim Wells County, Texas, 10 February 2001.

A volunteer examined this site, but found no bivalves.

Lattas Creek, on U.S. 281, ca 0.8 km south of S.H. 44, Jim Wells County, Texas, 10 February 2001.

A volunteer examined this site, but found no bivalves.

San Diego Creek, at U.S. 281 Bypass at Alice, ca 0.8 km south of S.H. 44, Jim Wells County, 10 February and 26 March 2001.

A volunteer examined this site, but found no bivalves.

Chiltipin Creek, at U.S. 281 north of Alice, Jim Wells County, Texas, 10 February 2001.

A volunteer examined this site, but found no bivalves.

Agua Dulce Creek, at U.S. 281, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site and found the following species:

Agua Dulce Creek, at U.S. 281				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Pondhorn sp(p).	2	7.0+0.5x7	recently dead	100.0

San Fernando Creek, at F.M. 3376 northeast of Alice, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

San Fernando Creek, at S.H. 44/359 east of Alice, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

San Fernando Creek, at F.M. 665 southeast of Alice, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

San Fernando Creek, at F.M. 1930 southeast of Alice, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

Los Olmos Creek, at U.S. 281 north of Fulfurrias, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

Los Olmos Creek, at F.M. 1418 northeast of Fulfurrias, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

Los Olmos Creek, at S.H. 285 east of Fulfurrias, Jim Wells County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

Paisano Creek, at S.H. 285 near county line, Brooks County, Texas, 26 March 2001.

A volunteer examined this site, but found no bivalves.

Salado Creek, at S.H. 285 west of Riviera, Kleberg County, Texas, 26 March 2001.
A volunteer examined this site, but found no bivalves.

Jaboncillos Creek, at F.M. 772 west of U.S. 77, Kleberg County, Texas, 26 March 2001.
A volunteer examined this site, but no bivalves were found.

Jaboncillos Creek, at C.R. 1060 east of U.S. 77 and north of F.M. 772, Kleberg County, Texas,
26 March 2001.
A volunteer examined this site, but no bivalves were found.

Jaboncillos Creek, at U.S. 77 south of Ricardo, Kleberg County, Texas, 26 March 2001.
A volunteer examined this site, but no bivalves were found.

Escondido Creek, at U.S. 77 Business at Kingsville, Kleberg County, Texas, 13 January and 26
March 2001.
A volunteer examined this site, but no bivalves were found.

Santa Gertrudis Creek, at U.S. 277 at Kingsville, Kleberg County, Texas, 13 January and 26
March 2001.
A volunteer examined this site, but found no bivalves.

Santa Gertrudis Creek, at C.R. 1030 west of U.S. 277 Business, Kleberg County, Texas, 26
March 2001.
A volunteer examined this site, but found no bivalves.

Escondido Creek, at C.R. 1030 west of U.S. 277 Business, Kleberg County, Texas, 26 March
2001.
A volunteer examined this site, but no bivalves were found.

Tranquitas Creek, at U.S. 277 Business in Kingsville, Kleberg County, Texas, 26 March 2001.
A volunteer examined this site, but no bivalves were found.

Tranquitas Creek, at F.M. 1898 near Kingsville, east-west branch, Kleberg County, Texas, 28
December 2001.
A volunteer examined this site, but no bivalves were found.

Tranquitas Creek, at F.M. 1898 near Kingsville, north-south branch, Kleberg County, Texas, 28
December 2001.
A volunteer examined this site, but no bivalves were found.

San Fernando Creek, at U.S. 277 Business north of Kingsville, Kleberg County, Texas, 26 March
2001.
A volunteer examined this site, but no bivalves were found.

San Fernando Creek, at U.S. 77, Kleberg County, Texas, 28 December 2001.

A volunteer examined this site, but no bivalves were found.

San Fernando Creek, at F.M. 2045 east of Kingsville, Kleberg County, Texas, 28 December 2001.

A volunteer examined this site, but no bivalves were found.

Carreta Creek, at County Road south of Bishop, Nueces County, Texas, 26 March 2001.

A volunteer examined this site, but no bivalves were found.

Carreta Creek, at U.S. 77 south of Bishop, Nueces County, Texas, 26 March 2001.

A volunteer examined this site and reported the following species:

Carreta Creek, at U.S. 77				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Pondhorn sp(p).	0	2.0+0.5x4	unstated	100.0

Petronila Creek, at F.M. 2826, Nueces County, Texas, 28 December 2001.

A volunteer examined this site, but no bivalves were found.

Petronila Creek, at U.S. 77, Nueces County, Texas, 28 December 2001.

A volunteer examined this site, but no bivalves were found.

Petronila Creek, at F.M. 665 east of Driscoll, Nueces County, Texas, 26 March 2001.

A volunteer examined this site, but no bivalves were found.

Petronila Creek, at F.M. 892 east of Bishop, Nueces County, Texas, 26 March 2001.

A volunteer examined this site, but no bivalves were found.

Petronila Creek, new bridge at F.M. 70 east of Bishop, Nueces County, Texas, 26 March 2001.

A volunteer examined this site, but no bivalves were found.

Petronila Creek, old bridge at F.M. 70 east of Bishop, Nueces County, Texas, 26 March 2001.

A volunteer examined this site, but no bivalves were found.

Rio Grande Drainage

Amistad Reservoir, Box Canyon Road access, Val Verde County, Texas, 13 November 2001.

During other work at this location, HOH staff documented the following specimens.

Amistad Reservoir, Box Canyon Road				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Tampico pearlymussel	0	0.5x2	relatively-recently dead	40.0
Tampico pearlymussel	0	0.5x3	relatively-long dead	60.0
Asian clam (extremely abundant)				

During this time, the reservoir was down 17.4 m below normal pool level. Staff reported millions of dead Asian clams deposited on the exposed bottom from the water line and up hill for many meters.

Rio Grande, impounded area upstream of Anzalduas Dam, Anzalduas Park, Hidalgo County, Texas, 10 and 26 January 2001.

A volunteer examined this site. Several Asian clams were located on 10 January, but no bivalves were found on the 26th.

Canal north of Anzalduas Dam, Anzalduas Park, Hidalgo County, Texas, 10 February 2001.

A volunteer examined this site. Asian clams were numerous, but no unionids were present.

Rio Grande, downstream of Anzalduas Dam, Hidalgo County, Texas, 10 February 2001.

A volunteer found the following species:

Rio Grande, downstream of Anzalduas Dam				
Species	<i>N</i> alive	<i>N</i> shells	Condition	Percentage
Southern mapleleaf	0	0.5x1	relatively-recently dead	100.0
Asian clam (present)				

Ditch, at F.M. 494, 0.4 km north of F.M. 1016, Hidalgo County, Texas, 10 February 2001.

A volunteer examined this site, but found no bivalves.

Resaca de los Cuates, F.M. 1421, west of U.S. 77/83 southeast of San Benito, Cameron County, Texas, 26 January 2001.

A volunteer examined this site, but found no bivalves.

Resaca at F.M. 1421, ca 1.6 km north of F.M. 1732, Cameron County, Texas, 26 January 2001.

A volunteer examined this site, but found no bivalves.

Rio Grande, mouth, Cameron County, Texas, 12 January 2001.

A volunteer examined this site, but no freshwater bivalve taxa were found. However, two marine-estuarine taxa were present.

Water Body and Species Summary

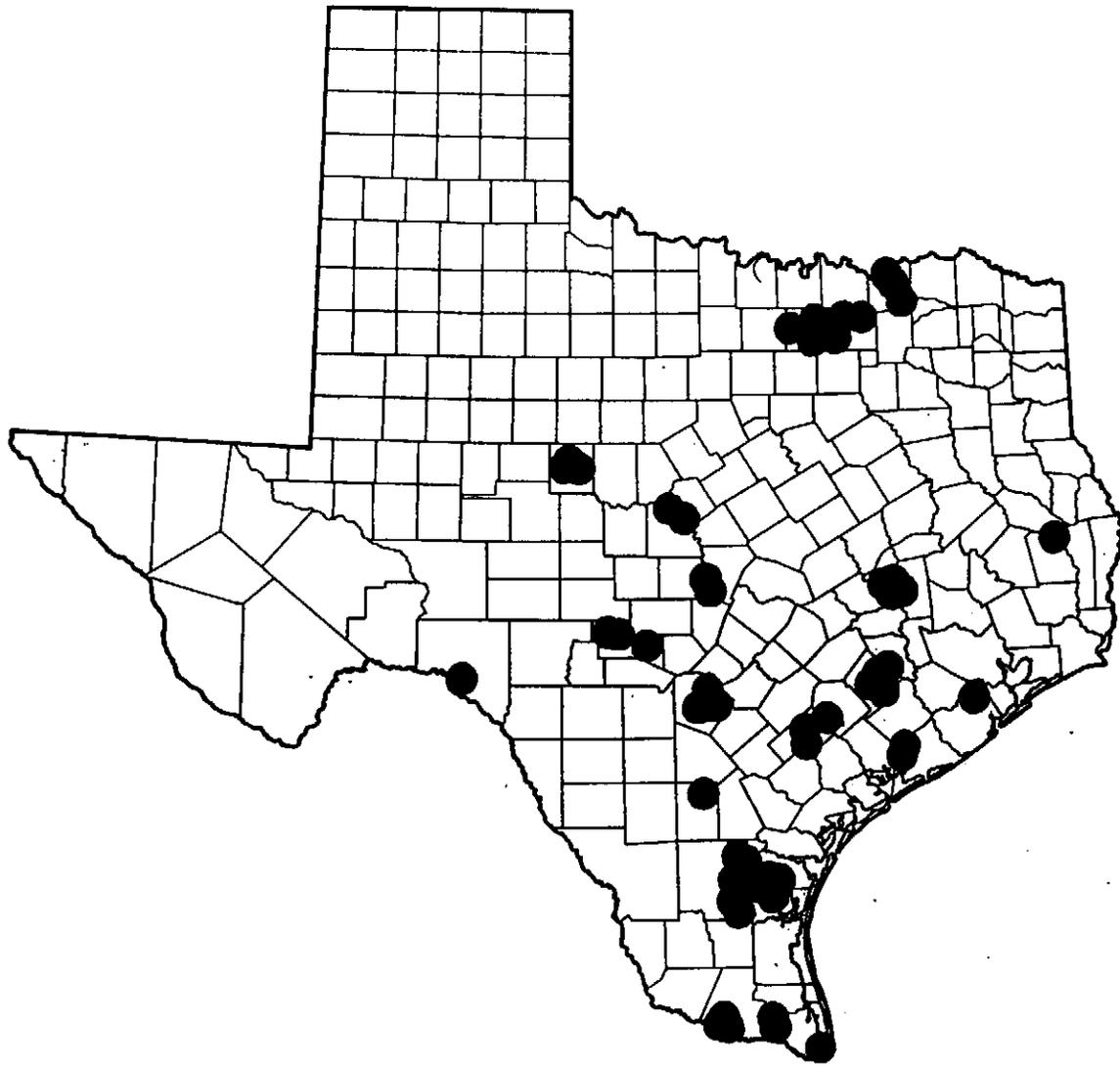
The number of specimens examined was not documented in 1992, but from 1993 through 2001 was >2,500; >3,000; >1,700; >7,200; >1,500, >1,200, > 3,000, >3,100, and <150, respectively. The number of locations examined each year from 1992 through 2001 was 56, 162, 202, 179, 232, 87, 118, 136, 121, and 90 respectively. Generally, too few specimens were documented and too few locations examined to allow conclusions about status of freshwater mussels in Texas in 2001. Drought conditions that began in mid-1995 in many areas of Texas continued, more or less continually, until mid-2000 when many locations experienced an increase in precipitation in elevation in water levels. Indeed, at some sites drought followed by scouring flooding occurred with subsequent negative impacts on local mussels.

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Figure 1. Locations surveyed for freshwater mussels (Family: Unionidae) and other bivalves in 2000 by Texas Parks and Wildlife Department personnel or by volunteers who subsequently provided data on these sites.



APPENDIX I.

Common and Scientific Names

Common names used in this and previous TPWD mussel-distribution reports and associated scientific names include:

Family: Unionidae

Threeridge *Amblema plicata*

Flat floater *Anodonta suborbiculata*

Floater sp. *Anodonta* sp. – Collections in B.A. Steinhagen Reservoir in 1993 produced specimens that appear intermediate between giant floater and flat floater. They have higher beaks and darker coloration than flat floater and are more inflated and less-deep bodied. Similar specimens have been found by P. Hartfield (U.S. Fish and Wildlife Service, Jackson, Mississippi; pers. com.) in Mississippi. Whether these represent an undescribed species, unusual ecophenotype of flat floater, or a hybrid remains unresolved.

Rock-pocketbook *Arcidens confragosus*

Ouachita rock-pocketbook *Arkansia wheeleri*

Tampico pearlymussel *Cyrtonaias tampicoensis*

Spike *Elliptio dilatata*

Texas pigtoe *Fusconaia askewi*

Wabash pigtoe *Fusconaia flava*

Triangle pigtoe *Fusconaia lananensis*

Round pearlshell *Glebula rotundata*

Texas fatmucket *Lampsilis bracteata*

Plain pocketbook *Lampsilis cardium*

Louisiana fatmucket *Lampsilis hydiana*

Sandbank pocketbook *Lampsilis satura*

Yellow sandshell *Lampsilis teres*

Pocketbook *Lampsilis ovata* – not present in Texas

Pocketbooks – collectively refers to plain pocketbook, sandbank pocketbook, or both

Fatmuckets – collectively refers to Texas fatmucket, Louisiana fatmucket, or both

White heelsplitter *Lasmigona complanata*

Fragile papershell *Leptodea fragilis*

Pond mussel *Ligumia subrostrata*

Washboard *Megalonaias nervosa*

Threehorn wartyback *Obliquaria reflexa*

Southern hickorynut *Obovaria jacksoniana*

Bankclimber *Plectomerus dombeyanus*

Louisiana pigtoe *Pleurobema riddellii*

Texas heelsplitter *Potamilus amphichaenus*

Pink papershell *Potamilus ohioensis*

Bleufer *Potamilus purpuratus*

Salina mucket *Potamilus salinasensis* – this species has also been called *Disconaias salinasensis* and *Potamilus metnecktayi*

Giant floater *Pygaonodon grandis*

Rio Grande monkeyface *Quadrula couchiana*

Southern mapleleaf *Quadrula apiculata*

Golden orb *Quadrula aurea*

Smooth pimpleback *Quadrula houstonensis*

Western pimpleback *Quadrula mortoni* – also known as *Quadrula pustulosa mortoni*

Gulf mapleleaf *Quadrula nobilis*

Wartyback *Quadrula nodulata*

Texas pimpleback *Quadrula petrina*

Pimpleback *Quadrula pustulosa*

Mapleleaf or common mapleleaf *Quadrula quadrula*

Pimpleback sp. or sp(p). – refers to golden orb, smooth pimpleback, western pimpleback, Texas pimpleback, pimpleback, or some combination of those species; identification of worn specimens and others from the Trinity River drainage can be difficult or impossible

False spike *Quincuncina mitchelli*

Creeper *Strophitus undulatus* – previously called squawfoot

Lilliput *Toxolasma parvus*

Texas lilliput *Toxolasma texasiensis* – western lilliput *Toxolasma mearnsi* is considered only a form of

Texas lilliput herein

Pistolgrip *Tritogonia verrucosa*

Mexican fawnsfoot *Truncilla cognata*

Fawnsfoot *Truncilla donaciformis*

Texas fawnsfoot *Truncilla macrodon*

Deertoe *Truncilla truncata*

Tapered pondhorn *Uniomerus declivis*

Pondhorn *Uniomerus tetralasmus*

Paper pondshell *Utterbackia imbecillis*

Little spectaclecase *Villosa lienosa*

Family: Corbiculidae

Asian clam *Corbicula* sp(p). – Most recognize all American corbiculas as *Corbicula fluminea*; however, some genetic studies suggest a second species may be present in Texas; no efforts were made to define species in this study

Family: Dreissenidae

Zebra mussel *Dreissena polymorpha*

Quagga mussel *Dreissena bugensis*

Zebra mussels – collectively zebra mussel, quagga mussel, or both

Family : Mactridae

Atlantic rangia *Rangia cuneata*

Family: Sphaeriidae

Fingernail clams and their relatives – no effort was made to identify species herein

SHELL CONDITION TERMINOLOGY

It is not usually possible to determine exactly how long a freshwater mussel shell has been dead. Different conditions such as water and substrate pH, erosive or corrosive environments, and exposure to sun can impact specimen condition and rate of disintegration. None the less, some qualitative estimate of time-since-death can be very useful. The following terms are used in TPWD freshwater mussel surveys:

Very-recently dead: Soft tissue remains attached to the shell; shell in good condition, essentially as it would be in a living specimen; internal and external colors are not faded.

Recently dead: No soft tissue remains, but shell otherwise in good condition (looking like a living specimen that had been killed and cleaned); internally nacre is glossy and without evidence of algal staining, calcium deposition, or external erosive effects; internal and external colors are not faded.

Relatively-recently dead: Shell in good condition, but internally nacre is losing its glossy nature; algal staining, calcium deposition, or external erosive effects (or some combination of these) is evident on the nacre; internal and external colors often faded somewhat.

Long dead: Shell shows early signs of internal and external erosion, staining, calcium deposition, or some combination of these; most or all of the internal coloration and glossy nature has faded (especially in species with colored nacre); shell epidermis with major sections absent, or, if present, clearly aged and flaking.

Very-long dead: Shell shows significant signs of erosion, staining, and calcium deposition more widely pronounced than above; coloration often faded white or nearly so; relatively little intact epidermis left; for specimens in erosive environments, internal features (*e.g.*, pseudocardinal teeth) and external features (*e.g.*, pustules) often weathered and smoothed, or otherwise exfoliated; shells often chalky, brittle, and crumbling.

Subfossil: Shells with little or no epidermis; nacre faded white and entire shell often white; sometimes with signs of erosion, staining, or calcium deposition; typically chalky and powdery to the touch; shells often brittle and crumbling.

SHELL COUNTING METHODS

0.5 x 1 = one valve (one half shell); counted as one specimen in some calculations.

1 = one living specimen with a complete shell (two matched valves);

1.0 = one complete shell consisting of two, matching valves.

0.5 x 2 = one valve from each of two individuals; counted as two specimens in some calculations.

3.0+ 0.5 x 2 = three complete shells (pairs of matched valves) and two additional unpaired valves from two additional individuals; counted as five specimens in some calculations.